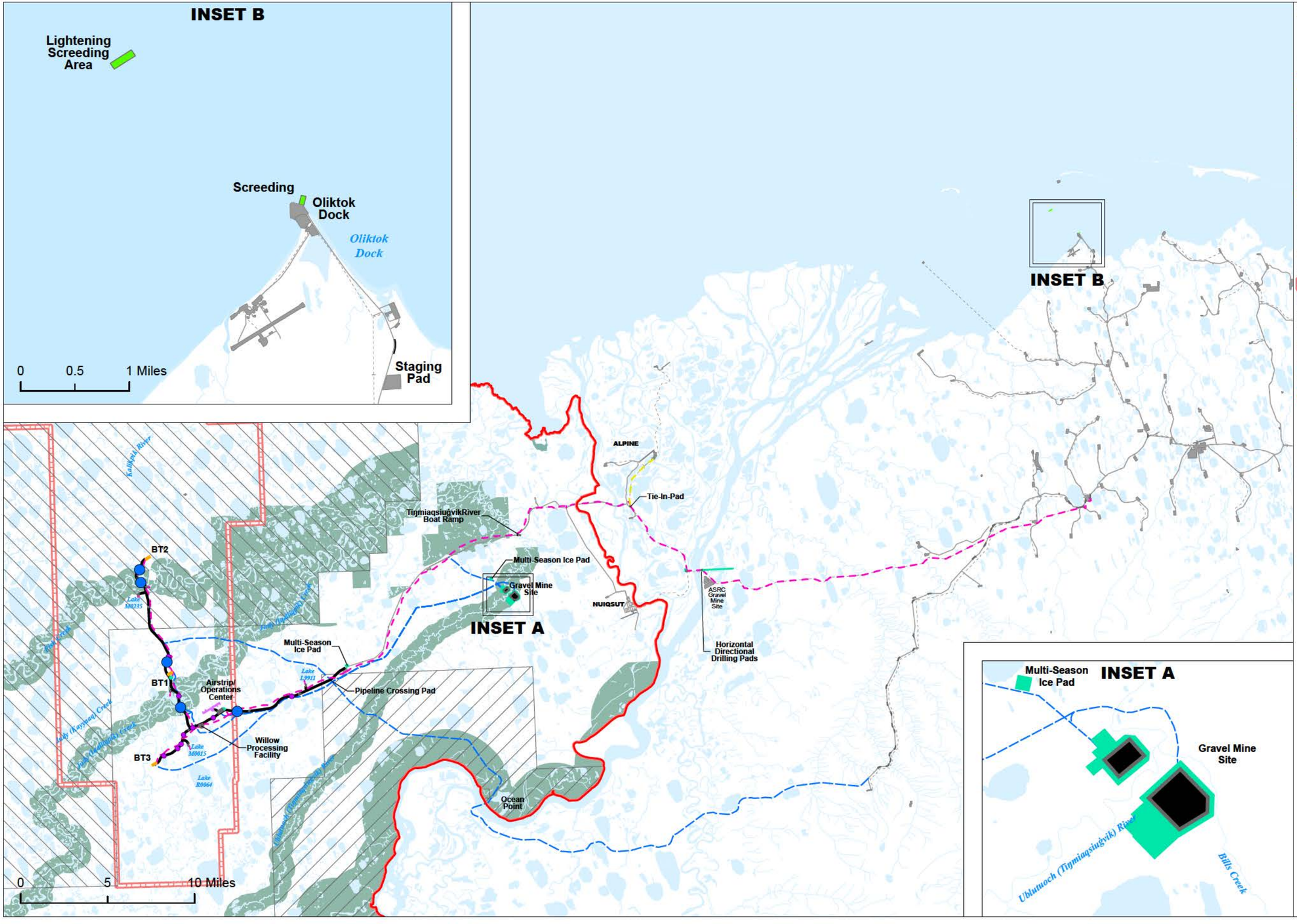

Willow Proposed Development Features
- Culvert
- Bridge
- Gravel Road
- New Pipeline New VSM
- New Pipeline Existing VSM
- Ice Road
- Airstrip
- Drill Site Pad
- Gravel Pad
- Mine Excavation
- Ice Pad
- Screeding

Other Infrastructure
- Existing Road
- Existing Pipeline
- Existing Infrastructure

Oil and Gas Unit
- Bear Tooth Unit

NPR-A Special Areas
- Colville River Special Area
- Teshekpuk Lake Special Area

Required Operating Procedure
- K-1: River Setbacks

Land Designation
- National Petroleum Reserve in Alaska

Figure 1

This page intentionally left blank.

4.0 ALTERNATIVES

Considering alternatives helps to ensure that ultimate decisions concerning projects are well founded and consistent with national policy goals and objectives (33 CFR 325 Appendix B (7), 40 CFR 230.5(C), and 40 CFR 1502.14). NEPA requires that an EIS include a discussion of a range of reasonable alternatives, including the No Action Alternative, and the effects of those alternatives. The term reasonable as defined in NEPA regulations is based on consideration of a project's purpose as well as technology, economics, and common sense.

Under Clean Water Act (CWA) Section 404(b)(1) Guidelines, practicability of alternatives is taken into consideration and no alternative may be permitted if there is a less environmentally damaging practicable alternative. Practicable is defined in the CWA regulations as meaning the alternative is available and capable of being done after taking into consideration cost, existing technology, and/or logistics in light of the overall project purpose (40 CFR 230.3(q)).

4.1 Alternatives Considered and Carried Forward for Detailed Analysis in the Supplemental EIS

In preparing the Supplemental EIS, the BLM and cooperating agencies developed an expanded range of alternatives (four action alternatives, including the Proponent's proposal, and the No Action Alternative) to address the District Court's decision. This range of alternatives was developed through an iterative process that built upon the extensive coordination that occurred between BLM, CPAI, cooperating agencies, Tribes and Alaska Native Corporations, and other stakeholders in formulating the alternatives analyzed in the initial 2020 EIS. See Final Supplemental EIS, Appendix D.1, Section 3.2 (*Alternatives Development for the 2020 Environmental Impact* Statement) for a complete summary of the alternatives development process for the 2020 EIS including early coordination between the Proponent and BLM focused on compliance with LSs and ROPs and how to best protect important resources within the TLSA and Colville River Special Area (CRSA).

As presented in the Final Supplemental EIS, Chapter 2, and Appendix D.1, Section 3.5 (*Alternatives Development for the 2022 Supplemental Environmental Impact Statement*), in developing new alternatives concepts for the Supplemental EIS, BLM first reviewed public comments that were submitted on the 2019 Draft EIS and 2019 Draft Supplemental EIS for any alternatives concepts that were previously excluded from consideration but might now be relevant following the District Court's decision. BLM also consulted with key Alaska stakeholders to solicit input on potential alternative concepts that would address the District Court's decision. BLM then met with cooperating agencies to develop an expanded range of alternatives for the Supplemental EIS based on the District Court's decision. BLM and cooperating agencies reexamined alternative concepts that were proposed during the previous EIS process and worked to develop new alternative concepts that would reduce overall Project infrastructure and impacts. New alternative concepts were developed with a focus on reducing infrastructure within the TLSA and CRSA to provide for the "maximum protection" of surface values. Options identified during the cooperating agencies' alternatives development meetings included elimination of proposed drill sites, relocation of proposed drill sites, revised access road alignment, and a new disconnected (i.e., ice road access only) drill site option.

BLM also held a 30-day informal public scoping comment period to solicit public input on the Supplemental EIS. Commenters suggested alternatives concepts such as variations on disconnected (i.e., no gravel road connection) three, four-, and five-drill site alternatives, a concept with seasonal drilling at some or all of the satellite pads, alternative modes of transportation for module transport, use of the Alpine Central Processing Facility to process fluids (e.g., water, oil, gas) produced by the Project, a three-drill site alternative concept, and phased development of the Project.

Potential new alternative concepts were evaluated against revised Project screening criteria (Final Supplemental EIS, Appendix D.1, Section 3.5.1, *Revised Screening Criteria for the Supplemental Environmental Impact Statement*). Alternatives or alternative components that met the screening criteria were advanced as a new alternative and those that did not meet the screening criteria were dismissed from further evaluation.

Project screening criteria were reevaluated and augmented while developing the Supplemental EIS to ensure any new alternatives adequately addressed the District Court's decision and were compliant with applicable law. In its decision, the District Court remanded the Willow MDP EIS to BLM for the following reasons:

- BLM acted contrary to law insofar as it developed its alternatives analysis based on the view that CPAI had the right to extract all possible oil and gas from its leases.
- BLM acted contrary to law in its alternatives analysis for the TLSA insofar as it failed to consider the statutory directive that BLM give "maximum protection" to surface values in that area.

All screening criteria from the previous Willow MDP EIS were retained (Final Supplemental EIS, Appendix D.1, Section 3.1.1, *Alternatives Screening Criteria*) and a new screening criteria was adopted to directly address the District Court's reasons for remanding the Willow MDP EIS to BLM. The new screening criteria is:

- Addresses the District Court's decision: This screening criteria was developed in recognition of the District Court's finding that CPAI did not have unfettered right to extract "all possible" oil and gas from its leases and to evaluate whether an alternative concept directly addresses the District Court's directive to BLM to consider alternatives that would reduce infrastructure and environmental impacts relative to CPAI's proposal (i.e., Alternative B), and specifically that would reduce infrastructure and impacts within the TLSA.

See Chapter 2.0 and Appendix D.1 of the Final Supplemental EIS for a detailed description and comparison of the alternatives considered and carried forward for detailed analysis in the Final Supplemental EIS.

BLM and the cooperating agencies developed four action alternatives (Alternatives B, C, D, and E) and the No Action Alternative (Alternative A) and three sealift module delivery options (Options 1, 2, and 3) as the reasonable range of alternatives analyzed in detail in the Supplemental EIS.

The four action alternatives and no action alternative are as follows:

- Alternative A: No Action
- Alternative B: Proponent's Project
- Alternative C: Disconnected Infield Roads
- Alternative D: Disconnected Access
- Alternative E: Three-Pad Alternative (Fourth Pad Deferred)

The three module delivery options are as follows:

- Option 1: Atigaru Point Module Transfer Island
- Option 2: Point Lonely Module Transfer Island
- Option 3: Colville River Crossing

4.2 Rationale for Decision Adopting Alternative E as modified [BT1, BT2 and BT3 approved; BT5 disapproved] and Module Delivery Option 3

Among the alternatives evaluated in the Supplemental EIS, Alternative E with Module Delivery Option 3 would result in fewer overall environmental impacts—including impacts to important surface resources, subsistence uses and resources, and the climate—than the other action alternatives and module delivery

options and therefore is considered by BLM to be the environmentally preferred alternative. This alternative was developed by BLM and cooperating agencies to reduce impacts to surface resources, particularly in the TLSA, in response to the Alaska District Court's remand decision. Alternative E as analyzed in the Final Supplemental EIS serves as the basis for the Decision, which adopts a minor variation of Alternative E that is qualitatively within the spectrum of alternatives that were discussed and analyzed in the Supplemental EIS. The discussion that follows generally first explains the reasons for identifying Alternative E and Module Delivery Option 3 as the preferred alternative in the Final Supplemental EIS followed by the rationale for selecting a variation of Alternative E involving the disapproval of drill site BT5 (instead of its deferral) in this Record of Decision.

Of all the action alternatives and options analyzed in the Final Supplemental EIS, the combination of Alternative E and Module Delivery Option 3, even with drill site BT5, requires the fewest ice roads, fewest total miles of infield pipelines, least water use, fewest vehicle trips, fewest fixed-wing aircraft trips, fewest helicopter trips, and fewest acres of screeding. Unlike Module Delivery Options 1 and 2, Option 3 also requires no gravel fill in the marine area. These reductions in the amounts of facilities, use of water and gravel, and operational activities substantially reduce impacts to important surface resources and subsistence uses as compared to the other action alternatives. Additionally, Alternative E and Module Delivery Option 3, even with drill site BT5, have the fewest total greenhouse gas emissions of all the action alternatives, making their selection consistent with the principles and objectives outlined in President Biden's Executive Order 13990, entitled "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis" (Jan. 20, 2021) and Executive Order 14008, entitled "Tackling the Climate Crisis at Home and Abroad" (Jan. 27, 2021), and Secretary Haaland's Order No. 3399, entitled "Department-Wide Approach to the Climate Crises and Restoring Transparency and Integrity to the Decision-Making Process" (April 16, 2021).

The Proponent's proposed development plan is based on its oil and gas leases in the NPR-A. Those leases provide that the authorization to drill for and extract oil and gas resources is subject to the terms and stipulations of the lease, as well as applicable laws and regulations in effect at the time of lease issuance and subsequently promulgated regulations and orders to the extent not inconsistent with the provisions of the lease. Appendix A of this ROD contains the terms and conditions of approval, which are designed to implement the terms and stipulations of the Proponent's leases. Moreover, the selected alternative is specifically designed to comply with two sections of the NPRPA, both of which were in effect at the time of lease issuance. First, 42 USC 6506a(b) provides that activities in the NPR-A "shall include or provide for such conditions, restrictions, and prohibitions as the Secretary deems necessary or appropriate to mitigate reasonably foreseeable and significantly adverse effects on the surface resources of" NPR-A. Second, 42 USC 6504(a) requires the BLM to ensure that any exploration in the NPR-A in special areas "shall be conducted in a manner which will assure the *maximum protection* of such surface values to the extent consistent with the requirements of this Act for the exploration of the reserve." (emphasis added.)

The adoption of Alternative E and Module Delivery Option 3 in this Decision, as modified to include disapproval of drill site BT5, is intended to fulfill both of these statutory directives consistent with the Proponent's leases.

Specifically, this Decision reflects careful consideration of the Secretary's statutory directive to provide maximum protection to significant surface values within the NPR-A (i.e., Special Areas). As presented in the Final Supplemental EIS, Alternative E requires less surface infrastructure, primarily within the TLSA, than would be required under Alternatives B, C, or D due to the elimination of BT4 and its associated infrastructure. Reducing the gravel infrastructure (e.g., gravel footprint, miles of gravel road, miles of pipeline) will lessen impacts to wetlands and vegetation, hydrology, gravel resources, and wildlife. Reducing the amount of overall infrastructure will also diminish potential impediments to the movement of caribou and subsistence users. As compared to other action Alternatives, Alternative E, as described in the Final Supplemental EIS, also requires the least length of pipelines and roads with less than 500 feet of

separation, thereby reducing the occurrence of "pinch points" that may restrict caribou and subsistence user movement. Additionally, disapproval of BT5 and its associated infrastructure further reduces the total length of pipelines and roads and impacts associated with that infrastructure.

Table 1 summarizes approved Project components, how they minimize effects, and how they contribute to the rationale for selection of Alternative E [BT1, BT2 and BT3 approved; BT5 disapproved] and Module Delivery Option 3.

Table 1. Summary of Rationale for Selected Alternative and Option

Project Component	Rationale for Selection
Infrastructure within TLSA and sensitive areas	• Substantially reduces the amount of surface infrastructure (e.g., gravel footprint, pipelines, ice roads) within the TLSA through the elimination of BT4. • Reduces the impacts to identified yellow-billed loon nests located near the previously proposed BT5 location through the elimination of BT5 and associated infrastructure (e.g., gravel footprint, pipelines, ice roads). • Substantially reduces the amount of overall Project infrastructure (e.g., gravel footprint, miles of gravel road, miles of pipeline) that may impede caribou movement and impact wetlands, hydrology, birds, and subsistence users.
Number of wells	• Has the least amount of production and injection wells (199 as approved versus 251 in Alt. B). • Has the least amount of projected oil production and associated greenhouse gas emissions.
Mud plant	• Uses an existing mud plant located on the K-Pad, near Alpine CD5, and eliminates the need to construct a new mud plant at the Willow operations center.
Acres of freshwater ice infrastructure	• Has the smallest ice road and ice pad footprint. • Has the least impacts to vegetation and wildlife.
Water use	• Has the least amount of freshwater requirements. • Will not require a constructed freshwater reservoir.
Vehicle trips	• Least potential for vehicle strikes of wildlife. • Fewest number of vehicles causing dust from gravel infrastructure (and associated dust-related effects to soils, permafrost, water resources, wetlands and vegetation, wildlife forage resources, visual resources, etc.). • Fewest emissions from vehicles. • Least disturbance of wildlife and birds. • Least amount of vehicle noise and visual contrast from vehicles and associated dust. • Least impact to subsistence resources and access.
Fixed-wing aircraft trips	• Least potential for bird strikes. • Fewest aircraft emissions. • Least disturbance of wildlife and birds. • Least amount of noise and visual contrast from aircraft. • Least impactful to subsistence resources.
Helicopter trips	• Least potential for bird strikes. • Fewest helicopter emissions. • Least disturbance of wildlife and birds. • Least amount of noise and visual contrast from helicopters. • Least impactful to subsistence resources.
Acres of screeding	• Least amount of suspended sediment and turbidity, which could affect water resources, fish, birds, marine mammals, and subsistence users. • Least amount of habitat alteration for fish, birds, and marine mammals. • Least in-water and airborne noise and thus least disturbance and displacement of fish, birds, and marine mammals. • Least injury and mortality of fish in the screeding footprint. • Fewest emissions from screeding.

Project Component	Rationale for Selection
Gravel fill in the marine environment	• No permanent marine habitat loss or alteration for fish, birds, and marine mammals. • Least in-water and airborne noise and thus least disturbance and displacement of fish, birds, terrestrial mammals, and marine mammals. • Least injury to and mortality of fish. • Fewest emissions associated with sealift module and material delivery.

Notes: BT4 (drill site BT4); BT5 (drill site BT5); TLSA (Teshekpuk Lake Special Area).

Although Alternative E in the Supplemental EIS evaluates the full development of the Willow reservoir with four satellite drill pads (BT1, BT2, BT3 and BT5), BT5 is disapproved in this ROD, as is BT4 (analyzed under Alternatives B, C and D).

As compared to the Proponent's proposed project (Alternative B in the Final Supplemental EIS – proposing five drill sites: BT1, BT2, BT3, BT4 and BT5), the project approved in this Decision (BT1, BT2 and BT3 approved; BT4 and BT5 disapproved) significantly reduces the footprint of project infrastructure and the level of construction and operational activities, both within and outside of the sensitive TLSA, and thereby substantially reduces impacts to a broad range of surface resources. In addition to lessening impacts to important surface resources such as wetlands and vegetation, hydrology, gravel resources, and wildlife generally, of particular note is the reduction of adverse impacts to caribou and their movement, and resulting adverse impacts to subsistence harvesting of caribou, from the substantially reduced length of roads and pipelines associated with the elimination of BT4 and BT5 and the elimination of year-round operations associated with those two drill sites. The Project's impacts to caribou and subsistence harvesting of caribou, particularly associated with roads and pipelines, has been consistently identified as a key concern by the community of Nuiqsut, which relies heavily on caribou for their sustenance and is located closest to the Project.

Furthermore, disapproving BT5, in lieu of deferring it (as described in Alternative E of the Supplemental EIS), reduces the overall period of construction activities, which tend to involve more intense impacts to subsistence activities and wildlife including caribou. The Final Supplemental EIS assumed BT5 construction in Year 7 to be the most impactful scenario under Alternative E because it would have the most overlap between the construction of BT5 and drilling phases at BT1, BT2, and BT3. Disapproving BT5 reduces the severity and intensity of the impacts due to there being less overall Project activity (i.e., other construction and drilling activity) and eliminates the most impactful scenario under Alternative E as analyzed in the Final Supplemental EIS; that is, the most overlap between the construction of BT5 and drilling phases at BT1, BT2, and BT3.

Disapproving BT4 and BT5 also reduces the Project's direct and indirect greenhouse gas emissions, better enabling the United States to reach its economy-wide target of reducing its net greenhouse gas emissions by 50% to 52% below 2005 levels by 2030 pursuant to its commitment under the Paris Agreement (UNFCCC 2021).

This decision strikes a balance, allowing for development to occur in the NPR-A consistent with the terms of existing leases while at the same time requiring the implementation of robust protections for surface resources, as well as measures to limit greenhouse gas emissions and thereby reduce climate impacts. The latter is especially important in the NPR-A, given the significant effects of climate change on the Arctic and the North Slope (see Section 3.2.1 of the Final Supplemental EIS). In the expanded range of alternatives considered in the Final Supplemental EIS, BLM has directly addressed the direction of the U.S. District Court to reassess the range of alternatives. Alternative E, both as presented in the Final Supplemental EIS and also as modified in this Decision, produces less oil than Alternatives B, C, and D and also does not afford ConocoPhillips the right to extract "all possible" oil and gas on its leases. By adopting Alternative E as modified, therefore, the BLM has not only selected an alternative that results in fewer overall greenhouse gas emissions, but the agency has also given effect to the Court's direction.

As reflected in the Final Supplemental EIS, Table D.4.8 (Appendix D.1, *Alternatives Development*), under Alternative B (Proponent's Project) the estimated total oil and non-gas liquids production would be 628.9 million barrels, with associated indirect CO_2e emissions of 260,790,000 metric tons (Section 3.2.2.6). Under Alternative E, total oil and non-gas liquids production for development of all four drill sites (BT1, BT2, BT3 and BT5) is 613.5 million barrels, with associated indirect CO_2e emissions of 254,391,000 metric tons. Thus, under Alternative E as described in the Final Supplemental EIS, the elimination of BT4 results in 15.4 million barrels (2.45%) less production relative to Alternative B and a total reduction of indirect CO_2e emissions of 6,399,000 metric tons.

As reflected in Section 3.2.2.6 of the Final Supplemental EIS, under Alternative E as modified in this Decision, total production for drill sites BT1, BT2 and BT3, without the contribution of the disapproved drill site BT5, is approximately 576.0 million barrels with associated indirect CO_2e emissions of 239,040,000 metric tons; this is 52.9 million barrels (8.4%) less production relative to Alternative B and a total reduction of indirect CO_2e emissions of 21,750,000 metric tons.

Under Alternative E as approved in this Decision [BT1, BT2 and BT3 approved; BT5 disapproved], the Project would produce approximately 94% of the total production for Alternative E as analyzed in the Final Supplemental EIS, which included production from BT5. More specifically, drill site BT1 would produce approximately 295.6 million barrels, which is approximately 48% of the total production for Alternative E as analyzed, with associated indirect CO_2e emissions of 122,674,000 metric tons. Drill site BT2 would produce approximately 143.6 million barrels, which is approximately 23% of the total production for Alternative E as analyzed, with indirect CO_2e emissions of 59,594,000 metric tons. Drill site BT3 would produce approximately 136.8 million barrels, which is approximately 22% of the total production for Alternative E as analyzed, with indirect CO_2e emissions of 56,772,000 metric tons. Disapproved drill site BT5 would have produced approximately 37.5 million barrels, or approximately 6% of the total production under Alternative E as analyzed, with associated indirect CO_2e emissions of 15,562,500 metric tons.

In accordance with ANILCA Section 810, the Decision adopted in this ROD also addresses local residents' concerns regarding protection of their subsistence way of life and the subsistence resources on which they depend through the application of numerous lease stipulations, ROPs, design features, and new mitigation measures that provide protection for subsistence resources and uses, as well as through the disapproval of drill sites BT4 and BT5 and their associated roads and pipelines. The Project will facilitate subsistence activities for local subsistence users by including three subsistence boat ramps and up to seven vehicle turnouts with subsistence/tundra access ramps and affording additional road access.

The Project will lead to increased revenues for the State of Alaska and NSB resulting from federal royalties and state and local taxes potentially up to $10 billion as well as increased federal revenues potentially up to $7 billion (see Final Supplemental EIS Table 3.15.5, *Summary of State, Federal, and Borough Revenues from the Project*). Pursuant to the NPRPA, 50% of royalties from the production of oil and gas on federal lands in the NPR-A is paid to the State of Alaska. Local residents and communities impacted by the Project will benefit indirectly from revenues associated with the development on federally managed lands that would accrue to the State of Alaska. Under the NPRPA, in allocating its 50% share of federal revenues from oil and gas development on federal lands in the NPR-A, the State must give priority consideration to use by those communities most impacted by such development, which it does through its NPR-A Impact Grant Program. Construction of Project facilities would occur over approximately 8 years and employ up to 1,733 seasonal workers (peak). During the project drilling phase, up to 400 annual workers would be employed. Up to 450 annual workers would be employed during the Project's operational phase (see Final Supplemental EIS Tables 3.15.6-8).

5.0 PUBLIC INVOLVEMENT

Public involvement is an integral part of the NEPA process and is required in the preparation and implementation of agencies' NEPA procedures. Public involvement provided an opportunity for the public and agencies to express their views and help identify issues to be addressed in the Supplemental EIS and to provide comments on the Draft Supplemental EIS.

BLM hereby certifies that the agency has considered all of the alternatives, information, analyses, and objections submitted by State, Tribal, and local governments and public commenters for consideration by the lead and cooperating agencies in developing the Final Supplement EIS.

5.1 Public Notices

Public Notice dates:

- Notice of Intent: August 8, 2018
- Notice of Availability of Draft EIS: August 20, 2019
- Notice of Availability of Supplemental Draft Environmental Impact Statement (SDEIS): March 26, 2020
- Notice of Availability of Final EIS: August 14, 2020
- Notice of Intent of Supplemental EIS: February 7, 2022
- Notice of Availability of Draft Supplemental EIS: July 15, 2022
- Notice of Availability of Final Supplemental EIS: February 3, 2023

Public Notice periods:

- Public scoping: August 8, 2018, to September 30, 2018
- Public comment on Draft EIS: August 30, 2019, to October 29, 2019
- Public comment on SDEIS: March 26, 2020, to May 4, 2020
- Informal scoping period on Supplemental EIS: February 7, 2022, to March 9, 2022
- Public Comment on Draft Supplemental EIS: July 15, 2022, to August 29, 2022

5.2 Previous Public Involvement

Previously, the *Federal Register* published an initial Notice of Intent to prepare an EIS (83 FR 38725) on August 8, 2018. An open scoping period was held from August 8, 2018, through September 30, 2018. On August 30, 2019, a Notice of Availability of the Draft EIS was published in the *Federal Register* (84 FR 45801) announcing the public comment period for the Draft EIS, which ended on October 29, 2019. Public meetings for the Draft EIS were held in September and October 2019. On March 26, 2020, a Notice of Availability of the SDEIS was published in the *Federal Register* (85 FR 17094) announcing the public comment period for the SDEIS, which ended on May 4, 2020. Public meetings for the SDEIS were held online and via telephone on April 16, 21, and 23, 2020.

BLM published the Project documents on its website (https://eplanning.blm.gov/eplanning-ui/project/109410/510) to provide information, maps, and documents for the public about the Project and the NEPA process and to give meeting notices. The website also provided links to other useful online resources.

5.3 Public Involvement for the Supplemental EIS

The *Federal Register* published a Notice of Intent to prepare a Supplemental EIS (87 FR 6890) on February 7, 2022. An informal scoping period was held from February 7, 2022, through March 9, 2022, to gather public and stakeholder input regarding the Project. Comment submissions and issues raised informed the analysis in the Supplemental EIS.

On July 15, 2022, a Notice of Availability of the Draft Supplemental EIS was published in the *Federal Register* announcing a 45-day public comment period for the Draft Supplemental EIS, which ended on

August 29, 2022. The public meeting process held during the comment period provided the opportunity for potentially affected and interested individuals, agencies, and groups to help:

- Share information and identify concerns about the new Alternative E
- Define a range of alternatives
- Determine and define the scope of issues to examine
- Identify other environmental and consultation requirements
- Gather additional information regarding potential effects of the Proposed Action
- Inform and identify potentially interested parties

The BLM held public meetings (virtual and in-person) on the Draft Supplemental EIS in August 2022. Details concerning dates, times, and locations of the meetings were announced through local news media, newspapers, and the BLM Project ePlanning website. Verbal comments given at public meetings and the public hearing were documented in formal transcripts for each individual meeting. Comments on the Draft Supplemental EIS were received via email and mail, via the ePlanning website, and at public meetings. The presentation used during the meetings, transcripts of each meeting, public and agency input received during the public process, and a summary scoping report are available on the BLM Willow MDP ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/109410/510.

- August 08, 2022 - Virtual
- August 15, 2022 - Virtual
- August 16, 2022 - Nuiqsut
- August 17, 2022 - Virtual
- August 18, 2022 - Virtual
- August 22, 2022 - Utqiaġvik
- August 24, 2022 - Virtual

The Nuiqsut meeting included the public hearing for comments regarding the Project's potential impacts to subsistence resources and activities as per the ANILCA Section 810.

On February 3, 2023, the U.S. Environmental Protection Agency published a Notice of Availability of the Final Supplemental EIS in the *Federal Register* (88 FR 7445), initiating a 30-day pre-ROD waiting period that ended on March 6, 2023.

5.4 Evaluation and Consideration of Comments Received

Numerous comments were received from local, state, and federal agencies, Tribes, and the public on the Draft Supplemental EIS during the comment period which ran from July 15, 2022, to August 29, 2022. Comments received on the Draft Supplemental EIS are summarized, and responses provided, in Appendix B.5 of the final Supplemental EIS (*Draft Supplemental EIS Comments and BLM Responses*).

The BLM received a total of 218,931 submissions during the public comment period via email, online, or mailed-in letters, or comments submitted verbally at public meetings. Of the submissions, 4,440 were unique (i.e., original submissions that did not have identical or almost identical wording as another submission). The remaining submissions were form letters (i.e., submissions containing identical content), form letters with slight modifications (e.g., one or two unique sentences added, but otherwise identical to a form letter), or duplicate submissions (i.e., the sender submitted the same submission multiple times). In total, 817 individual substantive comments were identified from the various letters and verbal testimonies and categorized, Final Supplemental EIS, Appendix B.2, Table B.2.4. Just over half of all comments (52%) fell into the following top seven categories: mitigation or minimization, climate change, request for extension or for no extension of public comment period, alternatives, cumulative effects, marine mammals, and EIS process/timeline.

5.4.1 Comments Received Prior to the Final Supplemental EIS

The BLM received a number of submissions after the formal 45-day comment period on the Draft Supplemental EIS concluded on August 29, 2022. All submissions received outside of the formal comment period but prior to the publication of the Final Supplemental EIS on February 1, 2023 were

considered in the same manner as those comments received during the formal comment period. All substantive comments identified were reviewed by subject matter experts, and new information and citations were incorporated into the Final Supplemental EIS as appropriate.

5.4.2 Comments Received After the Final Supplemental EIS

After the Final Supplemental EIS was published (February 1, 2023), the BLM received and considered comments and additional information submitted to the BLM by the public and various stakeholders. Submissions were received via email, phone call, and hard copy letter. These comments were generally similar to and consistent with the comments received during the development of the Supplemental EIS. The majority of comments received were non-substantive, expressing either opposition to or support for the Willow MDP Project. Some comment submissions were substantive, providing specific input regarding the Final Supplemental EIS, which the BLM has included in the decision file and considered prior to executing this ROD.

The BLM reviewed all comment submissions received after the release of the Final Supplemental EIS to determine if the information presented significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, consistent with 40 CFR 1502.9(d). As a result of that review, the BLM finds that existing analysis in the Final Supplemental EIS remains adequate and does not require supplementation.

During its review of comments and additional information received following the publication of the Final Supplemental EIS, the BLM realized a need to clarify its response to comment #6501-320 in Appendix B.5, *Draft Supplemental Environmental Impact Statement Comment Report* (p. 20) concerning the evaluation of emissions associated with construction activities of drill site BT5 under Alternative E. As such, the following clarification is provided:

> The Final Supplemental EIS includes quantitative modeling and emissions for Alternative E. The Final Supplemental EIS calculated and reported construction emissions for all pads, including BT5. As noted in the Air Quality Technical Support Document (AQTSD) (Appendix E.3B, Final Supplemental EIS), the annual criteria pollutant emissions totals during construction phases are expected to peak during Year 4 of the Project when concurrent activities occur during construction of WPF, Willow Operation Center, BT1 drill site, BT2 drill site, BT3 drill site along with installation of major pipeline and roads/bridges. Thus, these activities were conservatively modeled for the construction activities in Alternative E.
>
> The Final Supplemental EIS also includes quantitative modeling for a "Development Drilling" scenario that evaluated impacts associated with concurrent operations of BT5 and other pads, drilling at BT2 and BT3, and construction of facility installations of BT1, BT2, BT3, and WCF, and construction of pipeline and vertical support members. This scenario represents an estimate of the combined impacts that could occur from production and construction activities during drilling if concurrent operations were to occur. Modeled impacts for Alternative E for the "Development Drilling" scenario were below the NAAQS (impacts ranging from 3% to 84% of the NAAQS) anywhere in the analysis area. Thus, any slight changes to emissions modeled would not materially impact the conclusions. Modeled impacts for Alternative E for other scenarios are also below applicable thresholds for all pollutants.
>
> The Alternative E near-field modeling approach, input data, model configurations, emissions processing methods, and results are documented in Attachment H to the AQTSD.

5.5 Engagement with Environmental Justice Communities

BLM Instruction Memorandum 2022-059, *Environmental Justice Implementation*, directs BLM to "…proactively provide opportunities for meaningful involvement of minority populations, low-income populations, and Tribes in BLM decision making processes that affect their lives, livelihoods, and health.

This commitment is in addition to the BLM's responsibilities to consult with federally recognized Tribes and Alaska Native Corporations, as outlined in Department and BLM policies."

During development of the Supplemental EIS, BLM engaged with multiple Alaska Native entities on the North Slope to seek input on the Project and how it may impact environmental justice populations. These consultations provided community members the opportunity to engage with BLM to provide their comments on the Project and offer suggestions on how Project impacts may be avoided or minimized, or potential mitigation measures that may reduce Project impacts for Alaska Native stakeholders. The Final Supplemental EIS, Table 3.17.2 *Summary of BLM's Alaska Native Consultation Meetings for the Willow Supplemental Environmental Impact Statement*, provides an overview of BLM's consultation efforts with Alaska Native entities during development of the Supplemental EIS. It includes cooperating agency meetings where the City of Nuiqsut, Native Village of Nuiqsut, or Inupiat Community of the Arctic Slope attended, as well as meetings with North Slope entities that included numerous community representatives, the North Slope Resource Advisory Council meetings, and NPR-A Working Group meetings.

Information presented during public meetings and public comments, consultations, cooperating agency meetings, government to government consultations and other stakeholder meetings was used to develop the range of alternatives and identify potential impacts to environmental justice populations. The Alternative and mitigation measures chosen in this ROD address in part the comments from the community of Nuiqsut and entities from Nuiqsut to further protect the caribou herd in the TLSA. This information was also incorporated into the resource analyses for subsistence and sociocultural systems, terrestrial mammals, public health, economics, and environmental justice. Commenters also suggested mitigation measures that could reduce the impacts of the Project. Potential mitigation measures that were developed in response to community concerns are included in the Final Supplemental EIS Table 3.17.3, *Mitigation Measures Proposed for the Willow Supplemental Environmental Impact Statement to Reduce Impacts to Environmental Justice Populations*.

6.0 RELATED LAWS AND POLICIES

6.1 Alaska National Interest Lands Conservation Act

ANILCA Section 810 provides that no public land use, occupancy, or disposition which would significantly restrict subsistence uses shall be effected until the authorizing federal agency gives the required notice and holds a hearing in accordance with ANILCA Section 810(a)(1) and (2) and makes the three determinations required by ANILCA Section 810(a)(3)(A), (B), and (C). The three determinations that must be made are that 1) such a significant restriction of subsistence use is necessary and consistent with sound management principles for the use of public lands; 2) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition; and 3) reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources resulting from such action (16 USC 3120(a)(3)(A), (B), and (C)).

The ANILCA Section 810 analysis and findings are included in Final Supplemental EIS Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis* and are briefly summarized here.

BLM's findings conclude that for all action alternatives analyzed in the Final Supplemental EIS the Project is not expected to result in a large reduction in the abundance (population level) of caribou or any other subsistence resource. However, the evaluation concludes that the Project may significantly restrict subsistence uses for the community of Nuiqsut due to a reduction in the availability of resources caused by the alteration of their distribution and the limitation on subsistence user access to the area. Module Delivery Option 3, in combination with Alternative E as modified herein, would not result in any additional significant restriction of subsistence uses for communities in or near the Project area.

BLM's findings conclude that the cumulative effects of current and future activities may significantly restrict subsistence uses for Nuiqsut due to a reduction in availability of caribou and furbearers and due to limitations on subsistence user access to the area.

Because the final ANILCA Section 810 evaluation in the Final Supplemental EIS concluded that BLM's preferred alternative, Alternative E, may significantly restrict subsistence uses, including in the cumulative case, BLM is required to make the three determinations required by ANILCA Section 810(a)(3)(A), (B), and (C). BLM's determinations are included in Appendix B of this ROD.

6.2 Endangered Species Act

Section 7(a)(2) of the ESA requires federal agencies to consult with USFWS and National Marine Fisheries Service (NMFS), as appropriate, to ensure that their actions do not jeopardize the continued existence of species listed as threatened or endangered under the ESA or destroy or adversely modify their critical habitat. Pursuant to Section 7 of the ESA (16 USC 1531 et seq.), BLM consulted with both NMFS and USFWS on ESA-listed species that may occur within the action area.

