U.S. Department of the Interior
Bureau of Land Management

Willow Master Development Plan

Environmental Impact Statement

FINAL

Volume 4: Appendices B through E.2

August 2020

Prepared by:
U.S. Department of the Interior
Bureau of Land Management

In Cooperation with:
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Native Village of Nuiqsut
Iñupiat Community of the Arctic Slope
City of Nuiqsut
North Slope Borough
State of Alaska

Estimated Total Costs Associated with Developing and Producing this EIS: $6,668,400

Mission

To sustain the health, diversity, and productivity of the public lands for the future use and enjoyment of present and future generations.

Cover Photo Illustration: Caribou in the Alpine Development on Alaska's North Slope.
Photo by: Wendy Mahan, courtesy of ConocoPhillips.

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BLM/AK/PL-19/012+1610+F010

Willow Master Development Plan

Appendix B
Public Engagement and Comment Response

August 2020

Appendix B.1
Scoping Process and Comment Summary

Appendix B.2
Draft EIS Comments and BLM Responses

Appendix B.3
Supplement to the Draft EIS Comments and BLM Responses

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Willow Master Development Plan

Appendix B.1
Scoping Process and Comment Summary

August 2020

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Table of Contents

List of Tables

List of Acronyms

BLM	Bureau of Land Management
EIS	Environmental Impact Statement
NEPA	National Environmental Policy Act

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1.0 PUBLIC ENGAGEMENT AND SCOPING PROCESS

Public involvement is an integral part of the National Environmental Policy Act (NEPA) process and is required in the preparation and implementation of agencies' NEPA procedures. The Bureau of Land Management (BLM) published a Notice of Intent to prepare an Environmental Impact Statement (EIS) on August 7, 2018, and held public scoping meetings from August 20, 2018, to September 18, 2018 (Table B.1.1). Meeting dates and locations were advertised on the BLM Willow MDP ePlanning website and through local media (print and radio). Flyers on meetings were also sent to local organizations to be posted in public locations.

Table B.1.1. Scoping Meeting Dates and Locations

Meeting	Date	Location
Public meeting #1	August 20, 2018	Utqiaġvik (Barrow)
Public meeting #2	August 22, 2018	Fairbanks
Public meeting #3	August 23, 2018	Anchorage
Public meeting #4	August 27, 2018	Atqasuk
Public meeting #5	August 29, 2018	Anaktuvuk Pass
Public meeting #6	September 18, 2018	Nuiqsut
Community open house	November 1, 2018	Nuiqsut

The original scoping period was 30 days; however, it was extended by 14 days due to public requests and officially ended on September 20, 2018. The community of Nuiqsut was given an additional 8 days to comment, for a total of 52 days, because many community members were whaling during much of the scoping period. The scoping period was announced in the *Federal Register*, local newspaper ads, radio announcements, postcard mailers to the mailing list (including all post office boxes in Nuiqsut), a BLM news release, and the BLM Willow MDP ePlanning website. Public comments were received via email and mail and at public meetings.

The presentation used during public scoping, transcripts of each meeting, public and agency input received during the scoping process, and a summary scoping report are available on the BLM Willow MDP ePlanning website.

2.0 COMMENT SUMMARY

A total of 1,430 respondents submitted comments during the scoping period. Of these, the majority of comments were submitted via email or mailed-in letters (98%) and the remainder (2%) submitted verbally at public scoping meetings. Of the comment letters, the majority (95%) were submitted as form letters (i.e., letters containing identical content), while the remainder were either form letters with slight modifications (1%) (e.g., one or two unique sentences added, but otherwise identical to a form letter) or unique comment letters (4%) (i.e., original letters that did not have identical or almost identical wording as another letter). The 1,330 form letter submissions all originated from a total of five unique form master letters, some of which shared overlapping phrases or bullet points.

Nearly all respondents were individuals (99%), with the exception of one tribe, two Native corporations, one business, four organizations, and eight government agencies (Table B.1.2). Individuals who provided their business title or employer information in their letter or testimony but did not state that they were an official representative were counted as individuals as opposed to businesses or organizations.

Table B.1.2. Respondent Group Types

Respondent Group Type	Respondent Title
Tribes/Alaska Native Claims Settlement Act corporations	Native Village of Nuiqsut* Kuukpik Corporation Doyon Limited
Businesses and organizations	Alaska Chamber Audubon Alaska North Star Terminal and Equipment Services Resource Development Council Combined comment from: Alaska Climate Action Network, Alaska Wilderness League, Center for Biological Diversity, Conservation Lands Foundation, Defenders of Wildlife, Earthjustice, Northern Alaska Environmental Center, and The Wilderness Society
Government agencies	Alaska Department of Fish and Game* Alaska Department of Natural Resources (DNR) Division of Mining, Land, and Water* Alaska DNR Division of Oil and Gas* Alaska DNR Office of Project Management and Permitting* Alaska Department of Fish and Game* Alaska Office of History and Archaeology/State Historic Preservation Office* North Slope Borough* U.S. Environmental Protection Agency* U.S. Fish and Wildlife Service*

*Cooperating agency

Within each comment letter or verbal transcript, individual comments (i.e., stand-alone comments that relate to a single issue, idea, or conclusion) were identified and grouped into one or more of the following categories listed in Table B.1.3. Comment categories are either defined by individual resources which may be affected by the project, individual elements of the proposed project, or specific phases and aspects of the EIS/NEPA process (Table B.1.3). Categories are intended to describe the main topic or resource that is discussed in the comment, regardless of whether the comment is expressing opposition or support for the project as it relates to that topic. Any comments identified within form letters were categorized only once and counted as a single comment no matter how many form letters with that same comment were submitted.

Table B.1.3. Comment Categories

Resource Topics	Project Element Topics	EIS/NEPA Process Topics
Caribou and General Wildlife Subsistence Safety/Emergency Response Human Health General Socioeconomics Nuiqsut Socioeconomics Air Quality Water Quality Teshekpuk Lake Special Area Domestic Oil Production/Tran-Alaska Pipeline System Climate Change	General Statement of Support Proponent Track Record Project Description Mitigation Minimal Environmental Impacts Integrated Activity Plan (IAP)	EIS Process/Timeline Stakeholder Engagement Cumulative Effects Alternatives Request for Extended Scoping Period

A total of 377 individual comments were identified from the various letters and verbal testimonies and categorized, as shown in Table B-4. Half of all comments (50%) fell into the following top five categories: General Socioeconomics, Subsistence, Nuiqsut Socioeconomics, Alternatives, and Proponent Track Record. Additional details concerning the content of comments and their key points are summarized in Table B.1.5.

Table B.1.4. Comments Received

Comment Category	No. Comments Received	% Total Comments
General Socioeconomics	67	17.8%
Subsistence	39	10.3%
Nuiqsut Socioeconomics	29	7.7%
Alternatives	26	6.9%
Proponent Track Record	26	6.9%
General Statement of Support	23	6.1%
EIS Process/Timeline	21	5.6%
Caribou and General Wildlife	20	5.3%
Domestic Oil Production/Trans-Alaska Pipeline System	18	4.8%
Human Health	17	4.5%
Project Description	15	4.0%
Air Quality	12	3.2%
Stakeholder Engagement	11	2.9%
Minimal Environmental Impacts	10	2.7%
Safety/Emergency Response	7	1.9%
Cumulative Effects	6	1.6%
Mitigation	6	1.6%
Teshekpuk Lake Special Area	6	1.6%
Climate Change	5	1.3%
Water Quality	5	1.3%
2013 Integrated Activity Plan	4	1.1%
Request for Extended Scoping Period	4	1.1%
Sum	**377**	**100%**

Table B.1.5. Comment Summary

Comment Category	Summary of Key Points
General Socioeconomics	Commenters requested that the EIS include an analysis of potential benefits to local/state/national economies resulting from construction/operation/indirect jobs, increased tax revenue and royalties, reduced TAPS tariffs, the NPR-A Impact Mitigation Grant Program, project-funded environmental/biological research, project-funded infrastructure (e.g., roads or pipeline spurs), a low-cost natural gas supply for Nuiqsut, and potential indirect environmental benefits resulting from these socioeconomic improvements. Comments stated that the EIS should identify the specific communities (including any that are low income or minority), federally recognized tribes, and corporations that could be impacted socioeconomically as a result of changes in subsistence-based economies and access to traditional use areas and traditional foods.
Subsistence	Commenters requested that the EIS evaluate the potential benefits of new roads for subsistence hunting, and for people who don't have off-road capable vehicles or snowmobiles. Respondents also indicated that the EIS should evaluate potential adverse effects of air/ground traffic, blasting/mining activities, and project infrastructure (including roads, gravel island, haul routes, gravel mine, or pipelines) on caribou migration patterns and other species of wildlife, and the resulting impacts to subsistence hunting, fishing, or whaling, especially for the Nuiqsut community. Nuiqsut community members requested that mitigation should be provided for any adverse impacts to Nuiqsut subsistence hunting. Kuukpik Corporation encouraged any analysis of access road impacts to include a thoughtful and balanced analysis of both potential adverse impacts (on caribou/avoidance effect, air quality, water quality or other resources) as well as potential beneficial impacts to subsistence hunters/access (in terms of the number of trips, areas able to be accessed, areas subject to reduced pressure, etc.). One comment requested that the BLM should not allow the gravel mine to be reclaimed and used as a human-made lake with artificially introduced fish for subsistence use. Respondents requested specific attention be given to important subsistence areas such as Fish Creek, Judy Creek, and Harrison Bay.
Nuiqsut Socioeconomics	Commenters requested that the EIS evaluate potential adverse socioeconomic or environmental justice impacts to the Village of Nuiqsut resulting from: health impacts and cost of medical treatment, subsistence impacts and cost of food subsidies, and increased use of public resources including health clinics and emergency response resources, as well as evaluating whether project-created jobs could specifically benefit the village of Nuiqsut. Some comments also stated that the BLM should re-evaluate NPR-A royalty distributions, and whether or not royalties are being distributed in a fair and equitable manner where the number of royalty shares are commensurate with the severity of impacts felt by the community. The Native Village of Nuiqsut requests that any analysis of potential impacts to tribal communities and resources be performed in accordance with their Project and Land Management Evaluation Rubric as well as Section VIII of the Alaska National Interest Lands Conservation Act.
Proponent Track Record	Commenters expressed confidence in the Project Proponent's (ConocoPhillips Alaska, Inc.) ability to construct and operate a project on the North Slope in an environmentally responsible and safe manner, working cooperatively with stakeholders and in a way that respects and protects the subsistence lifestyle of local communities.
General Statement of Support	Commenters expressed their general support for "responsible oil and gas developments" in the NPR-A, including the proposed Willow Master Development Plan.
EIS Process/Timeline	Most comments within this category encouraged BLM to complete the EIS analysis in a timely and efficient manner, consistent with new executive orders and secretarial guidance and focusing on the issues that matter most to the public. Commenters added that the sooner the project gets approved, the sooner project-related socioeconomic benefits can be realized for local and state economies. In addition, commenters encouraged the use of a science-based approach. Some commenters requested that BLM ask for additional time or page allowances beyond what is allowed in recent executive and secretarial orders to facilitate a more thorough analysis that will be less vulnerable to legal challenges.
Domestic Oil Production/TAPS	Commenters requested that the EIS include an analysis of potential increases in domestic oil production and associated benefits to national energy and economic security, and the long-term viability and integrity of the TAPS.

Comment Category	Summary of Key Points
Caribou and General Wildlife	Commenters requested that the EIS evaluate potential impacts to caribou and wildlife migration patterns, flora and fauna, fish species, aquatic habitats, wildlife habitat, and fragmentation and associated wildlife impacts. These comments also stated that the evaluation should be done in a scientifically sound manner and should reference existing protections for flora and fauna in the NPR-A IAP/EIS. Specifically, some respondents asked that the EIS evaluate potential impacts to: special areas protected under the IAP and which have been set aside for their importance to caribou, including Teshekpuk Lake Special Area and Colville River Special Area; tundra habitats and species from thermokarst development; caribou migration patterns or avoidance effects from module delivery, aboveground/elevated pipelines, ice roads, and winter activities; shorebirds and waterfowl from habitat loss and aircraft flushing; bird species of concern from habitat loss and roads; whales, seals, and other aquatic species from the gravel island in Harrison bay; and fish species from road crossings and gravel mining. Other requested analysis in comments included: impacts of gravel island and vessel traffic on nearshore/aquatic habitats, fish passage, whales and marine mammal movement, polar bear movement, and bird migration. Kuukpik Corporation requested that at least one alternative be developed and evaluated in the EIS that is specifically aimed at minimizing impacts to caribou, such as modifying some of the infield road alignments to run parallel, instead of perpendicular, to caribou migration patterns, or an elevated loop system to reduce caribou deflection.
Project Description	Commenters requested that the EIS include more detail and explanation for the following project components: timing, design, and location of the proposed developments; reclamation activities; miles of ice roads per year; the difference between “other proposed infrastructure” and roads and pipelines; details concerning the timing and duration of blasting activities; plans for reclamation or continued use of the gravel mine site following project construction; wastewater discharge details; anticipated solid and hazardous waste generation and management methods; injection wells; and dredging and sediment disposal details.
Alternatives	Commenters suggested alternative elements of the proposed action should include: eliminating gravel island/ocean overland transfer in favor of ice road/overland transfer; removal of gravel island in lieu of leaving it in place; a different mine site location to minimize gravel hauling distances; eliminating the new Willow airstrip/runway and using the existing one at Alpine; using the existing central processing facility in Prudhoe Bay instead of building a new one; alternative drill site and road locations or road alignments (east-west instead of north-south); innovative pipeline designs, such as an elevated loop system; widening Willow Road for use as an airstrip in lieu of constructing an entirely new standalone airstrip; road routes with or without connections to Greater Mooses Tooth 2; a roadless alternative (aircraft only); making Willow or Nuiqsut a hub for future NPR-A developments as opposed to Alpine; eliminating or minimizing the number of roads or other proposed facilities within Teshekpuk Lake Special Area and Colville River Special Areas (specifically, eliminating the approximately 7-mile north-south drill site access road through Teshekpuk Lake Special Area or eliminating drill sites BT2 and BT4 and the roads to them); or any other alternative design that reduces the footprint of the project and reduces the amount of new infrastructure being proposed. In addition, the U.S. Environmental Protection Agency commented if unavoidable impacts to jurisdictional wetland and waters are proposed, an alternatives analysis to satisfy the Section 404(b)(1) guidelines of the Clean Water Act will be required to support a finding that the proposed discharge represents the “least environmentally damaging practicable alternative.”
Human Health	Commenters requested that the EIS consider potential adverse impacts of the project on human health as a result of air pollution, water pollution, stress, limited access to medical resources, changes in socioeconomic status, or changes in traditional way of life and diet. Specific concerns expressed by respondents include asthma and other respiratory and cardiovascular diseases, cancer, genetic mutations and endocrine disruption, bioaccumulation of toxins in animals and food, general exposure to toxins in air and drinking water, reduced access to traditional food sources or inadequate food supply. Some commenters indicated that a health risk assessment or health impact assessment may be warranted and that the BLM should consider partnering with local, state, tribal, and federal health officials to determine an appropriate path forward and to identify data needs. The Village of Nuiqsut requested that a qualified third party with no conflicts of interest be responsible for preparing the health impact assessment.

Comment Category	Summary of Key Points
Minimal Environmental Impacts	Commenters generally indicated that they felt the project would result in minimal environmental impacts if the following industry standards or project elements are implemented: implementation of North Slope best management practices, use of existing road and pipeline infrastructure in the Alpine/Kuparuk areas and Colville River/Kuparuk River Units to minimize project footprint, maintaining standards for safety and emergency response, maintaining rigorous industry standards for environmental and subsistence protections on North Slope, and use of modern technology or design refinements to minimize the project footprint.
Air Quality	Commenters requested that the EIS evaluate potential air quality impacts from project emissions including: fine particulate matter, diesel exhaust, anthrax released from thawing permafrost, benzene, hydrogen sulfide, hazardous air pollutants, ozone, smoke, and volatile organic compounds. Respondents stated that any potential sources of emissions should be described along with their associated air pollutants, such as heavy machinery, flaring of gas, activities or equipment that can cause fugitive dust or leaks, and marine vessels. Some comments also asked that air quality modelling be performed to support the analysis presented in the EIS, and potential mitigation and control measures be identified.
Stakeholder Engagement	Many commenters expressed confidence in the Project Proponent's track record for engaging and cooperating with stakeholders on the North Slope. Conversely, several commenters, particularly people from, or advocating for, tribal communities such as the Village of Nuiqsut, requested an increased effort from BLM to engage with the tribe and address all of their comments and concerns in the development of the EIS. These commenters also requested that BLM better define and clarify the tribe's role in the NEPA process and recommended incorporating traditional cultural knowledge into the EIS analysis where appropriate. The Native Village of Nuiqsut expressed concern over their ability to provide meaningful input and engagement throughout the NEPA process for Willow given the number of regional planning projects currently underway and capacity challenges for the tribe.
Safety/Emergency Response	Commenters requested that the EIS evaluate potential beneficial or adverse impacts to emergency response as a result of new roads and airstrips, or the potential for public travel along project access roads leading to an increased need for emergency response (e.g., towing assistance). Commenters also requested that the EIS discuss spill and emergency response procedures and capabilities given the remote nature of the site, potential seismic risks, spill and leak detection methods, containment and cleanup operations, hazardous materials management and storage, and any toxic hazards.
Climate Change	Commenters requested that the EIS consider long-term and cumulative effects of climate change, including potential changes in weather, vegetation, seismic activity, or sea-level rise/flooding. In addition, commenters requested that the EIS discuss the relationship between thermokarst and climate change and how this might have a cumulative effect on environmental resources when combined with project-related impacts.
Teshekpuk Lake Special Area	Commenters requested that the EIS evaluate potential impacts to wetlands and caribou and other wildlife species and habitats within the Teshekpuk Lake Special Area, and any resulting subsistence impacts to North Slope communities. Respondents stated that the EIS should also describe protections for the Teshekpuk Lake Special Area and how the project complies with applicable use or development restrictions.
Water Quality	Commenters requested that the EIS characterize existing aquatic habitats and water resources in the area and evaluate potential water quality impacts including: introduction of water pollutants, compliance with water quality standards, downstream impacts, water use during construction or operation, groundwater injections, erosion and sedimentation, wastewater discharges, mercury and anthrax released from thawing permafrost, and xylene and benzene.
IAP	Commenters stated that the project conforms to the BLM's 2013 IAP, with no appreciable changes, which further supports and justifies statements of minimal environmental impacts and commenter requests for a timely and efficient EIS process.
Mitigation	Commenters requested that the EIS identify all activities needing mitigation and the types of mitigation activities proposed during construction, operation, or decommissioning of the project. Respondents noted that the EIS should identify the responsible parties for implementing mitigation, monitoring requirements, and where the public can find mitigation effectiveness and monitoring results as they become available. Commenters encouraged the use of the mitigation hierarchy (avoidance, minimization, and compensatory offsets) to ensure that unavoidable impacts are effectively and meaningfully offset with appropriate mitigation.

Comment Category	Summary of Key Points
Request for Extended Scoping Period	Commenters requested additional time to submit scoping comments, based on the complexity of the project, severity of potential impacts, timing of scoping overlapping with timing of subsistence activities, and/or multiple other concurrent or connected development actions currently being planned and reviewed within the region.
Cumulative Effects	Commenters requested that the Cumulative Effects analysis consider future/concurrent/nearby leases and proposed explorations such as Nanushuk, Smith Bay, Alpine CD-5, Special Alaska Lease Sale Areas, and Greater Mooses Tooth 1 and 2, or other projects planned for development on Nuiqsut's traditional subsistence lands which have yet to be constructed. Cumulative effects to the community of Nuiqsut, relating to noise, traffic, thermokarsting, dust, water quality, and human health were specifically mentioned as a concern by some respondents.

Notes: BLM (Bureau of Land Management); EIS (environmental impact statement); IAP (Integrated Activity Plan); NEPA (National Environmental Policy Act); NPR-A (National Petroleum Reserve in Alaska); TAPS (Trans-Alaska Pipeline System).

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Willow Master Development Plan

Appendix B.2
Draft EIS Comments and BLM Responses

August 2020

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Table of Contents

List of Tables

List of Acronyms

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AAAQS	Alaska Ambient Air Quality Standards
ACP	Arctic Coastal Plain
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AEGL	Acute Exposure Guidance Level
AEWC	Alaska Eskimo Whaling Commission
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
AOGCC	Alaska Oil and Gas Conservation Commission
APD	Application for Permit to Drill
AQRV	air quality related value
AQTSD	Air Quality Technical Support Document
AQTWG	Air Quality Technical Work Group

ASRC	Arctic Slope Regional Corporation
ASTAR	Arctic Strategic Transportation and Resources project
BLM	Bureau of Land Management
BMP	best management practice
BOEM	Bureau of Ocean and Energy 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
CAA	Clean Air Act
CAH	Central Arctic Herd
CAMx	Comprehensive Air Quality Model with Extensions
CEQ	Council on Environmental Quality
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPAI	ConocoPhillips Alaska, Inc.
CRD	Colville River Delta
CRSA	Colville River Special Area
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels, used to characterize airborne noise, referenced to 20 µPa
DNA	Determination of NEPA Adequacy
DOI	Department of the Interior
EFH	Essential Fish Habitat
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLPMA	Federal Land Policy and Management Act
FOIA	Freedom of Information Act
GHG	greenhouse gas
GIS	geographic information system
GMA	Goose Molting Area
GMT-1	Greater Mooses Tooth 1
GMT-2	Greater Mooses Tooth 2
HAP	hazardous air pollutant
HDD	horizontal directional drilling
HIA	health impact assessment
IAP	Integrated Activity Plan
IBA	Important Bird Area
IM	Instruction Memorandum
ITR	Incidental Take Regulation
km	kilometers
Kuukpik	Kuukpik Corporation
LS	lease stipulation
m	meters
MDP	Master Development Plan
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
mph	mile per hour
MTI	module transfer island
NAAQS	National Ambient Air Quality Standards

NEMS	National Energy Modeling System
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOx	nitrogen oxides
NOI	Notice of Intent
NPR-A	National Petroleum Reserve in Alaska
NPRPA	Naval Petroleum Reserves Production Act
NSB	North Slope Borough
NVN	Native Village of Nuiqsut
O_3	ozone
OCS	outer continental shelf
PAHs	Polycyclic Aromatic Hydrocarbons
$PM_{2.5}$	particulate matter less than 2.5 microns in aerodynamic diameter
PM_{10}	particulate matter less than or equal to 10 microns in aerodynamic diameter
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
REL	Reference Exposure Level
RFD	reasonably foreseeable development
RFFAs	reasonably foreseeable future actions
rms	root mean square
ROD	Record of Decision
ROPs	required operating procedures
ROW	right-of-way
SALSA	Special Alaska Lease Sale Area
SDEIS	Supplement to the Draft EIS
SO_2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TAPS	Trans-Alaska Pipeline System
TCH	Teshekpuk Caribou Herd
TLSA	Teshekpuk Lake Special Area
UIC	underground injection control
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOCs	volatile organic compounds
VSMs	vertical support members
WAH	Western Arctic Herd
Willow area	area around the gravel infrastructure and mine site for the Project
WOC	Willow Operations Center
WOUS	Waters of the United States
WPF	Willow Processing Facility

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1.0 DRAFT ENVIRONMENTAL IMPACT STATEMENT PUBLIC ENGAGEMENT PROCESS

The Willow MDP Draft EIS comment period began on August 30, 2019, with the publication of a Notice of Availability in the Federal Register. The comment period was open for 45 days and subsequently extended for 15 additional days, ending on October 29, 2019. The public comment period for the Project was also announced via a BLM news release and the Bureau of Land Management's (BLM) Project website. Public comments were received via email and mail, on the BLM's Project website, or at public meetings.

Public meetings were held in Anaktuvuk Pass, Anchorage, Atqasuk, Fairbanks, Nuiqsut, and Utqiaġvik (Barrow), Alaska, to afford the public an opportunity to provide input on the process, including North Slope communities that would be potentially impacted by the Project. The Nuiqsut meeting included the public hearing for comments regarding the Project's potential impact to subsistence resources and activities as per the Alaska National Interest Lands Conservation Act (ANILCA) Section 810. Details concerning dates, times, and locations of the meetings were announced through local news media, newspapers, and the BLM Project website. Verbal comments given at public meetings and the public hearing were documented in formal transcripts for each individual meeting.

The BLM held public meetings on the Draft EIS in September and October 2019 (Table B.2.1). Meeting dates and locations were advertised on the BLM Willow MDP ePlanning website and through local media (print and radio). Flyers on meetings were also sent to local organizations to be posted in public locations.

Table B.2.1. Draft Environmental Impact Statement Public Meeting Dates and Locations

Date	Location
September 9, 2019	Fairbanks
September 10, 2019	Anaktuvuk Pass
September 12, 2019	Anchorage
September 18, 2019	Utqiaġvik (Barrow)
September 19, 2019	Atqasuk
October 2, 2019	Nuiqsut

The presentation used during public scoping, transcripts of each meeting, public and agency input received during the scoping process, and a summary scoping report are available on the BLM Willow MDP ePlanning websit: https://eplanning.blm.gov/eplanning-ui/project/109410/510.

2.0 COMMENT ANALYSIS

The BLM received a total of 935 submissions during the public comment period. (A submission is defined as a single email, letter, webform submission, or speaker in written transcripts.) These were received via email, online, or mailed-in letters, or comments submitted verbally at public meetings. Of the submissions, 490 were unique (i.e., original submissions that did not have identical or almost identical wording as another submission) with the remainder submitted as "form" (i.e., submissions containing identical content) or form submissions with slight modifications (e.g., one or two unique sentences added, but otherwise identical to a form) or unique comment submissions (i.e., original submissions that did not have identical or almost identical wording as another submission). The form submissions all originated from a total of five unique form masters, some of which shared overlapping phrases or bullet points.

Not all respondents noted if they were affiliated with an organization or were providing comments as an individual. Of those that indicated an affiliation, nearly all respondents were individuals. Tribes/tribal corporations, organizations, and governmental agencies (or personnel that commented and provided this information) are shown in Table B.2.2. Individuals who provided their business title or employer information in their letter or testimony but did not state that they were an official representative were counted as individuals, not businesses or organizations.

Table B.2.2. Respondent Group Types

Respondent Group Type	Respondent Title	Respondent Title (continued)
Alaska Native Claims Settlement Act corporations	Arctic Slope Regional Corporation Kuukpik Corporation	Native Village of Nuiqsut Ukpeagvik Iñupiaq Corporation
Businesses and Organizations	Alaska Chamber of Commerce Alaska Crane Alaska District Council of Laborers Alaska Oil and Gas Association Alaska Support Industry Alliance Alaska Wilderness League Alyeska Pipeline Service Co. Anchorage Chamber of Commerce Associated General Contractors of Alaska Audubon Alaska Center for Biological Diversity ConocoPhillips Alaska, Inc. Conservation Lands Foundation Cruz Companies Defenders of Wildlife* Earthjustice Environmental Defense Fund F. Robert Bell and Associates Flowline Alaska Inc. Greater Fairbanks Chamber of Commerce Institute for Policy Integrity at New York University School of Law International Union of Operating Engineers Laborers' International Union of North America	Labors Local 942 Lynden Incorporated Montana Environmental Information Center Native Movement Northern Alaska Environmental Center North Star Terminal & Stevedore Co. LLC, North Star Equipment Services Ocean Conservancy Petro Technical Resources of Alaska PRL Logistics Resource Development Council Rotak Helicopter Services Sierra Club STG Incorporated Teamsters Local 959 The Wilderness Society The Wildlife Society Alaska Chapter Trustees for Alaska Udelhoven Companies Union of Concerned Scientists United Association of Plumbers and Pipefitters United Brotherhood of Carpenters and Joiners WildEarth Guardians
Government agencies and government officials	Harry K. Brower, Jr., North Slope Borough, Office of the Mayor National Oceanic and Atmospheric Administration State of Alaska Department of Natural Resources U.S. Army Corps of Engineers U.S. Coast Guard, Waterways Management Branch U.S. Environmental Protection Agency Region 10	Senator Click Bishop, Alaska State Legislature Senator John Coghill, Alaska State Legislature Senator Cathy Giessel, Alaska State Legislature Raul M. Grijalva, U.S. House of Representatives, Committee on Natural Resources Jared Huffman, U.S. House of Representatives, Subcommittee on Water, Oceans, and Wildlife Alan Lowenthal, U.S. House of Representatives, Subcommittee on Energy and Mineral Resources Senator Lisa Murkowski, U.S. Congress Senator Dan Sullivan, U.S. Congress Don Young, U.S. House of Representatives

* Defenders of Wildlife included a list of their members as signatories to their comment letter. There were approximately 12,600 names on the letter.

Within each comment letter or verbal transcript, individual comments (i.e., stand-alone comments that relate to a single issue, idea, or conclusion) were identified and grouped into one or more of the categories listed in Table B.2.3. Comment categories are either defined by individual resources that may be affected by the Project, individual elements of the Project, or specific phases and aspects of the EIS/NEPA process (Table B.2.3). Categories are intended to describe the main topic or resource that is discussed in the comment, regardless of whether the comment is expressing opposition or support for the Project as it relates to that topic. Any comments identified within form letters were categorized only once and counted as a single comment no matter how many form letters with that same comment were submitted.

Table B.2.3. Substantive Comment Categories

Resource Topics	Project Element Topics	EIS/NEPA Process Topics
Air quality Birds Climate change Environmental justice Fish General economics Land ownership and use Marine mammals Noise Nuiqsut economics Public health Soils and permafrost Terrestrial wildlife Visual resources Water resources Wetlands and vegetation Subsistence and ANILCA Section 810 analysis Spills	Avoidance, minimization, and mitigation National Petroleum Reserve in Alaska Integrated Activity Plan Project description	Alternatives Cumulative effects EIS process or timeline Permitting Purpose and need Request for comment period extension Request for new alternative Request for new analysis Stakeholder engagement

Note: Not all categories were used in coding and are therefore not summarized below. ANILCA (Alaska National Interest Lands Conservation Act); EIS (environmental impact statement); NEPA (National Environmental Policy Act).

