

Nanushuk Project

Applicant Proposed Mitigation Statements

Submitted by:



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Applicant Proposed Mitigation Statements

Background:

To develop a complete individual permit application under Section 404 of the Clean Water Act, certain information pertaining to how Oil Search Alaska, LLC (OSA) is proposing to mitigate impacts to waters of the U.S. (WOUS) is necessary. The information is provided to satisfy box 23 of the ENG Form 4345.

Applicant's Proposed Mitigation:

1. Avoidance of impacts to aquatic ecosystems, including wetlands:

The following measures will be taken to avoid impacts to the greatest extent practicable:

WOUS:

- Drill sites are located east of the Colville River and as far east as practicable, while still meeting the Nanushuk Project (Project) purpose and need to produce commercial quantities of crude oil from the target reservoirs. The location of drill sites avoids placement of surface facilities west of the East Channel of the Colville River (East Channel), which eliminates the need for associated transportation and pipeline infrastructure to access this area.
- Connection to the existing gravel road system allows use of the existing Deadhorse Airport to support field logistics. This eliminates the need for a new project-specific airstrip to transport personnel and the associated regular fixed-wing air travel impacts in the project area. Connection to the existing gravel road system also results in less storage space required at each drill site to accommodate required site support materials, fuels, hazardous substances, and solid waste, reducing the overall size of each pad.
- Stockpiling of gravel within WOUS is not proposed as part of the Project. Therefore, additional acreage is not being requested. Gravel will be transported directly from the material site and placed on the permitted project footprint.
- Existing barge infrastructure at Oliktok Point will be used to avoid the need to construct new marine facilities to support sealift module delivery.
- Seasonal ice pads and roads will be used to support winter pipeline and gravel infrastructure construction, avoiding the need for additional fill to support construction.
- Drilling for vertical support members (VSMs) will occur from an ice road and drilling cuttings will be sidecast onto the ice around each VSM, avoiding a discharge of fill material into WOUS, since the sidecasting will not change the bottom elevation of a WOUS or replace any portion of a WOUS with dry ground. The drilling cuttings will be removed once VSM installation is complete.
- Trenching will occur during the winter, and all 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. This will avoid a discharge of fill material into WOUS from the sidecast.

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- Power cables and fiber optic cables will be installed on the horizontal support members (HSMs) using messenger cables, avoiding the need for power poles and associated fill.
- At pipeline-river crossings, all pipelines, HSMs, and suspended cables will be elevated to maintain adequate freeboard.

Table 1 shows the acreage associated with the quantifiable avoidance mitigation measures listed above.

Table 1. Acreage of Quantifiable Avoidance Measures

Avoidance Measure	Acres Avoided
Connection to the existing gravel road system and use of the existing Deadhorse Airport to support field logistics	32
Stockpiling of gravel within WOUS is not proposed as part of the Project	13
Use of existing barge infrastructure at Oliktok Point	2
Use of seasonal ice pads to support winter pipeline and gravel infrastructure construction	24
Drilling VSMs from an ice road with drilling cuttings temporarily sidecast onto the ice around each VSM and removed after VSM installation is complete	38
Winter trenching with all trenched materials temporarily sidecast onto an ice pad and backfilled into the excavation after trenching is complete	<1
Installation of power cables and fiber optic cables on HSMs using messenger cables	<0.1
Total Avoidance Measures	109

Wildlife:

- Power and fiber optic cables will be installed on the HSMs using messenger cables, avoiding the use of overhead powerlines. Avoidance of overhead powerlines reduces the potential for bird strikes and limits creation of predator perching opportunities on power poles.

Cultural Resources/Subsistence:

- A site-specific survey was conducted and, to the extent possible, project facilities will be located outside of a 500-foot buffer from documented cultural resources.

Noise:

- A new project-specific airstrip will not be developed as part of the Project. This avoids regular fixed-wing air traffic into the project area, reducing noise/disturbance impacts to local residents, subsistence users, and wildlife, as well as air quality impacts.

