UNIT PLAN OF OPERATIONS APPLICATION

State of Alaska
Department of Natural Resources, Division of Oil & Gas
550 W. 7th Ave, Suite 1100, Anchorage, AK 99501-3563
Phone: 907-269-8800 Fax: 907-269-8943
Permitting Email: dog.permitting@alaska.gov

SECTION I: APPLICANT INFORMATION

1. Applicant:

Name: Oil Search (Alaska), LLC

Mailing Address: PO Box 240927

City: Anchorage

State: Alaska Zip Code: 99524-0927

Phone: 907-375-4600 Fax: 907-375-4630

Email: Enter Email.

2. Applicant Contact:

First Name: Julie Last Name: Lina

Title: Permitting Manager

Is the Mailing Address the same as Applicant's Mailing Address? If "No", please provide information below: ☒ Yes

Mailing Address: Enter Mailing Address.

City: Enter City. State: Enter State. Zip Code: Enter Zip Code.

Phone: 907-440-0270 Fax: Enter Fax.

Email: julie.lina@oilsearch.com

3. Unit Name

Pikka Unit

4. Unit Operator Contact:

Is The Unit Operator Contact the same as the Applicant Contact? If "No", please provide information below: ☒ Yes

First Name: Enter First Name. Last Name: Enter Last Name. Title: Enter Title.

Mailing Address: Enter Mailing Address.

City: Enter City. State: Enter State. Zip Code: Enter Zip Code.

Phone: Enter Phone. Fax: Enter Fax. Email: Enter Email.

Describe the relationship between the Unit Operator and the Applicant:

Click here to enter text.

SECTION II: THIRD PARTY INFORMATION

(Fill out this section only if you are applying for the Applicant)

Third Party Company Name: N/A

First Name: Enter First Name. Last Name: Enter Last Name.

Title: Enter Title.

Mailing Address: Enter Mailing Address.

City: Enter City.

State: Enter State. Zip Code: Enter Zip Code.

Phone: Enter Phone. Fax: Enter Fax.

Email: Enter Email.

Describe the affiliation to the Applicant:

Describe your affiliation to the Applicant.

SECTION III: APPLICATION DATE AND NUMBER

(FOR OFFICE USE ONLY)

Application Date:

Application Number:

SECTION IV: PROJECT INFORMATION

1. Project Name:	Nanushuk Project
2. Proposed Start Date:	12/15/2019

3. Project Description:

Is activity discussed in the approved Plan of Development on file with the Division's Units Section? ☐ Yes ☒ No

Describe what and where:

Oil Search (Alaska), LLC (OSA) is proposing development of hydrocarbon deposits from its oil and gas leasehold on the North Slope of Alaska. The Nanushuk Project (Project) targets oil deposits in the Alpine C and Nanushuk reservoirs. OSA will drill wells and construct and operate infrastructure and facilities to produce and transport sales-quality oil to the Trans-Alaska Pipeline System.
The Project will include construction of the Nanushuk Processing Facility (NPF), Nanushuk Drillsites A (ND-A), B (ND-B), and C (ND-C), the Nanushuk Operations Pad (NOP), Tie-in Pad (TIP), import and export pipelines, infield roads and pipelines, the Nanushuk Boat Ramp, and a potable water system. The Project also includes screeding activities in front of the existing Oliktok Dock, and trenching activities for electrical and fiber optic cables at pipeline-road crossings. Minor upgrades and maintenance to the existing road system may also be required to facilitate transportation of sealift modules. Gravel material for project development will be sourced from one or more existing gravel mine sites, which will be permitted and operated independently of the Project. See the enclosed Unit Plan of Operations Project Summary for additional project details.

SECTION V: LAND STATUS

1. State Mineral Estate:

Are supplemental pages for land status included in Appendix C? ☒ Yes ☐ No

Affected ADL: 392983 Date Effective: 5/1/2015 Date Assigned: Enter Date.

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: State of Alaska

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: N/A

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Nanushuk Processing Facility	Umiat, T11N, R6E, sec. 11	70.311872, -150.553964
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 391445 Date Effective: 6/1/2009 Date Assigned: Enter Date.

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: ASRC/State

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Nanushuk Boat Ramp	Umiat, T11N, R6E, Sec. 5	70.3346, -150.674174
Nanushuk Boat Ramp Access Road	Umiat, T11N, R6E, Sec. 5	N/A
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 393012 Date Effective: 7/1/2010 Date Assigned: Enter Date.

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: ASRC/State

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Nanushuk Drillsite A (ND-A)	Umiat, T12N, R6E, Sec. 26	70.359429, -150.533004
ND-A Road	Umiat, T12N, R6E, Sec. 26	N/A
ND-A Pipeline	Umiat, T12N, R6E, Sec. 26	N/A

Affected ADL: 392984 Date Effective: 5/1/2015 Date Assigned: Enter Date.

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: ASRC/State

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Nanushuk Drillsite B (ND-B)	Umiat, T11N, R6E, Sec. 4	70.335267, -150.634272
ND-B Road and pipeline	Umiat, T11N, R6E, Sec. 4	N/A
Nanushuk Boat Ramp Access Road	Umiat, T11N, R6E, Sec. 4	N/A

Affected ADL: 393029 Date Effective: 9/1/2006 Date Assigned: Enter Date.

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: ASRC/State

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Nanushuk Drillsite C (ND-C)	Umiat, T11, R5E, Sec. 36	70.26508, -150.740112
ND-C Road	Umiat, T11, R5E, Sec. 36	N/A
ND-C Pipeline	Umiat, T11, R5E, Sec. 36	N/A

2. State of Alaska Surface Lands:

Are supplemental pages for land status included in Appendix C? ☐ Yes ☒ No

Oil And Gas Mineral Estate Owner: State of Alaska, ADL #392983

Access Authorization(s): State of Alaska

Special Use Lands: 50666 North Slope Area

Jointly Managed Lands: No

Other Considerations: The State of Alaska is owner to the surface and subsurface rights within this ADL.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-A Road and pipeline	Umiat, T11N, R6E, Sec. 11	70.3346, -150.674174
ND-B Road and pipeline	Umiat, T11N, R6E, Sec. 11	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Oil And Gas Mineral Estate Owner: State of Alaska, ADL #392986

Access Authorization(s): State of Alaska

Special Use Lands: 50666 North Slope Area

Jointly Managed Lands: No

Other Considerations: The State of Alaska is owner to the surface and subsurface rights within this ADL.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-B Road and pipeline	Umiat, T11N, R6E, Sec.10	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Oil And Gas Mineral Estate Owner: N/A

Access Authorization(s): N/A

Special Use Lands: N/A

Jointly Managed Lands: N/A

Other Considerations: N/A

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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3. Private Lands:

Are supplemental pages for land status included in Appendix C? ☐ Yes ☒ No

Oil And Gas Mineral Estate Owner: N/A

Surface Ownership And Access Agreement(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Oil And Gas Mineral Estate Owner: N/A

Surface Ownership And Access Agreement(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Oil And Gas Mineral Estate Owner: N/A

Surface Ownership And Access Agreement(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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Click here to enter text.	Click here to enter text.	Click here to enter text.

SECTION VI: BOND INFORMATION

Bonded Company: Oil Seach (Alaska), LLC

Type: Certificate of Deposit Number: 9198783780 Amount: $500,000

Bonding Company: Well Fargo Bank

Mailing Address: 301 W. Northern Lights Blvd., Suite 212

City: Anchorage State: Alaska Zip Code: 99503

Phone: N/A Fax: N/A Email: N/A

SECTION VII: SEQUENCE AND SCHEDULE OF OPERATIONS

Project Milestone #	Project Milestone	Proposed Start Date	Proposed End Date
1.	Pre-pack and construct ice roads and pads (winter only)	11/1/2019	5/31/2021
2.	Placement of temporary construction camps (off ice pad in winter only)	12/1/2019	5/31/2023
3.	Gravel hauling and construction of roads and pads (construction in winter only and access from existing infrastructure in summer, gravel farming in summer)	12/1/2019	5/31/2021
4.	Facilities construction (summer and winter)	6/1/2019	5/1/2021
5.	Pipeline construction (winter only)	8/1/2022	5/31/2023
6.	Placement of temporary constrstruction camps (year-round)	11/1/2020	12/1/2021
7.	NOP camp construction (year-round)	1/1/2021	6/30/2021
8.	Screeding of barge landing at Oliktok Point area (summer), sealift delivery (summer), and transport of modules (winter or summer)	8/1/2022	8/31/2022
9.	Drilling (year-round)	1/1/2021	2036
10.	Operations (year-round)	4/1/2023	Life of Field

SECTION VIII: PROJECTED USE REQUIREMENTS

1. Describe the proposed operations, including the location and design, of **Well Sites**:

OSA will construct three drill sites: ND-A, ND-B, and ND-C. The number and locations of drill sites was dictated by the configuration of the oil reservoirs defined by previous exploration efforts, with consideration for site accessibility requirements, and by operational constraints. The three drill sites will accommodate up to 151 total production and injection wells (43 at ND-A, 55 at ND-B, and 53 at ND-C) with 20-foot spacing between wellheads. ND-B includes additional well slots to accommodate two Class 1 underground injection control (UIC) disposal wells. Grind and inject facilities will be constructed and operated on ND-B. Each drill site will accommodate drilling equipment and support facilities, including: well testing equipment, well stimulation equipment, drilling mud and cement tanks, production gathering facilities, diesel fuel storage tanks, a communication tower, cold storage, emergency response equipment, and drilling laydown areas. The drillsites will have heaters to heat production fluids prior to entering the pipeline to the NPF for the entire drillsite production. Each drill site also includes space for temporary camps. See the enclosed Unit Plan of Operations for additional project details.

2. Describe the proposed operations, including the location and design, of **Buildings**:

The Project will construct both permanent and temporary buildings. The NOP will support field-wide operations and will include: a 200-bed operations camp; office, warehouse and maintenance buildings; warm and cold storage buildings; water/wastewater treatment plants; communications structures; back-up generators and fuel storage; and a helicopter landing pad. The NPF will include processing and utilities modules; metering and pigging facilities; power generation facilities; a truck fill station; construction material and equipment staging areas; and a central control room. The NPF will include either a single flare or dual flares to support both high- and low-pressure safety relief systems. A number of additional temporary camps will be established to support construction and drilling activities. Off-site pioneer construction camp(s) will be located near the selected mine site on an ice pad or on an existing gravel pad, pending available space. The pioneer construction camps will be used until the construction camps are installed and operational. Construction camps will be located on one or

more of the Project gravel pads and will provide space to accommodate construction personnel. The construction camps will remain in place through the completion of the construction and startup phase, after which the camps will be decommissioned and removed from the site. Drilling support camps will be located on each drill site to support drilling activities. After completion of drilling activities on each pad, the associated camp will be decommissioned and removed from the drill site. Construction support ice pads will house field offices, break shacks, enviro-vacs, and field shops, and will stage construction equipment, vehicles, materials, and supplies until gravel pads become available for use.

3. Describe the proposed operations, including the location and design, of **Fuel and Hazardous Substances**:

The Project will require the transport of diesel and gasoline from Deadhorse to the project area to support activities during construction, drilling, and operations. During construction, dedicated temporary storage areas for diesel and gasoline will be defined and placed on ice pads and, once complete, moved onto the project gravel pads. Permanent diesel fuel storage tank infrastructure will be located on the NPF, NOP, and/or drillsites. Storage at the NOP will be in a bulk tank and/or in ISO tanks. Emergency generators located at the NOP will have day tanks that will be refilled as needed from the bulk storage tank. The NOP will also have storage tanks or ISO tanks for gasoline storage and dispensing. The primary storage location for production chemicals will be at the NOP, with smaller amounts at the NPF and drill sites. All fuels and hazardous substances used by the Project will be handled by qualified persons and stored on site in compliance with state and federal regulatory guidance and the Project's Oil Discharge Prevention and Contingency Plan and Spill Prevention, Control, and Countermeasure Plan. All fuels and chemicals will be stored in appropriate primary containment. Secondary containment areas will be designed in compliance with all applicable permits and regulations. OSA will design and develop the Project to avoid and minimize the possibility of spills. Spill prevention measures considered throughout the design and engineering phase include a maintenance and inspection program as well as an employee spill prevention training program. Hydrostatic testing will validate the integrity of the pipelines prior to operation. OSA has internal standards in place that provide guidance on spill prevention measures.

4. Describe the proposed operations, including the location and design, of **Solid Waste Sites**:

A range of wastes will be generated during construction, drilling, and operations. Wastes will include Class I and II, trash, debris, sewage, treated domestic waste water, drill muds, and drill cuttings. A Waste Management Plan will be prepared to address the types and quantities, regulatory controls, and management options for solid and liquid wastes. Key elements of the waste management approach will include: full compliance with federal, state, and local North Slope Borough (NSB) waste management regulations; waste minimization through careful project planning and beneficial reclamation, reuse, and recycling when practicable; subsurface disposal of authorized waste streams; planning for changing types and volumes of wastes and seasonal transportation restrictions, particularly during the construction phase; evaluating opportunities for product substitution to reduce hazardous waste; training staff on waste management and spill prevention procedures. Non-hazardous solid waste will be trucked off site and disposed of at the NSB landfill. Any waste receptacles stored outside will be managed to avoid potential wildlife interactions, via methods such as waste segregation and the covering of dumpsters, which will be outlined in OSA's Wildlife Avoidance and Interaction Plan.

5. Describe the proposed operations, including the location and design, of **Water Supplies**:

The Project will require both potable water for camp use and raw-lake water for construction, drilling, and operations. Potable fresh water for domestic use at the construction camps will be trucked from Deadhorse or other existing facilities. Typical fresh water volumes for domestic water use during construction, drilling, and operations are approximately 100 gallons per-worker per-day. During operations, approximately 5.5 million gallons (MG) per year of potable fresh water for the operations camp will be supplied by the potable water system. Lake MC7903 will be the primary source of fresh water for operations camp needs. Non-potable fresh water from local permitted lakes will be used for ice road and pad construction and maintenance, and for possible hydrostatic testing of pipelines. Ice roads require approximately 1 MG of fresh water per mile. Ice pads require approximately 82,400 gallons of water per acre for a 6-inch-thick pad. Hydrostatic testing could require up to 2.52 MG of water. During the drilling phase, approximately 10,000 gallons per day per rig of non-potable water will be obtained from locally permitted sources within the project area to support drilling activities. In addition, approximately 16-21 MG of make-up water (likely seawater) are needed per year for production and injection well stimulation to improve well productivity. Dust suppression during operations, will require approximately 20,000 gallons of water per mile of gravel road per application. Approximately 150,000 barrels per day of make-up water will be used as injection water for reservoir pressure maintenance. Pending commercial agreements and availability of supply, make-up water will likely be purchased from a third party. See the enclosed Unit Plan of Operations for additional project details.

6. Describe the proposed operations, including the location and design, of **Utilities**:

Power generation facilities, located at the NPF, will consist of gas-powered turbines. Power will be supplied to other project facilities, including drilling rigs, via power cables installed on infield and Nanushuk Pipeline horizontal support members (HSMs) using messenger cables. When power from the NPF is not available,

diesel-fired engines used to power the drilling rigs will comply with U.S. Environmental Protection Agency (EPA) Tier 4 final emission standards. Communications between project facilities will occur via fiber optic cables installed on infield and Nanushuk Pipeline HSMs using messenger cables. Communication towers will be located at the drill sites, the NPF, the NOP, and the TIP. Communication towers will be approximately 30 feet at the drill sites and 120 feet at the NOP and NPF. Communication towers are not anticipated to require guy-wires. Towers will be equipped with Federal Aviation Administration compliant lighting, if required. See the enclosed Unit Plan of Operations Project Summary for additional project details.

7. Describe the proposed operations, including the location and design, of **Material Sites**:

An estimated 2.86 million cubic yards of gravel will be needed to construct the proposed project facilities. Clean gravel material for project development will be obtained from one or more of the existing mine sites located on the North Slope in the vicinity of the project area. Likely sources include Mine Site F or the ASRC Mine Site. Both potential gravel sources are less than 15 miles from the NPF. Permitting and operation of existing mine sites would be conducted by the mine owner or designated operator. Gravel will be hauled during the winter over as few seasons as practicable. All gravel mining, overburden and gravel stockpiling, and mine rehabilitation activities will be evaluated as part of the permitting and operation of the gravel mine independent of the Project. Gravel will be loaded onto dump trucks for transport to the project site via a combination of existing gravel roads, new gravel roads, and/or ice roads. No gravel will be stockpiled at the project site outside of the permitted footprint for gravel fill. See the enclosed Unit Plan of Operations Project Summary for additional project details.

8. Describe the proposed operations, including the location and design, of **Roads**:

The Project includes 12.4 miles of gravel infield roads, including a 3.5-mile ND-A road, a 2.1-mile ND-B road, 5.2-mile ND-C road, a 1.4-mile Nanushuk Boat Ramp access road, and a 0.2-mile water source access road, to provide all-season ground transport between the NPF, drill sites, and other project facilities, The Project also includes a 9.5 mile gravel Nanushuk Access Road to provide all-season ground transport connecting the NPF to existing infrastructure. Gravel roads will be constructed to be 24 (approximately 44 feet at the base) to 32 feet (approximately 52 feet at the base) wide at the surface but may be wider at curves to accommodate larger module transport. Six road turnouts (three along the access road, one along the ND-A road, one on the ND-B road, and one on the ND-C road) will be included to allow safe access to project facilities during movement of large equipment, including modules and drilling rigs. Three gravel tundra access ramps will also be located at road turnouts near ND-A, ND-B, and ND-C to facilitate access for off-road travelers. Access and infield roads are designed to accommodate two-way traffic and will be used during facility construction, drilling, and operations for mobilization of construction materials; drill rigs and drilling materials; supplies; personnel; and, if necessary, emergency spill response equipment. The Nanushuk Access Road will follow the existing Mustang Access Road for approximately 4.7 miles. Use of the Mustang Access Road will require upgrades to bring it up to minimum design standards and improve road surface condition. Upgrades could include expansion of the road base width and addition of higher quality material to improve load capacity. Proposed gravel roads will parallel the proposed pipelines to facilitate year-round access for maintenance, repair, monitoring, and, if necessary, emergency response. Two bridges will be constructed for the Project: a 170-foot bridge for the access road over the Miluveach River, and a 245-foot bridge for the ND-C infield road over the Kachemach River. Drainage culverts will be designed for the infield and access roads prior to construction.

Ice roads will be used during construction of the pipelines, gravel roads, and bridges. Approximately 190 to 280 miles of ice roads are planned during the construction phase. Standard-duty ice roads on the North Slope are a minimum of 6 inches thick and an average of approximately 12 inches thick due to terrain features. Ice roads for construction, materials, and personnel transportation will be constructed to support expected loads and protect the vegetation and organic soil beneath. Ice roads will be wide enough to safely accommodate two-way vehicular traffic (minimum of 20 feet), drill rig access (minimum of 30 feet), and other

traffic, as required. The ice road season each year varies depending on weather conditions and ice road completion times. See the enclosed Unit Plan of Operations Project Summary for additional project details.

9. Describe the proposed operations, including the location and design, of **Airstrips**:

No new airstrip is proposed for the Project. During construction, drilling, and operations, the commercial airport in Deadhorse, located approximately 52 miles away, will support air transport of project personnel and small materials and supplies to the North Slope. Personnel and materials flown into Deadhorse will be driven to the project area via the existing road system and ice roads until the proposed gravel access road is completed. The NOP includes space for a helipad. During construction, helicopters will be used to support ice road layout, survey, and summer cleanup efforts. These activities usually take place in July or early August and last approximately 4 weeks, with daily helicopter traffic during that time. Helicopters may be used in the event of health or safety emergencies over the life of the project; however, routine helicopter use is not planned under normal operating conditions. See the enclosed Unit Plan of Operations Project Summary for additional project details.

10. Describe the proposed operations, including the location and design, of **All Other Facilities and Equipment**:

Additional facilities and equipment include: a TIP; infield pipelines (connect the drill sites to the NPF); the Nanushuk Pipeline (connects the NPF to existing infrastructure on the North Slope via the TIP); pipeline river crossings; Oliktok Dock screeding; the Nanushuk Boat Ramp, and seasonal ice pads. See the enclosed Unit Plan of Operations Project Summary for additional project details.

11. If another permit(s) is required for the above described Projected Use Requirements, provide the following information:

Are supplemental pages for land status included in Appendix C? ☒ Yes ☐ No

Agency	Permit Type	Permit Number	Application Status	Projected Use Requirement(s)
US Army Corps of Engineers	Department of the Army Clean Water Act (CWA) Section 404 / Rivers and Harbors Act Section 10 Permit	POA-2015-025	Record of Decision issued 5/14/2019. Permit issued 5/21/2019	All
US Environmental Protection Agency	Class I Underground Injection Control (UIC) Wells	TBD	Application In Progress	UIC wells
US Coast Guard	Rivers and Harbors Act Section 9 Bridge Permit	TBD	Application in Progress	Bridge over Kachemach River
Alaska Dept of Conservation	Minor Air Permits	TBD	Application in Progress	Facilities
Alaska Dept of Conservation	Solid Waste General Permit	TBD	Application in Progress	Drill Pads
Alaska Dept of Conservation	Grind and Inject Facility Approval	TBD	Application in Progress	G&I Facility
Alaska Dept of Conservation	Oil Discharge Prevention and Contingency Plan Approval	TBD	Application in Progress	All
Alaska Dept of Conservation	Alaska Pollutant Discharge Elimination System North Slope General Permit AKG332000	AKG332000	Notice of Intent	Discharges
Alaska Dept of Conservation	Drinking Water Design Plan Review	TBD	Application in Progress	Facilities
Alaska Dept of Conservation	Wastewater Design Plan Review	TBD	Application in Progress	Facilities

Alaska Dept of Conservation	CWA Section 401 Water Quality Certification	POA-2015-15	Permit issued 12/31/2019	All
Alaska Dept of Fish and Game	Title 16 Fish Habitat Permit	TBD	Application in Progress	Fish passage culverts, water withdrawal
Alaska Dept of Natural Resources	Temporary Land Use Permit	LAS 28269	Permit approved 8/15/2016	Ice roads, ice pads
Alaska Dept of Natural Resources	Temporary Water Use Authorization	TBD	Application in Progress	Water withdrawal
Alaska Dept of Natural Resources	Unit Plan of Operations Authorization	TBD	Application in Progress	All
Alaska Dept of Natural Resources	AS 38.05.850 Easement	TBD	Application in Progress	Nanushuk Project Access Road, NOP, NPF Pad, and Pipelines and TIP
Alaska Dept of Natural Resources	Pipeline Right-of-Way Lease AS 38.35	TBD	Application in Progress	Nanushuk Pipeline
Alaska Dept of Natural Resources	Tidelands Permit (Temporary Land Use Permit)	TBD	Application in Progress	Screeding, boat ramp, bridges, MC7903 water source
Alaska Oil and Gas Conservation Commission	Permit to Drill	TBD	Application in Progress	Wells
Alaska Oil and Gas Conservation Commission	Class II UIC Enhanced Oil Recovery Well Area Injection Order	TBD	Application in Progress	UIC Wells

SECTION IX: REHABILITATION PLAN

1. Proposed Level of Infrastructure, Facilities and Equipment Removal:

Upon completion of project activities and in compliance with permit and lease requirements, OSA will commence dismantlement, removal, and rehabilitation (DR&R) activities, which are generally expected to include: notification and coordination with Kuukpik Corporation, ADNR, NSB, and other regulatory agencies to discuss specific DR&R requirements and timeframes; plugging and abandonment of wells in accordance with general industry best practices and compliance with AOGCC requirements; development of a restoration plan that includes required elements identified by permitting agencies; dismantlement and removal of installed equipment and infrastructure, unless coordination with landowners or agencies indicates otherwise; and enactment of restoration activities identified in the restoration plan in accordance with goals and objectives identified in the plan. The timeframe of these activities will be identified through coordination with landowners and agencies.

2. Description of Restoration and Rehabilitation Activities for Vegetation, Habitat, Impacted Wildlife, and Other Applicable Resources:

Any areas of tundra damage will be identified and discussed with the land owner (either ADNR or Kuukpik Corporation) to determine appropriate remediation and restoration activities that may be required. Buried utility installations that are not covered by gravel fill (i.e. roadway) will be revegetated using transplanted sprigs, cultivars, or seed either gathered onsite or otherwise obtained that match the native plant species that occur in the vicinity of the trenched area. Revegetation work shall be performed by the end of the first growing season following the utility installation. Revegetation will be monitored in subsequent growing seasons and additional efforts will be performed until revegetation of the site is complete.

SECTION X: OPERATING PROCEDURES DESIGNED TO MINIMIZE ADVERSE EFFECTS

Describe operating procedures designed to prevent or minimize adverse effects on other natural resources and other uses of the Unit area and adjacent areas including:

Fish and Wildlife Habitats: A Wildlife Avoidance and Interaction Plan, and a Polar Bear Interaction Plan will be developed and implemented to minimize conflicts with wildlife. Ice roads will be constructed to avoid ice-road sensitive vegetation, such as willows, that extends above the snow level, per ADNR permit stipulations. In accordance with permits, ice road crossings of designated streams and rivers will be slotted, breached, or weakened upon completion of use. Fish passage culverts will be designed at stream crossings where fish are present. All water withdrawal will be conducted in compliance with water withdrawal authorizations and fish habitat permit stipulations to maintain adequate lake volumes in fish-bearing lakes. Where feasible, pipelines will be located parallel to gravel roads, and separated by a minimum of 500 feet to minimize caribou disturbance. Pipelines will have a non-reflective finish to reduce potential impacts to wildlife. Avoidance of overhead powerlines reduces the potential for bird strikes and limits creation of predator perching opportunities on power poles. The facility lighting will minimize light visible from outside of project facilities by using downward illumination to minimize the impact of lighting on visual aesthetics and minimize the occurrence of bird strikes.

Historic and Archeological Sites: Cultural resource surveys were conducted in the project area in 2015, 2016, and 2017. Archaeological surveys will also be conducted in 2019 to determine possible archaeological and cultural resources sites near the proposed activities. Specifically, information is desired on potential cultural properties that could be directly or indirectly affected by the proposed project. All surveys and proposed Project locations were coordinated with ADNR/Office of History and Archaeology (OHA) and the NSB. To the extent possible, project facilities will be located outside of a 500-foot buffer from

	Peat Road, a 46-mile-long historic road. Should cultural resources be discovered during project activities, work in the vicinity of the find will cease, the OHA/SHPO will be notified, and a professional archaeologist will be consulted.
Public Use Areas:	Public use of the area is limited to local subsistence activities. Subsistence representatives will be available onsite during operations to minimize impacts to subsistence activities. OSA will work with the Kuukpik Corporation to establish access agreements for use of project gravel roads and ice roads to increase potential access routes for subsistence activities.
Other Uses:	Other uses in the general area will be possible activities by other oil and gas companies for geophysical purposes. OSA will coordinate with those companies to avoid operational problems posed from concurrent activities, and develop an access agreement if needed.

SECTION XI: GLOSSARY OF TERMS

Term #	Term	Term Definition
1	Enter Term.	See Section 14.0 in the enclosed Unit Plan of Operations Project Summary for a complete list of terms.
2	Enter Term.	Enter Term Definition.
3	Enter Term.	Enter Term Definition.
4	Enter Term.	Enter Term Definition.
5	Enter Term.	Enter Term Definition.
6	Enter Term.	Enter Term Definition.
7	Enter Term.	Enter Term Definition.
8	Enter Term.	Enter Term Definition.
9	Enter Term.	Enter Term Definition.
10	Enter Term.	Enter Term Definition.