Although the BLM diligently considered each comment letter, the comment analysis process involved determining if a comment was substantive or non-substantive. In performing this analysis, BLM relied on Section 6.9.2, *Comments*, in the BLM NEPA Handbook H-1790-1 (2008) to determine what constituted a substantive comment. All substantive comments will be responded to in this report.

Substantive comments do one or more of the following:

- Question, with reasonable basis, the accuracy of information in the EIS or environmental assessment (EA)
- Question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis
- Present new information relevant to the analysis
- Present reasonable alternatives other than those analyzed in the EIS or EA
- Cause changes or revisions in one or more of the alternatives

Additionally, the BLM's NEPA handbook identifies the following types of substantive comments:

- Comments on the Adequacy of the Analysis—Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate are considered substantive; they may or may not lead to changes in the Final EIS. Interpretations of analyses should be based on professional expertise. Where there is disagreement within a professional discipline, a careful review of the various interpretations is warranted. In some cases, public comments may necessitate a reevaluation of analytical conclusions. If, after reevaluation, the BLM Authorized Officer responsible for preparing the EIS does not think that a change is warranted, the response should provide the rationale for that conclusion.

- Comments That Identify New Impacts, Alternatives, or Mitigation Measures—Public comments on a Draft EIS that identify impacts, alternatives, or mitigation measures that the draft did not address are considered substantive. This type of comment requires the BLM Authorized Officer to determine if it warrants further consideration; if so, he or she must determine if the new impacts, new alternatives, or new mitigation measures should be analyzed in the Final EIS, in a supplement to the Draft EIS, or in a completely revised and recirculated Draft EIS.

- Disagreements with Significance Determinations—Comments that directly or indirectly question, with a reasonable basis, determinations on the severity of impacts are considered substantive. A reevaluation of these determinations may be warranted and may lead to changes in the Final EIS. If, after reevaluation, the BLM Authorized Officer does not think that a change is warranted, the BLM's response should provide the rationale for that conclusion.

Comments that are not considered substantive include the following:

- Comments in favor of or against the proposed action or alternatives without reasoning that meet the criteria listed above (such as "we disagree with Alternative Two and believe the BLM should select Alternative Three")
- Comments that only agree or disagree with BLM policy or resource decisions without justification or supporting data that meet the criteria listed above (such as "more grazing should be permitted")
- Comments that don't pertain to the project area or the project (such as "the government should eliminate all dams," when the project is about a grazing permit)
- Comments that take the form of vague, open-ended questions

In response to substantive comments, the BLM could do the following:

- Modify alternatives including the proposed action
- Develop and evaluate alternatives not previously given detailed consideration by the agency
- Supplement, improve, or modify its analyses
- Make factual corrections
- Explain why the comments do not warrant further agency response, citing appropriate sources or authorities

Comments that merely express an opinion for or against the Project were not identified as requiring a response because they meet the BLM NEPA handbook definition for a non-substantive comment. Many comments received throughout the comment analysis process expressed personal opinions or preferences, had little relevance to the adequacy or accuracy of the Draft EIS, or represented commentary on management actions that are outside the scope of the EIS. These commenters did not provide specific information to assist the BLM in making a change to the existing action alternatives, did not suggest new alternatives, and did not take issue with methods used in the Draft EIS; the BLM did not address these comments further in this document.

The BLM read, analyzed, and considered all comments of a personal or philosophical nature and all opinions, feelings, and preferences for one element or one alternative over another. Because such comments were not substantive, the BLM did not respond to them. It is also important to note that, while the BLM reviewed and considered all comments, none were counted as votes. The NEPA public comment period is neither an election nor does it result in a representative sampling of the population. Therefore, public comments are not appropriate to be used as a democratic decision-making tool or as a scientific sampling mechanism.

Within the 490 unique submissions, 554 substantive comments were identified. Chapter 3.0, *Substantive Comment Summary*, provides a summary of the substantive comments received by comment category. Chapter 4.0, *Substantive Comments and Responses*, identifies the substantive comments received on the Draft EIS and provides BLM's response. Subject matter experts reviewed comments that recommended additional studies, data, or scientific literature to be incorporated into the analysis; new information and citations were incorporated into the Final EIS as appropriate.

3.0 SUBSTANTIVE COMMENT SUMMARY

3.1 Air Quality

Comments on air quality primarily focused on concerns that the analysis was inadequate and underestimated the direct and cumulative impacts. Additional concerns were raised that the Draft EIS failed to consider adequate mitigation measures to ensure that no significant air quality impacts would occur. Commenters requested that BLM consider an alternative that minimizes air quality impacts.

3.2 Alternatives

Comments received regarding the alternatives stated that the alternatives were inadequate and narrowed because the purpose and need was too narrow (Section 3.19, *Purpose and Need*). Commenters stated that the No Action Alternative was too easily dismissed.

3.3 Avoidance, Minimization, and Mitigation

Commenters provided several recommendations for additional mitigation measures (see details in Table I.1.3 of Appendix I.1, *Avoidance, Minimization, and Mitigation Technical Appendix*). Examples of these comments are as follows:

- The Project should include large, durably protected areas of ecological value to mitigate for impacts to areas of conservation importance (e.g., TLSA and Colville River Special Area)
- Archaeological surveys should be completed in areas of proposed ground disturbance
- Identify the responsible parties for implementing mitigation or monitoring requirements and identify where the public can find the results of mitigation effectiveness and monitoring as they become available
- Include measures to monitor the effectiveness of proposed long-term mitigation measures and adaptively manage them as needed
- The BLM should rely on BMP E-8 (from the existing NPR-A IAP/EIS, BLM 2013) to ensure that CPAI minimizes the impacts of gravel mining on air, land, water, fish, and wildlife resources
- Incorporate factors aimed at reducing short term nitrous oxide emissions from drilling
- To minimize volatile organic compound emissions, BLM should focus on minimizing fugitive leaks
- Discretionary air quality BMPs listed in the Draft EIS should be made compulsory
- Restrictions should be made to air traffic (e.g., minimum of 500 feet above the ground) within the TLSA

In addition, comments were received regarding the adequacy of the mitigation measures. For example, commenters raised concerns that the Draft EIS does not adequately consider mitigation measures and fails to demonstrate that all unavoidable and adverse impacts would be compensated for.

Requests were also received to add additional details about which areas and activities are subject to which BMPs and additional analysis to show that the design feature and mitigation measures are effective in reducing impacts. Resource-specific comments were received that relate to concerns that the resource-specific BMPs are inadequate.

Concerns were raised that the Draft EIS fails to adequately identify and analyze additional mitigation measures given the failure of existing LS and BMPs.

Comments received that relate to considering compensatory mitigation requirements for wetlands in accordance with CWA Section 404(b)(1) Guidelines are summarized under Section 3.16, *Permitting*.

3.4 Birds

Commenters generally raised concerns regarding impacts to birds, particularly yellow-billed loons and molting geese. Commenters raised concerns that the analysis areas and data used to estimate impacts were inadequate, and therefore the analysis was inadequate. Concerns were raised that the Draft EIS did not accurately describe the use of the analysis area for wintering birds and special status species within the Project area. Concerns were expressed regarding the overlap of Project alternatives in an area important for bird molting and nesting.

3.5 Climate Change

Commenters raised concerns that the analysis in the Draft EIS did not adequately address how climate change has the potential to impact the Project and the resources in the Project area. Commenters requested additional analysis for Project black carbon emissions and greenhouse gas emissions. Commenters stated that the greenhouse gas emission estimates are unsupported and inaccurate because the Draft EIS failed to disclose key assumptions and data used in its models. Other commenters stated that the analysis in the Draft EIS overexaggerates the incremental impact of the Project at the global scale.

3.6 Cumulative Effects

Commenters stated that the cumulative impacts analysis does not contain an adequate level of quantification and detail for many of the resources analyzed in the Draft EIS. Requests were made for adjustments to an analysis area and a request for additional maps.

Commenters provided numerous suggestions for how to improve resource-specific analysis. Commenters requested that additional present and reasonably foreseeable future actions be considered in the EIS's cumulative impacts analysis, including specific oil and gas exploration, leases, and development proposals; planning and policy actions; transportation projects; and changes in marine vehicle traffic in the Beaufort, Bearing, and Chukchi seas.

3.7 Environmental Impact Statement Process and Timeline

Commenters expressed concern that the community meetings were held during whaling season and that the EIS process is moving too quickly to provide for meaningful public involvement or allow for consultation with tribal entities and communities in the region. Commenters stated that because there are multiple other projects and comment periods occurring simultaneously, there is not enough time to provide meaningful review of and comments on the Project. Concerns were raised that the time and page limits are not appropriate for this EIS process if the BLM intends to complete determinations of NEPA adequacy from this EIS. Additionally, a request was made to delay a decision until further analysis, mitigation, and permitting can be completed. A comment was also received that stated the BLM violated the Freedom of Information Act with the NPR-A working group that had meetings without involving all stakeholders.

3.8 Environmental Justice

Commenters stated that the Draft EIS failed to sufficiently evaluate whether the Project would have disproportionately high and adverse human health or environmental impacts on minority populations and low-income populations and consequently has not considered adequate ways in which to reduce potential impacts. Concerns were also raised that other communities beyond Nuiqsut were not considered. Suggestions were made that the completion of a Heath Impact Assessment and on-going health monitoring and education be considered as mitigation measures for environmental justice impacts.

3.9 Fish

Comments were made raising concern about the adequacy of making broad statements regarding impacts to population levels rather than individual fish species. Commenters also requested that the EIS improve the analysis regarding impacts to fish resulting from water withdrawals, water pollution and spills, waste disposal, gravel extraction, and climate change.

3.10 General Economics

Commenters stated that the EIS would benefit local economies, while other commenters stated that the Draft EIS overstated the economic benefits. Request were made for the Draft EIS to clarify how many jobs would be held by locals versus non-locals.

3.11 Land Ownership and Use

Commenters requested additional details concerning the proximity of the Project to native allotments and stated that the ownership of submerged lands and other landownership or jurisdictions are incorrectly reported.

3.12 Marine Mammals

Commenters requested that the EIS consider potential impacts to marine mammals from noise, spills, climate change, increased human interactions, increased seismic activity and vessel traffic. Comments raised concerns about the lack of analysis for bowhead and beluga whales because the analysis area is too small. Commenters also stated that the analysis area was too small to capture noise impacts to marine mammals.

3.13 National Petroleum Reserve in Alaska Integrated Activity Plan

Comments received regarding the NPR-A IAP raised concerns that the Project is being analyzed prior to the completion of the forthcoming IAP revisions. These comments focused on concerns that the IAP revisions would open up the Teshekpuk Lake Special Area (TLSA) to additional roads that are not currently evaluated in cumulative impacts and that the timing of the IAP revision is confusing to the public. Commenters requested that BLM be clear about what set of standards the Project is being permitted under (the current plan or the new plan) and how the BLM will consider future permit applications in light of a potentially revised IAP.

3.14 Noise

Commenters stated that there was a lack of baseline information and quantification to analyze the impacts from noise and that the analysis be revised to include options for avoiding impacts from the Project. Additional requests for analysis included analyzing impacts from pile driving and the mine site.

3.15 Nuiqsut Economics

Commenters expressed concern over subsistence impacts and how they are tied to Nuiqsut's economy (food security), and about the employment and economic impacts of the Project (in terms of jobs for local residents, economic benefits and impacts to Nuiqsut residents, and disagreement with how benefits were documented in the Draft EIS). Comments requested monetary compensation to offset adverse economic impacts to the Nuiqsut economy, as well as commitments for local resident employment.

3.16 Permitting

Commenters stated that the action(s) subject to regulatory approvals were not clear in the Draft EIS. Commenters expressed concerns that the Draft EIS is unclear on how BLM will comply with their obligations under the Endangered Species Act, the Marine Mammal Protection Act, the Organic Act, or the Federal Land Policy and Management Act.

Commenters stated that the BLM proceeding with the Draft EIS was inappropriate since a "valid" permit application under Section 404 of the Clean Water Act (CWA) has not been submitted to the U.S. Army Corps of Engineers (USACE) and that the Draft EIS did not provide the information or analysis necessary for USACE to comply with the CWA.

Comments noted that insufficient information is presented in the Draft EIS to allow the U.S. Coast Guard to issue bridge permits.

3.17 Project Description

Commenters requested that the project description be clarified for several components, including the location of infrastructure; the length and location of roads; the location of the seawater pipeline intake, mine site design, and location; and the depth of horizontal directional drilling installation. Commenters raised concerns regarding fixed-wing flights, the thickness of ice roads, and if the pipeline inspections would be compliant with federal pipeline safety regulations. Additional comments were received related to separate ice roads for delivering sealift modules and those used for other vehicle traffic.

3.18 Public Health

Commenters expressed concerns over public health impacts caused by Project construction and operations, including air emissions, water quality impacts, safety impacts from pipelines, accident risks (e.g., fires, explosions), hazardous waste in landfills, and blasting. Comments raised concerns about how Project impacts on subsistence resources would impact public health from contamination or food insecurity. Criticisms of the Draft EIS analysis were raised regarding: adequacy of baseline health assessment, that the analysis was not sufficiently quantitative, that mental health impacts were not adequately addressed, that the timeframe of the health impact analysis was not long enough (i.e., that the long-term health impacts of Project operations were not adequately described), that health impacts of Project impacts on subsistence resources and practices were not included, and that proposed BMPs and LS do not adequately mitigate health and safety impacts. Comments were offered in support of proposed safety measures.

3.19 Purpose and Need

Commenters stated that the BLM purpose and need should be revised so that it is clearly defined as the agency purpose and need and not tied to the Project proponent's purpose. Further comments stated that because the purpose and need is tied to the Project proponent's, the Draft EIS incorrectly states that the No Action Alternative does not meet this purpose and need.

3.20 Request for Comment Period Extension

Commenters requested BLM extend the comment period because of the complexity and length of the Draft EIS and because there are several concurrent scoping and comment periods for other Arctic or Alaska projects.

3.21 Request for New Alternative

Commenters requested that a range of new alternatives be analyzed in the EIS. Suggestions include the following alternatives:

- Without an MTI
- With fewer drill sites (accessing the same oil using directional drilling)
- With a smaller gravel footprint and/or reduced infrastructure
- That avoids Special Areas
- That avoids additional airstrips
- That uses seasonal, roadless access to decrease impacts to important surface resources
- That reduces the significant air quality impacts
- That reduces the significant visual resource impacts
- That reduces the number of years needed for the mining process
- That reduces impacts to caribou and subsistence
- That uses an existing airstrip rather than constructing at least one new Project airstrip
- That uses natural gas and renewable energy for Project purposes with minimal backup diesel
- With delayed Project permitting
- That would not require deviations or would require fewer deviations from existing best management practices (BMPs) (as identified in the National Petroleum Reserve in Alaska [NPR-A] Integrated Activity Plan [IAP], 2013) or Project lease stipulations (LS)

Commenters also provided feedback that the range of alternatives analyzed was inadequate due to a lack of a true difference between the proposed action and the BLM alternatives. Commenters also stated that the BLM improperly dismissed alternatives before the NEPA process had started.

3.22 Request for New Analysis

BLM received many requests for new analysis or for additional details be included in the EIS. When comments were specific to a single resource topic, they were coded to that topic and provided in Section 4.2, *Comments and Responses*.

3.23 Soils and Permafrost

Commenters raised general concerns about the impacts to tundra from permafrost thawing (thermokarst) from climate change and how the Project would contribute to those impacts. Commenters also expressed concerns about impacts to soils and permafrost from gravel mining, and that BMPs and LS regarding these impacts were not specific enough and could not be effectively monitored with respect to their effectiveness on soils and permafrost, and that impacts to permafrost could not be mitigated.

3.24 Spills

Commenters stated that the spill risk assessment is inadequate because it does not use the most recent spill data from Alaska Department of Environmental Conservation and is qualitative rather than quantitative. In addition, comments were made that the well blowout risk analysis does not provide details about the seven shallow-gas blowouts reported on the North Slope since 1974 that were considered in the analysis, does not discuss safety and environmental hazards associated with blowouts, and does not account for recent North Slope uncontrolled releases from BP Alaska wells which were caused by thawing permafrost.

Additional concerns were raised regarding Project impacts on resources (e.g., caribou, marine mammals, water quality) within the Project area from potential spills. Commenters requested that BLM provide further details on how the prevention and response measures help reduce the potential impacts and additional detail on who would be responsible for performing these prevention and response measures.

3.25 Stakeholder Engagement

Commenters requested that the Project proponent provide the community of Nuiqsut with fracking notifications, meet with tribal offices, and discuss employment opportunities. Additional requests were for BLM and the Project proponent work with the stakeholders to reduce the overall Project footprint. Commenters asked for clarification on whether traditional knowledge was considered in preparation of the Draft EIS; it was suggested to include these groups in development of traditional knowledge: Kuukpik Corporation, Native Village of Nuiqsut, City of Nuiqsut, Arctic Slope Regional Corporation, and NPR-A Working Group

See also the comment summaries related to the EIS Process and Timeline (Section 3.7) and Request for Comment Period Extension (Section 3.20).

3.26 Subsistence and Alaska National Interest Lands Conservation Act Section 810 Analysis

Subsistence comments focused on concerns on how the Project would impact the availability and accessibility to subsistence resources. Commenters stated that subsistence resources could potentially avoid the Project area making it harder for subsistence hunting. Other comments were raised regarding inadequate analysis due to corrections being needed on maps of overlapping subsistence use, unreliable or low-quality baseline data, lack of analysis on how subsistence uses can result in secondary public health and safety impacts. There were requests to clarify contradictory subsistence conclusions, such as if there would be population-level impacts or not and if impacts require mitigation or not.

Commenters stated that the analysis failed to quantify the impacts on subsistence users in terms that are most relevant to the hunters (e.g., reduced bag, reduced season length, increased travel distance, more hunting days to be successful), and whether they can expect to harvest "amounts of caribou reasonably necessary for subsistence".

Commenters requested the Native Village of Barrow be included in the subsistence analysis and that the caribou avoidance buffer used in the ANILCA Section 810 analysis be 5 miles rather than 2.5 miles.

In addition to the comments on analysis, multiple requests were made for mitigation measures to offset Project impacts. A list of these suggested measures is included in Table I.1.3 in Appendix I.

Commenters stated that the Draft EIS does not consider alternatives that reduce impacts or that conclusions and impacts are not well supported, and therefore the ANILCA Section 810 analysis is inadequate.

3.27 Terrestrial Wildlife

Comments were received regarding the accuracy and sufficiency of the caribou impacts analysis and its conclusions; there were requests for more discussion of tradeoffs between displacement from air traffic the displacement from vehicle traffic. Analysis concerns were related to caribou migration and potential changes to their migration patterns, location, and timing, including deflection. Commenters disagreed with analysis assumptions used in caribou impacts, for example, whether caribou may be affected by infrastructure, and the distance to which that impact may occur. Commenters suggested new analysis using the recent Russell and Gunn (2019) model to quantitatively estimate caribou impacts. New citations were provided for BLM review regarding climate-related changes with respect to northern caribou populations; and there were requests to quantify climate change impacts on caribou.

Commenters requested that the EIS evaluate potential impacts to caribou and other wildlife species and habitats within the TLSA, and any resulting subsistence impacts to North Slope communities. Commenters stated that the EIS should also describe protections for the TLSA and how the Project complies with applicable use or development restrictions within the TLSA. Concerns were expressed regarding the overlap of Project alternatives in an area important for species' sensitive time periods, such as bird molting and nesting and caribou calving and grazing, especially in the TLSA. Comments stated these impacts were not sufficiently evaluated in the Draft EIS.

Comments stated the Draft EIS cumulative impacts analysis area for caribou was not large enough. Also, additional cumulative impacts analysis was requested, citing the reasonably foreseeable potential that multiple future projects could go through the TLSA, such as the Arctic Strategic Transportation and Resources project and the potential opening of the TSLA to oil and gas development due to the current NPR-A IAP revisions.

Commenters expressed concern over potential Project impacts to the TLSA and its associated wildlife resources.

3.28 Visual Resources

Commenters expressed general concern about Project impacts on the visual quality of public lands, and specific concerns about the impact assessment and mitigation, including that the Draft EIS presented inadequate information on the classification of scenic qualities, the differences between alternatives with respect to visual impacts, and the adequacy of avoidance, minimization, or mitigation measures for visual impacts.

3.29 Water Resources

Commenters raised concerns regarding the adequacy of the water quality impacts analysis, requesting additional explanation of the findings presented in the Draft EIS. Commenters expressed that the analysis inadequately considered existing water quality issues, failed to address impacts of Project elements (e.g., waterbody crossings, floodplain development), and accidental wastewater releases, and that additional information on mitigation and response plans for pipeline spills was needed.

Commenters expressed concerns regarding the adequacy of information on and analysis of water resources in the Draft EIS. Comments noted that the Draft EIS failed to consider the impacts of gravel mining on water resources and raised specific concerns regarding the proximity of proposed mining to the Ublutuoch (Tiŋmiaqsiuġvik) River. Commenters raised concerns that outdated and arbitrary data were used to characterize existing conditions, that the analysis and disclosure of Project impacts to floodplains and waterways was insufficient, that construction impacts were not adequately quantified, and that analysis of impacts of the MTI in Harrison Bay were inadequate. Comments requested additional information on water sources for ice roads, road and pipeline crossings of waterbodies, and mine site reclamation with respect to water resources. Additional comments raised concerns about the effectiveness of BMPs and LS to offset impacts to water resources.

3.30 Wetlands and Vegetation

Commenters raised concerns regarding the Project's contribution to climate change, thawing tundra, and shifting vegetation communities. Commenters also stated that climate change would also affect the long-term recovery and reclamation success for wetlands and this should be analyzed in the EIS. Commenters provided requests for additional disclosure on how Project-related impacts to tundra wetlands and permafrost thawing would further contribute to climate change.

Commenters also stated that the mitigation for wetland and wetland function loss is inadequate absent a functional assessment and full compensatory mitigation plan. Additional comments were received regarding analysis of impacts resulting from hydrologic changes, permafrost damage, changes to habitat quality and species diversity, fugitive dust, and the amount of time it takes for the tundra to recover (comments questioned both understating and overstating the impacts).

4.0 SUBSTANTIVE COMMENTS AND RESPONSES

4.1 How to Read This Volume

The BLM assigned a letter number to every unique communication received during the Draft EIS public comment period. The following tables contain all substantive comments with the BLM's responses; they are organized by the comment topic (or code). Commenter names and applicable organization or agency are provided for letter submissions. Complete transcripts of public meetings and copies of all comment letters are available on the BLM Willow MDP ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/109410/510.

4.2 Comments and Responses

Tables B.2.4 through B.2.33 provide the substantive comments on the DEIS and BLM's responses.