On January 13, 2023, in its Biological Opinion, USFWS determined that the Project may affect, but is not likely to adversely affect Alaska-breeding Steller's eiders, the southwest Alaska DPS of northern sea otters, or critical habitat for these two species. USFWS determined the effects of the Project are not reasonably likely to jeopardize the continued existence of spectacled eiders or polar bears or result in the destruction or adverse modification of any unit of critical habitat for these two species.

On March 2, 2023, in its Letter of Concurrence, NMFS concurred with BLM's determination that the Project may affect, but is not likely to adversely affect: the bowhead whale, blue whale, fin whale, North Pacific right whale, Western North Pacific DPS gray whale, Western North Pacific distinct population segment (DPS) or Mexico DPS humpback whale, sperm whale, Arctic subspecies ringed seal, Beringia DPS bearded seal, or the Western DPS Steller sea lion. NMFS also concurred with the BLM's determination that the Project would not destroy or adversely modify critical habitat for the North Pacific right whale, Western North Pacific or Mexico DPS humpback whale, Arctic subspecies ringed seal, Beringia DPS bearded seal, or Steller sea lion.

6.3 Clean Air Act

The Clean Air Act (CAA) (42 USC 7401–7671 Section 176(c)) General Conformity Rule review was carried out. The proposed permit action is not in a CAA non-attainment area, and the conformity determination requirements of the CAA would not apply to the Project at this time. Any later indirect emissions generally cannot be practicably controlled by BLM. For these reasons, a conformity determination is not required for this action.

6.4 Clean Water Act

Pursuant to Section 401 of the CWA (33 USC 1341), a Section 404 CWA permit is not valid until a Section 401 Water Quality Certification (WQC) has been issued or the requirement for the certification has been waived. For the purposes of the Project, the State of Alaska administers Section 401 WQC. Conditions of the Section 401 WQC would become conditions of the final U.S. Department of the Army permit.

6.5 Coastal Zone Management Act

By operation of Alaska State law, the federally approved Alaska Coastal Management Program expired on July 1, 2011, resulting in a withdrawal from participation in the Coastal Zone Management Act's (16 USC 1456(C)) National Coastal Management Program. The Coastal Zone Management Act federal consistency provision, Section 307, no longer applies in Alaska. The *Federal Register* Notice was published July 7, 2011 (76 FR 39857).

6.6 Fish and Wildlife Coordination Act

The Migratory Marine Game-Fish Act (16 USC 760c–760g), the Fish and Wildlife Coordination Act (16 USC 661–666c), and other acts express the will of the U.S. Congress to protect the quality of the aquatic environment as it affects the conservation, improvement, and enjoyment of fish and wildlife resources. Under the Fish and Wildlife Coordination Act, any federal agency that proposes to control or modify any body of water must first consult with USFWS or NMFS, as appropriate, and with the head of the appropriate state agency exercising administration over the wildlife resources of the affected state.

Coordination with USFWS, NMFS, and the State of Alaska Department of Fish and Game and completion of the process and analyses contained within the Final Supplemental EIS and ROD is required. A signature by the authorizing official completes BLM's Fish and Wildlife Coordination Act responsibilities.

6.7 Materials Act

Pursuant to 43 CFR 3601.3, BLM's authority to dispose of sand, gravel, and other mineral and vegetative materials that are not subject to mineral leasing or location under mining laws is the Act of July 31, 1947, as amended (30 USC 601 et seq.), commonly referred to as the Materials Act. In the NPR-A, the BLM is authorized to dispose of mineral materials as necessary to carry out the NPRPA. (43 USC 6502). This authority applies to the sale and free use of these materials. Mineral materials disposal is managed under BLM regulations at 43 CFR 3600. Under these regulations, site-specific mining and reclamation plans are required before BLM can permit specific disposal actions.

6.8 Magnuson-Stevens Fishery Conservation and Management Act

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on any action authorized, funded, or undertaken that may adversely affect Essential Fish Habitat (EFH). Marine EFH occurs throughout the Beaufort Sea for pink salmon, chum salmon, Chinook salmon, sockeye salmon, coho salmon, saffron cod, and Arctic cod. The Project could affect marine EFH due to screeding at Oliktok Dock and the barge lightering area.

EFH is assessed in Section 3.10 (*Fish*) of the Final Supplemental EIS. The EFH assessment that describes the Project's potential adverse effects on EFH in accordance with the Magnuson-Stevens Fishery Conservation and Management Act has been reviewed by NMFS and its concurrence is in the administrative record.

6.9 Mineral Leasing Act

Under Section 28 of the MLA (30 USC 185) and 43 CFR Part 2880, BLM has the authority to issue ROW grants for oil or natural gas pipelines or related facilities to cross BLM-managed public lands. In the NPR-A, the Secretary of the Interior acting through the BLM is authorized to issue such rights-of-way as necessary to carry out the NPRPA. (43 USC 6502). The Proponent would need to obtain a ROW grant and temporary use permits from BLM for crossing BLM-managed lands. In addition, Section 28(p) of the MLA, 30 USC 185(p), requires BLM to consider the colocation of ROWs to the extent practicable in order to minimize adverse environmental impacts.

6.10 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires each federal agency, prior to any federal or federally assisted or funded undertaking, to take into account the effect of its proposed undertaking on any property included in or eligible for the National Register of Historic Places (NRHP) (hereafter called historic properties).

Consultation under NHPA Section 106 the Willow Supplemental EIS process was initiated on January 13, 2023, with the Alaska State Historic Preservation Office. BLM, as the lead federal agency for Section 106

obligations under the NHPA, and in consultation with the State Historic Preservation Officer (SHPO), the Alaska Department of Natural Resources, the Advisory Council on Historic Preservation, and the Proponent, has established the undertaking's area of potential effects (APE), as defined in 36 CFR 800.16(d), which encompasses direct and indirect effects on historic properties for alternatives carried forward for detailed analysis in the Final Supplemental EIS. The APE applies to all lands, regardless of management status, that may be affected by the mine site, pipeline corridor, transportation system, staging areas, access roads, or other infrastructure related to the Project undertaking.

BLM has completed coordination and consultation pursuant to Section 106 of the NHPA (16 USC 470 et seq.). The Project would not adversely affect sites listed in, or eligible for listing in, the NRHP or of other national, state, or local significance. Consultation under and compliance with Section 106 of the NHPA have been concluded.

6.11 Executive Order 11988 (Floodplain Management)

Executive Order (EO) 11988 requires an agency to provide leadership and to take action to minimize the impact of floods on human safety, health, and welfare and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities. In carrying out activities required by EO 11988, the agency has the following responsibilities:

1. Evaluate the potential effects of any actions that may take place in a floodplain
2. Ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management

Prescribe procedures to implement the policies and requirements of EO 11988 Additional requirements are as follows:

1. Before taking an action, each agency shall determine whether the Proposed Action will occur in a floodplain and the evaluation required will be included in the EIS prepared under NEPA.
2. If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplain. If the head of the agency finds that the only practicable alternative consistent with the law and with the policy set forth in this EO requires siting in a floodplain, the agency shall, prior to taking action,
    a. Design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations, and
    b. Prepare documentation explaining why the action is proposed to be located in the floodplain.

The Project would place gravel fill in the 50- or 100-year floodplains of Fish Creek, Judy (Kayyaaq) Creek, Judy (Iqalliqpik) Creek, Willow Creek 2, Willow Creek 8, and the Ublutuoch (Tiŋmiaqsiuġvik) River, as described in Section 3.8.2.6 of the Final Supplemental EIS.

The long-term effects, both direct and cumulative, on floodplains of ConocoPhillips's development on BLM-managed lands, as approved in this ROD, are expected to be minor and would be mitigated to the greatest extent practicable. Similar to wetlands, total avoidance of floodplains is impossible due to the geography and hydrologic features of the area.

This decision avoids and minimizes impacts to floodplains by siting facilities to avoid unnecessary stream crossings and by incorporating design features (such as siting the mine pits, multi-season ice pads, and most of the single- season ice pads outside the floodplain) to minimize impacts. The Project will use bridges at larger stream crossings and culverts at smaller stream crossings.

Although the floodplain at most of the stream crossings is limited to a narrow area, the floodplains of Fish Creek and Judy (Iqalliqpik) Creek are wider and would encompass the gravel road on either side of the crossing. These two streams would also have boat ramps constructed in their floodplains. If gravel roads,

pads, or boat ramps block or restrict the flow of surface water during spring breakup, they may: 1) increase the depth and duration of water impoundment, 2) increase thermokarsting, 3) cause a change in flow direction, 4) cause channel instability or a change in alignment, 5) result in erosion of the tundra or a stream channel, or 6) result in deposition of sediment on the tundra or in a stream channel. Effects 1 through 3 would occur on the upstream side of the road or pad; Effects 4 through 6 could occur on either the upstream or the downstream side of the road or pad. If the blockages were fixed within the year in which they were first observed, did not overtop the road or pad, and did not drain along the upstream side of the road, the resulting impact of the blockage would be measurable but would not require rehabilitation. However, thermokarsting due to water impoundments resulting from blockages would create a depression that would last indefinitely. If the blockage caused a change in flow direction, channel instability, or erosion of the tundra or stream channel, or resulted in deposition of sediment on the tundra or in the stream channel, the impact would be measurable and require rehabilitation. The impact could be visible for many years, even with rehabilitation.

ROP E-3 requires that culverts maintain free passage of marine and anadromous fish. CPAI will be required to provide annual surveillance of bridge, culvert, and pipeline river crossings for the first 3 years to confirm that structures are functioning properly and to provide maintenance as required and at least once every 3 years thereafter.

Specific measures to protect water resources include requirements that roads, pipelines, and water crossings be designed to maintain existing hydrology, including during flood periods. Also, gravel roads, culverts, and bridges must be designed with erosion control mechanisms. In addition to BLM lease stipulations and ROPs, Project activities that could impact water resources will be subject to federal, state, and local permit requirements. Thus, the facilities authorized in this ROD will avoid impacts to floodplains to the maximum extent practicable and will have minimal to negligible impacts on the functions and values of floodplains.

6.12 Executive Order 11990 (Wetlands)

EO 11990 requires that BLM consider factors relevant to the Project's effect on the survival and quality of wetlands. Factors to be considered include the following:

- Public health, safety, and welfare, including water supply, quality, recharge, and discharge; pollution; flood and storm hazards; and sediment and erosion
- Maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources
- Other uses of wetlands in the public interest, including recreation and scientific and cultural uses

BLM is required to avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds

1. there is no practicable alternative to such construction and
2. the Proposed Action includes all practicable measures to minimize harm to wetlands that may result from such use. In making this finding, the head of the agency may take into account economic, environmental, and other pertinent factors.

Project facilities will be located entirely on the Arctic coastal plain, as depicted in Figure 3.9.2 of the Final Supplemental EIS. Wetlands occupy 94% of the field-verified wetlands analysis area (the Willow area), and freshwater waters of the U.S. occupy an additional approximate 5% (Table 3.9.1 of the Final Supplemental EIS). The most common wetland type in the wetland analysis area is Palustrine Emergent Persistent/Scrub-Shrub Broad- Leaved Deciduous Seasonally Saturated (31% of the analysis area). Table E.9.1 in Final Supplemental EIS, Appendix E.9 (*Vegetation and Wetlands*) demonstrates that wetland

types in the field-verified wetlands analysis area are not unique and occur throughout the analysis area and the Arctic Coastal Plain.

Alternative E as modified [BT1, BT2 and BT3 approved; BT5 disapproved] and Module Delivery Option 3 will result in wetland loss due to gravel fill or excavation (Table E.9.2 in Appendix E.9 of the Final Supplemental EIS), direct vegetation damage and soil compaction from ice infrastructure (Table E.9.5 in Appendix E.9 of the Final Supplemental EIS), and indirect changes to wetland composition due to dust and gravel spray (Table E.9.6 in Appendix E.9 of the Final Supplemental EIS). Loss of wetlands and changes to wetland composition will be long term; vegetation damage and soil compaction will be short to medium term depending on the degree of saturation of soils. Because virtually the entire Arctic Coastal Plain consists of wetlands, it is not possible to produce the oil reserves on ConocoPhillips's leases without impacting wetlands.

Wetlands impacts will be mitigated through BLM lease stipulations, ROPs, and design features, listed in Appendix A of this ROD. These include measures regarding the following:

- Waste management, spill prevention and response, and hazardous materials emergency contingency plans
- Winter travel and protection of soil, vegetation, and streams
- Facility design and requirements that permanent facilities minimize footprint
- Timing of extraction of gravel and construction of gravel roads, pads, and pipelines to use ice roads, thus minimizing potential impacts to wetlands
- Dust control
- Incorporation of the findings of fish surveys and hydrologic modeling into the design of bridges and culverts

Because of these mitigation measures, no significant impacts are expected that would affect public health, safety, and welfare through changes in the supply, quality, recharge or discharge, and pollution of water or flood and storm hazards or sedimentation and erosion.

Therefore, BLM finds that there is currently no practicable alternative to construction of the Project in wetlands and that all practicable measures to minimize harm to wetlands have been taken, given the technical, economic, and environmental factors that must be weighed.

6.13 Executive Order 13112 (Invasive Species)

Invasive species are addressed in accordance with EO 13112 in Sections 3.9 (*Wetlands and Vegetation*), 3.10 (*Fish)*, 3.13 (*Marine Mammals*), and 3.20 (*Cumulative Effects)* of the Final Supplemental EIS.

6.14 Executive Order 12898 (Environmental Justice)

EO 12898 directs federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal decisions on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. See Section 3.17 (*Environmental Justice*) of the Final Supplemental EIS.

For all action alternatives, the Final Supplemental EIS identified adverse impacts to the community of Nuiqsut, which meets the demographic characteristics to be qualified as a minority population. Impacts to subsistence and sociocultural systems that were considered in the finding of impacts for environmental justice were decreased resource availability and decreased harvester access (Section 3.17.6 of the Final Supplemental EIS).

Resource availability could decrease due to loss or alteration of habitat for birds, fish, caribou, and other terrestrial mammals; disturbance or displacement of animals; or direct injury or mortality. However, the decrease would not have population-level effects on subsistence resources harvested within or downstream from the Project area.

Harvester access would be adversely affected by the construction of roads through areas used for harvesting wolf, wolverine, caribou, and geese. As noted in Section 3.16, *Subsistence and Sociocultural Systems*, of the Final Supplemental EIS, at least one-third of harvesters that use the Project area are likely to avoid the affected area during at least 1 year during construction. During operations, harvester access would be adversely affected by roads through areas used for harvesting. Some Nuiqsut caribou hunters use trucks to access subsistence harvest areas and may use roads constructed under this alternative. This could increase competition along the road and deflect caribou from the community's traditional harvest area, reducing success for those continuing to use traditional areas. Some subsistence harvesters also avoid developed areas due to concerns about security protocols and an assumed lack of resources around these areas.

The effects on subsistence and sociocultural systems may be highly adverse and disproportionately borne by the Nuiqsut population.

Impacts to public health that were considered in the finding of impacts for environmental justice were Project employment opportunities and dividend income, increased stress, and impacts to subsistence (Section 3.17.3.3.3, *Public Health*, of the Final Supplemental EIS). The Project would result in additional employment opportunities in Nuiqsut. Although most construction jobs would be filled by non-locals, even a small number of additional jobs would positively impact the community's relatively small labor force. Project construction would increase household incomes for Nuiqsut residents employed with the Project, and dividend income would also increase for Arctic Slope Regional Corporation and Kuukpik shareholders if these corporations have subsidiaries working on the Project.

Not all Nuiqsut residents would find jobs or receive Alaska Native Claims Settlement Act corporation dividends, resulting in the potential for social tensions regarding an uneven distribution of money in the community. The Project would increase air and noise emissions and human activity in Nuiqsut's subsistence use area. This could increase stress in some Nuiqsut residents and lead to or exacerbate mental health issues such as anxiety and depression. As discussed in BLM (2018), rapid modernization and development, as well as other multiple stressful conditions, including significant changes in diet, housing, and traditional culture, has led to negative health outcomes, including suicide.

Reduced subsistence harvester access or subsistence resource availability would adversely affect community health by reducing the availability of subsistence foods and increasing the dependence on store-bought foods, increasing food insecurity. Among all NSB communities, a higher percentage of Nuiqsut households use subsistence resources for more than half of their diet (NSB 2016).

The effects on public health in Nuiqsut may be highly adverse and disproportionately borne by the Nuiqsut population.

In addition to the direct and indirect effects of the Project on environmental justice, the cumulative effects of the Project (considered in combination with past and future projects) on subsistence, sociocultural systems, and public health may be highly adverse and would be disproportionately borne by populations from Nuiqsut, Utqiaġvik, Anaktuvuk Pass, Atqasuk, Point Lay, and Wainwright. These effects are described in Section 3.20.15, *Cumulative Impacts to Environmental Justice*, of the Final Supplemental EIS and would be long term and of high intensity.

Stipulations in the federal leases and ROPs avoid or mitigate many of these impacts. Relevant stipulations include, but are not limited to, those that require ready access to spill cleanup materials, minimization of flights in the Project area during the peak caribou hunting period, spill response training, the separation distance between roads and pipelines (reducing the potential of combined facilities to obstruct caribou movement), and consultation with subsistence users.

The Project's existing mitigation measures, design features, and additional mitigation measures contribute to avoiding, minimizing, or mitigating impacts to subsistence and public health, including, but not limited to the following:

- Using a non-reflective finish on all pipelines
- Establishing speed limits, pull-outs, and caravanning requirements on Project roads
- Minimizing helicopter flights during peak caribou harvesting periods

This Decision's disapproval of drill sites BT4 and BT5 will further reduce effects of the Project on subsistence and sociocultural systems and public health borne by the Nuiqsut population. In particular, the disapproval of BT4 (proposed to be in the TLSA) will nearly cut in half the proposed development in the TLSA, thereby reducing impacts on caribou and the community's subsistence harvest of caribou. Additionally, by disapproving the farthest north and south pads, the Decision addresses community concerns regarding development encircling their community.

6.15 Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)

BLM conducted government-to-government consultation with Tribes and Alaska Native Claims Settlement Act consultation with Alaska Native Corporations in accordance with EO 13175. See Sections 1.10.4 (*Native Consultation*) and 3.17.2 (*Meaningful Engagement*), of the Final Supplemental EIS.

7.0 OTHER AUTHORIZATIONS

For other state and local authorizations that apply to the Project, see Appendix C of the Final Supplemental EIS.

This page intentionally left blank.

8.0 FINAL AGENCY ACTION

8.1 Bureau of Land Management Recommendation

I recommend approval of this ROD to select Alternative E as described herein [BT1, BT2 and BT3 approved; BT5 disapproved] and Module Delivery Option 3 (Colville River Crossing), as described above and subject to the terms and conditions for the Project described in Appendix A of this ROD.

MAR 12 2023

Steven M. Cohn
State Director
Bureau of Land Management, Alaska

Date

This page intentionally left blank.

8.2 Departmental Approval

I hereby approve this ROD to select Alternative E as described herein [BT1, BT2 and BT3 approved; BT5 disapproved] and Module Delivery Option 3 (Colville River Crossing), subject to the terms and conditions for the Project described in Appendix A.

My approval constitutes the final decision of the DOI and, in accordance with the regulations at 43 CFR 4.410(a)(3), is not subject to appeal under departmental regulations at 43 CFR 4.

TOMMY BEAUDREAU Digitally signed by TOMMY BEAUDREAU
Date: 2023.03.12 11:03:30 -04'00'

Tommy P. Beaudreau
Deputy Secretary of the Interior

Date

This page intentionally left blank.

9.0 REFERENCES

BLM. 2018. Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project – Final Supplemental Environmental Impact Statement. Anchorage, AK.

_____ 2022. *National Petroleum Reserve in Alaska Integrated Activity Plan/Record of Decision.* Anchorage, AK.

North Slope Borough. 2016. NSB 2015 Economic Profile and Census. Barrow, AK.

This page intentionally left blank.

Record of Decision

Willow Master Development Plan

Appendix A
Mitigation Measures

March 2023

This page intentionally left blank.

Table of Contents

List of Tables

List of Acronyms

AAQS	Ambient Air Quality Standards
ADF&G	Alaska Department of Fish and Game
ADEC	Alaska Department of Environmental Conservation
AKDNR	Alaska Department of Natural Resources
AOGCC	Alaska Oil and Gas Conservation Commission
BLM	Bureau of Land Management
CPAI	ConocoPhillips Alaska, Inc.
CWAT	Community Winter Access Trail
DMLW	Division of Mining, Land and Water
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FAA	Federal Aviation Administration
HDD	horizontal directional drilling
IAP	Integrated Activity Plan
ITRs	Incidental Take Regulations
km	kilometers
LS	lease stipulation
m	meter
MDP	Master Development Plan
MMPA	Marine Mammals Protection Act
MPH	miles per hour
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPR-A	National Petroleum Reserve in Alaska
NSB	North Slope Borough
PM	particulate matter
Project	Willow Master Development Plan Project
Proponent	ConocoPhillips Alaska, Inc.
PSO	Protected Species Observer
ROD	Record of Decision
ROP	required operating procedure
ROW	right-of-way
UAV	unmanned aerial vehicles
USFWS	U.S. Fish and Wildlife Service
VSM	vertical support member
WPF	Willow Processing Facility
WSE	water surface elevation

This page intentionally left blank.

1.0 APPLICABLE LEASE STIPULATIONS, REQUIRED OPERATING PROCEDURES, AND DESIGN FEATURES

1.1 Lease Stipulations and Required Operating Procedures

The 2022 National Petroleum Reserve in Alaska (NPR-A) Integrated Activity Plan (IAP)/Environmental Impact Statement (EIS) Record of Decision (ROD) established performance-based Lease Stipulations (LSs) and Required Operating Procedures (ROPs) that apply to oil and gas activities within the NPR-A to avoid and minimize impacts (BLM 2022a). In 2021, the Bureau of Land Management (BLM) was directed to reevaluate the 2020 NPR-A IAP. The NPR-A IAP reevaluation resulted in the issuance of a new NPR-A IAP ROD (BLM 2022a) that selected an alternative nearly identical to the 2013 NPR-A IAP ROD. Updated ROPs (BLM 2022a) adopted in the new NPR-A IAP ROD replaced previous ROPs; however, LSs applicable to the Willow Master Development Plan (MDP) Project (Project) have not changed because LSs are generally fixed at the time of the lease issuance. All projects are subject to the ROPs that are in place at the time the permit for development is issued. (The reader is referred to Section 2.2.7, *Lease Stipulations, Required Operating Procedures, and Lease Notices*, of the 2020 NPR-A IAP/EIS for further discussion on this topic).

Table 1.1 lists the 2022 NPR-A IAP LSs and ROPs and denotes whether or not they are applicable to this project. The reader is referred to the 2022 NPR-A IAP ROD [BLM 2022b] for the full text of all LSs and ROPs.

Table 1.1 Lease Stipulations and Required Operating Procedures

Applicability to the Willow MDP Project	Lease Stipulations (LSs) and Required Operating Procedures (ROPs)
Applicable	ROPs: A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-11, A-12, B-1, B-2, C-1, C-2, C-3, C-4, E-1, E-2, E-3, E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15, E-17, E-18, E-19, E-20, F-1, G-1, H-1, H-3, I-1, J, M-1, M-2, M-3, M-4 LSs: K-1, K-2, K-4, K-5, K-6, K-12
Not Applicable	ROPs: C-5, D-1, H-2 LSs: K-3, K-8, K-9, K-10, K-11 ROP C-5 is not applicable because the Project does not include seismic activities. ROP D-1 is not applicable because the Project does not include exploratory well activities. ROP H-2 is not applicable because the Project does not include seismic activities. LS K-3 is not applicable because the Project does not include exploratory well activities. LS K-8 is not applicable because no Project activities would occur within the Brant Survey Area. LS K-9 is not applicable because no Project activities would occur within the Teshekpuk Lake Caribou Habitat Area. LS K-10 is not applicable because no Project activities would occur within the Teshekpuk Lake Caribou Movement Corridor. LS K-11 is not applicable because no Project activities would occur within the Southern Caribou Calving Area.

Source: BLM 2022a

1.2 Exceptions to Lease Stipulations and Required Operating Procedures

Extensive work was conducted throughout the design and National Environmental Policy Act (NEPA) phases of project development to avoid setbacks and minimize project footprint. However limited exceptions to certain LSs and ROPs are necessary due to the technical requirements of the Project and physical constraints of the area that would require essential proposed infrastructure to cross identified setbacks. The following exceptions (Table 1.2)

have been considered in the Final Supplemental EIS and are approved, as applicable, by this Decision and will be incorporated into subsequent authorizations as relevant.

Table 1.2 Anticipated Exceptions from National Petroleum Reserve in Alaska Lease Stipulations and Required Operating Procedures

LS or ROP[a]	LS and ROP Description and Reason for Exception
ROP A-5	*Objective:* Minimize the impact of contaminants from refueling operations on fish, wildlife, and the environment. *Requirement/Standard:* Refueling of equipment within 500 feet of the active floodplain of any waterbody is prohibited. Fuel storage stations shall be located at least 500 feet from any waterbody with the exception of small caches (up to 210 gallons) for motorboats, float planes, ski planes, and small equipment (e.g., portable generators and water pumps) are permitted. The authorized officer may allow storage and operations at areas closer than the stated distances if properly designed to account for local hydrological conditions. *Reason for exception:* Exceptions may be required to support refueling and fuel storage for marine vessels for emergency response and refueling of specialized equipment for which regular movement is not feasible (e.g., drilling rigs, cranes) during construction activities within floodplains. (Specific waterbodies where exceptions may be required have not yet been identified.)
ROP B-1	*Objective*: Maintain populations of, and adequate habitat for, fish and invertebrates. *Requirement/Standard*: Withdrawal of unfrozen water from rivers and streams during winter is prohibited. The removal of ice aggregate from grounded areas ≤ 4-feet deep may be authorized from rivers on a site-specific basis. *Reason for exception*: Option 3 may require management of flowing water under the partially grounded ice bridge over the Colville River at Ocean Point. This may result in the need to pump water around the ice bridge over 2 winters of ice bridge use.
ROP B-2	*Objective:* Maintain natural hydrologic regimes in soils surrounding lakes and ponds, and maintain populations of, and adequate habitat for fish, invertebrates, and waterfowl. *Requirement/Standard*: Withdrawal of unfrozen water from lakes and the removal of ice aggregate from grounded areas ≤ 4-feet deep may be authorized on a site-specific basis depending on water volume and depth and the waterbody's fish community. Current water use requirements are: a. Lakes with sensitive fish (i.e., any fish except ninespine stickleback or Alaska blackfish): unfrozen water available for withdrawal is limited to 15% of calculated volume deeper than 7 feet; only ice aggregate may be removed from lakes that are ≤ 7-feet deep. b. Lakes with only non-sensitive fish (i.e., ninespine stickleback, Alaska blackfish): unfrozen water available for withdrawal is limited to 30% of calculated volume deeper than 5 feet; only ice aggregate may be removed from lakes that are ≤ 5-feet deep. c. Lakes with no fish present, regardless of depth: water available for use is limited to 35% of total lake volume. d. In lakes where unfrozen water and ice aggregate are both removed, the total use shall not exceed the respective 15%, 30%, or 35% volume calculations. e. Additional modeling or monitoring may be required to assess water level and water quality conditions before, during, and after water use from any fish-bearing lake or lake of special concern. f. 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. Note: All water withdrawal equipment must be equipped and must utilize fish screening devices approved by the Alaska Department of Fish and Game, Division of Habitat. g. Compaction of snow cover or snow removal from fish-bearing waterbodies shall be prohibited except at approved ice road crossings, water pumping stations on lakes, or areas of grounded ice. *Reason for exception*: Exceptions may be requested to allow for ice aggregate collection from bed-fast waterbodies that exceeds regulatory withdrawal limits for liquid water and ice aggregate. Many of the lakes in the Project area are shallower than the 7-foot and 5-foot maximum depth criteria and have documented sensitive or resident fish species, resulting in little or no liquid water availability during winter. Removal of water as ice from areas with grounded ice would not reduce the quantity of potential resistant overwintering fish habitat. Exception request would not exceed the Alaska Department of Natural Resources water withdrawal criteria which ensure that recharge will occur each spring. (Specific waterbodies where exceptions may be required have not yet been identified.)

LS or ROP[a]	LS and ROP Description and Reason for Exception
ROP E-2	*Objective*: Protect fish-bearing waterbodies, water quality, and aquatic habitats. *Requirements/Standard*: Permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited within 500 feet from the ordinary high-water mark of fish-bearing waterbodies. Essential pipeline and road crossings will be permitted on a case-by-case basis. Construction camps are prohibited on frozen lakes and river ice. Siting of construction camps on river sand and gravel bars is allowed and encouraged. Where leveling of trailers or modules is required and the surface has a vegetative mat, leveling shall be accomplished through blocking rather than use of a bulldozer. *Reason for exception*: ROP E-2 requires a 500-foot setback from fish-bearing waterbodies, although essential pipeline and road crossings are permitted on a case-by-case basis. Deviations from this ROP are warranted because compliance is technically infeasible due to the hydrology and number of waterbodies in the Project area. As a result, it is not possible in all instances to avoid encroachment within 500 feet of every waterbody. All action alternatives include essential road and pipeline crossings of fish-bearing waterbodies and freshwater access infrastructure.
ROP E-7	*Objective*: Minimize disruption of caribou movement and subsistence use. *Requirement/Standard*: Pipelines and roads shall be designed to allow the free movement of caribou and the safe, unimpeded passage of the public while participating in subsistence activities. Listed below are the accepted design practices: a. Above ground pipelines shall be elevated a minimum of 7 feet as measured from the ground to the bottom of the pipeline at vertical support members. b. In areas where facilities or terrain may funnel caribou movement, ramps over pipelines, buried pipelines, or pipelines buried under roads may be required by the authorized officer after consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate, based on agency legal authority and jurisdictional responsibility). c. A minimum distance of 500 feet between pipelines and roads shall be maintained. Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipelines and roads converge on a drill pad. Where it is not feasible to separate pipelines and roads, alternative pipeline routes, designs and possible burial within the road will be considered by the authorized officer. *Reason for exception*: While ROP E-7 requires a minimum distance of 500 feet between pipelines and roads, it is acknowledged this may not be feasible in all areas. Initial pipeline engineering has identified that the minimum distances would not be feasible in all areas for the Project based on road and pipeline design constraints. Deviations would occur where roads and pipelines converge on a drill pad or at narrow land corridors between lakes where it is not possible to maintain 500 feet of separation between pipelines and roads without increasing potential impacts to waterbodies.

LS or ROP[a]	LS and ROP Description and Reason for Exception
ROP E-11	*Objective*: Minimize impacts on bird species, particularly those listed under the Endangered Species Act and BLM Special Status Species, from direct or indirect interaction with infrastructure. *Requirement/Standard*: Bird species with special status are protected under ROP E-10 and ROP E-21, and by the protections outlined below. In accordance with the guidance below, before the approval of infrastructure construction, the following studies shall be conducted, and recommended design elements shall be incorporated. Special Conditions in Spectacled and/or Steller's Eiders Habitats: a. The BLM will require submittal of a minimum of 3 years of site-relevant survey data before authorization of construction, if such construction is within spectacled and Steller's eider habitats, as defined by the area contained within the USFWS Arctic Coastal Plain Aerial Waterbird Breeding Population Survey area or the Barrow Triangle Steller's Eider Survey area. The BLM will evaluate adequacy of survey data and ecological mapping (as required under ROP E-12) to determine if ground- based nest surveys are required. If required, spectacled and/or Steller's eider ground nest surveys shall be conducted, following accepted BLM protocol. Information gained from these surveys shall be used to make infrastructure siting decisions, as discussed in subparagraph "b," below. Data shall be transmitted to the BLM in a GIS format (ESRI shapefiles referencing the North American Datum of 1983). b. If spectacled and/or Steller's eiders are determined to be present within the proposed development area, the applicant shall work with the USFWS and BLM early in the design process to site roads and facilities in order to minimize impacts to nesting and brood-rearing eiders and their habitats. Such consultation shall address timing restrictions and other temporary mitigating measures, location of permanent facilities, placement of fill, alteration of eider habitat, aircraft operations, and management of high noise levels. Special Conditions in Yellow-billed Loon Habitats: The permittee shall determine and submit to the BLM information on the presence of yellow-billed loon habitat within a project area, using the most current data and analysis results from research conducted within the NPR-A. a. If yellow-billed loon habitat is determined to be present within the project area, the BLM will require submittal of a minimum of 3 years of site-relevant survey data of lakes greater than 25 acres within 1 mile of the proposed infrastructure. If required, surveys along shorelines of lakes shall be conducted, following accepted BLM protocol, during nesting in late June and during brood rearing in late August. b. The design and location of infrastructure must be such that disturbance is minimized. The default standard mitigation shall be a minimum 0.5-mile buffer around all recorded nest sites and shall be up to 1 mile, where feasible. Lakes with yellow-billed loon occupancy shall also include a minimum 1,625-foot buffer around the shoreline. Development would generally be prohibited within buffers. The BLM would consider waivers or modifications to this requirement if no other feasible option exists. *Reason for exception*: The Project will cross the default standard mitigation disturbance setback of 0.5 mile around recorded nest sites for yellow-billed loons and a 500-meter (1,625-foot) setback of the shoreline of lakes with yellow-billed loon occupancy.
LS K-1	*Objective*: Minimize the disruption of natural flow patterns and changes to water quality and the disruption of natural functions resulting from the loss or change to vegetative and physical characteristics of floodplain and riparian areas; the loss of spawning, rearing, or overwintering habitat for fish; the loss of cultural and paleontological resources; the loss of raptor habitat; impacts on subsistence cabins and campsites; the disruption of subsistence activities; and impacts on scenic and other resource values. *Requirement/Standard*: Permanent oil and gas facilities (e.g., gravel pads, roads, airstrips, pipelines) are prohibited in streambeds and adjacent to rivers listed. Rivers in the Project area that are listed include the Colville River (2-mile setback), Fish (Creek (3-mile and 0.5-mile setback), Judy (Kayyaaq) Creek (0.5-mile setback), and the Ublutuoch (Tiŋmiaqsiuġvik) River (0.5-mile setback). *Reason for exception*: The Project will include essential road and pipeline crossings of Judy (Iqalliqpik) and Fish creeks. Pipeline valve pads will also be located within the prescribed setbacks. The Project will locate the Tiŋmiaqsiuġvik Gravel Mine Site within the prescribed setback.

LS or ROP[a]	LS and ROP Description and Reason for Exception
LS K-2	*Deep Water Lakes* *Objective*: Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss or change to vegetative and physical characteristics of deepwater lakes; the loss of spawning, rearing or overwintering habitat for fish; the loss of cultural and paleontological resources; impacts on subsistence cabins and campsites; and the disruption of subsistence activities. *Requirement/Standard*: Generally, permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited on the lake or lakebed and within ¼ mile of the ordinary high water mark of any deep lake as determined to be in lake zone III (i.e., depth greater than 13 feet [4 meters]; Mellor 1985). On a case-by-case basis in consultation with federal, State and North Slope Borough regulatory and resource agencies (as appropriate based on agency legal authority and jurisdictional responsibility), essential pipeline(s), road crossings, and other permanent facilities may be considered through the permitting process in these areas where the lessee can demonstrate on a site-specific basis that impacts will be minimal. *Reason for exception*: The Project will include a water access pad near Lake M0015, a previously identified deep water lake.
LS K-5	*Coastal Area Setback* *Objective*: Protect coastal waters and their values as fish and wildlife habitat (including, but not limited to, that for waterfowl, shorebirds, and marine mammals); minimize hindrance or alteration of caribou movement within caribou coastal insect-relief areas; protect the summer and winter shoreline habitat for polar bears and the summer shoreline habitat for walruses and seals; prevent loss of important bird habitat and alteration or disturbance of shoreline marshes; and prevent impacts on subsistence resources and activities. *Requirement/Standard*: b. Marine vessels used as part of a BLM-authorized activity shall maintain a 1-mile buffer from the shore when transiting past an aggregation of seals (primarily spotted seals), Steller's sea lions, or walruses using a terrestrial haulout unless doing so would endanger human life or violate safe boating practices. Marine vessels shall not conduct ballast transfers or discharge any matter into the marine environment within 3 miles of the coast except when necessary for the safe operation of the vessel. *Reason for exception*: The Project will include sealift barge delivery of bulk construction materials, which will require grounding of barges to facilitate offloading. Barge grounding will require ballast water transfers.

Note: ≤ (less than or equal to); BLM (Bureau of Land Management); LS (lease stipulation); ROP (required operating procedure).
[a] Excludes essential road and pipeline crossings.