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- Power generated at the Central Processing Facility (CPF) will be supplied to each drill site through a power cable to reduce noise and air quality impacts at each of the drill sites.
2. Minimization of unavoidable impacts to WOUS, including wetlands:

The following measures will be taken to minimize impacts to the greatest extent possible:

WOUS:

- Locating drill sites as far east as practicable from the Colville River minimizes the distance of gravel road and pipeline needed to tie into existing infrastructure.
- The proposed project has been updated to a modified version of Alternative 5 evaluated in the Nanushuk Project Draft Environmental Impact Statement (Draft EIS; U.S. Army Corps of Engineers [USACE] 2017) that includes use of 4.7 miles of the existing Mustang Road, resulting in a reduction of fill in WOUS. Based on analysis presented by USACE in the Draft EIS, this update also has potential to reduce impacts to other resources.
- Based on stakeholder feedback, Drill Site 2 (DS2) has been relocated approximately 3,200 feet east to a location southeast of Lake 9211, minimizing the DS2 access road and infield pipeline by approximately 0.7 mile.
- Drill Site 3 (DS3) has been relocated to a suitable location outside of the Colville River floodplain, thus minimizing placement of gravel within the floodplain.
- Gravel roads and pads are located outside of the Alaska Department of Natural Resources 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.
- Roads will have standard minimum thickness (5 feet minimum) to protect underlying permafrost by insulating and maintaining stable permafrost conditions.
- Pads will have standard minimum thickness (6 feet minimum) to protect underlying permafrost by insulating and maintaining stable permafrost conditions. Pads are at least 1 foot thicker than roads due to higher thermal loads associated with pads.
- The following engineering methods will be employed to minimize heat transfer from infrastructure on pads to the underlying permafrost:
 - In well conductors, the gap between the well conductor and inner pipe will be filled with polyurethane foam.
 - Thermosyphons will be installed adjacent to well rows and at-grade heated structures (e.g., the warehouse and cold storage).
 - Heated at-grade structures will be constructed with 4 to 8 inches of rigid insulation installed approximately 24 inches below the foundation/floor slabs.
 - Flare stack height will be selected to reduce ground-level radiant heat intensity to levels that will protect personnel, structures, and equipment as well as to avoid permafrost degradation (typically 1,500 btu/hr/ft²).

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- Gravel roads provide all-season access to parallel export/import and infield pipelines for visual inspection and for routine and emergency maintenance and repairs. This also reduces the need for tundra travel associated with these activities. Roads and pipelines will be located within 1,000 feet of each other where feasible.
- On-site processing minimizes the length of the multiphase pipeline and potentially allows for a smaller total processing facility footprint relative to construction of pre-processing facilities at each drill site.
- No processing of multiphase fluids will occur at DS2 or DS3, avoiding the need for processing infrastructure at each site and reducing the overall gravel footprint.
- All on- and off-pad pipelines will be elevated above grade on VSMs to reduce impacts to permafrost.
- The export/import pipeline will be co-located with existing pipelines and/or gravel roads associated with the Southern Miluveach and Kuparuk River Units between the Mustang Pad and the Kuparuk DS2C near CPF2. Where available, co-location with existing pipelines and roads minimizes impacts to the aquatic environment compared to spacing the two features farther apart.
- Project roads are located to reduce impacts to hydrology through minimization of the placement of gravel fill within the floodplain. In addition, the placement of the Miluveach River and Kachemach River bridges at narrow portions of the rivers minimizes placement of gravel fill in the floodplain and piers below ordinary high water.
- Road widths have been designed, in part, based on the weights and sizes of vehicles expected to travel on them. Access roads to the boat ramp and pump house pad will be constructed to a minimum 24-foot-wide surface to minimize gravel fill relative to the 32-foot-wide gravel access road and DS1, DS2, and DS3 infield roads.
- Gravel road footprints have been further minimized by using 2:1 side slopes instead of 3:1 side slopes and reducing the access and infield road widths to 32 feet at the surface.
- Pad and road layouts consider topography and maintenance of natural drainage patterns and avoid ponds, lakes, and streams, where possible, to minimize gravel requirements, maintain natural drainage patterns, and minimize water ponding. Where natural drainage patterns are crossed, roads will be designed perpendicular to the general flow direction to the extent practicable. Layout design also considers the effects of spring breakup and other flood events.
- In addition to minimum gravel thickness criteria, gravel facilities located within the floodplain will be built to more conservative elevations based on hydrologic conditions, including both open-water and ice-affected stage frequency conditions, to minimize potential effects on hydrology.
- Drill sites are oriented with the long axis parallel to the prevailing northeast/southwest wind direction to minimize snow drift and related maintenance activities, resulting in a minimization of potential effects on hydrology during spring breakup.