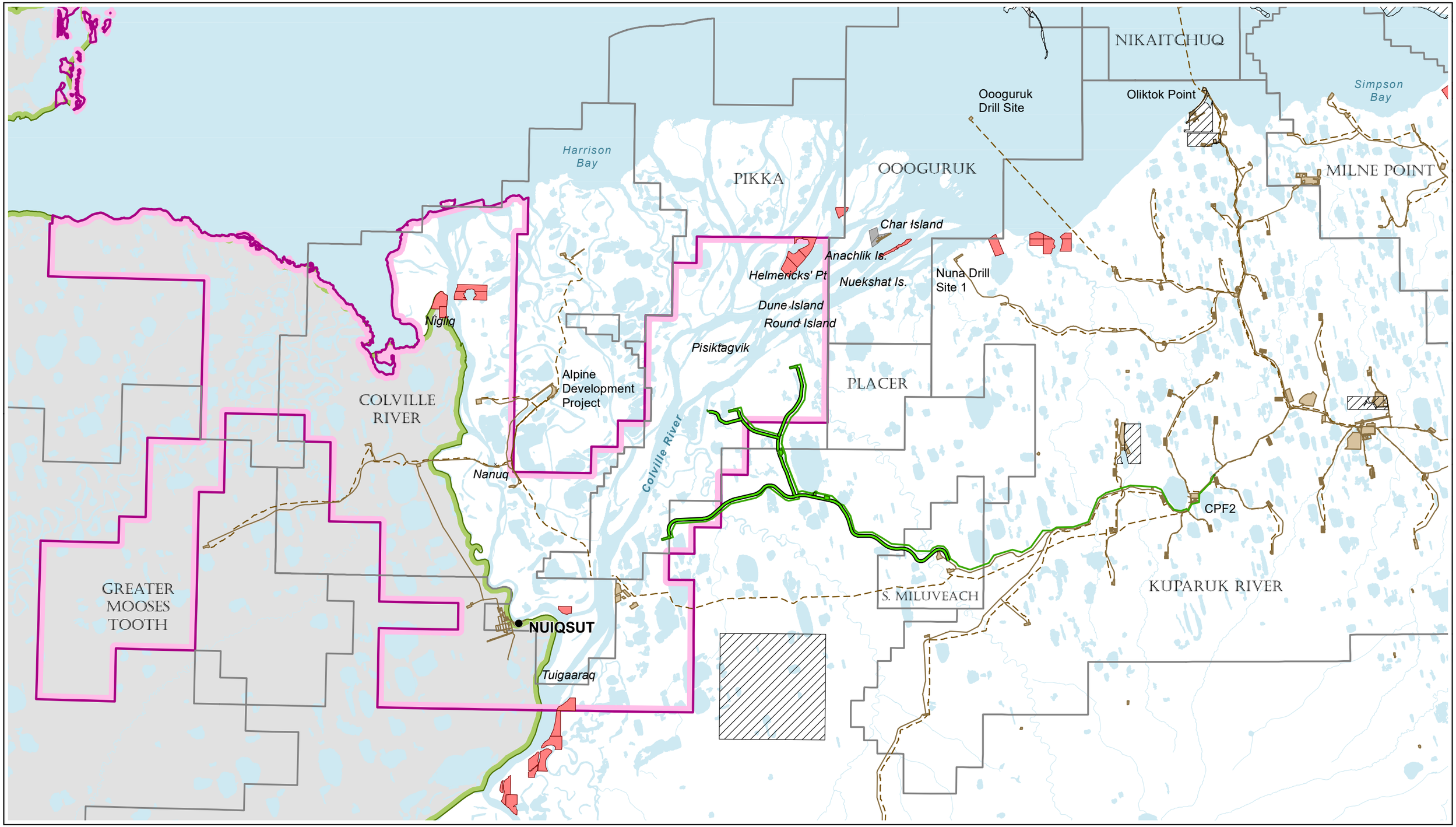
SECTION XII: CONFIDENTIALITY

The undersigned hereby requests that each page/section of this application marked confidential be held confidential under AS 38.05.035(a)(8).

APPLICANT CONTACT:

Signature	Name	Title	Date
Julie Lina	Julie Lina	Permitting Manager	7/15/2019

Appendix A
Maps



Oil Search

- PROJECT FACILITIES
- PROJECT GRAVEL ROADS
- PROJECT PIPELINE SYSTEMS
- EXISTING GRAVEL PAD
- EXISTING GRAVEL ROAD
- EXISTING PIPELINES
- PRODUCTION UNIT
- KUUKPIK BOUNDARY
- NATIVE ALLOTMENT
- PRIVATE PROPERTY
- MUNICIPAL LANDS
- NPR-A BOUNDARY

OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

PROJECT VICINITY

Figure 1

N W E S

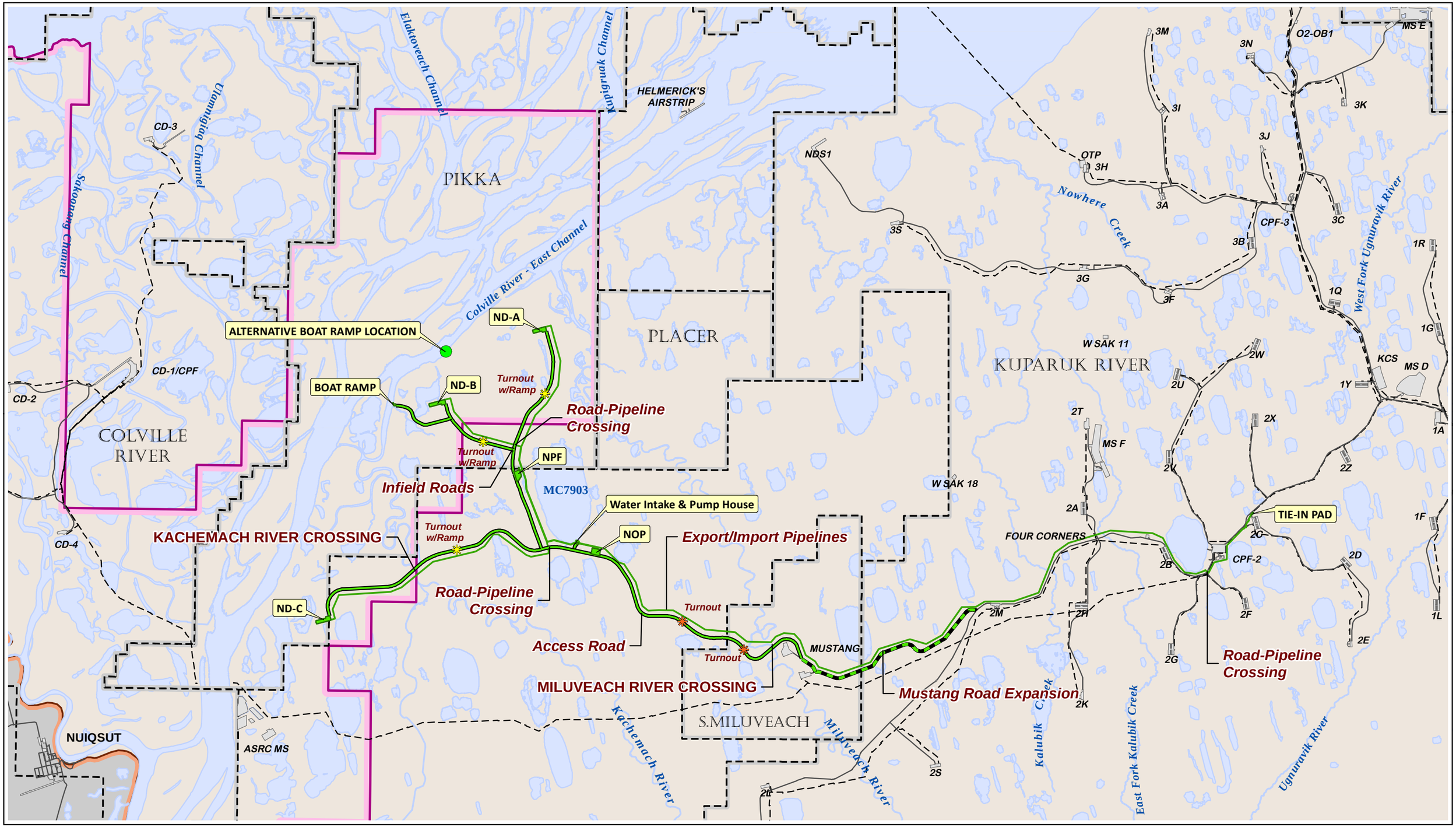
0 1 2 Miles

0 2 4 Kilometers

GCS: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

DATE: 2/27/2019, REV: 1.0, By: JB

Document name: DEV-PE-DF-M_NSBMP_VicinityMap2_11x17



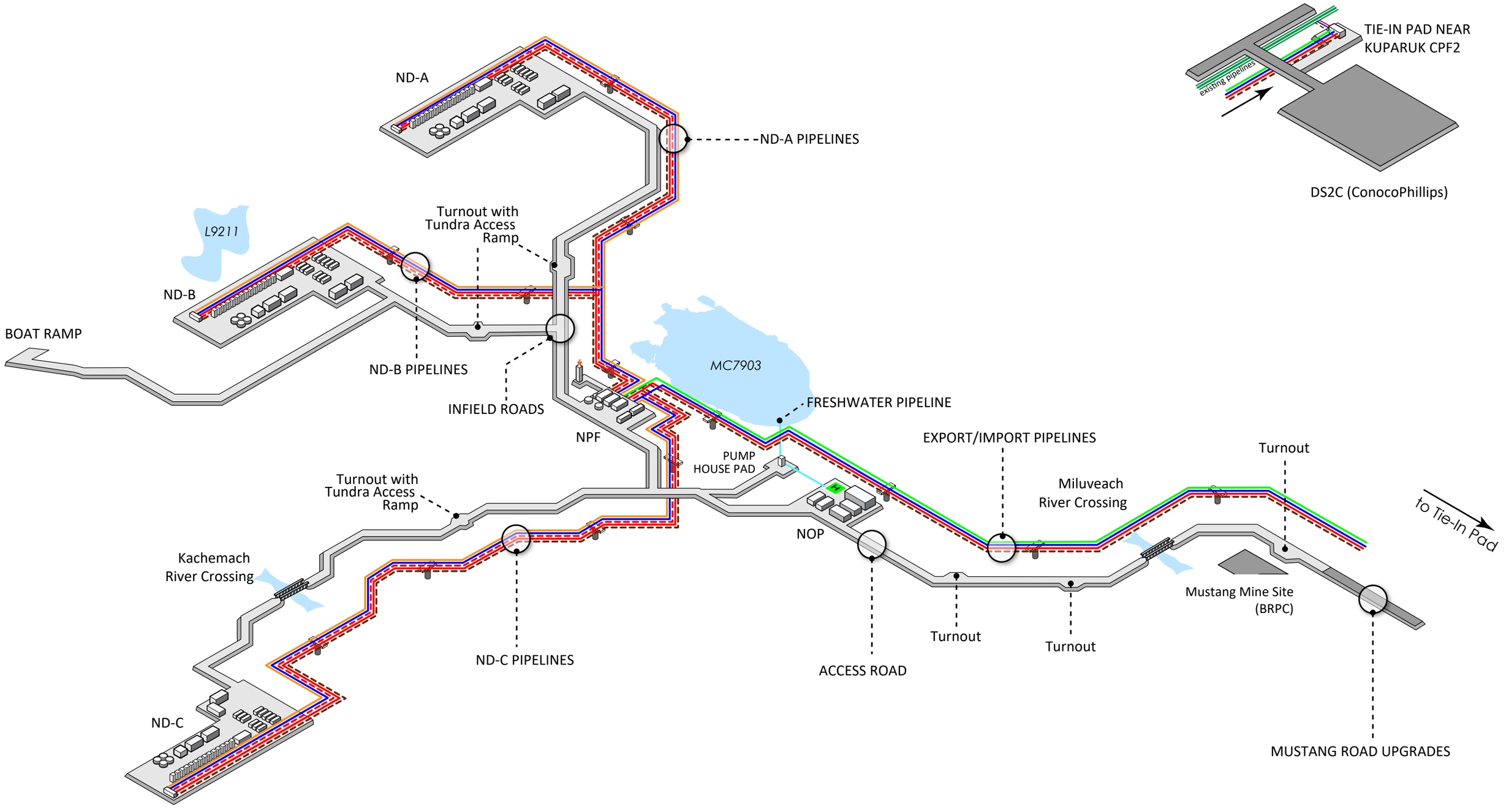
Oil Search

TYPES OF TURNOUTS

OIL SEARCH ALASKA LLC.

PROJECT OVERVIEW

Project Location



Oil Search

EXPORT PIPELINES
- Oil Export Pipeline
- Make-Up Water Line
- Make-Up Gas Line
- Fiber Optic/Power Cables

INFIELD PIPELINES
- Multiphase Pipeline
- Water Injection Pipeline
- Gas Injection Pipeline
- Gas Lift Pipeline
- Fiber Optic/Power Cables

- Proposed Gravel Roads/Pads
- Existing Gravel Roads/Pads

OIL SEARCH ALASKA LLC.
NANUSHUK PROJECT
PROJECT COMPONENTS
Figure 4

DATE: 2/10/2019. REV: 1.0. By: JB
Document name: Project Components.ai

PIKKA

OOOGURUK

PLACER

KUPARUK RIVER

SOUTHERN MILUVEACH

ND-A

ND-A Infield Road 3.3 miles

ND-A Infield Pipelines 2.6 miles

ND-B Infield Pipelines 0.8 miles

Boat Ramp Access Road 1.4 miles

ND-B

ND-B Infield Pipelines 1.9 miles

ND-A Infield Pipelines 1.1 miles

ND-B Infield Road - 0.7 miles

ND-B Infield Road - 1.2 miles

ND-A Infield Road - 0.1 miles

ND-A/B Infield Pipelines 0.1 miles

NPF

ND-C Infield Road - 3.2 miles

Freshwater Pipeline 0.2 miles

ND-C Infield Road 2.2 miles

ND-C Infield Road 0.3 miles

NOP

ND-C Infield Pipelines 5.4 miles

Miluveach Crossing

Export/Import Pipelines 21.9 miles

ND-C Infield Pipelines 2.5 miles

Kachemach Crossing

ND-C

Access Road 9.1 miles

Mustang Road Expansion 4.7 miles

MUSTANG

3S

W SAK 18

2A

FOUR CORNERS

W SAK 14

2B

TIE-IN PAD

2C

CPF-2

2F

2M

2H

2K

2S

2L

TIE-IN PAD

0 100 200 Feet

SPCS - 38.35 Pipeline ROW Lease

ADNR DOG - 850 Easement

ADNR DOG - Unit Plan of Ops

ADNR DOG - Unit Plan of Ops/ Kuukpik Land Use Agreement

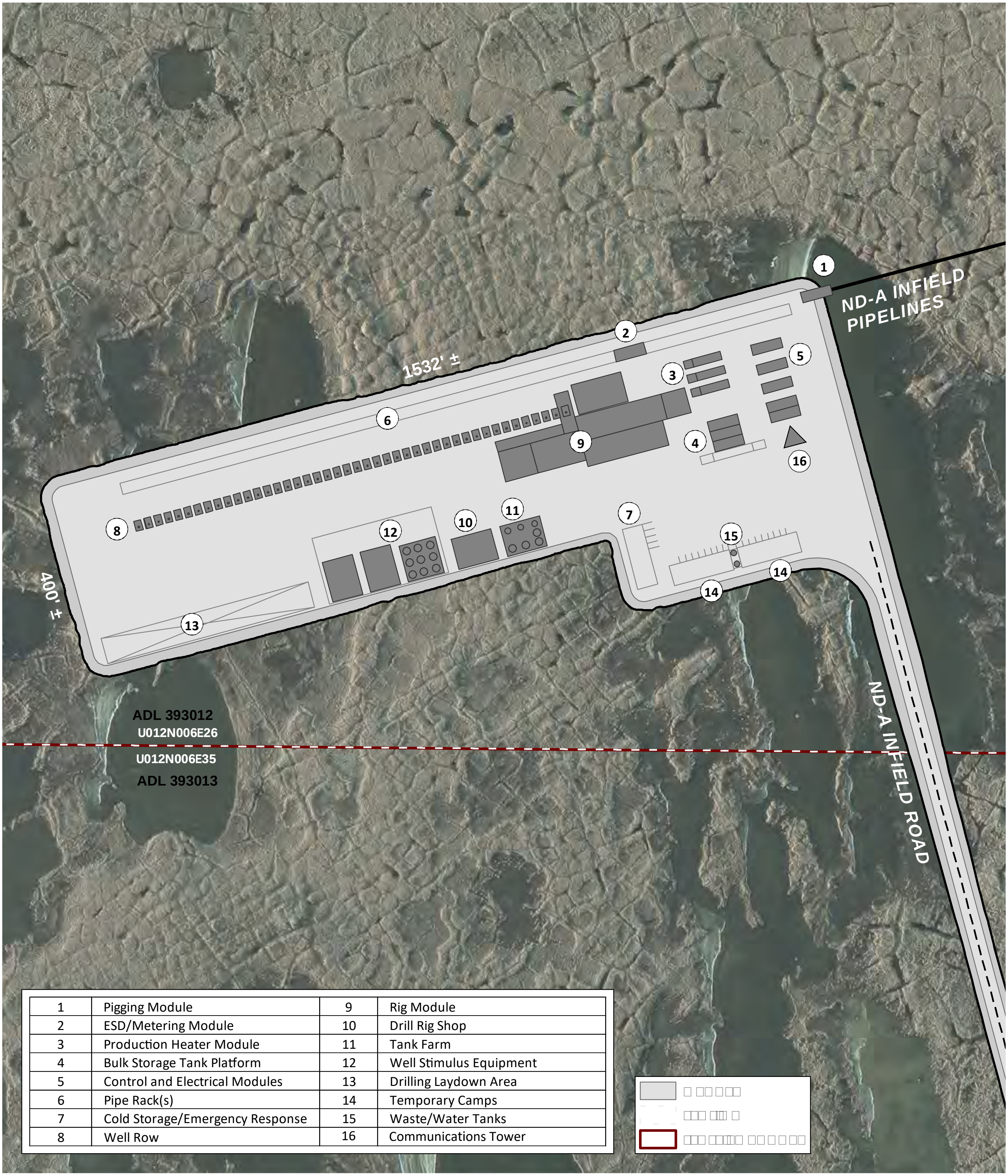
Kuukpik Land Use Agreement

Oil Search

OIL SEARCH ALASKA LLC.

STATE LAND PERMITS OVERVIEW

Project Location

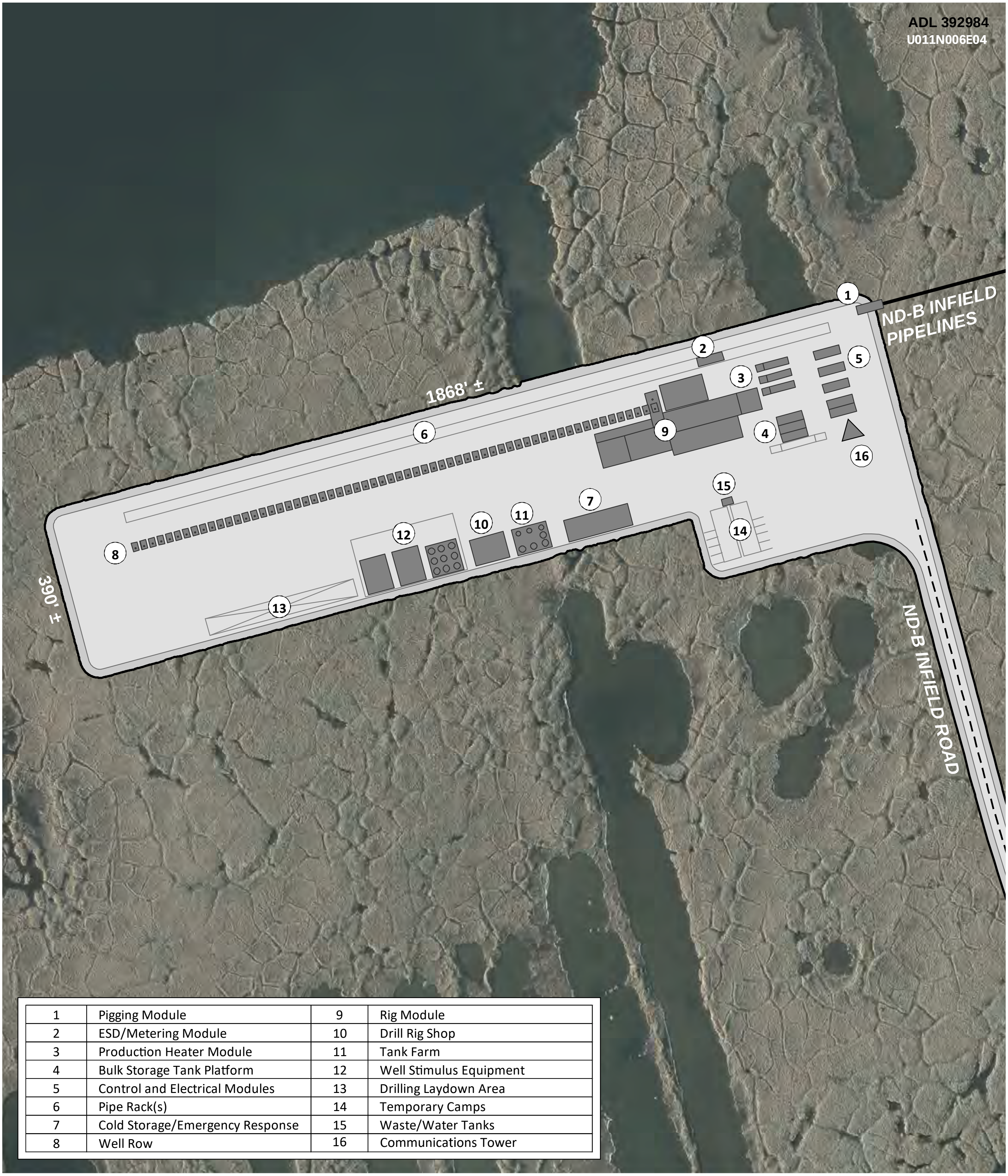


1	Pigging Module	9	Rig Module
2	ESD/Metering Module	10	Drill Rig Shop
3	Production Heater Module	11	Tank Farm
4	Bulk Storage Tank Platform	12	Well Stimulus Equipment
5	Control and Electrical Modules	13	Drilling Laydown Area
6	Pipe Rack(s)	14	Temporary Camps
7	Cold Storage/Emergency Response	15	Waste/Water Tanks
8	Well Row	16	Communications Tower

OIL SEARCH ALASKA LLC.

NANUSHUK DRILLSITE A TYPICAL PAD LAYOUT

Oil Search

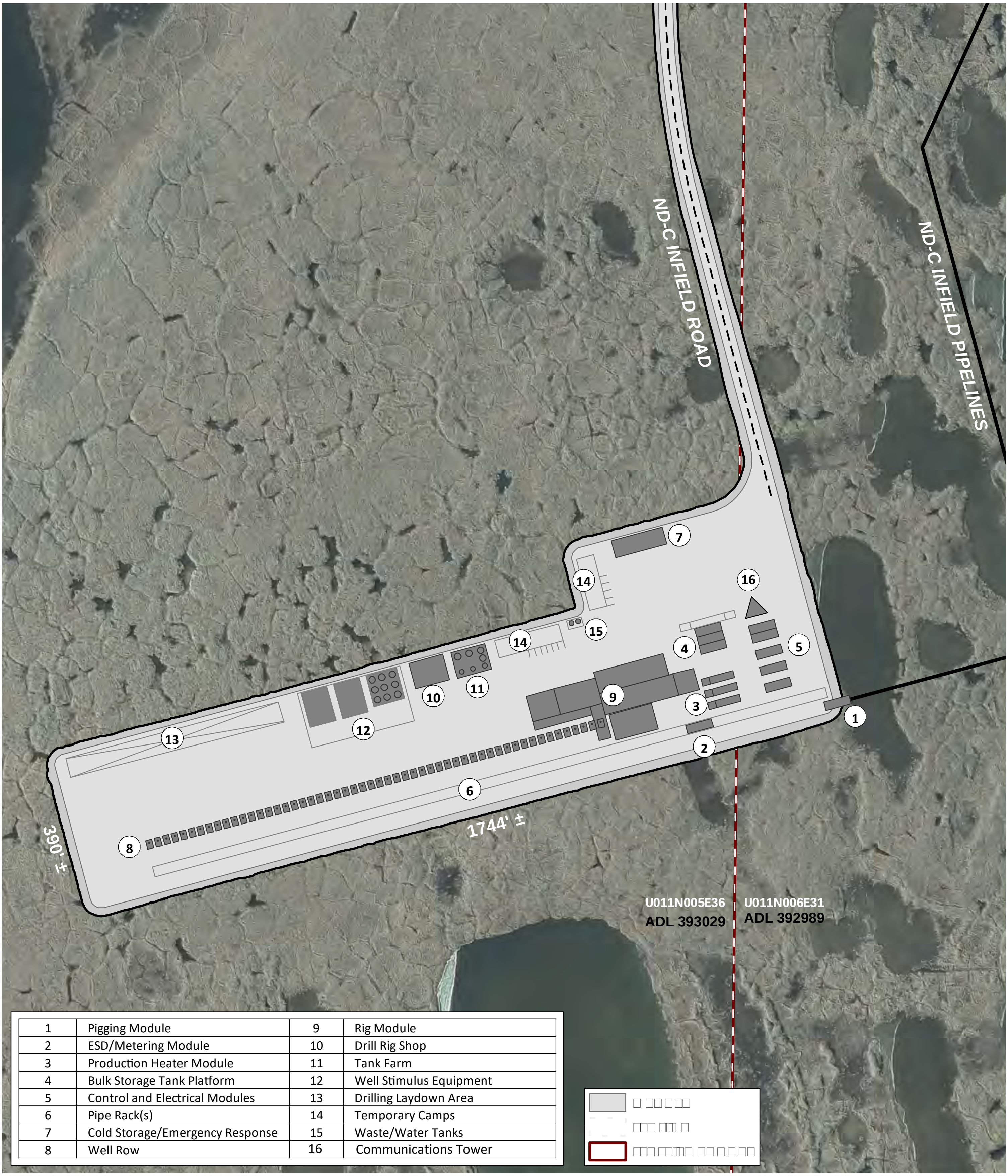


1	Pigging Module	9	Rig Module
2	ESD/Metering Module	10	Drill Rig Shop
3	Production Heater Module	11	Tank Farm
4	Bulk Storage Tank Platform	12	Well Stimulus Equipment
5	Control and Electrical Modules	13	Drilling Laydown Area
6	Pipe Rack(s)	14	Temporary Camps
7	Cold Storage/Emergency Response	15	Waste/Water Tanks
8	Well Row	16	Communications Tower

Oil Search

OIL SEARCH ALASKA LLC.