2.0 APPLICABLE DESIGN FEATURES

ConocoPhillips Alaska, Inc. (the Proponent or CPAI), has incorporated measures into the Project design to avoid and minimize impacts. These design features are listed in Table 2.1. Like LSs and ROPs, these design features are also applicable to the Project and enforceable. Some of these design features are similar to NPR-A LSs and ROPs or other requirements and are included to show the Proponent's commitment to adhering to them. The Proponent may propose additional measures in subsequent permitting phases.

Table 2.1 Design Features to Avoid and Minimize Impacts

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
1	Use directional drilling to reduce the overall gravel footprint for drill site pads.	Gravel infrastructure	ROP E-5; AOGCC	All
2	Construct road surfaces to the minimum width required for Project operations to minimize the placement of gravel fill: 32-feet-wide Willow access and BT1 and BT2 roads 24-feet-wide water source access pads roads, airstrip lighting roads, and BT3 infield road. Roads designed with a smaller top (crown) surface avoid additional fill placement where wider roads are not required.	Gravel infrastructure	ROP E-5; ADNR DMLW	All
3	Use 20-foot well spacing (instead of 30-foot well spacing) to reduce the overall gravel footprint for drill site pads.	Gravel infrastructure	ROP E-5; AOGCC; ADNR DMLW	Wetlands and vegetation

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
4	Share use of existing equipment and facilities (e.g., camps, seawater treatment plant, warehouses, maintenance shops, emergency response equipment) to reduce the overall Project gravel- and ice-pad footprint.	Gravel infrastructure	ROP E-5; ADEC	Water resources; wetlands and vegetation
5	Use single-season ice roads to support winter construction of gravel roads, pads, and pipelines to avoid the need for additional gravel roads for construction. This includes accessing Tiŋmiaqsiuġvik mine sites via ice road instead of gravel.	Gravel infrastructure, mine site	ROP E-5; ADNR DMLW	Wetlands and vegetation
6	Use 2:1 side slopes (i.e., gravel road and pad embankment slopes) instead of 3:1 to reduce the Project's overall gravel footprint.	Gravel infrastructure	ROP E-5	Wetlands and vegetation
7	Locate drill site BT4 (and associated roads and pipelines under Alternatives B, C, and D) outside of the Teshekpuk Lake Caribou Habitat area which would reduce the overall gravel footprint and eliminate the need for a bridged crossing of the Kalikpik River.	Gravel infrastructure, pipelines	Design Measure does not apply to Project as approved under this Decision as BT4 would not be constructed.	Wetlands and vegetation; terrestrial mammals
8	Avoid permanently flooded wetlands by locating Project infrastructure on higher, and relatively drier areas, when practicable. This practice applies to drill sites and other pads, road alignments, the new airstrip, and other Project components.	Gravel infrastructure	None	Wetlands and vegetation; water resources
9	Suspend communications and power cables from horizontal support members to avoid additional fill associated with utility poles and to reduce the potential for bird strikes and perches for predators.	Utilities	ROP E-20	Wetlands and vegetation; birds
10	Use ice roads and pads, including multi-season ice pads, to support Project construction, including using ice pads to house construction camps; stage construction equipment; allow stockpiling of gravel and mine site overburden during construction activities; and support construction activities at bridge crossings, along the Project's pipeline alignment, at the HDD crossing of the Colville River, and at other locations as needed near the proposed infrastructure.	Construction activity	ROP E-5; ADEC; ADNR DMLW	All
11	Design pipelines to minimize redundant parallel pipelines to the extent practicable. (For example, infield pipelines from drill site BT2 would tie into drill site BT1 pipelines at BT1; and then drill site BT1 infield pipelines would connect with the WPF. Additionally, the Willow export pipeline would tie into the existing Alpine Sales oil pipeline at a tie-in pad near Alpine CD4N to connect the Project to the Trans-Alaskan Pipeline System.)	Pipelines	ROP E-7; AOGCC; ADEC	Wetlands and vegetation; birds; terrestrial mammals; spill risk
12	Co-locate the WPF with drill site BT3 to eliminate the need for an additional gravel pad and associated gravel fill (Alternative D only).	Gravel infrastructure	ROP E-5; AOGCC	Wetlands and vegetation

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
13	Construct oil and gas facilities and other Project infrastructure more than 500 feet from fish-bearing waterbodies, to the maximum extent practicable. Only essential pipeline road crossings are proposed for the Project that would encroach on this minimum distance. (For example, the intersection between the BT1 and BT3 access roads was realigned and shifted west to locate the BT1 road outside of the 500-foot buffer of swale 2, an anadromous waterbody.) Construction camps would not be sited on frozen lakes or rivers. (Anticipated deviations are noted in the EIS.)	Gravel infrastructure, pipelines	ROP E-2; ADF&G; ADEC; ADNR DMLW	Water resources; fish
14	Consult with appropriate federal, state, and NSB agencies regarding the mine site design and reclamation plan. Design mine site to minimize impacts to wildlife, air quality, and water resources. Mine site operation and reclamation would include the storage and reuse of organic overburden (for the mine sites). Site the mine pits outside of the active floodplain to minimize impacts to water resources.	Gravel source	ROP E-8; ADF&G; ADEC; NSB; ADNR DMLW	Soils, permafrost, and gravel resources; visual resources; water resources; wetlands and vegetation; fish; birds; subsistence and sociocultural systems
15	Design, construct, maintain, and operate roads in ways to minimize environmental impacts and protect subsistence use areas and access. Gravel road alignments and pad layouts would consider topography, maintenance of natural drainage patterns, and the effects of spring breakup and other potential flood events. Road and pad layouts would also avoid ponds, lakes, and streams to the extent practicable.	Gravel infrastructure	ROP E-1; ADEC; ADNR DMLW	Soils, permafrost, and gravel resources; water resources; subsistence and sociocultural systems
16	Restrict summer tundra vehicle travel for Project personnel to emergency response or to permitted activities required by statute or regulation.	Personnel	ROP L-1; ADF&G; ADNR DMLW	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation; fish; birds; terrestrial mammals; marine mammals
17	Conduct overland (i.e., tundra) moves and similar off-road or cross-country activity use in accordance with ROP C-2 to minimize impacts to streambanks, soil substrate, and vegetation.	Off-road vehicle use	ROP C-2; ADF&G; ADNR DMLW	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation; fish; birds; terrestrial mammals; marine mammals
18	Use low-angle approaches for ice road waterway crossings to protect streambanks. Waterway crossings reinforced with additional snow or ice ("bridges") would be removed, breached, or slotted prior to spring breakup to maintain normal spring runoff patterns and fish passage. All constructed ice ramps and ice bridges would be substantially free of debris (e.g., sticks, brush).	Ice infrastructure	ROP C-3; ADF&G; ADEC; ADNR DMLW	Soils, permafrost, and gravel resources; water resources; fish; terrestrial mammals; marine mammals

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
19	Prohibit travel along streambeds unless it can be demonstrated that there would be no additional impacts from such travel to over-wintering fish or the invertebrates they rely on. Rivers, streams, and lakes would only be crossed with ice infrastructure at areas where waterbody or waterway ice has grounded, when practicable.	Ice infrastructure	ROP C-4; ADF&G; ADEC; ADNR DMLW	Water resources; fish
20	Inject produced water into the reservoir and do not discharge it to surface lands, surface waters, or marine waters.	Waste management	ROPs A-2 and A-7; ADF&G; ADEC	Water resources; wetlands and vegetation; fish; birds; terrestrial mammals; marine mammals; subsistence and sociocultural systems; public health
21	Use recent ecological mapping to assess wildlife habitat types to inform the design, placement, and development of permanent (i.e., gravel) infrastructure.	Gravel infrastructure	ROP E-12; ADF&G	Wetlands and vegetation; fish; birds; terrestrial mammals; marine mammals
22	Remove, slot, breach, or score ice road stream crossings prior to spring breakup to ensure adequate flow and drainage conditions at stream crossings.	Ice infrastructure	ROP C-3; ADF&G; ADNR DMLW	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation; fish; birds
23	Place gravel roads perpendicular to the general flow direction when crossing natural drainages to maintain the existing flow patterns and characteristics.	Gravel infrastructure	ROP E-6; ADNR DMLW; ADF&G	Water resources; wetlands and vegetation; fish; birds
24	Design and construct stream and swale crossings to ensure the free passage of fish, minimization of erosion, maintenance of natural drainage characteristics, and the minimization of impacts to natural stream flow. Bridges would be used to cross rivers and major streams.	Gravel infrastructure	ROP E-6; ADF&G; ADNR DMLW	Water resources; wetlands and vegetation; fish; birds
25	Collect 3 years of hydrologic and fish data at stream crossing and ensure fish passage at stream crossings.	Gravel infrastructure	ROP E-14; ADF&G; ADEC	Fish
26	Design fish-passage culverts in consultation with ADF&G.	Gravel infrastructure	ADF&G; ADEC	Fish
27	Install cross-drainage culverts as needed to maintain natural surface drainage to mitigate the risk of sheet flow interruption and thermokarsting. The estimated spacing of culverts is approximately every 1,000 feet. (Exact placement would be adjusted based on a field survey of in-field local drainage patterns.)	Construction	ROP E-6; ADF&G	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation; birds
28	Place bridges and river crossings at narrow river sections, where practicable, to avoid gravel fill and minimize the number of piers/pilings placed below ordinary high water.	Gravel infrastructure	ADF&G	Water resources; wetlands and vegetation; fish
29	Construct bridge abutments from sheet pile to reduce the overall gravel footprint and protect the structures from embankment erosion and stream scour.	Construction	ROP E-6; ADF&G; ADEC	Soils, permafrost, and gravel resources; water resources; fish

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
30	Do not stockpile gravel in Waters of the U.S., including wetlands. Gravel would be stockpiled in upland areas or on ice pads.	Gravel infrastructure	ADF&G; ADNR DMLW	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation; birds
31	Install vertical support members (for pipelines) from ice roads and pads, and ensure drill cuttings are temporarily stored on ice and removed to the gravel mine site prior to spring breakup.	Construction	AOGCC; ADNR DMLW	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation
32	Conduct trenching activity (e.g., pipeline road crossings) during winter and temporarily store trench materials on plywood, plastic sheeting, or an ice pad to avoid additional impacts to wetlands (e.g., fill).	Construction	ADNR DMLW	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation
33	Minimize heat transfer and impacts to permafrost from Project infrastructure on gravel pads by: designing flare stack height to reduce radiant heating; filling the gap between well conductors and inner pipes with polyurethane foam; using thermosyphons adjacent to well rows and at-grade structures; and installing insulation below the foundation floors of heated, at-grade structures.	Construction and operations	ADEC; ADNR	Soils, permafrost, and gravel resources
34	Elevate on-pad heated buildings or structures using pilings, to the extent practicable, to prevent or reduce heat transfer to underlying soils and preserve the thermal integrity of the permafrost.	Facilities	ADEC	Soils, permafrost, and gravel resources
35	Implement snow removal management measures to reduce the potential for gravel to be pushed off roads and pads during snow removal operations.	Construction and operations	ADNR DMLW	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation
36	Implement dust control measures for gravel roads, pads, and mining operations to reduce fugitive dust that can settle on vegetation or snow, which could increase thermal conductivity (i.e., reduce albedo), lead to thermokarsting, and promote earlier spring thaw in affected areas.	Gravel infrastructure	ROP A-10; ADEC	Soils, permafrost, and gravel resources; air quality; visual resources; water resources; wetlands and vegetation; fish; birds; terrestrial mammals; public health
37	Implement strict guidelines for travel on ice roads to avoid tundra damage, including requiring ice road driver training, establishing speed and weight limits, and installing road-edge delineators along both sides of roads.	Ice road travel	ADF&G; ADNR DMLW	Soils, permafrost, and gravel resources; wetlands and vegetation; birds; terrestrial mammals
38	Install Colville River pipeline crossings (e.g., diesel, seawater) with insulation and placed within an outer pipeline casing, which would inhibit heat transfer to permafrost, contain fluids in the event of a pipeline leak, and provide structural integrity to the pipeline crossing.	Pipelines	ADEC	Soils, permafrost, and gravel resources; Water resources; Spill risk

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
39	Design, construct, and use ice roads that are a minimum of 6 inches thick during winter construction to eliminate or minimize impacts to wetlands and tundra.	Ice infrastructure	ROP C-2; ADF&G; ADNR DMLW	Soils, permafrost, and gravel resources; wetlands and vegetation; birds; terrestrial mammals
40	Implement an erosion control plan to detail ways the Project would prevent or mitigate erosion that could impact terrestrial and aquatic environments. The plan would include CPAI's operations, monitoring, and maintenance procedures that detail the actions CPAI would undertake to monitor, maintain, and if needed, remediate gravel fill impacting surrounding tundra and wetlands.	Erosion control	ROP E-6; ADF&G; ADEC; ADNR DMLW	Soils, permafrost, and gravel resources; visual resources; water resources; wetlands and vegetation; fish; birds; terrestrial mammals; marine mammals; subsistence and sociocultural systems
41	Place cleared (i.e., plowed) snow in designated snow-storage areas and manage stormwater from all gravel pads to prevent contaminants from being released during spring breakup. Select snow push areas annually based on avoiding areas of thermokarsting, proximity to waterbodies, and evaluations of areas used the previous year.	Snow management	ROP A-3; ADNR; ADEC	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation
42	Use a minimum of 5-foot-thick section for gravel pads and roads to maintain a stable thermal regime by insulating the underlying tundra and offsetting the loss of insulating effect caused by the compression of the vegetated tundra beneath the gravel.	Gravel infrastructure	ROP E-5; ADNR DMLW	Soils, permafrost, and gravel resources
43	Route ice roads to avoid shrub areas and large areas of tussock tundra to the extent practicable.	Ice infrastructure	ROP C-2; ADF&G; ADNR DMLW	Wetlands and vegetation; birds; terrestrial mammals
44	Construct pipelines aboveground, to the extent practicable, to minimize permafrost impacts.	Pipelines	ADEC; ADNR	Soils, permafrost, and gravel resources
45	On BLM-managed lands, withdraw unfrozen water from lakes and not rivers and streams during winter to maintain populations of, and adequate habitat for, fish and invertebrates. Ice aggregate would not be removed from areas of grounded ice less than or equal to 4 feet in depth (on BLM-managed lands) without authorization from the BLM, on a site-specific basis.	Water withdrawal	ROP B-1; ADNR DMLW; ADEC	Water resources; fish
46	Do not construct causeways or docks in any river mouth or delta. Causeways, docks, artificial islands, or other bottom-fast structures, if employed, would be designed to ensure free passage of fish and prevent changes to water circulation patterns or water quality.	Gravel infrastructure	ROP E-3; ADNR DMLW; ADF&G	Water resources; fish; birds

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
47	Maintain air-traffic altitudes consistent with NPR-A ROP F-1, except during takeoffs and landings, and unless doing so would endanger human life or violate safe flying practices, to avoid disturbing caribou, birds, and subsistence users, when feasible. (Some air traffic would be required to support the Project or for regulatory compliance [e.g., wildlife studies, hydrology studies] and to ensure cleanup following the ice-road season could require flying at lower altitudes.)	Air traffic	ROP F-1; ADF&G	Noise; visual resources; birds; terrestrial mammals; marine mammals; subsistence and sociocultural systems
48	Develop a bear-interaction plan for Project personnel to minimize conflicts between bears and humans.	All	ROP A-8; ADF&G	Terrestrial mammals; marine mammals
49	Minimize disruption to caribou movement by maintaining a minimum clearance of 7 feet between the bottom of pipelines and the ground surface.	Pipelines	ROP E-7; ADF&G; ADEC	Terrestrial mammals; subsistence and sociocultural systems; spill risk
50	Design facilities to minimize nesting, denning, or sheltering opportunities for ravens, raptors, and foxes. Prohibit intentional feeding of wildlife.	Facilities	ROP E-9; ADF&G	Birds; terrestrial mammals
51	Minimize the amount of light visible from outside of facilities, including directing artificial exterior lighting inward and downward during all months of the year, which would prevent waterfowl (including species listed under the ESA) from striking facilities during low light conditions.	Facility lighting	ROP E-10; typical ESA conservation measure; ADF&G	Birds
52	Minimize the take of species, particularly those listed under the ESA and BLM Special Status Species, by conducting eider and yellow-billed loon surveys and working with resource agencies to ensure facilities minimize impacts to species found (e.g., ensure off-pad utility lines are either buried or suspended from pipe racks to the extent feasible, locate towers on pads near existing buildings to the extent feasible, minimize the use of tower guy wires, clearly mark guy wires that are used to prevent collisions).	Facilities	ROPs E-11 and J; typical ESA conservation measure; ADF&G	Birds
53	Develop a new gravel mine site that would not result in the loss of raptor nesting habitat because it would not take gravel from cliffs, river channels, or stream channels in a manner that would affect river bluffs.	Gravel source	ROPs E-8 and E-15; ADF&G	Birds
54	Minimize the electrocution hazard by suspending electrical distribution lines from pipe racks or burying cables (versus the use of overhead power lines) off pad.	Utilities	ROP E-20; typical ESA conservation measure; ADF&G	Birds
55	Provide the BLM authorized officer with GIS-compatible location information to facilitate agency monitoring and assessment of wildlife movements through the Project area after Project construction.	Facilities	ROP E-19; ADF&G	Birds; terrestrial mammals

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
56	Locate pipelines parallel to new and existing gravel roads and maintain a minimum separation distance of 500 feet, where feasible, to minimize caribou disturbance and prevent excessive snow accumulation from snowdrifts and snow removal.	Pipelines	ROP E-7; ADF&G	Terrestrial mammals; spill risk
57	Contract with a state-registered Primary Response Action Contractor to assist with quick spill response impacts in the event of a spill.	Operations	ROP A-4; ADEC	Spill risk
58	Align pipe racks installed adjacent and parallel to existing pipeline racks so vertical support members for each pipe rack are in line, to the extent practicable, to reduce obstructions to caribou and subsistence user movements.	Pipelines	ADNR	Birds; terrestrial mammals; subsistence and sociocultural systems
59	Use a muted (i.e., non-reflective) coating on pipelines to avoid glare.	Pipelines	ADNR	Visual resources; birds; terrestrial mammals; marine mammals; subsistence and sociocultural systems
60	Implement policies, procedures, and training to prevent wildlife attraction to Project facilities, including use of predator-proof dumpsters for food waste collection; a strict policy prohibiting the feeding of wildlife; and the use of Ziploc bags or other sealed containers for meals-on-the-go to conceal food odors.	Waste management and wildlife interaction	ROPs A-8 and I-1; ADEC	Birds; terrestrial mammals; marine mammals
61	Implement a Wildlife Avoidance and Interaction Plan that would include procedures to eliminate, minimize, and mitigate bear interactions. CPAI conducts training on waste management practices and would conduct Project-specific training on waste management to guide employees and contractors on managing predators.	Waste management	ROPs A-1, A-2, A-8, and I-1; typical ESA conservation measure; ADF&G; ADNR; ADEC	Birds; terrestrial mammals; marine mammals
62	Protect grizzly and polar bear denning sites by prohibiting cross-country travel or use of heavy equipment within 0.5 mile of a grizzly bear den and within 1.0 mile of a polar bear den. Where necessary, CPAI would conduct surveys near coastal areas to locate potential polar bear dens, in consultation with the U.S. Fish and Wildlife Service, as appropriate, before initiating activities in coastal habitat between October 30 and April 15.	All	ROP C-1; typical ESA conservation measure; ADF&G; ADNR DMLW	Terrestrial mammals; marine mammals
63	Conduct training for Project personnel on NPR-A ROPs, standards, and environmental, social, traditional, and cultural concerns specific to the Project region, including training on community interactions. This training would be designed to ensure strict compliance with local and corporate drug and alcohol policies.	Personnel	ROP I-1; NSB	Subsistence and sociocultural systems; cultural resources
64	Prohibit Project employees from hunting and trapping activities while employees are on active work status to avoid increased competition for subsistence and recreational wildlife resources.	Personnel	ROP H-3; ADF&G	Subsistence and sociocultural systems

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
65	Use the results of cultural and paleontological resource surveys to inform Project design and facilities placement. The Project would avoid known cultural and paleontological resources during ground-disturbing activities, including the construction of ice roads.	Construction	ROP E-13; ADNR	Cultural and paleontological resources
66	Implement a Visual Resources Management Plan to minimize visual resource impacts, consistent with the Visual Resources Management Class for the lands on which Project facilities would be located.	Project infrastructure	ROP E-17; ADNR	Visual resources
67	Avoid disturbance of caribou and strictly prohibit chasing wildlife with vehicles.	Personnel	ROP M-1; ADF&G	Birds; terrestrial mammals; marine mammals; subsistence and sociocultural systems
68	Continue to consult with affected subsistence communities, tribes, Alaska Native Corporations, and NSB, as well as the Kuukpikmuit Subsistence Oversight Panel, Alaska Eskimo Whaling Commission, Nuiqsut Whaling Captains, and Barrow Whaling Captains to mitigate potential impacts to subsistence activities. Plans would be maintained to ensure these consultations continue both periodically and robustly.	All	ROP H-1; NSB	Subsistence and sociocultural systems
69	Continue to consult with the Kuukpik Subsistence Oversight Panel, the Native Village of Nuiqsut, and Kuukpik Corporation to ensure Project activities do not adversely affect subsistence activities. CPAI would continue to hold frequent public community meetings well in advance of future activities. Travel would be scheduled with flexibility and managed through the use of speed limits, rerouting, and traffic stoppages to avoid conflict with subsistence use and hunting areas during seasonal periods.	All	ROPs E-1, F-1, H-1, H-3, and I-1; NSB	Subsistence and sociocultural systems
70	Continue to provide annual funding for the Kuukpik Subsistence Oversight Panel to help support the executive director and coordinate panel activities.	All	ROPs E-1, F-1, H-1, H-3, and I-1; NSB	Subsistence and sociocultural systems
71	Conduct high-disturbance construction activities such as gravel mining and placement, and pipeline and facility construction, primarily during the winter months when subsistence activity levels are relatively low and disruptions to water flows can be minimized.	Construction	ADF&G	Water resources; fish; birds; terrestrial mammals; subsistence and sociocultural systems
72	Include subsistence tundra access ramps and pullouts on gravel roads with locations based on community input. The pullouts would allow local residents to access the areas adjacent to roadways. The tundra access ramp and pullouts would be designed with considerations of lessons learned from the Greater Mooses Tooth 1 and 2 projects.	Gravel infrastructure	ADNR DMLW; NSB	Subsistence and sociocultural systems

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
73	Prohibit the use of airboats on rivers within BLM-managed lands and within a 50-mile radius of Nuiqsut, except for emergencies and emergency response training.	Operations	ADNR DMLW; ADF&G	Noise; birds; fish; terrestrial mammals; marine mammals; subsistence and sociocultural systems
74	Continue the internship program (CareerQuest) to introduce Nuiqsut high school students to jobs and careers in the oil fields and in their community.	Community outreach	NSB	Economics; subsistence and sociocultural systems
75	Continue to strive to hire qualified Nuiqsut, NSB, and Alaska residents for oil field jobs.	Personnel	NSB	Economics
76	Ensure current communications protocols for CPAI helicopter, fixed-wing aircraft, and marine-vessel traffic are adequate to address community (Nuiqsut) concerns about traffic-related impacts to subsistence activities.	Air and vessel traffic	ROP F-1; NSB	Subsistence and sociocultural systems
77	Allow Nuiqsut residents reasonable use of Project roads to access subsistence areas throughout the life of the Project.	Gravel infrastructure	ROPs E-1 and H-1; NSB; ADNR DMLW	Subsistence and sociocultural systems
78	Implement avoidance measures to ensure protection of cultural resource sites during Project activity by establishing a 500-foot avoidance buffer consistent with NSB regulations.	All	NSB	Cultural resources
79	Reduce and minimize air pollution through air quality monitoring and modeling, as appropriate. Develop an emissions inventory and apply additional mitigation measures and activity modifications, as appropriate, in response to the air quality information generated. Make reports generally available to the NSB and local communities.	Air emissions	ROP A-10; ADEC; NSB	Air quality; public health
80	Adhere to the BLM's oil and gas air resources ROPs, as applicable. These practices would minimize air emissions resulting from both Project construction and operations and would include: watering gravel roads to minimize fugitive dust, using clean fuels such as ultra-low sulfur diesel and natural gas, and the use of low emissions emitting equipment (including maximum use of electrical power, Tier IV final engines - or similar emission reduction technology for drill rigs and hydraulic fracturing equipment prior to WPF facility startup – storage tank closed vent systems to the extent practicable, and green completions).	All	ADEC	Air quality; climate change; water resources; wetlands and vegetation; public health
81	Use ultra-low sulfur diesel fuel (as defined by ADEC) in all diesel-fueled vehicles and equipment.	Vehicles and equipment	ROP A-9; ADEC	Air quality; public health
82	Use totally enclosed or acoustically packaged permanent electric power generator sets to abate noise.	Generators	ADEC	Noise; birds; terrestrial mammals; marine mammals

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
83	Generate Project power using the power plant at the WPF following facility startup and provide power to drill rigs except during periods when power from the WPF is unavailable. Use ultra-low-sulfur diesel powered portable generators to supply Project power prior to facility startup or during periods of facility maintenance, shutdown, or upsets.	Utilities	ADEC; AOGCC	Air quality; public health
84	Power off vehicles and heavy equipment (i.e., rolling stock) used for oil and gas operations when not in active use, to the extent practicable.	Vehicles	ROP A-7; ADEC	Air quality; climate change; public health
85	Equip vehicles with block heaters and institute Project practices to power off and plug in vehicle engines when temperatures are -30°F or above to conserve fuel and reduce emissions.	Vehicles	ADEC	Air quality; climate change; public health
86	Use Finewater Mist for process module fire protection and a non-ozone depleting agent for drill site and non-process module fire protection in lieu of Halon.	Fire protection	ADEC	Air quality; water quality
87	Manage all waste in accordance with a comprehensive waste management plan to reduce impacts to human health and safety and to minimize potential effects to subsistence resources, including fish and wildlife. This would be accomplished using the Alaska Waste Disposal and Reuse Guide (the "Red Book"). This guide addresses: waste prevention and reduction, recycling, treatment, and disposal. The waste management plan would include measures to avoid attracting wildlife, disposal of putrescible waste, disposal of pumpable waste, and disposal of wastewater. As allowed, injectable waste would be injected into the subsurface via disposal wells or used for enhanced oil recovery.	Waste management	ROP A-2; ADEC	Water resources; wetlands and vegetation; birds; terrestrial mammals; marine mammals; subsistence and sociocultural systems
88	Audit contractors' health, safety, and environment performance to ensure safe practices are followed.	Personnel	ADEC	Water resources wetlands and vegetation; fish; birds; terrestrial mammals; marine mammals; subsistence; public health
89	Audit the Project on a scheduled basis to ensure compliance with all environmental laws, regulations, and local requirements, company policies and procedures, and other regulations regarding safety, land use, fire codes, etc.	All	ADNR DMLW; ADEC	All
90	Employ Field Environmental Coordinators to monitor compliance with permits and other Project requirements.	All	ADNR	All
91	Evaluate environmental considerations when purchasing new storage tanks or adding new emissions sources that may affect the environment or operating permits.	All	ROP A-10; ADEC	All

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
92	Review new chemicals being considered for use on the Project to ensure the materials would minimize the generation of hazardous waste or risk to employees.	Operations	ROP A-3; ADEC	All
93	Develop and implement a spill prevention and response contingency plan for the Project (in accordance with 40 CFR 112) to reduce impacts to human health and safety and to minimize potential effects to subsistence resources, including fish and wildlife. The Plan would cover Project operations and describe spill prevention measures and on-site cleanup materials for permanent fueling stations, use of proper storage containers and liner materials, proper container identification, and notice of reportable spills. Identification of drip pans (i.e., "duck ponds") would be addressed through Project operating procedures.	Spill prevention and response	ROP A-4; ADEC	All
94	Use a hazardous materials contingency plan (also known as a spill prevention and response contingency plan), prepared pursuant to NPR-A ROP A-3, that would detail response actions, drills, and responder training.	Spill prevention and response	ROP A-3; ADEC	All
95	Build and operate pipelines with the best available technology for detecting and preventing corrosion or mechanical defects to minimize impacts related to point source pollution from oil spills or leaks.	Pipelines	ROP E-4; ADEC	All
96	Install pipeline valves on each side of Judy (Kayyaaq) and Fish creek crossings, to allow isolation of produced fluids pipelines on either side of bridges and minimize potential spill impacts in the event of a leak or break. These valves would reduce subsistence user concerns related to downstream contamination from the Project. Isolation valves or vertical loops would be installed on the Willow (sales oil) pipeline at each side of the Ublutuoch (Tiŋmiaqsiuġvik) River, and on each side of the segment crossing the Nigliagvik Channel, Niġliq Channel, and lakes L9341 and L9323. Vertical loops would be installed on the diesel pipeline at each side of the Miluveach River, Kachemach River, and Colville River. Two methods of leak detection will be used for the seawater and diesel pipeline crossings under the Colville River: (1) leak detection mass balance (primary), and (2) optical leak detection (secondary, within casing).	Pipelines	ADEC	All
97	Implement CPAI's "Target Zero" spill prevention program, which is designed to raise awareness around spill prevention and pass on lessons learned, for the Project.	Spill prevention and response	ROP A-3, A-4, and A-5; ADEC	All

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
98	Implement a fuel transfer standard operating procedure and use secondary containment on regulated oil and hazardous materials storage tanks.	Spill prevention and response	ROPs A-4 and A-5; ADEC	All
99	Continue to implement an extensive corrosion inspection program which includes ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared (heat signature detection) technology. The inspection programs are American Petroleum Institute Standard 570-based programs that focus inspection efforts on areas of greatest potential for spills.	Spill prevention and response	ROP A-3; ADEC	All
100	Continue CPAI's operating practice to immediately and completely clean up all spills, recovering 100% of spilled material for recycling when possible.	Spill prevention and response	ROP A-3; ADEC	All
101	Periodically treat pipeline fluids, as appropriate to product types, with chemicals to limit corrosion potential.	Pipelines	ROPs A-3 and E-4; ADEC	All
102	Equip and maintain oil spill response equipment intended for use in winter conditions for effective use in Arctic conditions (i.e., in a manner to prevent the freezing or icing of the equipment).	Spill prevention and response	ROPs A-3 and A-4; ADEC	All
103	Hydrostatically test pipelines prior to placing them into operation.	Pipelines	ROP E-4; ADEC	All
104	Provide access to the GMT and Alpine developments (under Alternatives B, C, and E) to offer additional response capabilities and minimize response time in the event of a spill or other unintended release or emergency.	Spill prevention and response	ROPs A-3 and A-4	All
105	Stage spill response equipment in strategic locations (e.g., drill sites) for initial spill response. On-site staged equipment would facilitate the rapid deployment of response personnel and may minimize or reduce the overall impacts associated with a spill or other accidental release.	Spill prevention and response	ROPs A-3 and A-4; ADEC	All
106	Designate Spill Response Teams and Hazardous Materials Response Teams, consisting of trained volunteer spill and hazardous materials response personnel on site.	Spill prevention and response	ROP A-3; ADEC	All
107	Continue to participate in the Mutual Aid Agreement among North Slope operators to supply labor and equipment for immediate spill response. Spill response drills and exercises would ensure response readiness and awareness; these drills would be scheduled according to the National Preparedness and Response Exercise Program guidelines and typically involves production, drilling, or pipeline spill response scenarios	Spill prevention and response	ROP A-3; ADEC; NSB	All

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
108	Do not refuel equipment within 500 feet of the active floodplain of any waterbody unless approved by the BLM authorized officer. Fuel-storage stations, except as approved by the BLM authorized officer, would be located at least 500 feet from waterbodies except for small caches (up to 210 gallons) for fueling motorboats, float planes, and small equipment.	Spill prevention and response	ROP A-5; ADNR DMLW; ADEC	All
109	Design well cellars to contain fluid drips and leaks.	Spill prevention and response	ROP A-4; ADEC	All
110	Continue philanthropy programs from local oil fields to provide income and other benefits to the residents of Nuiqsut.	All	None	Economics; sociocultural systems; public health
111	Design all bridges to maintain bottom chord clearance of at least 4 feet above the 100-year design flood elevation, or at least 3 feet above the highest documented flood elevation, whichever is higher. Additionally, design the Judy (Kayyaaq) Creek and Fish Creek bridges to maintain bottom chord clearance of at least 13 feet above the 2-year design flood elevation (open water) to provide vessel clearance.	Bridges	ROP E-6	Soils, permafrost, and gravel resources; water resources; wetlands and vegetation; fish; birds; terrestrial mammals; marine mammals; subsistence and sociocultural systems; public health
112	Include construction of up to three subsistence boat ramps to provide local residents with improved river access. Locations would include the Ublutuoch (Tiŋmiaqsiuġvik) River near the existing GMT-1 access road, Judy (Kayyaaq) Creek at the proposed Willow BT1 access road crossing, and Fish Creek at the proposed access road crossing (BT2 under Alternative E).	All	ROP E-1	Subsistence and sociocultural systems; public health
113	Implement a speed limit of 35 mph and stop traffic when caribou are crossing the road on all 32-foot-wide (surface width) roads. On roads with a 24-foot-wide surface width, implement a 25-mph speed limit for health, safety, and environmental purposes, including to reduce potential impacts to vegetation from dust and to wildlife.	Gravel infrastructure	None	All
114	Build a constructed freshwater reservoir to ensure a reliable source of fresh water for the Project while minimizing the need for water withdrawals from Willow-area lakes. Adaptively manage water levels by installing a flow control gate and valve to allow reduction of flow velocity into the reservoir based on monitoring of water levels in Lake M0015 and the lake outlet into Willow Creek if necessary.	Water withdrawal	None	Water resources; wetlands and vegetation; fish; birds
115	Place pipelines at Fish Creek and Judy (Kayyaaq) Creek on structural steel supports attached to the bridge girders below the bridge deck to avoid placement of pipeline VSMs below OHW.	Pipelines	LS K-1	Water resources; fish; birds
116	Remove the airstrip approach lighting access and secondary access roads from the proposed Project design to reduce the gravel footprint.	Gravel infrastructure	ROP E-5	All

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
117	Develop a module delivery option that uses the existing Oliktok Dock and staging pad to avoid the need to construct an MTI.	Gravel infrastructure, module delivery	ROP E-5	All
118	Minimize the footprint of the gravel mine based on amount of gravel needed (i.e., less gravel needed for Option 3).	Gravel infrastructure, mine site	ROP E-5	All
119	Reduce potential fugitive methane emissions by processing and compressing produced gas for reinjection and gas lift to enhance production.	Pipelines	None	Air quality; Climate change
120	Minimize vented methane gas volumes by initially depressurizing pipelines to the production system, flare, and then purge lines with nitrogen prior to opening. By using nitrogen sweep and purge, little to no natural gas should be released when opening the equipment to atmosphere.	Pipelines	None	Air quality; Climate change
121	Use flaring to support process safety only (no flaring for production).	Processing facility	None	Air quality; Climate change
122	Use electric solenoids or instrument air driven pneumatics instead of natural gas driven pneumatics.	Processing facility	None	Air quality; Climate change
123	Use high efficiency turbines at the WPF (versus older frame style units employed at Prudhoe Bay and Kuparuk.	Processing facility	None	Air quality; Climate change
124	Use waste heat from the power generation turbines at the WPF to provide building and process heat for the WPF. No gas fired process heaters would be required during normal operations.	Processing facility	None	Air quality; Climate change
125	Use waste heat from fuel gas fired drill site heaters to supply building heat at drill sites to reduce electrical demand.	Drill site facilities	None	Air quality; Climate change

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
126	Prevent hydrocarbon emissions by installing vapor recovery units on hydrocarbon process tanks and vessels to prevent hydrocarbon emissions. (Note: these are process vessels and not storage vessels in the regulatory sense of the word. The infield flowlines, processing facility, and sales pipeline design obviate the need for permanent oil storage capacity onsite.)	Processing facilities and storage tanks	None	Air quality; Climate change
127	Use three-phase (gas, oil, and water) lines, which flow from each drill site to the Willow processing facility, and gas injection pipelines which flow from the Willow processing facility to each drill site, instead of gas gathering lines. Both types of overland pipelines have connections that are welded by design and largely avoid flanged connections minimize potential for leaks. These pipelines would employ the same leak detection surveys as the existing Alpine development (i.e., the lines will be surveyed in accordance with state regulations 18 AAC 75.080).	Pipelines	None	Air quality; Climate change; Spill risk
128	Conduct leak surveys (including methane) in accordance with New Source Performance Standard (40 CFR 60 OOOOa or OOOOb [whichever regulation is applicable at the time]). Recycle the produced gas, not used for fuel or safety flare, and inject it for gas lift for reservoir pressure support (see also measure number 119).	Processing facilities and pipelines	40 CFR 60	Air quality; Climate change
129	Prior to WPF commissioning, use gas from the GMT-2 production pipeline to power the Willow Operations Center turbine via fuel gas rather than diesel fuel, which would produce less emissions than diesel fuel.	Processing facility	None	Air quality; Climate change
130	Use centrifugal compressors equipped with dry seals. Dry seal systems minimize methane leakage (versus wet seals).	Processing facility	None	Air quality; Climate change
131	Use electric power (from Project gas-fired turbines) for drilling and completion activities (e.g., drill rig and hydraulic fracturing equipment), versus using diesel fuel powered units.	Processing facility and drill site equipment	None	Air quality; Climate change
132	Capture and reinject produced gas during drilling, well completions, and flowbacks once the wellsite is connected by pipeline to the WPF to reduce combustion and methane emissions.	Processing facility and drill site equipment	None	Air quality; Climate change
133	Voluntarily comply with the Oil and Gas Methane Partnership, administered by the United Nations, which aims to improve methane measurements and drastically reduce methane emissions through measurement, reporting, and reduction. The Willow Project will comply with the OGMP 2.0 guidelines, which would be subject to verification under the OGMP.	Processing facilities, drill sites, and pipelines	None	Air quality; Climate change

No.	Measure	Project Component or Activity	LS, ROP, or Other Stipulation[a]	Primary Affected Resource or Subject
134	Implement a vehicle management plan (as required under the NSB rezoning ordinance), including traffic reduction measures.	Vehicles	None	Air quality; Climate change
135	Use mineral oil-based drilling muds where technically feasible to reduce vented methane emissions.	Well drilling	None	Air quality; Climate change
136	Use insulation in gravel roads and gravel pads where practicable to reduce the overall embankment height and gravel fill volume requirements while still maintaining thermal stability of the underlying permafrost.	Gravel infrastructure	NSB rezoning ordinance requirement	Permafrost and gravel resources; Terrestrial mammals; Subsistence
137	CPAI will institute the following restrictions to ground-vehicle traffic in the Willow Project area (i.e., gravel and ice roads extending south/southwest from GMT-2): • The maximum speed limit on Willow gravel roads will be 35 mph to reduce the potential for vehicular accidents and disturbance of caribou. Infield roads that are 25 feet wide will have a maximum speed of 25 mph. • Periodic traffic closures will be instituted when groups of 25 or more caribou appear to be approaching the road and current traffic exceeds 15 vehicles per hour. • Wildlife will always have the right-of-way and vehicle traffic will be slowed or stopped to allow animals to cross Project roads. • Bus transportation will be used as the primary means to transport personnel between camps and their assigned work locations, as well as between camps and the Alpine CD1 airstrip during mobilization and demobilization.	Vehicles	None	Air quality; Birds; Terrestrial mammals; Subsistence
138	CPAI will institute the same safety access and use guidelines for Project roads as the operating Alpine development and Greater Mooses Tooth facilities.	Gravel roads	None	Subsistence

Note: °F (degrees Fahrenheit); ADEC (Alaska Department of Environmental Conservation); ADF&G (Alaska Department of Fish and Game); ADNR (Alaska Department of Natural Resources); AOGCC (Alaska Oil and Gas Conservation Commission); BLM (Bureau of Land Management); BT1 (Bear Tooth 1 drill site); BT2 (Bear Tooth 2 drill site); BT3 (Bear Tooth 3 drill site); CPAI (ConocoPhillips Alaska, Inc.); DMLW (Division of Mining, Land, Water); EIS (Environmental Impact Statement); ESA (Endangered Species Act); GIS (geographic information system); GMT-1 (Greater Mooses Tooth 1); GMT-2 (Greater Mooses Tooth 2); HDD (horizontal directional drilling); LS (lease stipulation); mph (miles per hour); MTI (module transfer island); No. (number); NPR-A (National Petroleum Reserve in Alaska); NSB (North Slope Borough); OHW (ordinary high water); ROP (required operating procedure); VSM (vertical support member); WPF (Willow Processing Facility). All cited lease stipulations and required operating procedures are from the National Petroleum Reserve in Alaska Integrated Activity Plan/Environmental Impact Statement Record of Decision (BLM 2022b).