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- Pads and roads will be designed to limit point sources of runoff to the surrounding tundra. Instead, both snowmelt and rain water on the pad will primarily seep directly through the gravel.
- Drill site locations are designed to minimize lengths of infield roads and pipelines, with considerations for hydrology, wetlands, and subsistence use.
- All drill sites are sized to minimize overall gravel requirements while maintaining space for a sufficient number of well heads to meet the overall project purpose. Well-head spacing has been reduced from 30 feet to 20 feet to further minimize drill site footprint.
- Bridge abutments will be designed using sheet piles to minimize the gravel fill footprint, road embankment erosion, and stream scour.
- External corrosion inspections of pipelines will be conducted during winter and will be supported by approved tundra travel vehicles to avoid impacts associated with summer tundra travel.
- Drainage culverts will be sited and designed at streams and concentrated drainages to pass the 50-year flood event with a headwater elevation not exceeding the diameter of the culvert to minimize potential impacts to hydrology. Where possible, as determined by engineering or regulatory agencies, culverts within the 200-year floodplain may be designed to pass the 75-year flood event. Prior to construction, an engineer will walk and slope-stake roads to determine the precise locations of drainage structures and determine on-site conditions for final layout.
- 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.
- Cross-drainage culverts will be installed within the access and infield roads to reduce impoundment and allow conveyance of surface water flow that intersects the road, in order to maintain natural drainage patterns. As a general guideline, cross-drainage culverts will be sited approximately every 500 feet along the alignment during initial design efforts, although exact placement of culverts will depend on actual in-field local drainage patterns.
- Regular ice road use will be limited to construction activities to minimize the need for annual withdrawal of water for ice road construction. Ice roads are not planned for use on a regular basis to support development drilling and operations.
- In accordance with permits, ice road crossings of designated streams and rivers will be slotted, breached, or weakened upon completion of use.
- Pending commercial agreements and availability of supply, seawater purchased from a third party will be used to supply make-up water, minimizing use of local freshwater sources and avoiding the need for additional seawater treatment and transportation infrastructure.

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- During drilling and operations, grind and inject facilities (Underground Injection Control, or UIC, Class I well) will be available for disposal of Resource Conservation and Recovery Act exempt and non-hazardous waste. This will minimize the risk of fluid spills during transport of fluids to an off-site disposal facility. Project modifications reduced the number of UIC wells from four to two: one primary disposal well and one backup disposal well.
- Discharge of domestic wastewater to the tundra at the project site is not planned during normal conditions. As a result, a number of impacts would be minimized, including the potential for soil erosion from water discharge and potential impacts to water quality, vegetation, birds, and wildlife.
- Personnel will be required to stay on gravel or ice surfaces to minimize impacts to the tundra unless their specific job duties require them to be on the tundra and that activity is properly permitted.
- Except for removal of snow and ice in excess of 4 inches from work areas, disturbance of the tundra, including vegetation and organic cover, will be avoided during gravel placement to minimize impacts to permafrost.
- Dust control measures will be implemented to reduce the incidence of dust on vegetation and snow.
- Snow removal management measures will be implemented to reduce the potential for gravel fill to be pushed off pads during snow removal.
- At the conclusion of production, abandonment of project facilities will be conducted in accordance with Alaska Department of Natural Resources Division of Oil and Gas North Slope Areawide Lease Mitigation Measures and in compliance with all permit and lease requirements.

Table 2 shows the acreage associated with the quantifiable minimization mitigation measures listed above.

Table 2. Acreage of Quantifiable Minimization Measures

Minimization Measure	Acres Minimized
All pads are sized to minimize overall gravel requirements while maintaining space for a sufficient number of well heads to meet the overall project purpose. Well-head spacing has been reduced from 30 feet to 20 feet to further minimize drill site footprint.	13
Gravel road footprints have been further minimized by using 2:1 side slopes instead of 3:1 side slopes and reducing both the access and drill site infield road widths to 32 feet at the surface.	42
Road widths have been designed, in part, based on the weights and sizes of vehicles expected to travel on them. Access roads to the boat ramp and pump house pad will be constructed to a minimum 2424-foot-wide surface to	1

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minimize gravel fill relative to the 32-foot-wide gravel access road and DS1, DS2, and DS3 infield roads.	
DS2 has been relocated approximately 3,200 feet east to a location southeast of Lake 9211, minimizing the DS2 access road and pipeline.	5
Total Minimization Measures	61

Vegetation:

- Ice roads will be routed and constructed to minimize impacts to sensitive vegetation such as willow, per North Slope Borough (NSB) requirements.
- 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.