4.2.1 Air Quality

Table B.2.4. Substantive Comments Received on Air Quality

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
989	22	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Air Quality	Page 34, 3.3.2.3.1 Near-Field Air Impact Assessment Summary "All analyzed HAPs would be below RELs and RfCs." Does BLM have enough data to support this statement? Is there any HAPs monitoring in this area?	Results are based on EPA-preferred regulatory modeled and area-specific emissions inventories. HAPs monitoring performed between 2014 and 2018 is presented in Section 3.3.1.2 *(Characterization of Climate, Meteorology, and Air Quality in the Analysis Area)* of the EIS. Results of modeling and measured HAPs are below RELs.	N
991	3	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Chapter 3, page 30 Paragraph four on this page notes that "The PSD program includes special protections for Class I areas federally designated as part of the 1977 CAA amendments and Class II areas. The program requires federal land managers to protect AQRVs, such as visibility and deposition in these areas. The Class II areas within 300 miles of the project are the Arctic National Wildlife Refuge, the Gates of the Arctic National Park and Noatak National Preserve." This statement appears to be misleading. The CAA requires federal land managers to protect AQRVs for Class I areas, but the same requirement does not exist for Class II areas. The 2011 Memorandum of Agreement involving the Department of Interior, Environmental Protection Agency and the U.S. Forest Service requires that federal land managers be consulted when NEPA decisions could impact Sensitive Class II areas. Please rewrite this paragraph to make this clear.	The text has been updated in Section 3.3.1.1 (*Regulatory Framework*) of the EIS with the following in response to this and other comments: "The PSD program includes special protections for the Class I areas federally designated as part of the 1977 CAA amendments and Class II areas. The program requires Federal Land Managers to protect AQRVs, such as visibility and deposition (NPS 2011), in Class I areas (40 CFR 51.166). There are no Class I areas in the analysis area. AQRVs are assessed in the EIS at three federally managed areas with receptor locations of interest, referred to hereafter as the three assessment areas: Arctic National Wildlife Refuge (ANWR), Gates of the Artic National Park, and Noatak National Preserve."	Y
991	4	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Chapter 3, Page 35, Table 3.3.6, Alternative C Routine Operations Impacts to the 24 hour PM2.5 were modeled and exceed ambient air quality standards. No activity can be permitted that is estimated to exceed a NAAQS or AAAQS. Alternative C needs to either be reconfigured or emission restrictions implemented to bring them below the standards. These exceedances would need to be addressed for Alternative C to be considered a reasonable alternative.	In the Draft EIS, all alternatives and scenarios were in compliance with NAAQS, except Alternative C: Routine Operations with $PM_{2.5}$ exceedances. As part of the Final EIS modeling, Alternative C (and all other alternatives) also now demonstrates compliance based on updated Project information.	N
991	5	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Chapter 3, Page 37, 3.3.2.4.3 Routine Operations for Alternative C would be below the AAAQS except for 24 hour PM2.5 impacts. . . drop below the NAAQS/AAAQS beyond 40 meters. No activity can be permitted that is estimated to exceed a NAAQS or AAAQS, even if it is only 40 m out. Alternative C needs to either be reconfigured or emission restrictions implemented to bring them below the standards. These exceedances would need to be addressed for Alternative C to be considered a reasonable alternative.	In the Draft EIS, all alternatives and scenarios were in compliance with NAAQS, except Alternative C: Routine Operations with $PM_{2.5}$ exceedances. As part of the Final EIS modeling, Alternative C (and all other alternatives) also now demonstrates compliance based on updated Project information.	N
991	6	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Chapter 3, page 37 The final paragraph on this page notes that PM2.5 impacts are exceeded near sources at the north WOC. Please spell out Willow Operations Center in the main text of the document the first time it appears in a section. The only place WOC is spelled out in this section is in the footnote of Table 3.3.6.	The EIS is formatted in such a way that acronyms are only spelled out on their first appearance in the EIS (and as footnotes to tables when used in the table). The EIS includes a list of acronyms and their definitions for reader reference.	N
991	7	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Chapter 3, Page 39, Table 3.3.10 Table 3.3.10 shows 142% of the PM2.5 standard. No activity can be permitted that is estimated to exceed a NAAQS or AAAQS. Alternative C needs to either be reconfigured or emission restrictions implemented to bring them below the standards. These exceedances would need to be addressed for Alternative C to be considered a reasonable alternative.	In the Draft EIS, all alternatives and scenarios were in compliance with NAAQS, except Alternative C: Routine Operations with $PM_{2.5}$ exceedances. As part of the Final EIS modeling, Alternative C (and all other alternatives) also now demonstrates compliance based on updated Project information.	N
991	8	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Chapter 3, page 42 The final paragraph on this pages notes that BLM will *recommend* that CPAI implement a fugitive dust control plan to mitigate impacts from fugitive PM emissions from the Project. This paragraph also notes that the fugitive dust control plan will be included as part of the Final EIS. If this fugitive dust control plan will be included in the final EIS, you may want to consider using a word stronger than *recommend*. Please consider saying the BLM has *requested*. The EIS also needs to spell out which agency will be responsible for compliance and enforcement of the fugitive dust plan.	A Fugitive Dust Control Plan was developed as part of this Project during the Final EIS preparation. The text was updated in Section 3.3.2.1.3 (*Additional Suggested Avoidance, Minimization, or Mitigation*) of the EIS to note that BLM is "requiring" a Fugitive Dust Control Plan.	Y
991	9	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Chapter 3, page 131 This pages cites to BMP A-10 regarding ambient air monitoring and impacts to subsistence resources. As noted in an earlier comment, please include the full text of BMP A-10 in the EIS document. Given the importance of air quality to the residents of Nuiqsut, it would be important to provide the full requirements of BMP A-10 in this document. Please note that we would prefer that the Required Operating Procedures (ROPs) from the NPR-A EIS and the ANWR Coastal Plain Lease Sale EIS be used.	For consistency with the rest of the EIS, BMPs are paraphrased for all resources. Section 3.3.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*, was updated to include the proposed BMPs (or ROPs) from the NPR-A IAP revisions described in the Final EIS (BLM 2020).	Y
991	13	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Appendix A, page 16, Figure 3.3.2 The wind rose plot is fuzzy and hard to read. The legend for the wind rose is incorrect Correct legend in Figure E.3.3	The wind rose in Appendix E.3A (*Air Quality Technical Appendix*) of the EIS has been revised with a higher-quality image that is consistent with Figure E.3-3.	Y
991	16	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Appendix D, page 41 Paragraph six on this page discusses the projects dust control plan to be included in the final EIS as an appendix. This EIS needs to spell out which agency will be responsible for compliance and enforcement of the fugitive dust plan.	A Fugitive Dust Control Plan was developed during the Final EIS preparation and is provided as Appendix I.3 (*Dust Control Plan*) of the EIS.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
991	18	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Appendix E.3, Page 9, Table E.3.4 Data from Nuiqsut from 2015-2017 have not been reviewed for PSD quality. Caveat should be added to the table and discussion of data. The last dataset ADEC has reviewed for PSD quality is from 2013. EPA might have approved use of data for 2014 and potentially 2015. Quality of data from 2015-2017 has not been reviewed.	Caveat added to Table E.3.4 note in Appendix E.3A (*Air Quality Technical Appendix*) of the EIS and removed from Section 3.2.3 (*Meteorological Data*) in Appendix E.3B (*Air Quality Technical Support Document*).	Y
991	19	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	Appendix E.3, Air Quality Technical Appendix, Attachments for Appendix E.3 Air Quality Technical Appendix Appendix not provided. In depth review of assumptions for air analysis cannot be provided. Comments had been provided during the cooperating agency process, but final draft version of documents are not included in this DEIS. Since the technical background documents still have a potential to change for the NPR- A IAP DEIS, ADEC might have additional comments, once the documents have been released. BLM is using the technical document for 2 DEIS projects that are not on the same timescale anymore. This makes it very difficult to provide constructive comments.	After this attachment was missing from the initial upload of the Draft EIS, this attachment was later added to the BLM ePlanning website and made available to the public. All attachments will be available as part of the Final EIS.	N
991	24	Bruno	Jeff	Alaska State, Department of Natural Resources	Air Quality	I.1-8, Table I.1.2, No. 17, column 3 It seems like this restriction should apply to off-road vehicle use, not Personnel as listed. Tundra travel usually refers to vehicles, not people on foot. The list of affected resources also indicates this measure applies to off-road vehicles.	This table consists of proposed design features by the Project proponent. Although terminology is different than what is recommended, the overall outcome is expected to be the same. Therefore, BLM is not recommending changes to CPAI terminology.	N
1302	38	Dunn	Connor	ConocoPhillips	Air Quality	The terminology "Class II Areas" is used throughout Section 3.3 to refer to Gates of the Arctic, Noatak, and the Arctic National Wildlife Refuge. However, this is misleading because all areas in the modeling domain are Class II areas, not just those areas managed by the National Park Service or the U.S. Fish and Wildlife Service. This should be clarified and corrected throughout the section. For example, the text could be modified to specifically identify the federal conservation land units modeled rather than generically referring to them as Class II Areas.	The term "Class II Areas" has been changed to the three assessment areas throughout Section 3.3 *(Air Quality).*	Y
1302	57	Dunn	Connor	ConocoPhillips	Air Quality	Deposition thresholds are presented with enough context to help understand how they could be applicable even though there use under the CAA is limited to Class I Areas; however, in Class II Areas, these are simply thresholds selected to understand the magnitude of impacts, not for regulatory review. These should be presented in an analysis approach section and not a regulatory framework section.	The FLAG guidance from the Federal Land Managers notes that the AQRV guidance is applicable to Class II areas. We have added clarification to the text that the deposition analysis thresholds are based on FLAG guidance and are not part of a regulation in Section 3.3.1.1 (*Regulatory Framework*) of the EIS.	Y
1302	58	Dunn	Connor	ConocoPhillips	Air Quality	Considerable VOC measurements have been collected in the Nuiqsut area and the data is in the public record. Adding the VOC data to this section would improve the description of air quality.	The BLM has focused the detailed discussion on the six VOC HAPs that are commonly emitted from oil and gas development: benzene, toluene, ethylbenzene, xylene, formaldehyde, and n-hexane.	N
1302	59	Dunn	Connor	ConocoPhillips	Air Quality	The center of the first paragraph says: "The annual wind rose in Figure 3.3.2 shows the distribution of wind direction and speed at the ConocoPhillips monitoring station in Nuiqsut from 2013 to 2017." It would be better to use more than a 5-year dataset to characterize climate section particularly when nearly 20 years of data exists from that site.	The intent is to show recent data and, in particular, to be consistent with the meteorological data used in the modeling for the air quality impact analysis.	N
1302	60	Dunn	Connor	ConocoPhillips	Air Quality	"The monitored concentrations are all well below the NAAQS; thus, the existing air quality in the analysis area is generally good with respect to the NAAQS." Since the recorded values are all well below the NAAQS, the air quality is good. The word "generally" should be deleted.	Text was updated in Section 3.3.1.2 (*Characterization of Climate, Meteorology, and Air Quality in the Analysis Area*) of the EIS to note that the existing air quality in the analysis area is good with respect to the NAAQS.	Y
1302	61	Dunn	Connor	ConocoPhillips	Air Quality	The column header "annual" appears to be "annual average." Please verify and correct.	Table 3.3.1 was updated to clarify that the temperature is annual average and the precipitation is annual total. Note that the annual precipitation total is slightly different from the sum of the monthly total precipitation rates because of different data completion requirements for monthly and annual values.	Y
1302	63	Dunn	Connor	ConocoPhillips	Air Quality	To the table note, add "AAAQS" before SO2 in the following: "and SO2 24-hour and annual standards were converted from micrograms per cubic meter to parts per billion," because the NAAQS have been revoked for these standards.	AAAQS has been added to the footnote of Table 3.3.2 for 24-hour SO_2.	Y
1302	62	Dunn	Connor	ConocoPhillips	Air Quality	The "annual" total precip (in) does not equal the sum of the months (3.01). Explain how the number was derived.	Values are based on averages over the period 1998 to 2017 (from http://agacis.rcc-acis.org/?fips=02185). Monthly total averages and annual total averages computation have different data completeness requirements. Months within each year with >1 missing day are omitted from the monthly total average. Annual data with >1 missing day are also omitted from the annual total average. Due to this, the sum of monthly total does not equal the annual total. Explanation was added to footnote in Table 3.3.1.	Y
1302	64	Dunn	Connor	ConocoPhillips	Air Quality	The estimated PM10 and PM2.5 emissions in this table are different than the total life-of-project emissions summarized in Appendix E.3, Attachment C, Tables B-3a, B-3b, and B-3c. This information should be reconciled.	PM_{10} and $PM_{2.5}$ emissions are not expected to be consistent between the EIS and Attachment C of Appendix E.3B (*Air Quality Technical Support Document*), which is the proponent's emissions inventory report. Consistent with the BOEM Arctic modeling study, fugitive dust emissions in the EIS were developed assuming that dust emissions occur from May through October and road dust emission control efficiency is 50%. Fugitive dust emissions in Attachment C were developed with less conservative assumptions; that is, dust emissions occur from June through September and road dust emission control efficiency of 76%.	Y
1302	65	Dunn	Connor	ConocoPhillips	Air Quality	BLM should explain clearly why lead was not analyzed as a part of this EIS. See also Appendix E.3B, page 9.	The following paragraph was inserted in Appendix E.3B (*Air Quality Technical Support Document*), Chapter 2.0 (*Emissions Inventories*), to be included as part of the Final EIS: "Lead was not modeled because emissions would be low resulting in very small air quality impacts. The emission inventory includes lead emission estimates from diesel- and natural gas-fueled combustion sources; lead emissions from these sources are small because diesel and natural gas fuel and exhaust contain only trace amounts of lead, if any at all. Likewise, lead emissions from flaring and incinerator activities are expected to be small. The only potential for a lead additive would be in aviation gasoline for piston-engine aircraft. Piston-engine aircraft used in the proposed project and alternatives are not expected to use gasoline with lead additive."	Y
1302	66	Dunn	Connor	ConocoPhillips	Air Quality	We recommend including the applicable AAQS thresholds in these tables for comparison to model-predicted impacts, in addition to the percentages already provided. There are no complete summaries of the NAAQS/AAAQS in draft EIS that include all the thresholds in the units used to summarize impacts in these tables. For example, the CO AAQS is expressed as 35 ppm in Table 3.3.2, as 35 ppm (NAAQS) and 10 mg/m3 (AAAQS) in Table E.3.1, but the impacts in these tables should be compared to an equivalent threshold of 10,000 micrograms per cubic meter.	The AAAQS thresholds have been added to Tables 3.3.9, 3.3.11, and 3.3.13 in the EIS.	Y

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1302	67	Dunn	Connor	ConocoPhillips	Air Quality	Last column heading indicates cancer risk is provided in units of "1/(g/m3)." This is not a standard expression of cancer risk. Furthermore, in the table note "1/(g/m3) (liters per micrograms per cubic meter)," the "1" (one) appears to be confused with an "l" (lower case L).	The text and table notes for Tables 3.3.10, 3.3.12, and 3.3.14 in the EIS have been corrected to properly indicate the correct expression for cancer risk.	Y
1302	68	Dunn	Connor	ConocoPhillips	Air Quality	The following sections provide an overview of the near-field (regional) modeling results by alternative. Change "near-field" to "far-field."	The typographical error was corrected in Section 3.3.2.5 (*Regional Air Modeling Results*) of the EIS.	Y
1302	69	Dunn	Connor	ConocoPhillips	Air Quality	Regional air quality modeling results are not quantified anywhere in the draft EIS. We recommend they be included.	Regional air quality impacts are quantified in Chapter 5.0 of the AQTSD (Appendix E.3B, *Air Quality Technical Support Document*). We have added a citation and clarifying language to Final EIS Section 3.3.2.3.2, *Regional (Far-Field) Air Impact Assessment Summary*, to highlight this.	Y
1302	70	Dunn	Connor	ConocoPhillips	Air Quality	The third paragraph in this section is different from the rest in that it highlights elevated cumulative deposition impacts at Noatak even though it is very clear that the project has nothing to do with the impacts given project impacts are below the DATs. We suggest making this paragraph similar to the rest by striking the last sentence which talks about Noatak.	The last sentence of paragraph 3 in both Section 3.3.2.5.2 (*Alternative B: Proponent's Project*) and Section 3.3.2.5.3 (*Alternative C: Disconnected Infield Roads*) in the EIS has been removed in response to the comment. Both referenced Noatak National Preserve.	Y
1302	72	Dunn	Connor	ConocoPhillips	Air Quality	The second paragraph provides extensive discussion of the Regional Haze Rule which is not a regulatory framework applicable to this project. This section of the appendix should acknowledge that although the Regional Haze Rule is not applicable, it presents standards applicable to Class I Areas that can be used for the Project. BLM should also expressly recognize that those standards are used to protect pristine areas unlike those areas where the Project will be located.	The following sentence in Appendix E.3A (*Air Quality Technical Appendix*) of the EIS was added as a caveat: "The Project area is not a Class I area; however, the RHR can be treated as a guideline for the Project."	Y
1302	73	Dunn	Connor	ConocoPhillips	Air Quality	High wind events have been filtered from the data set without explanation. If background data were refined, it would only be appropriate based on analysis of wind direction, wind speed, precipitation, and other local conditions. For instance, the Nuiqsut Monitoring Station is known for capturing high PM events from silty areas from the nearby channel, which is a highly localized event and, realistically, uncharacteristic of most locations throughout project area. Ramboll should describe their protocol for refining the background data within this document and why the data removed is unrepresentative.	Additional text has been added to Section 3.2.6 (*Ambient Background Data*) in Appendix E.3B (*Air Quality Technical Support Document*) to further describe the development of background PM data.	Y
1302	74	Dunn	Connor	ConocoPhillips	Air Quality	As a general note, the document often refers to the presence of condensate processing. This is not terminology typical for North Slope operations. Condensate will not exist separate from oil under ambient conditions within the Willow Development. References to condensate processing should be removed/revised.	Removed terms for condensate and liquids from the following sections in Appendix E.3B (*Air Quality Technical Support Document*): Section 3.3.2.2 (*Air Emissions Inventory*) and footnote in Section 1.2.1 (*Modeling Objective*), Section 2.1.3 (*Alternative B (Proponent's Project)*), and Section 3.3.1.5 (*Routine Operation and Production of Wells*). It was also removed from a footnote in Section 3.3.2.3.1 (*Near-Field Air Impact Assessment Summary*) in the EIS.	Y
1302	75	Dunn	Connor	ConocoPhillips	Air Quality	We are unfamiliar with the term "completion rig." Possibly, it should be "hydraulic fracturing unit." Completion rigs are not a part of the project.	Updated mentions of completions to hydraulic fracturing in Section 3.3.1.2 (*BT1 Pre-Drill*) and Section 3.3.1.4 (*Development Drilling*) in Appendix E.3B (*Air Quality Technical Support Document*)	Y
1302	76	Dunn	Connor	ConocoPhillips	Air Quality	The AQTSD states that "During production operations, produced water, oil, and condensate from wells would be stored in tanks on the well pad and processing facilities." ConocoPhillips plans to have some tank storage at the central processing facility, but does not plan such storage at the well sites. Please revise to accurately reflect ConocoPhillips's planned operations.	The modeling is consistent with CPAI's planned operations for tank storage (i.e., tank emissions were not modeled at well sites). The text in Section 3.3.1.5 (*Routine Operation and Production of Wells*) in Appendix E.3B (*Air Quality Technical Support Document*) was revised accordingly.	Y
1302	77	Dunn	Connor	ConocoPhillips	Air Quality	The following statement from the top of page 88 is supposed to describe why the turbine emission rates change by month. However, the explanation does not seem correct. The variation in emissions is related to the ambient temperature affecting the air density which then affects how much fuel can be put into the turbine at full load. "Monthly fluctuations in emission rates are caused by changes in ambient air temperatures which affect preheating duty." This also happens on page 105.	Explanation updated to reflect comment in Section 3.3.2.2 (*Emission Calculations*) in Appendix E.3B (*Air Quality Technical Support Document*) of the Final EIS.	Y
1302	78	Dunn	Connor	ConocoPhillips	Air Quality	We believe that the "brute force method" described in this section is referring to the method described in the Air Quality MOU. If that is the case, please reference the Air Quality MOU.	Text has been revised in Section 1.2.2.2 (*Regional Modeling*) in Appendix E.3B (*Air Quality Technical Support Document*) to explain the "brute force method."	Y
1302	79	Dunn	Connor	ConocoPhillips	Air Quality	In the last paragraph of this section, criteria pollutants are stated to include VOCs. VOCs are not a criteria pollutant because they have no NAAAQS or AAAQS. Please correct.	The paragraph in Chapter 2.0 (*Emissions Inventories*) of Appendix E.3B (*Air Quality Technical Support Document*) was corrected to exclude VOCs from the list of criteria pollutants and instead defines VOCs based on 40 CFR 51.100(s).	Y
1302	80	Dunn	Connor	ConocoPhillips	Air Quality	The list of pollutants and averaging periods analyzed includes annual average PM10. There is no longer any applicable annual average PM10 NAAQS or AAAQS, nor does it even appear to be analyzed.	Annual average PM_{10} is included in the list of pollutants analyzed, given that there is an annual average PSD threshold for PM_{10}.	N
1302	81	Dunn	Connor	ConocoPhillips	Air Quality	The following statement found in the second to the last paragraph in this section refers to the town of Nanushuk. It most likely should be referring to Nuiqsut. "The proposed IP would be at the highest elevation when compared to the cumulative sources and the town of Nanushuk with the greatest elevation difference being roughly 26 m between the."	The text has been corrected in Section 3.2.7 (*Receptors*) in Appendix E.3B (*Air Quality Technical Support Document*) to refer to Nuiqsut.	Y
1302	83	Dunn	Connor	ConocoPhillips	Air Quality	The following statement sounds more like a lower 48 well site and not North Slope. There will be no permanent storage of fluids or condensate at the well sites. "During production operations, produced water, oil, and condensate from wells would be stored in tanks on the well pad and processing facilities."	Updated text to reflect comment in Section 3.3.1.5 (*Routine Operation and Production of Wells*) in Appendix E.3B (*Air Quality Technical Support Document*).	Y
1302	84	Dunn	Connor	ConocoPhillips	Air Quality	In the first sentence, the second "Table 3.3-1" should be "Table 3.3-2." References, table headings, and other details appear to be incorrect throughout Appendix E.3B.	Table references, table headings, and citations have been corrected throughout Appendix E.3B (*Air Quality Technical Support Document*).	Y

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1302	85	Dunn	Connor	ConocoPhillips	Air Quality	For the following reasons, the "Measured Concentrations at Nuiqsut during 2014-2018" should be removed from Table 3.3-10, Table 3.4-6, and Table 3.5-8 and moved to Section 3.3.1.2 of the EIS: 1)The narrative accompanying the referenced tables simply presents the measured values without explaining to the reader why they are presented in an Appendix focused on modeling results. From this standpoint the measurements are only presented to characterize the existing environment and are better placed in the Existing Environment section with similar presentations of other air pollutants. 2)The narrative accompanying the referenced tables does not provide context for the values which will lead he reader to misinterpret the model-predicted values. Therefore, the values should be removed from the tables. The potential for misinterpretation arises primarily from two areas. First, the measurements and the model-predicted values show little agreement leading the reader to misinterpret the results because they have not been given the perspective that the differences should be expected given the obvious differences between the modeled and measured source environment. Second, the reader will be left wondering why the measurements have not been added to the model-predicted values which is the case for nearly every other near-field analysis in the document. Because the reader has not been given the proper context for interpreting and including the measurements, they should be removed from the table. 3)The measurements are not directly comparable to the model-predicted impacts given: a) the wildly different time scales between the model predictions (1-hour) and the measurements (1 to 24 hours depending on the sample), b) the low frequency of sampling events (monthly) compared to the high frequency of modeled impact reporting (hourly), and c) the measurements represent impacts from near-field sources not characterized in the near-field model and don't include many sources included in the model (i.e., Willow). Since a direct comparison cannot be made, these results should not be presented together. We do agree that the HAP measurements made in Nuiqsut and documented by SLR are a critical part of documenting and understanding the existing environment which is why they should be presented and characterized in Section 3.3.1.2 and removed from the tables in this appendix where they will only lead to misinterpretation.	The data contained in "Measured Concentrations at Nuiqsut during 2014-2018" have been moved to Table 3.3.3 in Section 3.3.1.2 (*Characterization of Climate, Meteorology, and Air Quality in the Analysis Area*) of the EIS.	Y
1302	86	Dunn	Connor	ConocoPhillips	Air Quality	Additional discussion is needed for why maximum impacts are all on the ambient boundary of the GMT2 Drill Pad.	The text has been corrected in Section 3.3.6.5 (*HAPs Impacts*) in Appendix E.3B (*Air Quality Technical Support Document*) to read, "near or on the AAB of the BT1 Drill Pad."	Y
1302	87	Dunn	Connor	ConocoPhillips	Air Quality	The AQTSD states: "In summary, the model performs reasonably well excluding difficulties reproducing very low observational data and systematic biases for OC and soil." Based on the results of the MPE in Attachment B, it appears that the model does not perform well; the ""difficulties"" mentioned are important in considering the results of this analysis, and this is a mischaracterization of the results of the MPE. This is indicating a confirmation bias that dilutes the fact that the model does not perform well in the way it was applied for this project. This needs to be accurately characterized in this discussion."	The model performance evaluation was conducted using established methods. The reviewer has not indicated specifically why they believe the model does not perform well, other than the limitations already cited in the EIS. We also note that there are no bright-line (i.e., pass/fail) criteria for the evaluation of photochemical modeling.	N
1302	88	Dunn	Connor	ConocoPhillips	Air Quality	While this is a specific example, it occurs throughout the document: On page 76, it says "Receptors along the access road section were placed at the spacing noted above; however, receptors were at a minimum distance of one volume source width from the road volume sources due to model instabilities when the receptors are placed too close to volume sources." However, Figure 3.3-2 through Figure 3.3-6 seem to show receptors within the road buffers. Seems like the figures are inconsistent with the text. Note that this issue exists on almost all similar figures in the document.	Receptors are only excluded when sources are on the road. Text has been added to clarify this in Section 3.2.7 (*Receptors*) in Appendix E.3B (*Air Quality Technical Support Document*).	Y
1302	89	Dunn	Connor	ConocoPhillips	Air Quality	The HDD pads appear misaligned with water bodies in figure. The water bodies are not relevant to near-field modeling. Therefore, if this cannot be corrected, then the projection should be removed.	Water features were removed from the figures cited in the AQTSD, as they are not relevant to near-field modeling.	Y
1302	90	Dunn	Connor	ConocoPhillips	Air Quality	The AQTSD states: "Monthly emission factors are then applied to annual emission rates to allocate 85% of emissions to ice road season (February-April) and 15% of emissions during fugitive dust season (May-October)." Also: "Monthly emission factors are applied to all annual emission rates to allocate 60% of total emissions in ice road season (February-April) and the remaining 40% in all other operating months. The monthly emission factors are calculated as the ratio of the fractional emissions allocation of each month to the average fractional emissions allocation across all months." Applying "monthly emission factors" is a confusing way of saying that annual emissions were allocated to each month of the year according to the level of pad construction activity occurring during that month. Please revise this to include meaningful information regarding the development of the emissions.	The text has been edited to clarify the temporal allocation of the emissions in the AQTSD in the Final EIS. Text has been updated in Section 3.3.2.2 (*Emissions Calculations*) for BT2 and BT3 Pad Construction Nonroad Equipment.	Y
1302	91	Dunn	Connor	ConocoPhillips	Air Quality	Footnotes indicate the 1-hour NO2, 1-hour SO2, 24-PM2.5, and annual NO2/SO2/PM2.5 impacts are averaged over three years though the modeled years are 2013-2017 (5 years). AERMOD does not output 3-year averages. Therefore, any additional post-processing steps need to be further described so that it can be confirmed that the form of the output is correct for comparison to the form of the AAQS. Note that what is done appears to be conservative for comparison to the AAQS, but that is not discussed here.	Text has been added to Section 3.2.2 (*Applicable Air Quality Standards and Hazardous Air Pollutant Thresholds*) in Appendix E.3B (*Air Quality Technical Support Document*) to describe the processing of modeled concentrations for 3-year averages.	Y
1302	92	Dunn	Connor	ConocoPhillips	Air Quality	Impact scales are different between the cumulative impacts and project-only impacts. Please make these the same for appropriate comparison. These figures should illustrate the factor the project impacts are small.	The scales were selected to facilitate a comparison of impacts.	N
1302	93	Dunn	Connor	ConocoPhillips	Air Quality	The AQTSD states that "At this time, these represent the most recent 5-year dataset for Nuiqsut that has been approved by ADEC." The data has not been approved by ADEC or EPA.	Text has been revised to remove the sentence in Section 3.2.3 (*Meteorological Data*) in Appendix E.3B (*Air Quality Technical Support Document*).	Y

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1302	94	Dunn	Connor	ConocoPhillips	Air Quality	These figures include a projection of "National Hydrography Waterbodies" that imply certain aspects of the project, such as gravel roads and pads, would be constructed on waterbodies. It does not appear that some of these project components are georeferenced correctly in relation to important waterbodies. Because this information is generally irrelevant to near-field air quality modeling, we recommend it be removed from all figures in Attachment A.	Water features were removed from the figures cited in the AQTSD, as they are not relevant to near-field modeling.	Y
1302	95	Dunn	Connor	ConocoPhillips	Air Quality	The "Notes" in these tables incorrectly describe the following modeled sources as "diesel tailpipe from non-road equipment": IPPWRGEN (stationary power generation turbine) WLWIG01 (incinerator) WLWIG02 (incinerator) IPPWRGENN (stationary power generation turbine) WLWIG01S (incinerator) WLWIG02S (incinerator)	The notes in the tables in Attachment A (of Appendix E.3B, *Air Quality Technical Support Document*) have been revised to correct and clarify the type of source.	Y
1302	96	Dunn	Connor	ConocoPhillips	Air Quality	As the only stationary heater/boiler that is diesel-fired is the Mud Plant Boiler, we assume that the "Notes" in these tables incorrectly describe the following stationary external combustion equipment modeled sources as "diesel fueled heaters and boilers" when they are actually natural gas-fired: WCFSCE1 WCFSCE2 WCFSCE3 WCFSCE4 WCFSCE5 WCFSCE6 WCFSCE7 IPSCE IPSCES	The notes in the tables in Attachment A (of Appendix E.3B, *Air Quality Technical Support Document*) have been revised to correct and clarify the type of source.	Y
1302	97	Dunn	Connor	ConocoPhillips	Air Quality	The main body of the draft EIS refers to the Willow processing facility as "WPF." This attachment refers to the same facility as "WCF." Please make consistent.	The text of the Final EIS and Appendix E.3B (*Air Quality Technical Support Document*) were updated to use the term "WPF" consistently.	Y
1302	98	Dunn	Connor	ConocoPhillips	Air Quality	This simulation appears to omit overwater receptors. This decision should be reconsidered or explained. MTI mobile equipment tailpipe emissions sources are modeled on ice roads hundreds of meters from the MTI next to the shore, closest to modeled receptors. For example, it would be conservative to consider these emissions on the ice road nearest to the MTI where impacts are most likely to overlap.	The modeling analysis followed the methodologies used in previous BOEM modeling studies in northern Alaska, whereby overwater receptors were not included in ambient air quality comparisons. In addition, prior to conducting the air quality analysis an air quality modeling protocol was developed that detailed model receptor placement. This protocol was reviewed and approved by the AQTWG, which includes representatives from the ADEC, EPA, and BLM.	N
1302	99	Dunn	Connor	ConocoPhillips	Air Quality	ExxonMobil's Point Thomson facility expansion is listed as a "modification to existing sources" in the previous table. It should be included on the map.	Point Thomson Facility was added to Figure 2.2-1 in Section 2.2.2 (*Reasonably Foreseeable Development*) in Appendix E.3B (*Air Quality Technical Support Document*).	Y
1302	100	Dunn	Connor	ConocoPhillips	Air Quality	References to the IP should be updated to WOC.	References to the infrastructure pad (IP) have been changed to WOC throughout Appendix E.3B (*Air Quality Technical Support Document*) and Attachment A of Appendix E.3B.	Y
1302	101	Dunn	Connor	ConocoPhillips	Air Quality	The reference to Table 3.2-9 within the 1-h NO2 data value column is incorrect. It should be referencing Table 3.2-3	The text in Table 3.2-2 in Section 3.2.6 (*Ambient Background Data*) in Appendix E.3B (*Air Quality Technical Support Document*) has been corrected.	Y
1302	102	Dunn	Connor	ConocoPhillips	Air Quality	The color indicator for the Nuiqsut receptor is difficult to distinguish from the combination of the 10m, 25m, and 100m receptors. Consider change in the color of the Nuiqsut receptor here and in all figures with similar coloring.	Color indicator was changed in Figure 3.3-1.	Y
1302	103	Dunn	Connor	ConocoPhillips	Air Quality	Consider splitting this table into two different tables, with two different headings. This comment is the same for all similar tables in the following sections.	The BLM has decided to not split these tables, because that is not required.	N
1302	104	Dunn	Connor	ConocoPhillips	Air Quality	The peak year should be restated here.	The text has been revised to restate the peak year in Section 3.6.1 (*Overview of Scenario*) in Appendix E.3B (*Air Quality Technical Support Document*).	Y
1302	105	Dunn	Connor	ConocoPhillips	Air Quality	The row of "full domain" should have further explanation that these values are the maximum modeled impacts. It is not clear that is what these values are. This comment also applies to future tables with the same information.	Footnote added to each table (Chapter 5.0 of Appendix E.3B, *Air Quality Technical Support Document*), with a Full Domain row stating that "Full Domain values represent the maximum modeled concentration seen in the entire domain."	Y
1302	106	Dunn	Connor	ConocoPhillips	Air Quality	Most of the content in this paragraph has already been explained within the text of the DEIS. This should be updated to read: "Under the No Action Alternative, the Willow Project would not be constructed; however, oil and gas exploration in the area would continue. The analysis of this alternative is included to provide a baseline for the comparison of impacts of the action Alternatives (Section 6.6.2 of BLM NEPA Handbook H-1790-1; 40 CFR 1502.14(d)) (BLM 2008)."	The text in Chapter 1.0 (under Section 1.1.1) of Appendix E.3B (*Air Quality Technical Support Document*) has been updated according to the suggestion.	Y
1296	12	Imm	Teresa	Arctic Slope Regional Corporation	Air Quality	Air Quality ASRC understands that air quality is a growing concern for local stakeholders. Concerns over air quality still remain and local stakeholders have expressed distrust in the air quality modelling conducted. To address these concerns, ASRC recommends the following: BLM should support efforts for local capacity building so the City of Nuiqsut can manage the local air quality monitoring station and analysis of that data; and, the operator should commit to working with the NSB Health Department and Nuiqsut Trilateral Group on providing accessible and clear information on air quality measurements, information, and mitigation measures.	BMP A-10 requires that the Proponent make air quality monitoring data and reports publicly available in a timely manner. BMP H-5 requires that the Proponent make data and summary reports derived from North Slope studies easily accessible.	N