[a] Other stipulations include typical State of Alaska or NSB permit stipulations for North Slope activities or typical ESA conservation measures or LSs or ROPs. The table lists the agency from which the typical stipulation would arise.

3.0 ADDITIONAL MITIGATION MEASURES ADOPTED

In addition to Project design features, LSs, and ROPs applicable to the Project, the following additional mitigation measures are hereby adopted to further avoid or reduce impacts from the Project. These measures are discussed in the relevant resource sections in the Willow MDP Final Supplemental EIS, Chapter 3.0, *Affected Environment and Environmental Consequences*, and are summarized in Appendix I.1, *Avoidance, Minimization, and Mitigation Technical Appendix*, of the Final Supplemental EIS. They were developed based on suggestions from cooperating agencies, stakeholders, public comments, and BLM staff raised during both the initial Willow MDP EIS process

and the Willow MDP Supplemental EIS process. Some of these requirements were previously adopted in the 2020 Willow MDP ROD. These measures have been reviewed and updated as appropriate. Previous requirements that have been edited consistent with input provided from BLM specialists, cooperating agencies, stakeholders, and the public as well as requirements that are newly adopted as part of the Supplemental EIS process are marked with an asterisk.

Some clarifications and minor modifications were made to the additional mitigation measures adopted in this ROD and may not verbatim match the additional suggested mitigation measures as described in the Final Supplemental EIS in Appendix I.1. These edits were primarily made to correct sentence structure, grammatical errors, and wording, and in a few instances technical refinements were made for accuracy, to improve implementation, and ensure enforceability. The rationale for any substantive changes to mitigation measures (e.g., a portion of the suggested standard/requirement), is included in Tables 4.1, 4.2, and 4.3 in Section 4.0 of this appendix.

The Proponent may propose a deviation from these requirements/standards as described in the Final Supplemental EIS. If experience or additional study indicate that a requirement/standard is not achieving or is unlikely to achieve its protective objective or will be less effective than the use of more recently proven technology or techniques, BLM may allow or require other measures to meet the objective. This will be accomplished at the activity-level permitting stage and under the terms of the LS or ROP exception process outlined in the NPR-A IAP/EIS ROD.

Measure 1: Fugitive Dust Control Plan

Objective**:** Control fugitive particulate matter (PM) emissions from the Project.

Requirement/Standard**:** Implement a Fugitive Dust Control Plan to mitigate impacts from fugitive PM emissions from the Project. This plan will require regular watering of pads and unpaved roads, establish speed limits on gravel roads, and several other measures to reduce fugitive dust emissions and impacts. See Final Supplemental EIS Appendix I.3, *Dust Control Plan*, for additional details. The Dust Control Plan details the frequency of compliance monitoring and reporting, as well as the frequency of control measures.

Potential Benefits and Residual/Unavoidable Impacts**:** Dust remains a concern on the North Slope and was a key issue during scoping. The Project air quality analysis assumed that Proponent would provide a Dust Control Plan. Air quality modeling indicated that $PM_{2.5}$ would be 85% of ambient air quality standards (AAQS) at the Project site and 22% of AAQS in Nuiqsut. Modeling indicated that PM_{10} would be 89% of AAQS at the Project site and 34% of AAQS in Nuiqsut.

Measure 2: Flight Paths

Objective**:** Minimize effects of aircraft noise on Nuiqsut.

Requirement/Standard**:** Alter flight paths (fixed-wing and helicopter) to avoid Nuiqsut.

Potential Benefits and Residual/Unavoidable Impacts**:** Minimize effects of aircraft noise on residents of Nuiqsut and subsistence users in the area.

Measure 3: Blasting Hours

Objective**:** Minimize effects of blasting noise on Nuiqsut residents.

Requirement/Standard**:** Limit blasting at the Tiŋmiaqsiuġvik mine site to the hours of 10:00 a.m. to 8:00 p.m., notify residents, and strive to adhere to a consistent daily schedule.

Potential Benefits and Residual/Unavoidable Impacts**:** Minimize noise to hours when sleep would be least likely to be affected. Provide a stated window when noise from blasting would not occur, so that residents can plan activities accordingly.

Measure 4: Visual Impact Management

Objective**:** Minimize effects to visual resources from the Project.

Requirement/Standard**:** Include the following in the plan to minimize visual impacts (plan is required as per ROP E-17): Use a dull finish on tall metal structures not otherwise painted, including but not limited to communications towers and drill rigs. This measure does not apply to ancillary, external building components, including but not limited to clamps, pipes, and vents.

Potential Benefits and Residual/Unavoidable Impacts**:** Minimize effects to visual resources from the Project.

Measure 5: Project Lighting*

Objective**:** Minimize light visible from outside of Project facilities.

Requirement/Standard**:** Implement lighting controls to turn off exterior lighting at satellite pads and other unoccupied facilities when personnel are not present, between August 1 and October 31.

Potential Benefits and Residual/Unavoidable Impacts**:** Minimize light visible from outside of Project facilities to reduce contrast from glare and artificial lighting and reduce effects to visual aesthetics. This measure will also reduce effects to birds that may be disoriented or attracted to the light and mitigate the collision risk to birds.

Measure 6: Culvert, Bridge, and Pipeline Stream Crossings

Objective**:** Ensure Project culvert, bridge, and pipeline stream crossings are designed to adequately pass flood events and minimize likelihood of structure failure, erosion, backwatering, etc.

Requirement/Standard**:** Final Supplemental EIS Appendix E.8A (*Water Resources Technical Appendix*) provides detail about culvert, bridge, and pipeline design and how that influences potential effects to water resources. Additional measures to reduce impacts created by culvert, bridge, and pipeline crossings, will include:

1. Unless a more appropriate method is available, when estimating flood-peak discharge at locations within the Fish Creek, Judy (Iqalliqpik) Creek, and Ublutuoch (Tiŋmiaqsiuġvik) River basins, use a weighted average from a single station analysis of the BLM long-term monitoring station data on each of these streams and the Shell regression equations (Appendix E.8A, *Water Resources Technical Appendix*). Weight the results of the two computations based on the uncertainty associated with each estimate.
2. As appropriate, consider both 1) snow- and ice-impacted conditions and 2) ice-free conditions in the hydraulic design of bridges, culverts, and pipeline river crossings. Cross-section data at the time of the peak stage and peak discharge that are available for many rivers and streams indicate that the water surface elevation (WSE) was affected by snow and/or ice blockage. Based on the available information, develop designs that will perform satisfactorily during the design event considering both the possibility of open water conditions and the possibility that snow and ice blockage is occurring at the time of the design event. At a minimum, the magnitude of the blockage used in the designs will be similar to the magnitude of the blockage that has been observed.
3. At a minimum, design stream culverts to perform satisfactorily for all flood events up to and including the 50-year event. The headwater-to-diameter ratio at the maximum design condition will be no greater than 1.0.
4. Identify the locations requiring cross-drainage culverts during spring breakup prior to construction, by noting all locations where water is flowing over the proposed alignment. This is necessary because it is often not possible to determine where water flowing in polygon troughs will cross the alignment during a summer or fall inspection. At the same time, identify the ends of the proposed culverts and the invert elevation of the ends of the culvert in order to maintain the flow in the historical flow path.
5. At a minimum, design road bridges to pass the 50-year flood-peak discharge with a minimum of a 3-foot freeboard (assuming snow and ice conditions have been considered in estimating the design WSE). Design for bridge foundation scour equal to the maximum scour depth produced by floods up through a magnitude equal to the 100-year flood event, and a geotechnical design practice safety factor of 2 to 3. Check the bridge design using a superflood and a geotechnical design practice safety factor of 1. The superflood is defined as the 500-year event, 1.7 times the magnitude of the 100-year event, or the overtopping flood,

whichever is the least. These are standard criteria used by Alaska Department of Transportation and Public Facilities for bridges on the North Slope in non-designated flood hazard areas.

6. At a minimum, design pipeline river crossings to perform satisfactorily for all floods up to and including the 200-year event (including crossings on bridges or vertical support members [VSMs]). This is the magnitude of the design event that has typically been used for common carrier pipelines on the North Slope and a higher level of design than is being proposed for the Project.
7. Start bridge and culvert hydraulic computations sufficiently downstream so that the downstream boundary assumptions do not affect the performance of the proposed design. Consider the U.S. Army Corps of Engineers (1986) report "Accuracy of Computed Water Surface Profiles" in determining the location of the downstream boundary for hydraulic computations.
8. If the highest observed WSE or high water mark is higher than the predicted 50-year WSE at a culvert, bridge, or pipeline, re-evaluate the design WSE to confirm that snow and ice blockage and other details of the computation are accurate. Given the conditions on the North Slope, it is unlikely that high water marks from a 50-year flood or greater will be recognizable unless it occurred in the last 10 to 20 years. Additionally, it is improbable that a 1- to 5-year field program will experience a 50-year flood. It is more likely that snow and ice blockage greater than accounted for in the model used to predict the 50-year WSE or an error in the downstream boundary condition used in the model has occurred.
9. Pipelines will be designed with a minimum of 3 feet of freeboard for open water conditions and a minimum of 1 foot of freeboard for ice-affected conditions. Additional freeboard will be applied if uncertainty in the magnitude of the design discharge, hydraulic computations, or ice-affected analysis warrants.
10. Where an aboveground pipeline crossing is immediately upstream from a road, backwater from the road during the pipeline design event will be considered when setting the bottom of pipe elevation. Additionally, if the road is designed for a smaller flood than the pipeline, the changes in hydraulic conditions at the pipeline as a result of the road wash-out will be considered (i.e., changes in location of the concentrated flow and the impact on erosion at the VSMs).
11. Where an aboveground pipeline crossing is immediately downstream from a road, the impact of the road on where water will be flowing and the velocity of the water at the pipeline VSMs will be considered. Additionally, if the road is designed for a smaller flood than the pipeline, the changes in hydraulic conditions at the pipeline as a result of the road wash-out will be considered (i.e., changes in the location of the concentrated flow and the impact on erosion at the VSMs).

Potential Benefits and Residual/Unavoidable Impacts**:** This measure will minimize the likelihood of structure failure, erosion, backwatering, and potential spills (from pipeline crossing failures). Structure failures can impact a number of different human, physical, and biological resources.

Measure 7: Ice Infrastructure

Objective**:** Minimize effects to waterbodies from Project ice infrastructure.

Requirement/Standard**:** This measure provides additional specificity to ROP C-3. Breach ice road crossings sufficiently that ice from crossing will not contribute to ice jams or increase snow and ice blockage during spring breakup. Consistency with this requirement will generally be demonstrated by employing such measures as the following, or similarly protective measures implemented by the Proponent or its contractors:

- Ice slot widths proportional to channel widths.
- Ice slots wide enough to prevent damming and overbank flooding upstream of the crossing.
- Ice slots located along the crossing such that they connect the deep upper section of the channel with the deep lower section of the channel.
- Inspect ice slots during the early breakup season to ensure the bridge crossing is breached.
- Note problems with damming so that improved slotting measures can be used at the crossing in subsequent years.
- Avoid placing multi-season ice pads in floodplains (e.g., construction pads at the mine site).

Potential Benefits and Residual/Unavoidable Impacts**:** Minimizes potential effects of ice dams and backwatering due to ice in stream channels or floodplains.

Measure 8: Colville River Horizontal Directional Drilling Crossing Construction

Objective**:** Minimize effects to the Colville River from Project horizontal directional drilling (HDD) crossing.

Requirement/Standard**:** Prior to HDD construction, provide a monitoring and response plan for determining if drilling mud is being lost to formation or the surface (i.e., making it to the river bottom) during drilling. The plan will include:

- Amount of drilling mud pumped into the drill hole.
- Amount of drilling mud returned back up the drill hole.
- Other monitoring measures such as turbidity monitoring in the river.
- Response measures to be taken in the event mud is lost.

The plan will be submitted to the BLM Arctic District Authorized Officer for awareness 60 days prior to the start of HDD construction.

Potential Benefits and Residual/Unavoidable Impacts**:** This measure will ensure that any loss of drilling mud would be documented and crews would be prepared to respond. HDD drilling mud will be limited to water-based varieties, without petroleum products.

Measure 9: Surveillance of Stream Crossings

Objective**:** Ensure Project structures at stream crossing are functioning properly.

Requirement/Standard**:** Provide annual surveillance of bridge, culvert, and pipeline river crossings for the first 3 years to confirm that structures are functioning properly and provide maintenance as required. Results of this monitoring will be made available to the BLM Authorized Officer upon request. After the first 3 years surveillance would be done every 3 years.

Potential Benefits and Residual/Unavoidable Impacts**:** This measure will help ensure that bridge, culvert, and pipeline river crossings are functioning properly and help minimize effects to waterbodies (and potentially aquatic species, if present) should a maintenance issue occur. Required surveillance will ensure that issues are detected and addressed in a timely manner.

Measure 10: Option 3 Colville River Crossing Data and Adaptive Management Plan

Objective**:** Design and implement an ice bridge crossing of the Colville River that is informed by current ice and water data and allows passage of fish and water as needed, while minimizing effects to all resources.

Requirement/Standard**:** For the Ocean Point crossing site, prepare an Adaptive Management Plan based on baseline data that addresses potential unanticipated conditions and events, such as surface water flow blockages. The plan will describe measures to respond to such issues. The plan will be submitted to the BLM Authorized Officer for awareness prior to winter construction.

Potential Benefits and Residual/Unavoidable Impacts**:** An Adaptive Management Plan for the Colville River Crossing will minimize effects to the river and aquatic species if they are present during construction. Because few data are available for Ocean Point, this measure requires a plan for how to manage for different conditions at the time of construction.

Measure 11: Boat Ramps Maintenance Plan

Objective**:** Minimize impacts to streams from Project boat ramps.

Requirement/Standard**:** Develop a maintenance plan for the boat ramps to ensure long-term viability and use of the site(s) while minimizing impacts to the adjacent waterbodies; initial plan to be submitted to the BLM Authorized Officer 60 days prior to initiating the first year's maintenance activities. Any substantive changes to the maintenance plan will be submitted to BLM prior to initiation of maintenance activities impacted by those changes. The plan will include such measure as:

- Determine if erosion mitigation features or options in engineering design of boat ramp(s) are needed to prevent or minimize erosion potential at the boat ramp(s) and along adjacent riverbanks. Describe the

evaluation that was completed to determine if erosion control is needed and what type of features are included in the final design.
- Identify entity responsible for site maintenance.
- Describe annual maintenance (grading) of parking pads, turning pads, access ramps, and road access.
- Identify the gravel source for reinforcement of boat ramps and pads when necessary. Describe the location and quantity of gravel available and the frequency of how often the need for additional gravel will be evaluated.
- Include regular clean-up of pads and surroundings, including back-haul of trash to suitable disposal site.
- Describe that spills will be removed or mediated per the Project's spill plan.

Potential Benefits and Residual/Unavoidable Impacts**:** A maintenance plan for the boat ramps will increase the likelihood that the ramps will be maintained and reduce erosion or sedimentation of the stream.

Measure 12: Terrestrial Invasive Species Protections

Objective**:** Minimize transport or introduction of invasive species due to the Project.

Requirement/Standard**:** As part of the Invasive Species Prevention Plan required in ROP M-2, as applicable, include the following at a minimum:

1. Use existing vehicle and equipment wash stations and inspect vehicles and equipment for organic matter (e.g., invasive species) prior to moving equipment into the NPR-A to reduce the risk of introducing invasive species. Clean tires and wheel wells so they are free from soils, seeds, and plant parts.
2. Provide stations to clean footwear and gear so they are free from soils, seeds, and plant parts.
3. Provide training to employees and contractors in identification, control, and prevention of known invasive plant species.

Potential Benefits and Residual/Unavoidable Impacts**:** Invasive species can have broad-ranging effects on numerous species and habitats, food chains, and food resources for aquatic species. Prevention of introduction is typically easier than control once invasive species are established. This measure would help minimize the likelihood of transportation and introduction of terrestrial invasive species.

Measure 13: Overwintering Fish Habitat

Objective**:** Avoid crossing overwintering fish habitat with ice infrastructure.

Requirement/Standard**:** Identify overwintering fish habitat (maximum water depths, particularly free- water depth under ice cover) in the Colville River at Ocean Point and other streams in the NPR-A that might intersect the Option 3 (Colville River Crossing) ice road. Avoid crossings of potential overwintering habitat whenever practicable.

Potential Benefits and Residual/Unavoidable Impacts**:** Because overwintering fish habitat is limited on the North Slope, avoiding this limited resource would help minimize impacts to overwintering fish.

Measure 14: Aquatic Invasive Species Prevention

Objective**:** Prevent introduction or transportation of aquatic invasive species.

Requirement/Standard**:** Adopt National Marine Fisheries Service (NMFS) BMPs for invasive species prevention in essential fish habitat (Limpinsel, Eagleton et al. 2017) within the NPR-A:

- Uphold fish and game regulations of the Alaska Board of Fisheries (AS 16.05.251) and Board of Game (AS 16.05.255), which prohibit and regulate the live capture, possession, transport, or release of native or exotic fish or their eggs.
- Adhere to regulations and use best management practices outlined in the State of Alaska Aquatic Nuisance Species Management Plan (ADF&G 2002).

Potential Benefits and Residual/Unavoidable Impacts**:** Aquatic invasive species can have broad-ranging effects on numerous species and habitats, food chains, and food resources for aquatic species. Prevention of introduction is typically easier than control once invasive species are established. This measure would help minimize the likelihood of transportation and introduction of aquatic invasive species.

Measure 15: Bird Collisions*

Objective**:** Minimize collisions of birds with Project infrastructure.

Requirement/Standard**:** Implement the following as much as practical:

- Locate mast poles away from the pad edge.
- Minimize the number and height of towers.
- Restrict speed limits to minimize collision hazard and dust production (35 miles per hour [mph] except in areas of congestion, on bridges, and on pads, which will be slower). All speed limits shall be prominently signed.
- Minimize barge and support vessel speed to reduce potential for bird strikes. (Vessels will travel at speeds slower than 14 knots [16 mph] as per the Endangered Species Act Section 7 consultation with U.S. Fish and Wildlife Service [USFWS].)
- Reduce window reflectivity to minimize bird strikes by using window treatments on externally facing windows on buildings. This measure expands the visibility requirements in ROP E-10. Also see Measure 5: Project Lighting.
- Communication towers shall be monopoles without guy wires where feasible. In instances where it is not feasible to use monopoles, all guy wires shall be marked with reflectors to deter bird collisions.
- For tower structures exceeding 200 feet in height with Federal Aviation Administration (FAA) required light, use white (preferable) or red strobe lights. The strobed should be set at a minimum number of flashes per minute allowable by the FAA. The use of solid red or pulsating warning lights at night should be avoided, if possible.

Potential Benefits and Residual/Unavoidable Impacts**:** Reducing the collision hazards will reduce mortality and injuries for all species of birds in the analysis area. Controlling incidental light and reducing reflectivity of windows will reduce the potential for collisions and energetic costs from attraction and disorientation of flying birds during migratory movements during low visibility. Bird collisions will continue to occur, but rates of injury and mortality will likely be decreased.

Measure 16: Bird Disturbance*

Objective**:** Minimize bird habitat alternation and disturbance of birds from the Project.

Requirement/Standard**:** Implement the following:

- Wherever practical, route ice roads around identified yellow-billed loon nesting sites and nesting lakes to avoid vegetation compaction at nesting sites and delayed melt-out of nesting lakes.
- Haze birds out of the blast area at the mine site before blasting (if resident birds are present in winter).
- Consistent with the goals of ROP E-18, plan construction activities and road improvement activities to minimize noise impacts as much as practical between June 1 and July 31 when birds on nests would be unable to move away from the disturbance.

Potential Benefits and Residual/Unavoidable Impacts: Minimizing noise, air traffic, and helicopter use will reduce disturbance, potential loss of nests, disruption of broods, and energetic costs to molting waterfowl.

Measure 17: Caribou Crossings*

Objective**:** Minimize effects to caribou movement due to Project infrastructure.

Requirement/Standard**:** ROP E-7 describes requirements related to caribou ramps over pipelines or buried pipelines. *Measure 17: Caribou Crossings* designates locations for these, specifically: along the access road just west of the intersection of the infield and access roads, and similarly along the access road just east of the intersection of the infield and access roads.

Potential Benefits and Residual/Unavoidable Impacts**:** Caribou are generally able to cross pipelines elevated to 7 feet, but ramps could be effective in areas where caribou movements are funneled towards pipelines close to roads with high traffic levels (Lawhead, Parrett et al. 2006). Caribou may still have difficulty crossing roads with high traffic volumes.

Measure 18: Aircraft Use Plan

Objective**:** Minimize effects to caribou movement due to Project air traffic.

Requirement/Standard**:** ROP F-1 requires the use of an Aircraft Use Plan. *Measure 19: Aircraft Use Plan* clarifies items that will be included in the plan for the Project. The plan will include the following:

- Minimize Q400 traffic between Alpine and Willow during calving (May 20 to June 20) to reduce impacts to caribou. Q400 traffic between Willow and Kuparuk or Deadhorse is necessary and would be allowed.
- Plans to minimize the disturbance to calving caribou (description of areas avoided, how flight numbers were minimized, and that low altitude flights were avoided orlimited).

Potential Benefits and Residual/Unavoidable Impacts**:** Limiting high-decibel aircraft activity will help lower the amount of disturbance and displacement of caribou that occurs near the airstrip, especially during calving. Because some flights between Willow and Kuparuk or Deadhorse will still occur in addition to general activity at the airstrip area, some displacement of calving caribou is still likely.

Measure 19: Deicing Materials

Objective**:** Minimize effects to wildlife from Project deicing materials.

Requirement/Standard**:** Use propylene glycol for deicing, except in extreme weather events**.**

Potential Benefits and Residual/Unavoidable Impacts**:** This will reduce use of toxic materials and thereby reduce potential exposure of wildlife and subsistence users.

Measure 20: Community Winter Access Trail Coordination

Objective: Minimize effects from the Project to users of the Community Winter Access Trail (CWAT).

Requirement/Standard: Develop and implement a coordination plan with other stakeholders who are permitted to use the CWAT snow road (i.e., North Slope Borough [NSB] residents) by BLM to prevent access conflicts during sealift module movement across the Colville River.

Potential Benefits and Residual/Unavoidable Impacts: The CWAT was issued as a 5-year right-of-way (ROW) to the NSB with the right to renew. Other private users and companies hauling freight across this route will be required to coordinate their use with both the NSB and CPAI. There are usually two to three commercial freight hauling efforts each winter. Coordination with other ROW holders and local residents who may use the route will facilitate improved communication and use requirements in the permits of future ROW applicants.

Measure 21: Subsistence Access*

Objective: Design and maintain subsistence boat ramps, pullouts, subsistence tundra access ramps, and bridges so they are safe and effective for community members thereby minimizing impacts to subsistence access.

Requirement/Standard: Implement the following as much as practicable:

- Ramps shall be designed such that the top of the ramp is level and long enough or situated in such a way to accommodate snowmachines pulling sleds without having to enter the associated pull out or adjacent road. Warning signs will be placed on the adjacent roadway approaching the subsistence ramp/pullout to warn drivers of the potential for vehicles (e.g., snowmachines, all-terrain vehicles) crossing the road.
- Materials and equipment shall not be staged on gravel road pullouts or in such a way as to block subsistence ramps or the roadway view for subsistence ramp users.
- Operators will install signs at roadway pullouts stating, “Equipment and Materials Shall Not be Staged Here”.
- The applicant will provide training (as part of orientation program required by ROP I-1) on the importance of maintaining clear and safe areas around pullouts and subsistence ramps.
- Subsistence ramp locations will be made available to local search and rescue groups (e.g., Nuiqsut, NSB) as GPS coordinates and on published maps.
- Project bridges will be designed to ensure adequate clearance for safe passage for boaters travelling along waterways.

Prior to construction CPAI shall continue to consult with local subsistence users and community organizations regarding the appropriate design and location of subsistence boat ramps, pullouts, subsistence tundra access ramps, and bridges. CPAI shall continue to consult with other operators regarding other boat ramp projects on the North Slope that may inform future designs.

Potential Benefits and Residual/Unavoidable Impacts: Residents will be more likely to use Project roads if they are easier to access and tundra access ramps are in locations that ease use. Allowing potential users of the access ramps a role in ramp location and design will increase likelihood that the ramps will provide a locally accepted mechanism for leaving the road surface and accessing tundra that is safe, feasible, and can minimize impacts to subsistence access and aid in search and rescue missions. Regular meetings with local residents who use the roads will facilitate improved design features or other suggestions that can be incorporated to make use of the road, pullouts, and ramps safer and more effective for users and prevent tundra damage.

Measure 22: Continued Coordination with Local Tribe*

Objective**:** Minimize effects from the Project to the community of Nuiqsut.

Requirement/Standard**:** Attend government-to-government meetings between the Native Village of Nuiqsut and BLM, as requested by Native Village of Nuiqsut, to discuss issues and resolution strategies throughout the life of the Project.

Potential Benefits and Residual/Unavoidable Impacts**:** Regular meetings with the community and BLM will facilitate improved communication and early identification of potential issues that may affect the community. It will allow discussion of strategies to resolve concerns and provide the community with a platform for dialog throughout the life of the Project.

Measure 23: Air Quality Monitoring*

Objective: Collect additional air pollutant data within Willow project area and in Nuiqsut and make the data available to the public.

Requirement/Standard: Install at least one additional air quality monitoring station within the Willow project area. All air quality monitoring stations shall operate within the following parameters:

- Monitor criteria air pollutants and volatile organic compounds for the life of the project as part of air quality monitoring plan (required by ROP A-10). Monitoring protocol subject to review by the AO in consultation with appropriate federal, State, and/or local agencies. The measured concentrations will be made available as close as technically possible to real time for the community of Nuiqsut and the public at large.
- Monitoring of hazardous air pollutants and polycyclic aromatic hydrocarbons shall be completed once every 5 years throughout the life of the project. After two reporting cycles, CPAI may request a waiver for hazardous air pollutants and polycyclic aromatic hydrocarbons monitoring from the AO.

Potential Benefits and Residual/Unavoidable Impacts: Impacts to air quality from oil and gas development remain a key concern among North Slope communities as was indicated during scoping. This measure provides public assurance that the project, in combination with other activities in the area are not causing the air quality in Nuiqsut to degrade.

Measure 24: Use of Unmanned Aerial Vehicles*

Objective: Reduce impacts to wildlife and subsistence use.

Requirement/Standard: Use unmanned aerial vehicles (i.e., drones) to conduct inspections and surveys to the greatest extent practicable to reduce impacts to wildlife and subsistence users

Potential Benefits and Residual/Unavoidable Impacts: Use of unmanned aerial vehicles (UAV) could reduce the number of flights needed to conduct surveys and inspections in support of project activities and operations thereby minimizing the impact to wildlife, especially caribou, and subsistence users from noise and presence of overhead flights. Current limitations to UAV use (e.g., short battery life in arctic conditions, inclement weather, FAA requirements to maintain UAV within line of sight of pilot) preclude their use for all inspections and surveys

within the Project Area. Studies have shown that UAVs have not resulted in a large effect on captive caribou though there remains potential for effects to caribou (Christie et al. 2016).

Measure 25: Polar Bear Maternal Den Detection Surveys *

Objective: Minimize impacts to denning polar bears.

Requirement/ Standard: For each year in which winter project activities will take place, permittee will conduct two airborne infrared den detection surveys for polar bear dens prior to initiating those activities.

Potential Benefits and Residual/Unavoidable Impacts: The use of airborne infrared sensors has proven to be an effective means of locating maternal polar bear dens during den detection surveys. However, this survey methodology does not provide perfect detection, where occupied maternal dens are sometimes missed in pre-operations surveys. Using two airborne infrared surveys, conducted over the same area would substantially reduce the potential for missed maternal polar bear dens during den detection surveys. If maternal polar bear dens are identified, operators would coordinate with USFWS on mitigation measures specific to the den site location and adjacent activities.

Measure 26: Use of Surface Miner*

Objective: Reduce impacts from blasting at the Willow Tiŋmiaqsiuġvik Mine Site.

Requirement/Standard: CPAI will evaluate the use of a "surface miner" (a track-driven surface shaving device for the selective mining of hard or soft material) at the Tiŋmiaqsiuġvik mine site to develop the gravel resource. CPAI will use a surface miner at the Kuparuk Mine Site during the first year of winter construction activities and shall provide a report to BLM on the efficacy of this equipment in North Slope conditions no later than June of the following year. The report shall describe how the equipment was used, any engineering or logistical challenges of using this equipment and steps taken to adapt the surface miner for use in North Slope operations. BLM specialists may conduct on the ground inspections to observe the surface miner during use. If the surface miner is determined to be feasible as an alternative to blasting, the BLM may require its use at the Willow Mine Site.

Potential Benefits and Residual/Unavoidable Impacts: If feasible for continued use, the use of the surface miner would reduce the impacts of blasting at the gravel mine site (blasting would still be required to remove overburden). The noise associated with blasting can impact a variety of wildlife species (e.g., caribou and migratory birds) as well as local subsistence users.

Measure 27: Protections for Teshekpuk Lake Area *

Objective: Permanently protect the most important habitat areas for the maternal and migrating caribou of the Teshekpuk Caribou Herd, including Teshekpuk Lake, a buffer around the lake, and the migration corridors to the east and northwest.

Requirement/Standard: BLM will develop compensatory mitigation that provides durable, long-term protection for the Teshekpuk Caribou Herd to fully offset impacts of the project on that Herd, to include protecting the surface area of Teshekpuk Lake, a buffer along all shores of the lake, and the K-10 Caribou Movement Corridors/K-16 Deferral Areas (under Alternative E in the 2020 National Petroleum Reserve in Alaska Integrated Activity Plan Final Environmental Impact Statement) using existing statutory, management or administrative authorities, with a focus on restricting future leasing or surface development in those areas.

Potential Benefits and Residual/ Unavoidable Impacts: To off-set identified impacts in the Greater Mooses Tooth-1 (GMT1) Project, including major impacts to subsistence uses that cannot be fully mitigated by avoidance and minimization, the 2015 GMT1 ROD required CPAI to provide $8 million to BLM to establish a compensatory mitigation fund, including the development and implementation of a landscape-level Regional Mitigation Strategy (RMS) for the Northeastern NPR-A region. Additionally, Supplemental Best Management Practice 1-- *Establishment of Compensatory Mitigation Fund and Regional Mitigation Strategy* directed the BLM to prepare the RMS to serve as a roadmap for mitigating impacts from GMT1 and future projects enabled or assisted by the existence of GMT1. The BLM finalized the RMS in August of 2018. While specific to the GMT1 project and not intended to establish a precedent for future projects in the NPR-A or any particular methodology for

compensatory mitigation, the RMS was intended to serve as a mitigation roadmap for future projects, like the Willow Project, that are enabled or assisted by the existence of GMT1. RMS Table 1, "Potential Mitigation Projects and Project Locations", Mitigation Objective 3 "Sustain and enhance the functionality of the ecological system," (emphasis in original), describes a potential mitigation project to "Establish conservation easements and voluntary limits on use and occupancy of existing leases" in the potential project location of, among others, the Teshekpuk Lake Special Area and vicinity.

In its February 23, 2023 letter to Secretary Haaland regarding its comments on the Final Supplemental EIS, Kuukpik Corporation noted that

> Because Willow will affect the Teshekpuk Lake Caribou Herd (TLCH) more than any other subsistence resource, Kuukpik strongly supports BLM's proposal to "develop compensatory mitigation that provides durable, long-term protection for the Teshekpuk Lake Caribou Herd to fully offset impacts of the Project on that Herd…." Successfully implementing this mitigation measure will virtually eliminate the risk of further development in the most important caribou habitat areas—areas that will become even more important after Willow is constructed.

Kuukpik Corporation made two follow-on recommendations. One, that the Department clarify that the "durable and long-term protection" would be more than restrictions included in an NPR-A Integrated Activity Plan, and two, that the buffer for the area to be protected be clarified to have support by conservation and subsistence-minded stakeholders that a sufficiently large area will be protected and development-oriented stakeholders that the restrictions are justified and not excessive.

Recognizing the importance of this matter, the BLM is directed to take action to further this mitigation measure.

The BLM shall explore creating a bi-lateral or multi-lateral conservation instrument to provide protections for the Herd and its key habitat for the duration of the Project's impacts. Within 120 days, the BLM should provide a report to the Principal Deputy Assistant Secretary of Lands and Minerals Management that addresses the following: who would hold the instrument; the scope of the lands to be protected; and the types of protections, with a focus on restricting future leasing and/or surface development. The report should contain a discussion of BLM's findings and recommendations with respect to this conservation instrument, including a proposal for stakeholder engagement and implementation, if approved.

One benefit unique to a conservation instrument is to provide local community entities greater ability to directly influence the pace, scale and location of future leasing activities and/or surface development impacting an important subsistence resource.

4.0 ADDITIONAL MITIGATION MEASURES CONSIDERED BUT NOT ADOPTED

The decision in this ROD includes the adoption of all practicable means to avoid or minimize environmental harm consistent with the purpose and need of the action, including potential impacts associated with cumulative impacts. BLM provides the following explanations for not adopting the following mitigation measures considered in the Willow MDP Final Supplemental EIS (Tables 4.1, 4.2, and 4.3). All proposed mitigation measures considered in the Final Supplemental EIS are described in Appendix I.1 of the Final Supplemental EIS.