Air Quality:

- Air emissions will be minimized through compliance with ambient air quality standards as demonstrated through computer modeling approved by the Alaska Department of Environmental Conservation (ADEC).
- No incinerator will be located on site, thereby reducing overall project air emissions.
- Post-construction, natural gas-fired combustion turbines will be used for power generation and compression, which minimizes the use of diesel-fired emission units. Combustion turbines will be equipped with appropriate technologies to ensure efficient combustion, increased fuel efficiency, and reduced greenhouse gas (GHG) emissions rates.
- Most combustion turbines at the CPF will be equipped with waste heat recovery units for process and space heat, reducing GHG emissions.
- OSA will use a safety flare for emergency control of excess gas, instead of venting the excess gas, to reduce GHG emissions.
- OSA will implement good combustion practices for all fuel-fired equipment, including regular maintenance according to manufacturer's recommendation, to reduce potential GHG emissions.

Wildlife:

- 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.
- All pipelines, HSMs, and suspended cables will be a minimum of 7 feet above tundra surface except where pipelines intersect a road or pad or are constructed within 100 feet of an existing pipeline that is elevated less than 5 feet.

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- Project facilities were located to reduce impacts to wildlife by moving the Miluveach River Bridge and access road away from ADF&G-identified sensitive brown bear denning habitat.
- A Polar Bear Interaction Plan and a Wildlife Avoidance and Interaction Plan will be developed to provide personnel with guidance to minimize the possibility of wildlife interactions and impacts to bears and human safety.
- Facility lighting will be designed to minimize the impact of lighting on visual aesthetics and minimize the occurrence of bird strikes. The facility lighting will minimize light visible from outside of project facilities by using downward illumination such as downcast floodlights and excluding use of horizontally aimed floodlights, locating mast poles away from the pad edge, using lighting fixtures with lamps contained within the reflector, and shading externally facing windows on buildings.
- Placement of new gravel fill on tundra is not planned to occur during the bird nesting season, to minimize the potential for disturbances to nesting birds and broods.
- Pipelines will have a non-reflective finish to reduce reflectivity and potential impacts to wildlife from visual disturbances.
- Project facilities are located to reduce impacts to hydrology and fish through minimization of the gravel fill footprint within 500 feet of fish-bearing water bodies, where practicable.
- 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.

North Pacific Right Whale Critical Habitat:

- Vessels directly supporting the project will either:
 - a. avoid transiting through designated North Pacific right whale critical habitat (73 FR 19000); or
 - b. implement the following mitigation measures while traveling within North Pacific right whale critical habitat at speeds greater than 5 knots (kn).
 - i. Operators will maintain a ship log indicating the time and geographic coordinates at which vessels enter and exit North Pacific right whale critical habitat.
 - ii. Vessels will travel at speeds of 10 kn (or less) with Marine Mammal Observers (MMOs) while traveling within the boundaries of designated North Pacific right whale critical habitat.
 - iii. At least one MMO or trained crew member will maintain a constant watch for North Pacific right whales, from the vessel's bridge or other similar vantage point, during travel through North Pacific right whale critical habitat,
 - iv. The MMO or trained crew member will maintain direct contact with the vessel pilot, advising the pilot/operator of the position of observed North Pacific right whales as soon as they are observed.