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84	11	Long	Becky	—	Air Quality	The Conoco Phillips air quality monitoring equipment is not adequate for baseline and current data needs. This equipment only tracks 2 to 3 hours daily unlike the lower 48 standards. Supposedly it is technically unfeasible for 24 hour monitoring because of the remoteness. But actually it could be done with real time instrumentation so variability over time could be captured. This needs to be done. The State of Alaska contends they have no money for this.	The Nuiqsut monitoring station provides continuous (24-hour/day) monitoring for CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$, and O_3. The CO, NO_2, SO_2, and O_3 instruments capture data nonstop, and hourly averages are calculated from this data, while the PM_{10} and $PM_{2.5}$ instruments capture 1-hour samples which are then averaged into a 24-hour sample. Publicly available monitoring reports show high yearly data capture rates, with 2018 showing a greater than 90% yearly data capture rate for all of the above-mentioned compounds.	N
84	12	Long	Becky	—	Air Quality	When the 2012 shallow well blowout of a Repsol exploratory well happened 18 miles from NVN, the air monitoring equipment was down due to routine maintenance. There should have been a back-up. Residents say that the incident impacted their health. Without the air monitoring data, an evacuation decision could not be decided. Shallow pressurized gas is a common drilling hazard. The Alaska Oil and Gas Conservation Commission Chair has said in the past that the technology is not perfect. A standard blowout preventer cannot always be used if there is not a pipe casing in the ground to attach it too. But the AOGCC can and should require that wells to be cased at a shallower depth. Oil and gas development in the Nuiqsut area and other BLM lands has proceeded too rapidly without enough care for the health of the people from air quality and subsistence resources impacts. Respiratory illness has increased since 1986. The increased percentage of cases is far more than due to population growth. Yet industry and state agencies blame the residents' lifestyle.	Chronic respiratory problems for Nuiqsut residents are described in Section 3.18.1.7, *Health Effect Category 7: Noncommunicable and Chronic Diseases*. The BLM has no authority over AOGCC requirements.	N
9	6	Miller	Pamela	—	Air Quality	Air quality is a vitally important issue, and there should be truly independent monitoring with the communities and the public having the right to feel confident that the sites of the air monitoring equipment are properly placed; that they are adequate; that they will measure the range of pollutants that's needed, including those related to climate change.	There is a large and well-designed air quality monitoring network on the North Slope. This includes air monitoring for CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$, O_3, and speciated VOCs at the Nuiqsut monitoring station (CPAI). Other North Slope monitoring stations include the Alpine CD1 facility, CD5 pad, A-Pad, and the central compressor plant (all industry sites). Although the Nuiqsut monitoring station is an industry-owned site, the data collected are designed and operated in accordance with applicable EPA PSD regulations and guidance documents. This includes independent audits by an outside party, quarterly calibrations, and documentation/explanation of missing data periods. GHG concentration monitoring for climate change occurs at the Utqiaġvik (Barrow) Atmospheric Baseline Observatory. Other monitoring occurs near Bettles, Fairbanks, and Denali National Park but is outside the Project area.	N
1295	8	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Air Quality	Air Quality Criteria Pollutant Impacts The BLM's preferred alternative, Alternative B, is not anticipated to result in any significant adverse impacts to air quality based on air quality modeling results presented in the Draft EIS. However, we note that the near field air quality modeling conducted for Alternative C projects exceedances of the 24-hour PM2.s National Ambient Air Quality Standards, with projected levels of PM2.s at 142% of the 24-hour NAAQS modeled to occur near the fence line of the North Willow Operations Center during routine operations. If the BLM were to select Alternative C, we recommend that the Final EIS include the necessary measures to mitigate this NAAQS exceedance and to protect public health. We appreciate that the Air Quality Technical Support Document provides an evaluation of the exceedance and contributing source units. This analysis indicates that three diesel-fired power generation engines and the incinerators proposed for the North WOC are the sources that have the highest contribution to this exceedance. Given that the proposed project includes power generation engines meeting Tier IV interim standards, additional measures to reduce the 24-hour PM2.s concentrations projected for Alternative C may include use of natural gas-fired engines or other refinements to the engineering design of the North WOC that minimize concentrations of source emissions.	As part of the Final EIS modeling, Alternative C now demonstrates compliance based on updated information from the Project proponent. All NAAQS for criteria air pollutants are expected to pass.	N
1295	10	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Air Quality	We also support the BLM's commitment to include a Fugitive Dust Control Plan in the Final EIS and recommend that the plan include not only the procedures and methods for control, but an outline of the monitoring, communications, and record-keeping procedure plans. In addition to air quality impacts, 4 particulate matter emissions from gravel roads and work areas can settle out, thereby impacting multiple resources including aquatic resources, vegetation, and permafrost.	A Fugitive Dust Control Plan was developed during the Final EIS preparation, and is provided as Appendix I.3 (*Dust Control Plan*) of the EIS.	Y
1295	11	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Air Quality	Hazardous Air Pollutants Consistent with our scoping comments, we continue to recommend that air quality analyses for oil and gas projects consider a larger list of HAPs. The Draft EIS analyzes hazardous air pollutant impacts from benzene, toluene, ethylbenzene, and xylene (collectively referred to as "BTEX"); n-hexane; and formaldehyde. The document explains that "[t]hese six HAPs were selected for analysis as BTEX and n hexane are present in the raw natural gas, condensate, and oil. Formaldehyde is formed from the combustion of small chain alkanes that predominate in natural gas." We note that 40 CFR Part 63 subpart HH Table 1 lists hazardous air pollutants for oil and natural gas production facilities, and includes the following additional pollutants: acetaldehyde, carbon disulfide, carbonyl sulfide, ethylene glycol, naphthalene, and 2,2,4-trimethylpentane.	The BLM is evaluating air quality impacts of the following six HAPs that are commonly emitted from oil and gas development: benzene, toluene, ethylbenzene, and xylene, n-hexane, and formaldehyde. Impacts from other HAPs listed under 40 CFR 63, Subpart HH, Table 1, were addressed qualitatively in Chapter 2.0 (*Emissions Inventories*) of Appendix E.3B (*Air Quality Technical Support Document*).	Y
1295	12	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Air Quality	If possible, we recommend that the HAPs impacts analysis be expanded in the Final EIS to include additional pollutants. Alternatively, we recommend that the Final EIS disclose that the values presented for "total HAPs" are the sum of only the six pollutants that have been quantitatively evaluated. According to emissions quantified in the Draft EIS, the quantity of volatile organic compounds anticipated to be emitted is approximately an order of magnitude larger than the "total HAPs" category; however, as the chemical-specific risks associated with the full-range of VOC emissions are not currently quantitatively assessed, there is uncertainty around this analysis.	The BLM has analyzed the six HAPs that are commonly emitted from oil and gas developments. The wording in Final EIS Section 3.3.1.2 (*Characterization of Climate, Meteorology, and Air Quality in the Analysis Area*) was updated to clarify this.	Y

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1295	14	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Air Quality	While the Draft EIS appropriately analyzes air quality and air quality related value impacts in the Arctic National Wildlife Refuge, Gates of the Arctic National Park, and Noatak: National Preserve, we note that the term “Class II areas” is incorrectly defined and used throughout Section 3.3 of the Draft EIS to distinguish these three areas. We recommend that this definition be corrected in the Final EIS, and that a different term be used to distinguish the three non-Class I federally managed areas that are included in the air quality analysis, such as “federally managed areas with sensitive air quality related values.” Under the Clean Air Act Section 162, federally-managed national parks, memorials, and wilderness areas in existence in 1977, and exceeding a minimal acreage, were designated as Class I areas, and provided additional air quality and air quality related-value protections. All other areas of the country are designated as Class II areas. Therefore, all portions of the air quality analysis area for this EIS that are not designated as Class I areas under the Clean Air Act are designated as Class II.	Text was updated in Section 3.3.1.1 (*Regulatory Framework*) of the EIS to use the term “three assessment areas” to refer to Class II areas analyzed in additional detail.	Y
1294	35	Nukapigak	Joe	Kuukpik Corporation	Air Quality	Vol. I, p. 31, Table 3.1.1, Average Temperature and Precipitation at the Nuiqsut National Weather Service Monitor The data in this table is from 1981-2010. One would think more current Nuiqsut weather info is available. The Nuiqsut weather has changed since just 2010.	More recent meteorology data are available; however, the data presented in Table 3.3.1 in the EIS are the 1981 to 2010 Climate Normal, which is the most recent one. A Climate Normal is a 30-year average of variables such as precipitation and maximum/minimum temperature. Climate Normals provide a better representation of climatology, or average conditions, of an area and are updated every decade with a new 30-year normal.	N
1307	14	Pardue	Margaret	Native Village of Nuiqsut	Air Quality	As explained in the conservation groups comment letter, BLM’s air quality modeling and analysis is flawed and underestimates the Willow MDP’s likely effects on our air quality, and none of the alternatives BLM considers includes sufficient, enforceable mitigation measures. BLM must correct these deficiencies before deciding whether to permit the project. It is particularly important to NVN that BLM use accurate baseline data and that it fully consider the cumulative effects of oil and gas development on our air quality.	Regarding the modeling underestimation concerns, the BLM notes that the different modeling scenarios were selected in consultation with air quality specialists at BLM and key cooperating agencies and after careful consideration of peak emissions and spatial and temporal variations to capture high impacts. Construction was modeled for the maximum year of emissions because there is construction activity in different locations in different years. The near-field modeling impact analysis also includes a developmental drilling scenario that includes concurrent construction (different from the Draft EIS), drilling, and operations. The purpose for modeling the other individual scenarios was to assess any other high spatial impacts that may not show up in the other scenarios. The BLM also notes that a Project-specific near-field analysis would be required for any development to be permitted in the NPR-A. The purpose of NEPA is to analyze the proponent’s Project and the action alternatives. It is assumed that the proponent would not change the Project design. Modeling results show compliance with federal and state air quality standards; therefore, no significant air quality impacts will occur. The operating data that are used in the modeling are Project design components and therefore do not necessitate an additional prescriptive requirement through mitigation measures. The selection of air quality baseline data was determined in consultation with air quality specialists at key cooperating agencies as part of a protocol process. It was determined that monitoring at Nuiqsut was the most representative of the Willow MDP Project area. Cumulative effects of oil and gas development were analyzed.	N
1307	15	Pardue	Margaret	Native Village of Nuiqsut	Air Quality	As residents, we have personally experienced and observed the impacts of oil development on air quality within our region, and we do not believe that BLM is doing enough to ensure that our community’s air is safe. The cumulative effects of development within our region have severely compromised our air quality. Our community is already experiencing significant health problems related to air pollution. . . . Accurate information about current air quality in Nuiqsut does not exist. A 2009 study showed that numerous volatile organic compounds (VOCs) and other pollutants were already present in our air.* And a 2012 study conducted in the weeks after the Repsol blowout found additional VOCs, including Benzene at levels above EPA carcinogenic screening levels.** Since that time, oil and gas development around our community has increased dramatically. The community is now surrounded by numerous production facilities and an expansive network of gravel roads and ice roads. This additional exploration and development raises the likelihood of toxic air pollution from normal operations, as well as the risk of blowouts that can cause dramatic increases in air pollution. An up-to-date, independent study of the air quality in our community and the surrounding region must be conducted before BLM approves additional projects, including the Willow MDP. This analysis should be conducted by independent outside experts, not oil companies or agencies with an interest in development. This analysis will take time and is another reason why we believe approval of Willow should be delayed. * Alaska Native Tribal Health Consortium, Independent Evaluation of Ambient Air Quality in the Village of Nuiqsut, Alaska (2009). ** Alaska Native Tribal Health Consortium, February 27, 2012 & March 15, 2012 VOC Air Sampling Results & Future Monitoring Recommendations (2012).	Chronic respiratory problems for Nuiqsut residents are described in Section 3.18.1.7, *Health Effect Category 7: Noncommunicable and Chronic Diseases*. The BLM is actively vested in the safety of the community of Nuiqsut but based on information available there should be no cause for concern. The North Slope is classified as an area that meets NAAQS and AAAQS. Modeling results show that there would be no exceedances of NAAQS/AAAQS as a result of the Project, and that HAPs would be below respective RELs and AEGLs. VOC data for benzene, toluene, ethylbenzene, xylenes, n-hexane, and formaldehyde collected between 2014 and 2018 are discussed in Section 3.3.1.2 (*Characterization of Climate, Meteorology, and Air Quality in the Analysis Area*) of the EIS. It shows that these commonly emitted HAPs from oil and gas development are below respective RELs and AEGLs. Neither the modeled results nor recent HAPs VOC monitoring data indicate a cause for concern. BLM does not see the need for additional sampling in the near term. However, this will be continually assessed as part of all NPR-A projects. It is common for federal agencies to reference data collected by the project proponent when developing an EIS. NEPA does not require federal agencies to conduct new studies and data collection; rather, NEPA requires the use of best-available data. The current NPR-A BMPs require project proponents to collect baseline data for certain resources and to provide that data to BLM. BLM’s subject-matter experts conducted a thorough and independent review of all existing data and studies and referenced them, as appropriate, for the various EIS analyses.	N

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3	1	Pavic	Karolina	—	Air Quality	I had a question about your earlier slide about air quality impacts and then the slide that showed that there would be no — there would be no air quality impact. It's, like, three slides back. And I'm just curious about how you collected the air quality data. That's what I'm asking about. I'm asking about how the data was collected to predict that there would be no air quality (inaudible). I guess my question about the modeling aspect of it is what is the modeling data based on? We do a lot of modeling—so the extent of my question here is about how the air quality data was collected, and because the answer to that question is there was no air quality data collected, it was based on modeling, where are you getting your numbers for the models? We have been out of compliance as a state with federal requirements for air quality for — what are we going on now? Does anybody know how many years? And I just wanted to know, did you have air quality monitors installed on North Slope that record the emissions, the exceedance of emissions that are out of compliance with the state and not only the federal government? I guess the modeling question is more, you model — you put some numbers in a computer, but where do those numbers generate from? That's really what my question was about.	Air quality data are collected by several monitors throughout the North Slope which show compliance with federal standards. The Project area is classified as attainment/unclassified. The NSB is in compliance with all NAAQS/AAAQS. The only nonattainment area in the state of Alaska is the Fairbanks North Star Borough. It is about 612 km to the south of the Project area and has been in nonattainment for $PM_{2.5}$ since 2009. However, the boundary of the Fairbanks nonattainment area is localized to Fairbanks and surrounding communities and is not relevant to the North Slope. Two state-of-the-science models were used for this Project, AERMOD and CAMx. Two models were needed for modeling different spatial scales. AERMOD is for pollutant transport in close proximity to emissions sources, and CAMx is needed to model transport and chemical reactions over longer distances. AERMOD is the EPA's preferred model for regulatory work because it models dispersion based on boundary layer turbulence, ground level and elevated pollution sources, and takes into account simple and complex terrain. Its results were added to baseline data collected at Nuiqsut for a conservative estimate of Project impacts. CAMx has been used in the past for State Implementation Plans and NAAQS assessments and can handle both physical transport and chemical reactions in the atmosphere. CAMx output was compared to actual monitoring data (see Attachment B) to evaluate it before it was used for Project impacts.	N
3	2	Pavic	Karolina	—	Air Quality	Does anybody know if the project, once it's completed, would be designated as a Title 5 source?	This type of permitting is designated for stationary sources that are considered to be "major" sources of pollutants. Applications are completed by the proponents and processed by the ADEC. It is unknown if components of this Project will be designated as Title V sources at this time. The Project proponent (CPAI) would need to comply with and obtain all federally required permits once the Project is approved by the BLM. For context, CPAI's Alpine central processing facility is designated as a Title V source.	N
17	2	Peter	Enei Begaye	Native Movement	Air Quality	I feel like it needs to be said that up to 70 percent of the residents of Nuiqsut are on medication just to breathe. So air quality monitoring not being taken seriously in this EIS and being based off of modeling, mathematical projections, and being based on the company's data, which these — these air quality monitoring systems just coincidentally happen to always break down during the big toxic blowouts and there isn't any data, surprisingly, when these things happen. So, we need data from a third party.	Ambient air quality monitoring occurs at Nuiqsut and throughout the North Slope. At Nuiqsut, air monitoring follows rigorous measurement protocols and data reports are publicly available, which include details on missing data periods. Toxic pollutant (benzene, toluene, ethylbenzene, xylenes, n-hexane, and formaldehyde) monitoring through 2018 at Nuiqsut found these pollutants (commonly emitted by oil and gas sources) to be well below RELs and AEGLs (see the Final EIS for this data). NO_2, SO_2, CO, PM_{10} and $PM_{2.5}$, and O_3 measured at Nuiqsut are also found to be below federal and state standards. It is common for federal agencies to reference data collected by the project proponent when developing an EIS. NEPA does not require federal agencies to conduct new studies and data collection; rather, NEPA requires the use of best-available data. The current NPR-A BMPs require project proponents to collect baseline data for certain resources and to provide that data to BLM. BLM's subject-matter experts conducted a thorough and independent review of all existing data and studies and referenced them, as appropriate, for the various EIS analyses.	N
988	6	Peter	Enei Begaye	Native Movement	Air Quality	Furthermore, we have attached a report titled: *Air Pollution in Alaska's North Slope*: its implications for the community of Nuiqsut. This air quality report uses data provided by The National Emissions Inventory (NEI), which is published by the US Environmental Protection Agency (EPA). This report documents millions of pounds of pollutants currently being emitted by oil and gas extraction and development on the Arctic Slope. Community members of Nuiqsut have had a 50% rise in respiratory illness in the last 30 years, 70% of Nuiqsut community members are on breathing aid medication, and there is a current lawsuit from the Native Village of Nuiqsut over ConocoPhillips exploration in the NPR-A. BLM's DEIS has not no mention of these facts and the inevitable increasing health impacts that would be caused by ConocoPhillips proposed Willow Master Development Plan.	Monitoring of HAPs commonly emitted from oil and gas development shows data that are below exposure guidelines. Detailed modeling conducted for the EIS shows that pollutants due to the Willow MDP Project would be below relevant ambient air standards and health-based thresholds at Nuiqsut. Chronic respiratory problems for Nuiqsut residents are described in Section 3.18.1.7, *Health Effect Category 7: Noncommunicable and Chronic Diseases*.	N
992	9	Perry	Sharla	—	Air Quality	ConocoPhillips—the organization that stands to benefit most from this project—is in charge of collecting data on air quality. I request that an unbiased 3rd party agency be involved in the process of collecting data on air quality.	Although the Nuiqsut monitoring station is an industry-owned site, the data collected are designed and operated in accordance with applicable EPA PSD regulations and guidance documents. This includes independent audits by an outside party, quarterly calibrations, and documentation/explanation of missing data periods. It is common for federal agencies to reference data collected by the project proponent when developing an EIS. NEPA does not require federal agencies to conduct new studies and data collection; rather, NEPA requires the use of best-available data. The current NPR-A BMPs require project proponents to collect baseline data for certain resources and to provide that data to BLM. BLM's subject-matter experts conducted a thorough and independent review of all existing data and studies and referenced them, as appropriate, for the various EIS analyses.	N
864	102	Psarianos	Bridget	Trustees for Alaska	Air Quality	Willow, which would lead to oil production for many years into the future, would undermine the country's - and the world's - urgently needed implementation of its goals for moving swiftly away from dependence on carbon-based fuels. BLM's analysis will have to ask a set of questions about how the choice to authorize Willow relates to the overall carbon budget and to decisions about whether to pursue other fossil fuels in light of the reality that a vast majority of already-discovered fossil fuels must be left undeveloped.	Section 3.2.1, *Affected Environment*, of the Final EIS addresses ongoing impacts of climate change on the environment, including in the Project area. Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) and Section 3.19.4 (*Cumulative Impacts to Climate Change*) analyze impacts that the Project and cumulative actions may have on climate.	N

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864	125	Psarianos	Bridget	Trustees for Alaska	Air Quality	The air quality modeling analysis performed by the BLM for the DEIS for the Willow MDP Project indicates that significant adverse impacts on air quality could occur. Further, the air quality analysis is deficient and likely underestimates impacts. As a result, it is likely that air quality impacts would be more extensive than what is presented in the DEIS. In addition, all of the alternatives fall short of establishing enforceable mitigation measures that reflect assumptions that were made in the analysis and that will ensure that no significant air quality impacts will occur.	In the Draft EIS, predicted impacts from all alternatives and scenarios were below NAAQS and AAAQS and established thresholds for AQRVs, except for Alternative C Routine Operations, which was predicted to exceed the $PM_{2.5}$ 24-hour NAAQS and AAAQS. As shown in the Final EIS, impacts from the revised Project are predicted to be below all applicable NAAQS and AAAQS and established thresholds for AQRVs for all alternatives and scenarios, including Alternative C Routine Operations. Therefore, there would not be significant impacts on air quality. Related to modeling underestimation concerns, modeling does not underestimate impacts because the modeling scenarios were selected to capture high impacts, with careful consideration of peak emissions and spatial and temporal emissions variations and in consultation with air quality specialists at key cooperating agencies. As described in the Final EIS and appendices, the near-field modeling impact analysis assesses multiple scenarios. Notably, the Developmental Drilling scenario presented in the Final EIS has been revised from the approach in the Draft EIS to analyze concurrent construction, drilling, and operations for the peak emissions year. Other scenarios analyze activities with potentially localized peak impacts that could differ from the Developmental Drilling scenario. The Construction scenario models the maximum construction emissions. The Pre-drill scenario assesses impacts associated with drilling activities before electric drill rigs are able to operate. The Routine Operations scenario assesses impacts after temporary and transient activities are complete. Related to the request for enforceable mitigation measures, the purpose of NEPA is to analyze the Project, as proposed by the proponent, and alternatives to inform the selection of an alternative. Since air quality modeling results show that impacts for all alternatives would be below all applicable NAAQS and AAAQS and established thresholds for AQRVs, no significant air quality impacts would occur. Therefore, additional prescriptive mitigation measures are not required for protection of air quality. It is the jurisdiction of ADEC Division of Air Quality, not the BLM, to stipulate required and enforceable operating conditions as part of an air quality permit. Importantly, as part of ADEC's air quality permitting process, the proponent would be required to conduct a Project-specific ambient air impact assessment for those pollutants and averaging periods that trigger permitting requirements.	N
864	126	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM's [air quality] modeling analysis is deficient and likely underestimates impacts in part due to a lack of reliable baseline data in the area. The DEIS relies on monitoring data collected in Nuiqsut by ConocoPhillips to represent background concentrations for the air quality analysis. Since these data are not publicly available (e.g., through EPAs Air Quality System Data Mart), the BLM should confirm that the data have been reviewed and approved by EPA or the State in order to assure the public that the data have been properly collected and quality-assured. In 2011, EPA issued a determination of appropriate background values for the North Slope, for use in OCS permitting. At the time, EPA did not consider the ConocoPhillips data collected in Nuiqsut. . . . In 2011, EPA established the following appropriate representative background concentrations for the village of Nuiqsut, which are significantly higher than what is used in the Willow DEIS: (1) a 24-hour average PM2.5 concentration of 17 g/m3 from data collected at the Deadhorse monitor, compared with the value presented in the DEIS of 7.5 g/m3; and (2) a 1- hour average NO2 concentration of 50 parts per billion (ppb) from data collected at the A-Pad monitor, compared with the value presented in the DEIS of 23 ppb. In addition to ConocoPhillips-collected data, BLM should also review and consider data from the same monitors EPA relied on in determining background values for Nuiqsut. Even if EPA determines that the ConocoPhillips monitoring data in Nuiqsut are properly collected and quality assured, the data may not be representative of background concentrations in areas nearer to the Willow project sources and therefore may not be sufficient to assess overall air quality impacts to exposed populations outside the village of Nuiqsut and closer to the project area, e.g., to subsistence hunters in the region. BLM should coordinate efforts with the State and/or EPA to secure additional monitoring around the Alpine Development Area surrounding Nuiqsut that would be made publicly available through the EPAs Air Quality System. Considering the substantial amount of oil and gas activity in this area, it would be reasonable for BLM to seek publicly supported data sources to monitor air quality in the Prudhoe Bay region.	The air quality modeling analysis methodology and selection of air quality baseline data were determined in consultation with air quality specialists at key cooperating agencies as part of a protocol process. Although the Nuiqsut monitoring station is an industry-owned site, the site is operated, and data are collected in accordance with applicable EPA PSD regulations and guidance. Specifically, the monitoring equipment is audited by an outside party, quarterly calibrations are conducted, and there is documentation/explanation of missing data periods. Notably, EPA Region 10's determination of appropriate background values for the North Slope as part of OCS PSD permitting purposes is not relevant for the selection of baseline data for this Project in several important respects. Specifically, this analysis is being conducted as required by NEPA, not as a PSD permitting assessment; this analysis is for an onshore development, not an offshore analysis; and this analysis is being conducted in 2020, and more recent data are available since EPA Region 10's assessment of baseline data in 2011. The BLM and air specialists at key cooperating agencies considered monitors other than Nuiqsut and determined that the Nuiqsut monitor was the most representative monitor for the Willow MDP Project's background concentrations. To assist with the disclosure of impacts for a NEPA analysis, it is more appropriate to use available representative data than data from a site that is less representative. The Deadhorse and A-Pad monitors are both over 100 km from the WPF (while Nuiqsut is only approximately 40 km away) and are located in the Prudhoe Bay Unit, which is an older development and has substantially different source mixture than the sparsely developed NPR-A. The Willow MDP Project area is remote and has no anthropogenic emission sources. Therefore, data collected at Deadhorse and A-Pad are not representative of the Willow MDP Project area or background concentrations for subsistence hunters near Willow. Furthermore, the Nuiqsut monitor is located in the community of Nuiqsut and in proximity to stationary and mobile sources (dirt roads, vehicles, etc.). While the Nuiqsut monitor is the most representative data for the Project area, the monitored air quality concentrations are anticipated to be conservatively high relative to the actual background concentrations at the Project area due to localized emissions sources in the community of Nuiqsut. Related to the assessment of impacts to populations outside Nuiqsut, the near-field ambient air impact assessment analyzed air quality impacts to ambient air anywhere within 50 km of Project emissions sources for multiple scenarios. Impacts to all criteria pollutants were below NAAQS and AAAQS, indicating that subsistence hunters would not be exposed to concentrations above the NAAQS and AAAQS.	N

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864	127	Psarianos	Bridget	Trustees for Alaska	Air Quality	In addition to concerns with the representativeness of the background concentration data presented in the DEIS, BLM has removed PM10 data from the monitoring dataset. . . . EPA has established rigorous criteria and procedures for determining whether data are considered and treated as exceptional events and BLM must make a determination based on similar criteria and procedures prior to removing any data from the dataset used in determining representative background concentrations for the DEIS. If high wind events are occurring year after year it would seem unlikely that the resulting pollutant concentrations would be considered to be exceptional. And if the analysis intends to assess impacts in Nuiqsut then it should consider these high wind events as representative of conditions there. Given that the near-field modeling analysis presented in the DEIS predicts PM10 impacts that are approaching levels of the NAAQS (e.g., 24-hour PM10 concentrations from construction activity are 80% of the NAAQS for Alternative B), it is imperative that BLM fully account for all sources of background air quality in order to ensure that additional impacts from the proposed Willow development will not cause or contribute to exceedances of the PM10 NAAQS.	Consistent with the approach followed for previous EISs, including for GMT-1 and GMT-2, the BLM has removed a small number of 24-hour average PM_{10} concentrations measured at Nuiqsut from the values used to determine a monthly-varying, representative PM_{10} background concentration for the Willow MDP Project area. Importantly, the BLM does not refer to these data as Exceptional Events, nor does it seek exclusion of these data as Exceptional Events. CAA Section 319(b) allows for the exclusion of monitored data influenced by Exceptional Events when using the data for regulatory decisions, such as exceedances or violations of the NAAQS. The EPA's Exceptional Event Demonstration guidance has been developed as an option for states if data collected by regulatory monitors are influenced by Exceptional Events and states would like to exclude these data from regulatory decisions. Since the Nuiqsut monitor is not a regulatory monitor, and the data collected by the monitor are not used for regulatory decisions, Exceptional Event Demonstrations would not be necessary for data collected at the Nuiqsut monitor. Furthermore, the data collected at the Nuiqsut monitor during 2015 through 2017 did not exceeded the PM_{10} 24-hour NAAQS, so no Exceptional Events Demonstration would be warranted even if the monitor was a regulatory monitor. Related to the concern about high wind events occurring year after year, it is important to note that the Exceptional Events Rule defines "natural events," such as high wind dust events, as an event which may recur at the same location provided that human activity plays little or no direct causal role. High wind events that loft silt from the Nigliq Channel into the air meet the definition of a natural event and therefore would be considered Exceptional Events regardless of frequency of occurrence. Related to the concern about the representativeness of high wind events monitored at Nuiqsut, the Nuiqsut monitor is located in close proximity to the Nigliq Channel, a channel of the CRD, while the WPF and a majority of the Willow MDP Project evaluated with the near-field modeling analysis are located approximately 50 km from the CRD. Therefore, the high wind events that contribute to elevated PM_{10} concentrations monitored at Nuiqsut are not anticipated to be representative of typical conditions at the Project area. The background data used in the near-field modeling analysis were selected with care to fully account for representative conditions for the Project area. Other emissions sources not accounted for in the Nuiqsut monitoring data, such as RFD, were explicitly included in the modeling analysis.	N
864	129	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM's Modeling Analysis is Deficient and Likely Underestimates Impacts. Modeled Scenarios It appears that the near-field modeled scenarios do not account for concurrent construction, drilling, and operation activities and therefore underestimate potential air quality impacts from the proposed Project. The DEIS presents separate modeling scenarios for construction, pre-drilling activities at proposed drill site BT1, development drilling, and routine operations for Alternative B in the AQTSD (Section 3.3.1). The DEIS then presents the corresponding impacts from these scenarios, as if they occur in isolation, when in fact construction, drilling, and routine operations will occur simultaneously during many years of the project. According to the AQTSD, emissions from construction, drilling, and operations occur concurrently in years 2021 through 2032. The modeling report includes detailed emissions summaries showing combined emissions from construction, drilling, and operations activities for each year of the project (2020-2050). BLM must model scenarios that fully account for all construction, drilling, and routine operations activities that will occur at the same time. Instead, the DEIS presents model results for PM10 impacts from construction activities, BT1 pre-drilling activities, developmental drilling activities, and routine operations separately in the DEIS. . . . Construction emissions under Alternative B in 2023, the year that construction emissions were modeled in the DEIS, are 146.4 tons. Yet, total PM10 emissions in that same year (2023) from construction, drilling, and operations activities combined are 172.1 tons. The BLM's analysis does not model the impacts of these combined PM10 emissions. The year with the highest PM10 emissions from all project activities under Alternative B occurs in 2026, with total PM10 emissions from construction (105.6 tons), drilling (87.6 tons), and operations (170.2 tons) of 363.5 tons. Again, the BLM's analysis does not model the impacts of these combined emissions (that are over two times the amount of PM10 emissions modeled for the construction scenario under Alternative B) in the DEIS. In fact, there are nine other years in which the total PM10 project emissions exceed the emissions modeled for the maximum impact scenario under Alternative B in the DEIS.	The overall total annual Project emissions throughout the relatively large and spatially disperse Willow MDP Project area are not necessarily a predictor of peak, localized impacts in close proximity to emissions activities. Instead, the amount of concurrent emissions in a given area of the Project area, such as a drill site or the central processing facility, is more related to potential peak impacts. In light of this, the near-field modeling scenarios were selected to capture high impacts with careful consideration of peak emissions, spatial and temporal emissions variations, and in consultation with air quality specialists at key cooperating agencies. Notably the Developmental Drilling scenario presented in the Final EIS has been revised from the approach in the Draft EIS to analyze concurrent facility construction, drilling and operations for the peak emissions year. In the revised Final EIS, the emissions have changed relative to the Draft EIS and the values cited in the comment. In the Final EIS, the highest PM_{10} impacts under Alternative B have decreased relative to the Draft EIS and are predicted to be up to 57% of the NAAQS and AAAQS during Development Drilling and the Routine Operations. Other scenarios analyzed in the Draft EIS and Final EIS assess activities with potentially localized peak impacts that could differ from the Developmental Drilling scenario. The Construction scenario models the maximum annual construction emissions and assesses impacts from key activities expected to occur during the construction phase, including gravel mining and HDD to install pipelines under the Colville River. The Pre-drill scenario assesses impacts associated with concurrent diesel-fired drilling and hydraulic fracturing activities before electricity is available for electric drill rigs are able to operate. Once the central processing facility is operational and is generating electric power, diesel-fired drilling would no longer occur and electric drill rigs would be used. Impacts associated with concurrent operation of two electric drill rigs, hydraulic fracturing, and drill site facilities installation, as well as operation of the WPF and all other routine operations, are assessed as part of the Development Drilling scenario. The Routine Operations scenario assesses impacts from Project operational emissions after temporary and transient activities associated with construction and drilling are complete. The impacts associated with module delivery options are also assessed. All scenarios are developed to characterize potential peak localized impacts from the Project for various pollutants or spatial locations and all scenarios predict impacts would be below applicable NAAQS and AAAQS. New text was added to Section 3.1 (*Approach Overview and Results Summary*) in Appendix E.3B (*Air Quality Technical Support Document*) to describe the scenario selection.	Y