NANUSHUK DRILLSITE B TYPICAL PAD LAYOUT

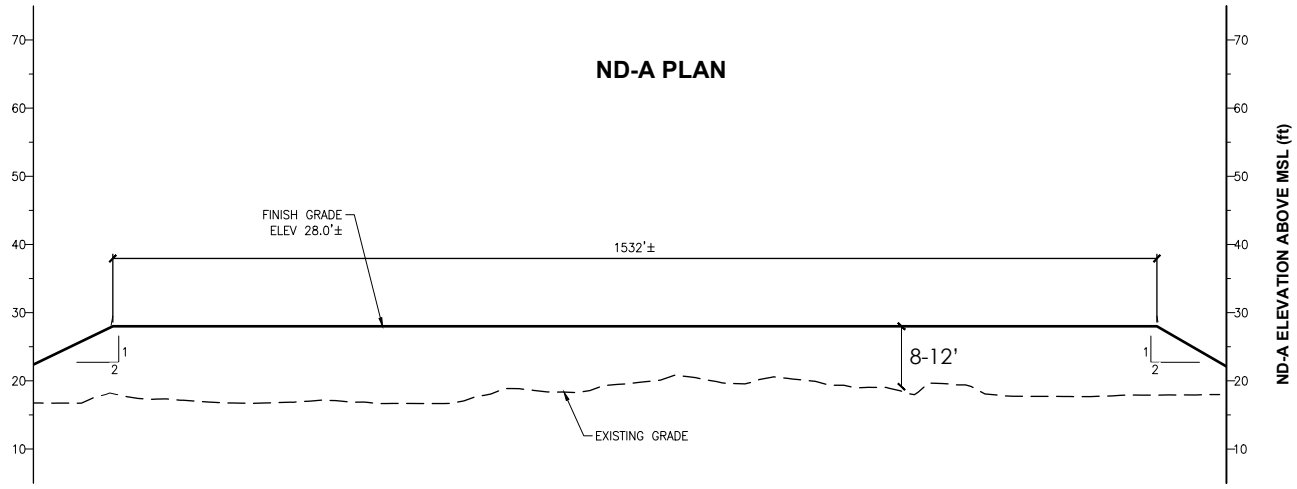


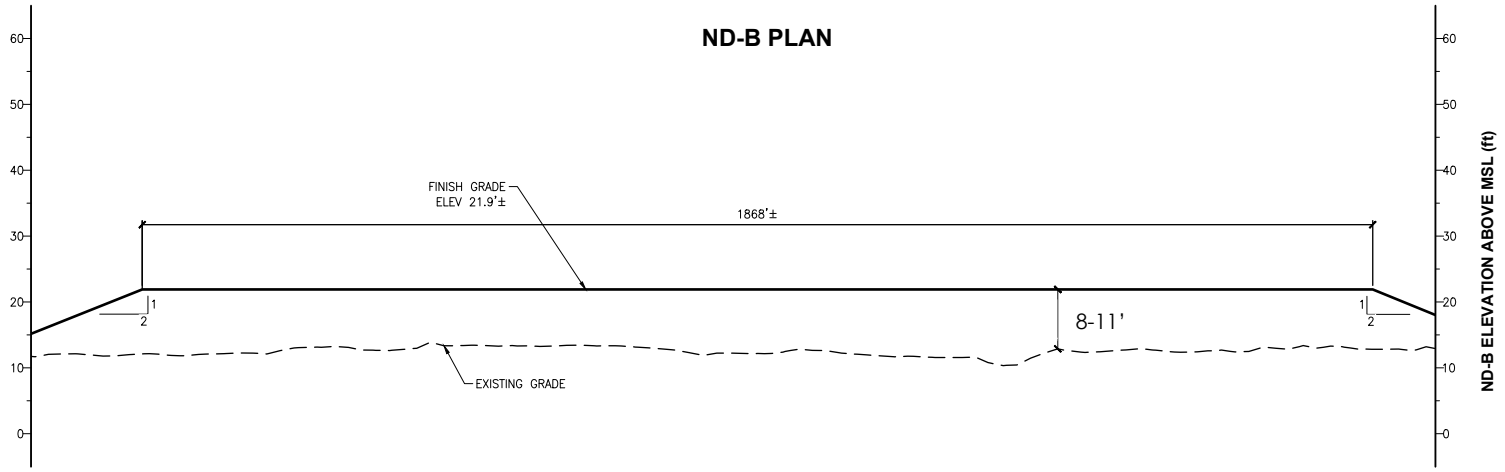
1	Pigging Module	9	Rig Module
2	ESD/Metering Module	10	Drill Rig Shop
3	Production Heater Module	11	Tank Farm
4	Bulk Storage Tank Platform	12	Well Stimulus Equipment
5	Control and Electrical Modules	13	Drilling Laydown Area
6	Pipe Rack(s)	14	Temporary Camps
7	Cold Storage/Emergency Response	15	Waste/Water Tanks
8	Well Row	16	Communications Tower

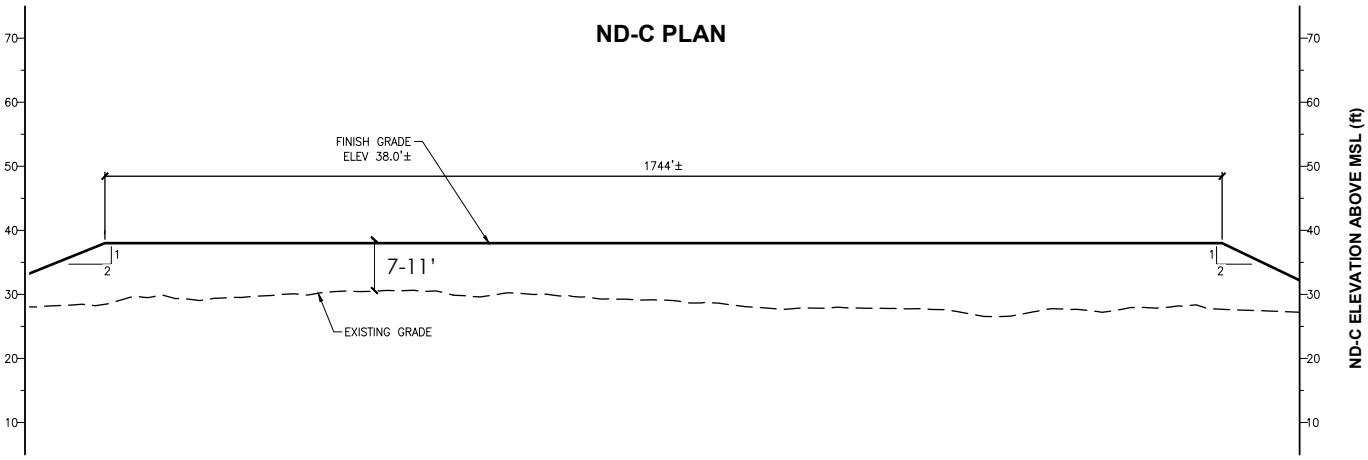
OIL SEARCH ALASKA LLC.

NANUSHUK DRILLSITE C TYPICAL PAD LAYOUT

N W E S







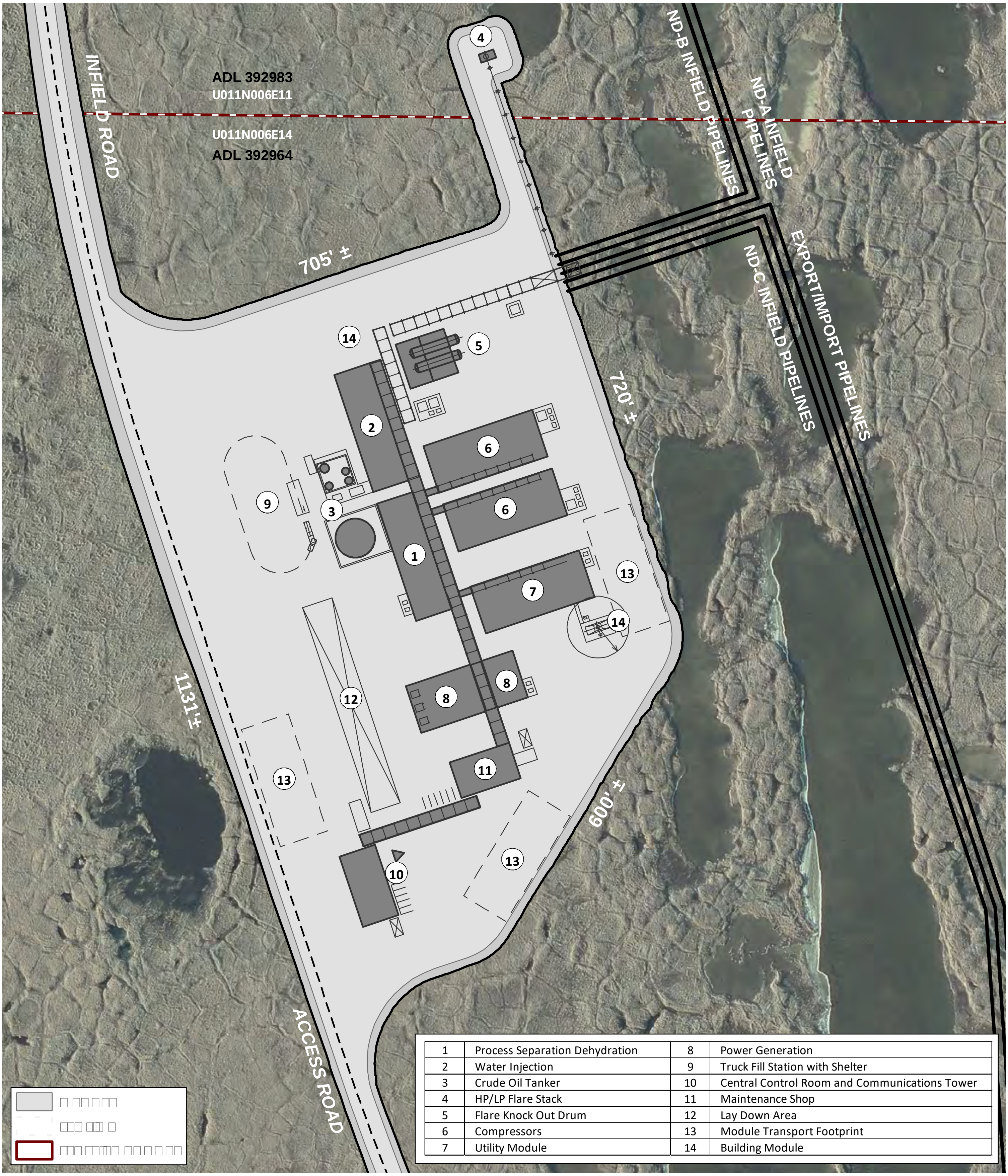
OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

ND-A, ND-B AND ND-C CROSS SECTION PROFILES

Figure 10

DATE: 3/20/2019. REV: 1.1. By: JB



1	Process Separation Dehydration	8	Power Generation
2	Water Injection	9	Truck Fill Station with Shelter
3	Crude Oil Tanker	10	Central Control Room and Communications Tower
4	HP/LP Flare Stack	11	Maintenance Shop
5	Flare Knock Out Drum	12	Lay Down Area
6	Compressors	13	Module Transport Footprint
7	Utility Module	14	Building Module

OIL SEARCH ALASKA LLC.

NANUSHUK PROCESSSING FACILITY PAD LAYOUT

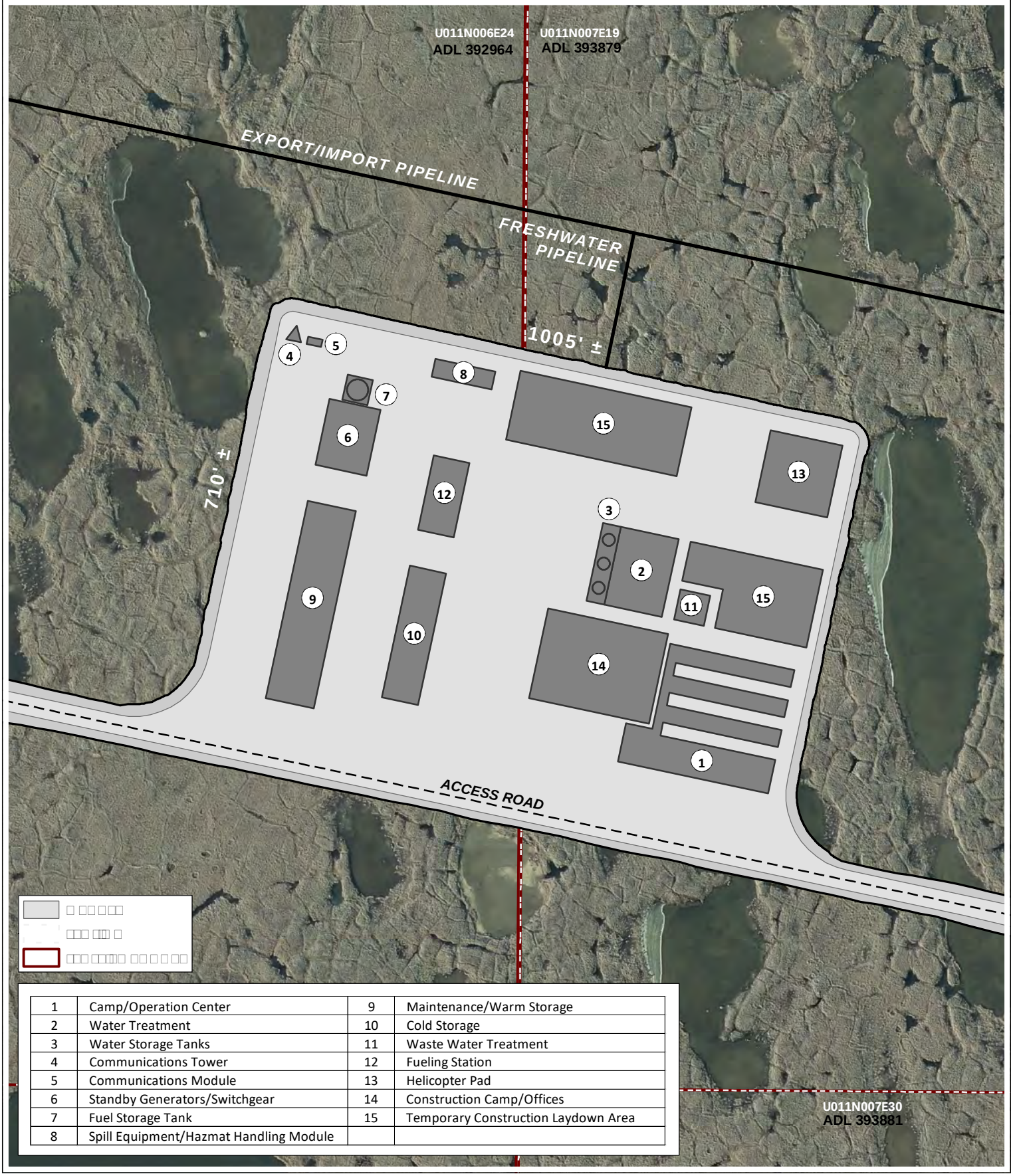
Oil Search

0 50 100 200

0 50 50

OIL SEARCH ALASKA LLC.

TIE-IN PAD LAYOUT



1	Camp/Operation Center	9	Maintenance/Warm Storage
2	Water Treatment	10	Cold Storage
3	Water Storage Tanks	11	Waste Water Treatment
4	Communications Tower	12	Fueling Station
5	Communications Module	13	Helicopter Pad
6	Standby Generators/Switchgear	14	Construction Camp/Offices
7	Fuel Storage Tank	15	Temporary Construction Laydown Area
8	Spill Equipment/Hazmat Handling Module		

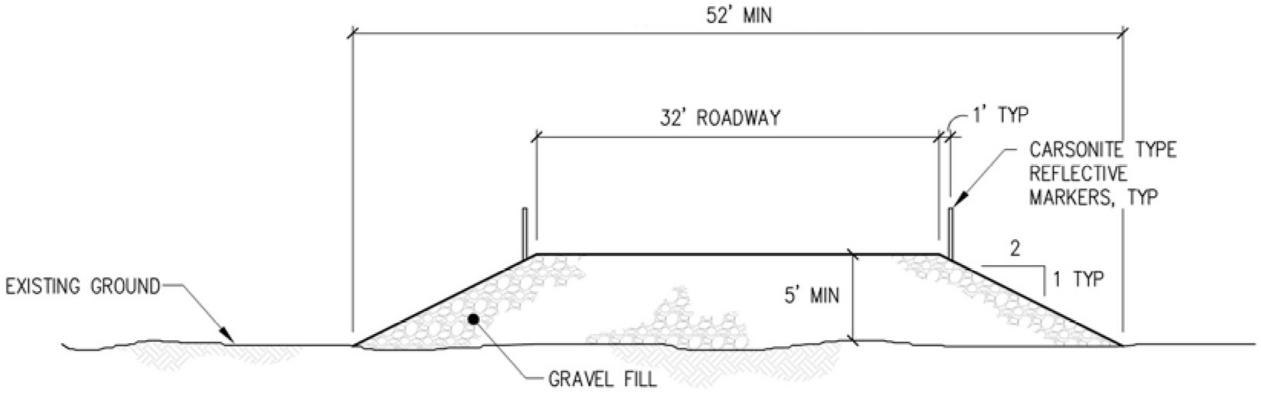
Oil Search

OIL SEARCH ALASKA LLC.

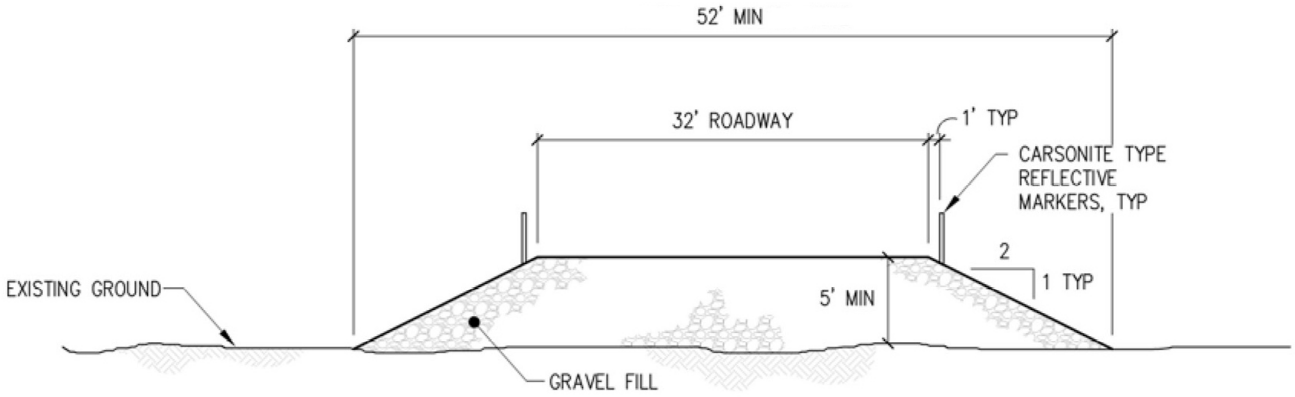
NANUSHUK OPERATIONS PAD LAYOUT

N
W E
S

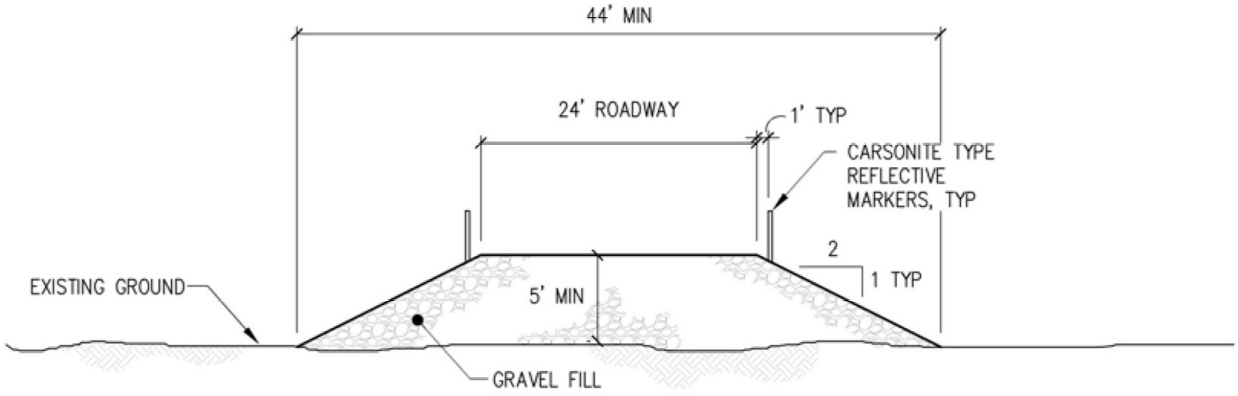
0 100 200



TYPICAL GRAVEL ACCESS ROAD SECTION



TYPICAL GRAVEL INFIELD ROAD SECTION



TYPICAL GRAVEL BOAT RAMP & WATER SOURCE ACCESS ROAD SECTION

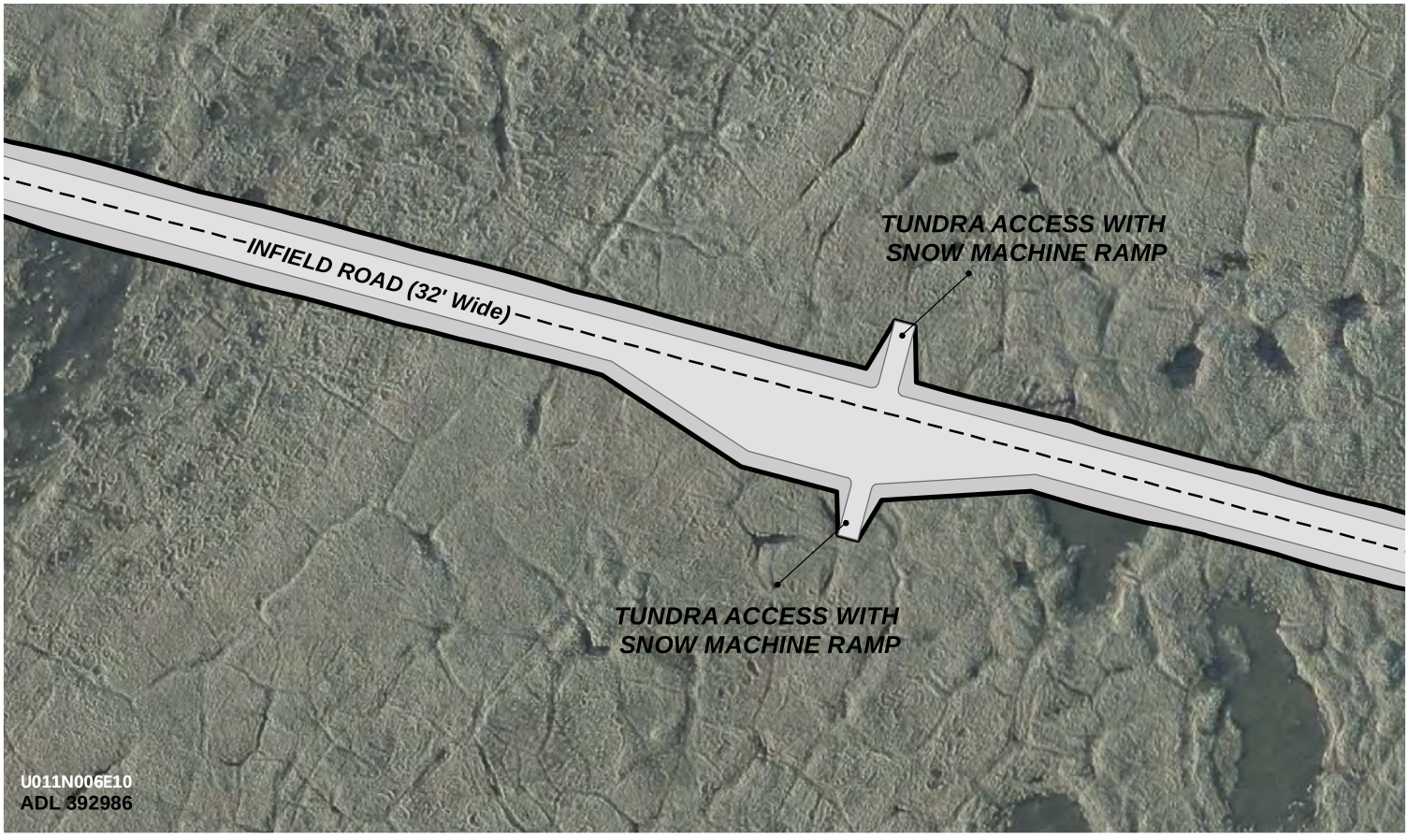
OIL SEARCH ALASKA LLC.