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- v. If a North Pacific right whale is sighted, avoidance measures will be taken to maintain a 500 yard distance between the whale and the vessel.
 - vi. Vessel will stay at least 300 meters (m) away from cow-calf pairs, feeding aggregations, or whales that are engaged in breeding behavior.
 - vii. The vessel operator will avoid: i) direct approach of whales; ii) operating in a way to separate members of a group of whales or sea lions from other members of that group; iii) causing a whale of any species to make multiple changes in direction; and iv) pursuing marine mammals.
 - viii. If a whale approaches the vessel and if maritime conditions safely allow, the engine will be put in neutral and the whale will be allowed to pass beyond the vessel. If the vessel is taken out of gear, vessel crew will confirm that no whales are within 50 m of the vessel when propellers are re-engaged, thus minimizing risk of marine mammal injury; or
- c. in the absence of on-duty MMOs, travel at speeds of 5 kn or less within the boundaries of designated North Pacific right whale critical habitat.
- Marine Mammal Observer Protocol
 - a. The MMO will have experience or training in field identification of marine mammals and their behaviors, and will be trained to prepare reports of observations and complete data entry forms accurately.
 - b. The MMO will have the following equipment at a minimum: binoculars, a range finder, compass, Global Positioning System (GPS), and a log book or data sheets that are used to record observations.
 - c. The MMO will work in shifts lasting no longer than 4 hours, and will not work for more than 12 hours in a 24-hour period. Note that during the MMO breaks, a crew member can be assigned to be the observer as long as they do not have other duties at that time and they have received instructions and tools to allow them to make marine mammal observations.
 - d. The MMO will have the ability to effectively communicate orally, by radio and in person, with project personnel to provide real-time information on marine mammals, and will have the ability to order appropriate mitigation responses to avoid take of marine mammals.
 - e. The MMO will have no other primary duties beyond watching for, acting on, and reporting events related to marine mammals. For crew members, this mitigation measure only applies during the time the crew member must assume the duties of the MMO due to the absence of a qualified MMO.
- Reporting
 - a. When project vessels are traveling through North Pacific right whale critical habitat, the MMO will record information about North Pacific right whales observed within the critical habitat using a log book or data sheets. Sightings of North Pacific right whales will be reported to National Marine Fisheries Service (NMFS) within 24 hours. These sighting reports will include the following information:

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- i. Ship logs (time and location for when a vessel entered and exited North Pacific right whale critical habitat).
- ii. Species, date, and time for each observation.
- iii. Number of animals per sighting event; and number of adults/juveniles/calves per sighting event (if determinable).
- iv. Geographic coordinates for the observed animals, with the position recorded by using the most precise coordinates practicable (coordinates must be recorded in decimal degrees, or similar standard (and defined) coordinate system).
- v. Environmental conditions as they existed during each sighting event, including sea conditions, weather conditions, visibility (km/mi), lighting conditions, and percent ice cover.
- vi. Photographs or video obtained.
- vii. A summary report containing the data recorded by the MMO during barge transit through North Pacific right whale critical habitat will be submitted to NMFS within 90 calendar days of the completion of transit through the critical habitat.

Cultural Resources/Subsistence/Socioeconomics:

- Impacts to subsistence use areas will be minimized through location of project facilities (including the Miluveach River Bridge) away from subsistence use areas near the mouth of the Miluveach River.
- Bridge locations have been chosen to minimize impacts to boaters and subsistence use areas. Clearance for the Kachemach River crossing will maintain adequate freeboard plus an additional 4 feet to minimize interference with vessel-based subsistence activities.
- Tundra access ramps will be constructed at three previously proposed road turnouts on infield roads to DS1, DS2, and DS3 to facilitate access for off-road travelers.
- A boat ramp, including a small staging and turnaround area with enough space for short-term parking of vehicles with trailers, will be constructed on the lower Kachemach River in the vicinity of DS2 to facilitate use by local users to launch and retrieve boats.
- 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.
- OSA will provide regular project updates to the community and leadership in Nuiqsut during project development, and will incorporate measures to address concerns into project designs, where practicable. Additionally, OSA will continue to communicate regularly with the community and leadership in Nuiqsut throughout construction and operations.
- OSA will interface with the Kuukpik Subsistence Oversight Panel to minimize conflict with subsistence users.

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- 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 Iñlisagvik College to develop training programs for North Slope residents, if needed.

Spill Prevention and Response Planning:

- External pipe walls will be coated with fusion-bonded epoxy. Pipelines containing temperature-controlled fluids and multiphase product will include an insulation system consisting of polyurethane foam insulation covered with an interlocked sheet metal jacket. Pipeline facilities will include pig launchers and receivers capable of handling in-line inspection tools, and maintenance and cleaning tools.
- Where pipelines cross road embankments, coated and insulated pipelines will be encased in structural steel pipe casings buried within the roadway section. Casings for pipeline-road crossings will extend a minimum of 2 feet beyond the road embankment toe.
- All pipelines will be designed above ground and the Miluveach River and Kachemach River crossings are located in the vicinity of proposed roads, allowing for better access for leak detection, maintenance, and potential spill response.
- Gravel road connection to existing infrastructure provides reliable year-round, rapid access to project facilities in the event of an emergency, including a blowout, oil spill, or need for medical evacuation.
- Periodic surveillance of the pipelines will be conducted in accordance with federal regulatory and American Society of Mechanical Engineers (ASME) B31.4 requirements and in accordance with ADEC regulations (18 Alaska Administrative Code 75). Leak detection systems and surveillance will be compliant with ASME codes and state and federal standards. For pipeline-river crossings, either isolation valves or vertical loops will be used, depending on the type of pipeline.
- 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.
- Fuels and other products will be transported to the project area using a licensed, commercial transporter following federal Department of Transportation regulations for safe transport of materials to minimize spill risk.
- Trained North Slope employees and contractors who are familiar with North Slope oilfields will be employed, providing personnel who are familiar with industry requirements regarding environmental and regulatory compliance standards. Personnel will be trained on Nanushuk Operational Plans, including oil handler training, waste management, snow removal, spill prevention, and wildlife interaction, which will minimize the potential for impacts during daily operations.