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864	130	Psarianos	Bridget	Trustees for Alaska	Air Quality	The DEIS presents the following PM10 impacts, individually, and fails to present an analysis of the combined impacts of the scenario where emissions from these activities will occur at the same time: [see tables in comment letter]. And for PM2.5 and NOx impacts, the BLM has disaggregated impacts even further. . . . The BLM's analysis does not model the impacts of these combined emissions and does not even model the combined impacts of emissions from both developmental drilling and BT1 pre-drilling activities. The DEIS presents the following NOx impacts, individually, and fails to present an analysis of the combined impacts of the scenario where emissions from these activities will occur at the same time, despite the fact that such activities would occur simultaneously under the Willow proposal [see tables in comment letter]. The magnitude of the impacts from combined emissions from construction, drilling, and operations activities cannot be known without a modeling analysis to determine ambient air concentrations. Depending on where and when emissions occur from the various project activities it is possible that resulting impacts would exceed the NAAQS, especially when considering the 1-hour average NAAQS for NOx and 24-hour average NAAQS for PM10 and PM2.5. And given the proximity of the project to Nuiqsut it is possible that the combined emissions from construction, drilling, and operations could result in higher impacts there than what is presented in the DEIS. As described above, the lack of accurate background concentrations is another flaw that leads to underestimated impacts in the modeling.	The overall total annual Project emissions throughout the relatively large and spatially disperse Willow MDP Project area are not necessarily a predictor of peak, localized impacts in close proximity to emissions activities. Instead, the amount of concurrent emissions in a given area of the Project area, such as a drill site or the central processing facility, is more related to potential peak impacts. In light of this, the near-field modeling scenarios were selected to capture high impacts with careful consideration of peak emissions, spatial and temporal emissions variations, and in consultation with air quality specialists at key cooperating agencies. Notably the Developmental Drilling scenario presented in the Final EIS has been revised relative to the approach in the Draft EIS to analyze concurrent faculty construction, drilling and operations for the peak emissions year. In the revised Final EIS, the emissions have changed relative to the Draft EIS and the values cited in the comment. In the Final EIS, the highest NOx impacts under Alternative B have decreased relative to the Draft EIS and are predicted to be up to 83% of the NAAQS and AAAQS during Development Drilling and the Routine Operations. The highest $PM_{2.5}$ impacts under Alternative B have increased in the Final EIS relative to the Draft EIS and are predicted to be up to 87% of the NAAQS and AAAQS during Development Drilling and the Routine Operations. Other scenarios analyzed in the Draft EIS and Final EIS assess activities with potentially localized peak impacts that could differ from the Developmental Drilling scenario. The Construction scenario models the maximum annual construction emissions and assesses impacts from key activities expected to occur during the construction phase, including gravel mining and HDD to install pipelines under the Colville River. The Pre-drill scenario assesses impacts associated with concurrent diesel-fired drilling and hydraulic fracturing activities before electricity is available for electric drill rigs to operate. Once the central processing facility is operational and is generating electric power, diesel-fired drilling would no longer occur and electric drill rigs would be used. Impacts associated with concurrent operation of two electric drill rigs, hydraulic fracturing, and drill site facilities installation, as well as operation of the WPF and all other routine operations, are assessed as part of the Development Drilling scenario. The Routine Operations scenario assesses impacts from Project operational emissions after temporary and transient activities associated with construction and drilling are complete. The impacts associated with module delivery options are also assessed. All scenarios are developed to characterize potential peak localized impacts from the Project for various pollutants or spatial locations and all scenarios predict impacts would be below applicable NAAQS and AAAQS. Regarding the comment that concurrent development drilling and pre-drilling is not analyzed, the Final EIS has been modified to explain that pre-drilling activities would not occur concurrent with developmental drilling activities. Regarding the comment that it is also important to analyze concurrent impacts at Nuiqsut, the impacts of all scenarios, including the Development Drilling scenario, and total maximum annual emissions from the regional modeling analysis are assessed at Nuiqsut and impacts are presented in the Draft EIS and Final EIS. Related to the concern about the accuracy of the background data, the BLM and air specialists at key cooperating agencies considered available monitors for the selection of a representative background monitor. It was determined that the Nuiqsut monitor was the most representative monitor for the Willow MDP Project's background concentrations. While the Nuiqsut monitor is the most representative data for the Willow MDP Project area, the monitored air quality concentrations are anticipated to be conservatively high relative to the actual background concentrations at the Project area due to localized emissions sources in the community of Nuiqsut. New text was added to Section 3.1 (*Approach Overview and Results Summary*) in Appendix E.3B (*Air Quality Technical Support Document*) to describe the scenario selection.	Y
864	131	Psarianos	Bridget	Trustees for Alaska	Air Quality	NO2 Modeling BLM's impact analysis relies on seasonally-varying hourly background concentrations for NO2. Specifically, instead of adding a single representative background concentration to the modeled design value concentration, the DEIS relies on a different background concentration for each hour of the day, by season. According to the AQTSD, the seasonally varying hourly NO2 background values are based on air monitoring data from Nuiqsut for calendar years 2015, 2016, and 2017. For each of four 3-month seasons (e.g., Season 1 = December, January, February, etc.) each hour of the day is represented by the 3-year average of the 98th percentile value of all valid observations for that hour during the season. While not explicitly described in the DEIS, it appears that this analysis method pairs the 3-year average of 98th percentile monitored NO2 concentrations by hour, in a given season, with corresponding modeled concentrations for that hour. This method of pairing data, in time, likely underestimates impacts by overlooking hours when higher background concentrations coincide with the highest modeled concentrations. And while EPA guidance discusses cases where this type of methodology might be used, EPA admits that these alternative analyses result in a less conservative estimate of impacts. This type of analysis could be considered appropriate if, for example, there is a concern about double-counting of monitored and modeled contributions, but this does not seem likely for the Willow project. BLM must justify why this less conservative analysis is warranted. The AQTSD briefly mentions seasonal variance and describes consistency with the GMT2 analysis as potential reasons for this type of refined analysis but fails to provide any evidence for why, in addition to a seasonal variation, the modeling should consider diurnal variations in its analysis for the Willow DEIS. And even if this type of analysis is justifiable, EPA guidance indicates that background values should be based on the 3rd highest value for each season and hour-of-the-day combination (as opposed to the 98th percentile, or 8th highest value).	Background 1-hour NO_2 values have been revised in Section 3.2.6 (*Ambient Background Data*) in Appendix E.3B (*Air Quality Technical Support Document*) to the third-highest hourly values per day per season. This is still a conservative estimate of background, given that we are pairing maximum predicted concentrations with maximum background values.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	132	Psarianos	Bridget	Trustees for Alaska	Air Quality	Fundamentally, the modeling for the Willow DEIS should be used as a tool to ensure that adverse impacts will not occur in the future, not simply to determine whether or not an adverse impact occurs over the period of time modeled. The most protective approach, and one presented in EPAs guidance without need for further justification, would be to add the overall highest hourly background NO2 concentration (across the three year monitoring record) to the modeled design value based on the maximum emissions scenario. A less conservative approach outlined in EPAs guidance, but one that still would not need further justification, would be to combine the modeled design value based on the maximum emissions scenario to the monitored NO2 design value, i.e., the 98th-percentile of the annual distribution of daily maximum 1-hour values averaged across the three years of monitored data (irrespective of the meteorological data period used in the dispersion modeling). The method of varying background concentrations seasonally and by hour-of-day likely results in a less conservative analysis and, given that the modeling shows impacts close to the NAAQS (i.e., 91% of the 1-hour NO2 NAAQS for developmental drilling activities under Alternative B and 92% of the 1-hour NO2 NAAQS for routine operations under Alternative C), BLM should consider adopting mitigation measures aimed at minimizing NOx emissions from the Willow development. (See below).	Background 1-hour NO_2 values have been revised to the third-highest hourly values per day per season in Section 3.2.6 (*Ambient Background Data*) in Appendix E.3B (*Air Quality Technical Support Document*). This is still a conservative estimate of background, given that we are pairing maximum predicted concentrations with maximum background values.	Y
864	133	Psarianos	Bridget	Trustees for Alaska	Air Quality	In addition to potential underestimates of NO2 impacts from varying background concentrations by season and hour-of-day in the modeling, NO2 impacts may be further under predicted by the use of source-specific in-stack NO2/NOx ratios in the modeling analysis. The DEIS uses ratios based on source test data for many sources, e.g., stationary engines, non-road and on-road diesel engines, heaters, turbines, etc. Flares are the only source category for which the analysis uses the EPA-approved default value of 0.5. Some of the ratios use a value ten times lower than the default value. For example, the ratio used for natural gas heaters (0.05) is from the Converse County DEIS in Wyoming which bases its in-stack ratios on manufacturing data and surveys. These in-stack ratios can be important parameters in the modeling and, therefore, BLM must ensure the ratios used are reasonably conservative since small changes to the ratios used could have a measurable impact on predicted concentrations. If BLM wants to rely on source-specific data it should include justification demonstrating that it is basing source-specific data on a reasonable sample size representing a wide load range for these sources that is representative of local operating conditions for the Willow Project. In the absence of sufficient justification and supporting data, BLM should use the EPA-approved default value of 0.5 for these sources.	The BLM is not relying on new source-specific data for the in-stack NO_2-to-NOx ratios. Data for in-stack ratios were obtained from approved ADEC sources unless otherwise stated (see Chapter 3.0 of Appendix E.3B, *Air Quality Technical Support Document*). ADEC in-stack ratios provide data that are most representative of local operating conditions for the Willow MDP Project. For sources that had no available data, the EPA default value of 0.5 was used. The Converse County Draft EIS in-stack ratios for natural gas heaters were derived from the EPA and ADEC in-stack ratio databases, not manufacturing data. To clarify, Table 3.2-1 in Appendix E.3B (*Air Quality Technical Support Document*) was revised to cite the original data sources for the natural gas heater in-stack ratio.	Y
864	134	Psarianos	Bridget	Trustees for Alaska	Air Quality	PM10 Modeling Similar to the NO2 impact analysis, BLM's PM10 analysis relies on monthly-varying background concentrations. Specifically, instead of adding a single representative background concentration to the modeled design value concentration, the DEIS relies on a different background concentration for each month. Absent any EPA guidance on the use of varying background concentrations for assessing PM10 impacts on compliance with the NAAQS, BLM must provide clear and convincing justification for why this type of variation which would likely result in a less conservative analysis of PM10 impacts is warranted and protective of the NAAQS and should request guidance from EPA technical staff on the use of this method. Given that the modeling shows impacts close to the NAAQS (i.e., 80% of the 24-hour PM10 NAAQS for construction activity under Alternative B), BLM should consider adopting additional mitigation measures aimed at further minimizing fugitive dust from the Willow project development as described below.	Consistent with the approach followed for the GMT-2, the BLM has used monthly-varying, representative PM_{10} background concentrations from the Nuiqsut monitoring station for the Willow MDP Project area. The background data used in the near-field modeling analysis were selected with care to fully account for representative conditions for the Project area. In addition, other emissions sources not accounted for in the Nuiqsut monitoring data, such as RFD, were explicitly included in the modeling analysis. Prior to conducting the air quality analysis, an air quality modeling protocol was developed and approved by the AQTWG, which includes representatives from the ADEC, EPA, and BLM. As stated in the protocol, "for most of the pollutants and average times, a single background value will be added to the model results. However, if further analysis of the monitoring data shows variability in the data between seasons or hours, seasonal hourly or daily background data may be used especially for NO_2, PM_{10}, and $PM_{2.5}$. PM_{10} will be further analyzed to determine a final background level as the monitor at the Nuiqsut Monitoring Station is known to capture PM_{10} from the Nigliq Channel during summer high wind events. Because there would not be a similar channel with sediment surrounding the proposed Willow MDP drill sites, these high wind events would not be representative of the background. The PM_{10} data from the Nuiqsut Monitoring Station, coupled with wind speed and direction data, will be looked at in detail to determine a more representative background." In addition to further mitigate fugitive dust impacts, a fugitive dust control plan will be implemented on-site.	N

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864	135	Psarianos	Bridget	Trustees for Alaska	Air Quality	Unpaved Road Dust Modeling According to the AQTSD and model performance evaluation report in the DEIS, "the Willow regional modeling analysis originally relied on unpaved fugitive dust emissions from the BOEM modeling platform but BLM concluded that the impacts from the modeled emissions were typically at least an order of magnitude larger than monitored values during summertime." BOEM had indicated that the fugitive dust emissions estimates were uncertain due mainly to the necessary use of non-local data such as default moisture content BLM corrects for this over-estimate by uniformly and arbitrarily reducing dust emissions by a factor of ten from May to September. According to BLM, this adjustment improved model performance considerably. BLM failed to provide sufficient technical justification for the adjustment, other than the fact that the model now predicts concentrations that more closely resemble historic monitored values. Instead of reducing emissions by an arbitrary amount, BLM must make an effort to assess and incorporate localized values for moisture content and other important factors for determining emissions from unpaved roads (e.g., silt content data, precipitation data, etc.). It's also not clear if the emissions used in the performance evaluation modeling included emissions from unpaved road dust sources that are not generally reflected in the monitoring record used for comparison. BLM must more clearly explain whether the modeled emissions from BOEM are representative of the types of emissions expected to have occurred during the monitoring record used to evaluate model performance.	The decision to correct the fugitive dust emissions in the regional modeling and the level of the correction was based on evidence that the modeled fugitive dust emissions were contributing to modeled overprediction of monitored levels of airborne soil at two locations in the North Slope. It was determined that fugitive dust emissions were overpredicted in the BOEM regional modeling based on several factors. First, the fugitive dust emissions were modeled as occurring only from May to September. This enables a comparison of the model performance during May to September (the period with fugitive dust emissions) to model performance in October through April (the period without fugitive dust emissions). The model performance during May through September had a substantial and consistent level of overprediction of fine soil relative to monitored values that does not occur in months October through April. Second, the correction made to the fugitive dust emissions were demonstrated to be effective by improved model performance for fine soil during May through September without effecting (positively or negatively) the model performance for other months or other chemical constituents. Third, the unpaved road dust emission developed by BOEM have substantial uncertainty stemming from uncertainty in the inputs used to calculate the emission factor, such as silt and moisture content, the overall emission factor uncertainty, and uncertainty related to the estimated amount of vehicle miles traveled. The BOEM study made a focused effort to assess and incorporate localized information for the development of all emissions inputs, including unpaved roads. The BLM did not identify additional sources of information beyond information used by BOEM to revise the emissions estimates; however, the lack of localized information does not preclude the BLM from revising the database when there is evidence that the values are erroneous and would be misleading. Importantly, the BOEM regional modeling study provides a platform in order to assess Project-specific and cumulative regional impacts. The correction to the regional fugitive dust emissions does not alter or affect the predicted Project-specific impacts, nor the contribution of the Project to predicted total cumulative impacts. To address the last concern raised by the comment, the two monitoring sites used to evaluate the model performance are located in areas expected to be similarly impacted by unpaved road emissions as other locations throughout the North Slope.	N
864	136	Psarianos	Bridget	Trustees for Alaska	Air Quality	The adjustment BLM made to fugitive dust emissions is also questionable since BLM's own conclusions warn that, model performance results should be interpreted with care given that contemporaneous air quality observations were very limited for this area. Relying on limited air monitoring to make an arbitrary adjustment to fugitive dust emissions estimates, resulting in modeled emission rates that are 10 times lower than what was estimated when derived from engineering calculations does not seem justified. BLM must more fully assess whether the monitoring record used in the performance evaluation for fugitive dust is representative of the modeled sources in the 2012 Base Case simulation used for evaluating the model performance and whether the assumptions made in calculating fugitive dust emissions are representative of local conditions. Also, fugitive dust emissions are only estimated for May through October and therefore the potential impacts are underestimated in the DEIS. . . . BLM must include these fugitive dust impacts that occur outside May through October in its analysis of impacts from the proposed project.	The decision to correct the fugitive dust emissions in the regional modeling and the level of the correction was based on evidence that the modeled fugitive dust emissions were contributing to modeled overprediction of monitored levels of airborne soil at two locations in the North Slope. It was determined that fugitive dust emissions were overpredicted in the BOEM regional modeling based on several factors. First, the fugitive dust emissions were modeled as occurring only from May to September. This enables a comparison of the model performance during May to September (the period with fugitive dust emissions) to model performance in October through April (the period without fugitive dust emissions). The model performance during May through September had a substantial and consistent level of overprediction of fine soil relative to monitored values that does not occur in months October through April. Second, the correction made to the fugitive dust emissions were demonstrated to be effective by improved model performance for fine soil during May through September without effecting (positively or negatively) the model performance for other months or other chemical constituents. Third, the unpaved road dust emission developed by BOEM have substantial uncertainty stemming from uncertainty in the inputs used to calculate the emission factor, such as silt and moisture content, the overall emission factor uncertainty, and uncertainty related to the estimated amount of vehicle miles traveled. The BOEM study made a focused effort to assess and incorporate localized information for the development of all emissions inputs, including unpaved roads. The BLM did not identify additional sources of information beyond information used by BOEM to revise the emissions estimates; however, the lack of localized information does not preclude the BLM from revising the database when there is evidence that the values are erroneous and would be misleading. Importantly, the BOEM regional modeling study provides a platform in order to assess Project-specific and cumulative regional impacts. The correction to the regional fugitive dust emissions does not alter or affect the predicted Project-specific impacts, nor the contribution of the Project to predicted total cumulative impacts. Related to the concern about fugitive dust emissions calculated for the Willow MDP Project outside of the May through October time period, the AQTSD has been revised to include a discussion of winter fugitive dust emissions.	N
864	137	Psarianos	Bridget	Trustees for Alaska	Air Quality	[Air Quality] Cumulative Impacts Analysis The DEIS includes a list of 12 Reasonably Foreseeable Future Actions (RFFA) that were included in a cumulative impact modeling analysis. There is limited information on the results of the cumulative impacts analysis in the DEIS. . . . The AQTSD includes maps of modeled cumulative impacts for the various pollutants and the different Alternatives analyzed but the size / scale of the maps is too small to be able to clearly distinguish potential areas of concern. In addition to these maps there is a general descriptive summary of impacts, but with very little specifics. . . . BLM should provide further details on any significant project impacts resulting from the cumulative modeling analysis. And BLM should include model results of the cumulative impacts of the proposed project along with all other existing and reasonably foreseeable future projects on the community of Nuiqsut, specifically, as well as impacted areas that are used by members of the Nuiqsut community for whaling and hunting. The DEIS fails to disclose what the cumulative impacts to Nuiqsut community members will be in the DEIS.	The cumulative maps have sufficient resolution in the figures that one could zoom in on the online version. Also, near-field impacts are addressed as part of the near-field modeling. For the cumulative far-field modeling, impacts at Nuiqsut are lower than the domain maximums, which are well below thresholds.	N

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864	138	Psarianos	Bridget	Trustees for Alaska	Air Quality	In addition to disclosing additional results from the cumulative modeling analysis, BLM should ensure that the cumulative assessment fully considers all potential emission sources that could occur at the same time from concurrent projects, e.g., including from construction impacts from the RFFA sources. BLM must include construction emissions from these sources unless it will be imposing a requirement that future development will not occur until after construction is completed for previous projects (e.g., GMT-1, GMT-2). BLM should also ensure the cumulative impact analysis considers all existing and reasonably foreseeable development, including the following existing sources: winter exploration within the Bear Tooth Unit, Greater Mooses Tooth Kuparuk, Putu, and Horseshoe. BLM should also include emissions from future actions such as future expansion of the Willow project and additional westward expansion into the NPR-A, construction and operation of the Liberty project in the nearshore Beaufort Sea, the Nanushuk project, the proposed Alaska LNG Gas Treatment Facility and associated compressor stations on the North Slope, and future development in the Arctic Refuge Coastal Plain.	The list of projects to evaluate and include for assessing cumulative air quality impacts was determined in consultation with air quality specialists at key cooperating agencies as part of a protocol process. The full RFD list is shown in Table 2.2-2 in the AQTSD (Appendix E.3B, *Air Quality Technical Support Document*). Cumulative near-field modeling analysis included impacts from four RFDs: GMT-1, GMT-2, and Greater Willow potential drill sites 1 and 2. The RFD emissions were selected with care. The operational emissions from GMT-1 and GMT-2 were modeled due to the anticipated timing of those planned developments relative to the Willow MDP Project schedule. Drilling emissions for the Greater Willow sites were modeled due to the higher NO_2 emissions during that phase. Each of the specific projects/activities raised in the comment was considered. Winter exploration within the Bear Tooth Unit is not anticipated to occur when the Willow MDP Project is operational beyond activities to develop at Greater Willow potential drill sites 1 and 2, which are assessed as RFD. Development at GMT Kuparuk either is already included as an RFD, with the inclusion of GMT-1 and GMT-2, or is already included in the background data because the project existed in 2017. Putu is outside the near-field assessment area. Horseshoe is already included in the background data collected in 2017. Future expansion of the Willow MDP Project is included with the inclusion of Greater Willow potential drill sites 1 and 2. Westward expansion into the NPR-A is assessed as part of BLM planning for the NPR-A IAP; however, at this time, development is too speculative for inclusion as an RFD for this project. Other projects listed (i.e., Liberty, Nanushuk, TAPS) are outside the near-field analysis area but are included in the cumulative regional modeling analysis.	N
864	139	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM's Air Quality Analysis Does Not Assure the Prevention of Significant Deterioration (PSD) of Air Quality. The DEIS directly compares modeled project impacts to Class II PSD increments. According to these comparisons, predicted modeled concentrations from project development alone consume as much as 20% of some of the PSD Class II increments (e.g., for NO2 and PM2.5). BLM should complete a proper PSD increment analysis to determine how much of the available increments will have already been consumed in the affected area (e.g., by GMT1, GMT2, and other sources) and how much additional increment is available for consumption from the proposed Willow Project. Without this level of analysis, BLM is not adequately ensuring that air quality will not deteriorate more than allowed under the CAA. Specifically, BLM should complete an analysis of all increment consuming and increment expanding sources that impact the same area impacted by the proposed action, including an inventory of increment-affecting emissions (i.e., emissions from major stationary sources which commenced construction or modification after the applicable major source baseline date and emissions increases from minor, area and mobile sources that occurred after the relevant minor source baseline date).	A PSD increment analysis is the responsibility and jurisdiction of the ADEC. This is why the work presented is provided for informational purposes and not a formal PSD increment analysis.	N
864	140	Psarianos	Bridget	Trustees for Alaska	Air Quality	The DEIS Fails to Consider Adequate Mitigation Measures. BLM Assumes Certain Operating Parameters and Emissions Controls That Are Not Reflected as Mitigation Measures in the DEIS. The DEIS includes an inventory of emissions which relies on certain emissions controls and operating assumptions that may not be representative of actual operating scenarios and that are not reflected in the proposed mitigation measures for the DEIS. . . . Fugitive dust emissions are estimated for months from May through October, consistent with the months for which fugitive dust emissions were estimated in the BOEM Arctic modeling study (Fields Simms et al. 2018, Stoeckenius et al. 2017). Fugitive dust may also occur in other months, especially during dry snowless conditions and from dry and frozen roads. Thus, fugitive dust emissions outside May through October may affect air concentrations of particulate matter, but likely to a smaller extent than fugitive dust emitted during May through October when there is much less (or no) snow cover. Likewise, some operations would only be expected to occur during daytime hours. Hourly emission rates are then halved under the assumption fracturing engines will operate at 50% load for sixteen hours instead of 100% load for eight hours.	The purpose of NEPA is to analyze and assess impacts due to the Project, as proposed by the proponent, and alternatives. Operating assumptions that are used in modeling are Project design components and thus do not necessitate an additional prescriptive requirement under mitigation measures. Additionally, details such as diesel engine tier level (and hence diesel engine control efficiency) will be specified in the air permit obtained by the Project proponent. For control efficiency estimates, BLM has deferred to agency experts in assuming a more conservative (i.e., protective of the environment) control efficiency of 50% for dust control to assess near-source dust impacts. A fugitive dust control plan will be implemented on-site to reduce PM emission impacts. Modeling assumptions that reflect average work practices, for example, the average number of vehicle trips, cannot be incorporated as specific requirements; therefore, a regime would be unworkable in practice. Consistent with the BOEM Arctic modeling study, fugitive dust emissions were developed assuming that road dust emission control efficiency is 50%. Documentation included in the Draft EIS (Attachment C) indicating a less conservative assumption (i.e., dust emissions occur from June through September and road dust emission control efficiency of 76%) is not indicative of the dust control assumption included in the Draft EIS emission inventory and near-field impact analysis. Fugitive dust emissions are estimated for months from May through October, consistent with the months for which fugitive dust emissions were estimated in the BOEM Arctic modeling study. Fugitive dust may also occur in other months, especially during dry snowless conditions or when the ground is dry and frozen. Fugitive dust emissions outside May through October may affect air concentrations of PM, but likely to a smaller extent than fugitive dust emitted during May through October when there is much less (or no) snow cover. Load factor represents the average engine load when an engine is turned on. A 50% load for an engine operating for 16 hours describes activity for an engine that is turned on for 16 hours and operates, on average, at 50% of its rated power. Applied load factors are either conservative or consistent with other reference sources (e.g., EPA MOVES-NONROAD model).	N
864	141	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM does not reference many of the underlying assumptions used in developing the emissions inventories. For example, the AQTSD and appendices do not include detailed information on assumed engine load factors, drilling and completion times, drilling engine technologies (e.g., whether engines meet Tier II or better engine standards), traffic estimates (e.g., speeds, VMT, etc.), flare gas volumes and destruction efficiencies, fugitive emission capture/destruction efficiencies, etc. BLM must ensure that all assumptions regarding operation and control effectiveness which are the basis for the modeling analysis are established as enforceable mitigation measures and implemented through permit stipulations. Otherwise, BLM should model emission sources under maximum possible operating conditions and assuming no controls.	A summary table (Table 2.1-5) showing key operating assumptions and controls was added to Section 2.1.1 (*Emission Inventory Summary*) in Appendix E.3B (*Air Quality Technical Support Document*) of the Final EIS. Operational and control assumptions are fully documented in the detailed emission inventory spreadsheets that are publicly available for the Draft EIS and will be publicly available for the Final EIS. The purpose of NEPA is to analyze and assess impacts due to the Project, as proposed by the proponent, and alternatives. Operating data that are used in modeling are Project design components and thus do not necessitate an additional prescriptive requirement under mitigation measures. Additionally, details such as diesel engine tier level (and hence diesel engine control efficiency) will be specified in the air permit obtained by the Project proponent.	Y