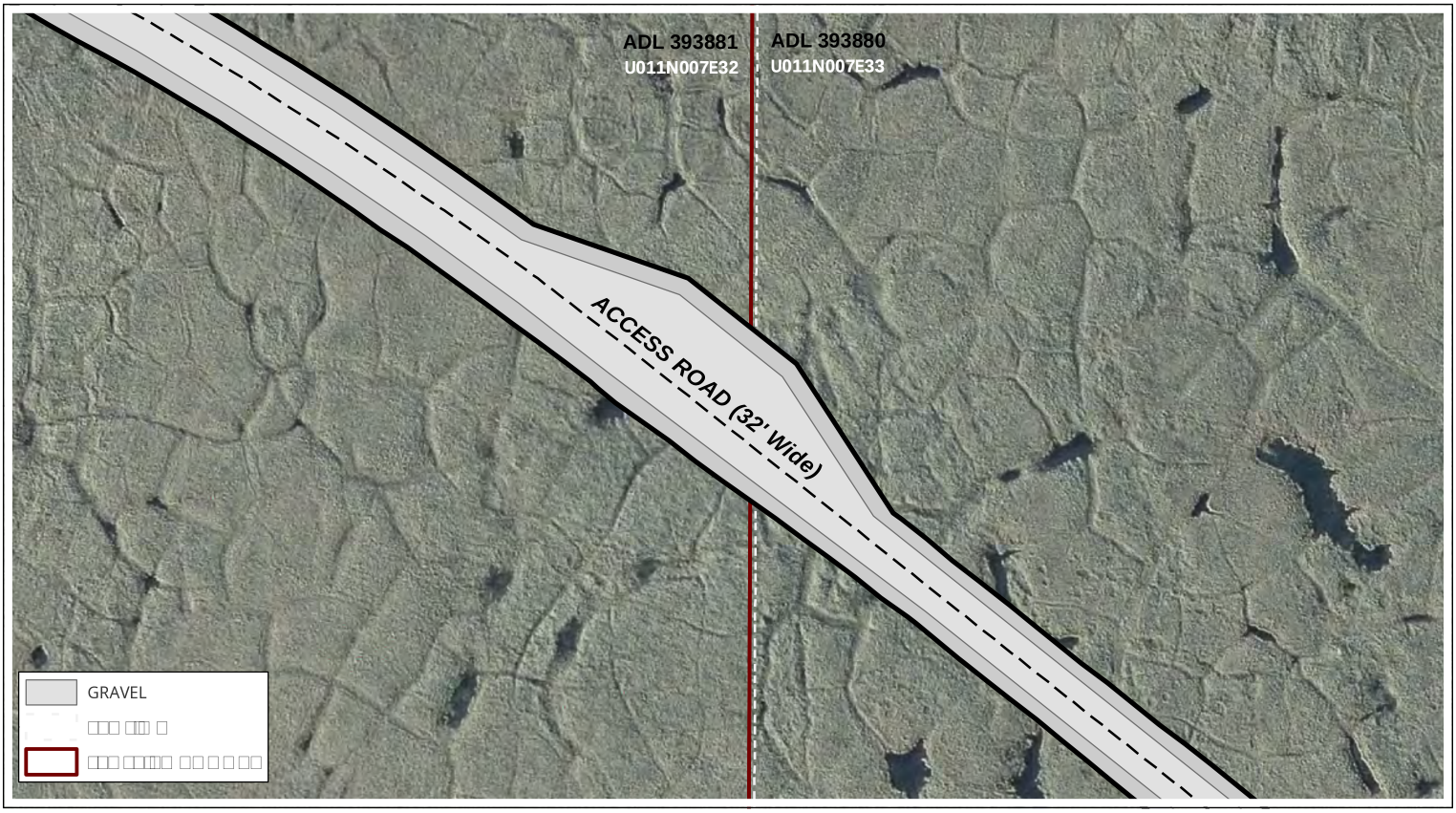
NANUSHUK PROJECT

TYPICAL ROAD SECTIONS

Figure 14

DATE: 2/19/2019. REV: 1.0. By: JB





OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

TYPES OF TURNOUTS

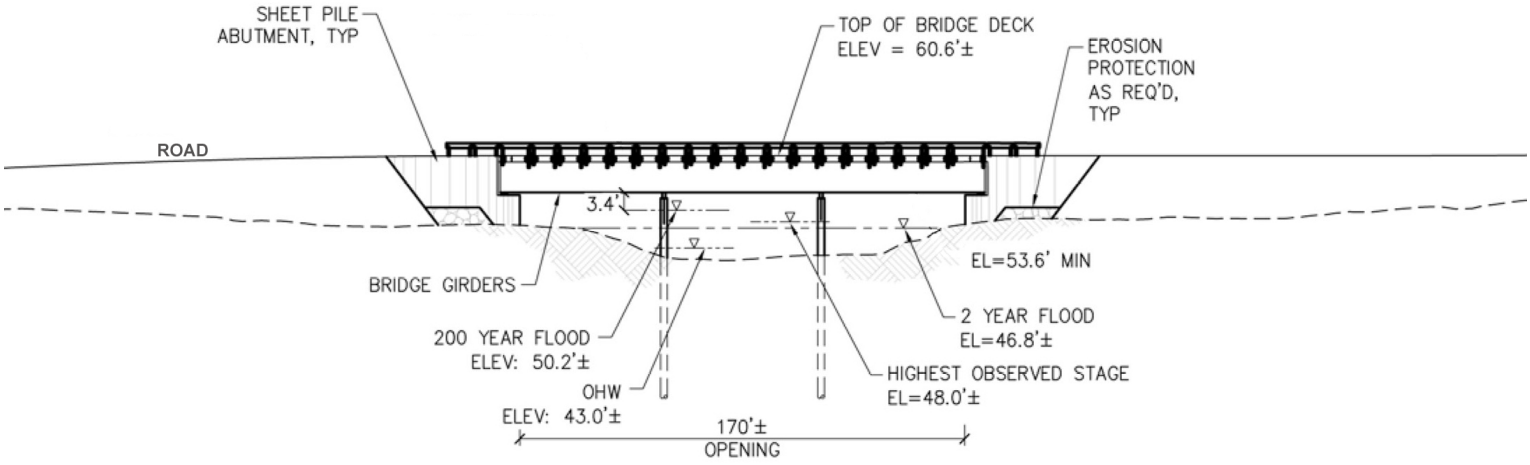
Figure 15

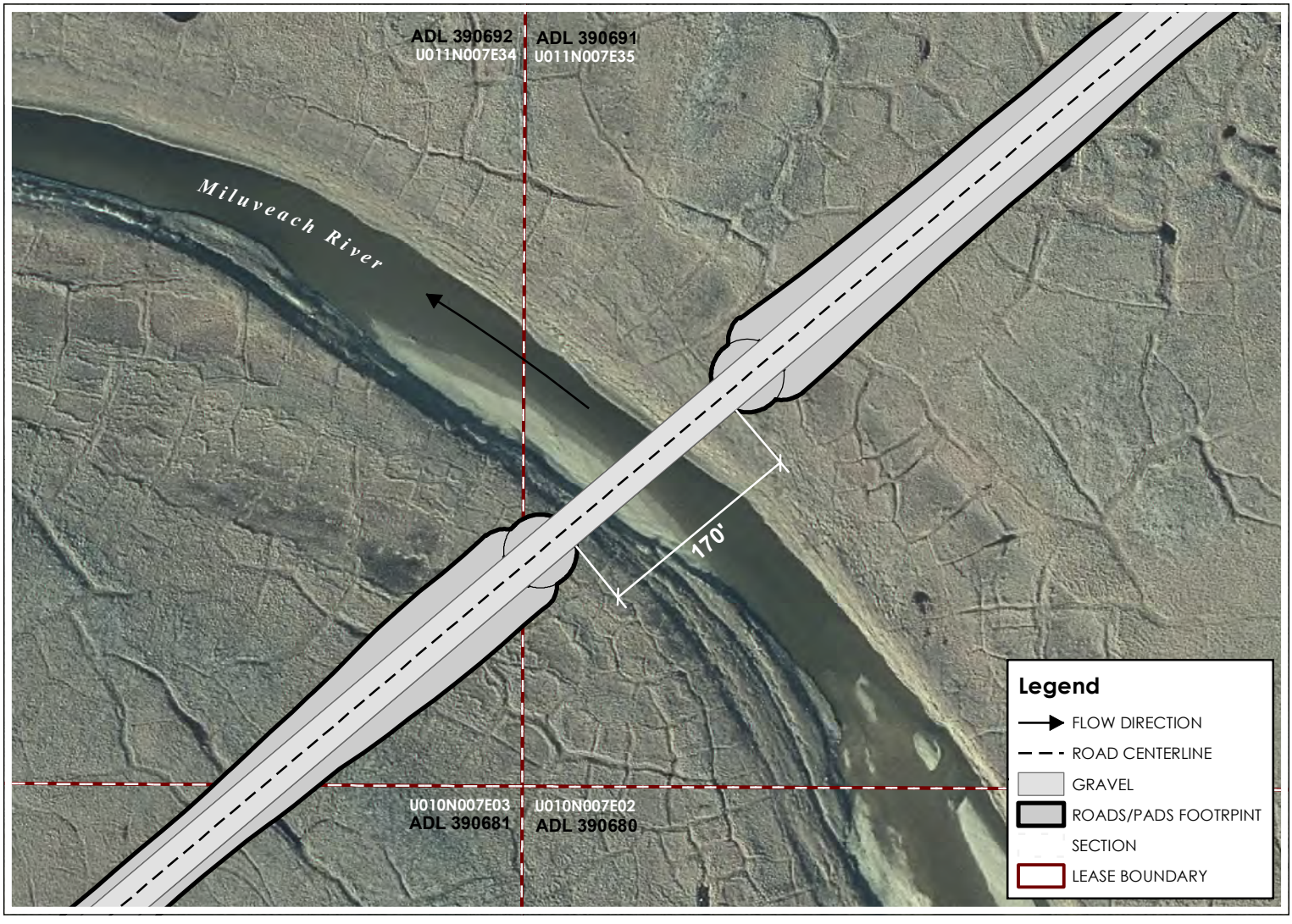
GC : NAD 1983 St ePlane 4 5004 Feet
DATE: 5/ 2019 REV: 10 JB
Document name -M_ M_ r

0 25 0 100
eet
M r
0 0 0

N W E S

Oil Search





OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

MILUVEACH RIVER BRIDGE

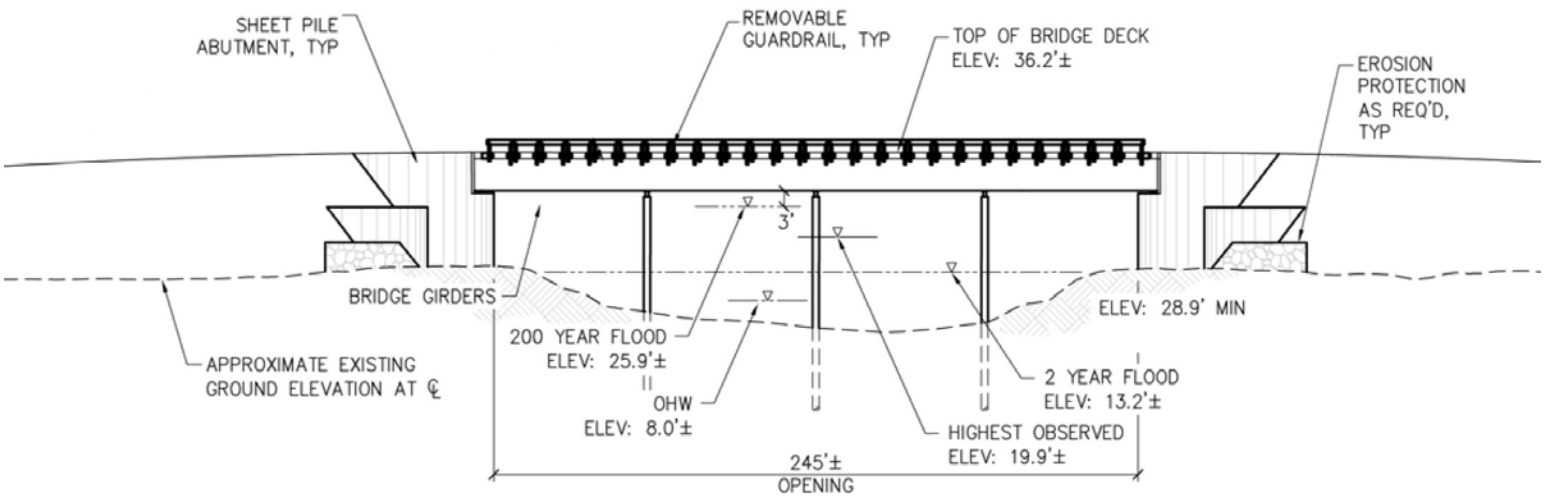
Figure 16

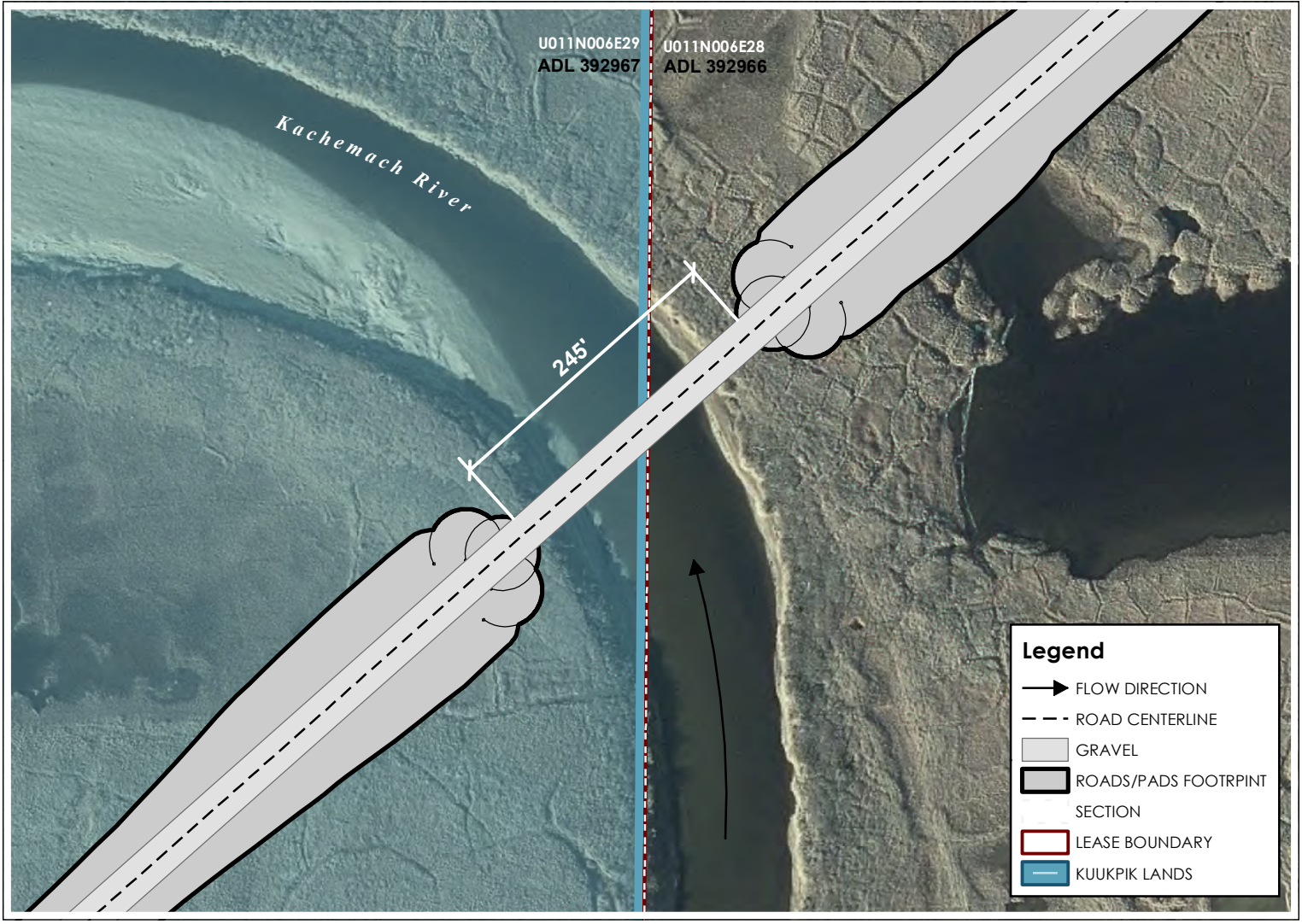
GCS: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet
DATE: 5/8/2019. REV: 1.0. By: JB
Document name: DEV-PE-DF-M_NSBMP_Miluveach

N W E S

0 25 50 100 Feet

0 20 40 Meters





Oil Search

OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

KACHEMACH RIVER BRIDGE

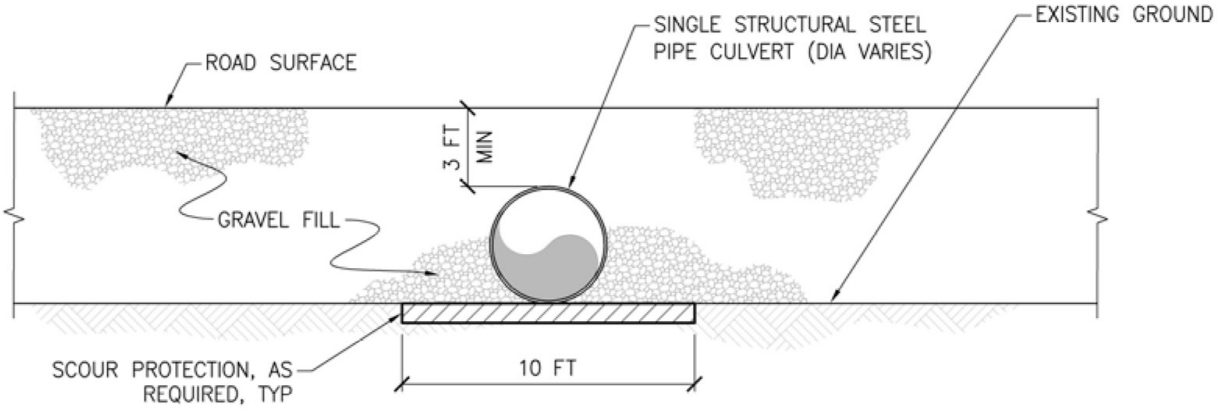
Figure 17

GCS: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet
DATE: 5/8/2019. REV: 1.0. By: JB
Document name: DEV-PE-DF-M_NSBMP_Kachemach

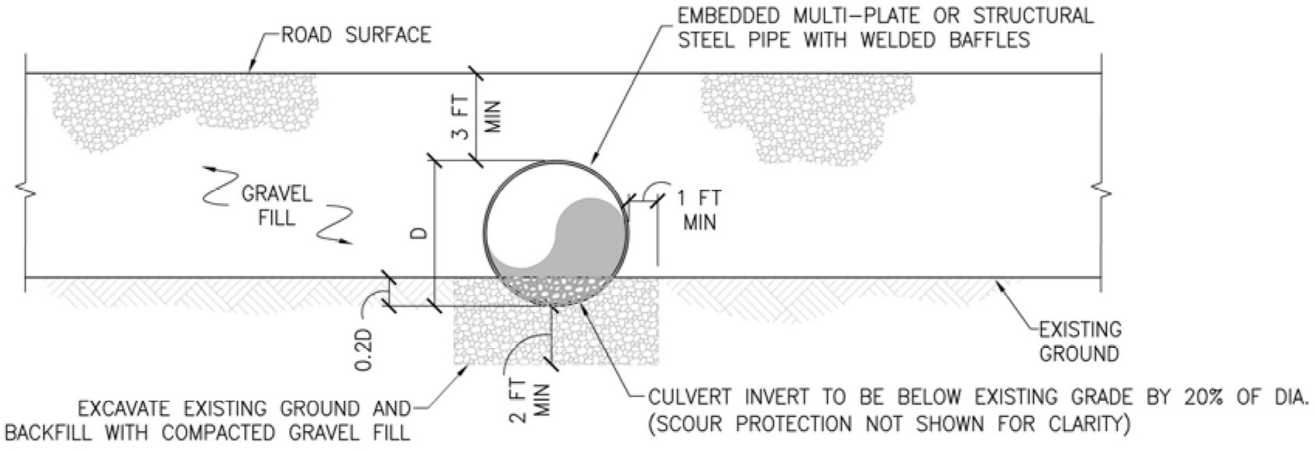
N W E S

0 25 50 100 Feet

0 20 40 Meters



TYPICAL SINGLE CULVERT ELEVATION



TYPICAL FISH PASSAGE CULVERT DETAIL

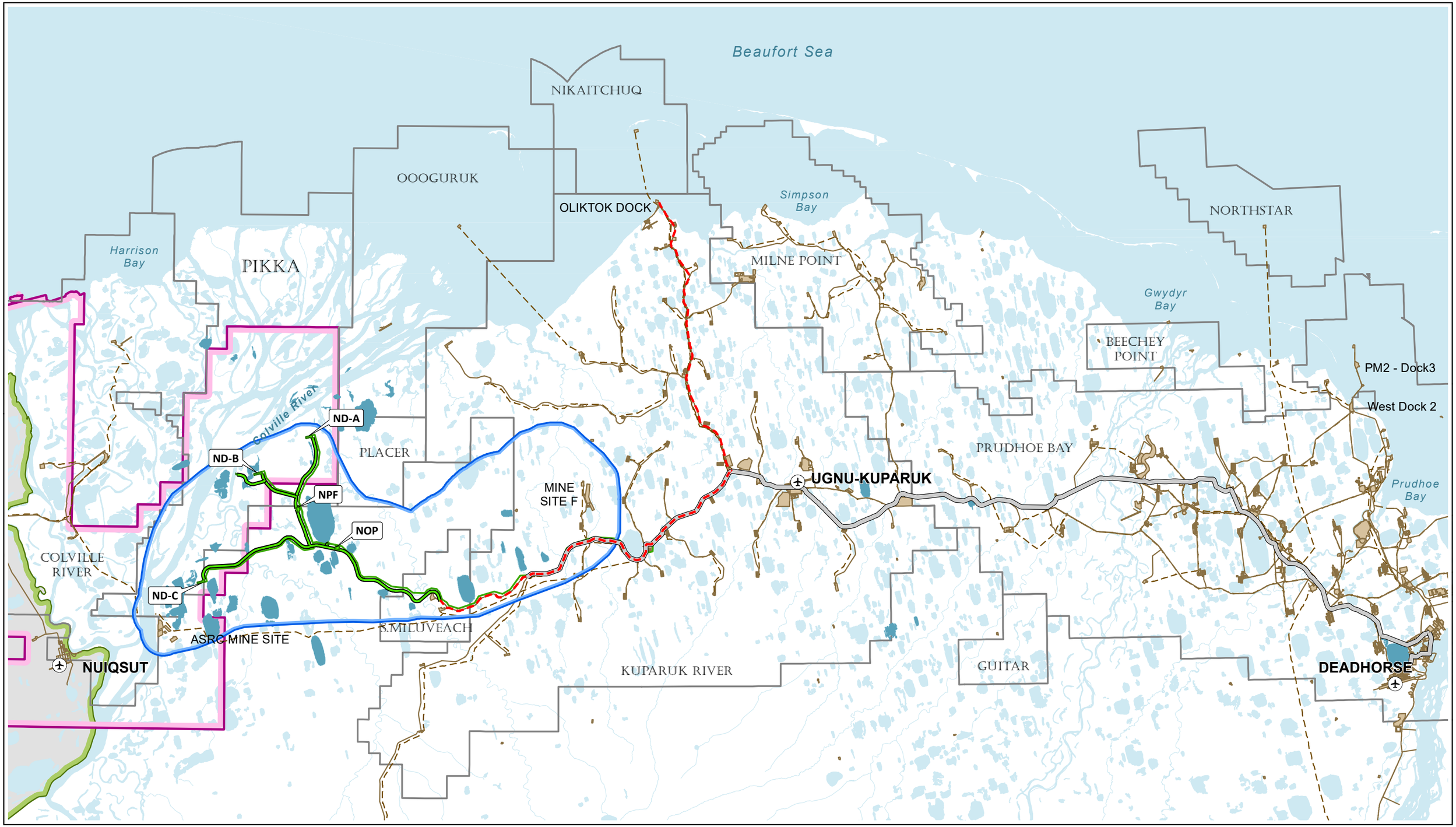
OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

CULVERT TYPES

Figure 18

DATE: 2/10/2019. REV: 1.0. By: JB



Oil Search

- ACTIVE AIRPORT
- SEALIFT ROUTE (Short Use)
- MAIN GROUND TRANSPORTATION ROUTE (Deadhorse-to-Mustang)
- ICE ROADS AREA
- PROJECT FACILITIES
- PROJECT GRAVEL ROADS
- PROJECT PIPELINE SYSTEMS
- EXISTING GRAVEL PAD
- EXISTING GRAVEL ROAD
- EXISTING PIPELINES
- PRODUCTION UNIT
- KUUKPIK BOUNDARY
- LAKE W/ACTIVE TWUA

OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

MAIN TRANSPORTATION ROUTES OVERVIEW

Figure 19

N W E S

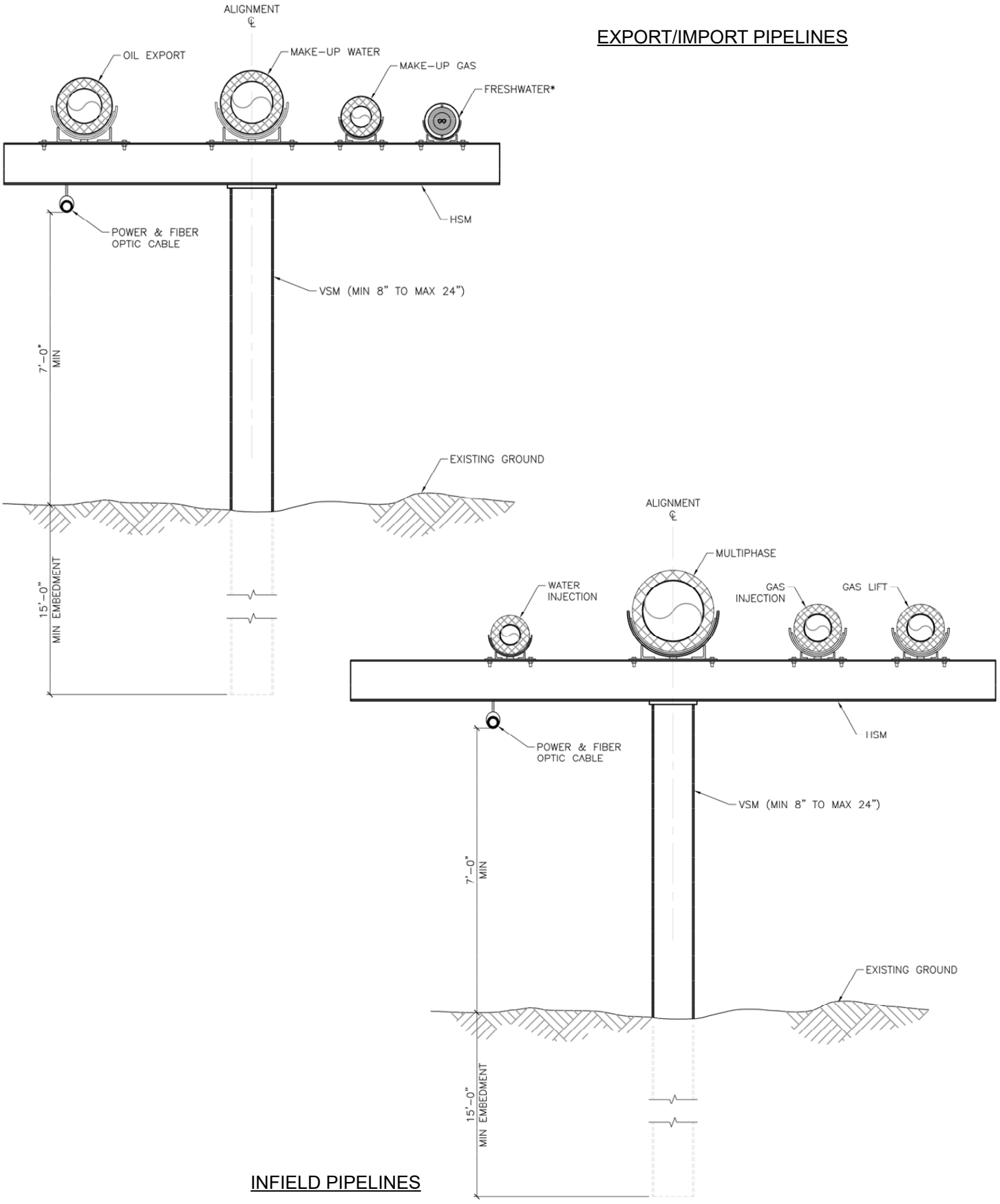
0 1 2 Miles

0 2 4 Kilometers

GCS: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

DATE: 5/8/2019. REV: 2.0. By: JB

Document name: DEV-PE-DF-M_NSBMP_transportationMap_11x17



OIL SEARCH ALASKA LLC.

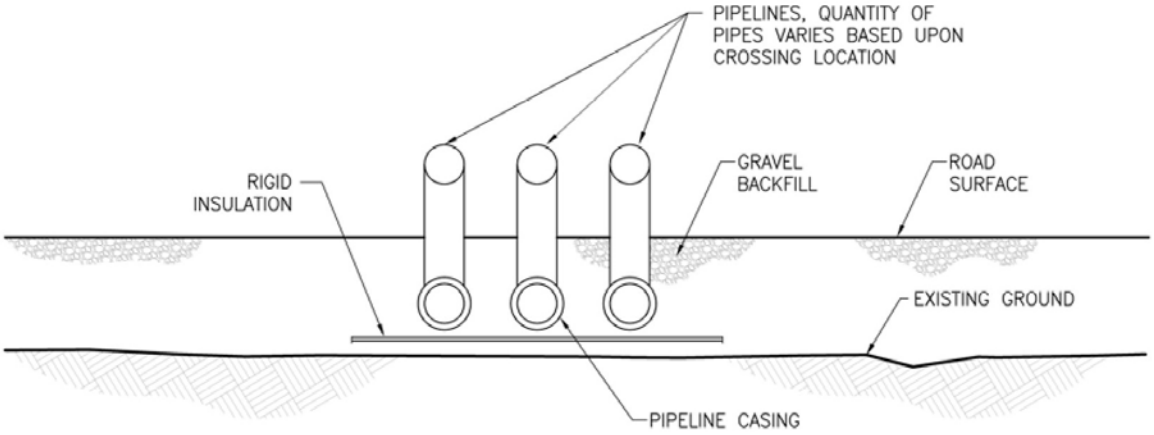
NANUSHUK PROJECT

PROJECT TYPICAL PIPELINES

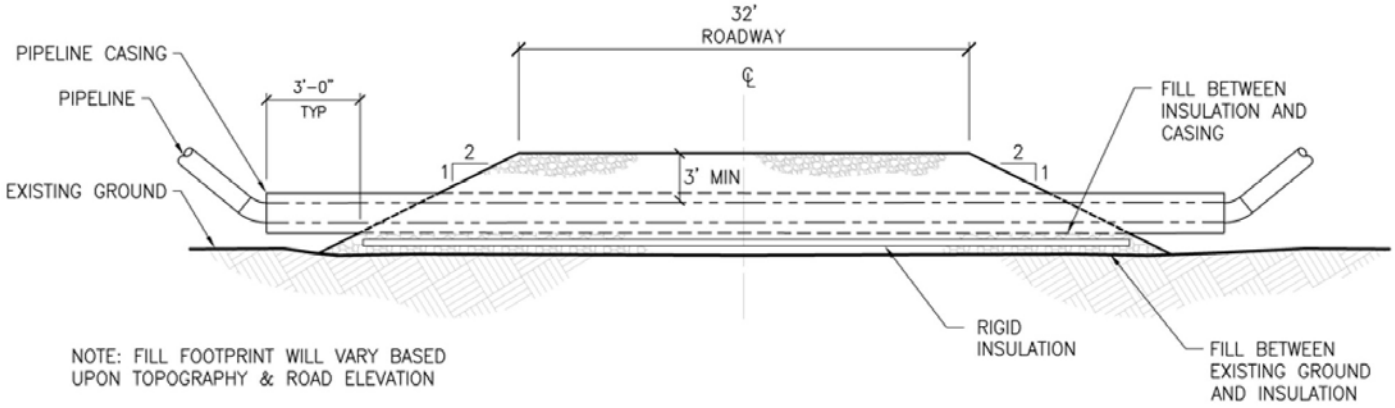
Figure 20

DATE: 2/28/2019. REV: 1.0. By: JB

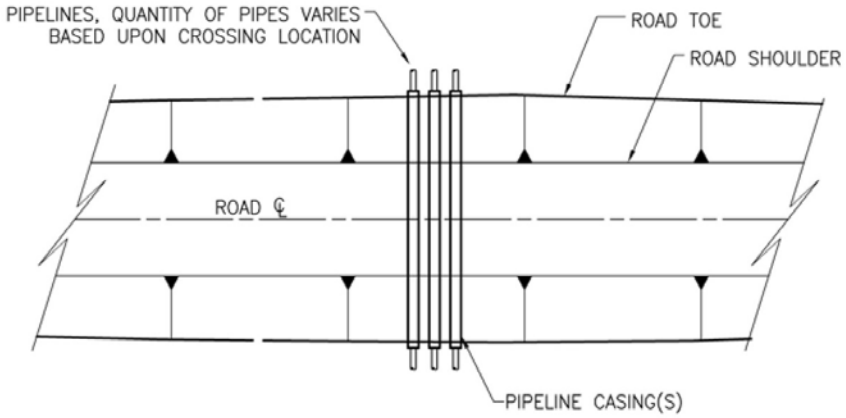
Oil Search



PROPOSED ROAD PIPELINE CROSSING PROFILE



PROPOSED ROAD PIPELINE CROSSING SECTION



PROPOSED ROAD PIPELINE CROSSING PLAN

OIL SEARCH ALASKA LLC.