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- Dedicated spill response equipment will be positioned throughout the field to minimize spill response time. This allows responders to address a potential spill and start response as soon as possible, while minimizing the amount of fluid that may be released and associated impacts. The locations and types of oil spill response equipment, and equipment deployment times will be identified in detail in the project ODPCP.
- OSA will maintain its membership with Alaska Clean Seas and the Mutual Aid Agreement with other operators on the North Slope to provide resources to respond to spills, which may require resources other than those readily staged on pad. Membership in Alaska Clean Seas supports faster response time, especially if additional equipment or personnel are required to address an accidental release.

Noise:

- Routine helicopter use will be avoided during regular development, drilling, or production activities, minimizing noise and related impacts to aesthetics, wildlife, and subsistence.

3. Compensation for unavoidable impacts to waters of the U.S., including wetlands:

As described in the Applicant Proposed Mitigation Statements submitted as part of a July 2017 Department of the Army Permit application, Armstrong Energy, LLC, the applicant at that time, recommended that compensatory mitigation is not appropriate for the Project. The Project falls within three 10-digit Hydrologic Unit Code (HUC) watersheds: the Colville River Delta Watershed (HUC 1906030410), the Kachemach River Watershed (HUC 1906030411), and the Miluveach River Watershed (HUC 1906030412), which are all located within the Colville River Basin (6-digit HUC 190603). These three watersheds total approximately 500,000 acres. Based on the U.S. Geological Survey Land Cover dataset with addition of existing developments, approximately 0.15 percent of those 500,000 acres has been directly impacted by placement of gravel fill. Similarly, U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory mapping indicates that less than 1 percent (0.85 percent) of the area is classified as uplands.

Following implementation of extensive avoidance and minimization measures described above, direct impacts from the Project would result in a loss of just 0.05 percent of aquatic resources within the three watersheds, resulting in a cumulative conversion of less than 1 percent (0.2 percent) of aquatic resources to uplands. Thus, the Project occurs in precisely the type of region identified by USACE and the U.S. Environmental Protection Agency (EPA) as inappropriate for compensatory mitigation: a “region . . . where wetlands constitute the overwhelming majority of land cover type, and there is a lack of available upland sites for creating wetlands or degraded wetlands sites for enhancement or restoration.”¹

OSA understands that USACE has evaluated these factors and has determined that compensatory mitigation is appropriate for the Project because “*the direct, indirect and cumulative impacts of the proposed project would occur within wetlands that are unique due to their location within/adjacent to the Colville River Delta (CRD)...which is the largest (approximately 250*

¹ EPA, USFWS, and National Marine Fisheries Service, Alaska Wetlands Initiative Summary Report, May 1, 1994, Attachment 1, Mitigation Requirements of the Clean Water Act Section 404 Regulatory Program: Applying Flexibility in Alaska.

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square miles) and most complex delta in northern Alaska, draining about 30% (20,700 square miles) of the North Slope.”² In addition, “EPA has identified the CRD, its associated tributaries and wetlands, and adjacent wetland systems, as an Aquatic Resource of National Importance (ARNI).”³ While USACE acknowledges that the Project is not located in the CRD, USACE has stated that the Project would “result in impacts to wetlands that are adjacent to and hydrologically feed the CRD. These adjacent areas are also included in the ARNI designation. These wetlands are of importance to both the human and aquatic environment, and the filling of these wetlands would result in losses of specific aquatic resource functions, for example; terrestrial mammal and waterbird habitat, flood flow moderation and conveyance and maintenance of the soils thermal regime.”⁴ Based on these factors, USACE has determined compensatory mitigation to be appropriate for the proposed Project.