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864	142	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM Must Establish Enforceable [Air Quality] Mitigation Measures. The DEIS includes a list of ConocoPhillips Design Features to Avoid and Minimize Impacts. The only compulsory air quality feature included is the use of reduced-sulfur fuel in diesel-fueled equipment. There are a few other features included in the DEIS that are discretionary measures and, therefore, do not assure measurable impact avoidance or minimization. These discretionary measures include adherence to BLM's oil and gas resources BMPs (as applicable), including watering to minimize fugitive dust, maximizing use of electrical power, Tier 2 and higher combustion engines, storage tank controls (to the practicable), green completions, and additional mitigation measures (as appropriate). BLM describes the following mitigation measures in the DEIS: ConocoPhillips design measures would reduce CAP and HAP emissions above and beyond federal or state regulations and existing NPR-A IAP/EIS BMPs. These measures include capturing and injecting produced gas to enhance oil recovery in a closed process, limiting flaring to pilot flares or emergency flares, and using hydraulic fracturing equipment that meet non-road engine Tier 4 emissions standards.	The purpose of NEPA is to analyze the Project, as proposed by the proponent, and alternatives. It is assumed that the proponent would not change the Project design. Modeling results show compliance with federal and state air quality standards; therefore, no significant air quality impacts will occur. The operating assumptions that are used in the modeling are Project design components and therefore do not necessitate an additional prescriptive requirement through mitigation measures.	N
864	143	Psarianos	Bridget	Trustees for Alaska	Air Quality	The DEIS also includes a recommendation that ConocoPhillips implement a fugitive dust control plan. . . . BLM must require that this plan be enforceable and reflect the assumptions for fugitive dust control used in the modeling for the DEIS (e.g., 76% control of fugitive dust control from watering, a 35 mile per hour speed limit, etc.). The DEIS must include a more comprehensive and consistent set of required, measurable, and enforceable mitigations to ensure there will be no significant impacts to air quality from the proposed Willow Project. . . . BLM should rigorously explore and objectively evaluate all reasonable control measures to minimize air quality impacts from the Willow Project and should focus on prioritizing mitigation measures targeting the biggest sources of emissions.	A fugitive dust control plan was developed and will be implemented on-site. The purpose of NEPA is to analyze the Project, as proposed by the proponent, and alternatives. It is assumed that the proponent would not change the Project design. Modeling results show compliance with federal and state air quality standards; therefore, no significant air quality impacts will occur. The operating data that are used in the modeling are Project design components and therefore do not necessitate an additional prescriptive requirement through mitigation measures.	N
864	144	Psarianos	Bridget	Trustees for Alaska	Air Quality	In addition to concerns with the representativeness of the background concentration data presented in the DEIS, BLM has removed PM10 data from the monitoring dataset. . . . EPA has established rigorous criteria and procedures for determining whether data are considered and treated as exceptional events and BLM must make a determination based on similar criteria and procedures prior to removing any data from the dataset used in determining representative background concentrations for the DEIS. If high wind events are occurring year after year it would seem unlikely that the resulting pollutant concentrations would be considered to be exceptional. And if the analysis intends to assess impacts in Nuiqsut then it should consider these high wind events as representative of conditions there. Given that the near-field modeling analysis presented in the DEIS predicts PM10 impacts that are approaching levels of the NAAQS (e.g., 24-hour PM10 concentrations from construction activity are 80% of the NAAQS for Alternative B), it is imperative that BLM fully account for all sources of background air quality in order to ensure that additional impacts from the proposed Willow development will not cause or contribute to exceedances of the PM10 NAAQS.	Consistent with the approach followed for previous EISs, including for GMT-1 and GMT-2, the BLM has removed a small number of 24-hour average PM_{10} concentrations measured at Nuiqsut from the values used to determine a monthly-varying, representative PM_{10} background concentration for the Willow MDP Project area. Importantly, the BLM does not refer to these data as Exceptional Events, nor does it seek exclusion of these data as Exceptional Events. CAA Section 319(b) allows for the exclusion of monitored data influenced by Exceptional Events when using the data for regulatory decisions, such as exceedances or violations of the NAAQS. The EPA's Exceptional Event Demonstration guidance has been developed as an option for states if data collected by regulatory monitors are influenced by Exceptional Events and states would like to exclude these data from regulatory decisions. Since the Nuiqsut monitor is not a regulatory monitor, and the data collected by the monitor are not used for regulatory decisions, Exceptional Event Demonstrations would not be necessary for data collected at the Nuiqsut monitor. Furthermore, the data collected at the Nuiqsut monitor during 2015 through 2017 did not exceeded the PM_{10} 24-hour NAAQS, so no Exceptional Events Demonstration would be warranted even if the monitor was a regulatory monitor. Related to the concern about high wind events occurring year after year, it is important to note that the Exceptional Events Rule defines "natural events," such as high wind dust events, as an event which may recur at the same location provided that human activity plays little or no direct causal role. High wind events that loft silt from the Nigliq Channel into the air meet the definition of a natural event and therefore would be considered Exceptional Events regardless of frequency of occurrence. Related to the concern about the representativeness of high wind events monitored at Nuiqsut, the Nuiqsut monitor is located in close proximity to the Nigliq Channel, a channel of the CRD, while the WPF and a majority of the Willow MDP Project evaluated with the near-field modeling analysis are located approximately 50 km from the CRD. Therefore, the high wind events that contribute to elevated PM_{10} concentrations monitored at Nuiqsut are not anticipated to be representative of typical conditions at the Willow MDP Project area. The background data used in the near-field modeling analysis were selected with care to fully account for representative conditions for the Project area. Other emissions sources not accounted for in the Nuiqsut monitoring data, such as RFD, were explicitly included in the modeling analysis.	N
864	218-1	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM has also not obtained sufficient information about the potential health impacts to Nuiqsut. Air quality and other health-related concerns have repeatedly been flagged by Nuiqsut. Despite this, BLM has yet to prepare a Health Impact Analysis. In addition, as detailed in these comments, there are substantial flaws with the modeling related to air quality. BLM has failed to adequately capture the potential air quality concerns related to Willow and to look at them in tandem with the potential cumulative impacts to air quality in the region. BLM needs to prepare a Health Impact Assessment looking at the specific health impacts to Nuiqsut and should not review generalized information and data related to communities on the North Slope more broadly. It is vital that the agency have a thorough understanding of the potential health impacts, given that it is contemplating allowing a massive industrial complex to further extend into the back yard of the community.	In response to the modeling flaws comment: The different modeling scenarios were selected in consultation with air quality specialists at key cooperating agencies and after careful consideration of peak emissions and spatial and temporal variations to capture high impacts. Construction was modeled for the maximum year of emissions because there is construction activity in different locations in different years. The near-field modeling impact analysis also includes a Developmental Drilling scenario which includes concurrent drilling and operations. The purpose for modeling the other individual scenarios was to assess any other high spatial impacts which may not show up in the other scenarios. The BLM also notes that a Project-specific near-field analysis would be required for any development to be permitted in the NPR-A. Baseline health data for Nuiqsut are provided in Section 3.18.1, *Affected Environment*. A full HIA conducted by the State of Alaska would not further inform BLM of the differences between the alternatives presented for the Willow MDP Project. Health impacts are analyzed in Final EIS Section 3.18, *Public Health*; BLM determined, in consultation with the State of Alaska, that an HIA was unnecessary.	N

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864	228	Psarianos	Bridget	Trustees for Alaska	Air Quality	The Draft EIS fails to properly disclose and analyze the direct, indirect, and cumulative impacts to air quality from fracking. Such failures render BLM's analysis arbitrary and unlawful. A growing body of scientific research has documented adverse public health impacts from these practices, including studies showing air pollutants at levels associated with reproductive and developmental harms and the increased risk of morbidity and mortality. A comprehensive review of the risks and harms of fracking to public health came to several key findings related to air pollution . . . The range of illnesses that can result from the wide array of air pollutants from fracking were summarized in a study by Dr. Theo Colburn, which charts which chemicals have been shown to be linked to certain illnesses . . . Adverse health impacts documented among residents living near drilling and fracking operations include reproductive harms, increased asthma attacks, increased rates of hospitalization, ambulance runs, emergency room visits, self-reported respiratory problems and rashes, motor vehicle fatalities, trauma, and drug abuse. A 2019 review concluded: By several measures, evidence for fracking-related health problems has emerged across the United States and Canada.	It should be noted that many of the studies cited might not be applicable to Nuiqsut. Several recent studies mention negative health impacts for those living within a certain distance to oil and gas development. Nuiqsut is several miles away from the nearest development areas, which makes the studies mentioned not entirely applicable. Another thing to note is that oil formations in the NPR-A are conventional sandstone formation, and do not require continuous hydraulic fracturing like unconventional shale formations in the lower 48. All hydraulic stimulation activities will comply with AOGCC regulation found in 20 AAC 25.283.	N
864	229	Psarianos	Bridget	Trustees for Alaska	Air Quality	Also, in Pennsylvania, hospitalizations for pneumonia among the elderly are elevated in areas of fracking activity, and one study found significantly elevated rates of bladder and thyroid cancers. In Colorado, children and young adults with leukemia were 4.3 times more likely to live in an area dense with oil and gas wells. Drilling and fracking operations in multiple states are variously correlated with increased rates of asthma; increased hospitalizations for pneumonia and kidney, bladder, and skin problems; high blood pressure and signs of cardiovascular disease; elevated motor vehicle fatalities; symptoms of depression; ambulance runs and emergency room visits; and incidence of sexually transmitted diseases. Benzene levels in ambient air surrounding drilling and fracking operations are sufficient to elevate risks for future cancers in both workers and nearby residents, according to studies. Animal studies show numerous threats to fertility and reproductive success from exposure to various concentrations of oil and gas chemicals at levels representative of those found in drinking water. A recent study found that 43 chemicals used in drilling and fracking operations are classified as known or presumed human reproductive toxicants, while 31 others are suspected human reproductive toxicants. An earlier study identified two dozen chemicals commonly used in fracking operations as endocrine disruptors that can variously disrupt organ systems, lower sperm counts, and cause reproductive harm at realistically expected exposure levels. A rigorous study by Johns Hopkins University, which examined 35,000 medical records of people with asthma in Pennsylvania, found that people who live near a higher number of, or larger, active gas wells were 1.5 to 4 times more likely to suffer from asthma attacks than those living farther away . . . Relatedly, in a 2018 study of pediatric asthma-related hospitalizations, it was found that children and adolescents exposed to newly spudded unconventional natural gas development wells within their zip code had 1.25 times the odds of experiencing an asthma-related hospitalization compared to children who did not live in these communities. . . . A recent Yale University study identified numerous fracking chemicals that are known, probable, or possible human carcinogens.	It should be noted that many of the studies cited might not be applicable to Nuiqsut. Several recent studies mention negative health impacts for those living within a certain distance to oil and gas development. Nuiqsut is several miles away from the nearest development areas, which makes the studies mentioned not entirely applicable. It should also be noted that oil formations in the NPR-A are conventional sandstone formation, and do not require continuous hydraulic fracturing like unconventional shale formations in the lower 48. All hydraulic stimulation activities will comply with AOGCC regulation found in 20 AAC 25.283.	N
864	230	Psarianos	Bridget	Trustees for Alaska	Air Quality	A 2018 study by McKenzie et al. conducted in the Denver Julesberg Basin on the Colorado Northern Front Range, found that the currently established setback distance of 152 m (500 ft) does little to protect people in that proximity. In analyses of nonmethane concentrations from 152 to >1600 m from oil and gas facilities, it was found that the EPAs minimum cumulative lifetime excess cancer risk benchmark of 1 in a million was exceeded. . . . Numerous studies also suggest that higher maternal exposure to fracking and drilling can increase the incidence of high-risk pregnancies, premature births, low-birthweight babies, and birth defects. A study of more than 1.1 million births in Pennsylvania found evidence of a greater incidence of low-birth-weight babies and significant declines in average birth weight among pregnant women living within 3 km of fracking sites. . . . A study of 9,384 pregnant women in Pennsylvania found that women who live near active drilling and fracking sites had a 40 percent increased risk for having premature birth and a 30 percent increased risk for having high-risk pregnancies. Another Pennsylvania study found that pregnant women who had greater exposure to gas wells—measured in terms of proximity and density of wells—had a much higher risk of having low-birthweight babies. . . . In rural Colorado, mothers with greater exposure to natural gas wells were associated with a higher risk of having babies with congenital heart defects and possibly neural tube defects. Other studies have found that residents living closer to drilling and fracking operations rates had higher hospitalization and reported more health symptoms including upper respiratory problems and rashes. Methods of collecting and analyzing emissions data often underestimate health risks by failing to adequately measure the intensity, frequency, and duration of community exposure to toxic chemicals from fracking and drilling; failing to examine the effects of chemical mixtures; and failing to consider vulnerable populations. Of high concern, numerous studies highlight that health assessments drilling and fracking emissions often fail to consider impact on communities vulnerable populations including environmental justice and children.	It should be noted that many of the studies cited might not be applicable to Nuiqsut. Several recent studies mention negative health impacts for those living within a certain distance to oil and gas development. Nuiqsut is several miles away from the nearest development areas, which makes the studies mentioned not entirely applicable. Also, modeling performed in the EIS using well-established methods and conservative assumptions, showed impacts at Nuiqsut were below all relevant standards. It should also be noted that oil formations in the NPR-A are conventional sandstone formation, and do not require continuous hydraulic fracturing like unconventional shale formations in the lower 48. All hydraulic stimulation activities will comply with AOGCC regulation found in 20 AAC 25.283.	N

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864	239	Psarianos	Bridget	Trustees for Alaska	Air Quality	The range of Alternatives considered in the DEIS fails to incorporate project design factors and mitigations that would meaningfully affect air quality impacts. The air quality impacts from drilling activities are virtually the same across Alternatives B, C, and D for all pollutants and the NOx impacts from all activities (i.e., construction, drilling, and operations) are virtually the same across Alternatives B, C, and D. BLM should consider an Alternative aimed at minimizing air quality impacts, e.g., one that would incorporate factors aimed at reducing short-term NOx emissions from drilling.	The BLM interdisciplinary team carefully decided on the range of alternatives that would meet the Purpose and Need. As shown in the Final EIS, impacts from the revised Project are predicted to be below all applicable NAAQS and AAAQS and established thresholds for AQRVs for all alternatives and scenarios. Therefore, there would not be significant impacts on air quality. No adverse air quality impacts are predicted for any scenario or alternative; therefore, additional mitigation measures are not warranted. The Project proponent intends to use equipment that minimizes air quality emissions, particularly NO_2 emissions from drilling by using electric-powered drilling equipment when highline power is available, and when highline power is not available, diesel-fired drill rigs would meet the most stringent emissions standards available. Impacts across alternatives are similar for some pollutants, such as NO_2, but not all. For example, PM_{10} and $PM_{2.5}$ impacts vary across scenarios and alternatives.	N
864	240	Psarianos	Bridget	Trustees for Alaska	Air Quality	Modeled Scenarios It appears that the near-field modeled scenarios do not account for concurrent construction, drilling, and operation activities and therefore underestimate potential air quality impacts from the proposed Project. The DEIS presents separate modeling scenarios for construction, pre-drilling activities at proposed drill site BT1, development drilling, and routine operations for Alternative B in the AQTSD (Section 3.3.1). The DEIS then presents the corresponding impacts from these scenarios, as if they occur in isolation, when in fact construction, drilling, and routine operations will occur simultaneously during many years of the project. According to the AQTSD, emissions from construction, drilling, and operations occur concurrently in years 2021 through 2032. The modeling report includes detailed emissions summaries showing combined emissions from construction, drilling, and operations activities for each year of the project (2020-2050). BLM must model scenarios that fully account for all construction, drilling, and routine operations activities that will occur at the same time. . . . The DEIS presents the following PM10 impacts, individually, and fails to present an analysis of the combined impacts of the scenario where emissions from these activities will occur at the same time [see tables in comment letter]. And for PM2.5 and NOx impacts, the BLM has disaggregated impacts even further. . . . The BLM's analysis does not model the impacts of these combined emissions and does not even model the combined impacts of emissions from both developmental drilling and BT1 pre-drilling activities. The DEIS presents the following NOx impacts, individually, and fails to present an analysis of the combined impacts of the scenario where emissions from these activities will occur at the same time, despite the fact that such activities would occur simultaneously under the Willow proposal [see tables in comment letter]. The magnitude of the impacts from combined emissions from construction, drilling, and operations activities cannot be known without a modeling analysis to determine ambient air concentrations. Depending on where and when emissions occur from the various project activities it is possible that resulting impacts would exceed the NAAQS, especially when considering the 1-hour average NAAQS for NOx and 24-hour average NAAQS for PM10 and PM2.5. And given the proximity of the project to Nuiqsut it is possible that the combined emissions from construction, drilling, and operations could result in higher impacts there than what is presented in the DEIS.	The overall total annual Project emissions throughout the relatively large and spatially disperse Willow MDP Project area are not necessarily a predictor of peak, localized impacts in close proximity to emissions activities. Instead, the amount of concurrent emissions in a given area of the Project area, such as a drill site or the central processing facility, is more related to potential peak impacts. In light of this, the near-field modeling scenarios were selected to capture high impacts with careful consideration of peak emissions, spatial and temporal emissions variations, and in consultation with air quality specialists at key cooperating agencies. Notably the Developmental Drilling scenario presented in the Final EIS has been revised relative to the approach in the Draft EIS to analyze concurrent faculty construction, drilling and operations for the peak emissions year. In the revised Final EIS, the emissions have changed relative to the Draft EIS and the values cited in the comment. In the Final EIS, the highest NOx impacts under Alternative B have decreased relative to the Draft EIS and are predicted to be up to 83% of the NAAQS and AAAQS during Development Drilling and the Routine Operations. The highest $PM_{2.5}$ impacts under Alternative B have increased in the Final EIS relative to the Draft EIS and are predicted to be up to 87% of the NAAQS and AAAQS during Development Drilling and the Routine Operations. Other scenarios analyzed in the Draft EIS and Final EIS assess activities with potentially localized peak impacts that could differ from the Developmental Drilling scenario. The Construction scenario models the maximum annual construction emissions and assesses impacts from key activities expected to occur during the construction phase, including gravel mining and HDD to install pipelines under the Colville River. The Pre-drill scenario assesses impacts associated with concurrent diesel-fired drilling and hydraulic fracturing activities before electricity is available for electric drill rigs to operate. Once the central processing facility is operational and is generating electric power, diesel-fired drilling would no longer occur and electric drill rigs would be used. Impacts associated with concurrent operation of two electric drill rigs, hydraulic fracturing, drill site facilities installation, as well as operation of the WPF and all other routine operations are assessed as part of the Development Drilling scenario. The Routine Operations scenario assesses impacts from Project operational emissions after temporary and transient activities associated with construction and drilling are complete. The impacts associated with module delivery options are also assessed. All scenarios are developed to characterize potential peak localized impacts from the Project for various pollutants or spatial locations and all scenarios predict impacts would be below applicable NAAQS and AAAQS. Regarding the comment that concurrent development drilling and pre-drilling is not analyzed, the Final EIS has been modified to explain that pre-drilling activities would not occur concurrent with developmental drilling activities. Regarding the comment that it is also important to analyze concurrent impacts at Nuiqsut, the impacts of all scenarios, including the Development Drilling scenario, and total maximum annual emissions from the regional modeling analysis are assessed at Nuiqsut and impacts are presented in the Draft EIS and Final EIS. Related to the concern about the accuracy of the background data, the BLM and air specialists at key cooperating agencies considered available monitors for the selection of a representative background monitor. It was determined that the Nuiqsut monitor was the most representative monitor for the Willow MDP Project's background concentrations. While the Nuiqsut monitor is the most representative data for the Willow MDP Project area, the monitored air quality concentrations are anticipated to be conservatively high relative to the actual background concentrations at the Project area due to localized emissions sources in the community of Nuiqsut.	N

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864	241	Psarianos	Bridget	Trustees for Alaska	Air Quality	Background Concentrations The DEIS relies on monitoring data collected in Nuiqsut by CPAI to represent background concentrations for the air quality analysis. Since these data are not publicly available (e.g., through EPAs Air Quality System Data Mart), the BLM should confirm that the data have been reviewed and approved by EPA or the State in order to assure the public that the data have been properly collected and quality-assured. In 2011, EPA issued a determination of appropriate background values for the North Slope, for use in OCS permitting. . . . In 2011, EPA established the following appropriate representative background concentrations for the village of Nuiqsut, which are significantly higher than what is used in the Willow DEIS . . . In addition to CPAI-collected data, BLM should also review and consider data from the same monitors EPA relied on in determining background values for Nuiqsut. Even if EPA determines that the CPAI monitoring data in Nuiqsut are properly collected and quality assured, the data may not be representative of background concentrations in areas nearer to the Willow project sources and therefore may not be sufficient to assess overall air quality impacts to exposed populations outside the village of Nuiqsut and closer to the project area, e.g., to subsistence hunters in the region. BLM should coordinate efforts with the State and / or EPA to secure additional monitoring around the Alpine Development Area surrounding Nuiqsut that would be made publicly available through the EPAs Air Quality System. Considering the substantial amount of oil and gas activity in this area, it would be reasonable for BLM to seek publicly supported data sources to monitor air quality in the Prudhoe Bay region. In addition to concerns with the representativeness of the background concentration data presented in the DEIS, BLM has removed PM10 data from the monitoring dataset . . . EPA has established rigorous criteria and procedures for determining whether data are considered and treated as exceptional events and BLM must make a determination based on similar criteria and procedures prior to removing any data from the dataset used in determining representative background concentrations for the DEIS. If high wind events are occurring year after year it would seem unlikely that the resulting pollutant concentrations would be considered to be exceptional. And if the analysis intends to assess impacts in Nuiqsut then it should consider these high wind events as representative of conditions there. Given that the near-field modeling analysis presented in the DEIS predicts PM10 impacts that are approaching levels of the NAAQS (e.g., 24-hour PM10 concentrations from construction activity are 80% of the NAAQS for Alternative B), it is imperative that BLM fully account for all sources of background air quality in order to ensure that additional impacts from the proposed Willow development will not cause or contribute to exceedances of the PM10 NAAQS.	Consistent with the approach followed for previous EISs, including for GMT-1 and GMT-2, the BLM has removed a small number of 24-hour average PM_{10} concentrations measured at Nuiqsut from the values used to determine a monthly-varying, representative PM_{10} background concentration for the Willow MDP Project area. Importantly, the BLM does not refer to these data as Exceptional Events, nor does it seek exclusion of these data as Exceptional Events. CAA Section 319(b) allows for the exclusion of monitored data influenced by Exceptional Events when using the data for regulatory decisions, such as exceedances or violations of the NAAQS. The EPA's Exceptional Event Demonstration guidance has been developed as an option for states if data collected by regulatory monitors are influenced by Exceptional Events and states would like to exclude these data from regulatory decisions. Since the Nuiqsut monitor is not a regulatory monitor, and the data collected by the monitor are not used for regulatory decisions, Exceptional Event Demonstrations would not be necessary for data collected at the Nuiqsut monitor. Furthermore, the data collected at the Nuiqsut monitor during 2015 through 2017 did not exceeded the PM_{10} 24-hour NAAQS, so no Exceptional Events Demonstration would be warranted even if the monitor was a regulatory monitor. Related to the concern about high wind events occurring year after year, it is important to note that the Exceptional Events Rule defines "natural events," such as high wind dust events, as an event which may recur at the same location provided that human activity plays little or no direct causal role. High wind events that loft silt from the Nigliq Channel into the air meet the definition of a natural event and therefore would be considered Exceptional Events regardless of frequency of occurrence. Related to the concern about the representativeness of high wind events monitored at Nuiqsut, the Nuiqsut monitor is located in close proximity to the Nigliq Channel, a channel of the CRD, while the WPF and a majority of the Willow MDP Project evaluated with the near-field modeling analysis are located approximately 50 km from the CRD. Therefore, the high wind events that contribute to elevated PM_{10} concentrations monitored at Nuiqsut are not anticipated to be representative of typical conditions at the Willow MDP Project area. The background data used in the near-field modeling analysis were selected with care to fully account for representative conditions for the Project area. Other emissions sources not accounted for in the Nuiqsut monitoring data, such as RFD, were explicitly included in the modeling analysis.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	242	Psarianos	Bridget	Trustees for Alaska	Air Quality	NO2 Modeling BLM's impact analysis relies on seasonally-varying hourly background concentrations for NO2.14 Specifically, instead of adding a single representative background concentration to the modeled design value concentration, the DEIS relies on a different background concentration for each hour of the day, by season. According to the AQTSD, the seasonally varying hourly NO2 background values are based on air monitoring data from Nuiqsut for calendar years 2015, 2016, and 2017. For each of four 3-month seasons (e.g., Season 1 = December, January, February, etc.) each hour of the day is represented by the 3-year average of the 98th percentile value of all valid observations for that hour during the season. While not explicitly described in the DEIS, it appears that this analysis method pairs the 3-year average of 98th percentile monitored NO2 concentrations by hour, in a given season, with corresponding modeled concentrations for that hour. This method of pairing data, in time, likely underestimates impacts by overlooking hours when higher background concentrations coincide with the highest modeled concentrations. And while EPA guidance discusses cases where this type of methodology might be used, EPA admits that these alternative analyses result in a less conservative estimate of impacts. This type of analysis could be considered appropriate if, for example, there is a concern about double-counting of monitored and modeled contributions, but this does not seem likely for the Willow project. BLM must justify why this less conservative analysis is warranted. The AQTSD briefly mentions seasonal variance and describes consistency with the GMT2 analysis as potential reasons for this type of refined analysis but fails to provide any evidence for why, in addition to a seasonal variation, the modeling should consider diurnal variations in its analysis for the Willow DEIS. And even if this type of analysis is justifiable, EPA guidance indicates that background values should be based on the 3rd highest value for each season and hour-of-the-day combination (as opposed to the 98th percentile, or 8th highest value). Fundamentally, the modeling for the Willow DEIS should be used as a tool to ensure that adverse impacts will not occur in the future, not simply to determine whether or not an adverse impact occurs over the period of time modeled. The most protective approach, and one presented in EPAs guidance without need for further justification, would be to add the overall highest hourly background NO2 concentration (across the three year monitoring record) to the modeled design value based on the maximum emissions scenario. A less conservative approach outlined in EPAs guidance, but one that still would not need further justification, would be to combine the modeled design value based on the maximum emissions scenario to the monitored NO2 design value, i.e., the 98th-percentile of the annual distribution of daily maximum 1-hour values averaged across the three years of monitored data (irrespective of the meteorological data period used in the dispersion modeling). The method of varying background concentrations seasonally and by hour-of-day likely results in a less conservative analysis and, given that the modeling shows impacts close to the NAAQS (i.e., 91% of the 1-hour NO2 NAAQS for developmental drilling activities under Alternative B and 92% of the 1-hour NO2 NAAQS for routine operations under Alternative C), BLM should consider adopting mitigation measures aimed at minimizing NOx emissions from the Willow development. (See Section V). In addition to potential underestimates of NO2 impacts from varying background concentrations by season and hour-of-day in the modeling, NO2 impacts may be further under predicted by the use of source-specific in-stack NO2/NOx ratios in the modeling analysis. The DEIS uses ratios based on source test data for many sources, e.g., stationary engines, non-road and on-road diesel engines, heaters, turbines, etc. Flares are the only source category for which the analysis uses the EPA-approved default value of 0.5. Some of the ratios use a value ten times lower than the default value. For example, the ratio used for natural gas heaters (0.05) is from the Converse County DEIS in Wyoming which bases its in-stack ratios on manufacturing data and surveys. These in-stack ratios can be important parameters in the modeling and, therefore, BLM must ensure the ratios used are reasonably conservative since small changes to the ratios used could have a measurable impact on predicted concentrations. If BLM wants to rely on source-specific data it should include justification demonstrating that it is basing source-specific data on a reasonable sample size representing a wide load range for these sources that is representative of local operating conditions for the Willow Project. In the absence of sufficient justification and supporting data, BLM should use the EPA-approved default value of 0.5 for these sources.	Background 1-hour NO_2 values have been revised to the third-highest hourly values per day per season. This is still a conservative estimate of background, given that we are pairing maximum predicted concentrations with maximum background values. The BLM is not relying on new source-specific data for the in-stack NO_2-to-NOx ratios. Data for in-stack ratios were obtained from approved ADEC sources unless otherwise stated (see Chapter 3.0 of Appendix E.3B, *Air Quality Technical Support Document*). ADEC in-stack ratios provide data that are most representative of local operating conditions for the Willow MDP Project. For sources that had no available data, the EPA default value of 0.5 was used. The Converse County Draft EIS in-stack ratios for natural gas heaters were derived from the EPA and ADEC in-stack ratio databases, not manufacturing data. To clarify, Table 3.2-1 in Appendix E.3B (*Air Quality Technical Support Document*) was revised to cite the original data sources for the natural gas heater in-stack ratio.	N
864	243	Psarianos	Bridget	Trustees for Alaska	Air Quality	PM10 Modeling Similar to the NO2 impact analysis, BLM's PM10 analysis relies on monthly-varying background concentrations. Specifically, instead of adding a single representative background concentration to the modeled design value concentration, the DEIS relies on a different background concentration for each month. Absent any EPA guidance on the use of varying background concentrations for assessing PM10 impacts on compliance with the NAAQS, BLM must provide clear and convincing justification for why this type of variation which would likely result in a less conservative analysis of PM10 impacts is warranted and protective of the NAAQS and should request guidance from EPA technical staff on the use of this method. Given that the modeling shows impacts close to the NAAQS (i.e., 80% of the 24-hour PM10 NAAQS for construction activity under Alternative B), BLM should consider adopting additional mitigation measures aimed at further minimizing fugitive dust from the Willow project development. (See Section V.)	Consistent with the approach followed for the GMT-2, the BLM has used monthly-varying, representative PM_{10} background concentrations from the Nuiqsut monitoring station for the Willow MDP Project area. The background data used in the near-field modeling analysis were selected with care to fully account for representative conditions for the Project area. In addition, other emissions sources not accounted for in the Nuiqsut monitoring data, such as RFD, were explicitly included in the modeling analysis. Prior to conducting the air quality analysis, an air quality modeling protocol was developed and approved by the AQTWG, which includes representatives from the ADEC, EPA, and BLM. As stated in the protocol, "for most of the pollutants and average times, a single background value will be added to the model results. However, if further analysis of the monitoring data shows variability in the data between seasons or hours, seasonal hourly or daily background data may be used especially for NO_2, PM_{10}, and $PM_{2.5}$. PM_{10} will be further analyzed to determine a final background level as the monitor at the Nuiqsut Monitoring Station is known to capture PM_{10} from the Nigliq Channel during summer high wind events. Because there would not be a similar channel with sediment surrounding the proposed Willow MDP drill sites, these high wind events would not be representative of the background. The PM_{10} data from the Nuiqsut Monitoring Station, coupled with wind speed and direction data, will be looked at in detail to determine a more representative background." In addition to further mitigate fugitive dust impacts, a fugitive dust control plan will be implemented on-site.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	245	Psarianos	Bridget	Trustees for Alaska	Air Quality	Cumulative Impacts Analysis The DEIS includes a list of 12 Reasonably Foreseeable Future Actions (RFFA) that were included in a cumulative impact modeling analysis. There is limited information on the results of the cumulative impacts analysis in the DEIS. . . . The AQTSD includes maps of modeled cumulative impacts for the various pollutants and the different Alternatives analyzed but the size / scale of the maps is too small to be able to clearly distinguish potential areas of concern. In addition to these maps there is a general descriptive summary of impacts, but with very little specifics. . . . BLM should provide further details on any significant project impacts resulting from the cumulative modeling analysis. And BLM should include model results of the cumulative impacts of the proposed project along with all other existing and reasonably foreseeable future projects on the community of Nuiqsut, specifically, as well as impacted areas that are used by members of the Nuiqsut community for whaling and hunting. The DEIS fails to disclose what the cumulative impacts to Nuiqsut community members will be in the DEIS. In addition to disclosing additional results from the cumulative modeling analysis, BLM should ensure that the cumulative assessment fully considers all potential emission sources that could occur at the same time from concurrent projects e.g., including from construction impacts from the RFFA sources. BLM must include construction emissions from these sources unless it will be imposing a requirement that future development will not occur until after construction is completed for previous projects (e.g., GMT-1, GMT-2). BLM should also ensure the cumulative impact analysis considers all existing and reasonably foreseeable development, including the following existing sources: winter exploration within the Bear Tooth Unit, Greater Mooses Tooth Kuparuk, Putu, and Horseshoe. BLM should also include emissions from future actions such as future expansion of the Willow project and additional westward expansion into the NPR-A, construction and operation of the Liberty project in the nearshore Beaufort Sea, the Nanushuk project, the proposed Alaska LNG Gas Treatment Facility and associated compressor stations on the North Slope, and future development in the Arctic Refuge Coastal Plain.	The list of projects to evaluate and include for assessing cumulative air quality impacts was determined in consultation with air quality specialists at key cooperating agencies as part of a protocol process. The full RFD list is shown in Table 2.2-2 in the AQTSD (Appendix E.3B, *Air Quality Technical Support Document*). Cumulative near-field modeling analysis included impacts from four RFDs: GMT-1, GMT-2, and Greater Willow potential drill sites 1 and 2. The RFD emissions were selected with care. The operational emissions from GMT-1 and GMT-2 were modeled due to the anticipated timing of those planned developments relative to the Willow MDP Project schedule. Drilling emissions for the Greater Willow sites were modeled due to the higher NO_2 emissions during that phase. Each of the specific projects/activities raised in the comment was considered. Winter exploration within the Bear Tooth Unit is not anticipated to occur when the Willow MDP Project is operational beyond activities to develop at Greater Willow potential drill sites 1 and 2, which are assessed as RFD. Development at GMT Kuparuk either is already included as an RFD, with the inclusion of GMT-1 and GMT-2, or is already included in the background data because the project existed in 2017. Putu is outside the near-field assessment area. Horseshoe is already included in the background data collected in 2017. Future expansion of the Willow MDP Project is included with the inclusion of Greater Willow potential drill sites 1 and 2. Westward expansion into the NPR-A is assessed as part of BLM planning for the NPR-A IAP; however, at this time development is too speculative for inclusion as an RFD for this project. Other projects listed (i.e., Liberty, Nanushuk, TAPS) are outside the near-field analysis area but are included in the cumulative regional modeling analysis. The cumulative maps have sufficient resolution in the figures that one could zoom in on the online version. Also, near-field impacts are addressed as part of the near-field modeling. For the cumulative far-field modeling, impacts at Nuiqsut are lower than the domain maximums, which are well below thresholds.	N
864	248	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM Must Establish Enforceable Mitigation Measures. The DEIS includes a list of CPAI Design Features to Avoid and Minimize Impacts. The only compulsory air quality feature included is the use of reduced-sulfur fuel in diesel-fueled equipment. There are a few other features included in the DEIS that are discretionary measures and, therefore, do not assure measurable impact avoidance or minimization. . . . The DEIS also includes a recommendation that CPAI implement a fugitive dust control plan . . . BLM must require that this plan be enforceable and reflect the assumptions for fugitive dust control used in the modeling for the DEIS (e.g., 76% control of fugitive dust control from watering, a 35 mile per hour speed limit, etc.). The DEIS must include a more comprehensive and consistent set of required, measurable, and enforceable mitigations to ensure there will be no significant impacts to air quality from the proposed Willow Project. BLM should rigorously explore and objectively evaluate all reasonable control measures to minimize air quality impacts from the Willow Project and should focus on prioritizing mitigation measures targeting the biggest sources of emissions. To minimize NOx emissions, BLM should focus on controls and optimization of Willow Central Facility and Willow Operations Facility sources (e.g., combustion sources, tanks, etc.), power generation sources, and drilling and construction engines. BLM should require add-on controls to minimize NOx emissions from engines, where feasible, in order to achieve the strictest NOx emission rates possible, based on engine size. To minimize PM10 emissions, BLM should focus on the Willow Central Facility and Willow Operations Facility sources and on minimizing emissions from vehicle traffic (e.g., production/operations traffic, drilling and completion traffic, construction traffic). BLM should also focus on minimizing emissions of PM2.5 and PM10 from drilling. BLM should require the use of dust suppression practices on all unpaved roads and should explore the use of Tier 4 engine technology that includes a diesel particulate filter (DPF). Other reasonable alternatives to reduce PM emissions that BLM should consider include reducing the pace and intensity of the project and using remote monitoring systems to reduce the extent of on-site inspections and associated mobile source emissions. To minimize VOC emissions, BLM should focus on minimizing fugitive leaks. Equipment leak detection and repair programs across all segments of the project (i.e., processing, production, transmission and storage) can be cost-effective and significantly reduce VOC and methane emissions. Leak detection and repair (LDAR) programs are vital to addressing fugitive emissions from oil and gas sources. . . . BLM should require leak detection and repair at gas production, processing, and transport sources.	A fugitive dust control plan was added to the Final EIS Section 3.3.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*. The purpose of NEPA is to analyze the Project, as proposed by the proponent, and alternatives. It is assumed that the proponent would not change the Project design. Modeling results show compliance with federal and state air quality standards; therefore, no significant air quality impacts will occur. The operating assumptions that are used in the modeling are Project design components and therefore do not necessitate an additional prescriptive requirement through mitigation measures.	Y