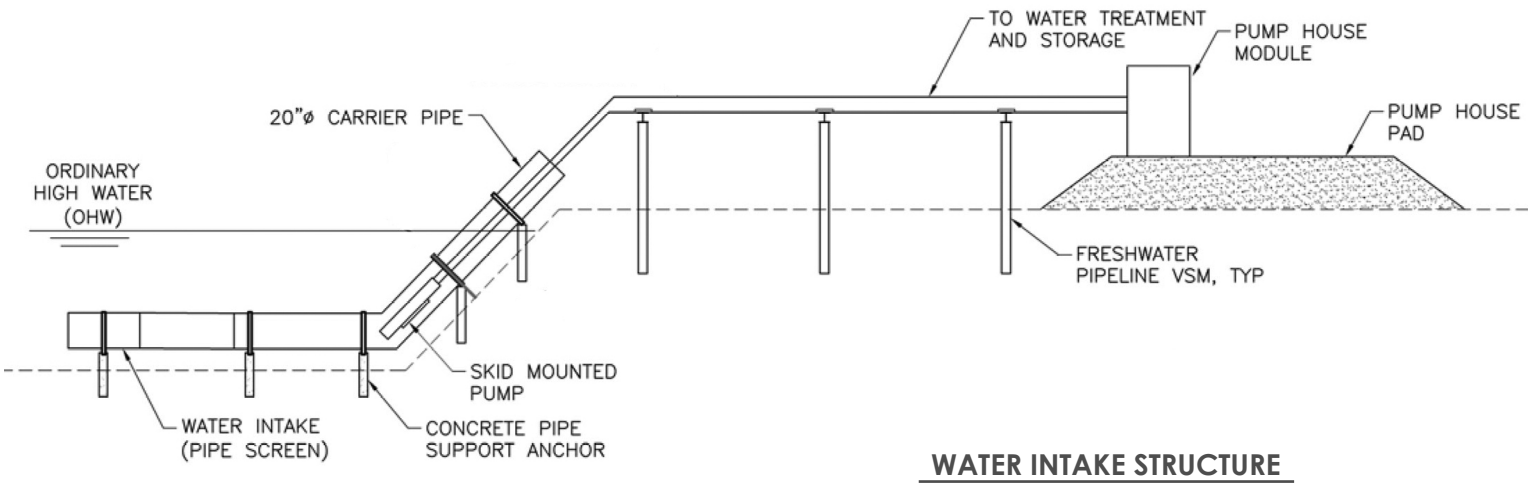
NANUSHUK PROJECT

TYPICAL PIPELINE ROAD CROSSING

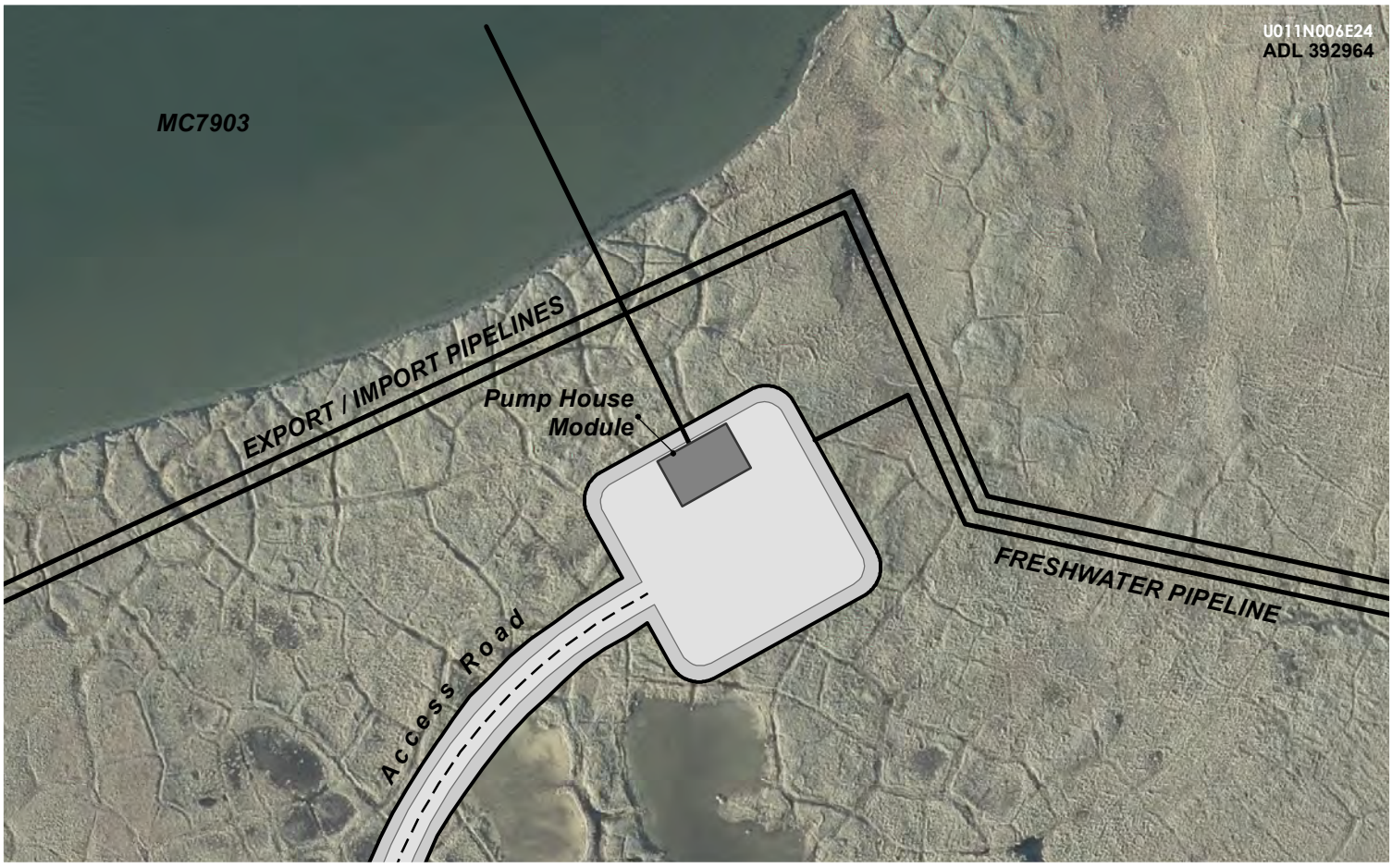
Figure 21

DATE: 2/28/2019. REV: 1.0. By: JB

Oil Search



WATER INTAKE STRUCTURE



OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

WATER INTAKE AND PUMP HOUSE

Figure 22

GCS: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet
DATE: 5/8/2019. REV: 1.0. By: JB
Document name: DEV-PE-DF-M_NSBMP_PumpPad

0 25 50 100
Feet
Meters
0 20 40

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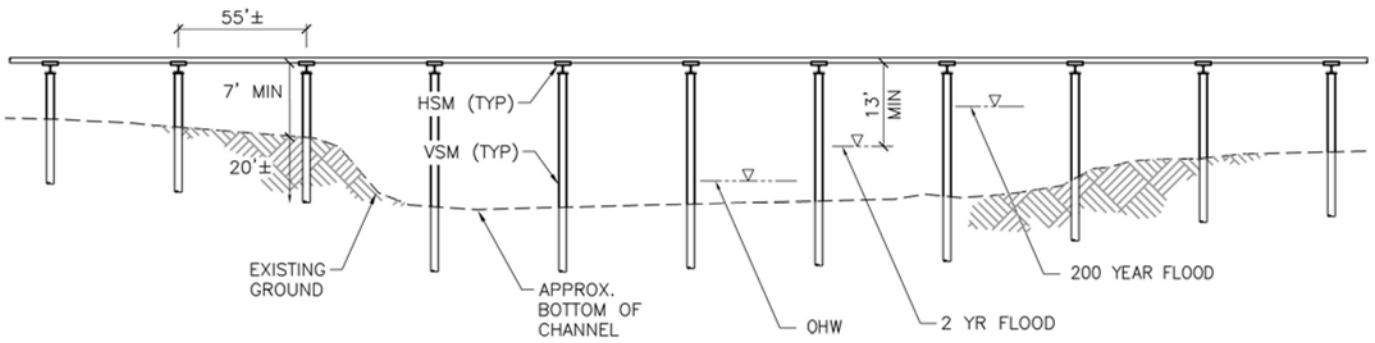
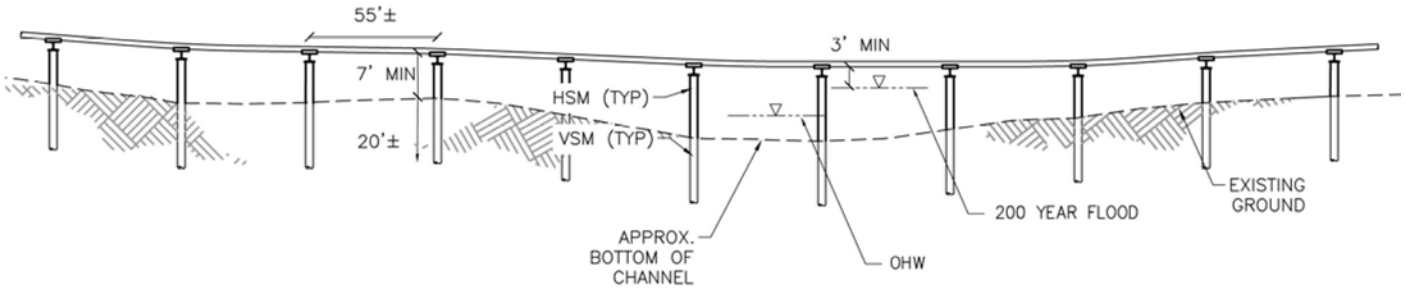


KACHEMACH RIVER PIPELINE CROSSING

NOTE:
1. KACHEMACH BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF THIRTEEN (13) FEET ABOVE THE 2-YEAR FLOOD, THREE (3) FEET ABOVE HIGHEST PREDICTED ELEVATION OF THE 200-YEAR FLOOD, OR THE MAXIMUM OBSERVED STATE ELEVATION PLUS THREE (3) FEET, WHICHEVER IS GREATER.



MILUVEACH RIVER PIPELINE CROSSING

NOTES:
1. MILUVEACH BRIDGE BOTTOM OF PIPE ELEVATION WILL BE A MINIMUM THREE (3) FEET ABOVE THE HIGHEST OF THE PREDICTED ELEVATION FROM THE 200-YEAR FLOOD OR STORM SURGE, OR THE HIGHEST RECORDED HISTORICAL WATER SURFACE ELEVATION.
2. PIPELINE CROSSING PROFILES ARE BASED UPON TOPOGRAPHIC SURVEY DATA.
3. PILE EMBEDMENT DEPTHS, DIAMETERS, AND SPACING MAY VARY DEPENDING UPON SITE CONDITIONS AND FINAL DESIGN CONSIDERATIONS.

Oil Search

OIL SEARCH ALASKA LLC.

NANUSHUK PROJECT

PIPELINE RIVER CROSSINGS

Figure 23

DATE: 2/10/2019. REV: 1.0. By: JB

OIL SEARCH ALASKA LLC.

□□□ □□□ □□□□□ □□□ □

OLIKTOK DOCK SCREEDING AREA

□□□r□□□

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Oil Search

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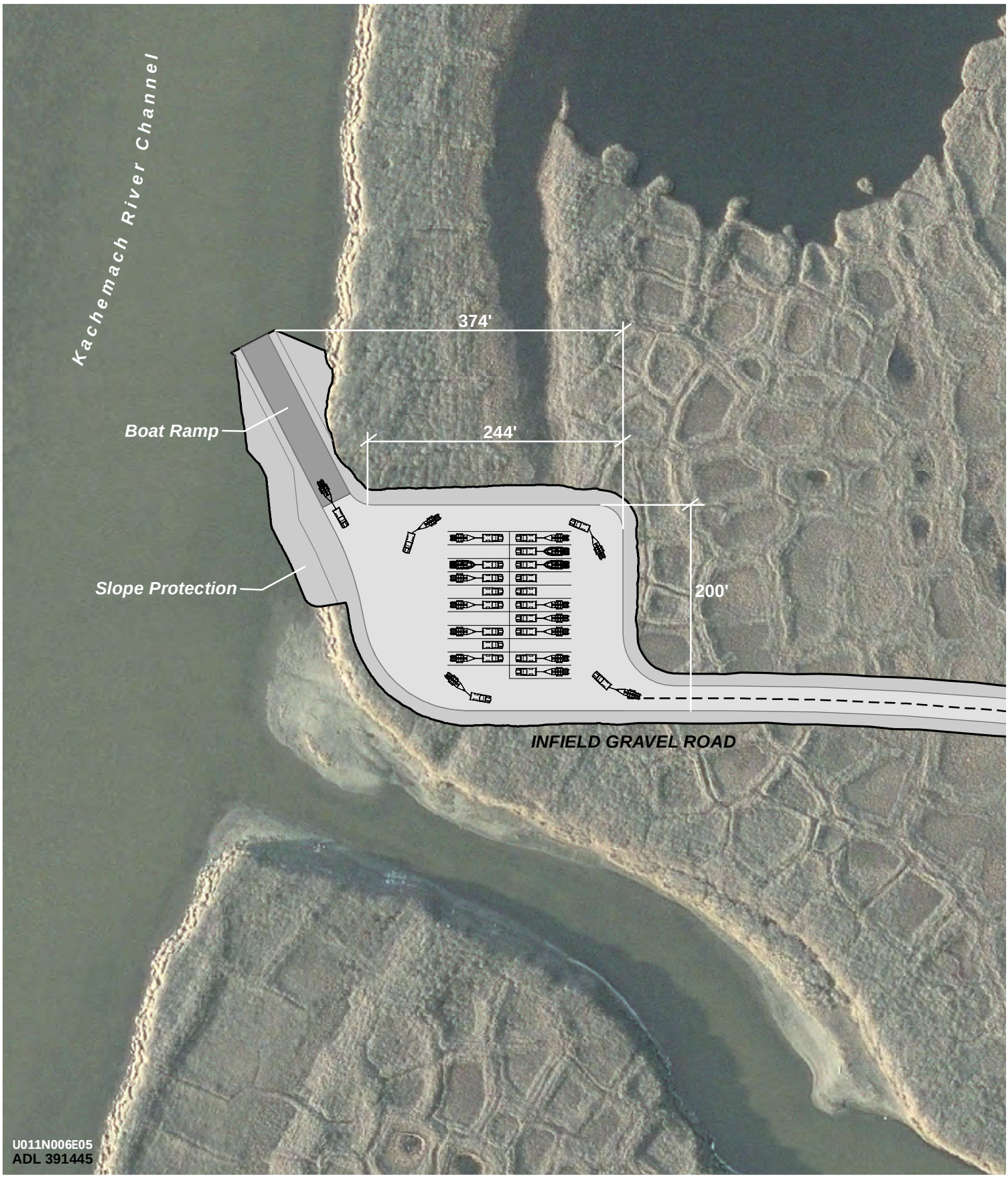

Oil Search

OIL SEARCH ALASKA LLC.

BOAT RAMP LAYOUT

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Appendix B
Mitigation Measures

Alaska Department of Natural Resources
Division of Oil & Gas
550 W 7th Ave. Suite 800
Anchorage, Alaska 99501

Revised: 4/18/2018

MITIGATION MEASURE ANALYSIS: NORTH SLOPE

The following instructions are provided for guidance to adequately complete the Mitigation Measure Analysis form.

1. The applicant shall respond to each Mitigation Measure, and all subsets of mitigation measures; i.e. A.2.d.i should be addressed and A.2.d.ii, and so forth.

2. The applicant's response shall begin by clearly indicating if the **mitigation measure is satisfied**, an **exception is requested**, or if the mitigation measure is **not applicable**.

3. The applicants' response shall then address how the proposed project clearly satisfies the mitigation measure, meets the intent of the mitigation measure, is not practicable, or is not applicable.

4. The applicant shall verify working 'in consultation with' parties other than Department of Natural Resources (DNR), Division of Oil and Gas (DO&G) by reporting meeting dates and parties present for Mitigation Measures which require consultation with parties other than DNR, DO&G; i.e. Mitigation Measure 1.b.

Please note that this form, along with the Plan of Operations Application form and the Plan of Operations, must be adequately completed before DNR DO&G will review an application for potential approval.

NORTH SLOPE **A. Mitigation Measures**	**Company Response**
1. Facilities and Operations	
a. Oil and gas facilities, including pipelines, shall be designed using industry-accepted engineering codes and standards. Technical submittals to the Division of Oil and Gas (DO&G) that reflect the "practice of engineering," as defined by AS 08.48.341, must be sealed by a professional engineer registered in the State of Alaska.	A.1.a. Mitigation measure is satisfied. Industry accepted codes and standards will be used in all designs. All submittals will reflect the "practice of engineering."
b. A plan of operations shall be submitted and approved before conducting exploration, development, or production activities in accordance with 11 AAC 83.	A.1.b. Mitigation measure is satisfied. The Oil Search (Alaska), LLC (OSA) Nanushuk Plan of Operations is being submitted with this analysis.
c. Facilities shall be designed and operated to minimize sight and sound impacts in areas of high residential, recreational, and subsistence use and important wildlife habitat.	A.1.c. Mitigation measure is satisfied. OSA coordinates with local interests to ensure that potential impacts to subsistence users are minimized. OSA is obtaining applicable permits from ADNR, ADF&G, ADEC, NSB, and other federal, state, and local agencies.
d. The siting of facilities, including roads, airstrips, and pipelines, is prohibited within one-half mile of the coast as measured from the mean high water mark and 500 feet of all fish bearing waterbodies.	A.1.d. Exception is requested. Project facilities are further than one-half mile of the coast. There are 8 fish bearing waterbodies within 500 feet of Project infrastructure. The gravel fill footprint will be minimized within 500 feet of fish bearing waterbodies, where practicable.
e. Notwithstanding (d) above, the siting of facilities is prohibited within one-half mile of the banks of the Colville, Canning, Sagavanirktok, Kavik, Shaviovik, Kadleroshilik, Echooka, Ivishak, Kuparuk, Toolik, Anaktuvuk and Chandler Rivers as measured from the ordinary high water mark. Facilities may be sited, on a case-by-case basis, within the	A.1.e. Mitigation measure is satisfied. No Project facilities will be located within one-half mile of any of the river banks listed. The banks of the Colville River are further than one-

one-half mile buffer if the lessee demonstrates that siting of such facilities outside this buffer zone is not feasible or prudent, or that a location within the buffer is environmentally preferable.	half mile from all three Project drill sites. Gravel roads and pads are located outside of the 0.5-mile setback from the Colville River, to the extent practicable, minimizing potential impacts to the watershed and subsistence users in the project vicinity.
f. No facilities will be sited within one-half mile of identified Dolly Varden overwintering and/or spawning areas on the Canning, Shaviovik, and Kavik rivers. Notwithstanding the previous sentence, road and pipeline crossings may only be sited within these buffers if the lessee demonstrates to the satisfaction of the Director and Alaska Department of Fish and Game (ADF&G) in the course of obtaining their respective permits, that either (1) the scientific data indicate the proposed crossing is not within an overwintering or spawning area; or (2) the proposed road or pipeline crossing will have no significant adverse impact to Dolly Varden overwintering or spawning habitat.	A.1.f. Not applicable. OSA's project winter activities are not located within these drainages.
g. Impacts to important wetlands shall be minimized to the satisfaction of the Director, in consultation with ADF&G and Alaska Department of Environmental Conservation (ADEC). The Director will consider whether facilities are sited in the least sensitive areas.	A.1.g. Mitigation measure is satisfied. See the Applicant's Proposed Mitigation Statement (submitted to the US Army Corps of Engineers 5 October 2018) for a description of all of the avoidance and minimization measures that will be taken to mitigate impacts to wetlands.
h. Exploration roads, pads, and airstrips shall be temporary and constructed of ice. Use of gravel roads, pads, and airstrips may be permitted on a case-by-case basis by the Director, in consultation with Division of Mining, Land, and Water (DMLW) and ADF&G.	A.1.h. Not applicable. This is not an exploration project.
i. Road and pipeline crossings shall be aligned perpendicular or near perpendicular to watercourses.	A.1.i. Mitigation measure is satisfied. Where natural drainage patterns are crossed, roads will be designed perpendicular to the general flow direction to the extent practicable. All pipelines, horizontal support members (HSMs), and suspended cables will be elevated at river crossings to maintain adequate freeboard.

j. Pipelines i. Shall use existing transportation corridors and be buried where soil and geophysical conditions permit. ii. In areas with above ground placement, pipelines shall be designed, sited, and constructed to allow for the free movement of wildlife and to avoid significant alteration of caribou and other large ungulate movement and migration patterns. iii. At a minimum, above ground pipelines shall be elevated seven feet, as measured from the ground to the bottom of the pipeline, except where the pipeline intersects a road, pad, or a ramp installed to facilitate wildlife passage. A lessee shall consider snow depth in relation to pipe elevation to ensure adequate clearance for wildlife. iv. Pipelines and gravel pads shall facilitate the containment and cleanup of spilled fluids.	A.1.j. Mitigation measure is satisfied. A.1.h.i. The proposed pipelines will parallel existing pipeline and/or gravel roads where feasible. The Nanushuk Pipeline infrastructure will be located parallel to the proposed access road and Mustang access road between the Nanushuk Processing Facility (NPF) and Kuparuk drill site 2M (DS2M). Between DS2M and the tie-in pad near Kuparuk CPF2, the Nanushuk Pipeline will parallel existing pipelines and/or gravel roads associated with the Kuparuk River Unit. Pipelines will be above ground, and not buried, to minimize impacts to permafrost. All pipelines will rest on HSMs supported by one or two 8- to 24-inch-diameter pipe pile vertical support members (VSMs) spaced approximately 55 to 60 feet apart. A.1.j.ii. Roads and pipelines will be separated by a minimum of 500 feet, where feasible, to minimize caribou disturbance and excessive snow drift accumulation and reduce the risk of vehicle impacts to the pipeline. A.1.j.iii. All pipelines, HSMs, and suspended cables will be a minimum of 7 feet above the tundra surface, except where pipelines intersect a road or pad. A. 1.j.iv OSA will design and develop the Project to avoid and minimize the possibility of spills. Spill prevention measures considered throughout the design and engineering phase include a maintenance and inspection program as well as an employee spill prevention training program. All fuels and hazardous substances used by the Project will be handled by qualified persons and stored on site in compliance with state and federal regulatory guidance and the Project's ODPCP and SPCC. All fuels and chemicals will be stored in appropriate primary containment. Secondary containment areas will be designed in compliance with all applicable permits and regulations. Additional details are provided in Section VIII of the Plan of Operations.
k. Causeways and docks shall not be located in river mouths or deltas. Approved causeways shall be designed, sited, and constructed to prevent significant changes to	A.1.k. Not applicable

nearshore oceanographic circulation patterns and water quality characteristics (e.g., salinity, temperature, suspended sediments) that result in exceedances of water quality criteria, and must maintain free passage of marine and anadromous fish.	No causeways or docks will be located in river mouths or deltas.
l. Artificial gravel islands and bottom founded structures shall not be located in river mouths or active stream channels on river deltas, except as provided for in (m) below.	A.1.l. Not applicable No artificial gravel islands or bottom founded structures are proposed as part of the activities.
m. Each proposed structure will be reviewed on a case-by-case basis. Causeways, docks, artificial gravel islands and bottom founded structures may be permitted if the Director, in consultation with ADF&G and ADEC, determines that a causeway or other structures are necessary for field development and that no practicable alternatives exist. A monitoring program may be required to address the objectives of water quality and free passage of fish, and mitigation shall be required where significant deviation from objectives occurs.	A.1.m. Not applicable No causeways, docks, artificial gravel islands or bottom founded structures will be constructed for the Project.
n. Upon abandonment of material sites, drilling sites, roads, buildings or other facilities, such facilities must be removed and the site rehabilitated to the satisfaction of the Director, unless the Director and any non-state surface owner, determines that such removal and rehabilitation is not in the state's interest.	A.1.n. Mitigation measure is satisfied. Upon completion of project activities and in compliance with permit and lease requirements, OSA will commence dismantlement, removal, and rehabilitation (DR&R) activities, which are generally expected to include: •Notification and coordination with Kuukpik Corporation, ADNR, NSB, and other regulatory agencies to discuss specific DR&R requirements and timeframes. •Plugging and abandonment of wells in accordance with general industry best practices and compliance with Alaska Oil and Gas Conservation Commission (AOGCC) regulations. Abandonment of specific wells may occur throughout the life of the Project. •Development of a restoration plan that includes required elements identified by permitting agencies. •Dismantlement and removal of installed equipment and infrastructure, unless coordination with landowners or agencies indicates otherwise. •Enactment of restoration activities identified in the restoration plan in accordance with goals and objectives identified in the plan.