OSA acknowledges the ecological importance of the CRD. For these reasons, OSA has avoided and minimized impacts to the CRD to the maximum extent practicable. For example, as described above, drill sites have been located east of the Colville River and as far east as practicable, while still meeting the overall project purpose to produce commercial quantities of crude oil from the target reservoirs. The location of drill sites avoids placement of surface facilities west of the East Channel of the Colville River, which eliminates the need for associated transportation and pipeline infrastructure to access this area. Additional measures to minimize impacts to specific aquatic resource functions highlighted by USACE are included in OSA’s application through the use of proven arctic engineering design standards; these include roads and pads that have a standard minimum thickness to protect the thermal regime of the underlying permafrost by insulating and maintaining stable permafrost conditions; separating roads and pipelines by a minimum of 500 feet, where feasible, to minimize terrestrial mammal (caribou) disturbance; and implementation of rigorous hydrologic design criteria for bridges and culverts to minimize impacts to flood flow moderation and conveyance across the landscape.

As part of project evaluation under the National Environmental Policy Act, USACE’s Draft EIS has not identified any significant impacts to aquatic resources, including wetlands and other WOUS. However, based on USACE’s determination that compensatory mitigation for the proposed Project is appropriate, OSA is evaluating the availability of appropriate and practicable options for compensatory mitigation within the watersheds affected by the proposed Project. Due to the lack of availability of mitigation banks and In-Lieu Fee programs, Permittee-Responsible Mitigation (PRM) was identified as the only mechanism by which compensatory mitigation could be performed.

In accordance with the 2008 Mitigation Rule (33 CFR § 325 and 332; 40 CFR § 230), OSA is developing PRM based on a watershed approach. OSA is currently assessing the Colville River Basin (HUC-6) and the HUC-10 and HUC-12 watersheds that would be directly impacted by the Project for their potential to support PRM commensurate with the impacts of the proposed Project. OSA’s watershed approach includes evaluation of existing aquatic resource conditions, potential threats to aquatic resources, and goals for improving aquatic resources within the affected watersheds. OSA is also considering mitigation located within the encompassing Arctic

² USACE, CEPOA-RD Memorandum for Record, Subject: POA-2015-25, Nanushuk Development Project, Appropriateness of Mitigation, September 14, 2018.

³ Ibid.

⁴ Ibid.

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Alaska Subregion (4-digit HUC 1906); mitigation that qualifies as out-of-kind mitigation⁵ and could serve the aquatic resource needs of the watershed; and mitigation on public lands consistent with Memorandum of Agreement between the Department of the Army and the Environmental Protection Agency Concerning Mitigation Sequence for Wetlands in Alaska under Section 404 of the Clean Water Act.⁶

Potential compensatory mitigation concepts are being reviewed based on practicability, consistency with the watershed approach, potential for functional lift and/or overall environmental benefit, and value to local stakeholders. Through their review process, OSA identified a limited number of permittee responsible compensatory mitigation concepts within the Colville River Basin and the Arctic Alaska Subregion that could compensate for unavoidable impacts associated with the Nanushuk Project. These mitigation concepts include:

- Restoration of fish passage and flood-flow moderation and conveyance through replacement or repair of existing stream culverts;
- Rehabilitation of existing gravel infrastructure to support maintenance of natural drainage patterns and maintenance of the soil thermal regime;
- Upgrading existing infrastructure to meet arctic engineering design standards and protect soil thermal regime and hydrologic function;
- Removal of fill from floodplain areas to restore hydrologic connectivity and improve fish and wildlife habitat;
- Preservation of land under threat from future development.

OSA is in the process of refining these concepts through discussions with landowners and other stakeholders. OSA will develop a compensatory mitigation plan for submittal to USACE as part of the ongoing permit review process. This plan will identify the selected mitigation project and describe it in detail according to the requirements of the 2008 Mitigation Rule (33 CFR § 332.4(c)).

⁵ a resource of a different structural and functional type from the impacted resource (40 CFR 230.92)

⁶ Department of the Army and Environmental Protection Agency. 2018. Memorandum of Agreement between the Department of the Army and the Environmental Protection Agency concerning Mitigation Sequence for Wetlands in Alaska under Section 404 of the Clean Water Act. June 15, 2018. https://www.epa.gov/sites/production/files/2018-06/documents/epa_army_moa_alaska_mitigation_cwa_404_06-15-2018_0.pdf