This page intentionally left blank.

4.1 Additional Suggested Avoidance, Minimization, or Mitigation Considered in the 2020 Willow MDP Environmental Impact Statement

Table 4.1 summarizes additional suggested avoidance, minimization, or mitigation measures considered in the 2020 Willow MDP EIS. Table 4.2 summarizes cooperating agency suggested mitigation measures developed for the Willow MDP Supplemental EIS.

Table 4.1 Additional Suggested Avoidance, Minimization, or Mitigation from the 2020 Willow MDP Environmental Impact Statement

Affected Resource(s)	Additional Suggested Avoidance, Minimization, or Mitigation	Mitigation Adopted (Yes or No)	Rationale For or Against Adoption
Air Quality	Implement a Fugitive Dust Control Plan to mitigate impacts from fugitive particulate matter emissions from the Project. This plan would require regular watering of pads and unpaved roads, enforcing speed limits on unpaved access and haul roads, and several other measures to reduce fugitive dust emissions and impacts. See Appendix I.3, *Dust Control Plan*, for additional details.	Yes	See Measure 1.
Soils, Permafrost, and Gravel Resources	Use the following in design of roads and embankments: • Separate native soils from Project fill materials using geotextiles or fabrics	No	The use of geotextiles would not improve the structural integrity of the permafrost or protect permafrost beyond the proposed design. Additionally, during reclamation, fabric could mix with gravel and native soil and turn otherwise reusable soil into large volumes of waste that would need to be hauled outside of the NPR-A to a waste disposal site.
Soils, Permafrost, and Gravel Resources	Use the following in design of roads and embankments: • Use thick embankments and shallow slopes	No	The mitigation measure would dramatically expand infrastructure footprints, contradicting requirements derived from the Clean Water Act to minimize the gravel footprint.
Soils, Permafrost, and Gravel Resources	Use the following in design of roads and embankments: • Monitor thermokarsting, depth of active layer, and compression of soil and vegetation in annual resupply ice road footprint, for footprints that are used consecutively each year	No	The adopted alternative and module delivery option do not have an annual ice road.
Noise	Alter flight paths to avoid sensitive areas (such as Nuiqsut)	Yes	See Measure 2.
Noise	Limit blasting to the hours of 10:00 a.m. to 8:00 p.m.	Yes	See Measure 3.
Visual Resources	Include the following in the plan to minimize visual impacts (plan is required as per ROP E-17): · Ensure structures are a color that blends in with the background colors of the natural landscape. All colors would be pre-approved by the BLM.	No	ROP E-17 already requires a plan for approval by BLM that construction of permanent facilities best minimize visual impacts, consistent with the visual resource management class for the lands on which facilities would be located.
Visual Resources	Include the following in the plan to minimize visual impacts (plan is required as per ROP E-17): • ROP E-7 and CPAI's design measure 58 (Appendix I.1, Table I.1.2) state that a non-reflective coating would be used on pipelines; that could be expanded to all metal structures not otherwise painted, including but not limited to communications towers and drill rigs.	Yes	See Measure 4.
Visual Resources	Minimize light visible from outside of Project facilities at all times of the year by using lighting fixtures with lamps contained within the reflector and shading externally facing windows on buildings. This will minimize impacts on visual aesthetics (i.e., reduce contrast from glare and artificial lighting).	Yes	See Measure 15 (window shading). Note that as adopted in Measure 15 the words "external shading" is replaced with "window treatments" to ensure that this measure is not interpreted as a requirement for external structures, such as awnings or blinds. Design Measure 51 requires minimization of external visible light year-round, this was updated for the 2022 Willow Supplemental EIS such that the requirement to minimize light from outside of Project facilities at all times of the year by using lighting fixtures with lamps is sufficiently met.

Affected Resource(s)	Additional Suggested Avoidance, Minimization, or Mitigation	Mitigation Adopted (Yes or No)	Rationale For or Against Adoption
Water Resources	Appendix E.8 provides detail about culvert, bridge, and pipeline design and how that influences potential effects to water resources. Additional suggested measures to reduce impacts created by culvert, bridge, and pipeline crossings, could include: • Unless a more appropriate method is available, when estimating flood-peak discharge at locations within the Fish Creek, Judy (Iqalliqpik) Creek, and Ublutuoch (Tiŋmiaqsiuġvik) River basins, use a weighted average from a single station analysis of the BLM long-term monitoring station data on each of these streams and the Shell regression equations (Appendix E.8). Weight the results of the two computations based on the uncertainty associated with each estimate. • As appropriate, consider both 1) snow- and ice-impacted conditions and 2) ice-free conditions in the hydraulic design of bridges, culverts, and pipeline river crossings. Cross-section data at the time of the peak stage and peak discharge that are available for many rivers and streams indicate that the WSE was affected by snow and/or ice blockage. Based on the available information, develop designs that would perform satisfactorily during the design event considering both the possibility of open water conditions and the possibility that snow and ice blockage is occurring at the time of the design event. At a minimum, the magnitude of the blockage used in the designs should be similar to the magnitude of the blockage that has been observed. • At a minimum, design culverts to perform satisfactorily for all flood events up to and including the 50-year event. The headwater-to-diameter ratio at the maximum design condition should be no greater than 1.0. • Identify the locations requiring cross-drainage culverts during spring breakup prior to construction, by noting all locations where water is flowing over the proposed alignment. This is necessary because it is often not possible to determine where water flowing in polygon troughs will cross the alignment during a summer or fall inspection. At the same time, identify the ends of the proposed culverts and the invert elevation of the ends of the culvert in order to maintain the flow in the historic flow path. • At a minimum, design road bridges to pass the 50-year flood-peak discharge with a minimum of a 3-foot freeboard (assuming snow and ice conditions have been considered in estimating the design water surface elevation). Design for bridge foundation scour equal to the maximum scour depth produced by floods up through a magnitude equal to the 100-year flood event, and a geotechnical design practice safety factor of from 2 to 3. Check the bridge design using a superflood and a geotechnical design practice safety factor of 1. The superflood is defined as the 500-year event, 1.7 times the magnitude of the 100-year event, or the overtopping flood, whichever is the least. These are standard criteria used by Alaska Department of Transportation and Public Facilities for bridges on the North Slope in non-designated flood hazard areas. • At a minimum, design pipeline river-crossings to perform satisfactorily for all floods up to and including the 200-year event (including crossings on bridges or VSM). This is the magnitude of the design event that has typically been used for common carrier pipelines on the North Slope and a higher level of design than is being proposed for the Project. • Start bridge and culvert hydraulic computations sufficiently downstream so that the downstream boundary assumptions do not affect the performance of the proposed design. Consider the U.S. Army Corps of Engineers (1986) report "Accuracy of Computed Water Surface Profiles" in determining the location of the downstream boundary for hydraulic computations. • If the highest observed WSE or high-water mark is higher than the predicted 50-year WSE at a culvert, bridge, or pipeline, re-evaluate the design water surface elevation to confirm that snow and ice blockage, and other details of the computation are accurate. Given the conditions on the North Slope, it is unlikely that high water marks from a 50-year flood or greater would be recognizable unless it occurred in the last 10 to 20 years. Additionally, it is improbable that a 1- to 5-year field program would experience a 50-year flood. It is more likely that snow and ice blockage greater than accounted for in the model used to predict the 50-year WSE or an error in the downstream boundary condition used in the model has occurred. • Use a freeboard at bridges and pipeline crossings which considers the uncertainty in the magnitude of the design flood, the uncertainty in the hydraulic computations, and the height of the ice and debris that may be carried by the flood but is not less than 3 feet. • Where an aboveground pipeline crossing is immediately upstream from a road, backwater from the road during the pipeline design event should be considered when setting the bottom of pipe elevation. Additionally, if the road is designed for a smaller flood than the pipeline, the changes in hydraulic conditions at the pipeline as a result of the road wash-out should be considered (i.e., changes in location of the concentrated flow and the impact on erosion at the VSM). • Where an aboveground pipeline crossing is immediately downstream from a road, the impact of the road on where water would be flowing and the velocity of the water at the pipeline VSM should be considered. Additionally, if the road is designed for a smaller flood than the pipeline, the changes in hydraulic conditions at the pipeline as a result of the road wash-out should be considered (i.e., changes in the location of the concentrated flow and the impact on erosion at the VSM).	Yes	See Measure 6.
Water Resources	Breach ice road crossings sufficiently that ice from crossing would not contribute to ice jams or increase snow and ice blockage during spring breakup.	Yes	See Measure 7.
Water Resources	Avoid placing multi-season ice pads in floodplains (e.g., construction pads at the mine site).	Yes	See Measure 7.
Water Resources	Prior to HDD construction, provide a monitoring and response plan for determining if drilling mud is being lost to formation or making it to the river or groundwater during drilling.	Yes	See Measure 8.
Water Resources	Should any spills occur on the MTI, the affected gravel would be addressed immediately and removed prior to MTI abandonment.	No	The adopted module delivery option, Option 3, will not have an MTI.
Water Resources	If Option 1 or 2 is selected, place and maintain appropriate navigation aids on the MTI after it is decommissioned (the top of the MTI is expected to drop to or below the water surface)	No	The adopted module delivery option, Option 3, will not have an MTI.

Affected Resource(s)	Additional Suggested Avoidance, Minimization, or Mitigation	Mitigation Adopted (Yes or No)	Rationale For or Against Adoption
Water Resources	Provide annual surveillance of bridge, culvert, and pipeline river crossings to confirm that structures are functioning properly and provide maintenance as required.	Yes	See Measure 9.
Water Resources	Continue to collect baseline data regarding discharge, ice and liquid water conditions and distribution, and bank conditions on the Colville River near Ocean Point throughout winters every year until ice bridge construction so that an ice bridge plan can be drafted that would include exact crossing location for bridge and ramps, plans for flow and fish passage management (should they be needed), and actions to be taken at the end of ice bridge use (such as slotting). Prepare an adaptive management plan that provides detail regarding how any unanticipated surface water flow blockages would be identified and corrected as quickly as possible, to avoid lasting environmental impacts.	Yes	See Measure 10.
Water Resources	Include erosion mitigation features or options in engineering design of boat ramp(s) to prevent or minimize erosion potential at the boat ramp(s) and along adjacent riverbanks.	Yes	See Measure 11.
Water Resources	Develop a maintenance plan for the boat ramps to ensure long-term viability and use of the site(s) while minimizing impacts to the adjacent waterbodies. Include the following points at a minimum: • Identify entity responsible for site maintenance • Annual maintenance (grading) of parking pads, turning pads, access ramps, and road access • Maintain a gravel supply (off-site) to reinforce boat ramps and pads when necessary • Regular clean-up of pads and surroundings, including back-haul of trash to suitable disposal site	Yes	See Measure 11.
Water Resources	Before construction and continuing through operations, test and monitor freshwater sources that intersect the Project for hydrocarbons.	No	Water quality protection and monitoring is the purview of the ADEC. Testing and monitoring of all freshwater sources that intersect the Project is not reasonable and does not mitigate known Project effects.
Wetlands and Vegetation	If Alternative C or D is selected, monitor vegetation damage, and compression of soil and vegetation in annual resupply ice road footprint (footprints that are used consecutively each year). Because wetter landscapes show less impact from multiyear ice roads (Yokel, Huebner et al. 2007) and ADNR monitors only tussock tundra and soil compaction, this suggested measure would focus on non-tussock wetlands (including patterned ground) with a Cowardin water regime class of Temporarily Flooded, Saturated, or Seasonally Flooded Ground by vegetation type (total live cover of graminoid, shrub, forb, moss) and percentage of bare soil would be monitored with control points and points within ice road footprints to determine changes.	No	Alternative C or D was not selected. Selected Alternative does not have an annual ice road.
Wetlands and Vegetation	Use vehicle and equipment wash stations and inspect vehicles and equipment for organic matter (e.g., invasive species) prior to moving equipment west of the Colville River to reduce the risk of introducing invasive species. Clean tires and wheel wells so they are free from soils, seeds, and plant parts.	Yes	See Measure 12.
Wetlands and Vegetation	Provide stations to clean footwear and gear so they are free from soils, seeds, and plant parts.	Yes	See Measure 12.
Wetlands and Vegetation	Provide training to employees and contractors in identification, control, and prevention of known invasive plant species.	Yes	See Measure 12.
Wetlands and Vegetation	Confine loading and unloading of soils for gravel stockpiles to the downwind side of the pile; if piles would be on-site for longer periods of time, seed with appropriate vegetation to reduce wind erosion. Wind barriers (such as snow fences) may also be appropriate in some situations.	No	This mitigation would introduce new safety risks. Loading from the downwind side would impair the vision of the operator, expose the operator to breathing particulates, and would result in increased equipment maintenance (air intake). Revegetation can take several years to establish and would not provide protection from wind erosion in the short time period desired.
Fish	Identify overwintering fish habitat (maximum water depths, particularly free-water depth under ice cover) in the Itkillik River and other tributaries to the Colville River that might intersect the Option 3 ice road. Avoid crossings of potential overwintering habitat.	Yes	See Measure 13. Note that this measure was adopted, but limited to NPR-A, the only BLM-managed lands in the Project area.
Fish	Adopt best management practices suggested by NMFS for essential fish habitat for invasive species (Limpinsel, Eagleton et al. 2017): • Uphold fish and game regulations of the Alaska Board of Fisheries (AS 16.05.251) and Board of Game (AS 16.05.255), which prohibit and regulate the live capture, possession, transport, or release of native or exotic fish or their eggs. • Adhere to regulations and use best management practices outlined in the State of Alaska Aquatic Nuisance Species Management Plan (ADF&G 2002).	Yes	See Measure 14.
Fish	• Encourage vessels to exchange ballast water in marine waters (in accordance with the U.S. Coast Guard's voluntary regulations) to minimize the possibility of introducing invasive estuarine species into similar habitats. Ballast water taken on in the open ocean would contain fewer organisms, and these would be less likely to become invasive in estuarine conditions. • Discourage vessels that have not exchanged ballast water from discharging their ballast water into estuarine receiving waters.	No	These marine activities are outside BLM's direct jurisdiction, but the objective is addressed as part of the NMFS measures being adopted as part of the Section 7 consultation.
Birds	Locate mast poles away from the pad edge.	Yes	See Measure 15.
Birds	Implement lighting controls to turn off exterior lighting at satellite pads and other unoccupied facilities when personnel are not present, between August 1 and October 31.	Yes	See Measure 5.
Birds	Minimize the number of tall towers.	Yes	See Measure 15.
Birds	Limit water withdrawal to lakes without sensitive fish or breeding yellow-billed loons.	No	The State of Alaska regulates water withdrawal with restrictions on volumes of water removed. Proponent water withdrawals from yellow-billed loon lakes will be done in accordance with permitted ADNR- and ADF&G-authorized limitations.
Birds	Route ice roads around identified yellow-billed loon nesting sites and nesting lakes to avoid vegetation compaction at nesting sites and delayed melt-out of nesting lakes.	Yes	See Measure 16.

Affected Resource(s)	Additional Suggested Avoidance, Minimization, or Mitigation	Mitigation Adopted (Yes or No)	Rationale For or Against Adoption
Birds	Restrict speed limits to minimize collision hazard and dust production (35 miles per hour except in areas of congestion, on bridges, and on pads, which should be slower).	Yes	See Measure 15.
Birds	Haze birds out of the blast area before blasting (if resident birds are present in winter).	Yes	See Measure 16.
Birds	Minimize noise impacts between June 1 and July 15 when birds on nests would be unable to move away from the disturbance.	Yes	See Measure 16.
Birds	Minimize air traffic during the nesting period when the movements of incubating birds are restricted, and the molting period when birds may be energetically stressed and sensitive to disturbance.	No	ROP F-1 sufficiently protects birds from air traffic.
Birds	Avoid routine use of helicopters during drilling and operations activities to minimize noise and impacts related to birds.	No	ROP F-1 sufficiently protects birds from air traffic.
Birds	Consider revising traffic patterns, altitude, and location to minimize conflicts with molting geese.	No	There are no goose molting areas in NPR-A that would overlap with the selected project Alternative and Module Delivery Option.
Birds	Avoid preferred habitats, where possible.	No	Project facilities have been located to the extent possible to avoid preferred habitats of listed spectacled and Steller's eiders. Ice roads could be routed to avoid preferred habitats, but that would place them in moist and shrub habitats where ice roads cause more damage to vegetation. Because of the dispersion of preferred habitats with non-preferred habitats, it is not feasible to avoid overflying preferred habitats. Flight altitude restrictions (1,500 feet above ground level) reduce disturbance to nesting birds.
Birds	Minimize barge and support vessel speed to reduce potential for bird strikes.	Yes	See Measure 15.
Birds	Complete upgrades to the Kuparuk gravel road system involving wetland fill before or after the nesting season (June 1 through July 31), if possible.	No	The Kuparuk gravel road system is outside of NPR-A and not managed by BLM.
Terrestrial Mammals	ROP E-6 describes requirements related to caribou ramps over pipelines or buried pipelines. The Project could designate specific locations for these, such as northeast of the airstrip in Alternative B, or areas where caribou movements could be funneled or where roads and pipelines would be close together. The decision to add a crossing ramp over a buried pipeline should consider potential negative effects of reduced access to the pipeline for oil spill detection and response and thermokarst or changes in surface flow due to the resulting long-linear ditch that would fill with water.	Yes	See Measure 17.
Terrestrial Mammals	Install game cameras to study the effectiveness of measures used to reduce vehicle traffic impacts, such as stopping traffic or caravanning.	No	This method of monitoring is expensive and labor-intensive and has not been shown to be effective in this area, as cameras would capture thousands of pictures of tundra for every picture of caribou and data typically yield results that are difficult to tie to definitive conclusions.
Terrestrial Mammals	Include the following in the vehicle use plan to minimize traffic impacts (plan is required as per ROP M-1): • Require vehicles to stop traffic when 25 or more caribou appear to be approaching the road. • Require vehicles to caravan or require periodic traffic closures when groups of caribou are near a road and the road has traffic rates of more than 15 vehicles per hour. Caravanning has limited ability to lower calving displacement (Lawhead, Prichard et al. 2004), but it may increase crossing success on roads with high traffic levels (more than 15 vehicles per hour) by providing periods without traffic to allow caribou to cross. It may be easier logistically to close the road for a specified number of hours a day (as determined by BLM) rather than caravanning. Spring, fall, and winter would likely be the periods of greatest concern for caribou crossing Project roads.	No	NSB Rezoning Condition of Approval 3 already requires that a Vehicle Use Plan be developed for the Willow project. The plan requires vehicles to stop when groups of 10 or more caribou are approaching the road. This is a reduction from 25 as required in the 2020 Willow ROD. The plan also incorporates seasonal speed limitations during caribou calving season and the fall migration season as well as other measures to limit traffic on roadways.
Terrestrial Mammals	Restrict Q400 traffic between Alpine and Willow at certain times of year to reduce impacts to caribou.	Yes	See Measure 18.
Terrestrial Mammals	Require the use of propylene glycol for deicing and for vehicle cooling systems, which is not toxic to wildlife.	Yes	See Measure 19. Note that propylene glycol would be used for deicing but cannot be used in some vehicle cooling systems per manufacturer specifications. Potentially toxic chemicals used by equipment fleets are managed according to EPA and ADEC requirements.
Subsistence and Sociocultural Systems	Inform employees who are North Slope residents of company subsistence leave policies and ensure that leave policies are flexible to account for annual variation in the timing and length of subsistence activities.	No	Lessee leave policies are outside of BLM's jurisdiction.
Subsistence and Sociocultural Systems	Employ subsistence representatives who receive daily communications on Project activities and report potential conflicts with subsistence users. Subsistence representatives should be provided with clear communication protocols and training, be local and knowledgeable residents, and be included in field activities the community believes have a high potential of conflicting with subsistence uses (e.g., helicopter-based surveys).	No	ROP H-1 sufficiently meets the objective to prevent unreasonable conflicts between subsistence users and other activities.
Subsistence and Sociocultural Systems	In coordination with local organizations, such as the KSOP (required in CPAI design measure 68), ensure communications include the timing and location of development activities such as air traffic, blasting, and other construction activities.	No	ROP H-1 sufficiently meets the objective to prevent unreasonable conflicts between subsistence users and other activities.
Subsistence and Sociocultural Systems	Identify areas with high drifted snow accumulation along pipelines after construction and implement a snow management program to clear drifts and create access points (i.e., openings) in areas where drifts accumulate for a long distance (e.g., quarter- and half-mile lengths) along pipelines. Consult with Nuiqsut residents on an appropriate distance for cleared access areas as well as the depth of snowdrifts that impede travel under pipelines.	No	Pipelines 7 feet and higher, as proposed for Willow, rarely (if ever) create drifts large enough to prevent movement.
Subsistence and Sociocultural Systems	As part of the Subsistence Plan (required in ROP H-1) and as part of the Proponent's notification and consultation with Alaska Native groups (ROP H-1), provide equal opportunities for various local entities (e.g., KSOP, NVN, City of Nuiqsut, Kuukpik), in addition to knowledgeable subsistence users, to provide input.	No	ROP H-1 sufficiently meets the objective to prevent unreasonable conflicts between subsistence users and other activities.
Subsistence and Sociocultural Systems	Continue to consult with local subsistence users and community organizations regarding the appropriate design and location of subsistence boat ramps, pullouts, and subsistence tundra access ramps. Consult with other operators regarding other boat ramp projects on the North Slope that may inform future designs.	Yes	See Measure 21.

Affected Resource(s)	Additional Suggested Avoidance, Minimization, or Mitigation	Mitigation Adopted (Yes or No)	Rationale For or Against Adoption
Subsistence and Sociocultural Systems	Participate in Conflict Avoidance Agreements with the Alaska Eskimo Whaling Commission to reduce potential impacts on bowhead whale hunting resulting from barge and vessel traffic.	No	ROP H-1 sufficiently meets the objective to prevent unreasonable conflicts between subsistence users and other activities. BLM does not have the authority to require an applicant to hire locals.
Subsistence and Sociocultural Systems	Work with community organizations to establish measures to reduce impacts of vehicle traffic on subsistence activities, particularly during the Project's construction phase.	No	ROP H-1 sufficiently meets the objective to reduce impacts of vehicle traffic on subsistence activities.
Subsistence and Sociocultural Systems	Install traffic control signs (e.g., stop signs) to halt industry vehicle traffic at all subsistence access ramps to ensure that subsistence users can cross safely	No	Establishing an expectation in the minds of subsistence users that industrial size vehicles will stop for them would create an extremely hazardous situation biased dangerously against the safety of the subsistence user.
Subsistence and Sociocultural Systems	Place development-free buffer around Native Allotment be at least 1 mile to ensure the viability of the allotment for subsistence use. Exceptions would be made for allotment owners who agree to having development closer than 1 mile.	No	Setbacks are already addressed at the plan level in the NPR-A Integrated Activity Plan. Measure does not mitigate Project specific impacts.
Environmental Justice	Continue to use the KSOP to maintain meaningful engagement in the Project and identify continuing concerns and specific Project impacts.	No	ROP H-1 sufficiently meets the goal of maintaining meaningful engagement in the Project by the community and to identify continuing Project concerns.
Environmental Justice	Attend government to government meetings between NVN and BLM, as requested by NVN or BLM, to discuss issues and resolution strategies through construction and operations.	Yes	See Measure 22.
Public Health	Limited health data are available for Nuiqsut. The best data available date from the NSB's 2010 survey. Funding a collection of health information for Nuiqsut and studies of contaminant levels in local subsistence resources would provide better data for evaluation of potential health effects associated with oil field development and operation.	No	Public health monitoring is the purview of the State of Alaska and NSB and would require handling of sensitive information protected under Health Insurance Portability and Accountability Act.
Public Health	Create a public health monitoring program at a regional level to track health indicators that are vulnerable to impacts from oil and gas activities. These indicators should focus on health outcomes and/or determinants of local concern that can be tied to oil and gas activity. Where possible, indicators should include threshold levels and specific actions should be developed for when thresholds are surpassed. The State should be responsible for the development and implementation of the monitoring program; however, the NSB and the Alaska Native Tribal Health Consortium should be consulted in the identification of appropriate indicators, thresholds, and responsive actions.	No	Public health monitoring is the purview of the State of Alaska and NSB and would require handling of sensitive information protected under Health Insurance Portability and Accountability Act.
Public Health	Establish a Nuiqsut public health coordination group to conduct health education and engage the community in the public health monitoring program described above.	No	Establishing a public health coordination group would be the proper role of the State of Alaska; it is beyond the expertise of BLM, which is not a public health agency.

Note: ADEC (Alaska Department of Environmental Conservation); ADNR (Alaska Department of Natural Resources); BLM (Bureau of Land Management); CPAI (ConocoPhillips Alaska, Inc.); EIS (Environmental Impact Statement); EPA (U.S. Environmental Protection Agency); HDD (horizontal directional drilling); KSOP (Kuukpik Subsistence Oversight Panel); Kuukpik (Kuukpik Corporation); MTI (module transfer island); NMFS (National Marine Fisheries Service); NPR-A (National Petroleum Reserve in Alaska); NSB (North Slope Borough); NVN (Native Village of Nuiqsut); ROP (required operating procedure); VSM (vertical support member); WSE (water surface elevation).

Table 4.2 Cooperating Agency Suggested Mitigation Measures for the Willow MDP Supplemental Environmental Impact Statement