	The timeframe of these activities will be identified through coordination with landowners and agencies.
o. Material sites required for exploration and development activities shall be: i. restricted to the minimum necessary to develop the field efficiently and with minimal environmental damage, ii. where practicable, designed and constructed to function as water reservoirs for future use, and iii. located outside active floodplains of a watercourse unless the Director DMLW, after consultation with ADF&G, determines that there is no practicable alternative, or that a floodplain site would enhance fish and wildlife habitat after mining operations are completed and the site is closed.	A.1.o. Not applicable A.1.o.i. Not applicable A.1.o.ii. Not applicable A.1.o.iii. Not applicable Gravel material for project development will be sourced from one or more existing gravel mine sites, which will be permitted and operated independently of the Project.
p. The Director may include plan stipulations if necessary to reduce or eliminate adverse impacts to fish and wildlife or to protect the environment.	A.1.p. Comment noted
2. Fish and Wildlife Habitat	
a. The lessee shall consult with the North Slope Borough (NSB) before proposing the use of explosives for seismic surveys. The Director may approve the use of explosives for seismic surveys after consultation with the NSB.	A.2.a. Not applicable Use of explosives is not part of the proposed operations.
b. Any water intake structures in fish bearing or non-fish bearing waters shall be designed, operated, and maintained to prevent fish entrapment, entrainment, or injury. All water withdrawal equipment must be equipped and must use fish screening devices approved by ADF&G.	A.2.b. Mitigation measure is satisfied. OSA will obtain Fish Habitat Permits from ADF&G for water withdrawal from fish-bearing water bodies. OSA will adhere to water intake stipulations, including screen size and velocity requirements.

c. Removal of snow from fish-bearing rivers, streams, and natural lakes shall be subject to prior written approval by ADF&G. Compaction of snow cover overlying fish-bearing waterbodies is prohibited except for approved crossings. If ice thickness is not sufficient to facilitate a crossing, then ice or snow bridges may be required.	A.2.c. Mitigation measure is satisfied. All activities in fish-bearing water bodies will be authorized under ADF&G Fish Habitat Permits. Crossings of fish streams will be at approved crossing locations. Where necessary, ice or snow bridges will be constructed. In accordance with permits, ice road crossings of designated streams and rivers will be slotted, breached, or weakened upon completion of use.
d. Bears: i. Brown bears A. A lessee must consult with ADF&G before commencing any activities to identify the locations of known brown bear den sites that are occupied in the season of proposed activities. B. Exploration and production activities shall not be conducted within one-half mile of occupied brown bear dens unless alternative mitigation measures are approved by ADF&G. C. A lessee who encounters an occupied brown bear den not previously identified by ADF&G shall report it to the Division of Wildlife Conservation, ADF&G, within 24 hours. The lessee will avoid conducting mobile activities one-half mile from discovered occupied dens unless alternative mitigation measures are approved by the Director, with concurrence from ADF&G. Non-mobile facilities will not be required to relocate. ii. Polar bears A. Consultation with the US Fish and Wildlife Service (USFWS) is required prior to commencement of any activities as required by the Endangered Species Act, and also to identify the locations of known polar bear den sites.	A.2.d. Mitigation measure is satisfied. A.2.d.i. A.2.d.i.A. OSA will consult with ADF&G to identify locations of known brown bear den sites. A.2.d.i.B. If occupied den sites are identified within 0.5 miles of proposed activities, they will either be avoided or, in consultation with ADF&G, alternate mitigation measures may be employed. A.2.d.i.C. If occupied den sites are identified they will be reported to the Division of Wildlife Conservation. If dens are discovered within 0.5 miles of proposed activities, consultation with ADF&G will be initiated and alternate mitigation measures may be employed. A.2.d.ii. A.2.d.ii.A. OSA will consult with the United States Fish and Wildlife Service (USFWS) to identify the locations of known polar bear den sites. A maternal den survey will be conducted to identify these areas as necessary. OSA will work with USFWS to identify and implement the appropriate mitigation measures. Letters of Authorization (LOA) for incidental and intentional take of polar bears will be obtained from USFWS. A.2.d.ii.B. Known occupied den sites will be avoided by at least one mile.

B. Operations shall avoid known polar bear dens by at least one mile. C. A lessee who encounters an occupied polar bear den not previously identified by USFWS shall report it to the USFWS within 24 hours and subsequently avoid the new den by at least one mile. D. If a polar bear should den within an existing development, off-site activities shall be restricted to minimize disturbance. iii. For projects in proximity to areas frequented by bears, the lessee is required to prepare and implement a human-bear interaction plan designed to minimize conflicts between bears and humans. The plan shall include measures to: A. minimize attraction of bears to facility sites; B. organize layout of buildings and work areas to minimize interactions between humans and bears; C. warn personnel of bears near or on facilities and the proper actions to take; D. if authorized, deter bears from the drill site; E. provide contingencies in the event bears do not leave the site; F. discuss proper storage and disposal of materials that may be toxic to bears; and G. provide a systematic record of bears on the site and in the immediate area.	A.2.d.ii.C. Occupied den sites will be avoided and all sightings will be reported to USFWS. A.2.d.ii.D. OSA will work with the USFWS to identify and implement the appropriate mitigation measures to minimize disturbance if a polar bear should den within offsite activities. A.2.d.iii. As part of the LOA application and other state/local permits, a human-bear/wildlife interaction plan will be developed which will identify measures to: A.2.d.iii.A. minimize attraction of bears to facility sites through proper waste management procedures; A.2.d.iii.B. organize layout of buildings and work areas to minimize interactions between humans and bears by minimizing hiding places or areas of poor visibility; A.2.d.iii.C. warn personnel of bears near or on facilities and the proper actions to take through pre-determined notification procedures; A.2.d.iii.D. deter bears from the drill sites and other facilities by using trained Security staff; A.2.d.iii.E. if deterrence activities are unsuccessful trained Security staff will monitor the bear's location, workers will be instructed to avoid the area, and the Project will coordinate with ADF&G and the USFWS on alternative actions; A.2.d.iii.F. discuss proper storage and disposal of materials that may be toxic to bears through proper labeling, storage, and prompt disposal of hazardous chemicals; and A.2.d.iii.G. provide a systematic record of bears on the site and in the immediate area by immediately reporting all sightings to ADF&G and USFWS as applicable.

e. Permanent, staffed facilities shall be sited to the extent practicable outside identified brant, white-fronted goose, snow goose, tundra swan, king eider, common eider, Steller's eider, spectacled eider, and yellow-billed loon nesting and brood rearing areas.	A.2.e. Mitigation measure is satisfied. Bird nesting and brood rearing areas were considered when determining facility locations. The alternative selected will have the least negative impacts to birds, since it will have the smallest area of habitat loss and alteration, and the second-lowest disturbance and displacement of birds (See Section 3.9.6 of the Nanushuk Project FEIS 2018). Placement of new gravel fill on the tundra is not planned to occur during the bird nesting season, to minimize the potential for disturbances to nesting birds and broods.
f. The Director, in consultation with ADF&G, may impose additional and seasonal restrictions on activities located in, or requiring travel through or overflight of, important caribou or other large ungulate calving and wintering areas during the plan of operations approval stage.	A.2.f. Comment noted.
3. Subsistence, Commercial and Sport Harvest Activities	
a. Lease-related use will be restricted if necessary to prevent unreasonable conflicts with subsistence, commercial, or sport fish and wildlife harvest activities. Traditional and customary access to subsistence areas will be maintained unless reasonable alternative access is provided to subsistence users. "Reasonable access" is access using means generally available to subsistence users. Lessees will consult the NSB, nearby communities, and native organizations for assistance in identifying and contacting local subsistence users.	A.3.a. Mitigation measure is satisfied. Traditional and customary access to subsistence areas will be maintained. OSA has an ongoing stakeholder engagement program to inform the residents of Nuiqsut, including subsistence users, of proposed activities and to obtain feedback and recommendations on how these activities can be performed and to avoid conflicts with subsistence activities. Updates of planned and ongoing activities will be provided to local residents and Subsistence Representatives to ensure that activities are conducted in a manner to minimize potential impacts to local subsistence activities.
b. Before submitting a plan of operations that has the potential to disrupt subsistence activities, the lessee will consult with the potentially affected subsistence communities and the NSB (collectively "parties") to discuss the siting, timing, and methods of	A.3.b. Mitigation measure is satisfied. OSA will consult with the potentially affected subsistence communities

proposed operations and safeguards or mitigating measures that could be implemented by the operator to prevent unreasonable conflicts. The parties will also discuss the reasonably foreseeable effect on subsistence activities of any other operations in the area that they know will occur during the lessee's proposed operations. Through this consultation, the lessee will make reasonable efforts to ensure that exploration, development, and production activities are compatible with subsistence hunting and fishing activities and will not result in unreasonable interference with subsistence harvests.	and the NSB on proposed operations and measures to prevent unreasonable conflicts. The proposed activities will be on surface lands owned by Kuukpik Corporation and the State of Alaska. OSA will coordinate operations with Kuukpik Corporation. Community meetings are planned for the future. A Community Liaison is employed by OSA to provide updates of planned and ongoing activities to local residents. Subsistence Representatives will be employed by OSA to ensure that activities are conducted in a manner to minimize potential impact to local subsistence activities. Records of all concerns expressed by subsistence hunters during OSA operations will be maintained.
4. Fuel, Hazardous Substances and Waste	
a. The lessee will ensure that secondary containment is provided for the storage of fuel or hazardous substances and sized as appropriate to container type and according to governing regulatory requirements in 18 AAC 75 and 40 CFR 112. Containers with an aggregate storage capacity of greater than 55 gallons that contain fuel or hazardous substances will not be stored within 100 feet of a waterbody, or within 1,500 feet of a current surface drinking water source.	A.4.a. Exception is requested. There will be fuel and hazardous substances stored within 100 feet of a water body for drill sites ND-B and ND-C. Each of the drill sites orientation and layout were dictated by the configuration of the oil reservoirs and defined by previous exploration efforts, with consideration for site accessibility requirements, operational constraints, and stakeholder input. However, all fuel and hazardous substances used by the Project will be handled and stored on site in compliance with state and federal regulatory guidance and the Project's Oil Discharge Prevention and Contingency Plan (ODPCP) and Spill Prevention Control and Countermeasures (SPCC) Plan. All fuels and chemicals will be stored in appropriate primary containment. Secondary containment areas will be designed in compliance with all applicable permits and regulations.
b. During equipment storage or maintenance, the site must be protected from leaking or dripping fuel and hazardous substances by the placement of drip pans or other surface liners designed to catch and hold fluids under the equipment, or by creating an area for storage or maintenance using an impermeable liner or other suitable containment	A.4.b. Mitigation measure is satisfied. OSA has adopted the Alaska Safety Handbook, the North Slope Environmental Field Handbook, and the Alaska Waste Disposal and

mechanism.	Reuse Guide (Red Book) as guidance for standard operating procedures and best management practices for workplace health, safety and environmental and waste management. Drip pans or liners will be placed under parked vehicles and equipment to capture fluids.
c. During fuel or hazardous substance transfer, secondary containment or a surface liner must be placed under all container or vehicle fuel tank inlet and outlet points, hose connections, and hose ends. Appropriate spill response equipment, sufficient to respond to a spill of up to five gallons, must be on hand during any transfer or handling of fuel or hazardous substances.	A.4.c. Mitigation measure is satisfied. Fuel and hazardous substance transfers will be performed in accordance with OSA's Fluid Transfer Procedures included in the OSA C-Plan and the Fluid Transfer Guidelines in the North Slope Environmental Field Handbook. This plan includes the use of surface liners under all potential spill points. Adequate spill response equipment will be on-hand at all times.
d. Vehicle refueling will not occur within the annual floodplain, except as addressed and approved in the plan of operations. This measure does not apply to water-borne vessels.	A.4.d. Mitigation measure is satisfied. Vehicle refueling will not occur within the annual floodplain.
e. All independent fuel and hazardous substance containers must be marked with the contents and the lessee's or contractor's name using paint or a permanent label.	A.4.e. Mitigation measure is satisfied. All containers with fuel or hazardous substances will be labeled with the contents and lessee's or contractor's name.
f. A fresh water aquifer monitoring well, and quarterly water quality monitoring, is required down gradient of a permanent storage facility, unless alternative acceptable technology is approved by ADEC.	A.4.f. Not applicable. There are no known fresh water aquifers in the Project area. ADEC issued a Certificate of Reasonable Assurance under Section 401 of the Clean Water Act (CWA) on 31 December 2018. The Certificate identifies stipulations, best management practices, provisions under Section 401, and Alaska Water Quality Standards required to avoid impacts to water quality.
g. Waste from operations must be reduced, reused, or recycled to the maximum extent practicable. Garbage and domestic combustibles must be incinerated whenever possible or disposed of at an approved site in accordance with 18 AAC 60.	A.4.g. Mitigation measure is satisfied. Waste management activities will be conducted in general accordance with best environmental practices as described in the North Slope

	Environmental Field Handbook and the Red Book. Attention will be focused on waste minimization, segregation, reuse, and recycling, when practicable. Non-hazardous solid waste will be trucked off site and disposed of at the NSB landfill.
h. Proper disposal of garbage and putrescible waste is essential to minimize attraction of wildlife. The lessee must use the most appropriate and efficient method to achieve this goal. The primary method of garbage and putrescible waste is prompt, on-site incineration in compliance with State of Alaska air quality regulations. The secondary method of disposal is on-site frozen storage in animal-proof containers with backhaul to an approved waste disposal facility. The tertiary method of disposal is on-site non-frozen storage in animal proof containers with backhaul to an approved waste disposal facility. Daily backhauling of non-frozen waste is required unless safety considerations prevent it.	A.4.h. Mitigation measure is satisfied. Solid, non-burnable waste will be deposited in dumpsters located at each site and backhauled to the NSB landfill as needed. The food waste that could attract wildlife will be stored in enclosed wildlife-resistant containers and backhauled to the NSB landfill when full. Cold winter temperatures will result in the food waste being frozen soon after placement into the containers.
i. New solid waste disposal sites, other than for drilling waste, will not be approved or located on state property for exploration.	A.4.i. Not applicable. No new solid waste disposal sites will be developed for the Project. Non-hazardous solid waste will be trucked off site and disposed of at the NSB landfill.
j. The preferred method for disposal of muds and cuttings from oil and gas activities is by underground injection. Drilling mud and cuttings will not be discharged into lakes, streams, rivers, or wetlands. On-pad temporary cuttings storage may be allowed as necessary to facilitate annular injection and backhaul operations. Injection of non-hazardous oilfield wastes is regulated by Alaska Oil and Gas Conservation Commission through its Underground Injection Control Program for oil and gas wells.	A.4.j. Mitigation measure is satisfied. Drilling waste may be disposed of on-site by annual injection as approved by AOGCC. ND-B will include well slots to accommodate two Class 1 Underground Injection Control waste disposal wells as approved by the Unite States Environmental Protection Agency (USEPA). A Waste Analysis Plan will be prepared and will outline procedures for classifying, sampling, and analyzing wastes prior to downhole disposal. Temporary Storage Permits will be obtained from ADEC for temporary storage of drilling waste if necessary.
5. Access	
a. Exploration activities must be supported only by ice roads, winter trails, existing road systems, or air service. Wintertime off-road travel across tundra and wetlands may be	A.5.a. Not applicable

approved in areas where snow and frost depths are sufficient to protect the ground surface	This is not an exploration project.
b. Summertime off-road travel across tundra and wetlands may be authorized subject to time periods and vehicle types approved by DMLW.	A.5.b. Mitigation measure is satisfied. Off-road travel will be coordinated with the Division of Mining, Land, and Water (DMLW) and ADF&G in advance of such activities.
c. Emergency exceptions may be granted by the Director of DMLW, and the Director, if it is determined that travel can be accomplished without damaging vegetation or the ground surface on a site-specific basis.	A.5.c. Comment noted
d. Gravel use may be authorized on a site-specific basis if it is determined, after consulting with ADF&G and DMLW, that no practicable alternatives exist for constructing an exploration road or pad in the area south of the boundary described below and depicted in the map below: Beginning at the NPR-A boundary, from the northeast corner of T 1N, R 2E, then east to the northwest corner of T 1N, R 9E, then north to the northwest corner of T 4N, R 9E, then east to the northwest corner of T 4N, R 23E, then south to the southwest corner of T 4N, R 23E, and then east along the top of T 3N to the ANWR boundary.	A.5.d. Not applicable The Project is not within the area south of the boundary described. This is not an exploration project.

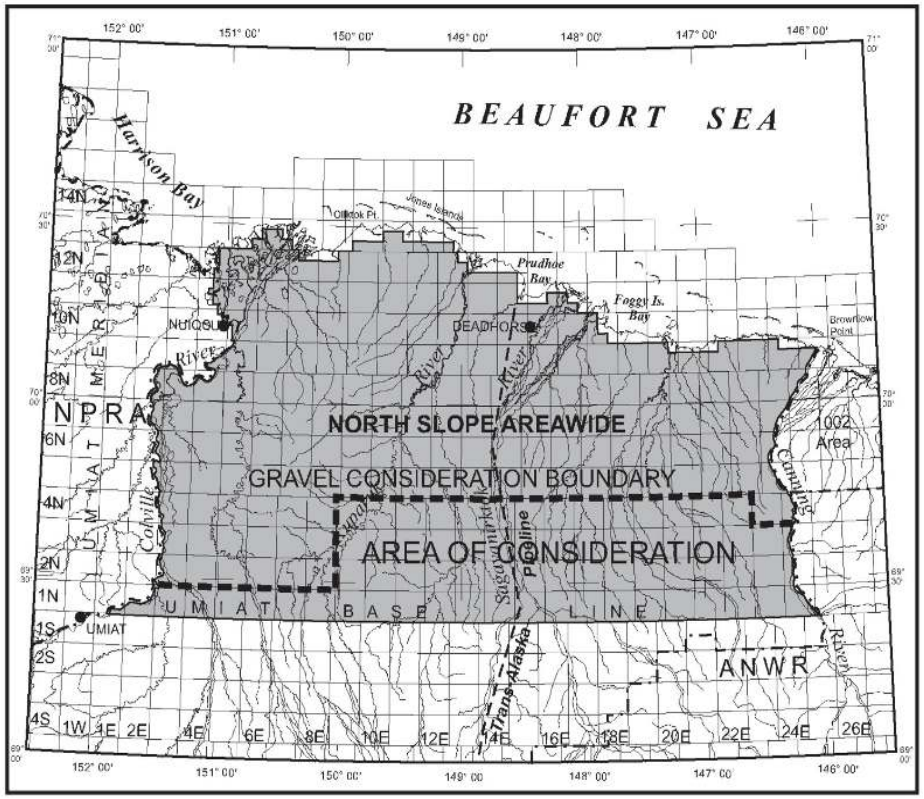

Figure 0.1.— Gravel Consideration Boundary

e. Public access to, or use of, the lease area may not be restricted except within the immediate vicinity of drill sites, buildings, and other related structures. Areas of restricted access must be identified in the plan of operations.	A.5.e. Mitigation measure is satisfied. To ensure safe operations and to protect the public from potential hazards presented by operations, public access within the immediate vicinity of drill sites, buildings, and other related facilities will be restricted. Public access to the remaining lease area will not be restricted by OSA. Operations will be located so that access to public

	waters is not blocked. Public access across ice and gravel roads (e.g. subsistence hunters on snowmachines) will not be restricted, except in close-proximity to the drill sites to maintain public safety. OSA has an ongoing stakeholder engagement program to inform the residents of Nuiqsut, including subsistence users, of proposed activities and to obtain feedback and recommendations on how these activities can be performed and to avoid conflicts with subsistence activities.
6. Prehistoric, Historic, and Archeological Sites	
a. Before the construction or placement of any structure, road, or facility supporting exploration, development, or production activities, the lessee must conduct an inventory of prehistoric, historic, and archeological sites within the area, including a detailed analysis of the effects that might result from that construction or placement.	A.6.a. Mitigation measure is satisfied. Cultural resource surveys were conducted in the project area in 2015, 2016, 2017, and 2019. OSA received a concurrence of "No Historic Properties Adversely Affected" from the ADNR Office of History and Archaeology (OHA) State Historic Preservation Office (SHPO) on 28 November 2018. The concurrence is based on the Cultural Resources Survey report submitted to SHPO by OSA.
b. The inventory of prehistoric, historic, and archeological sites must be submitted to the Director and the Office of History and Archeology (OHA) who will coordinate with the NSB for review and comment. If a prehistoric, historic, or archeological site or area could be adversely affected by a lease activity, the Director, after consultation with OHA and the NSB, will direct the lessee as to the course of action to take to avoid or minimize adverse effects.	A.6.b. Mitigation measure is satisfied. The cultural resource surveys and proposed Project locations were coordinated with the OHA and the NSB. To the extent possible, project facilities will be located outside of a 500-foot buffer from documented cultural resources, with one exception. The gravel access road and import/export pipeline intersect the Colville #1 Peat Road (HAR-00173), a 46-mile long historic road. In 2017, the resource was recommended eligible for the National Register of Historic Places and received SHPO concurrence. The Project initiated consultation with SHPO and received a letter of concurrence (dated 28 November 2018) to the finding of no adverse effect to HAR-00173, Colville#1 Peat Road.
c. If a site, structure, or object of prehistoric, historic, or archaeological significance is discovered during lease operations, the lessee shall report the discovery to the Director as soon as possible. The lessee shall make all reasonable efforts to preserve and	A.6.c. Mitigation measure is satisfied. If prehistoric, historic, or archaeological resources are discovered

protect the discovered site, structure, or object from damage until the Director, after consultation with the State Historic Preservation Office and the NSB, has directed the lessee on the course of action to take for its preservation.	during OSA operations, all work in the vicinity of the discovery will cease and ADNR-SHPO and NSB-IHLC will be notified. Measures to mitigate impacts to archeological, historic, and cultural resources identified by the archaeologist, ADNR-SHPO, and NSB-IHLC will be implemented.
7. Hiring Practices	
a. The lessee is encouraged to employ local and Alaska residents and contractors, to the extent they are available and qualified, for work performed in the lease area. Lessees shall submit, as part of the plan of operations, a hiring plan that shall include a description of the operator's plans for partnering with local communities to recruit, hire, and train local and Alaska residents and contractors. As a part of this plan, the lessee is encouraged to coordinate with employment and training services offered by the State of Alaska and local communities to train and recruit employees from local communities.	A.7.a. Mitigation measure is satisfied. OSA will work with the Kuukpik Corporation, the City of Nuiqsut, and the NSB to ensure that Nuiqsut and NSB residents have opportunities to apply for work on the Project and will provide local North Slope companies with opportunities to compete for contract work associated with the Project. OSA will also work with contractors, trade associations, Alaska Process Careers Consortium, and Iḷisaġvik College to develop training programs for North Slope residents, if needed.
b. In accordance with Administrative Order 278, the lessee is encouraged to employ apprentice labor to perform at least 15 percent of total work hours, to the extent they are available and qualified, for work performed in the lease area. Lessees shall submit, as part of the plan of operations, a hiring plan detailing the means by which the lessee might incorporate apprentice labor.	A.7.b. Administrative Order 278 as drafted is only applicable to construction projects financed by the State of Alaska and would therefore not apply to the applicant's activities. Notwithstanding the inapplicability of Administrative Order 278 to the applicant's activities, the applicant is evaluating the extent to which apprentice labor may be incorporated by its contractors to work on the project, and opportunities to promote use of apprentice labor by contractors.
c. A plan of operations application must describe the lessee's past and prospective efforts to communicate with local communities and interested local community groups.	A.7.c. Mitigation measure is satisfied. OSA has an ongoing stakeholder engagement program that includes regular public meetings to inform the residents of Nuiqsut, including subsistence users, of proposed activities and to obtain feedback and recommendations on how these activities can be performed and to

	avoid conflicts with subsistence activities.
d. A plan of operations application must include a training program i. for all personnel including contractors and subcontractors; ii. designed to inform each person working on the project of environmental, social, and cultural concerns that relate to that person's job; iii. using methods to ensure personnel understand and use techniques necessary to preserve geological, archeological, and biological resources; and iv. designed to help personnel increase their sensitivity and understanding of community values, customs, and lifestyles in areas where they will be operating.	A.7.d. Mitigation measure is satisfied. A training program will be implemented to include the following: A.7.d.i. Field personnel will be North Slope Training Cooperative (NSTC) trained. A.7.d.ii. OSA will have trained staff onsite at all times that are familiar with project-specific subsistence, environmental, social, and cultural concerns and will periodically provide awareness training and oversight to contractors and subcontractors as it pertains to their scope of work. A.7.d.iii. NSTC training addresses the following topics: camps and safety orientation, use of personal protective equipment, hazard communication, pipeline awareness, environmental excellence, and hazardous waste awareness. A.7.d.iv. OSA will have trained staff onsite at all times that are familiar with project-specific subsistence, environmental, social, and cultural concerns and will periodically provide awareness training and oversight to contractors and subcontractors as it pertains to their scope of work.
8. Definitions	

a. In this document: i. **Facilities** – Any structure, equipment, or improvement to the surface, whether temporary or permanent, including, but not limited to, roads, pads, pits, pipelines, power lines, generators, utilities, airstrips, wells, compressors, drill rigs, camps, and buildings. ii. **Hazardous substance** – As defined under 42 USC 9601 – 9675 (Comprehensive Environmental Response, Compensation, and Liability Act of 1980). iii. **Important wetlands** – Those wetlands that are of high value to fish, waterfowl, and shorebirds because of their unique characteristics or scarcity in the region or that have been determined to function at a high level using the hydrogeomorphic approach. iv. **Minimize** – To reduce adverse impacts to the smallest amount, extent, duration, size, or degree reasonable in light of the environmental, social, or economic costs of further reduction. v. **Plan of operations** – A lease plan of operations under 11 AAC 83.158 and a unit plan of operations under 11 AAC 83.346. vi. **Practicable** – Feasible in light of overall project purposes after considering cost, existing technology, and logistics of compliance with the mitigation measure. vi. S**econdary containment** – An impermeable diked area, portable impermeable containment structure, or integral containment space capable of containing the volume of the largest independent container. The containment shall, in the case of external containment, have enough additional capacity to allow for local precipitation. vii. **Temporary** – No more than 12 months.	

Appendix C
Supplemental Information

Nanushuk Project

Pikka Unit

Unit Plan of Operations

Project Summary

Alaska Department of Natural Resources

Division of Oil and Gas

July 2019

CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

Oil Search (Alaska), LLC (OSA), is proposing development of hydrocarbon deposits within the Pikka Unit on the North Slope of Alaska. The Nanushuk Project (Project) targets oil deposits in the Alpine C and Nanushuk reservoirs. OSA will drill wells and construct and operate infrastructure and facilities to produce and transport sales-quality oil to the Trans-Alaska Pipeline System (TAPS).

The Project is located approximately 52 miles west of Deadhorse and, at its closest point, is approximately 7 miles northeast of the community of Nuiqsut and southeast of the East Channel of the Colville River (Figure 1) on OSA-operated State of Alaska and Arctic Slope Regional Corporation oil and gas leases. The Project is located southwest of the existing Oooguruk Development Project, west of the existing Kuparuk River Unit, and east of the existing Alpine and Alpine Satellite Development Projects. The Mustang Prospect is located east and the Nuna Project is located northeast of the Project. The Project sits on lands owned by Kuukpik Corporation and the State of Alaska (Figure 2). Table 1 provides location information for Project components.

The Project components will include the Nanushuk Processing Facility (NPF); Nanushuk Drillsites (ND) ND-A, ND-B, and ND-C; the Nanushuk Operations Pad (NOP); the Tie-in Pad (TIP), infield pipelines, import and export pipelines; infield and access roads; the Nanushuk Boat Ramp; and a potable water system (Figures 3 and 4). The Project also includes delivery of large modules by barge to Oliktok Point during open water and transport using Self-Propelled Module Transporter's over the existing and new road system. Minor upgrades and maintenance to the existing road system to facilitate transportation of sealift modules will occur if engineering and construction design determine it is required. Gravel material for project development will be sourced from one or more existing gravel mine sites, which will be permitted and operated independently of the Project.

The Project will require permits and authorizations from the State of Alaska, including a Unit Plan of Operations authorization for project components located within the Pikka Unit, an Alaska Statute (AS) 38.05.850 Easement for project components located on state land outside of the Pikka Unit, and an AS 38.35.050 Pipeline Right-of-Way Lease for the export pipeline. Figure 5 illustrates the state land permits required for the Project components and Figure 6 shows the current operators in the project vicinity. Section 11.0 contains a list of other state, federal, and borough permits and authorizations potentially required for the Project.