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864	244	Psarianos	Bridget	Trustees for Alaska	Air Quality	Unpaved Road Dust Modeling According to the AQTSD and model performance evaluation report in the DEIS, the Willow regional modeling analysis originally relied on unpaved fugitive dust emissions from the BOEM modeling platform but BLM concluded that the impacts from the modeled emissions were typically at least an order of magnitude larger than monitored values during summertime. BOEM had indicated that the fugitive dust emissions estimates were uncertain due mainly to the necessary use of non-local data such as default moisture content. BLM corrects for this over-estimate by uniformly and arbitrarily reducing dust emissions by a factor of ten from May to September. According to BLM, this adjustment improved model performance considerably. BLM failed to provide sufficient technical justification for the adjustment, other than the fact that the model now predicts concentrations that more closely resemble historic monitored values. Instead of reducing emissions by an arbitrary amount, BLM must make an effort to assess and incorporate localized values for moisture content and other important factors for determining emissions from unpaved roads (e.g., silt content data, precipitation data, etc.). It’s also not clear if the emissions used in the performance evaluation modeling included emissions from unpaved road dust sources that are not generally reflected in the monitoring record used for comparison. BLM must more clearly explain whether the modeled emissions from BOEM are representative of the types of emissions expected to have occurred during the monitoring record used to evaluate model performance. . . . BLM must more fully assess whether the monitoring record used in the performance evaluation for fugitive dust is representative of the modeled sources in the 2012 Base Case simulation used for evaluating the model performance and whether the assumptions made in calculating fugitive dust emissions are representative of local conditions. Also, fugitive dust emissions are only estimated for May through October and therefore the potential impacts are underestimated in the DEIS. . . . BLM must include these fugitive dust impacts that occur outside May through October in its analysis of impacts from the proposed project.	The decision to correct the fugitive dust emissions in the regional modeling and the level of the correction was based on evidence that the modeled fugitive dust emissions were contributing to modeled overprediction of monitored levels of airborne soil at two locations in the North Slope. It was determined that fugitive dust emissions were overpredicted in the BOEM regional modeling based on several factors. First, the fugitive dust emissions were modeled as occurring only from May to September. This enables a comparison of the model performance during May to September (the period with fugitive dust emissions) to model performance in October through April (the period without fugitive dust emissions). The model performance during May through September had a substantial and consistent level of overprediction of fine soil relative to monitored values that does not occur in months October through April. Second, the correction made to the fugitive dust emissions were demonstrated to be effective by improved model performance for fine soil during May through September without effecting (positively or negatively) the model performance for other months or other chemical constituents. Third, the unpaved road dust emission developed by BOEM have substantial uncertainty stemming from uncertainty in the inputs used to calculate the emission factor, such as silt and moisture content, the overall emission factor uncertainty, and uncertainty related to the estimated amount of vehicle miles traveled. The BOEM study made a focused effort to assess and incorporate localized information for the development of all emissions inputs, including unpaved roads. The BLM did not identify additional sources of information beyond information used by BOEM to revise the emissions estimates; however, the lack of localized information does not preclude the BLM from revising the database when there is evidence that the values are erroneous and would be misleading. Importantly, the BOEM regional modeling study provides a platform in order to assess Project-specific and cumulative regional impacts. The correction to the regional fugitive dust emissions does not alter or affect the predicted Project-specific impacts, nor the contribution of the Project to predicted total cumulative impacts. Related to the concern about fugitive dust emissions calculated for the Willow MDP Project outside of the May through October time period, the AQTSD has been revised to include a discussion of winter fugitive dust emissions. To address the last concern raised by the comment, the two monitoring sites used to evaluate the model performance are located in areas expected to be similarly impacted by unpaved road emissions as other locations throughout the North Slope.	N
864	246	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM’s Air Quality Analysis Does Not Assure the Prevention of Significant Deterioration (PSD) of Air Quality. The DEIS directly compares modeled project impacts to Class II PSD increments. According to these comparisons, predicted modeled concentrations from project development alone consume as much as 20% of some of the PSD Class II increments (e.g., for NO2 and PM2.5). BLM should complete a proper PSD increment analysis to determine how much of the available increments will have already been consumed in the affected area (e.g., by GMT1, GMT2, and other sources) and how much additional increment is available for consumption from the proposed Willow Project. Without this level of analysis, BLM is not adequately ensuring that air quality will not deteriorate more than allowed under the CAA. Specifically, BLM should complete an analysis of all increment consuming and increment expanding sources that impact the same area impacted by the proposed action, including an inventory of increment-affecting emissions (i.e., emissions from major stationary sources which commenced construction or modification after the applicable major source baseline date and emissions increases from minor, area and mobile sources that occurred after the relevant minor source baseline date).	A PSD increment analysis is the responsibility and jurisdiction of the ADEC. This is why the work presented is provided for informational purposes and not a formal PSD increment analysis.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	247	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM Assumes Certain Operating Parameters and Emissions Controls That Are Not Reflected as Mitigation Measures in the DEIS. The DEIS includes an inventory of emissions which relies on certain emissions controls and operating assumptions that may not be representative of actual operating scenarios and that are not reflected in the proposed mitigation measures for the DEIS. . . . Fugitive dust emissions are estimated for months from May through October, consistent with the months for which fugitive dust emissions were estimated in the BOEM Arctic modeling study (Fields Simms et al. 2018, Stoeckenius et al. 2017). Fugitive dust may also occur in other months, especially during dry snowless conditions and from dry and frozen roads. Thus, fugitive dust emissions outside May through October may affect air concentrations of particulate matter, but likely to a smaller extent than fugitive dust emitted during May through October when there is much less (or no) snow cover. Likewise, some operations would only be expected to occur during day time hours. Hourly emission rates are then halved under the assumption fracturing engines will operate at 50% load for sixteen hours instead of 100% load for eight hours. BLM does not reference many of the underlying assumptions used in developing the emissions inventories. For example, the AQTSD and appendices do not include detailed information on assumed engine load factors, drilling and completion times, drilling engine technologies (e.g., whether engines meet Tier II or better engine standards), traffic estimates (e.g., speeds, VMT, etc.), flare gas volumes and destruction efficiencies, fugitive emission capture/destruction efficiencies, etc. BLM must ensure that all assumptions regarding operation and control effectiveness which are the basis for the modeling analysis are established as enforceable mitigation measures and implemented through permit stipulations. Otherwise, BLM should model emission sources under maximum possible operating conditions and assuming no controls.	The purpose of NEPA is to analyze and assess impacts due to the Project, as proposed by the proponent, and alternatives. Operating assumptions that are used in modeling are Project design components and thus do not necessitate an additional prescriptive requirement under mitigation measures. Additionally, details such as diesel engine tier level (and hence diesel engine control efficiency) will be specified in the air permit obtained by the Project proponent. For control efficiency estimates, BLM has deferred to agency experts in assuming a more conservative (i.e., protective of the environment) control efficiency of 50% for dust control to assess near-source dust impacts. A fugitive dust control plan will be implemented on-site to reduce PM emission impacts. Modeling assumptions that reflect average work practices, for example, the average number of vehicle trips, cannot be incorporated as specific requirements; therefore, a regime would be unworkable in practice. Consistent with the BOEM Arctic modeling study, fugitive dust emissions were developed assuming that road dust emission control efficiency is 50%. Documentation included in the Draft EIS (Attachment C) indicating a less conservative assumption (i.e., dust emissions occur from June through September and road dust emission control efficiency of 76%) is not indicative of the dust control assumption included in the Draft EIS emission inventory and near-field impact analysis. Fugitive dust emissions are estimated for months from May through October, consistent with the months for which fugitive dust emissions were estimated in the BOEM Arctic modeling study. Fugitive dust may also occur in other months, especially during dry snowless conditions or when the ground is dry and frozen. Fugitive dust emissions outside May through October may affect air concentrations of PM, but likely to a smaller extent than fugitive dust emitted during May through October when there is much less (or no) snow cover. Load factor represents the average engine load when an engine is turned on. A 50% load for an engine operating for 16 hours describes activity for an engine that is turned on for 16 hours and operates, on average, at 50% of its rated power. Applied load factors are either conservative or consistent with other reference sources (e.g., EPA MOVES-NONROAD model). A summary table showing key operating assumptions and controls was added to the AQTSD included in the Final EIS. Operational and control assumptions are fully documented in the detailed emission inventory spreadsheets that are publicly available for the Draft EIS and will be publicly available for the Final EIS.	N
65	2	Riley	Stanley	—	Air Quality	I was wondering about these air quality testing and about who would be conducting these tests. Would there be in-house testing? Because it's kind of like a thing; you know, it would be, like, were ConocoPhillips, you know, and if you don't think there's going to be bad air, trust me, we'll test it for you. You know, that's what I'm kind of worried about. Is it going to be a third-party person that does the testing?	There is a large and well-designed air quality monitoring network on the North Slope. This includes air monitoring for CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$, O_3, and speciated VOCs at the Nuiqsut monitoring station (CPAI). Other North Slope monitoring stations include the Alpine CD1 facility, CD5 pad, A-Pad, and the central compressor plant (all industry sites). Although the Nuiqsut monitoring station is an industry-owned site, the data collected are designed and operated in accordance with applicable EPA PSD regulations and guidance documents. This includes independent audits by an outside party, quarterly calibrations, and documentation/explanation of missing data periods. These are documented in publicly available annual reports. For VOCs commonly associated with oil and gas development, data are presented through 2018 in the Final EIS that show values well below RELs, and AEGLs. CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$, and O_3 are all below federal and state air quality standards. It is common for federal agencies to reference data collected by the project proponent when developing an EIS. NEPA does not require federal agencies to conduct new studies and data collection; rather, NEPA requires the use of best-available data. The current NPR-A BMPs require project proponents to collect baseline data for certain resources and to provide that data to BLM. BLM's subject-matter experts conducted a thorough and independent review of all existing data and studies and referenced them, as appropriate, for the various EIS analyses.	N

4.2.2 Alternatives

Table B.2.5. Substantive Comments Received on Alternatives

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
986	9	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Alternatives	We recommend that a development-free buffer around Native Allotment be at least 5,280 feet to ensure the viability of the allotment for subsistence use. *Concerns with Off-Shore Island* CPAI has proposed constructing a temporary island near Atigaru Point to transport in the modules and materials to construct the Willow facilities and drill sites. We understand CPAI is concerned that shipping these materials into the dock at Oliktok Point and transporting them over land to the Willow prospect would significantly delay the project and increase its cost. It is important that the EIS consider that, and other alternatives not requiring island construction, in its analysis. The construction of this island and related ship traffic could impact the migration of bowhead whales and other marine mammal species. Thus, BLM must consider the impacts to bowhead whales and other marine mammals from the construction of this island. BLM should also require CPAI to work with the Alaska Eskimo Whaling Commission on mitigating potential conflicts.	Proposed BMP K-15 would stipulate that permanent oil and gas facilities within 1 to 5 miles of native allotments are prohibited, except for essential road and pipeline crossings in areas of overlapping setbacks. This was added to *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* in the Final EIS. Sealift activity does consider impacts to marine mammals (including bowhead whales) in the EIS (Section 3.13, *Marine Mammals*). Additionally, BLM is coordinating with the USFWS and NMFS regarding impacts to marine mammals. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	Y
986	10	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Alternatives	*Suggestions for Crafting Alternatives* We support the construction of a road connecting Willow to the GMT Unit. We would not support a roadless alternative because of the large increase in air traffic this option would require throughout the life of the project. The negative impacts of increased flight traffic (deflection of wildlife and direct impact on hunts) outweigh the negative impacts of additional roads (road dust and overall footprint, potential impacts to caribou and subsistence hunter movement, and hydrology). Increased air traffic is one of the top concerns, if not the top concern, from our residents and subsistence hunters concerning oil and gas development because of its impacts on caribou movements and subsistence harvests. Therefore, minimizing flights should be prioritized over limiting ground infrastructure.	Comment noted. All traffic values for all action alternatives and module delivery options have been updated for the Final EIS.	N
989	16	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Alternatives	Page 10, 2.5.3.2 Gravel Roads Please note that the road to Greater Mooses Tooth 1 has insufficient subsistence ramps. The ramps are too steep, and should have a more gradual incline. This is especially important in the winter months to allow adequate passage. An additional concern expressed about these ramps is the fact that the stopping area at the top of these ramps is not large enough to accommodate someone on a snow machine towing a sled to stop without stopping in the middle of the road. This creates the possibility of snow machine collisions with oncoming vehicular traffic. BLM must allow and require CPAI to make these ramps larger and more gradual.	The Project would include subsistence access ramps which have been designed based on lessons learned from GMT-1 and community feedback; additionally, the Project proponent has added boat ramps to support subsistence access (see the SDEIS and Final EIS). The updated boat ramps have reduced gradients and “landing pads” to reduce conflicts with vehicle traffic.	N
984	3	Hartsig	Andrew	Ocean Conservancy	Alternatives	In addition, BLM’s NEPA analysis should explain why other module delivery alternatives—including alternatives that do not involve construction of artificial islands or alternative locations for the module transfer islands—were not considered for analysis. We appreciate this opportunity to submit comments and can provide additional information to BLM upon request	Final EIS Appendix D.1, *Alternatives Development*, Section 3.1.2, *Alternative Components Considered during Alternatives Screening Process*, provides a summary overview of alternatives to the MTI that were explored during the alternatives development process; Section 3.1.3 *Alternatives Components Considered but Eliminated from Further Analysis*, provides the rationale for why other module delivery options were dismissed. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
1296	6	Imm	Teresa	Arctic Slope Regional Corporation	Alternatives	Although ASRC notes ConocoPhillips’ efforts to proactively address subsistence impacts through monetary means, project design features, mitigation measures and other mechanism, valid concerns remain from local stakeholders on the cumulative impact and pace of local resource development on the subsistence lifestyle of the local people. While ASRC, Kuukpik Corporation (Kuukpik), ConocoPhillips, BLM, and the local stakeholders work diligently to minimize these impacts, steps can be taken to support this working relationship. For instance, in a recent public meeting in Nuiqsut for the Willow MDP scoping concerns were voiced that the proposed 25 mile road extending north-south in this area will be a major deterrent to migrating caribou, particularly those moving from Teshekpuk Lake in the west to areas east of Nuiqsut. ASRC encourages ConocoPhillips to work closely with the local hunters with respect to caribou migration patterns and address concerns regarding the proposed location and orientation of infield roads and pipelines. Addressing any negative impacts to subsistence would help preserve the benefits, which have begun to accrue as a result of the Spur Road, and which helped make other projects (GMT1 and GMT2) more acceptable from a cost-benefit perspective. ASRC is pleased to see subsistence tundra access ramps included in the road design. Nevertheless, ASRC encourages ConocoPhillips to continue to address concerns regarding the design of the subsistence ramps and, where possible, reduce the slope of the subsistence ramps and height of the road to an acceptable level.	At the development stage the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. CPAI has updated the design of the proposed subsistence ramps, based on stakeholder feedback to include a landing at the top that would be off the roadway. The updated design limits the ramp grade to a maximum of 15%.	N
9	4	Miller	Pamela	—	Alternatives	I don’t understand why a module on an artificial island is needed when you have land access already, when there’s proven access for construction of a massive oilfield complex, including the Alpine field, without going out into the ocean. Anytime you have ocean, you have transportation, risk of spills, and the proposed access corridor violates the intent, if not the letter, of the no surface occupancy zone, which is the most protected of lands within the National Petroleum Reserve-Alaska.	The SDEIS for the Willow MDP Project includes a third module delivery option (Option 3: Colville River Crossing) that would not construct an offshore gravel island. Table D.3.2 in Appendix D.1 (*Alternatives Development*) describes why large sealift modules are needed and why they cannot be transported across the Alpine Ice Road.	N

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1294	4	Nukapigak	Joe	Kuukpik Corporation	Alternatives	As Kuukpik noted in its scoping comments: "The NEPA process shouldn't be—or even appear to be—a formality that basically approves what has already been decided. NEPA is about comparing the likely impacts of the proposal with various 'reasonable alternatives.' Given the scope of the proposed Willow project and, in particular, its location in and near important caribou habitat and migration corridors, Kuukpik hopes to see a wide array of potential alternatives that can help us, BLM, and any other interested person or agency determine what changes to the proposed project could reduce the negative impacts as much as possible and even whether the project could provide partially offsetting benefits. There's no other way to determine Willow's potential impacts, to realistically evaluate what impacts are 'unavoidable,' and to decide what tradeoffs are necessary to minimize impacts while nevertheless allowing CPAI to access most of the resource." Kuukpik went on to emphasize that analyzing alternatives in a multi-facility project like Willow requires much more than just moving roads around (as was done in the alternatives for comparatively small, standalone projects like GMT1 and GMT2). The Willow project is more on the order of building a new Kuparuk-sized facility than it is building a GMT1 or GMT2. Even with all its satellites, Alpine is smaller than Willow. Therefore, just as the Alpine Satellite Development Project EIS analyzed a range of different development options, the Willow EIS should look at "a suite of alternatives (and/or sub-alternatives) that could reduce both Willow's footprint and its likely impacts on Nuiqsut and the subsistence resources the community depends upon. At a minimum, this means looking at alternative drill site locations and road layouts, and possibly eliminating certain roads entirely . . ." We strongly urge BLM to include roadless BT4/BT5 satellites in a new alternative in the Final EIS so we can see a detailed analysis of anticipated flight numbers, the marginal differences between alternatives, and a careful assessment of where and when the impacts from those flights would occur.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The target resources (i.e., oil reservoirs) are in fixed locations and remain the same regardless of action alternative, hence the same drill site pad locations across all action alternatives. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. Though the elimination of a road would aid caribou movements in that area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. In the case of BT4, the airstrip would be close to the high-density calving area, with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and have some impacts on caribou movements during other times of the year. The increase in air traffic for a roadless alternative is substantial. The addition of 1 more airstrip in Alternative C, would add 7,473 more fixed-wing trips and 489 helicopter trips over the life of the Project (62% more fixed-wing traffic and 20% more helicopter traffic than having a road). The suggested configuration would not further reduce impacts than the action alternatives analyzed in the EIS.	N
1294	10	Nukapigak	Joe	Kuukpik Corporation	Alternatives	One possible explanation [of Alternative B as the Preferred Alternative] is that BLM may be falling into the old trap of simply equating "gravel footprint" with impacts. Table ES. 1, for example, shows that Alternative C's footprint is about 10% bigger than Alternative B's. The Table uses that information and only that information to conclude that Alternative C has the "Greatest potential for subsistence hunter avoidance due to larger infrastructure footprint" and "Greatest direct loss of subsistence use areas due to increase in overall infrastructure footprint." But those conclusions are misleading. In fact, as between Alternatives B and C, there's very little practical relationship between increased gravel footprint and more hunter avoidance. Modestly larger pads at BT1, BT2, and BT4 (under Alternative C) wouldn't affect hunting patterns nearly as much as the fact that there would be no road connection to those drill sites. The exact impacts of that would be mixed, but that's not really the point here. The point is that simply treating gravel footprint as a proxy for avoidance—or worse, for subsistence impacts generally is overly simplistic and usually flat out wrong because so many other factors are equally or more important when to comes to evaluating a native's impacts on subsistence. . . . Instead, the only conclusion drawn for Alternative B which has the most gravel roads of any of the proposals is that it would have the "Most gravel roads for subsistence access." This is a selective, incomplete, and erroneous conclusion that doesn't flow from the impacts cited in the table. Alternatives C and D are then seemingly criticized because they would have "fewer" and the "fewest gravel roads for subsistence access," respectively. . . . Kuukpik understands Table ES. I is a summary (and that this whole EIS is, shall we say, abbreviated). . . . The summary needs to be very clear that the alternative with the most roads, Alternative B here, is without a doubt the most likely to seriously disrupt caribou migration. . . . If BLM's preference is based primarily on differences in gravel footprint and the assumption that any alternative that increased flights would, by definition, be a non-starter for Nuiqsut, Kuukpik thinks BLM is mistaken and its conclusion flawed. As we've indicated above, the community may accept some additional flights if it means significantly reducing the risk of deflection by infrastructure on the ground, especially in particularly sensitive areas such as those around BT4. And although gravel impacts to the tundra are a serious concern for Kuukpik, the prospect of mass deflection of two key caribou herds is much, much more important.	Table ES-1 is a summary table included in the EIS Executive Summary. The description of the potential impacts is taken from the overall analyses in the Draft EIS, including the sections describing subsistence and terrestrial mammals, which does include overall gravel footprint. While the overall gravel footprint is an important metric when considering impacts to many resources (e.g., wetlands and vegetation, terrestrial mammals, subsistence), BLM considers impacts to all resources in its determination of preferred alternatives. For example, Alternative D would construct the smallest gravel footprint of all action alternatives, but the lack of a gravel road connection to the GMT Unit includes additional downsides such as not increasing potential year-round subsistence access to local residents and increasing air traffic. Note that the Final EIS includes updated impact metrics (e.g., gravel pad size, ice road miles, traffic values) based on the updated Project refinements from CPAI.	N
1294	11	Nukapigak	Joe	Kuukpik Corporation	Alternatives	As BLM has become increasingly aware throughout this NEPA process, there is essentially total opposition in Nuiqsut to CPAI's proposed Module Transfer Island (MTI). Throughout the public meetings and Kuukpik's consultations with BLM, BLM has heard nothing but negative comments about the island in general and many of the proposed details. . . . we strongly urge CPAI and BLM to consider alternatives to the proposed MTI and to analyze at least some other alternative in the Final EIS. If the Final EIS does not contain any other proposals, then BLM wouldn't even legally be able to select any another alternative. BLM cannot let that happen.	The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. The module delivery options with MTIs (Options 1 and 2) are carried forward in the Final EIS for analysis.	N
1294	16	Nukapigak	Joe	Kuukpik Corporation	Alternatives	Eliminating the MTI would also vastly reduce the amount of gravel needed for the project. That could benefit locals if it meaningfully reduced the amount of blasting needed to mine the gravel. It would also conserve a scarce resource on the North Slope rather than dumping it on the floor of Harrison Bay. For these and other reasons, Kuukpik urges BLM to go back to the drawing board and generate other options for delivering the modules to the Willow project area. Kuukpik believes the community's reasons for opposing the MTI are valid and that the MTI should not go forward. BLM should therefore work with CPAI and local stakeholders to develop additional options and release those options for an additional public comment period prior to publication of the Final EIS. Stakeholders are entitled to an opportunity to comment on any alternatives that are not included in the Draft EIS. And since BLM did not even bother to include at least one alternative that doesn't include the MTI, it will have no choice but to analyze new alternatives when they are developed.	The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. The MTIs at Atigaru Point and Point Lonely (Options 1 and 2) are carried forward in the Final EIS for analysis.	N