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
1	All	Provide time between development projects to observe impacts and changes to baseline conditions. Observations from developed projects may result in additional NEPA review and analysis, changes to proposed projects (including phases), and/or new mitigation measures.	Proposed projects that would have a gravel footprint exceeding 300 acres would be limited to developing no more than 65% of the proposed project before instituting a minimum 2-year pause to observe project impacts (e.g., permafrost, hydrology, caribou, subsistence). The authorized officer will be responsible for determining the need for permit review based on the monitored findings.	No	This measure does not mitigate known project effects. Establishment of a mandatory pause in development is arbitrary and could unnecessarily extend the duration of project impacts. Monitoring of project impacts to resources including permafrost, hydrology, caribou, and subsistence is required under existing required operating procedures and lease stipulations within the NPR-A as well as NSB Rezone Mitigation Measures and Conditions of Approval. The BLM may voluntarily conduct additional analysis of any project if it is determined that a change in conditions warrants reanalysis.
2	All	Provide time before the construction of Project drill site BT5 is authorized to observe overall project impacts and changes to environmental baseline conditions.	Drill site BT5 and the gravel roadway to BT5 will not be authorized for construction for three years after the construction of the Project's other three drill sites is complete.	No	The selected alternative, Alternative E, as modified, disapproves construction of BT5.
3	Socioeconomics; Environmental justice	Provide Nuiqsut with a guaranteed minimum proportion of the impact mitigation fund as the Nuiqsut is the community most directly impacted by oil and gas development.	The NPR-A Impact Mitigation Fund will direct a minimum of 15% of the grant funding to the City of Nuiqsut. This direct funding would not prevent Nuiqsut from applying for grants from the NPR-A Impact Mitigation Fund.	No	The BLM does not have the authority to direct grant funding allocations from the NPR-A Impact Mitigation Fund. The NPR-A Impact Grant Program is managed by the Alaska State Department of Commerce, Community and Economic Development.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
4	Socioeconomics; Public health	Provide additional resources to Nuiqsut to support search and rescue efforts. With expanded oil and gas development, many Nuiqsut residents travel further from the village to pursue subsistence opportunities. This expanded range strains the current search and rescue program in the community.	CPAI will provide Nuiqsut $250,000 for search and rescue equipment and operations with the start of Project construction (i.e., gravel placement). CPAI will provide a second $250,000 payment to Nuiqsut for additional search and rescue equipment following commissioning of the Willow processing facility.	No	This measure does not mitigate known project effects. CPAI has voluntarily committed to engage with the Nuiqsut search and rescue group to identify opportunities for CPAI to support them with equipment needs or equipment staging. CPAI will continue to support the Nuiqsut Community Development Foundation which supports the City of Nuiqsut in obtaining and managing grants for community needs, such as search and rescue.
5	Caribou; Subsistence	Reduce the amount of equipment traveling on Project roads at specific times to reduce impacts to caribou and subsistence users.	Install caribou monitoring stations that use real time caribou GPS telemetry data (i.e., caribou collars) and manage road use for successful caribou passage. The applicant and BLM will consult with the NSB wildlife department and ADF&G caribou experts to identify the minimum percentage of the Teshekpuk Caribou Herd that should have active GPS telemetry collars and the caribou density and distance from Project roads that will initiate traffic restrictions.	No	It is not possible to obtain real time location data from GPS telemetry collars due to satellite upload times which create an average lag of between 1 and 4 days between data upload and database download. As such, it is not reasonable to rely upon GPS collar data alone to establish traffic restrictions. NSB Rezoning Required Measure 13 requires CPAI to assist ADF&G or the NSB Division of Wildlife Management in the collection of GPS telemetry data in support of analyzing the distribution and movements around the Willow Project area to assess and reduce impacts from Project activities. Implementation of this measure and the Vehicle Use Plan required under NSB Rezoning Condition of Approval 3 sufficiently meets the objective to reduce the amount of equipment traveling on Project roads to reduce impacts to caribou and subsistence users.
6	Caribou; Subsistence	Reduce impacts to calving caribou (approximately May 20 through June 20).	Outdoor construction activity (e.g., gravel working, building fabrication) will be halted during caribou calving season when calving caribou are within 1 mile of the activity. Drilling and operations activity will be minimized at drill site pads during caribou calving season to the extent that is safely practicable; new activities (e.g., initiating drilling for a new well, hydraulic fracturing) will not be initiated at drill sites during this time.	No	Stopping activity after caribou are observed within 1 mile would not substantially minimize impacts to calving caribou. Caribou will generally be at lower than expected densities within approximately 4 kilometers (2.5 miles) of roads during calving so few calving caribou would be expected within 1 mile of active roads unless activity is already halted. Requirements to limit or prohibit activities during caribou calving season were contemplated and addressed in the 2020 NPR-A IAP/EIS under ROP K-9, the provisions of which apply to the TLCHA. The geographic boundary of the TLCHA was established in the 2022 NPR-A IAP/ROD. No Willow project activities would occur within the TLCHA. There are no impacts unique to this project that warrant expansion of the geographic scope of ROP K-9.
7	Air quality; Public health; Environmental justice	Collect air quality monitoring data in the immediate area of development, between Nuiqsut and the Willow Project, to confirm the Project is operating at anticipated emissions levels (i.e., as modeled) and provide a record of regulatory emissions violations.	Install air quality monitoring stations at a predominantly down-wind location on a gravel pad used to directly support drilling or operations (e.g., drill site pad, processing facility pad). One air monitoring station will be required for every five drill site pads or single processing facility, per development project. This data will be collected and be made publicly available in real time through the North Slope Science Initiative website.	Yes	See Measure 23.
8	Caribou	Limit overall activity or minimize air traffic at specific times to reduce impacts to caribou.	ROP F-1 requires the use of an Aircraft Use Plan. The plan will include the following: • Minimize Q400 traffic between Alpine and Willow during calving (May 20 to June 20) to reduce impacts to caribou. Q400 traffic between Willow and Kuparuk or Deadhorse is necessary and would be allowed. • Plans to minimize the disturbance to calving caribou (description of areas avoided, how flight numbers were minimized, and that low altitude flights were avoided or limited).	Yes	See Measure 18.
9	Subsistence	Maintain subsistence ramp access, including pullout surface area, free of obstructions, including equipment and material storage.	Materials and equipment shall not be staged on gravel road pullouts or in such a way as to block subsistence ramps or the roadway view for subsistence ramp users. Safe access to subsistence ramps will be maintained. Operators will incorporate staff training on the importance of maintaining clear and safe areas around pullouts and subsistence ramps into their orientation and safety programs. Operators will install signs at roadway pullouts stating, "Equipment and Materials Shall Not be Staged Here".	Yes	See Measure 21.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
10	Water resources; Wetlands and vegetation; Fish; Birds; Terrestrial mammals; Marine mammals; Subsistence	Dispose all Project waste properly and in a timely manner.	Waste management plans shall specify the intervals for total site cleanup at areas of activity. Cleanup intervals will not exceed 72 hours during periods of activity, including on Project pads.	No	ROP A-2 sufficiently meets the objective to dispose of all Project waste properly and in a timely manner. During construction and operations activities clean up intervals typically do not exceed 24 hours.
11	Birds	Further reduce impacts to nesting Yellow-billed loons from vehicle traffic.	In areas where roads cross through Yellow-billed loon nesting buffers, maximum vehicle speeds will be restricted to 25 mph within the buffer zone during the nesting season (approximately June 1 through July 31). These speed limits will be prominently signed during this period.	Yes	See Measure 15. Note that the speed limit as adopted is 35 mph year-round on gravel roads, not just during nesting season. While it is possible that reducing the speed limit to 25 mph would further reduce the risk of vehicle/bird collisions, such occurrences would be very rare.
12	Climate change	To minimize or avoid environmental harms caused by greenhouse gas emissions and ensure NEPA adequacy over the life of the Project. Analysis by the EPA indicates that with technological advances and new data provided by infield drilling following a development and production environmental impact statements, more petroleum hydrocarbons are often extracted from the target reservoir than originally estimated. This results in more greenhouse gas emissions produced than estimated or disclosed to the public.	A NEPA adequacy review will be completed if the barrels per day gross annual average is greater than 10% of the original barrels per day production target (disclosed in the development's most recent NEPA document) over a two-year period; or when the cumulative recovered reserves are greater than 10% of the original estimated recoverable reserves (disclosed in the development's most recent NEPA document).	No	This measure would provide no additional reduction of known Project effects. The requirement for compliance with the National Environmental Policy Act arises when there is a proposal for a major Federal action. The suggested points of re-analysis are not tied to specific BLM action; therefore, no additional NEPA would be required by regulation. However, BLM may voluntarily conduct additional analysis if it is determined that a change in conditions warrants reanalysis.
13	Water resources; Wetlands and vegetation; Fish	Protect surface waters in the Project area through monitoring and mitigation.	The Project will include an adaptive management plan "that provides detail regarding how any unanticipated surface water flow blockages would be identified and corrected as quickly as possible, to avoid lasting environmental impacts" for monitoring and mitigation of potential surface water flow impacts throughout the project area.	No	Measure 6 as adopted in this ROD ensures that culverts, bridges, and pipeline stream crossings are designed in such a manner as to reduce unanticipated surface water flow blockages. Special Condition 11 of the USACE Section 404 permit requires that the natural drainage patterns be maintained along access roads and pads, and if there is evidence of altered hydrology (such as excessive ponding, drying, channelization), CPAI is required to restore hydrology to preconstruction conditions. Adherence to this measure and condition sufficiently meets the objective.
14	Water resources	Protect and minimize impacts to surface waters at Ocean Point and across the Project area.	The Project will include an adaptive management plan for the Colville River crossing activity at Ocean Point.	Yes	See Measure 10.
15	Water resources; Wetlands and vegetation; Fish	Minimize floodplain impacts where gravel roads, pads, or boat ramps may block or restrict the flow of surface waters during spring breakup through timely detection and corrective action.	The Project will prepare an adaptive management plan to address potential floodplain impacts where gravel roads, pads, or boat ramps may block or restrict the flow of water during spring breakup. The adaptive management plan will provide methods for detecting and correcting unanticipated blockages before they lead to further environmental degradation. The adaptive management plan will address the potential for spring breakup surface waters to: • Increase the depth and duration of water impoundment • Increase thermokarsting • Cause a change in flow direction • Cause channel instability or a change in alignment • Result in erosion of the tundra or a stream channel • Result in the deposition of sediment on the tundra or in a stream channel	No	Measure 6 as adopted in this ROD ensures that culverts, bridges, and pipeline stream crossings are designed in such a manner as to reduce unanticipated surface water flow blockages. Special Condition 11 of the USACE Section-404 permit requires that the natural drainage patterns be maintained along access roads and pads, and if there is evidence of altered hydrology (such as excessive ponding, drying, channelization), CPAI is required to restore hydrology to preconstruction conditions. Adherence to this measure and condition sufficiently meets the objective.
16	Water resources; Wetlands and vegetation; Fish	Minimize impacts to the water levels of Willow Creek 3 and Lake M0015 resulting from the construction of the constructed freshwater reservoir.	CPAI will collect stage monitoring data for Willow Creek 3 and Lake M0015 during ice-free periods for three consecutive years prior to the start of construction of the constructed freshwater reservoir (under Alternatives B, C, and D). This information will be used to ensure adequate water levels are maintained during the filling and operations of the constructed freshwater reservoir.	No	The selected Alternative does not include construction of a constructed freshwater reservoir.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
17	Climate change; Permafrost; Water resources; Wetlands and vegetation	Minimize the potential impacts of thawing and thermokarst from climate change on Project structures, including roads, pads, and the constructed freshwater reservoir to protect the TLSA.	CPAI will prepare an adaptive management plan that will be responsive to climate change by monitoring and mitigating potential thawing and thermokarst impacts on all Project structures including roads, pads, and the constructed freshwater reservoir.	No	Monitoring for thawing and thermokarst impacts to project infrastructure is a requirement of CPAI's road maintenance approach. In addition to CPAI monitoring obligations, BLM maintains its own soil/snow monitoring network within NPR-A which is used to consistently monitor conditions for the duration of the winter development season. BLM releases a weekly, publicly viewable, report with soil temperature and snow depth data which is shared with industry, other agencies, and the public. BLM also conducts annual, winter and summer, inspections of ROWs permitted in NPR-A with a heightened emphasis placed on winter road construction and observable vegetative recovery. Industry also conducts its own geotechnical analysis for new development proposals. These analyses allow for identification of site-specific issues such as thaw unstable soils and are used for both routing and engineering design. Implementation of these efforts sufficiently meets the objective.
18	Public health; Environmental justice	Collect health baseline data for a Community Health Study what will inform evaluation of potential health effects associated with oil and gas developments.	Fund the collection of baseline health information on Nuiqsut residents and a Community Health Study that studies contaminant levels in local subsistence resources. The study shall include a section on potential trends that may have occurred in local health during the Covid-19 activity slowdown in 2020.	No	Public health monitoring is the purview of the State of Alaska and NSB. ROP A-11 requires baseline studies and monitoring of contaminants in local subsistence foods such that the objective is sufficiently met.
19	Air quality; Climate change; Public health; Visual resources	Reduce the concentration and/or intensity of flaring near Nuiqsut.	CPAI will prepare a coordination plan between the Kuparuk, Alpine, and Willow developments to minimize the use flaring across all three developments and to reduce the incidences of multiple facilities flaring simultaneously. When simultaneous flaring must occur, the length of flare overlap shall be minimized to the greatest extent possible.	No	In accordance with Design Measure 121, flaring for the Willow project is conducted to support process safety only (no flaring is to be conducted for production). As such, it would not be feasible for the BLM to set arbitrary limits on flaring timing, as that would present a safety risk and be completely unworkable. Flaring occurrences for wells within the NPR-A are monitored by the BLM. Flaring is regulated through the Notice to Lessees (NTL-3) along with reporting requirements for undesirable events which includes venting and flaring and the cause of release. BLM reviews and evaluates these reports to ensure no undue discharge is occurring. Note that Kuparuk is not located within the NPR-A and is therefore outside of the BLM 's jurisdiction.
20	Environmental justice	Improve local understanding and knowledge of traditional and scientific principles related to the oil and gas industry for school age children in Nuiqsut.	Fund traditional and western scientific education programs in Nuiqsut schools to help inform and improve the community's understanding of the oil and gas industry development and its associated impacts.	No	Consistent with Design Measure 74, CPAI will continue its internship program (CareerQuest) to introduce Nuiqsut high school students to jobs and careers in the oil field and in their community. As such, implementation of Design Measure 74 sufficiently meets the objective.
21	Fish; Birds; Terrestrial Mammals; Marine Mammals; Subsistence; Environmental justice; Cultural resources	Utilize local knowledge by including community members (e.g., elders, tribal council members, hunters, NSB wildlife experts) when conducting studies and Project planning.	Include local advisors (e.g., elders, tribal council members, hunters, NSB wildlife experts) as team members when conducting studies, identifying historic sites, and completing Project planning.	No	ROP H-1 and Design Measures 68 and 69 require continued consultation with local communities concerning subsistence use. NSB Rezoning Required Mitigation Measure 38 requires engagement of the NSB Iñupiat History, Language and Culture in the identification of historic sites. NSB Rezoning Required Mitigation Measure 3 requires that CPAI consult with NSB, NVN, Kuukpik, and KSOP at least annually concerning ongoing project activities, plans, and impacts. Implementation of these measures sufficiently meets the objective to utilize local knowledge when conducting studies and Project planning.
22	Fish; Birds; Terrestrial Mammals; Marine Mammals; Subsistence; Environmental justice;	Provide the community with information on the health of local subsistence resources.	Fund an NSB wildlife biologist position stationed in Nuiqsut to help the community and NSB monitor wildlife health and provide the community information on the safety of consuming subsistence resources.	No	NSB Rezoning Required Measure 37 requires that CPAI hire a year-round subsistence representative. This, in combination with the requirements of ROP A-11 and ROP H-1 sufficiently meets the objective.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
23	Subsistence; Public health	Improve the design and deployment of subsistence access ramps so they are safe and effective for community members.	Develop an adaptive management plan for subsistence access ramps that considers community input for improvements to subsistence ramp design and to address modifications of existing subsistence ramps. New subsistence ramps will be placed at a minimum of 1 ramp for every 3 miles of new gravel road. CPAI will meet with the community of Nuiqsut to establish subsistence ramp design parameters to ensure the designs are adequate for users. Design parameters will include a minimum length "landing ramp" at the top that is level and long enough to accommodate snow machines pulling sleds without sleds having to enter the associated pullout or adjacent road. The design parameters will set a maximum grade of the ramps. The subsistence ramp pullouts will be signed that materials and equipment are not to be stored at pullouts. Warning signs will be placed on the adjacent roadway approaching the subsistence ramp/pullout to warn drivers of the potential for vehicles (e.g., snowmachines, all-terrain vehicles) crossing the road. Subsistence ramp locations will be made available to local search and rescue groups (e.g., Nuiqsut, NSB) as GPS coordinates and on published maps.	Yes	See Measure 21. Note that selected Alternative will include five vehicle turnouts/ subsistence ramps for approximately 25.8 miles of new gravel road. The occurrence of these ramps may not necessarily be one within every three miles due to limitations of geography or sensitive surface values.
24	Gravel	Support the local community's needs for gravel infrastructure maintenance.	Provide Nuiqsut gravel to support road maintenance, specifically the subsistence access road.	No	This measure does not mitigate known project effects. Consistent with the provisions of 43 CFR 3600, the BLM cannot compel the holder of a mineral sales contract to provide gravel resources to users other than the contract holder.
25	Air quality; Fish; Birds; Terrestrial mammals; Marine mammals; Subsistence; Public health; Environmental health	Collect additional air pollutant data in Nuiqsut and make the data available to the public.	Expand the air monitoring capabilities in Nuiqsut to include monitoring for hazardous air pollutants, volatile organic compounds, and polycyclic aromatic hydrocarbons. The measured concentrations will be made available in near real time for the community and the public at large.	Yes	See Measure 23.
26	Terrestrial mammals; Subsistence	Reduce caribou deflection.	Aboveground pipelines shall have a nonreflective finish.	No	Design Measure 59 requires the use of non-reflective finishes on pipelines.
27	Wetlands and vegetation; Fish; Birds; Terrestrial mammals; Marine mammals; Subsistence; Public health; Environmental health	Test local subsistence resources for contamination.	Provide periodic testing of consumable subsistence resources for contamination. Testing frequency and the number of samples tested per testing interval will be determined in consultation with the community of Nuiqsut.	No	ROP A-11 sufficiently meets this objective.
28	Air quality; Public health; Environmental justice	Provide independent oversight and management to the air quality monitoring station in Nuiqsut.	CPAI shall fund the Nuiqsut air quality monitoring station. A third-party contractor will be identified to operate and maintain the station. The third-party contractor will develop a training program open to Nuiqsut residents for operating and maintaining the monitoring station, with appropriate technical oversight completed by the contractor.	No	CPAI currently owns and operates the air quality monitoring station in Nuiqsut. Lessee hiring and staffing directives are outside of the BLM's jurisdiction.
29	Subsistence	Provide local subsistence oversight of all field activity being conducted in support of the Project.	A subsistence representative shall be present whenever field activity is occurring, including having representatives scheduled to cover day and night work shifts. Subsistence representatives are to be included in all field activities conducted in support of the Project.	No	NSB Rezoning Required Measure 37 requires that CPAI hire a year-round subsistence representative. Lessee staffing directives are outside of the BLM's jurisdiction.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
30	Air quality; Water resources; Wetlands and vegetation; Fish; Birds; Terrestrial mammals; Marine mammals; Subsistence; Public health; Environmental justice	Actively monitor for pollution indicators in the environment for the duration of the Project and modify Project activities as needed to address found contamination.	Develop an ongoing contamination study program (e.g., snow sampling, fish sampling) and adaptive management plan to address found contamination. Any contamination found in excess of State or EPA levels will be reported to ADEC within 72 hours of being determined.	No	ROP A-11 sufficiently meets this objective. Establishing thresholds for contamination reporting is outside of the jurisdiction of the BLM as it is not a public health agency.
31	Air quality; Water resources; Wetlands and vegetation; Fish; Birds; Terrestrial mammals; Marine mammals; Subsistence; Public health; Environmental justice	Monitor for and minimize impacts from hydraulic fracturing or underground injection control disposal well operation.	Monitor water quality, permafrost, and vegetation near sites where hydraulic fracturing or deep well injection (i.e., underground injection control wells) are occurring for potential contamination or unanticipated impacts. Develop an adaptive management plan that outlines how impacts would be analyzed and potentially addressed.	No	ROPs A-2, A-3 and A-4 sufficiently meet the objective by ensuring appropriate measures are in place to prevent contamination and requiring appropriate response to occurrences of contamination.
32	Wetlands and vegetation	Protect vegetation along ice road routes.	Monitor vegetation along ice road footprints for vegetation damage and compression of soil and vegetation. Because ADNR monitors only tussock tundra and soil compaction, this measure focuses on non-tussock wetlands (including patterned ground) with a Cowardin water regime class of Temporarily Flooded, Saturated, or Seasonally Flooded Ground by vegetation type (total live cover of graminoid, shrub, forb, moss). Additionally, the percentage of bare soil would be monitored with control points and points within ice road footprints to determine changes.	No	Existing requirements under ROP C-2 and NSB Rezone Required Measure 46 and 48 ensure that ice roads shall be designed to minimize impacts to vegetation. The NSB also requires monitoring of ice road impacts such that the objective is sufficiently met.
33	Water resources; Wetlands and vegetation; Fish; Birds; Terrestrial mammals; Marine mammals; Subsistence; Environmental Justice	Provide the Nuiqsut community with a level of control and oversight on baseline studies to Nuiqsut.	The community of Nuiqsut shall be involved in the development of studies in the Project area, from study design to implementation. CPAI shall present planned studies (e.g., study requirements, methodology, timing) to the community and incorporate feedback as practicable. CPAI will provide regular updates to the community about ongoing studies and study planning.	No	ROP H-1 and Design Measures 68 and 69 require continued consultation with local communities concerning subsistence use. NSB Rezoning Required Mitigation Measure 38 requires engagement of the NSB Iñupiat History, Language and Culture in the identification of historic sites. NSB Rezoning Required Mitigation Measures 3 requires that CPAI consult with NSB, NVN, Kuukpik, and KSOP at least annually concerning ongoing project activities, plans, and impacts; per NSB Rezone Required Measure 8 CPAI will consult with KSOP on all study designs prior to submittal to the NSB. NSB Rezone Required Measure 12 requires that to the extent practicable, CPAI will involve students from Nuiqsut or other local communities in studies. Implementation of these measures sufficiently meets the objective. Environmental studies are published online at https://northslopescience.org/ and updates on ongoing studies are provided on at least an annual basis.
34	Subsistence	New bridges will not interfere with subsistence activity.	CPAI shall consult with Nuiqsut on the design of proposed Project bridges to ensure they provide adequate clearances and safe passage for boaters traveling along waterways.	Yes	See Measure 21. Note that all Willow bridges have been designed to facilitate boater passage.
35	Socioeconomics	Protect oilfield workers from retaliation for reporting on-the-job issues.	CPAI shall institute whistleblower protections for CPAI employees or their contractors who report violations to company policy, regulatory requirements, or state and local laws.	No	This measure is not within the proper jurisdiction of BLM to enforce and would duplicate requirements of existing law.
36	All	Provide adequate agency (State of Alaska and the NSB) oversight of Project construction and operations to ensure permit compliance.	BLM shall coordinate with the State of Alaska and the NSB to provide an adequate number of inspectors on site during construction and operations of the Project to ensure the project is in compliance with its permits. CPAI shall provide site access and accommodations to the required inspection staff.	No	This measure does not mitigate known project effects. CPAI is required to provide reasonable access for all BLM inspection needs.
37	Subsistence	Identify important inter-community subsistence areas.	CPAI shall conduct at least two multi-village workshops during project development to identify important inter-community subsistence areas. The communities included for the Project are at a minimum: Nuiqsut, Utqiaġvik, Anaktuvuk Pass, and Atqasuk.	No	ROPs E-1, H-1 in combination with implementation of Design Measures 68 and 69 sufficiently meet the objective.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
38	Fish; Terrestrial mammals; Subsistence	Determine potential impacts mine site blasting has on fish returns and caribou migration.	Develop and conduct a study to monitor for and determine potential impacts that may occur to fish returns and caribou migration from mine site blasting.	No	ROP H-1 and NSB Rezone Required Measures 13 and 21 requires monitoring studies of project impacts to caribou and fish within the Willow area. Implementation of these measures sufficiently meets the objective.
39	Water resources; Wetlands and vegetation; Fish; Birds; Terrestrial mammals; Marine mammals; Subsistence	Determine if contaminants potentially migrate off the drill site BT2 North pad.	Institute a monitoring program for drill site BT2 to determine if contamination migrates off the gravel pad. Monitoring shall include water, snow, soil, and vegetation sampling. Any contamination found in excess of State or EPA levels will be reported to ADEC within 72 hours of being determined.	No	ROPs A-2, A-3 and A-4 sufficiently meet the objective by ensuring appropriate measures are in place to prevent contamination and requiring appropriate response to occurrences of contamination. These ROPs are required for all Project activities. All instances of reportable spills (required by 40 CFR 300.125 and Alaska Administrative Code 75.300) must be made to the BLM no later than 24 hours after the occurrence. Additionally, water quality monitoring is the purview of the ADEC.
40	Subsistence; Public health	Nuiqsut residents must rely on imported foods to a greater extent when subsistence resources are negatively impacted by oil and gas development. Protect imported food supplies during transit through Utqiaġvik and Deadhorse to Nuiqsut.	Imported foods are frequently stored improperly and are damaged or ruined prior to arrival in Nuiqsut. CPAI shall pay to construct food storage facilities at airports in Deadhorse and Utqiaġvik to protect perishable goods from precipitation, freezing, spoiling, and wildlife.	No	This measure does not mitigate known Project effects. The condition of food storage at airports is outside of the BLM's jurisdiction.
41	Socioeconomics; Environmental justice	Provide laboratory testing in Nuiqsut for standard testing protocols to avoid having to send samples for testing to Utqiaġvik, Fairbanks, or Anchorage.	Construct and operate an environmental testing laboratory in Nuiqsut.	No	This measure does not mitigate known project effects. Most samples are currently processed in at a lab in Prudhoe Bay with samples requiring more sophisticated testing technology sent to Anchorage or Fairbanks. It is not reasonable or necessary to process all environmental tests in Nuiqsut.
42	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns.	Restrict noise (e.g., limit drilling, limit construction activity) when caribou are present during the calving and migration periods. When noise is unavoidable, avoid abrupt sounds. A steady drone of noise is easier for caribou to acclimate to, so consider adding a white noise generator if necessary to lessen abrupt sounds.	No	A white noise generator would be additive to project sounds and would increase overall project noise impacts on all resources, including caribou, and communities. Use of a white noise generator to mask louder noise impacts to wildlife has not been tested.
43	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns.	Limit the overall activity, including outdoor foot traffic, and minimize air traffic at specific times to reduce impacts to caribou (especially during calving and migration periods).	Yes	See Measure 18 (air traffic). Vehicle traffic is minimized in accordance with the Vehicle Use Plan as required by NSB Rezoning Condition of Approval 3. At all times, harassment of caribou using vehicles is prohibited under ROP M-1 and consistent with CPAI policy. Impacts to caribou from foot traffic associated with project activities is expected to be minimal; therefore, no specific measure to minimize foot traffic is needed.
44	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns.	Minimize visual impacts by fencing or otherwise camouflaging or screening pads and areas that have the most activity and movement. Caribou are more likely to turn away from movement than from structures perceived as stationary objects. Caribou also react more strongly and habituate less readily to foot traffic than to vehicle traffic	No	The use of fencing/ screening around project infrastructure is not practicable for the following reasons: • Size of pads would need to increase to account for screening thereby increasing impacts to tundra and surface waters. • Screening would hamper moving equipment. • Screening would create snow drifting and hinder snow removal. • The Arctic Coastal Plain is very flat and structures are tall so screening would need to be on top of the pads and be very tall to be effective. • The Arctic Coastal Plain has high winds so screening would require significant structural elements.
45	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns.	Protect hunting success versus biological success by: • Reducing the number of animals required to halt traffic ("let the lead caribou cross"). • Limiting traffic during the fall hunting period (approximately September 15 through October 15) and incorporate local recommendations for the timeframe. • Following the Red Dog Mine model for caribou crossings. • Use recommendations from the subsistence committee. • Stopping traffic as soon as caribou are sighted or when caribou are a half mile or less from the road. • Incorporate crossing ramps, 7-foot tunnels/overpasses, and/or visual windows into road design when possible.	Yes	See Measure 17 (caribou crossing ramps) in support of requirements under ROP E-7. The Vehicle Use Plan required by NSB Rezoning Condition of Approval 3 requires that vehicles will stop when groups of 10 or more caribou are approaching the road. This is a reduction from 25 as required in the 2020 Willow ROD. The plan also incorporates seasonal speed limitations during caribou calving season and the fall migration season. ROP H-1 sufficiently meets the need to consult with local subsistence users on best practices and recommendations for minimizing traffic during hunting season.
46	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns.	Buffer the Teshekpuk Caribou Habitat area by 5 to 6 kilometers (3.1 to 3.7 miles) to account for the avoidance response of calving caribou to infrastructure.	No	The geographic boundary of the TLCHA was established in the 2022 NPR-A IAP/ROD. No Willow Project activities would occur within the TLCHA. There are no impacts unique to this Project that warrant expansion of the geographic scope of ROP K-9.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
47	Terrestrial mammals; Subsistence	Minimize deflection and disruption of caribou migratory patterns.	Use convoys and/or checkpoints to moderate traffic flow and to consolidate traffic in space and time.	No	The Vehicle Use Plan required by NSB Rezoning Condition of Approval 3 incorporates measures to consolidate traffic in space and time that sufficiently meet the objective.
48	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns through monitoring and awareness.	Employ caribou monitoring personnel to maintain awareness of presence and movements of caribou.	No	NSB Rezoning Required Measure 37 requires that CPAI hire a year-round subsistence representative.
49	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns through suspension of off-pad activities at critical times.	Off-pad activities shall be suspended from May 20 through June 20, unless approved by the authorized officer. The intent of this requirement is to restrict activities that would disturb caribou during calving. The permittee shall submit a stop-work plan that considers this, and other mitigation related to caribou early arrival. The intent of this latter requirement is to provide flexibility to adapt to changing climate conditions that may occur over the life of the Project.	No	Similar requirements were contemplated and addressed in the 2020 NPR-A IAP/EIS under ROP K-9, the provisions of which apply to the TLCHA. The geographic boundary of the TLCHA was established in the 2022 NPR-A IAP/ROD. No Willow Project activities would occur within the TLCHA. There are no impacts unique to this Project that warrant expansion of the geographic scope of ROP K-9.
50	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns through ground traffic restrictions on permanent oil and gas-related roads.	The following ground traffic restrictions shall apply to permanent oil and gas-related roads: • From May 20 through August 20, traffic speed shall not exceed 15 mph when caribou are within 0.5 mile of the road. Additional strategies may include limiting trips, using convoys, using different vehicle types, stockpiling equipment and materials, etc. to the extent practicable. The permittee shall submit with the development proposal a vehicle use plan that considers these and other mitigation measures. • The permittee shall observe caribou movement from May 20 through August 20, or earlier if caribou are present prior to May 20. Based on these observations, traffic would be stopped: o Temporarily to allow a crossing by 10 or more caribou. The permittee shall submit with the development proposal a vehicle use plan that considers these and other mitigation measures. o By direction of the authorized officer, traffic may be stopped through the Project area for a limited amount of time, and only if necessary to prevent displacement of calving caribou. Such closures will not be undertaken without first consulting with permittees to assess operational impacts on permitted activities	No	Similar requirements were contemplated and addressed in the 2020 NPR-A IAP/EIS under ROP K-9, the provisions of which apply to the TLCHA. The geographic boundary of the TLCHA was established in the 2022 NPR-A IAP/ROD. No Willow Project activities would occur within the TLCHA. There are no impacts unique to this Project that warrant expansion of the geographic scope of ROP K-9.
51	Terrestrial mammals; Subsistence	Minimize the deflection and disruption of caribou migratory patterns through air traffic restrictions.	ROP F-1 requires the use of an Aircraft Use Plan. The plan will include the following: • Minimize Q400 traffic between Alpine and Willow during calving (May 20 to June 20) to reduce impacts to caribou. Q400 traffic between Willow and Kuparuk or Deadhorse is necessary and would be allowed. • Plans to minimize the disturbance to calving caribou (e.g., description of areas avoided, how flight numbers were minimized, and that low altitude flights were avoided or limited).	Yes	See Measure 18.
52	Subsistence	Reduce the impacts to subsistence users resulting from increased travel requirements for subsistence users.	Provide household level vouchers for fuel (not fixed dollar value) to support subsistence activities on a quarter-annual basis.	No	NSB Rezoning Condition of Approval 6 requires that during the construction period of the Willow Project (prior to start-up of the central processing facility), if requested by the NSB Subsistence Mitigation Committee, in addition to the existing contributions, CPAI will provide an annual air charter for a group of Nuiqsut hunters and their gear to support caribou subsistence activities. In addition, it requires CPAI to develop a Good Neighbor Policy on caribou in consultation with the community of Nuiqsut and the NSB Wildlife and Planning Departments. The Good Neighbor Policy will include support to transport Nuiqsut caribou subsistence hunters and their gear to and from areas where caribou are available if it is determined that the Willow Project has significantly impacted the ability of the hunters to harvest caribou based on criteria in the Good Neighbor Policy. Implementation of these requirements sufficiently meets the objective in a manner inclusive of community input and consultation.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
53	Public health	Provide a funding source to support Nuiqsut healthcare needs.	Provide funding to support the Nuiqsut healthcare clinic so that treatment options available in the clinic can address the most frequent concerns (e.g., asthma).	No	This measure does not mitigate known project effects. Public health initiatives would be the proper role of the State of Alaska and NSB; it is beyond the expertise of the BLM, which is not a public health agency.
54	Public health	Provide a funding source for a professional third-party contractor to design and administer a human health study.	Provide funding to the City of Nuiqsut to contract with a third-party professional organization or consultant to develop and administer a human health study. The study shall consider unique aspects to life on the North Slope, including the consumption of subsistence food sources.	No	This measure does not mitigate known project effects. Public health initiatives would be the proper role of the State of Alaska and NSB; it is beyond the expertise of the BLM, which is not a public health agency.
55	Water quality; Terrestrial mammals; Subsistence	Provide BLM with ready access to CPAI's North Slope roads (e.g., Kuparuk, Alpine, Greater Mooses Tooth, Willow).	Develop a road use agreement between CPAI and BLM that provides BLM unfettered access of project gravel and ice roads, except when safety may be jeopardized by road conditions or activity.	No	This measure does not mitigate known project effects. CPAI is required by law to provide access to the BLM for inspections and monitoring.
56	Terrestrial mammals; Subsistence	Continue the long-term caribou monitoring project in and near Nuiqsut through the life of the Willow Project to provide better understanding of the effects of North Slope oil and gas development on caribou.	Continue to fund the long-term caribou monitoring project in and near Nuiqsut through the life of the Willow Project.	No	NSB Rezoning Required Measure 13 requires that CPAI continue to fund caribou monitoring studies around the Willow Project area.
57	Terrestrial mammals; Subsistence	Provide funding for a caribou collaring study within the Willow Project area.	Provide a funding mechanism to support ongoing caribou collar studies through construction of the Willow Project and five years of operations only activity to provide a better understanding of caribou responses to increased oil and gas development.	No	NSB Rezoning Required Measure 13 requires that CPAI continue to fund caribou monitoring studies, to include caribou collar studies, around the Willow Project area.
58	Sociocultural systems	Support the development of a cultural center in Nuiqsut.	Provide funding to help design and develop a cultural center in Nuiqsut for the community's use.	No	This measure does not mitigate known project effects. Such a project would be more properly supported through NPR-A Impact Mitigation Fund grants.
59	Terrestrial mammals; Subsistence	Provide funding for a caribou movement study in the Alpine and Greater Mooses Tooth project areas.	Provide a funding mechanism to support ongoing Teshekpuk Caribou Herd studies in the Alpine and Greater Mooses Tooth project areas with a focus on how caribou respond to roads and vehicle traffic.	No	NSB Rezoning Required Measure 13 requires that CPAI continue to fund caribou monitoring studies around the Willow Project area.
60	Birds	Prevent collisions by birds with overhead power lines and guy wires during mating, inclement weather (e.g., fog), and migration	Add to ROP E-15: Communication towers should be monopoles without guy wires that could be a collision hazard for birds.	Yes	See Measure 15.
61	Birds	Use white strobe lights instead of solid, or pulsating (beacon) red lights to reduce attracting night-migrating birds to tower structures exceeding 200 feet in height with required FAA lighting	Add to ROP E-8: For tower structures exceeding 200 feet in height with FAA required lighting, use white (preferable) or red strobe lights. The strobes should be set at the minimum number of flashes per minute allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided, if possible.	Yes	See Measure 15.
62	Birds	Protect birds during nesting season	Construction/placement of gravel for roads and pads should occur in winter to avoid damage to nesting birds, eggs, and hatchlings and adjacent tundra habitats. No gravel placement or tundra disturbance should occur during bird nesting season (June 1 to July 31). For FAA airstrip construction, snow removal and the first layer of gravel for the entire airstrip footprint should take place in late May, prior to the onset of the bird nesting season. Additional gravel layers within the footprint can then be placed and compacted throughout the summer without damage to birds and habitats.	No	Project schedule is already designed such that gravel placement activities are to occur during winter months only. Measure 16 in this ROD requires that, to the greatest extent practicable, construction and road improvement activities be planned outside the period from June 1 to July 31 to minimize noise impacts to nesting birds.
63	Water resources	Prevent ponding of sheet flow and maintain natural flow during rain events	Place culverts within long linear roads in sufficient number to prevent ponding of sheet-flow and to maintain natural flow throughout break-up and summer/fall rain events.	No	Design Measure 27 requires CPAI to install cross-drainage culverts as needed to maintain natural surface drainage to mitigate the risk of sheet flow interruption and thermokarsting. The estimated spacing of culverts is approximately every 1,000 feet; however, exact placement would be adjusted based on a field survey of in-field local drainage patterns.
64	Water resources	Prevent high-water erosion of roads/pads and stream bottoms	Place erosion control material (e.g., supersacks, revetment) on banks of rivers under and adjacent to bridges and adjacent to and on bottom of stream approach and exit of large culvers (when necessary) to prevent high-water erosion of road or pad and stream bottom.	No	Design Measure 40 requires that CPAI produce an adaptive erosion control plan that incorporates plans for use of each type of erosion control. While the use of supersacks and erosion control mats can result in a temporary reduction in erosion activities, their use can cause subsequent adverse impacts to fish passage. All culvert designs for the project adhere to Alaska Department of Transportation and Public Facilities Alaska Highway Drainage Manual (ADOT&PF 2006). This document includes erosion control best management practices as well as a section outlining bank protection types (e.g., sand/concrete sacks, revetments) and design guidelines for each protection type.

Measures No. in the 2022 Draft Supplemental EIS	Affected Resource(s)	Objective	Standard/Requirement	Mitigation Adopted (Yes/No)	Rationale For or Against Adoption
65	Water resources	Protect surface waters	Prohibit the discharge of any contact fluids into surface waters.	No	ROP A-2 requires that all pumpable solid, liquid, and sludge waste be disposed of by injection in accordance with EPA and State of Alaska regulations and procedures. On pad temporary muds and cuttings storage, as approved by ADEC, will be allowed as necessary to facilitate annular injection and or backhaul operations. Wastewater discharges or disposal of domestic wastewater into bodies of fresh, estuarine, and marine waters, including wetlands, are prohibited unless authorized by a National Pollutant Discharge Elimination System or State permit.
66	Soils	Implementation of an Adaptive Management Plan	Implement an adaptive management plan that includes regular monitoring and is responsive to floodplain impacts, thermokarst development, changes in hydrology, vegetation damage, seasonal flows, water levels, erosion, deposition throughout the Project area.	No	Monitoring for thawing and thermokarst impacts to project infrastructure is part of CPAI's road maintenance approach. In addition to CPAI monitoring obligations, BLM maintains its own soil/snow monitoring network within NPR-A which is used to consistently monitor conditions for the duration of the winter development season. BLM releases a weekly, publicly viewable, report with soil temperature and snow depth data which is shared with industry, other agencies, and the public. BLM also conducts annual, winter and summer, inspections of ROWs permitted in NPR-A with a heightened emphasis placed on winter road construction and observable vegetative recovery. Industry also conducts its own geotechnical analysis for new development proposals. These analyses allow for identification of site-specific issues such as thaw unstable soils and are used for both routing and engineering design. Implementation of these efforts sufficiently meets the objective. Special Condition 11 of the USACE Section 404 requires that the natural drainage patterns be maintained along access roads and pads, and if there is evidence of altered hydrology (such as excessive ponding, drying, channelization), CPAI is required to restore hydrology to preconstruction conditions. NSB Rezone Required Measure 31 requires monitoring for sedimentation buildup. Implementation of these measures sufficiently meets the objective.
67	Public health	Food Security	Provide gravel and building materials for construction of a public greenhouse suitable for Arctic conditions, to protect food security and allow communities to better adapt to the future climate through the establishment of local fresh food production.	No	This measure does not mitigate known project effects. Consistent with the provisions of 43 CFR 3600, the BLM cannot compel the holder of a mineral sales contract to provide gravel resources to users other than the contract holder. Such a project would be more properly supported through NPR-A Impact Mitigation Fund grants.

Notes: ADEC (Alaska Department of Environmental Conservation); ADF&G (Alaska Department of Fish and Game); ADNR (Alaska Department of Natural Resources); BLM (Bureau of Land Management); CPAI (ConocoPhillips Alaska, Inc.); EIS (Environmental Impact Statement); EPA (U.S. Environmental Protection Agency); FAA (Federal Aviation Administration); GPS (global positioning system); IAP (Integrated Activity Plan); KSOP (Kuukpik Subsistence Oversight Panel); Kuukpik (Kuukpik Corporation); mph (miles per hour); NEPA (National Environmental Policy Act) No. (number); NPR-A (National Petroleum Reserve in Alaska); NSB (North Slope Borough); NVN (Native Village of Nuiqsut); ROD (Record of Decision); ROP (required operating procedure); ROW (right of way); TLCHA (Teshekpuk Lake Caribou Habitat Area); TLSA (Teshekpuk Lake Special Area); USACE (U.S. Army Corps of Engineers).

4.2 Suggested Mitigation Measures from Public Comments on the 2022 Willow MDP Draft Supplemental Environmental Impact Statement

Table 4.3 provides the suggested mitigation measures identified in public comments on the 2022 Willow MDP Draft Supplemental EIS.

Table 4.3. Public Comment Period Suggested Mitigation Measures

No.	Affected Resource(s)	Objective	Standard/Requirement	Adopted (Yes/No)	Rationale For or Against Adoption
1	Water resources	Implement an adaptive management plan to address surface water blockages.	Implement an adaptive management plan that addresses surface water blockages around Project infrastructure.	No	Measure 6 as adopted in this ROD ensures that culverts, bridges, and pipeline stream crossings are designed in such a manner as to reduce unanticipated surface water flow blockages. Special Condition 11 of the USACE Section 404 permit requires that the natural drainage patterns be maintained along access roads and pads, and if there is evidence of altered hydrology (such as excessive ponding, drying, channelization), CPAI is required to restore hydrology to preconstruction conditions. Adherence to this measure and condition sufficiently meets the objective.

No.	Affected Resource(s)	Objective	Standard/Requirement	Adopted (Yes/No)	Rationale For or Against Adoption
2	Climate change	Monitor for permafrost thaw and implement an adaptive management plan to address identified permafrost thaw and thermokarsting.	Implement an adaptive management plan that addresses monitoring potential permafrost thawing and thermokarst impacts for all Project structures, including roads, pads, and the constructed freshwater reservoir (under Alternatives B, C, and D) to further protect the TLSA. Share monitoring information with ADF&G and other relevant agencies.	No	Monitoring for thawing and thermokarst impacts to project infrastructure is a requirement of CPAI's road maintenance policy. In addition to CPAI monitoring obligations, BLM maintains its own soil/snow monitoring network within NPR-A which is used to consistently monitor conditions for the duration of the winter development season. BLM releases a weekly, publicly viewable, report with soil temperature and snow depth data which is shared with industry, other agencies, and the public. BLM also conducts annual, winter and summer, inspections of ROWs permitted in NPR-A with a heightened emphasis placed on winter road construction and observable vegetative recovery. Industry also conducts its own geotechnical analysis for new development proposals. These analyses allow for identification of site-specific issues such as thaw unstable soils and are used for both routing and engineering design. Implementation of these efforts sufficiently meets the objective.
3	Birds	Limit the disturbance of tundra-nesting birds.	Limit road upgrades to times outside of the bird nesting season (generally July 1 through July 31).	Yes	See Measure 16.
4	Subsistence	Provide access to gravel resources for local community infrastructure projects.	Permittee shall stockpile excess gravel from open cells at the Tinmiaqsiugvik mine site for use in community infrastructure projects. The permittee would operate the mine site on behalf of the community, and the community shall be responsible for obtaining a mineral materials sales contract from BLM.	No	This measure does not mitigate known project effects. Consistent with the provisions of 43 CFR 3600, the BLM cannot compel the holder of a mineral sales contract to provide gravel resources to users other than the contract holder.
5	Subsistence; Air quality; Climate change	Improve access for subsistence users and reduce the need for snow road construction.	Provide the State of Alaska's Community Winter Access Trail access to Willow gravel and ice road infrastructure for use to reduce the reliance on constructing snow roads through the Willow Project area.	No	Design Measure 77 stipulates that CPAI will allow Nuiqsut residents reasonable use of Project roads to access subsistence areas throughout the life of the Project. Use of the road is provided in support of continuing subsistence activities to mitigate restrictions to subsistence access to the community of Nuiqsut. Expanding access to include all NSB residents does not mitigate known project impacts. Increased user traffic of project roads may result in increased safety risks.
6	Wildlife; Subsistence	Reduce helicopter and fixed-wing aircraft flight impacts to wildlife and subsistence users.	Use unmanned aerial vehicles (i.e., drones) to conduct inspections and surveys to the greatest extent practicable to reduce impacts to wildlife and subsistence users.	Yes	See Measure 24.
7	Invasive species	Prevent spread of invasive species in the Project area.	Use existing and temporary indoor and outdoor vehicle washing facilities and inspection stations in locations as needed to wash and inspect vehicles prior to use in the Project area. Permittee will follow an Invasive Species Monitoring Control Plan for vehicle washing practices and to monitor for invasive species.	Yes	See Measure 12.
8	Climate change	Reduce downstream greenhouse gas emissions resulting from the Willow Project.	The Willow project would cease producing oil 20 years from the date of the spudding of the first well.	No	All project alternatives are designed and evaluated based on a full 30-year field life consistent with the Master Development Plan for the Bear Tooth Unit. Selection of Alternative E would reduce both the scope and scale of development and resulting production, thereby reducing GHG emissions.