Table 1. Project Components and Locations

Project Component	Township[a]	Range	Section(s)	ADL Lease Number(s)
Nanushuk Processing Facility (NPF)	11 North	6 East	11, 14	392983, 392964
Nanushuk Drillsite A (ND-A)	12 North	6 East	26	393012
Nanushuk Drillsite B (ND-B)	11 North	6 East	04	392984
Nanushuk Drillsite C (ND-C)	11 North 11 North	5 East 6 East	36 31	393029 392989
Nanushuk Operations Center (NOP)	11 North 11 North	6 East 7 East	24 19	392964
Tie-in Pad	11 North	9 East	16	25654

Table 1. Project Components and Locations				
Project Component	**Township[a]**	**Range**	**Section(s)**	**ADL Lease Number(s)**
Pump house pad	11 North	6 East	24	392964
Nanushuk Boat Ramp	11 North	6 East	05	391445
Nanushuk Access Road	10 North 11 North 11 North	7 East 6 East 7 East	02, 03 14, 23, 24 19, 30, 31, 32, 33, 34, 35	390680, 390681 392964 390692, 390691
Mustang Road upgrades	10 North 10 North 11 North	7 East 8 East 8 East	01, 02 05, 06 31, 32, 33	390680 25590 25585, 25586
Infield roads	11 North 11 North 12 North	5 East 6 East 6 East	25, 36 02, 04, 05, 09, 10, 11, 14, 21, 22, 23, 24, 28, 29, 30, 31 26, 35, 36	391022, 393029 392982, 392984, 391445, 392985, 392986, 392983, 392964, 392987, 392966, 392967, 392988, 392989 393012, 393013, 393014
Miluveach River Bridge	11 North	7 East	34, 35	390692, 390691
Kachemach River Bridge	11 North	6 East	28, 29	392966, 392967
Nanushuk Pipeline[b]	10 North 10 North 11 North 11 North 11 North 11 North	7 East 8 East 6 East 7 East 8 East 9 East	01, 02 06 14, 23, 24 19, 29, 30, 32, 33, 34, 35 23, 24, 26, 27, 28, 31, 32, 33 16, 19, 20, 21, 28, 29	390680 25590 392964 390692, 390691 25570, 25587, 25586, 25585 25654, 25655, 25657, 25656
Infield pipelines	11 North 12 North	6 East 6 East	01, 02, 03, 04, 10, 11, 14, 21, 22, 23, 28, 29, 30, 31 25, 26, 36	392962, 392982, 392963, 392984, 392986, 392983, 392964, 392987, 392966, 392967, 392988, 392989 391553, 393012, 393014
Potable water system	11 North	6 East	14, 23, 24	392964
Oliktok Dock barge offload area	13 North	9 East	05	355024

[a] All locations are based on the Umiat Meridian.

[b] Includes export pipeline, make-up water pipeline, make-up gas pipeline, and power and fiber optic cables.

The footprint of gravel fill needed for each project component is listed in Table 2, and the length of each project component is provided in Table 3. Gravel pads will have a minimum gravel thickness of 6 feet and side slopes of 2:1. A side slope of 2:1 means the slope drops 1 foot for every 2 horizontal feet. Gravel roads will have a minimum gravel thickness of five feet and side

slopes of 2:1. Gravel infrastructure located in the floodplain will be built to more conservative elevations based on hydrologic conditions[1]. Placement of roads and pads will be optimized to minimize ponding to the extent practical, and road and pad elevations will be designed as appropriate to prevent overtopping and road washout. In areas where ponding next to a pad cannot be avoided during flood events or where flowing water may occur adjacent to the gravel embankment, erosion potential will be assessed, and erosion control measures will be implemented as needed. OSA will use the most appropriate engineered cost-effective erosion protection for the roads, pads, and boat ramp. Erosion and breakup monitoring is part of the overall project.

Table 2. Footprints of Project Components

Project Component	Fill Type	Footprint (acres)
NPF	Gravel	17.1
ND-A	Gravel	16.2
ND-B	Gravel	19.5
ND-C	Gravel	18.0
NOP	Gravel	16.4
Tie-in Pad	Gravel	0.8
Pump house pad	Gravel	1.1
Boat ramp	Gravel	2.0
Nanushuk access road	Gravel	72.8
Mustang Road upgrades	Gravel	5.9
Infield roads[a]	Gravel	95.8
Vertical Support Member (VSM)	Gravel	0.6
Total gravel fill[b]	**-**	**261.4**
Temporary Impacts	**Gravel**	**5.8**
Total Waters of the U.S. Impacted	**--**	**272**

Notes: NPF: Nanushuk Processing Facility; ND-A: Nanushuk Drillsite A; ND-B: Nanushuk Drillsite B; ND-C: Nanushuk Drillsite C; NOP: Nanushuk Operations Pad; TIP: Tie-in Pad.

[a] Infield roads include ND-A, ND-B, and ND-C infield roads; the boat ramp; and water source access roads and three road turnouts with tundra access ramps.

[b] Other gravel fill includes bridges and vertical support members.

[1] Based on field conditions, pads are estimated to range from 6.5 to 10.5 feet thick, and roads are estimated to be an average of 6.5 to 7.5 feet. Thicknesses could be greater in floodplains.

Table 3. Lengths of Project Components	
Project Component	**Length (miles)**
Ice Roads	35–100[a]
Gravel Infield Roads	12.4
Gravel Access Road	9.5
Nanushuk Pipeline	22.1
Infield Pipelines	14.3
Potable Water Pipeline	0.2
[a] Ice road length will vary by year based on construction needs, topography, other field conditions, and agency approvals.	

The majority of gravel infrastructure will be constructed during winter. After the gravel footprint is surveyed and staked, all snow and ice in excess of 4 inches will be removed from the tundra surface in the work area. This process will not disturb the tundra surface. Pit-run gravel will then be placed in lifts using large-capacity dump trucks and spread using bulldozers or similar heavy equipment. Each lift will be compacted by a heavy roller. During summer, ice present in the gravel will melt, leading to further consolidation and settlement. To enhance this process, the gravel will be farmed[2] and re-compacted each year that gravel placement occurs.

Table 4. Project Schedule			
Project Milestone #	**Project Milestone**	**Proposed Start Date**	**Proposed End Date**
1	Pre-pack and construct ice roads and pads (winter only)	2019 November	2023 May
2	Placement of temporary construction camps (off ice pad in winter only)	2020 December	2021 May
3	Gravel hauling and construction of roads and pads (construction in winter only and access from existing infrastructure in summer, gravel farming in summer)	2019 December	2021 May
4	Facilities construction (summer and winter)	2020 November	2023 May
5	Pipelines construction (winter only)	2020 December	2023 May
6	Placement of temporary construction camps (year-round)	2020 November	2021 December
7	NOP Camp construction (year-round)	2021 January	2021 June

[2] Farming, also called seasoning, consists of turning the upper layers of gravel to expose buried areas and facilitate drying.

Table 4. Project Schedule			
Project Milestone #	**Project Milestone**	**Proposed Start Date**	**Proposed End Date**
8	Screeding of barge landing at Oliktok Point area (summer), sealift deliver (summer), and transport of modules (winter or summery)	2022 August	2022 August
9	Drilling (year-round)	2021 January	2036
10	Operations (year-round)	2023 April	Life of Field

2.0 PROJECT FACILITIES

2.1 Well Sites

The Project includes three drill sites: ND-A, ND-B, and ND-C (Figures 4, 7-10). The number and locations of drill sites were dictated by the configuration of the oil reservoirs and defined by previous exploration efforts, with consideration for site accessibility requirements, and operational constraints. Drill sites are also oriented with the long axis parallel to the prevailing northeast/southwest wind direction to minimize snow drifting.

The three drill sites will accommodate up to 151 total production and injection wells (43 at ND-A, 55 at ND-B, and 53 at ND-C) with 20-foot spacing between wellheads. ND-A, ND-B, and/or ND-C may also include additional well slots to accommodate two Class 1 underground injection control (UIC) disposal wells. Grind and inject facilities will be constructed and operated on ND-B. Each drill site will accommodate drilling equipment and support facilities, including well testing equipment, well stimulation equipment, drilling mud and cement tanks, production gathering facilities, diesel fuel storage tanks, a communication tower, cold storage, emergency response equipment, process heater, and drilling laydown areas. Each drill site will also include space for temporary camps and offices. An access corridor will provide egress and ingress in the event of an emergency. This corridor serves a secondary function of providing access to facilities and infrastructure for maintenance and service. Power generated at the NPF (Figure 11) will be supplied to each drill site through a 34.5-kilovolt (kV) cable, which will be suspended from the pipelines' horizontal support members (HSMs) using messenger cables. No processing of multiphase product - a mixture of crude oil, natural gas, and produced water - beyond routine well testing and process fluid heating, will occur at the drill sites. Following construction of drill pads, should there remain open areas these could be repurposed by drilling or operations uses.

2.2 Buildings

2.2.1 Permanent Facilities

2.2.1.1 Nanushuk Processing Facility

The NPF (Figure 11) will comprise processing and utility modules. Multiphase product from the three drill sites will be transported to the NPF via multiphase pipelines for processing. Facilities at the NPF will process approximately 120,000 barrels per day of cumulative oil production. Seawater and produced water separated from the oil will be treated and transported back to the drill sites via water injection pipelines to be re-injected into the subsurface formation to help with

crude oil production. Separated gas will be used for fuel at the NPF, and the remainder will be transported back to the drill sites via pipelines for gas lift. Excess gas, if any, will be injected into dedicated injection wells at the drill sites. Sales-quality oil processed at the NPF will be transported to the TIP (Figure 12) near the Kuparuk Central Processing Facility 2 (CPF2) via the Nanushuk Pipeline, where it will tie into the Kuparuk Sales Pipeline for transportation to TAPS.

Processing facilities at the NPF include equipment designed for fluid separation (gas, oil, water), heating and cooling, pumping, gas treatment and compression for gas lift and injection, and water treatment for injection. The NPF also includes metering and pigging facilities; power generation facilities; a truck fill station; construction material and equipment staging areas; a central control room; an equipment receiving module; and a communication tower. The NPF will house a tank farm consisting of diesel, crude oil, production chemicals, glycol, and methanol storage tanks.

The NPF will include either a single flare or dual flares to support both high- and low-pressure safety relief systems. The flares will be designed in accordance with regulatory requirements. The height and width of the flare stacks have not yet been determined.

NPF facilities will be fabricated off-site and delivered to the project area either overland, by truck, or by barge during summer. Modules delivered by barge will be offloaded at Oliktok Dock and transported to the site during summer.

2.2.1.2 Nanushuk Operations Pad

The NOP will include facilities to support field-wide operations (Figure 13). The NOP infrastructure includes:

- A 200-bed operations camp to house operations and maintenance personnel, including living quarters, housekeeping, a recreation area, food service facilities, and a small medical clinic
- Office, warehouse, and maintenance buildings
- Warm and cold storage buildings
- Water/wastewater treatment plants and temporary waste storage areas
- Communication structures, including a communication tower
- Diesel-fired standby power generators and fuel storage
- A helicopter landing pad (helipad; note that routine helicopter use is not planned under normal operating conditions)

The NOP will house a tank farm consisting of diesel and refined fuel. The NOP will also support construction camps, offices, laydown, storage, and maintenance facilities during the construction phase. Following construction, those facilities will be removed from the site. The area vacated on the pad will then be repurposed for use by drilling and operations. Power generated at the NPF will be supplied to the NOP through a 13.8 kV cable, which will be suspended on the pipelines HSMs using messenger cables.

2.2.2 Temporary Facilities

A number of temporary camps will be established to support construction and drilling activities. Camps are detailed in Table 5 and will include the following:

- Off-site pioneer construction camps will be located near the selected mine site on an ice pad or an existing gravel pad, pending available space. The pioneer construction camps will be used until the construction camps are installed and operational.
- Construction camps will be located on one or more of the Project gravel pads and will provide space to accommodate construction personnel. The construction camps will remain in place through the completion of the construction and startup phases, after which the camps will be decommissioned and removed from the site.
- Drilling support camps will be located on each drill site. After completion of drilling activities on each pad, the associated camp will be decommissioned and removed from the drill site.
- Construction support ice pads will house field offices, break shacks, enviro-vacs, camps and field shops; and will stage construction equipment, vehicles, materials, and supplies until gravel pad construction is complete.

Table 5. Camps

Camp	Location	Capacity[a]	Project Year(s)[b]
Operations camp	NOP	200 people	2 to life of the Project[c]
Temporary construction camp(s)	Project gravel pad(s)	800 people	2 to 5
Off-site pioneer construction camp(s)	Ice pad or existing gravel pad	300 people	1 to 2
Drilling support camps	ND-A, ND-B, and ND-C	120 to 150 people per rig	4 to 19

Notes: NOP: Nanushuk Operations Pad; ND-A: Nanushuk Drillsite A; ND-B: Nanushuk Drillsite B; ND-C: Nanushuk Drillsite C.
[a] Based on the number of beds.
[b] See project schedule (Section 3.0).
[c] The design life of the Project is 30 years or more.

3.0 FUEL AND HAZARDOUS SUBSTANCES

3.1 Handling and Storage

The Project will require the transport of diesel and gasoline to the project area to support activities during construction, drilling, and operations. During construction, dedicated temporary storage areas for diesel and gasoline will be selected and placed on ice pads and, once complete, moved onto the project gravel pads. Permanent diesel fuel storage tank infrastructure will be located on the NPF, NOP, and/or drillsites. Storage at the NOP will be in a bulk tank and/or in International Organization for Standardization (ISO) tanks. Standby generators located at the NOP will have day tanks that will be refilled as needed from the bulk storage tank. The NOP will also have storage tanks or ISO tanks for gasoline storage and dispensing. The primary storage location for production chemicals will be at the NOP, with smaller amounts at the NPF and drill sites.

There will be fuel and hazardous substances stored within 100 feet of a water body for ND-B and ND-C. Each of the drill sites orientation and layout were dictated by the configuration of the oil reservoirs and defined by previous exploration efforts, with consideration for site accessibility requirements, operational constraints, and stakeholder input. However, all fuel and hazardous

substances used by the Project will be handled and stored on site in compliance with state and federal regulatory guidance and the Project's Oil Discharge Prevention and Contingency Plan (ODPCP) and Spill Prevention Control and Countermeasures (SPCC) Plan. All fuels and chemicals will be stored in appropriate primary containment. Secondary containment areas will be designed in compliance with all applicable permits and regulations.

3.2 Spill Prevention and Response

OSA will design and develop the Project to avoid and minimize the possibility of spills. Spill prevention measures considered throughout the design and engineering phase include a maintenance and inspection program as well as an employee spill prevention training program. Hydrostatic testing will validate the integrity of the pipelines prior to operation. All fuels and chemicals will be stored in appropriate primary containment. Secondary containment areas will be designed in compliance with all applicable permits and regulations. OSA has internal procedures in place that provide guidance on spill prevention measures.

Pipeline spill prevention measures include multiple forms of leak detection, isolation valves or vertical loops, and regular maintenance and cleaning. Leak detection systems and surveillance will be compliant with industry, state, and federal standards. For pipeline-river crossings, either isolation valves or vertical loops will be used, depending on the type of pipeline. Pipeline facilities will include pig launchers and receivers capable of handling in-line inspection tools, and maintenance and cleaning tools.

The Project will include dedicated oil spill response equipment positioned throughout the field. The locations and types of oil spill response equipment, and equipment deployment times will be identified in the project ODPCP and staged before startup. Equipment and support infrastructure will be managed and maintained by OSA in coordination with Alaska Clean Seas. OSA is a member of Alaska Clean Seas, which is a spill response cooperative organized to respond to an emergency with trained responders and response equipment on the North Slope. Alaska Clean Seas provides personnel, material, equipment, and training response capability for use in preparing for, responding to, and cleaning up an oil spill.

In the case of a leak, pipeline operations will be shut down and isolated. The appropriate agency notifications will be made as soon as practicable. The cause of the incident would be identified, and repairs will be implemented after regulatory approval. Spill containment and mechanical cleanup would begin as soon as possible.

During construction, dedicated temporary storage areas for diesel and gasoline will be defined and placed on ice pads, and once complete, moved onto project gravel pads. Permanent diesel fuel storage tank infrastructure will be located at the NPF, NOP, and drillsites.

4.0 SOLID WASTE SITES

A range of wastes will be generated during construction, drilling, and operations. A Waste Management Plan will be prepared to address the types and quantities, regulatory controls, and management options for solid and liquid wastes. OSA will also use other resources, such as the *Alaska Waste Disposal and Reuse Guide* (commonly known as the *Redbook*), to guide waste management decisions. Key elements of the waste management approach will include:

- Full compliance with federal, state, and local NSB waste management regulations.
- Use of the NSB's landfill, as appropriate, for non-hazardous solid waste. No onsite incineration is planned.

- Waste minimization through careful project planning and beneficial reclamation, reuse, and recycling when practicable.
- Subsurface disposal of authorized waste streams.
- Planning for changing types and volumes of wastes and seasonal transportation restrictions, particularly during the construction phase.
- Evaluation of opportunities for product substitution to reduce hazardous waste.
- Staff training on waste management and spill prevention procedures.

Any waste receptacles stored outside will be managed to avoid potential wildlife interactions, in accordance with OSA's Wildlife Avoidance and Interaction Plan.

5.0 WATER SUPPLIES

5.1 Construction

During construction, non-potable fresh water from local permitted lakes will be used for ice road and pad construction and maintenance, and for possible hydrostatic testing of pipelines (Table 6). Ice roads require approximately 1 million gallons (MG) of fresh water per mile. Ice pads require approximately 82,400 gallons of water per acre for a 6-inch-thick pad. Hydrostatic testing may require up to 2.52 MG of water. Potable fresh water for domestic use at the construction camps will be trucked from Deadhorse or other existing facilities. Fresh water consumption requirements during construction, drilling, and operations are approximately 100 gallons per worker, per day.

5.2 Drilling

During the drilling phase, up to 10,000 gallons per day, per rig, of non-potable water will be obtained from locally permitted sources within the project area to support drilling activities (Table 6). This water volume is an approximation determined by similar drilling operation and North Slope industry practices. Potable fresh water for domestic use at the drilling camp will be trucked from Deadhorse or other existing facilities. In addition, approximately 16-21 MG of make-up water (treated seawater) will be needed per year for production and injection well stimulation to improve well productivity.

5.3 Operations

During operations, 5.5 MG of potable fresh water per year for the operations camp will be supplied by the potable water system (Table 6). Lake MC7903 will be the primary source of fresh water for the operations camp needs. Water will be recovered using a water intake structure and electric skid-mounted pump. The intake structure will be supported on concrete pipe support anchors. Water will be circulated between the water intake structure and the NOP via two freshwater pipelines located within an insulated carrier pipeline. The carrier pipeline will be placed on dedicated vertical support members (VSMs) from the intake structure directly to the NOP for treatment and storage. The Lake MC7903 system will include construction of a water source access road (a minimum of 24 feet wide at the surface) and pump house pad to provide regular access to the water intake structure from project facilities.

Non-potable fresh water used for dust suppression during operations will be obtained from locally permitted lakes. A 0.25-inch water application for road dust control requires 20,000 gallons of water per mile of gravel road per application.

Up to 150,000 barrels per day of make-up water (treated seawater) will be used as injection water for reservoir pressure maintenance. Pending commercial agreements and availability of supply, make-up water will likely be purchased from a third party and will be transported from the TIP to the project area via a make-up water pipeline on the Nanushuk Pipeline VSMs.

Table 6. Water Use During Construction, Drilling, and Operations

	Potable Fresh Water	Non-Potable Fresh Water	Make-up Water
Construction			
Ice Roads	--	1 MG per mile	--
Ice Pads (6 inches thick)	--	82,400 gal per acre	--
Hydrostatic Testing	--	2.52 MG per year	--
Camp	100 gal per worker per day	--	--
Drilling			
Camp	100 gal per worker per day	--	--
Drilling Activities	--	10,000 gal per day	--
Well Stimulation	--	--	16-21 MG per year
Operations			
Operations Camp	5.5 MG per year	--	--
Gravel Road Dust Suppression	--	20,000 gal per mile per application	--
Reservoir Pressure Maintenance	--	--	150,000 barrels per day

Notes: MG = million gallons; gal = gallons.

5.4 Water Discharges

Snowmelt and runoff from project roads and pads will be managed through implementation of standard Best Management Practices (BMPs) under a site-specific Storm Water Pollution Prevention Plan. An Alaska Pollutant Discharge Elimination System (APDES) determination will be undertaken as potential water discharges are identified during project planning. Storm water accumulated on gravel pads and in secondary containments will be monitored. Clean, uncontaminated storm water will be allowed to filter through the pad surface to the surrounding environment. Any storm water that does not meet discharge criteria will be contained and disposed of in compliance with applicable regulations. OSA will seek approval for one-time discharges related to hydrostatic testing of new pipelines, prior to commissioning. Prior to discharge, this water will be required to meet State of Alaska water quality standards.

5.4.1 Class 1 Disposal Wells

Two Class 1 UIC waste disposal wells are proposed to be permitted. The Class 1 wells will be located at ND-B. The Class 1 wells will be used to dispose of Resource Conservation and Recovery Act (RCRA) exempt and non-hazardous waste and treated domestic wastewater from project camps. If the disposal wells are not available, domestic wastewater will be managed, treated at a permitted wastewater treatment facility located on State land and discharged or disposed off-site in compliance with all federal, state, and NSB standards. As a contingency, if the disposal wells are unavailable, OSA would discharge treated domestic wastewater on state land to tundra in compliance with an APDES permit.

5.4.2 Waste Analysis Plan

A Waste Analysis Plan (WAP) will be prepared to fulfill the requirements of UIC and Solid Waste Disposal permits. The WAP will outline procedures for classifying, sampling, and analyzing wastes prior to downhole disposal. The purpose of the WAP is to ensure that wastes are properly characterized before the decision is made as to whether they may be accepted for injection/disposal in the Class 1 wells.

6.0 UTILITIES

Power generation facilities, located at the NPF, will consist of gas-powered turbines. Power will be supplied to other project facilities, including drilling rigs if power availability allows, via power cables installed on infield and Nanushuk Pipeline horizontal support members (HSMs) using messenger cables. Power generated at the NPF will be supplied to each drill site through 34.5-kV power cables. A 13.8-kV cable will run from the NPF to supply power at the NOP and the TIP. When power from the NPF is not available, diesel-fired engines used to power the drilling rigs will comply with EPA Tier 4 final emission standards.

Communications between project facilities will occur via fiber optic cables installed on infield and Nanushuk Pipeline HSMs using messenger cables. Communication towers will be located at the drill sites, the NPF, the NOP, and the TIP. Communication towers will be approximately 30 feet at the drill sites and 120 feet at the NOP and NPF. Communication towers are not anticipated to require guy-wires. Towers will be equipped with Federal Aviation Administration compliant lighting, if required.

7.0 MATERIAL SITES

7.1 Gravel Requirements

An estimated 3 million cubic yards (mcy) of gravel will be needed to construct the proposed project facilities. Clean gravel material for project development will be obtained from one or more of the existing mine sites located on the North Slope in the vicinity of the project area. Likely sources include Mine Site F or the Arctic Slope Regional Corporation Mine Site. Both potential gravel sources are less than 15 miles from the NPF. Permitting and operation of existing mine sites would be conducted by the mine owner or designated operator.

Gravel will be hauled during the winter over as few seasons as practicable. All gravel mining, overburden and gravel stockpiling, and mine rehabilitation activities will be evaluated as part of the permitting and operation of the gravel mine independent of the Project. Gravel will be loaded onto dump trucks for transport to the project site via a combination of existing gravel roads, new gravel roads, and ice roads. No gravel will be stockpiled at the project site outside of the permitted footprint for gravel fill.

7.2 Discharges to Waters of the U.S.

In total, the Project will result in unavoidable temporary and permanent discharges into jurisdictional waters of the U.S. (WOUS) located within the project area. Permanent discharges will affect a total of 261.3 acres of WOUS, including 260.7 acres of gravel infrastructure, 0.6 acre of pipeline VSMs, and less than 0.1 acre of bridge pilings in WOUS. Project development will require approximately 3 mcy of clean gravel fill and 13,950 cubic yards (cy) of sand slurry. The Project will also include temporary discharges to 5.8 acres of jurisdictional WOUS as a result of screeding at the existing Oliktok Dock, and trenching of electrical and fiber optic cables in jurisdictional WOUS at each pipeline-road crossing.

8.0 ROADS

8.1 Gravel Roads

The Project includes 12.4 miles of gravel infield roads, including a 3.5-mile ND-A road, a 2.1-mile ND-B road, a 5.2-mile ND-C road, a 1.4-mile Nanushuk Boat Ramp access road, and a 0.2-mile water source access road (Figures 3 and 4), to provide all-season ground transport between the NPF, drill sites, and other project facilities. The Project also includes a 9.5-mile gravel Nanushuk Access Road to provide all-season ground transport connecting the NPF to existing infrastructure.

Gravel roads will be constructed to be 24 feet (up to 44 feet at the base) to 32 feet (up to 52 feet at the base) wide at the surface. Roads could be wider at curves to accommodate larger module transport (Figure 14) resulting in widths within a range based on North Slope industry construction and safety practices. Six road turnouts (three along the Nanushuk Access Road, one along the ND-A road, one on the ND-B road, and one on the ND-C road) will be included to allow safe access to project facilities during movement of large equipment, including modules and drilling rigs (Figures 3, 4, and 15). Three gravel tundra access ramps will be located at road turnouts near ND-A, ND-B, and ND-C to facilitate access for off-road travelers (Figures 5 and 15). Snow ramps will initially be constructed for tundra access and the gravel tundra access ramps will be sited and constructed based on areas of highest use by local subsistence users. Access and infield roads were designed to accommodate two-way traffic and will be used during facility construction; drilling; and operations for mobilization of construction materials, drill rigs and drilling materials, supplies, personnel, and, if necessary, emergency spill response equipment.

The Nanushuk Access Road will follow the existing Mustang access road for 4.7 miles although exact mileage could vary slightly due to wider curves and other topographical features. Use of the Mustang access road will require upgrades to bring it up to minimum design standards and improve road surface condition. Upgrades could include expansion of the road base width and the addition of higher quality material to improve load capacity.

Proposed gravel roads will parallel the proposed pipelines to facilitate year-round access for maintenance, repair, monitoring, and, if necessary, emergency response. Gravel roads will maintain a separation distance of 500 feet or more from pipelines, where practicable, but not more than 1,000 feet in order to reduce risk of vehicle impacts, ensure access during a spill or fire, and expedited snow removal. All gravel roads will also include 4-foot-high flexible reflective markers along the sides, spaced between 50 and 75 feet apart and 1 foot from the road shoulder. Where pipelines cross gravel roads, they will be buried within the roadway section and encased with structural pipe sized appropriately for required loads.

8.1.1 Bridges

The proposed access road crosses the Miluveach River (Figure 16) and the proposed ND-C infield road crosses the Kachemach River (Figure 17) on 170- and 245-foot bridges, respectively. Both bridges will be multi-span structures, and will include pipe pile foundations at sheet pile abutments and several sets of intermediate pier piles between abutments. Both bridges will consist of steel girders with precast concrete decks with a 32-foot clear width between the faces of a removable steel railing. At the Kachemach River crossing, the bridge has been designed to accommodate boat traffic.

8.1.2 Culverts

The access road will also include sufficient drainage structures to pass the expected flow along the road. Prior to construction, an engineer will walk and slope-stake the roads to determine precise locations of drainage structures and determine on-site conditions for final layout.