No.	Affected Resource(s)	Objective	Standard/Requirement	Adopted (Yes/No)	Rationale For or Against Adoption
9	Climate change	Reduce net greenhouse gas emissions resulting from the Willow Project.	Permittee shall offset 50% of the projected net GHG emissions associated with the final preferred alternative selected in the Project's ROD, in accordance with U.S. commitments under the Paris Agreement. GHGs shall be offset through reforestation of land (as opposed to preservation of existing forest land), and the required acreage of reforestation necessary to offset the Project's GHG's shall be calculated by assuming that the average mature tree can sequester (i.e., consume and retain) up to 48 pounds of carbon dioxide per year (European Environment Agency 2011). In its 2022 budget justification, the U.S. Forest Service reported that the National Forest System's reforestation needs are estimated at 4 million acres (USFS 2021). These efforts are accomplished with the help of non-profit partners such as the National Forest Foundation and civic groups who contribute to the agency's capacity for reforestation through partnerships and matching fund agreements. Implementation of this mitigation measure would require the permittee to offset 50% of the projected net GHG emissions associated with the Project (approximately 69 to 73 million metric tons of net CO_2e compared to Alternative A, depending on the action alternative and choice of global warming potential). The U.S. has established an economy-wide target of reducing its net GHG emissions by 50% to 52% below 2005 levels in 2030 in its Nationally Determined Contributions under the Paris Agreement (UNFCCC 2021); offsetting 50% of the net Willow emissions over the life of the Project would help the U.S. achieve this goal.	No	This measure conflicts with and duplicates current initiatives, both from the industry and government perspective. It takes a narrow and prescriptive approach to what is a layered, extremely complex, and evolving policy and technical area guided by industry practice, government policy and regulation. The applicant has already committed to net-zero GHG emissions by 2050 on a *portfolio-wide* basis, specifically by reducing/offsetting direct operational GHG emissions (termed Scope 1 and 2 emissions as defined by the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*). The Willow project is included in this portfolio-wide approach. This includes both emissions reduction activities as well as emissions offsets. This approach is well documented and reported to the EPA on a regular basis, and includes short term (by 2025), medium term (by 2030), and long term (by 2050) reductions. In effect, the objective stated above is already met, and this new measure would duplicate the existing effort. The applicant's net zero commitments are consistent with and guided by both industry-wide and government-wide efforts to reduce operational emissions, including emissions produced as result of downstream combustion of oil from projects like Willow. Requiring the offset of downstream emissions (i.e., indirect emissions) from the Willow project would be redundant to the reduction/offset efforts of the end-users of Willow oil. In other words, including the downstream consumption or burning of Willow oil (often referred to as Scope 3 emissions) – as is done in the measure above – would result in double counting the same emissions. Finally, this measure would not be feasible for BLM to enforce. It requires the sort of government-wide cooperation and goal setting that is already occurring by those best positioned to directly regulate and guide such initiatives, such as the EPA and the SEC.
10	Climate change; Subsistence	Increase food security by providing adaptive measures for food storage	Permittee shall work with the local community to improve food storage capacity and durability. This could include providing gravel and insulation to "harden" existing cellars, providing transportation of chest freezers to the North Slope, etc.	No	This measure does not mitigate known project effects. Consistent with the provisions of 43 CFR 3600, the BLM cannot compel the holder of a mineral sales contract to provide gravel resources to users other than the contract holder.
11	Hazardous materials	Facilitate clean-up of historic contamination.	Permittee shall work with the BLM to facilitate access to contaminated sites using temporary and permanent Willow Project infrastructure to promote clean-up efforts.	No	This measure does not mitigate known project effects. BLM is responsible for cleanup of historic or legacy contamination on BLM-managed lands within the NPR-A.
12	Soil; Wetlands and vegetation	Minimize impacts to soils and vegetation from snow and ice infrastructure.	Permittee would provide BLM with as-built GIS of snow and ice infrastructure at the end of every winter season. Ice road and pad alignments shall be different every year to minimize impacts to soils and vegetation unless otherwise approved by the BLM authorized officer. Snow roads may use the same alignment year to year depending on snow conditions.	No	ROP C-2 and the reporting parameters outlined in the Vehicle Use required under NSB Rezoning Condition of Approval 3 sufficiently meet the objective to impacts to soils and vegetation from snow and ice infrastructure.
13	Subsistence	Provide North Slope residents access to Colville River ice road crossings.	Permittee shall allow reasonable access to North Slope residents to use ice roads built for the Willow Project, including the annual Colville River ice bridge.	No	Design Measure 77 stipulates that CPAI will allow Nuiqsut residents reasonable use of Project roads to access subsistence areas throughout the life of the Project. Use of road is provided in support of continuing subsistence activities to mitigate restrictions to subsistence access to the community of Nuiqsut. Expanding access to include all NSB residents does not mitigate known project impacts. Increased user traffic of project roads may result in increased safety risks.
14	Air quality; Climate change	Reduce methane emissions from project activities.	Permittee shall use the best available technology to reduce venting of methane to the atmosphere during wellhead and processing facility maintenance. Remote inspections of pipelines and well-pads will occur once per quarter to inspect for methane leaks.	No	Design Measure 120 requires that CPAI minimize vented methane gas volumes by initially depressurizing pipelines to the production system, flare, and then purge lines with nitrogen prior to opening. By using nitrogen sweep and purge, little to no natural gas should be released when opening the equipment to atmosphere. Design Measure 128 requires CPAI to conduct leak surveys (including methane) in accordance with New Source Performance Standard (40 CFR 60 OOOOa or OOOOb [whichever regulation is applicable at the time]). Implementation of these measures sufficiently meets the objective to reduce methane emissions from project activities.
15	Water quality; Fish; Subsistence	Monitor water quality for contamination.	Develop a water quality monitoring plan to regularly sample area waterways for contamination downstream from Project facilities.	No	Water quality protection and monitoring is the purview of the ADEC. Testing and monitoring of all freshwater sources that intersect or are downstream from the project is not reasonable and does not mitigate known project effects.

No.	Affected Resource(s)	Objective	Standard/Requirement	Adopted (Yes/No)	Rationale For or Against Adoption
16	Economics	Provided targeted employment opportunities for NSB residents, particularly Nuiqsut residents.	Provide job training, hiring events, and outreach to local residents in the NSB. These employment outreach efforts will include training for upcoming Project positions, as well as engagement with locally owned support service companies to provide an overview of the types of Project support that will be required. Employment outreach in Nuiqsut will be held at least once per year.	No	BLM does not have the authority to require an applicant to hire locals. Design Measures 74 commit CPAI to continued support of the internship program (CareerQuest) to introduce Nuiqsut high school students to jobs and careers in the oil fields and in their community. Design Measure 75 commits CPAI to continue to strive to hire qualified Nuiqsut, NSB, and Alaska residents for oil field jobs.
17	Wetlands and vegetation; Birds; Terrestrial mammals; Subsistence	Protect stream banks, minimize compaction of soils, and minimize breakage, abrasion, compaction, and displacement of vegetation resulting from winter tundra travel.	a. Off-road travel will be allowed by the BLM authorized officer when soils are frozen to sufficient depth (defined by a soil temperature of 23 degrees Fahrenheit or lower at a depth of 12 inches), and 6 inches of snow cover exists. Snow distribution and pre-packing may be used to maintain sufficient snow cover in areas of poor snow coverage. The permittee shall submit data to BLM to show that these conditions have been reached prior to conducting work. Snow survey and soil freeze-down data collected for ice road or snow trail planning and monitoring shall be submitted to BLM with the required weekly report of operations. b. Off-road travel is generally to be conducted with low-ground-pressure vehicles unless otherwise approved by the BLM authorized officer. Low-ground pressure is defined as vehicles with less than 4 pounds per square inch ground pressure, or vehicles that have passed the Alaska Department of Natural Resources low-pressure vehicle qualification certification. c. Ice roads would be designed and located to avoid the most sensitive and easily damaged tundra types, as much as practicable. d. The permittee shall provide the BLM with an as-built of all ice roads, snow trails, and ice pads after the infrastructure is completed. Data must be in a GIS format (ESRI shapefiles referencing the North American Datum of 1983).	No	ROP C-2 and the reporting parameters outlined in the Vehicle Use required under NSB Rezoning Condition of Approval 3 sufficiently meet the objective.
18	Marine mammals	Minimize impacts to denning polar bears.	Permittee will conduct two airborne infrared surveys for polar bear dens prior to initiating winter activities.	Yes	See Measure 25.
19	Water resources; Fish; Marine mammals; Subsistence	Minimize impacts to streams from Project boat ramps.	Develop a maintenance plan for boat ramps to ensure the long-term viability and use of the site(s) while minimizing impacts to the adjacent waterbodies. The initial plan shall be submitted to the BLM authorized officer 60 days prior to initiating the first year's maintenance activities. Any substantive changes to the maintenance plan will be submitted to BLM prior to initiation of maintenance activities impacted by those changes. The plan will include such measure as: a. Determine if erosion mitigation features or options in engineering design of boat ramp(s) are needed to prevent or minimize erosion potential at the boat ramp(s) and along adjacent riverbanks. Describe the evaluation that was completed to determine if erosion control is needed and what type of features are included in the final design. b. Identify entity responsible for site maintenance. c. Describe annual maintenance (grading) of parking pads, turning pads, access ramps, and road access. d. Identify the gravel source for reinforcement of boat ramps and pads when necessary. Describe the location and quantity of gravel available and the frequency of how often the need for additional gravel will be evaluated. e. Include regular clean-up of pads and surroundings, including back-haul of trash to suitable disposal site. f. Describe how spills will be removed or mediated per the Project's spill plan.	Yes	See Measure 11.
20	Economics; Environmental justice	Provide economic development opportunities in the community of Nuiqsut.	Permittee shall support economic development workshops focused on identifying and developing small business ideas that are not dependent on the extraction industry. Workshops will provide information about how to apply for small business grants, how to craft a business plan, etc.	No	This measure does not mitigate known project effects.
21	Soil; Wetlands and vegetation	Reduce impacts from blasting at the Willow Mine Site.	CPAI will evaluate the use of a surface miner at the Tiŋmiaqsiuġvik mine site to develop the gravel resource. CPAI will use a surface miner at the Kuparuk Mine Site during the 22-23 winter season and shall provide a report to BLM on the efficacy of this equipment in North Slope conditions no later than June 2023. The report shall describe how the equipment was used, any engineering or logistical challenges of using this equipment and steps taken to adapt the surface miner for use in North Slope operations. BLM engineers may conduct on the ground inspections to observe the surface miner during the winter 22-23 season. If the surface miner is determined to be technologically feasible as an alternative to blasting, the BLM will require its use at the Willow Mine Site to reduce the impacts of blasting (blasting would still be required to remove overburden).	Yes	See Measure 26.

No.	Affected Resource(s)	Objective	Standard/Requirement	Adopted (Yes/No)	Rationale For or Against Adoption
22	Visual Resources; Water Resources; Wetlands/Vegetation; Birds, Terrestrial Mammals; Marine Mammals; Land Ownership & Use; Subsistence; Environmental Justice; and Wilderness Characteristics	Permanently protect the most important habitat areas for the maternal and migrating caribou of the Teshekpuk Caribou Herd, including Teshekpuk Lake, a buffer around the lake, and the migration corridors to the east and northwest.	BLM will develop compensatory mitigation that provides durable, long-term protection for the Teshekpuk Caribou Herd to fully offset impacts of the project on that Herd, to include protecting the surface area of Teshekpuk Lake, a buffer along all shores of the lake, and the K-10 Caribou Movement Corridors/K-16 Deferral Areas (under Alternative E in the 2020 NPR-A Integrated Activity Plan Final Environmental Impact Statement) using existing statutory, management or administrative authorities, with a focus on restricting future leasing or surface development in those areas.	Yes	See Measure 27.

Notes: ADEC (Alaska Department of Environmental Conservation); ADF&G (Alaska Department of Fish and Game); BLM (Bureau of Land Management); CO_2e (carbon dioxide equivalent); CPAI (ConocoPhillips Alaska, Inc.); EPA (Environmental Protection Agency); GHG (greenhouse gases); GIS (geographic information system); No. (number); NPR-A (National Petroleum Reserve in Alaska); NSB (North Slope Borough); ROD (Record of Decision); ROP (required operating procedure); ROW (right of way); SEC (Securities and Exchange Commission); TLSA (Teshekpuk Lake Special Area); USACE (U.S. Army Corps of Engineers).

5.0 OTHER REQUIRED MITIGATION MEASURES

5.1 Mitigation Measures in Support of Endangered Species Act Section 7

5.1.1 Measures from Section 7 Consultation: U.S. Fish and Wildlife Service

The following reasonable and prudent measure contained in the USFWS's Biological Opinion (USFWS 2023) for the Project is applicable to the Project:

Reasonable and Prudent Measure 1: Contribute to improved understanding of spectacled eider collision risk with Project infrastructure, facilities, and/or vessels.

To be exempt from the prohibitions of Section 9 of the Act, BLM, the U.S. Army Corps of Engineers, and their agents must comply with the following terms and conditions, which implement the Reasonable and Prudent Measure described above. These terms and conditions are non-discretionary.

Term and Condition 1: Observations of collision events in which one or more listed eider, or 3 or more birds of any species, appear to have collided with oil and gas infrastructure (i.e., wires, towers, or buildings), or vessels shall be recorded and reported to the USFWS, Northern Alaska Field Office and BLM, Arctic District Office in an annual report due by December 31, unless listed eider collisions exceed the number exempted by the Incidental Take Statement (ITS), in which case, the collision event shall be reported within 48 hours. Reports should include: the date, time of day, weather conditions, number and species of birds involved, and other factors considered to be relevant by the observer, and should include photos of dead birds, top and bottom view, with wings spread, and with the bill and feet visible if possible.

5.1.2 Measures from Section 7 Consultation: National Marine Fisheries Service

Additional measures, described below, resulted from BLM's Section 7 consultation with the National Marine Fisheries Service (NMFS) for the Project (NMFS 2023) and are hereby adopted.

General Mitigation Measures

1. The BLM will inform NMFS of impending in-water activities a minimum of one week prior to the onset of those activities.
2. If construction activities will occur outside of the time window specified in this letter (i.e., outside of June 15 through October 15 of project years), the applicant will notify NMFS of the changed action at least 60 days prior to the end of the specified time window to allow for reinitiation of consultation.
3. Project-associated staff will cut all materials that form closed loops (e.g., plastic packing bands, rubber bands, and all other loops) prior to proper disposal in a closed and secured trash bin. Trash bins will be properly secured with locked or secured lids that cannot blow open, preventing trash from entering into the environment, thus reducing the risk of entanglement in the event that waste enters marine waters.
4. Project-associated staff will properly secure all ropes, nets, and other marine mammal entanglement hazards to ensure they do not blow or wash overboard.

Protected Species Observer (PSO) Measures

5. One or more PSOs will perform PSO duties onsite throughout barge transit, screeding, and lightering.
6. For each in-water activity, PSOs will monitor all marine waters within the indicated shutdown zone radius for that activity (Table 5.1).

Table 5.1. Shutdown Zones for Each Activity

Activity	Zone Radius
Screeding	300 meters

7. PSOs will be positioned such that they will collectively be able to monitor the entirety of the shutdown zone. The action agency will coordinate with NMFS on the placement of PSOs prior to commencing in-water work.
8. Prior to commencing screeding, PSOs will scan waters within the 300 m shutdown zone and confirm no listed species are within the shutdown zone for at least 30 minutes immediately prior to initiation of the in-water activity. If one or more listed species are observed within the shutdown zone, the in-water activity will not begin until the listed species exit the shutdown zone of their own accord, or the shutdown zone has remained clear of listed species for 30 minutes immediately prior to screeding or lightering.
9. This pre-construction activity observation period will take place at the start of each day of in-water activities, each time in-water activities have been shut down or delayed due the presence of a listed species, and following cessation of in-water activities for a period of 30 minutes or longer.
10. The on-duty PSOs will continuously monitor the shutdown zone and adjacent waters during screeding operations for the presence of listed species.
11. In-water activities will take place only:
    a. between local sunrise and sunset (but see measure 13);
    b. during conditions with a Beaufort Sea State of 4 or less; and
    c. when the entire shutdown zone and adjacent waters are visible (e.g., monitoring effectiveness is not reduced due to rain, fog, snow, haze or other environmental/atmospheric conditions).
12. If visibility degrades such that a PSO can no longer ensure that the shutdown zone remains devoid of listed species during screeding, the crew will cease in-water work until the entire shutdown zone is visible and the PSO has indicated that the zone has remained devoid of listed species for 30 minutes.
13. If lightering occurs outside local sunrise and sunset, PSOs will be provided with night vision equipment (e.g., night vision binoculars, monocles, or spotting scopes) to support viewing and maintaining the nearshore area.
14. The PSO will order the screeding activities to immediately cease if one or more listed species has entered, or appears likely to enter, the associated shutdown zone.
15. If screeding activities are shut down for less than 30 minutes due to the presence of listed species in the shutdown zone, screeding may commence when the PSO provides assurance that listed species were observed exiting the shutdown zone. Otherwise, the activities may only commence after the PSO provides assurance that listed species have not been seen in the shutdown zone for 30 minutes (for cetaceans) or 15 minutes (for pinnipeds).
16. Following a lapse of screeding activities of more than 30 minutes, the PSO will authorize resumption of activities only after the PSO provides assurance that listed species have not been present in the shutdown zone for at least 30 minutes immediately prior to resumption of operations.
17. If a listed species is observed within a shutdown zone or is otherwise harassed, harmed, injured, or disturbed, PSOs will report that occurrence to NMFS within one business day using the contact information specified in Table 3.
18. PSOs must be independent (i.e., not construction personnel or vessel operators) and have no other assigned tasks during monitoring periods.
19. The action agency or its designated non-federal representative will provide resumes or qualifications of PSO candidates to the NMFS consultation biologist or section 7 coordinator for approval at least one week prior to in-water work. NMFS will provide a brief explanation of lack of approval in instances where an individual is not approved.
20. At least one PSO will have prior experience performing the duties of a PSO during construction activity.

21. At least one PSO on the project will complete PSO training prior to deployment. The training will include:
    a. field identification of marine mammals and marine mammal behavior;
    b. ecological information on marine mammals and specifics on the ecology and management concerns of those marine mammals;
    c. ESA and MMPA regulations;
    d. proper equipment use;
    e. methodologies in marine mammal observation and data recording and proper reporting protocols; and
    f. an overview of PSO roles and responsibilities.
22. PSOs will:
    a. have vision that allows for adequate monitoring of the entire 300 m zone for screeding;
    b. have the ability to effectively communicate orally, by radio and in person, with project personnel;
    c. be able to collect field observations and record field data accurately and in accordance with project protocols;
    d. be able to identify to species all marine mammals that occur in the action area;
    e. have writing skills sufficient to create understandable records of observations
23. PSOs will work in shifts lasting no longer than 4 hours with at least a 1-hour break from monitoring duties between shifts. PSOs will not perform PSO duties for more than 12 hours in a 24-hour period.
24. PSOs will have the ability and authority to order appropriate mitigation responses, including shutdowns, to avoid takes of all listed species.
25. The PSOs will have the following equipment to address their duties:
    a. tools which enable them to accurately determine the position of a marine mammal in relationship to the shutdown zone;
    b. two-way radio communication, or equivalent, with onsite project manager;
    c. tide tables for the project area;
    d. watch or chronometer;
    e. binoculars (7x50 or higher magnification) with built-in rangefinder or reticles (rangefinder may be provided separately);
    f. night vision binoculars, monocles, or spotting scopes;
    g. instruments that allow observer to determine geographic coordinates of observed marine mammals;
    h. a legible copy of this LOC and all appendices;
    i. legible and fillable observation record form allowing for required PSO data entry.
26. Prior to commencing in-water work or at changes in watch, PSOs will establish a point of contact with the construction crew. The PSO will brief the point of contact as to the shutdown procedures if listed species are observed likely to enter or within the shutdown zone, and will request that the point of contact instruct the crew to notify the PSO when a marine mammal is observed. If the point of contact goes "off shift" and delegates his duties, the PSO must be informed and brief the new point of contact.

Dredging/Screeding

27. All vessels involved in dredging, screeding, and underwater excavating operations, including survey vessels, will transit at velocities below 10 knots.
28. Dredging, screeding and underwater excavating activities must shut down whenever a listed marine mammal approaches within 300 m.

Vessels[1]

29. Vessel operators will:
    a. maintain a watch for marine mammals at all times while underway;
    b. stay at least 91 m (100 yds) away from listed marine mammals, except they will remain at least 460 m (500 yards) from endangered North Pacific right whales;
    c. travel at less than 5 knots (9 km/hour) when within 274 m (300 yards) of a whale;
    d. avoid changes in direction and speed when within 274 m (300 yds) of a whale, unless doing so is necessary for maritime safety;
    e. not position vessel(s) in the path of a whale, and will not cut in front of a whale in a way or at a distance that causes the whale to change direction of travel or behavior (including breathing/surfacing pattern);
    f. check the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged;
    g. reduce vessel speed to 10 knots or less when weather conditions reduce visibility to 1.6 km (1 mi) or less;
30. Adhere to the Alaska Humpback Whale Approach Regulations when vessels are transiting to and from the project site: (see 50 CFR §§ 216.18, 223.214, and 224.103(b)) (note: these regulations apply to all humpback whales). Specifically, pilot and crew will not:
    a. approach, by any means, including by interception (i.e., placing a vessel in the path of an oncoming humpback whale), within 100 yards of any humpback whale;
    b. cause a vessel or other object to approach within 100 yards of a humpback whale; or
    c. disrupt the normal behavior or prior activity of a whale by any other act or omission.
31. If a whale's course and speed are such that it will likely cross in front of a vessel that is underway, or approach within 91 m (100 yds) of 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, except that vessels will remain 460 m (500 yds) from North Pacific right whales.
32. Vessels will take reasonable steps to alert other vessels in the vicinity of whale(s).
33. Vessels will not allow lines to remain in the water unless both ends are under tension and affixed to vessels or gear. No materials capable of becoming entangled around marine mammals will be discarded into marine waters.

Vessel Transit, North Pacific Right Whales, and their Critical Habitat

34. Vessels will:
    a. remain at least 460 m (500 yards) from North Pacific right whales.
    b. avoid transiting through designated North Pacific right whale critical habitat if practicable (50 CFR 226.215). If traveling through North Pacific right whale critical habitat cannot be avoided, vessels will:

[1] Vessel measures will be implemented provided doing so does not endanger the vessel or crew.

i. travel through North Pacific right whale critical habitat at 5 knots or less; or at 10 knots or less while PSOs maintain a constant watch for marine mammals from the bridge;

ii. maintain a log indicating the time and geographic coordinates at which vessels enter and exit North Pacific right whale critical habitat.

Vessel Transit, Western DPS Steller Sea Lions, and their Critical Habitat.

35. Vessels will not approach within 5.5 km (3 nm) of rookery sites listed in (50 CFR § 224.103(d)).
36. Vessels will not approach within 914 m (3,000 ft) of any Steller sea lion haulout or rookery which is not listed in 50 CFR § 224.103(d)).

General Data Collection and Reporting

Data Collection

37. PSOs will record observations on data forms or into electronic data sheets.
38. The action agency will ensure that PSO data will be submitted electronically in a format that can be queried such as a spreadsheet or database (i.e., digital images of data sheets are not sufficient).
39. PSOs will record the following:
    a. the date, shift start time, shift stop time, and PSO identifier;
    b. date and time of each reportable event (e.g., a marine mammal observation, operation shutdown, reason for operation shutdown, change in weather);
    c. weather parameters (e.g., percent cloud cover, percent glare, visibility) and sea state where the Beaufort Wind Force Scale will be used to determine sea-state (https://www.weather.gov/mfl/beaufort);
    d. species, numbers, and, if possible, sex and age class of observed marine mammals, and observation date, time, and location;
    e. the predominant anthropogenic sound-producing activities occurring during each marine mammal observation;
    f. bearing and direction of travel of observed marine mammal(s);
    g. observations of marine mammal behaviors and reactions to anthropogenic sounds and presence;
    h. initial, closest, and last location of marine mammals, including distance from observer to the marine mammal, and minimum distance from the predominant sound-producing activity or activities to marine mammals;
    i. whether the presence of marine mammals necessitated the implementation of mitigation measures to avoid acoustic impact, and the duration of time that normal operations were affected by the presence of marine mammals;
    j. geographic coordinates for the observed animals, with the position recorded by using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or similar standard and defined coordinate system).

Data Reporting

40. All observations of North Pacific right whales (including in critical habitat) will be reported to NMFS within 24 hours. These observation reports will include the following information:
    a. date, time, and geographic coordinates of the observation(s);
    b. number of North Pacific right whales observed, including number of adults/juveniles/calves observed, if determinable;

c. Environmental conditions as they existed during each observation event, including sea conditions, weather conditions, visibility, lighting conditions, and percent ice cover;

d. Photos and videos of the whales if possible.

41. If project vessels are travelling within North Pacific right whale critical habitat in a manner that requires the use of PSOs (i.e., vessel is travelling within North Pacific right whale critical habitat at greater than 5 kts), PSOs will collect, organize, and report on vessel travel within North Pacific right whale critical habitat and on non-North Pacific right whale marine mammal observations made within that critical habitat. These reports will be submitted to AKR.section7@noaa.gov by the end of the calendar year. The report will outline the following information:

    a. species, date, and time for each observation;

    b. number of animals per observation event; and number of adults/juveniles/calves per observation event (if determinable);

    c. geographic coordinates for the observed animals, with the position recorded by using the most precise coordinates practicable (coordinates will be recorded in

42. Observations of humpback whales will be transmitted to AKR.section7@noaa.gov by the end of the calendar year, including information specified in General Data Collection and Reporting (above) and photographs and videos obtained of humpback whales, most notably those of the whale's flukes.

Unauthorized Take

43. If a listed marine mammal is determined by the PSO to have been disturbed, harassed, harmed, injured, or killed (e.g., a listed marine mammal(s) is observed entering a shutdown zone before operations can be shut down, or is injured or killed as a direct or indirect result of this action), the PSO will report the incident to NMFS within one business day, with information submitted to akr.section7@noaa.gov. These PSO records will include:

    a. all information to be provided in the final report (see Mitigation Measures under the *Final Report* heading below):

    b. number of animals of each threatened and endangered species affected;

    c. the date, time, and location of each event (provide geographic coordinates);

    d. description of the event;

    e. the time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal;

    f. mitigation measures implemented prior to and after the animal was taken; and

    g. if a vessel struck a marine mammal, the contact information for the PSO on duty, or the contact information for the individual piloting the vessel if there was no PSO on duty;

    h. Photographs or video footage of the animal(s) (if available).

Stranded, Injured, Sick or Dead Marine Mammal (not associated with the project)

44. If PSOs observe an injured, sick, or dead marine mammal (i.e., stranded marine mammal), they will notify the Alaska Marine Mammal Stranding Hotline at 877-925-7773 (Table 3). The PSOs will submit photos and available data to aid NMFS in determining how to respond to the stranded animal. If possible, data submitted to NMFS in response to stranded marine mammals will include date/time, location of stranded marine mammal, species and number of stranded marine mammals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals.

Illegal Activities

45. If PSOs observe marine mammals being disturbed, harassed, harmed, injured, or killed (e.g., feeding or unauthorized harassment), these activities will be reported to NMFS Alaska Region Office of Law Enforcement at 1-800-853-1964 (Table 3).
46. Data submitted to NMFS will include date/time, location, description of the event, and any photos or videos taken.

Final Report

47. A draft of the final report will be submitted to NMFS within 90 calendar days of the completion of the project (i.e., after Year 6 activities are complete) summarizing the data recorded and submitted to AKR.section7@noaa.gov. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report may be considered final. The report will summarize all in-water activities associated with the proposed action, and results of PSO monitoring conducted during the in-water project activities.
48. The final report will include:
    a. summaries of monitoring efforts, including dates and times of construction, dates and times of monitoring, dates and times and duration of shutdowns due to marine mammal presence;
    b. date and time of marine mammal observations, geographic coordinates of marine mammals at their closest approach to the project site, marine mammal species, numbers, age/size/gender categories (if determinable), and group sizes.
    c. number of marine mammals observed (by species) during periods with and without project activities (and other variables that could affect detectability);
    d. observed marine mammal behaviors and movement types versus project activity at time of observation;
    e. numbers of marine mammal observations/individuals seen versus project activity at time of observation
    f. distribution of marine mammals around the action area versus project activity at time of observation.
    g. digital, queryable documents containing PSO observations and records, and digital, queryable reports.

5.2 Mitigation Measures in Support of Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat

In accordance with Section 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation and Management Act, the BLM is hereby incorporating the following conservation recommendations to further avoid, minimize, mitigate, or otherwise offset project related effects to Essential Fish Habitat (EFH) as recommended by NMFS (BLM 2022b; NMFS 2022):

1. No in-water work[2] from August 15 through September 15 to protect migrating and early life stages of Pacific salmon. The permit holder should coordinate with the State of Alaska Department of Fish and Game (ADF&G) to refine the construction timing windows to the specific project area.

[2] After additional discussion with NMFS personnel, it was clarified that the first recommended mitigation (i.e., no in-water work) pertained only to riverine/freshwater EFH. Proposed construction activities (e.g., bridge construction, culvert installation, and installation of seawater and diesel pipelines beneath the Colville River using horizontal directional drilling) in areas identified as freshwater EFH would be conducted exclusively during winter using ice roads and pads. As such, the BLM would adopt this recommended mitigation with the clarification that no in-water construction work would occur in

2. The permit holder should use stream simulation design for culverts and bridges, like the designs found here: https://www.fws.gov/alaska-culvert-design-guidelines. These designs allow for construction of a channel in new culverts at anadromous streams to support safe and timely migration past the project site.[3]

5.3 Beaufort Sea Incidental Take Regulations

The current Beaufort Sea Incidental Take Regulations (ITRs) (86 FR 42982) for polar bears describe mitigation, monitoring, and reporting requirements for oil and gas operators in the central Beaufort Sea and have been important in mitigating impacts to polar bears from oil and gas activities.

Measures applicable to the Project are described below (see also Appendix E.13, Section 1.4). These measures include all mitigation measures typically required to be implemented in accordance with MMPA authorization for incidental take of marine mammals and take by deterrence of polar bears. These measures would be required for the life of the Project (approximately 30 years). BLM would apply these mitigation measures to the Project and support additional mitigation measures included in future ITRs in the analysis area.

Implementation of these measures does not depend on future MMPA authorizations; implementation of these measures would occur regardless of future authorizations. Should future authorizations require additional mitigation, those would also be implemented but are not included here.

5.3.1 Measures to Avoid and Minimize Potential Polar Bear Incidental Harassment

The following measures summarized below would be employed to avoid and minimize potential polar bear incidental harassment:

1. Project activities would be conducted in accordance with CPAI's Polar Bear Avoidance and Interaction Plan (June 2021). A copy of this plan would be kept on-site and would be available for reference by all Project personnel.
2. All employees, contractors, and personnel performing activities for the Willow Project would observe and carry out all applicable terms and conditions currently set forth in 50 CFR 18 subpart J, Mitigation, Monitoring, and Reporting Requirements for the 2021-2026 Beaufort Sea Incidental Take Regulations. The terms and conditions in the current set of ITRs would be implemented for the 30-year Project life.
3. All personnel would limit encounters with polar bears by being observant of approaching polar bears and by allowing polar bears to pass unhindered when possible.
4. If a polar bear interaction escalates into a life-threatening situation, MMPA section 101(c) allows, without specific authorization, the take (including lethal take) of a polar bear if such taking is necessary for self-defense or to save the life of a person in immediate danger. Such taking would be reported to USFWS and BLM as soon as possible, but no later than 48 hours after the incident.
5. Work activities would not take place within 1.0 mile of known polar bear dens without prior authorization. Two polar bear aerial infrared den detection surveys of all denning habitat within 1.0 mile of human activity would be conducted during the maternal denning period (as specified in the 2021-2026 Beaufort Sea ITR). These den detection surveys would be subject to weather restrictions or other factors but would take place from approximately November 25 through January 20). Should occupied dens be identified within 1.0 mile of Project activities at any time, work in the area will cease and BLM and USFWS Marine Mammals Management would be contacted.

freshwater EFH from August 15 through September 15. Additional protections to fish and fish habitats would also be provided by ADF&G Fish Habitat Permits, which are required as part of the permitting process for activities in waterbodies that support anadromous fish.

[3] In adopting this measure, the BLM notes that implementation of existing required operating procedures E-6 and E-14 and Project design measures for culvert and bridge construction and siting, including adherence to Alaska Department of Transportation culvert design guidelines (ADOT&PF 2006), would meet the USFWS design guidelines to support anadromous and non-anadromous fish passage within the project area.

6. Vessel operators would maintain the maximum distance possible and take every precaution to avoid harassment of concentrations of polar bears. Vessels would reduce speed and maintain a minimum 0.5-mile operation exclusion zone around polar bears observed on ice.

BLM and USFWS would be notified of changes to the Project, including changes to activities, locations, or methods, prior to implementation.

5.3.2 Measures to Avoid and Minimize Potential Polar Bear Deterrence

The following measures would be employed to avoid and minimize potential polar bear deterrence:

1. Project activities would be conducted in accordance with CPAI's Polar Bear Avoidance and Interaction Plan (June 2021). A copy of this plan would be kept on site and be available for reference by all Project personnel.
2. CPAI would ensure that only trained and qualified personnel are assigned the task of polar bear deterrence. Prior to initiation of activities, a list of trained personnel responsible for deterrence and a description of their training would be submitted to USFWS Marine Mammals Management.
3. Should firearms be used for polar bear deterrence, CPAI would ensure that personnel comply with all laws and regulations regarding the carry and use of firearms.
4. Within 48 hours of occurrence, CPAI or its designated agent, would document and report to USFWS Marine Mammals Management all instances involving polar bear deterrence activities. A final report of all polar bear deterrence activities would be submitted to BLM and USFWS Marine Mammals Management.
5. Appropriate deterrence techniques would include use of (but not limited to), bear monitors, airhorns, electric fences, bear spray, acoustic recordings, vehicles, and projectiles (e.g., beanbags, rubber bullets, "cracker" shells, "bangers", and "screamers"). Deterrence techniques must not cause the injury or death of a polar bear. Any injury or death of a polar bear would be reported to BLM and USFWS Marine Mammals Management as soon as possible but no later than 48 hours after the incident.
6. Prior to conducting a deterrence activity, CPAI would:
    a. Make a reasonable effort to reduce or eliminate attractants.
    b. Secure the site, notify supervisor, and move personnel to safety.
    c. Ensure the polar bear has escape route(s).
    d. Ensure communication with all personnel.
7. When conducting a deterrence activity, CPAI would:
    a. Never deter a polar bear for convenience or to aid Project activities. The safety and welfare of the polar bear is second only to the safety and welfare of humans in a deterrence situation.
    b. Shout at the polar bear before using projectiles or other techniques.
    c. Begin with the lowest level of force or intensity that is effective and increase the force or intensity of the technique, or use additional techniques, only as necessary to achieve the desired result.
8. After a deterrence event, CPAI would:
    a. Monitor the polar bear's movement (to ensure no return).
    b. Notify supervisor and personnel when it is safe to resume work.
    c. Submit a report to USFWS Marine Mammals Management within 48 hours.

5.4 NSB Rezoning Required Mitigation Measures

As part of the North Slope Borough's process to rezone the Willow Project area from Conservation District to Resource District land use designation, the Project received additional review from the NSB. The NSB's rezoning approval included both required stipulations and mitigation measures and conditions of approval. These NSB requirements are intended to further mitigate impacts to wildlife, subsistence use, and public health and safety from the Project. These measures are not requirements of the BLM but are included here to provide a comprehensive summary of required measures that serve to mitigate impacts from the Willow project.

Table 5.2 summarizes the NSB rezoning required stipulation and mitigation measures and Table 5.3 summarized the NSB rezoning conditions of approval.

Table 5.2. North Slope Borough Rezoning Required Stipulations and Mitigation Measures

No.	Category	Stipulation or Mitigation Measure
1	Overall/General – Duck Ponds	CPAI and its contractors shall place or affix permanent ownership identification and unique numbering on every duck pond owned and used.
2	Overall/General – Mitigation Fund	CPAI shall mitigate the impacts on local residents related to the additional infrastructure in the area and the potential for reduction of subsistence resource availability, including the impacts related to displacing resources from high priority subsistence use areas. Commencing with the start of construction and continuing for the life the project, in addition to any other agreements CPAI shall make annual payments in the amount of $50,000 per year to a mitigation fund directed and administered by the NSB.
3	Subsistence – Access	CPAI shall consult with the NSB, NVN, Kuukpik, and KSOP at least annually. Examples of uses and developments requiring consultation include but are not limited to the following: (1) construction of facilities and roads; (2) aircraft movement; (3) drilling; and (4) the selection of water sources. Through this consultation, CPAI shall make reasonable efforts to assure that planned activities are compatible with subsistence activities and will not result in unreasonable interference with subsistence harvests or subsistence resources. CPAI shall submit a report of this consultation, including areas of agreement and identification of any unresolved conflicts, to the Administrator prior to the commencement of the uses/developments at issue. The Administrator may take measures consistent with NSB municipal code Title 19 to address any unresolved conflicts relating to said uses/developments.
4	Subsistence – Due Diligence	CPAI shall exercise due diligence to mitigate all adverse impacts on subsistence use activities caused by CPAI's activities.
5	Subsistence – Timing	To the maximum extent practical, initial project construction activities, such as construction of gravel roads, pad, pipeline and bridges, will be done during the winter season.
6	Wildlife and Habitat Protection – General Provisions for Studies on Wildlife and Subsistence	Study designs will be discussed and coordinated with the NSB DWM for submittal to the NSB by March 1, 2021, and each year thereafter as necessary. The NSB DWM and Planning will review, seek revisions as appropriate, and approve the study designs by April 1, 2021, and each year thereafter as necessary.
7	Wildlife and Habitat Protection – General Provisions for Studies on Wildlife and Subsistence	An annual report will be prepared and distributed to NSB DWM and Planning departments by February 15 and a meeting scheduled with NSB DWM and Planning, to occur by April 1. This meeting will discuss the results and the potential need for adjustments to scope to assess possible impacts to caribou, waterbirds, fish, and subsistence users. The Land Management Administrator and Director of the DWM will make the final decision of whether study designs need to be altered and/or additional data collection or analyses are required.
8	Wildlife and Habitat Protection – General Provisions for Studies on Wildlife and Subsistence	CPAI will consult with KSOP on study design prior to submittal to the NSB and provide KSOP with annual reports.
9	Wildlife and Habitat Protection – General Provisions for Studies on Wildlife and Subsistence	CPAI will make data available from their studies annually to the NSB DWM and within a year of completion of the study to the general public through a data archive (e.g., University of Alaska's Geographical Information Network of Alaska, Alaska Ocean Observing System).
10	Wildlife and Habitat Protection – General Provisions for Studies on Wildlife and Subsistence	CPAI will provide the DWM with reports from studies (e.g., wildlife, habitat, erosion) required by other agencies involved in permitting lands associated with the Willow Project, and to the maximum extent practical where multiple study requirements can be aligned, avoid duplication of study efforts among the NSB and such other agencies.
11	Wildlife and Habitat Protection – General Provisions for Studies on Wildlife and Subsistence	To the extent practicable, CPAI and its contractors will minimize flights by hiring local boat drivers, snow machine drivers, and allowing their contractors to camp at a study site.
12	Wildlife and Habitat Protection – General Provisions for Studies on Wildlife and Subsistence	To the extent practicable, CPAI will involve students from Nuiqsut (or other North Slope communities if no students are available from Nuiqsut) in their studies.