Typical drainage culverts will be structural steel pipe (Figure 18). Fish passage culverts will be designed at stream crossings where the Alaska Department of Fish and Game (ADF&G) determine that fish are present, and design will be in accordance with ADF&G Title 16 fish passage standards. Flow velocities at culvert outlets will be analyzed, and outlet erosion control measures will be designed as necessary to prevent channel degradation. Downstream scour protection, where required, generally consists of articulated concrete block mats or other appropriate material. Typically, steel pipe culverts will be constructed during winter. Multi-plate culverts will be installed during the summer months to allow proper compaction of gravel around the culverts; however, temporary passage structures can be installed during winter, allowing continued flow during construction of the permanent multi-plate structure.

Cross-drainage culverts will be installed within the infield and access roads to reduce impoundment and allow conveyance of surface water flow that intersects the road, in order to maintain natural drainage patterns. Cross-drainage culverts will be placed every 500 feet along the alignment during initial design efforts, although exact placement of culverts will depend on actual in-field local drainage patterns. Culvert spacing every 500 feet is an approximation based on general guidelines and North Slope construction industry practices.

8.2 Ice Roads

Ice roads will be used during construction of the pipelines, gravel roads, and bridges. Approximately 190 to 280 miles of ice roads are planned during the construction phase. Standard-duty ice roads on the North Slope are a minimum of 6 inches thick and an average of approximately 12 inches thick due to terrain features. Ice roads for construction, materials, and personnel transportation will be constructed to support expected loads and protect the vegetation and organic soil beneath. Ice roads will be wide enough to safely accommodate two-way vehicular traffic (minimum of 20 feet), drill rig access (minimum of 35 feet), and other traffic, as required. The ice road season each year varies depending on weather conditions and ice road completion times.

Table 7 lists the approximate mileages of ice roads planned during construction activities. Figure 19 shows where ice roads may be built. Exact ice road routes may vary based on topography, other field conditions, and agency approvals.

Table 7. Ice Road Infrastructure		
Year	**Approximate Mileage**	**Routes**
2019/2020	80-100	• Access road construction (Mustang Access Road Upgrade) • Infield road construction (Mustang Pad to NPF, NPF to ND-A and NFP to ND-B) • Gravel source(s) access (ASRC Pit, Mine Site F)
2020/2021	58 to 70	• Infield road construction (Nanushuk Access Road to ND-C and Nanushuk Boat Ramp Road) • Nanushuk and infield VSM and pipeline installation • Gravel source(s) access (ASRC Pit)
2021/2022	36 to 70	• Nanushuk and infield VSM and pipeline installation
2022/2023	36 to 70	• Nanushuk and infield pipeline installation and hydrostatic testing
Notes: NPF: Nanushuk Processing Facility; Kuparuk DS2M: Kuparuk drill site 2M; VSM: vertical support member; ND-A: Nanushuk Drillsite A; ND-B: Nanushuk Drillsite B; ND-C: Nanushuk Drillsite C.		

9.0 AIRSTRIPS

No new airstrip is proposed for the Project. During construction, drilling, and operations, the commercial airport in Deadhorse, approximately 52 miles away, will support air transport of project personnel and small materials and supplies to the North Slope. Personnel and materials flown into Deadhorse will be driven to the project area via the existing road system and ice roads until the proposed gravel access road is completed.

The NOP includes space for a helipad. During construction, helicopters will be used to support ice road layout, survey, and summer cleanup efforts. These activities usually take place in July or early August and last approximately 4 weeks, with daily helicopter traffic during that time. Helicopters may be used in the event of health or safety emergencies over the life of the project; however, routine helicopter use is not planned under normal operating conditions.

10.0 ALL OTHER FACILITIES AND EQUIPMENT

10.1 Tie-In Pad

The Project includes a TIP located on new gravel fill near the existing Kuparuk CPF2 facility (Figure 12). The TIP provides space for tie-in of the Nanushuk Pipeline infrastructure to existing North Slope facilities. TIP infrastructure will include a pig launcher and receiver, a metering skid, transformer skid, a pipe rack, pumping infrastructure, a shutdown valve, a laydown area, a communications tower, and the remote electrical and instrumentation module.

10.2 Pipelines

The Project includes two types of pipelines: (1) infield pipelines, which connect the drill sites to the NPF, and (2) the Nanushuk Pipeline, which connects the NPF to existing infrastructure on the North Slope via a TIP (Figure 20).

All pipelines will rest on HSMs supported by one or two (such as at anchor supports) 8- to 24-inch-diameter pipe pile VSMs spaced 55 to 60 feet apart (Table 8). Exact VSM spacing and placement will be unknown until engineering and construction designs are finalized, however; 55 to 60 feet is a standard industry estimate for North Slope based construction. Where feasible, pipelines will be located parallel to gravel roads at a distance of between 500 and 1,000 feet to minimize caribou disturbance and excessive snow drift while facilitating access for visual pipeline inspection, monitoring, repairs, modifications, and testing.

Both the infield pipelines and the Nanushuk Pipeline pipe racks will include a power cable and fiber optic cables to transmit power and facilitate communication between the NPF, drill sites, NOP, and TIP to avoid the need to install power poles. Power and fiber optic cables will be installed on the HSMs using messenger cables. All pipelines, HSMs, and suspended cables will be a minimum of 7 feet above the tundra surface, except where pipelines intersect a road or pad, or tie into a facility. There will be up to 14,000 cubic yards of fill associated with installation of the VSMs for the pipelines.

All pipelines will be externally-coated with 20 mils of fusion-bonded epoxy, covered with 3 inches of polyurethane foam insulation, and wrapped in a 24-gauge sheet-metal jacket. Pipelines will have a non-reflective finish to reduce reflectivity and potential impacts to wildlife. The estimated number of VSMs necessary to support pipelines and pipeline diameters are provided in Table 8 and Table 9, respectively.

Table 8. Pipeline VSMs

Pipeline	Approx. No. of VSMs
Nanushuk Pipeline	3,070
Infield Pipelines	1,980
Pipeline River Crossings	22
Freshwater Pipeline	30

Table 9. Pipeline Details

Pipeline		Diameter (inches)
Nanushuk Pipelines	Oil Export	18
	Make-up water (import)	20
	Bi-directional make-up gas (import)	6
Infield Pipelines (each drillsite)	Multi-phase	24
	Water injection	12
	Gas lift	6
	Gas injection	6
Freshwater Pipeline		6

Pipeline construction activities will occur via ice road during the winter construction seasons. VSM locations will be surveyed and drilled, followed by VSM installation into the pre-drilled holes using

sand slurry fill. Drilling will occur from an ice road and will result in cuttings sidecast onto the ice around each VSM. The cuttings will then be removed to an upland or previously disturbed area.

Where pipelines cross road embankments, coated and insulated pipelines will be encased in structural steel pipe casings buried within the roadway section (Figure 21). Casings for pipeline-road crossings will extend at least 2 feet beyond the road embankment toe. The power and fiber optic cables will cross under the road prism via a trench located parallel to each pipeline-road crossing. Trenching will occur during winter. Trenched materials will be temporarily sidecast onto an ice pad adjacent to the trench. Trenched materials will be taken off the ice pad and backfilled into the excavation once trenching is complete.

10.2.1 Infield Pipelines

Infield pipelines connect the drill sites to the NPF. The ND-A, ND-B, and ND-C infield pipe racks each include:

- A multiphase pipeline to deliver multiphase product from the drill site to the NPF
- A water injection pipeline to transport injection water from the NPF to the drill site for reinjection
- A gas lift pipeline to transport treated gas from the NPF to the drill site
- A gas injection pipeline to transport excess gas to dedicated injection wells at the drill site
- An infield power cable to transmit power produced at the NPF to the drill site
- An infield fiber optic cable to transmit signals and communications between the NPF and the drill site

In addition, a freshwater pipeline will transport water from the water intake structure at Lake MC7903 to the NOP (Figure 22). The freshwater pipeline will be located on dedicated VSMs from the intake structure to the NOP.

10.2.2 Nanushuk Pipeline

The export/import Nanushuk Pipeline pipe rack includes:

- An export pipeline to transport sales-quality oil from the NPF to the TIP near the Kuparuk CPF2
- A make-up water pipeline to transport make-up injection water (treated seawater) from the TIP to the NPF
- A bi-directional gas pipeline to transport make-up gas from the TIP to the NPF or excess gas from the NPF to the TIP
- A power cable to transmit power produced at the NPF to the TIP
- A fiber optic cable to transmit signals and communications between the NPF and the TIP

The Nanushuk Pipeline infrastructure will be located parallel to the proposed access road and Mustang access road between the NPF and Kuparuk drill site 2M (DS2M) (Figures 3 and 4). Between Kuparuk DS2M and the TIP near Kuparuk CPF2, the Nanushuk Pipeline will parallel existing pipelines and/or gravel roads associated with the Kuparuk River Unit. The Nanushuk Pipelines cannot be located on existing VSMs due to insufficient space on existing pipe racks. However, co-location with the existing pipeline and road corridor minimizes impacts to the environment compared to having the two features spaced farther apart.

10.2.3 Pipeline River Crossings

The Nanushuk Pipeline and the ND-C infield pipeline will cross the Miluveach River and Kachemach River, respectively (Figure 23). All pipelines, HSMs, and suspended cables will be elevated at river crossings. At the Kachemach River crossing, the bridge has been designed to accommodate boat traffic. VSMs placed within known floodplains will be designed to withstand the effects of scour, bank migration, and forces from ice floe impacts.

10.3 Oliktok Dock Module Offloading

Sealift modules for the processing facilities at the NPF will be transported to the North Slope via barge and will be offloaded at the existing dock at Oliktok Point during the open water season (Figure 24). Barge offloading is accomplished by temporarily grounding barges at the dock face, which requires a relatively flat area in front of the dock face to avoid barge stress by point loading due to bathymetric irregularities. The Project includes site preparation of the barge landing area within a 500-foot-wide by 500-foot-long (5.7-acre) area in front (seaward) of the dock face through screeding just prior to the arrival of barges.

The screeding process includes scraping or dragging sediments within the proposed area to a desired depth of 8.0 to 8.5 feet below Mean Lower Low Water line. Sediments will not be removed from the water, nor will sediments leave the general dock area. Between 2,000 and 3,000 cy of seafloor will be redistributed, with the final volume dependent on site conditions prior to commencement of activities. The dock face may require maintenance or modifications.

10.4 Boat Ramp

A boat ramp will be constructed in the vicinity of ND-B (Figure 3). The boat ramp project was located on the lower Kackemach River and was requested by the community of Nuiqsut in 2014 (Figure 25). The ramp's slope could be up to 15 percent and will integrate erosion protection such as armor rock and/or concrete erosion protection mats to stabilize the side slopes. The ramp will be 20 feet wide at surface and include a small staging and turnaround area with enough space for short-term parking of vehicles with trailers. The ramp will also include an access road (a minimum of 24 feet wide at the surface) to provide access from the ND-B infield road. An alternative boat ramp location was identified by Nuiqsut whaling captains and search and rescue in 2019.

10.5 Ice Pads

Seasonal ice pads will be used to support construction activities, including gravel placement, and pipeline and bridge installation. Ice pads will likely be located adjacent to bridges, at each major gravel pad, and every 3 to 4 miles along access/infield roads and Nanushuk/infield pipelines. Construction support ice pads will house field offices, break shacks, enviro-vacs, and field shops, and will stage construction equipment, vehicles, materials, and supplies until gravel pads become available for use. Each construction support ice pad will be a minimum of 6 inches thick and 1 acre or less in size. If space on an existing gravel pad is not available, an ice pad may be used to house the off-site pioneer construction camp during winter seasons of construction. Water for ice roads and ice pads will be obtained from permitted surface water sources.

11.0 PERMITS

Table 10 presents a list of state, federal, and borough permits and authorizations (other than state land permits, which are shown on Figure 5) potentially required for the Project.

Table 10. Potential Permits, Authorizations, and Approvals				
Agency	**Permit Type**	**Permit Number**	**Application Status**	**Projected Use Requirement(s)**
U.S. Army Corps of Engineers	Department of the Army Clean Water Act (CWA) Section 404 / Rivers and Harbors Act Section 10 Permit	POA-2015-025	Record of Decision Approved 5/14/2019, Permit Approved 5/21/2019	All
U.S. Environmental Protection Agency	Class I Underground Injection Control (UIC) Wells	TBD	Application in Progress	UIC wells
US Coast Guard	Rivers and Harbors Act Section 9 Bridge Permit	TBD	Application in Progress	Bridge over Kachemach River
Alaska Dept of Conservation	Minor Air Permits	TBD	Application in Progress	Facilities
Alaska Dept of Conservation	Solid Waste General Permit	TBD	Application in Progress	Drill Pads
Alaska Dept of Conservation	Grind and Inject Facility Approval	TBD	Application in Progress	G&I Facility
Alaska Dept of Conservation	Oil Discharge Prevention and Contingency Plan	TBD	Application in Progress	All
Alaska Dept of Conservation	Alaska Pollutant Discharge Elimination System North Slope General Permit AKG332000	AKG332000	Application in Progress	Discharges
Alaska Dept of Conservation	Drinking Water Design Plan Review	TBD	Application in Progress	Facilities
Alaska Dept of Conservation	Wastewater Design Plan Review	TBD	Application in Progress	Facilities
Alaska Dept of Conservation	CWA Section 401 Water Quality Certificate	POA-2015-15	Permit received 12/31/2018	All
Alaska Dept of Fish and Game	Title 16 Fish Habitat Permit	TBD	Application in Progress	Fish passage culverts, water withdrawal
Alaska Dept of Natural Resources	Temporary Land Use Permit	LAS 28269	Permit approved 8/15/2016	Ice roads, ice pads
Alaska Dept of Natural Resources	Temporary Water Use Authorization	TBD	Application in Progress	Water withdrawal
Alaska Dept of Natural Resources	Unit Plan of Operations Authorization	TBD	Application in Progress	All
Alaska Dept of Natural Resources	AS 38.05.850 Easement	TBD	Application in Progress	Nanushuk Access Road

Table 10. Potential Permits, Authorizations, and Approvals				
Agency	**Permit Type**	**Permit Number**	**Application Status**	**Projected Use Requirement(s)**
Alaska Dept of Natural Resources	Pipeline Right-of-Way Lease AS 38.35	TBD	Application in Progress	Nanushuk Pipeline
Alaska Dept of Natural Resources	Tidelands Permit (Temporary Land Use Permit)	TBD	Application in Progress	Screeding, boat ramp, bridges, MC7903 water source
Alaska Oil and Gas Conservation Commission	Permit to Drill	TBD	Application in Progress	Wells
Alaska Oil and Gas Conservation Commission	Class II UIC Enhanced Oil Recovery Well Area Injection Order	TBD	Application in Progress	UIC Wells
North Slope Borough	Industrial Development & Use Permit	TBD	Application in Progress	Entire project
North Slope Borough	Rezone and Master Plan Approval	TBD	Application in Progress	Entire project
North Slope Borough	Certificate of Inupiat History, Language, and Culture/Traditional Land Use Inventory Clearance (Form 500)	NSB Permit Application #19-089	Permit approved 6/17/2019	Entire project

12.0 REHABILITATION PLAN

12.1 Proposed Level of Infrastructure, Facilities, and Equipment Removal

Upon completion of project activities and in compliance with permit and lease requirements, OSA will commence dismantlement, removal, and rehabilitation (DR&R) activities, which are generally expected to include:

- Notification and coordination with Kuukpik Corporation, Alaska Department of Natural Resources (ADNR), NSB, and other regulatory agencies to discuss specific DR&R requirements and timeframes.
- Plugging and abandonment of wells in accordance with general industry best practices and compliance with Alaska Oil and Gas Conservation Commission requirements identified in 20 Alaska Administrative Code 25.105–25.172. Abandonment of wells may occur throughout the life of the Project.
- Development of a restoration plan that includes required elements identified by permitting agencies.
- Dismantlement and removal of installed equipment and infrastructure, unless coordination with landowners or agencies indicates otherwise.
- Enactment of restoration activities identified in the restoration plan in accordance with goals and objectives identified in the plan.

The timeframe of these activities will be identified through coordination with landowners and agencies.

12.2 Description of Restoration and Rehabilitation Activities for Vegetation, Habitat, Impacted Wildlife, and Other Applicable Resources

Any areas of tundra damage will be identified and discussed with the landowner (either ADNR or Kuukpik Corporation) and the NSB to determine appropriate remediation and restoration activities that may be required. Buried utility installations that are not covered by gravel fill (i.e., roadway) will be revegetated using transplanted sprigs, cultivars, or seed either gathered on-site or off site. Vegetation collected off site will match the native plant species found in the vicinity of the disturbance. Revegetation work shall be performed by the end of the first growing season following the utility installation. Revegetation will be monitored in subsequent growing seasons and additional efforts will be performed until revegetation of the site is complete.

13.0 OPERATING PROCEDURES DESIGNED TO MINIMIZE ADVERSE EFFECTS

Operating procedures designed to prevent or minimize adverse effects on other natural resources, other uses of the Pikka Unit, and adjacent areas are described in the subsections below.

13.1 Fish and Wildlife Habitats

A Wildlife Avoidance and Interaction Plan and a Polar Bear Interaction Plan will be developed and implemented to minimize conflicts with wildlife. Ice roads will be constructed to avoid sensitive vegetation, such as willows, that extends above the snow level. Ice road crossings of designated streams and rivers will be slotted, breached, or weakened once they are no longer needed or at the end of each season to prevent ice damming and aid breakup. Fish passage culverts will be installed at stream crossings where fish are present. All water withdrawals will be conducted in compliance with water withdrawal authorizations and fish habitat permit stipulations to maintain adequate lake volumes in fish-bearing lakes. Where feasible, pipelines will be located parallel to gravel roads and separated by a minimum of 500 feet to minimize caribou disturbance. Pipelines will have a non-reflective finish to reduce potential impacts to wildlife. Avoidance of overhead powerlines reduces the potential for bird strikes and limits predator perching opportunities on power poles. Project facilities will use downward illumination to minimize the impacts of lighting on visual aesthetics and minimize the potential for bird strikes.

13.2 Historic and Archeological Sites

Cultural resource surveys were conducted in the project area in 2015, 2016, and 2017. Archaeological surveys will be conducted in 2019 to determine possible archaeological and cultural resources sites near the proposed activities. Specifically, information is desired on potential cultural properties that could be directly or indirectly affected by the proposed project.

All surveys and proposed project locations were coordinated with ADNR/Office of History and Archaeology (OHA) and the NSB. Project facilities will be located outside a 500-foot buffer from documented cultural resources, with one exception. The gravel access road and the sales oil export pipeline intersect the Colville #1 Peat Road (HAR-00173), a 46-mile-long historic road. In

2017, the resource was recommended eligible for the National Register of Historic Places and received State Historic Preservation Officer (SHPO) concurrence. The Project initiated consultation with SHPO and received a letter of concurrence (dated November 28, 2018) to the finding of no adverse effect to HAR-00173, Colville #1 Peat Road. Should cultural resources be discovered during project activities, work in the vicinity of the find will cease, the OHA/SHPO will be notified, and a professional archaeologist will be consulted.

13.3 Public Use Areas

Public use of the area is limited to local subsistence activities. Subsistence representatives from the NSB or the Kuukpik Corporation will be available on-site during operations to minimize impacts to subsistence activities. OSA will work with the Kuukpik Corporation to establish access agreements so project gravel roads and ice roads can be used to increase access for subsistence activities.

13.4 Other Uses

Other uses in the general area will be possible activities by other oil and gas companies for geophysical purposes. OSA will coordinate with those companies to avoid operational problems posed from concurrent activities, and to develop an access agreement if needed.

14.0 GLOSSARY OF TERMS

Table 11 presents a compilation of acronyms and terms used in this Plan of Operations.

Table 11. Glossary of Terms

Term #	Term	Term Definition
1	ADEC DAQ	Alaska Department of Environmental Conservation Division of Air Quality
2	ADEC DEH	Alaska Department of Environmental Conservation Division of Environmental Health
3	ADEC DW	Alaska Department of Environmental Conservation Division of Water
4	ADEC SPAR	Alaska Department of Environmental Conservation Spill Prevention and Response
5	ADF&G	Alaska Department of Fish and Game
6	ADNR	Alaska Department of Natural Resources
7	ADNR DMLW	Alaska Department of Natural Resources Division of Mining Land and Water
8	ADNR DOG	Alaska Department of Natural Resources Division of Oil and Gas
9	ADNR SPCS	Alaska Department of Natural Resources State Pipeline Coordinator's Section
10	AOGCC	Alaska Oil and Gas Conservation Commission
11	ASME	American Society of Mechanical Engineers
12	CPF2	Kuparuk Central Processing Facility 2
13	cy	cubic yards

Table 11. Glossary of Terms		
Term #	**Term**	**Term Definition**
14	DR&R	Dismantlement, Removal, and Rehabilitation
15	DS2M	Kuparuk Drill Site 2M
16	EPA	U.S. Environmental Protection Agency
17	HSM	horizontal support member
18	kV	Kilovolt
19	mcy	million cubic yards
20	MG	million gallons
21	ND-A	Nanushuk Drillsite A
22	ND-B	Nanushuk Drillsite B
23	ND-C	Nanushuk Drillsite C
24	NMFS	National Marine Fisheries Service
25	NOP	Nanushuk Operations Pad
26	NPF	Nanushuk Processing Facility
27	NSB	North Slope Borough
28	ODPCP	Oil Discharge Prevention and Contingency Plan
29	OHA	Alaska Department of Natural Resources Office of History and Archaeology
30	OHW	Ordinary High Water
31	OSA	Oil Search (Alaska), LLC
32	SHPO	State Historic Preservation Officer
33	SPCC	Spill Prevention, Control, and Countermeasure Plan
34	TIP	Tie-In Pad
35	TAPS	Trans-Alaska Pipeline System
36	UIC	Underground Injection Control
37	USACE	U.S. Army Corp of Engineers
38	USCG	U.S. Coast Guard
39	USFWS	U.S. Fish and Wildlife Service
40	USDOT	U.S. Department of Transportation
41	VSM	vertical support member
42	WAP	Waste Analysis Plan
43	WOUS	waters of the U.S.

15.0 CROSSWALK OF COMPONENT NAMES

OSA applied to the USACE for a Section 404/10 permit for the Nanushuk Project (POA-2015-25) and received a Record of Decision on May 14, 2019. The project components listed in that permit application, the Nanushuk Final Environmental Impact Statement, and the permit decision are referred to using naming conventions other than those used in this document. Table 12 contains a crosswalk between those document naming conventions and terminology applicable to this Plan of Operations.

Table 12. Crosswalk of Component Names

Current Acronym/Name	Previous Acronym/Name	Description
Infield Pipelines	Infield Pipelines	Pipelines and cables between NPF and drill sites
Infield Roads	Infield Roads	All spur roads from the Nanushuk Access Road
Kachemach River Bridge	Kachemach River Bridge	Bridge over Kachemach River
Water Source Access Road	Water Source Access Road	Road to the Lake MC7903 tie-in pad
Freshwater Pipeline	Freshwater Pipeline	Pipelines that transport raw water from the water source, and transport freshwater from the NOP to the NPF
Mustang Access Road	Mustang Access Road	Providing access to both the Mustang Pad and the Nanushuk development
Miluveach River Bridge	Miluveach River Bridge	Bridge over Miluveach River
Nanushuk Access Road	Access Road	Gravel road connecting the NPF to the existing North Slope road infrastructure at DS2M or the Mustang Road
Nanushuk Boat Ramp	Boat Ramp	Boat launch ramp to the Colville River
ND-A/Nanushuk Drillsite A	DS1/Drillsite 1	Drillsite gravel pad hosting drilling associated equipment and infrastructure.
ND-A Pipeline	DS1 Pipeline	Pipelines and cables between the NPF and ND-A
ND-A Road	DS1 Road	Spur road that connects ND-A to NPF
ND-B /Nanushuk Drillsite B	DS2/Drillsite 2	Drillsite gravel pad hosting drilling associated equipment and infrastructure.
ND-B Pipeline	DS2 Pipeline	Pipelines and cables between the NPF and ND-B
ND-B Road	DS2 Road	Spur road that connects ND-B to the Nanushuk Access Road
ND-C/Nanushuk Drillsite C	DS3/Drillsite 3	Drillsite gravel pad hosting drilling associated equipment and infrastructure

Table 12. Crosswalk of Component Names		
Current Acronym/Name	**Previous Acronym/Name**	**Description**
ND-C Pipeline	DS3 Pipeline	Pipelines and cables between the NPF and ND-C
ND-C Road	DS3 Road	Spur road that connects ND-C to the Nanushuk Access Road. This road crosses the Kachemach River at the Kachemach River Bridge.
NOP/Nanushuk Operations Pad	Operations Center Pad	Pad hosting accommodation facilities and other operations support infrastructure
Nanushuk Pipeline	Nanushuk Pipeline	Pipelines and cables between the NPF and the TIP within the Kuparuk River Unit
NPF/Nanushuk Processing Facility	CPF/Nanushuk Central Processing Facility	Pad hosting crude oil processing and metering, power generation, compression facilities, and other infrastructure
TIP/Tie-In Pad	Tie-In Pad	Gravel pad hosting tie-in infrastructure, located adjacent to existing pipeline within the Kuparuk River Unit
Pump house pad	Pump house pad	Gravel pad hosting pumping infrastructure located adjacent to Lake MC7903

Supplemental Land Status Documentation

LAND STATUS: SUPPLEMENTAL SECTION

1. State Mineral Estate:

Affected ADL: 392982 Date Effective: 5/1/1015 Date Assigned: Enter Date.

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-A Road and pipeline	Umiat, T11N, R6E, Sec. 2	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 392962 Date Effective: 5/1/2015 Date Assigned:

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-A Pipeline	Umiat, T11N, R6E, Sec. 1	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 393013 Date Effective: 7/1/2010 Date Assigned:

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-A Road	Umiat, T12N, R6E, Sec. 35	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 393014 Date Effective: 7/1/2010 Date Assigned:

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-A Road and pipeline	Umiat, S12N, R6E, Sec. 36	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 391553 Date Effective: 7/1/2010 Date Assigned:

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-A Pipeline	Umiat, T12N, R6E, Sec. 25	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 392985 Date Effective: 5/1/2015 Date Assigned: Enter Date.

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-B Road	Umiat, T11N, R6E, Sec. 9	Click here to enter text.
Nanushuk Boat Ramp Access Road	Umiat, T11N, R6E, Sec. 9	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 392963 Date Effective: 5/1/2015 Date Assigned:

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-B Pipeline	Umiat, T11N, R6E, Sec. 3	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 391022 Date Effective: 9/1/2006 Date Assigned:

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: Kuukpik Corporation

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: State/ASRC

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-C Road	Umiat, T11N, R5E, Sec. 25	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: 392986 Date Effective: 5/1/2015 Date Assigned:

Oil And Gas Lessee(s): Oil Search (Alaska), LLC

Surface Ownership: State of Alaska

Do you have, or anticipate having an Access Agreement: ☒ Yes ☐ No

Special Use Lands: N/A

Jointly Managed Lands: N/A

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
ND-A Road and pipeline	Umiat, T11N, R6E, Sec. 11	Click here to enter text.
ND-B Road and pipeline	Umiat, T11N, R6E, Sec, 11	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: Enter ADL. Date Effective: Enter Date. Date Assigned: Enter Date.

Oil And Gas Lessee(s): Click here to enter text.

Surface Ownership: Click here to enter text.

Do you have, or anticipate having an Access Agreement: ☐ Yes ☐ No

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Click here to enter text.	Click here to enter text.	Click here to enter text.

Supplemental Projected Use Requirements

PROJECTED USE REQUIREMENTS: SUPPLEMENTAL SECTION				
Agency	**Permit Type**	**Permit Number**	**Application Status**	**Projected Use Requirement(s)**
NSB	Industrial Development & Use Permit	TBD	Application in Progress	Project development, drilling, and operations
NSB	Rezone and Master Plan Approval	TBD	Application in Progress	Entire project
NSB	Certificate of Traditional Land Use Inventory (TLUI) Clearance	NSB Permit Application #19-089	Permit approved 6/17/2019	Entire project
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).