No.	Category	Stipulation or Mitigation Measure
13	Wildlife and Habitat Protection – Caribou	CPAI will fund a caribou study to analyze the distribution and movements of caribou around the Willow Project area and adjacent areas to assess habitat relationships and possible impacts from development. CPAI will fund a third-party contractor to: • Characterize pre-construction caribou movements utilizing historic telemetry data • Assist ADF&G or the NSB DWM in the collection of GPS telemetry data (e.g., potential purchase of additional caribou collars or database management) • Determine caribou pre- and post-construction movement rates in relation to roads pipelines and pads associated with their project • Characterize habitat conditions (e.g., snow melt, vegetation habitat, plant biomass, infrastructure) within the study area using best available technology • Evaluate these indices of habitat conditions, with particular attention to possible impacts from development, on the distribution of caribou utilizing the study area
14	Wildlife and Habitat Protection – Birds	CPAI will conduct a study of molting waterfowl in the vicinity of the Willow Project and farther to the west. The final study area will be determined in consultation with the DWM and after consulting with the USFWS to determine the area that is currently being monitored for molting geese. The study will be conducted for at least three years. After that time, the results will be reviewed and a determination will be made about whether the surveys need to continue and if so, for how long. The final determination will be made by the Land Management Administrator and Director of the DWM.
15	Wildlife and Habitat Protection – Birds	CPAI will fund a third-party contractor to conduct a breeding shorebird study in and adjacent to the Willow Project area. As this is known to be important shorebird breeding habitat, baseline studies will be conducted annually pre-development, and at least once every three years after development has been initiated. This study will document shorebird abundance, density, and nesting success.
16	Wildlife and Habitat Protection – Birds	CPAI will fund a third-party contractor to conduct a Yellow-billed loon study in and adjacent to the Willow Project area. To minimize impacts to breeding Yellow-billed loons, the study will document presence and habitat use (breeding/non-breeding) through techniques such as aerial or ground surveys but will avoid nest examination until termination of nesting.
17	Wildlife and Habitat Protection – Fish	CPAI will fund a third-party contractor to collect baseline data to help detect possible impacts, mitigate impacts, or conduct a damage assessment in the event of oil spills and/or release of oil-related products. Potential impacts are not restricted to population level effects.
18	Wildlife and Habitat Protection – Fish	CPAI will repeat required predevelopment studies (baseline) outlined by BLM and USFWS every four years. Should differences be detected from baseline, then CPAI will consult with NSB DWM on whether additional studies are required to explain differences and/or to monitor change. If CPAI divests, sells, or significantly alters management responsibility for the Willow Project, then CPAI is required to provide funding for another year of those studies to incoming management to be conducted during the subsequent summer season.
19	Wildlife and Habitat Protection – Fish	CPAI will experimentally determine the effect of sublethal hydrocarbon exposure and persistence of detection of exposure on two species of fish (fourhorn sculpin and Arctic Cisco) and two prey items of fish, at four temperatures that reflect local seasonal changes (summer, autumn, and spring and winter) using, Alaska North Slope Crude oil and, when available, hydrocarbon from the Willow Project (i.e., not mixed to produce Alaska North Slope Crude). This experimental method must be developed so that it can used to determine whether fish and their prey items have been exposed during accidental releases of hydrocarbons from CPAI operations. If no accidental releases occur in 10 years, then repeat the experiment using more updated tools, methodologies, and analyses, while making sure that previous experimental results can be used for comparison. If data are not sufficient to fulfill this stipulation, additional studies may be required.
20	Wildlife and Habitat Protection – Fish	Fish detected with water mold or other newly emerging infections in both the Nuiqsut Fall Fishery and in areas associated with CPAI's influence will be recorded, collected, and reported to the NSB DWM.

No.	Category	Stipulation or Mitigation Measure
21	Wildlife and Habitat Protection – Water Quality	CPAI will collect data on water quality and hydrology to help detect potential Project related impacts on fish and the subsistence fishery. CPAI will be required to repeat required predevelopment studies (baseline) outlined by BLM and USFWS every four years. Should differences be detected from baseline, then CPAI will consult with NSB DWM on whether additional studies are required to explain differences and/or to monitor change. If CPAI divests, sells, or significantly alters management responsibility for the Willow Project, then CPAI is required to provide funding for another year of those studies to incoming management to be conducted during the subsequent summer season.
22	Wildlife and Habitat Protection – Subsistence	CPAI will fund a contractor to design and conduct a subsistence study that investigates the effects of CPAI's Willow Project development activities and associated infrastructure, as well as future exploration and development activities and associated infrastructure, to subsistence hunters from Nuiqsut. The study should focus on all of CPAI's facilities and activities within the area that is subject to this re-zone, as well as facilities and activities outside of this area that have the potential to impact subsistence resources and activities within the area, as determined by discussions with the NSB DWM and Planning staff. The project should at a minimum: • Examine possible effects from CPAI developments and activities to subsistence activities, especially on caribou and migratory bird hunting • Document hunter concerns and opinions about impacts from CPAI's facilities and activities associated with this rezone
23	Minimizing Traffic Impacts – General	CPAI shall coordinate with KSOP, Kuukpik, and the NSB DWM and Planning departments to establish standard air traffic routes that will minimize interference with animal concentrations. (Concentrations of caribou herds are of particular concern.) CPAI shall follow these routes unless there is a threat to human safety, or an animal concentration or subsistence user is positioned along the routes.
24	Onshore Oil and Gas Pipelines and Roads – General	Siting, design, construction, and maintenance of pipelines must minimize alteration of shorelines, water courses, wetlands, and tidal marshes and avoid significant disturbance to important habitats and critical migration periods.
25	Onshore Oil and Gas Pipelines and Roads – Consolidation	Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, must be consolidated to the maximum extent possible.
26	Onshore Oil and Gas Pipelines and Roads – Wildlife Crossing	Pipeline design and construction shall be based on the best available information and include adequate pipeline elevation, ramping, or burial to provide for unimpeded wildlife crossing. Aboveground pipelines and all associated infrastructure (including fiber optic and other cables) must be elevated at or above the 7-foot minimum height except at those points where the pipeline intersects a road, pad, or caribou ramp, or is constructed within 100 feet of an existing pipeline that is elevated less than 7 feet.
27	Onshore Oil and Gas Pipelines and Roads – Placement	Pipelines must be separated from roads by a minimum distance of 500 feet (except at those points where the pipeline intersects a road, pad, or caribou ramp).
28	Onshore Oil and Gas Pipelines and Roads – Placement	Pipelines shall not be constructed at a distance greater than 1,000 feet from any access road.
29	Onshore Oil and Gas Pipelines and Roads – Placement	Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited on the lake or lakebed and within 1,500 feet of the ordinary high-water mark of any fish-bearing deep lake (i.e., depth greater than 4 meters). If the fish-bearing status of a lake is unknown, the burden is on CPAI to demonstrate whether fish are present.
30	Onshore Oil and Gas Pipelines and Roads – Drainage	Appropriate facilities shall be installed to ensure adequate drainage patterns.
31	Onshore Oil and Gas Pipelines and Roads – Sedimentation	CPAI will monitor for sedimentation build-up or scouring resulting from all bridges and provide the Administrator with results of such monitoring on a regular basis. The Administrator may require measures to mitigate sedimentation and scouring, including dredging, to ensure that the subsistence use area is maintained.
32	Economic Opportunity – Job Fairs	CPAI will host a job fair annually in Nuiqsut beginning after the Assembly's approval of CPAI's Application.

No.	Category	Stipulation or Mitigation Measure
33	Economic Opportunity – Employment Reports	CPAI shall submit annual reports to the Administrator by December 1st of each year showing the number of NSB residents employed by CPAI by job type. Overall employment statistics will be part of this reporting, showing the percentage of NSB resident employment, separate for Alaska resident employment. The overall employment report will also reflect the total workforce, by resident location, of CPAI' s workforce in Alaska.
34	Economic Opportunity – Bids	When CPAI solicits bids, it shall invite North Slope suppliers, subcontractors, and regional and village corporations to bid on Willow projects for which they are qualified.
35	Economic Opportunity – Subsistence Policy	NSB strongly urges CPAI to adopt a formal policy to avoid scheduling disruptions and misunderstandings when subsistence leave is needed while employed by CPAI. The use of seasonal employment options as a method of addressing subsistence leave flexibility is not a meaningful method of employment that allows NSB residents to gain CPAI workplace experience. This requirement should be passed onto all CPAI contractors to the maximum extent allowable.
36	Economic Opportunity – Land Management Orientation	NSB shall provide land management orientation for CPAI for its Willow projects on an annual basis.
37	Economic Opportunity – Subsistence Representative	CPAI shall fund a year-round subsistence representative.
38	Cultural and Historical Site Protection – Data Points for Critical Sites	CPAI must contact the NSB IHLC Division at (907) 852-0422 and SHPO to obtain a set of data points for sites of possible historic, prehistoric, cultural, traditional, archeological, and paleontological significance (Critical Sites). CPAI will maintain the data provided by IHLC in a secure place for internal use only and shall not disclose that data to any other person or entity except SHPO and those entities with a need to know for the purposes of the planned Willow and associated developments and associated facilities, including roads, bridges, gravel pads, airstrips, and pipelines. CPAI will retain and update this data throughout the life of the development project. Prior to the completion of the development project, CPAI will come to an agreement with IHLC as to the disposition of IHLC data once the project is completed. Data points provided by IHLC in the form of geographic coordinates may be imprecise. CPAI is nevertheless responsible for ensuring that its operations do not cause any adverse impacts to Critical Sites and for reporting to IHLC the proper coordinates of any such site discovered. CPAI will release NSB from any liability associated with CPAI's use of these data points.
39	Cultural and Historical Site Protection – Buffer Zones	CPAI must maintain an effective buffer zone around all sites of possible historic, prehistoric, cultural, traditional, archeological, and paleontological significance (Critical Sites). An effective buffer zone will be at least 500 feet unless a smaller zone is necessary and can be mutually agreed upon by CPAI and the NSB Planning Department. CPAI must train its staff and contractors to observe this buffer and ensure that Critical Sites are not disturbed.
40	Cultural and Historical Site Protection – Discovery of Remains or Materials	Should any human remains or possible historic, prehistoric, cultural, traditional, archeological, and paleontological significant materials (Critical Site materials), including, but not limited to artifacts, house mounds, grave sites, ice cellars, and fossilized animal remains, be discovered in the course of this field survey that were not already identified by IHLC or SHPO, CPAI must stop all work in the vicinity of the discovery until CPAI has made contact with IHLC at (907) 852-0422, SHPO and, in the case of human remains, the Alaska State Troopers, and has obtained these agencies' approvals to continue work. CPAI must submit any information discovered that may be of historic, prehistoric, cultural, traditional, archeological, and paleontological significance to IHLC (including, but not limited to artifacts, house mounds, grave sites, ice cellars, and fossilized animal remains). CPAI must not disclose that data to any other person or entity except SHPO and those entities with a need to know for the purposes of working on the planned Willow and associated developments and associated facilities (including roads, bridges, gravel pads, airstrips, and pipelines). CPAI must not remove or disturb any items that may be of historic, prehistoric, cultural, traditional, archeological, and paleontological significance, except to the extent needed to document their existence and to comply with state and federal law and this ordinance.

No.	Category	Stipulation or Mitigation Measure
41	Cultural and Historical Site Protection – Allotments	CPAI must not trespass on Native Allotments or private property. Owner permission must be obtained in advance to enter onto the surface of these lands. CPAI must work with the Inupiat Community of the Arctic Slope and Native Allotment owners in and around the area in a beneficial manner.
42	Cultural and Historical Site Protection – Site Visits	Upon IHLC's request, CPAI must allow an IHLC representative to accompany CPAI during field work. The IHLC representative shall comply with all CPAI safety and operational rules and requirements when accompanying CPAI during field work.
43	Reclamation Plan – General	An abandonment/reclamation plan must be submitted to the Administrator within three years of cessation of permitted activities. At a minimum, the plan must contain: • A grading and site plan drawn and certified by an Alaska licensed professional engineer or land surveyor, indicating the areas excavated or filled, the proposed finished grades and contours, drainage directions and any control structures to be installed. • The methods and plans to be employed for reclamation of the site during and after the activity shall be stated along with a timetable for completions. • A description of all roads and structures and a site map showing the locations of all roads and development which will be built indicating which ones will remain after cessation of activities. • A description of any known reclamation requirements of any other governmental entity, and a copy of any reclamation plan under development or in existence for the activity. • All maps shall be submitted at a scale of one inch equals 200 feet extending 200 feet beyond the site area with a maximum contour interval of five feet. The scale requirements may be adjusted by the Administrator to fit unusual circumstances.
44	State, Local, and Federal Compliance – Other Permits	This approval shall not become effective until all other local, state, and federal permits, approvals, and authorizations have been issued. CPAI shall comply with all local, state, and federal laws and regulations for all projects within the Unit area.
45	Tundra Protection – General	Vehicles must be operated in a manner such that the vegetative mat of the tundra is not disturbed, and blading or removal of tundra or vegetative cover is prohibited unless specifically approved by the NSB Land Management Administrator or his designee.
46	Tundra Protection – General	Development is required to maintain the natural permafrost insulation quality of existing soils and vegetation.
47	Tundra Protection – General	Trails, campsites, and worksite must be kept clean. No littering is allowed. All solid waste including incinerator residue must be backhauled to an authorized solid waste disposal facility.
48	Tundra Protection – General	Winter on-tundra travel may begin when six inches of snow cover and twelve inches of frost depth conditions exist, consistent with State regulations, for the activities intended as determined by an authorized field representative of the Administrator. Certain on-tundra activities may begin sooner than others depending on the impact or magnitude of the operations.
49	Tundra Protection – General	After April 15 of each year, on-tundra travel must be subject to termination within 72 hours of notification by the NSB Administrator or his/her designee for protection of surface vegetation.

Note: ADF&G (Alaska Department of Fish and Game); BLM (Bureau of Land Management); CPAI (ConocoPhillips Alaska, Inc.); DWM (Department of Wildlife Management); GPS (global positioning system); IHLC (department of Inupiat History, Language and Culture); KSOP (Kuukpik Subsistence Oversight Panel); Kuukpik (Kuukpik Corporation); NSB (North Slope Borough); NVN (Native Village of Nuiqsut); SHPO (Alaska State Historic Preservation Office); USFWS (U.S. Fish and Wildlife Service).

Table 5.3. North Slope Borough Rezoning Conditions of Approval

No.	Category	Condition of Approval
1	Wildlife Disturbance – Gravel Infrastructure	CPAI will use insulation in the Willow gravel infrastructure to reduce the height (and visual barrier) of these features to minimize impacts on caribou movement, subject to obtaining necessary permits and agency authorizations. CPAI will submit a detailed implementation plan, including explanation of where insulation is and is not practicable, to the NSB by September 30, 2021, pursuant to NSBMC Chapter 19.50.

No.	Category	Condition of Approval
2	Wildlife Disturbance – Airstrip	CPAI will reduce the length of the Willow airstrip to a maximum 5,700 feet long. Final approval of the airstrip dimensions will be determined in accordance with NSBMC Chapter 19.50. CPAI has no plans to use the Willow airstrip for Boeing 737s or similar passenger aircraft, and therefore will leave the surface of the runway as gravel. Any modification of this condition, including the use of Boeing 737s or similar passenger aircraft, will require approval of the NSB Assembly. The airstrip permit application will include an analysis of required runway dimensions based on aircraft manufacturer guidance, Federal Aviation Administration requirements and recommendations, safety considerations, and engineering best practices.
3	Use Plans – Vehicle Plan	CPAI will provide the NSB a vehicle plan that includes restrictions on, and minimization of vehicle use, during sensitive periods (e.g., caribou calving, bird nesting, peak caribou subsistence activity). The objective of the vehicle plan is to mitigate potential impact of Willow project vehicle traffic on caribou calving, bird nesting, and peak subsistence activity. A vehicle plan for construction activities beginning in 2022 will be developed in consultation with the North Slope Borough Wildlife Department, and submitted for review and approval, in accordance with NSBMC Chapter 19.50, no later than September 1, 2021 and updated as needed when drilling and operations commence.
4	Use Plans – Aircraft Plan	CPA will provide the NSB an aircraft plan that minimizes aircraft use during sensitive time periods (e.g., caribou calving, bird nesting, peak caribou subsistence activity) and will include a communication protocol with the local community. The objective of the aircraft plan is to mitigate potential impact of Willow project air traffic on caribou calving, bird nesting, and peak subsistence activity. An aircraft plan will be developed in consultation with the NSB Wildlife Department and submitted for review and approval, in accordance with NSBMC Chapter 19.50, at least six months prior to the Willow airstrip commissioning.
5	Use Plans – Diesel Use Plan	CPAI will submit a diesel use plan for review and approval, in accordance with NSBMC Chapter 19.50, by October 31, 2021. The plan will include an analysis of diesel transportation, including the conversion of existing pipelines or the utilization of Willow pipelines authorized in the Willow Master Development Plan Environmental Impact Statement Record of Decision for diesel transportation. The objective of this plan is to minimize traffic impacts and spill impacts due to human error on roads in high-use subsistence areas.
6	Subsistence – Good Neighbor Policy	During the construction period of the Willow Project (prior to start-up of the central processing facility), if requested by the NSB Subsistence Mitigation Committee, in addition to the existing contributions, CPAI will provide an annual air charter for a group of Nuiqsut hunters and their gear to support caribou subsistence activities. This will be requested and administered by the NSB's Subsistence Mitigation Committee. CPAI will develop a Good Neighbor Policy on caribou in consultation with the community of Nuiqsut and the NSB Wildlife and Planning Departments. CPAI will host at least one community workshop in the Village of Nuiqsut to obtain input from hunters and residents prior to October 31,2021. The Good Neighbor Policy will include support to transport Nuiqsut caribou subsistence hunters and their gear to and from areas where caribou are available if it is determined that the Willow Project has significantly impacted the ability of the hunters to harvest caribou based on criteria in the Good Neighbor Policy. The determination will be made by the Director of the North Slope Borough Planning Department, in consultation with the North Slope Borough Wildlife Department. CPAI will submit a Good Neighbor Policy to the North Slope Borough on or before June 30,2022 for review and approval, in accordance with NSBMC Chapter 19.50.

No.	Category	Condition of Approval
7	Mitigation – Mitigation Fund Agreement Amendments	CPAI will amend Section 1(b) of the Oil Spill Mitigation Fund Agreement for the Alpine Development District (executed August 2019) ("Agreement"), to incorporate the Willow Development District into the Agreement, with an effective date prior to Willow first oil. The Agreement will also be amended to include spills to land. To accomplish that, Section 2(a)(i) of the Agreement will be deleted in its entirety and replaced with the following: "CPAI's oil and gas activities in the Alpine or Willow Development Districts cause oil to be present on land or in the water, or on the ice over water." CPAI will submit this amendment for NSB review and approval, in accordance with NSBMC Chapter 19.50, six months prior to anticipated Willow first oil.

Note: CPAI (ConocoPhillips Alaska, Inc.); NSB (North Slope Borough); NSBMC (North Slope Borough Municipal Code).

6.0 PROPONENT'S ADDITIONAL MITIGATION MEASURES

CPAI also provides additional mitigation to offset impacts from all CPAI developments in the Nuiqsut area (not the Willow Project alone). These efforts, while not required by the BLM under this Decision, serve to mitigate impacts from oil and gas development on the North Slope. These efforts are summarized below:

- Providing the City of Nuiqsut access to a grant writer to assist with grant proposals, which could increase the local understanding that mitigation funds are available and decrease some concerns over the impacts of the Project.
- Providing funding for accounting support, which is critical to successfully managing grant money.
- Continuing to provide resources, access, or services from CPAI North Slope developments to residents of Nuiqsut through the CPAI outreach program. The program includes:
    - Providing annual grants to support the Alaska Eskimo Whaling Commission (though this does not provide a direct benefit to Nuiqsut residents, the Nuiqsut Whaling Captains Association is affiliated with the Alaska Eskimo Whaling Commission, along with the other 10 Alaskan whaling communities)
    - Providing education and workforce development programs (Nuiqsut Trapper School, Ilisaġvik College, scholarship funds, and more)
    - Funding community projects (such as the Elder's Housing Project, Nuiqsut playground, outdoor basketball court, and early learning center)
    - Making donations to the community (including fire trucks, spill response boats, supplies for the teen center, etc.)
    - Providing emergency response assistance to the community of Nuiqsut
- Assisting the City of Nuiqsut with the design and construction of a Colville River boat launch.
- Engaging with the Nuiqsut search and rescue group to identify opportunities for CPAI to support them with equipment needs or equipment staging. CPAI will continue to support the Nuiqsut Community Development Foundation which supports the City of Nuiqsut in obtaining and managing grants for community needs, such as search and rescue.
- Providing natural gas to the community of Nuiqsut (per agreement with Kuukpik Corporation).
- Providing funds to support administration of the Kuukpik Subsistence Oversight Panel (per agreement with Kuukpik Corporation).
- Funding of scholarships via the Kuukpikmiut Foundation (per agreement with Kuukpik Corporation).[4]

[4] The project proponent may also add to these measures a relinquishment of leases within the northern and southern areas of the Bear Tooth Unit that are not targeted by the approved drill sites (BT1, BT2 and BT3). The Proponent may request to relinquish those leases to conform the Bear Tooth Unit to this Decision. The BLM would work through standard procedures to process and approve any such request.

7.0 REFERENCES

ADF&G. 2002. *Aquatic Nuisance Species Management Plan*. Juneau, AK: ADF&G, Aquatic Nuisance Species Task Force.

ADOT&PF. 2006. *Alaska Highway Drainage Manual*.

BLM. 2013. *National Petroleum Reserve-Alaska Integrated Activity Plan/Environmental Impact Statement Record of Decision*. Anchorage, AK.

-----. 2022a. *National Petroleum Reserve-Alaska Integrated Activity Plan/Record of Decision*. Anchorage, AK.

-----. 2022b. *BLM response to NMFS regarding proposed mitigation measures*.

European Environment Agency. 2011. Forests, Health and Climate Change. https://www.eea.europa.eu/articles/forests-health-and-climate-change.

Lawhead, B.E., J.P. Parrett, A.K. Prichard, and D.A. Yokel. 2006. *A Literature Review and Synthesis on the Effect of Pipeline Height on Caribou Crossing Success*. Open-File Report 106. Fairbanks, AK: BLM.

Lawhead, B.E., A.K. Prichard, M.J. Macander, and M. Emers. 2004. *Caribou Mitigation Monitoring Study for the Meltwater Project, 2003: Third Annual Report*. Anchorage, AK: Prepared by ABR, Inc. for ConocoPhillips Alaska, Inc.

Limpinsel, D.E., M.P. Eagleton, and J.L. Hanson. 2017. *Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska: EFH 5-Year Review, 2010 through 2015*. NOAA Technical Memorandum NMFS-F/AKR-14. Anchorage, AK: NMFS.

NMFS. 2022. *Essential Fish Habitat correspondence to BLM regarding mitigation measures*.

-----. 2023. *Willow Master Development Plan Letter of Concurrence*.

UNFCCC. 2021. *The United States of America Nationally Determined Contribution. Reducing Greenhouse Gases in the United States: A 2030 Emissions Target*.

USACE. 1986. *Accuracy of Computed Water Surface Profiles*. Davis, CA: Prepared by USACE Hydrologic Engineering Center for Federal Highway Administration.

USFS. 2021. *Budget Justification: FY 2022*. U.S. Department of Agriculture.

USFWS. 2023. *U.S. Fish and Wildlife Service Final Willow Master Development Plan Biological Opinion*.

Yokel, D., D. Huebner, R. Meyers, D.A. Nigro, and J.M. Ver Hoef. 2007. *Offsetting Versus Overlapping Ice Road Routes from Year to Year: Impacts to Tundra Vegetation*. Anchorage, AK: BLM.

Record of Decision

Willow Master Development Plan

Appendix B
Alaska National Interest Lands Conservation Act Section 810 Compliance

March 2023

This page intentionally left blank.

Table of Contents

List of Acronyms

ANILCA	Alaska National Interest Lands Conservation Act
BLM	Bureau of Land Management
BT1	Bear Tooth drill site 1
BT2	Bear Tooth drill site 2
BT3	Bear Tooth drill site 3
BT4	Bear Tooth drill site 4
BT5	Bear Tooth drill site 5
Decision	Record of Decision
EIS	Environmental Impact Statement
GMT-2	Greater Mooses Tooth 2
IAP	Integrated Activity Plan
LS	lease stipulation
MDP	Master Development Plan
NPR-A	National Petroleum Reserve in Alaska
Project	Willow Master Development Plan Project
ROD	Record of Decision
ROP	required operating procedure
TLSA	Teshekpuk Lake Special Area
WPF	Willow Processing Facility

This page intentionally left blank.

1.0 ALASKA NATIONAL INTEREST LANDS CONSERVATION ACT SECTION 810 COMPLIANCE

The Alaska National Interest Lands Conservation Act (ANILCA) Section 810 provides that no public land uses which would significantly restrict subsistence uses shall be effected until the federal agency gives the required notice and holds a hearing in accordance with ANILCA Section 810(a)(1) and (2) and makes the three determinations required by ANILCA Section 810(a)(3)(A), (B), and (C). The three determinations that must be made are:

1. That such a significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of public lands;
2. That the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition; and
3. That reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action.

The ANILCA Section 810 analysis and findings for the Willow Master Development Plan (MDP) Project (Project) are included in Final Supplemental Environmental Impact Statement (EIS) Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, and are summarized in the following paragraph with respect to Alternative E and Module Delivery Option 3 as described in the Final Supplemental EIS.

The Bureau of Land Management's (BLM) findings conclude that the Project is not expected to result in a large reduction in the abundance (population level) of caribou or any other subsistence resource. However, the evaluation concludes that under Alternative E (and the other action alternatives) the Project may significantly restrict subsistence uses for the community of Nuiqsut due to a reduction in the availability of caribou and furbearers caused by the alteration of their distribution and limitations on subsistence user access in or near the Project area. Module Delivery Option 3, in combination with Alternative E, would not result in any additional significant restriction of subsistence uses for communities in or near the Project area. BLM's findings conclude that the Project, when considered along with the cumulative effects of current and future activities, may also significantly restrict subsistence uses for Nuiqsut due to a reduction in availability of caribou and furbearers caused by the alteration of their distribution and limitations on subsistence user access in or near the Project area.

Consistent with ANILCA Section 810 (a)(1) and (2), and in light of the positive "may significantly restrict subsistence uses" findings described above, BLM undertook notice and hearing procedures in conjunction with the release of the Willow MDP Draft Supplemental EIS in order to solicit public comment from the potentially affected community of Nuiqsut. Input from the subsistence hearing conducted in Nuiqsut was incorporated into the final ANILCA Section 810 evaluation; however, no alterations were made to the final findings.

Because the final ANILCA Section 810 evaluation concludes that Alternative E and Module Delivery Option 3 as described in the Final Supplemental EIS may significantly restrict subsistence uses, including in the cumulative case, BLM is required to make the three determinations required by ANILCA Section 810(a)(3)(A), (B), and (C) found in this Appendix. These determinations incorporate this Decision's disapproval of drill site BT5 in lieu of its deferral, as well as the disapproval of drill site BT4.

1.1 Significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of public lands

BLM has prepared the Willow MDP Supplemental EIS in response to the United States District Court of Alaska's 2021 decision remanding the Willow MDP EIS to BLM for the purpose of addressing National Environmental Policy Act deficiencies in its analysis of ConocoPhillips Alaska, Inc.'s proposal to construct infrastructure necessary to allow the production and transportation to market of federal oil and

as resources in the Willow reservoir located in the Bear Tooth Unit in the northeast area of the National Petroleum Reserve in Alaska (NPR-A).

In its preparation of the Willow MDP Supplemental EIS, BLM considered and balanced a variety of factors in its development of Project alternatives and analysis of proposed Project activities on public lands. Prominent in its considerations were comments received during public scoping and comment periods and hearings that emphasized the importance of protecting caribou movement and migration and reducing the effects of industrial development on subsistence use and the traditional ways of life of the community of Nuiqsut. In recognition of these comments and consistent with the United States District Court's direction to consider alternatives that provide "maximum protection" for surface values in the Teshekpuk Lake Special Area (TLSA) in accordance with the BLM's statutory directives, BLM added a fourth action alternative (Alternative E), which reduces infrastructure within the TLSA relative to the previously analyzed action alternatives.

BLM has determined that Alternative E as modified and approved in this Decision [BT1, BT2 and BT3 approved; BT5 disapproved] combined with Module Delivery Option 3 (Colville River Crossing) best fulfills the purpose and need of the proposed action while also incorporating protective measures and Project features to reduce impacts to important subsistence uses and resources. By substantially reducing the overall amount of infrastructure, including in the TLSA, Alternative E reduces potential impediments to caribou movement and subsistence users. The construction of up to three new subsistence use boat ramps will help mitigate the impact of the proposed action on subsistence uses and resources by providing additional access points to important subsistence use areas. Additionally, the lease stipulations (LSs) and required operating procedures (ROPs) established by the 2022 NPR-A Integrated Activity Plan (IAP)/EIS Record of Decision (Decision or ROD) (BLM 2022) that apply to the alternative, combined with the additional mitigation measures adopted in Section 3.0 of Appendix A of this ROD will minimize the impact of the proposed action on subsistence uses and resources.

BLM has determined that the significant restrictions that may occur under Alternative E as modified and approved in this Decision [BT1, BT2 and BT3 approved; BT5 disapproved], in combination with Module Delivery Option 3, when considered together with all the possible impacts of the action, including the cumulative case, are necessary and consistent with sound management principles for the use of these public lands and BLM's obligations as established under the statutory directives in the Naval Petroleum Reserves Production Act, as amended, the Federal Land Policy and Management Act, and other applicable laws.

1.2 The proposed activity will involve the minimal amount of public lands necessary to accomplish the purpose of such use, occupancy, or other disposition

BLM analyzed a range of alternatives, including a No Action alternative (Alternative A) and four action alternatives (B, C, D, and E) and three module delivery options (1, 2, and 3) which met the purpose and need of the proposed action. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping, including those concerning potential impacts to subsistence uses and resources.

While Alternative A, the No Action Alterative, would involve the least amount of public lands, it would not accomplish the purpose and need of the proposed action. As such, BLM has determined that Alternative E as approved in this Decision [BT1, BT2 and BT3 approved; BT5 disapproved], combined with Module Delivery Option 3, involves the minimal amount of public lands necessary to fulfill the purpose and need of the proposed action. As modified and approved in this Decision, Alternative E includes three drill sites (BT1, BT2, and BT3), the Willow Processing Facility (WPF) and Willow Operations Center, an all-season gravel road connection extending from the Greater Mooses Tooth 2 (GMT-2) drill site southwest to the WPF, an airstrip, infield and export pipelines, and gravel roads (including five turnouts with subsistence/tundra access ramps and five bridges) connecting the three drill sites to the WPF. Gravel roads would cross Judy (Iqalliqpik), Judy (Kayyaaq), and Fish creeks.

In addition to Project infrastructure, the Proponent would also construct up to three boat ramps for subsistence uses. One of the boat ramps (common to all action alternatives) would provide access to the Ublutuoch (Tiŋmiaqsiuġvik) River along the existing gravel road between Alpine drill site CD5 and the Greater Mooses Tooth 1 drill site. Up to two additional boat ramps would be constructed along Judy (Iqalliqpik) Creek and/or Fish Creek pending further community input. All three boat ramps would be accessed via short roads connected to Project roads near Project bridges. During construction, the Project would also develop the Tiŋmiaqsiuġvik gravel mine site, with two distinct mine site pits.

Under Module Delivery Option 3, large sealift modules (weighing between 3,000 and 4,000 tons) would be received at the Oliktok Dock and transported over the existing gravel road network in Kuparuk south to existing drill site DS2P. From DS2P, the modules would be transported via a task-specific ice road across the Colville River (near Ocean Point) to the Project area near the GMT-2 drill site. From GMT-2, the modules would be transported over Project gravel roads to their installation location. Alternative E, combined with Module Delivery Option 3, as approved in this Decision (BT1, BT2 and BT3 approved; BT5 disapproved), would have a total footprint of approximately 499 acres (384 acres of gravel footprint and 115.0 acres of excavation). This is less than any of the other action alternatives.

All Project activities were developed in accordance with the 2022 NPR-A IAP ROD and Section 404 of the Clean Water Act, which all require lessees to minimize facility footprints and propose siting and alignment of facilities in such a manner as to minimize environmental impacts to various resources (e.g., caribou, wetlands).

1.3 Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions

BLM used information acquired through analysis of impacts to subsistence, insight from public meetings and ANILCA Section 810 hearings, and consultation with tribal and local governments to inform its selection of a modified Alternative E in this Decision. This Decision adopts Alternative E but in doing so further reduces impacts to subsistence uses by disapproving drill site BT5, as well as drill site BT4 (analyzed in Alternatives B, C, and D), and includes protective measures in the form of LSs, ROPs, Project design measures, and additional adopted mitigation measures which serve to reduce or minimize adverse impacts to subsistence uses. The full suite of protective measures applicable to the approved project is detailed in Appendix A of this ROD.

Existing measures as established by the 2022 NPR-A IAP/EIS ROD that would help minimize adverse impacts to subsistence resource availability and abundance, as well as subsistence use areas, and subsistence access associated with the construction, drilling, and operation of oil and gas facilities include ROPs A-11, E-1, E-3, E-7, F-4, H-1, and H-3 and Lease Stipulation K-1.

Specific Project design measures that would help minimize impacts to subsistence uses include Design Measures 68, 69, 72, and 112. As applied to Alternative E as adopted by this Decision, Design Measure 112 includes the construction of up to three subsistence boat ramps to provide local residents with improved river access. Locations would include the Ublutuoch (Tiŋmiaqsiuġvik) River near the existing GMT-1 access road, Judy (Kayyaaq) Creek at the proposed Willow BT1 access road crossing, and Fish Creek at the proposed access road crossing (BT2 under Alternative E).

Additional mitigation measures adopted in this Decision that would help minimize impacts to subsistence uses include Measures 1, 2, 11, 13, 15, 16, 17, 18, 21, and 24, 26, and 27. These measures were informed by input from BLM specialists, cooperating agencies, tribal and local governments, and other key stakeholders collected during the Willow MDP Supplemental EIS informal public scoping period and public comment period.

Although not required by BLM or adopted as part of this Decision, the North Slope Borough included both required stipulations and mitigation measures and conditions of approval as part of the North Slope Borough's rezoning process. Of these, Mitigation Measures 2, 3, 4, 5, 13, 22, 23, and 37 and Conditions of Approval 1, 3, 4, and 6 would help minimize adverse impacts to subsistence resource availability and

abundance, as well as subsistence use areas, and subsistence access associated with the construction, drilling, and operation of oil and gas facilities.

Additionally, this Decision's disapproval of drill sites BT4 and BT5 further reduces impacts to subsistence resources and uses, including in the sensitive TLSA. Elimination of these drill sites and their associated road and pipeline segments will substantially reduce impacts to subsistence resources and uses, including impediments to caribou movement and subsistence user access that are the basis of the positive "may significantly restrict subsistence uses" finding made in Appendix G of the Final Supplemental EIS.

Given these numerous protective measures that would apply to the Project under this Decision to reduce subsistence impacts, BLM determines that reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources from the action approved in this Decision.

2.0 REFERENCES

BLM. 2022. *National Petroleum Reserve in Alaska Integrated Activity Plan/Record of Decision*. Anchorage, AK.

This page intentionally left blank.