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1294	33	Nukapigak	Joe	Kuukpik Corporation	Alternatives	Volume 1, page 17, Section 2.7 - Sealift Module Delive1y Options. These passages do not address Kuukpik's scoping comments on armoring materials or on requiring gravel to be physically removed after MTI use.	Gravel bag design has advanced since the bags were first used as armoring media on the North Slope. These design improvements include the use of white (UV stabilized), nonbuoyant polyester fabric; the use of double drawstring closures to reduce the risk of bags emptying; and the addition of a sacrificial gravel bags that are tied together in zones where ice impacts would be frequent. The MTI would be located on state submerged lands. BLM does not have regulatory jurisdiction over that aspect of the Project and thus cannot require removal of the material. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
864	13	Psarianos	Bridget	Trustees for Alaska	Alternatives	BLM rejected requests to delay the Project EIS until after GMT-2 is in the drilling or operations phase. BLM's rationale for rejecting this request is provided in the draft EIS appendix that dismisses alternatives; however, this rushed process to permit ConocoPhillips' project is an issue of a lack of meaningful baseline data. BLM states that: BLM is unable to postpone Project permitting based on regulatory requirements applicable to the NPR-A found in 42 USC 6506(a). Deferral of a project authorization would be inconsistent with the directives of the Naval Petroleum Reserve Production Act to expeditiously carry out an oil and gas leasing program. Delayed permitting would be inconsistent with the rights of ConocoPhillips acquired with the subject leases to reasonably develop the oil and gas within those lease tracts (generally limited to a 10-year lease term) and with ConocoPhillips' obligations in the Bear Tooth Unit Agreement to promptly pursue development. We are not aware of, and BLM does not cite, any authority for the proposition that the Naval Petroleum Reserves Production Act (NPRPA) mandates BLM immediately process all applications before the agency, particularly where there are serious questions about the completeness of the applications before all the agencies involved in reviewing this project—especially the Corps of Engineers. It is reckless and contrary to law for BLM to be proceeding without all the necessary information before the agencies. We are not aware, and BLM does not cite, any language in ConocoPhillips' lease terms that entitle the company to receive permits within its desired timelines. BLM has the authority and the obligation to consider the benefits of delaying development. Given the rapid development in the northeastern NPR-A, a delay is critical to allow for updated baseline studies to be conducted and important information gathered, which would inform a comprehensive evaluation of the impacts of Willow and alternatives.	The NPRPA requires BLM to conduct an expeditious program of oil and gas leasing. The BLM cannot legally consider an alternative to require existing lessees to undertake phased development. Once a lease is sold, BLM must process permits for development as they are received. The leases are subject to a limited term of years, for which BLM cannot unreasonably delay project proposals. Within 30 days after the operator has submitted a complete application, including incorporating any changes that resulted from the on-site inspection, the BLM will approve the application, subject to reasonable Conditions of Approval, if the appropriate requirements of NEPA, National Historic Preservation Act, ESA, and other applicable laws have been met (Onshore Order 1).	N
864	28	Psarianos	Bridget	Trustees for Alaska	Alternatives	BLM's draft EIS for the Willow project contains numerous gaps in information and analysis that seriously frustrate public review and understanding. Certain highly significant issues that affect important resources and uses of the project area, such as wilderness and recreation, information on the hydrology and wetlands that will be impacted, and dust control plans are largely missing from the draft EIS. Many issues, such as impacts to hydrology, wildlife, marine mammals, subsistence, vegetation and wetlands, and spill risks are only partially addressed, with key elements of the draft EIS analysis missing, incomplete, inaccurate, inconsistent with the best available science, or otherwise inadequate. As discussed later in these comments, there are significant gaps with regard to the information necessary for the Corps to conduct an analysis under the 404 Guidelines.	The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook H-1790-1 (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
864	34	Psarianos	Bridget	Trustees for Alaska	Alternatives	Section 3.1.1 of Appendix D describes Alternatives Screening Criteria used by BLM and the cooperating agencies in developing the draft EIS, where BLM attempts to explain why the agency did not consider a reasonable range of alternatives that are meaningfully different from ConocoPhillips' proposed action. One such criteria—relative environmental effects—raises serious questions about how the BLM evaluated the environmental impacts of potential alternatives outside of the NEPA process. The draft EIS states that BLM considered whether potential alternatives would achieve the following before considering them further: -Reduce the overall Project footprint (i.e., direct impacts from facilities) -Reduce potential human health impacts (especially those relating to air quality and subsistence) -Reduce impacts to wildlife, subsistence resources (especially caribou), and subsistence use areas -Reduce risks related to spills or other accidental releases -Reduce impacts to water resources and floodplains, including marine habitat. These are the types of resource impacts that are meant to be considered in the NEPA analysis itself, not discussed behind closed doors by BLM in close coordination with the project applicant. There is no discussion as to how BLM quantified any of these differences, which is particularly relevant for issues related to the project footprint, air quality, and impacts to wetlands. Table D.3.2 in the draft EIS appears to be the agency's attempt to address some of these criteria; however, it only provides a few brief sentences that do not explain all of these bullet points. Nor is it clear where any of this information originated and there are no citations for assertions. In short, the public cannot evaluate BLM's decisions about which alternatives to consider and which to not carry forward.	At the development stage the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to the Project proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. As described in Final EIS Appendix D.1, *Alternatives Development*, BLM and cooperating agencies developed screening criteria and the range of alternatives for the EIS. The Project proponent provided technical input on capabilities and limitations of some agency-proposed Project elements to ensure alternatives developed would be executable. Table D.3.2 in Appendix D.1, *Alternatives Development*, provides the rationale for elimination of Project components not advanced as alternatives. BLM worked with the Project proponent to provide quantifiable data where needed to understand the scale of impacts from potential alternative components; this information is included in the table.	N

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864	36	Psarianos	Bridget	Trustees for Alaska	Alternatives	Another screening criterion included the requirement for the alternative to support reasonably foreseeable future development. It's not clear what reasonably foreseeable future development BLM is referring to, as Figure 3.19.2 only shows the Willow project itself along with pads for Greater Willow 1 and 2, but does not show any further development west of Willow. As an initial matter, BLM should be transparent in identifying what reasonably foreseeable future development the agency is considering when constraining its range of alternatives. If there is reasonably foreseeable future development expected from the Willow development, it must be considered in this EIS as a cumulative impact. It is unclear whether BLM solely considered Greater Willow 1 and 2 for purposes of screening out alternatives, or whether the agency is seeking to enable further expansion by ConocoPhillips or other companies. It is unreasonable for BLM to screen out alternatives that may have environmental benefits simply because they do not grease the skids for ConocoPhillips or other companies to expand westward into the Reserve. Additionally, this screening criterion is no way tied to the federal purpose and need. If anything, it may be in direct conflict with BLM's obligations under NEPA to consider a reasonable range of alternatives, BLM's NPRPA obligations to provide maximum protections for surface values, BLM's obligations under FLPMA to cause no unnecessary or undue degradation of public lands, nor the Corps obligations to pick the Least Environmentally Damaging Practicable Alternative.	Greater Willow 1 and Greater Willow 2 are potential future drill sites; the determination of whether these areas might be developed will require additional evaluation of the resources by CPAI. Although there are no specific plans by CPAI or other North Slope operators to expand farther into the NPR-A, CPAI does own oil leases in the area surrounding the Willow MDP Project, and CPAI continues exploration and evaluation efforts to determine whether future development in the Willow area may be pursued. No other sites are included as reasonably foreseeable, since any additional development beyond Greater Willow 1 and 2 would be speculative. The Willow MDP Project was designed in accordance with requirements in the NPR-A IAP, which is consistent with both the NPRPA and FLPMA. The NPRPA, as amended, requires oil and gas leasing in the NPR-A and the protection of surface values to the extent consistent with exploration and development of oil and gas. NPR-A IAPs meet that mandate by designating numerous special areas within the NPR-A and closing certain sensitive areas to leasing, while allowing for oil and gas leasing elsewhere. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Pursuant to Section 302(b) and Title V of FLPMA, proposed actions may not cause unnecessary or undue degradation.	N
864	37	Psarianos	Bridget	Trustees for Alaska	Alternatives	Though the draft EIS quotes CEQs and the Corps definition for reasonable alternatives throughout Appendix D, it is not clear where BLM drew the line for economic practicability. Indeed, there is no clarification as to which alternatives were eliminated due to cost considerations, other than the express mention of economic practicability in discarding alternatives which would require construction of a bridge over the Colville River, and use medium-sized modules for barging. If these are the only two alternatives that were discarded due to costs, BLM should explain what those differences in costs are that led the agency to conclude the project would be impracticable. If other alternatives were eliminated due to cost projections, the draft EIS must identify those in a transparent manner. Moreover, it is hard to see why the module transfer island is a component in every action alternative given its serious environmental impacts, if not for insistence by the project applicant.	As described in Appendix D.1 (*Alternatives Development*), Table D. 3.2, there were multiple reasons why these two potential alternative components (a bridge across the Colville River or use of medium-sized modules) were eliminated from detailed analysis, economics being just one of them. A bridge across the Colville River, for example, would have multiple environmental and human impacts. In each case, these two alternative components substantially increase the costs and challenged the viability of the Project. Alternatives to MTIs were considered and are detailed in Final EIS Appendix D.1, *Alternatives Development*, Table D.3.2. Since publication of the Draft EIS, the Project proponent has developed a new module delivery option, Option 3: Colville River Crossing.	N
864	38	Psarianos	Bridget	Trustees for Alaska	Alternatives	A reasonable range of alternatives should have evaluated, at a minimum: -An alternative where no gravel island is constructed and existing roads and infrastructure, as well as ice roads, are used for construction of the Willow project; -An alternative considering seasonal (i.e., winter-only) drilling; -An alternative eliminating infrastructure from within the Teshekpuk Lake Special Area; -An alternative considering a different gravel mine location; -Alternative configurations for the layout, size or location of projects drilling pads or the Willow Central Processing Facility; -An alternative using an existing airstrip rather than construction of at least one new airstrip for the Willow project; -An alternative using natural gas and renewable energy for Project purposes with minimal backup diesel, rather than relying on diesel for facility operations, eliminating the need for diesel pipelines; and -Delayed project permitting.	Appendix D.1, *Alternatives Development*, Table D.3.2 provides a summary of Project components considered for development as alternatives but dismissed and the rationale for dismissal. Alternative components considered but eliminated included use of an alternative to the proposed mine site, use of other airstrips, and the Project's permitting schedule. Appendix D.1 (*Alternatives Development*), Section 3.1.5, *Additional Alternatives Concepts Evaluated by ConocoPhillips Alaska, Inc*., includes additional discussion on an alternative mine site and provides the rationale for not including winter-only drilling (i.e., ice road or tundra access only). Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. Like most or all previous NPR-A projects, much of the Project area overlaps previously undisturbed area. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
864	42	Psarianos	Bridget	Trustees for Alaska	Alternatives	Avoiding Infrastructure in Special Areas: BLM failed to analyze any alternative where ConocoPhillips' pads and roads would not be located within Teshekpuk Lake and Colville River Special Areas. Though the Special Area boundaries are conspicuously absent from BLM's alternatives maps (and they should not be missing for public comment purposes), the draft EIS acknowledges—buried in the Land Use and Ownership section, not the project description—that Alternative B's access road and pipeline cross through a mile of the Colville River Special Area raptor protection area, and proposes an infield road, pipeline, and two drill sites (BT2 and BT4) within the TLSA (110 acres) and road, pipeline, and drill site (BT4) within the Teshekpuk Lake Caribou Habitat Area. We note the latter statement is inconsistent with BLM's maps, and assertions throughout Appendix D that BT4 is no longer located within the Teshekpuk Lake Caribou Habitat Area. The draft EIS states that "four options for gravel pads were considered during alternatives development. Suggested options for pads ranged from reducing pad size, altering pad locations, and reducing the overall number of pads. These options were aimed at reducing impacts to wetlands and vegetation. Each of these options is described in Table D.3.1." However, there is no discussion in that table of any option considered which would eliminate drill sites in the Teshekpuk Lake Special Area or road and pipeline routing through the Colville River Special Area. As described herein, both of these areas have very important wildlife, subsistence and scenic values. The fact that BLM did not even evaluate the potential for ConocoPhillips to place two large drilling pads, projected to have 50 wells apiece, outside of the Teshekpuk Lake Special Area boundary is a clear shortcoming of its alternatives analysis. Technology is improving such that additional areas can be accessed by directional drilling, allowing wells to be placed further from potential resources. BLM should have considered the environmental benefits to caribou, birds, and other wildlife from avoiding the placement of ConocoPhillips' massive infrastructure pads within an area BLM has identified as deserving the maximum protection of surface values. A failure to consider such an alternative is a clear shortcoming of this draft EIS, which must be revised.	All action alternatives would construct infrastructure (e.g., gravel roads, pipelines) in the CRSA and TLSA; the areas have been added to figures in Chapter 2.0, *Alternatives*, and Appendix D.1, *Alternatives Development*, for the Final EIS. Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. Like most or all previous NPR-A projects, much of the Project area overlaps previously undisturbed area. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA. No action alternative would construct infrastructure in the Teshekpuk Lake Caribou Habitat Area (also known as BMP K-5 in BLM 2013 NPR-A IAP/EIS ROD). In accordance with BMP E-5, the Project development footprint was minimized. The footprint of gravel pads and roads were refined as engineering advanced and refined pad and road sizes and locations are analyzed in the Final EIS.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	43	Psarianos	Bridget	Trustees for Alaska	Alternatives	Gravel Mine: BLM improperly dismissed consideration of the Clover material site prior to beginning its NEPA process, solely based on ConocoPhillips' preference. BLM should reconsider Clover as a potential gravel source for the project. BLM also dismissed the ASRC mine site, an existing site used for many of ConocoPhillips' existing Alpine infrastructure, allegedly due to that mine creating additional noise and air quality impacts in Nuiqsut caused by its closer proximity. This, however, does not account for the potential environmental benefits of NOT mining for gravel in an important subsistence area, one of the rapidly dwindling areas near the community of the Nuiqsut that has not already been industrialized. Moreover, there is no indication that any quantitative analysis was done to differentiate between the air and noise impacts that would be felt by the community. Indeed, BLM fails to account for the fact that the ASRC mine site would very likely continue to operate to serve other infrastructure projects in the area, meaning that Nuiqsut would have active gravel mining sites on both sides of the community. Such tradeoffs should have been fully considered as an alternative and subjected to modeling for air quality and noise impacts, and for input from the community of Nuiqsut. Also, though not expressly listed in BLM/ConocoPhillips' Table dismissing alternatives, it is possible that ConocoPhillips and BLM do not believe the ASRC mine site has sufficient gravel for the Willow project. As described herein, BLM has failed to consider alternatives which would minimize the amount of gravel needed for the project—such as eliminating the massive gravel island, requiring seasonal drilling, or reconfiguring any pad layouts or locations. Such changes would decrease the gravel footprint of the project, making alternative mining sites more feasible. BLM's foreclosure of meaningful alternatives has thus had a cascading effect, by limiting its consideration of alternative gravel sites.	The Clover Mine Site does not contain the required gravel volume needed to construct the Project. Further, the material at Clover is poorer (with increased silts and other fines) and would require additional maintenance over the life of the Project (Appendix D.1, *Alternatives Development*, Section 3.1.5.1, *Use of Clover Mine Site*). Finally, the Clover mine site would be approximately 1 mile closer to Nuiqsut than the proposed Tiŋmiaqsiuġvik Mine Site (6 miles vs. 7 miles). The use of the ASRC Mine Site has been repeatedly opposed by Nuiqsut residents, as voiced in previous Project comments. Use of the ASRC Mine Site would increase gravel haul lengths and associated ice roads, adding to air quality and noise impacts in the immediate vicinity of Nuiqsut from mining and trucking activity. The proposed mine site is approximately 7 miles from Nuiqsut and mining activity at this location is anticipated to have reduced impacts to the community from the Project (versus the ASRC Mine Site). It is assumed the ASRC Mine Site would have a sufficient volume of gravel to construct all Project action alternatives as described in the EIS.	N
864	44	Psarianos	Bridget	Trustees for Alaska	Alternatives	Alternative Layout, Designs, and Size: According to the draft EIS, the Project would construct five drill sites of the same size and the same locations under each action alternative. The pipelines would use the same alignment under each alternative. The Willow Operations Center (WOC), the Willow Processing Facility (WPF), water sources with associated gravel pads, and airstrip would remain the same size and in the same location under all the action alternatives. This is not a reasonable range of alternatives. During scoping, groups reminded BLM of its obligation to consider a range of alternatives that might include the use of directional drilling to minimize the number and size of pads, and locating infrastructure to avoid the most sensitive areas. BLM should have also considered different designs and configurations, such as whether pipelines should be buried at water crossings instead of crossing either below the bridge decks or on vertical support members downstream from the bridge. It is not clear why horizontal directional drilling for burying a pipeline is only being considered at the Colville River crossings for seawater and diesel pipelines.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The target resources (i.e., oil reservoirs) are in fixed locations and remain the same regardless of action alternative, hence the same drill site pad locations across all action alternatives. Pad sizes and pipeline alignments have been updated based on additional engineering—all action alternatives have been designed to the same level of engineering. Airstrip locations varied in the Draft EIS and continue to do so in the Final EIS. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. The Project would employ extended reach drilling (i.e., "directional drilling") at all drill site locations. Extended reach drilling still has technical limitations to the range it can reach. Buried pipelines in permafrost create additional risk associated with the potential for permafrost thaw and the inability to readily complete regular visual inspections. Additionally, HDD, as noted by the commenter, has been proposed for crossing the Colville River. This has been proposed by the Project proponent to minimize impacts to the Colville River, specifically where there is no existing crossing (bridge or pipeline) over the river.	N

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864	46	Psarianos	Bridget	Trustees for Alaska	Alternatives	BLM should have considered less environmentally-damaging alternatives to the project design such as eliminating the airstrip for Alternative B and eliminating all diesel pipelines and using natural gas and renewable energy sources such as wind for fuel with minimal amounts of diesel employed as backup. Neither of these options would prevent ConocoPhillips from accessing oil resources. Notably, it is unclear to us why Alternative B contains an airstrip at all since access to the project is possible via road, and flying to the project via fixed-wing aircraft would have a number of negative impacts including to subsistence. Alternative D understandably requires an airstrip for year-round operations as it is disconnected from existing infrastructure. It's not clear how BLM and cooperating agencies weighed the difference in impacts from construction of a new Project airstrip vs. utilizing the Alpine airstrip. BLM states such an alternative would increase air traffic at Alpine by approximately 700 flights per year during construction and would increase vehicle traffic through the GMT and Alpine developments. This is roughly two flights per day, and only during construction. Would this number decrease once Willow enters its development phase? What would be the tradeoffs in terms of decreased noise disturbance to wildlife and subsistence users, air quality, and other resources west of Nuiqsut during overflights? BLM should have evaluated these factors and weighed them carefully, instead of simply dismissing this potential alternative without a full analysis. As stated during scoping, BLM should have fully evaluated the positive and negative trade-offs of the different alternatives such as road disturbances compared to aircraft disturbances, including mitigating aviation impacts to the maximum extent possible. However, the proposed flight patterns in the draft EIS indicate that there will be significant impacts at a Willow airstrip, as flights to Willow will originate from Alpine, Kuparuk, Deadhorse, or other locations. It is absurd that ConocoPhillips would fly such a short distance between Alpine to Willow, which would involve flights at low altitudes that will disturb wildlife and the community of Nuiqsut. It also further begs the question as to why air traffic could not simply be routed through Alpine, since flights to a Willow airstrip will not in fact be protective of the Colville River Delta. We also encouraged BLM to incorporate minimal aircraft operations into all alternatives, including the use of low-impact drones where possible instead of helicopters and fixed-wing aircraft, e.g., for pipeline and methane emission inspections and aerial studies. The draft EIS fails to analyze these options as potential alternatives or mitigation measures.	USFWS voiced strong concern about the use of the Alpine airstrip to support the Willow MDP Project due to that airstrip's location in the more sensitive CRD. As noted by USFWS, the Alpine airstrip was never permitted with the intent to serve as an industrial hub within the NPR-A and is poorly sited to do such (e.g., coastal weather such as fog routinely grounds flights into and out of Alpine). Additionally, flight paths for the Willow MDP Project would include direct flights from Anchorage to Alpine, minimizing impacts to Nuiqsut based on possible flight paths. Finally, routing all air traffic through Alpine would increase ground traffic between Alpine and the Willow MDP Project area significantly. The Project proponent has provided updated traffic volumes (including fixed-wing aircraft flights) based on the use of a new, larger aircraft with the capability to carry approximately four times as many passengers (Bombardier Q400); these updated values are provided in the Final EIS. See Final EIS Appendix D.1 (*Alternatives Development*), Section 5.4, *Fixed-Wing Aircraft Traffic Comparisons*, for air traffic details by alternative for the life of the Project.	N
864	49	Psarianos	Bridget	Trustees for Alaska	Alternatives	When constructing the Module Transfer Island (MTI), ConocoPhillips says it will utilize a sheet pile dock design. The draft EIS does not explain this decision, which is particularly questionable given the problems that the Port of Anchorage has experienced with a sheet pile design for its dock expansion. Additionally, the draft EIS does not explain why the Point Atigaru location—7.2 miles offshore—was selected for analysis as opposed to a location closer to shore and/or closer to existing infrastructure. Last and notably, onshore impacts will differ depending on where the MTI is located. BLM needs to provide information about the MTI siting decision for the public to understand and comment on why that location was selected.	The sheet-pile dockface proposed for the MTIs is not comparable to the design the Port of Anchorage attempted to install as part of its upgrade an expansion plans. (*Note*: The Anchorage Port attempted to use sheet-pile lengths that were 70 to 90 feet long, and "90 foot sheet pile lengths are nearly twice as long as those used for previous open sheet pile projects . . . PND's own literature explains that sheet lengths exceeding 24 meters [78 feet] exceed the 'practical limit' of [open cell sheet pile] construction" [https://www.adn.com/anchorage/article/city-sues-three-firms-over-anchorage-port-design-oversight/2013/03/16/].) The Atigaru Point MTI would be located approximately 2.2 miles offshore (Final EIS Appendix D.1 (*Alternatives Development*), Section 4.7.1, *Atigaru Point Module Transfer Island)*. The distance from shore is driven by the water depth, with approximately 8 feet of water being required for barges; this is the location where this water depth is present. (*Note*: The Point Lonely MTI would be located approximately 0.6 mile offshore.) The Draft EIS does provide discussion on why these sites were identified as possible MTI locations.	N
85	1	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Alternatives	We find the number and range of alternatives to be unduly narrow. The proposed action would extract the same amount of oil (~590 million barrels) from the same number of drill sites (5) at the same locations, across all alternatives. All of the action alternatives include 2 drilling sites and associated infrastructure (BT-2 and BT-4) within the Teshekpuk Lake Special Area (TLSA)-an area of high sensitivity and concern. The project life is the same across alternatives (30 - 32 years) and the permanent infrastructure is similar across all action alternatives. For example, the gravel footprint is similar (411 - 489 ac), the miles of gravel roads is similar (28.3 - 38.2 mi), the length of pipeline rack is similar (95.6 - 95.7 mi), the number of stream crossings is similar (14 - 18), and the required number of bridges is similar (6 - 7). The associated greenhouse gas emissions for each alternative are essentially the same (261,419 - 263,816 metric tons).	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. *Note*: All quantitative values have been updated to reflect Project design refinements in the Final EIS.	N
1054	2	—	—	—	Alternatives	All formally required Alternatives to the Willow Plan are NOT included in the DEIS, rendering it deficient legally.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need.	N

4.2.3 Avoidance, Minimization, and Mitigation

Table B.2.6. Substantive Comments Received on Avoidance, Minimization, or Mitigation

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
48	1	Ahmaogak	Roy	—	Avoidance, Minimization, or Mitigation	We have a family cabin that's on the west end of Teshekpuk Lake. We're about four miles from the lake, itself, and we're six miles from the coast inland. And if there's any way possible that the air carriers, the helicopters can refrain from flying again, twice. This last year was the second year that they've been flying 200 feet, 250 feet above ground. There should be a minimum of 500 feet that they should be flying, because for three years in a row, we've had — been having issues with the air carriers flying their chopper in the summertime, because we only have such a short period to harvest our caribou. And if there's any way that — and I don't know if Leyla can answer this, but if there's any way that — you know, it impacts our family and having to deal with that helicopter issue the last two years, and if there's any way they can have minimum of 500 feet flying around Teshekpuk area.	Proposed BMP F-3 (previously described as F-1) would require all aircraft to maintain specified altitudes that vary by alternative. Alternative E would require all aircraft to maintain a 1,500-foot minimum altitude throughout NPR-A. This was added to the Final EIS in the *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections.	Y
989	9	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Avoidance, Minimization, or Mitigation	We are concerned that the construction of a module transfer island and related ship traffic could impact the migration of bowhead whales and other marine mammal species. BLM and CPAI must work with the Alaska Eskimo Whaling Commission on mitigating impacts to whales and other marine mammals and potential conflicts with whalers. CPAI should make this project and all associated ship traffic compliant with the conflict avoidance agreement.	The effects of ship traffic on marine mammals is described in Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*. Agreements between CPAI and AEWC are beyond the jurisdiction of BLM. AEWC communicates directly with oil and gas operators through AEWC's annual conflict-avoidance agreement.	N
986	11	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Avoidance, Minimization, or Mitigation	We encourage BLM and CPAI to allow local residents access to the Willow project's roads. CPAI should allow hunting from the road and produce concise policies regarding hunting from its roads. Moreover, the road should have several vehicle pullout pads and subsistence ramps to allow free passage and subsistence access. These pullouts and ramps will help mitigate the impacts of Willow on subsistence. The road to Greater Mooses Tooth 1 had insufficient subsistence ramps. The ramps are too steep, and should have a more gradual incline, especially for the winter months, in order to allow adequate passage. An additional concern expressed about these ramps is the fact that the stopping area at the top of these ramps is not large enough to accommodate someone on a snow machine towing a sled to stop without stopping in the middle of the road. This creates the possibility of snow machine collisions with oncoming vehicular traffic. BLM must allow and require CPAI to make these ramps larger and more gradual. In crafting alternatives, BLM and CPAI should also consider: suspending helicopter flights around select rivers for month long periods during peak caribou hunting season; and implementation mitigation measures for road dust including speed limits, a dust control plan, increased remote monitoring of facilities to reduce traffic and the watering of roads; and constructing a warm storage building to house vehicles, minimizing the need to idle vehicles for long periods of time.	The Project would include subsistence access ramps which have been designed based on lessons learned from GMT-1 and community feedback; additionally, the Project proponent has added boat ramps to support subsistence access (see the SDEIS and Final EIS). The updated boat ramps have reduced gradients and "landing pads" to reduce conflicts with vehicle traffic. A Project-specific dust plan is included in the Final EIS (which includes reduced speed limits) as Appendix I.3 (*Dust Control Plan*). Additionally, potential revisions to NPR-A IAP BMPs places limitations on helicopter use during specified periods (including peak caribou hunting, BMP F-4) and on vehicle idling (BMP I-14)—both are described and considered in the Final EIS under *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections (typically, Section 3.X.2.1.1).	Y
989	24	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Avoidance, Minimization, or Mitigation	Page 69, Sect 3.8.2.6.1, Option 1: Proponent's Module Transfer Island "Approximately 4.9 acres in front of the MTI dock would be screeded two times over the life of the MTI. A temporary increase in turbidity during and immediately after screeding would occur. Pile and sheet pile driving for MTI construction would occur in winter through bottom-fast sea ice, thus they would not increase turbidity during installation." This statement contradicts the following prior statements in the EIS: -Page 61, Sect 3.8.1.1.4, Para 6: "The coastline of Harrison Bay is predominantly erosional (Gibbs and Richmond 2015). Though a shoal occurs near Atigaru Point, it has had little deposition (0.06 foot/year) in the last 65 years (CPAI 2019a)." -Page 68, Sect 3.8.2.6.1, Para 8: "Based on data for western Harrison Bay, current speeds are too low to cause significant, permanent scour of the sea bottom surrounding the MTI (Coastal Frontiers Corporation 2018a). Average rates of shoaling in the area are low (CPAI 2019a). Other human made islands in the Beaufort Sea experience small amounts of shoaling on the leeward side. Similar amounts would be expected al the MTI and would not affect the stability of the MTI or coastal processes around it. No accretion or further shallowing of the MTI area would be expected to occur." If there is little deposition in Harrison Bay and currents and wave action are too low to scour the sea bottom, how is the MTI expected to subside int he next 10-20 years? We recommend, as mitigation measure, that the gravel be moved to the shore and that appropriate navigation aids be placed so that mariners do not crash into the artificial shoal produced by the island.	First part of comment is unclear; BLM does not believe that the identified statements are in contradiction. As stated in Final EIS Section 3.8.2.6, *Module Delivery Option 1: Atigaru Point Module Transfer Island*, the MTI is not expected to subside. It is expected to be reshaped by wind and waves, but the gravel would still be present. The MTI would be located on state submerged lands. BLM does not have regulatory jurisdiction over that aspect of the Project and thus cannot require removal of the material.	N
989	25	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Avoidance, Minimization, or Mitigation	Page 70-71, 3.8.3 Additional Suggested Best Management Practices or Mitigation Please implement these BMPs, especially the ones concerning flood events.	Comment noted, selected measures for the Project will be included in the ROD.	N

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989	28	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Avoidance, Minimization, or Mitigation	Page 97-98, 3.11.3 Additional Suggested Best Management Practices or Mitigation -"7. 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)." *Why use 35 miles per hour? Is there any data to support this BMP? If not, perhaps it should be slower, such as 25 or 30 miles per hour, until data are available to justify 35 mph. -"8. Haze birds out of blast area before blasting." *This stipulation should restrict blasting during nesting (analogous with 10 below) and brood-rearing/molting. -"12. Require aircraft to fly at altitudes higher than 1,500 feet to minimize effects to birds; consult with BLM to determine altitude." *BLM needs to collect data to see if 1,500 feet is appropriate. It may be that birds are still sensitive when aircraft are at 1,500 feet but it is likely that birds will tolerate aircraft at lower heights. -"13. Avoid routine use of helicopters during drilling and operations activities to minimize noise and impacts related to birds." *Why is this about drilling and operations and not about nesting and brood-rearing/molting? -"15. Avoid preferred habitats, where possible." *What are the thresholds for "where possible" what are the allowable tradeoffs? For example, building a longer road (and thus putting more gravel on the tundra) relative to building in preferred habitats. Thresholds should be specified. -"16. Minimize barge and support vessel speed to reduce potential for bird strikes." *This will also minimize disturbance to marine mammals.	Speed limits for the Project would be 25 mph to BT3, BT4, and BT5 and 35 mph elsewhere. The speed limit of 35 mph is what has been used and approved by agencies on other projects. Mining would be a winter activity only and would not overlap with nesting. Proposed BMP F-3 (previously described as F-1) would require all aircraft to maintain specified altitudes that vary by alterative. Alternative E would require aircraft to a 1,500 foot minimum altitude maintain throughout NPR-A. This was added to the Final EIS in Section 3.12.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*. Helicopter support is required for construction activities but can be minimized for drilling and operations. However, some helicopter traffic would be required for wildlife surveys at specific times of the year that cannot be altered. *Where possible* indicates that there are instances where practicability or allowable trade-offs in effects should be considered. Marine vessels would transit at a slow speed, below 14 knots.	N
989	34	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Avoidance, Minimization, or Mitigation	Page 111-112, Table 3.13.2. Summary of Applicable Existing Lease Stipulations and Best Management Practices Intended to Mitigate Impacts to Marine Mammals -BMP A-5 - Other protective equipment at refueling stations? Booms? Membrane to prevent seepage? -BMP C-1 - Seal birthing lairs are extremely difficult to see. It would be good to survey desired ice routes using dogs trained to find seal birthing lairs. -BMP F-1—If polar bears are observed reacting to aircraft (helicopters in particular), flight path and/or altitude should be adjusted to avoid further disturbance. High levels of research related helicopter activity by USGS has caused most polar bears in the Beaufort Sea to have had many disturbing experiences with aircraft. -BMP H-3—Does this mean protect sport hunting and trapping? Not sure how much "sport" occurs up here. Definitely need to protect subsistence. -LS/BMP K-6—Need to protect the winter shoreline for ringed seals. Protecting the winter shoreline for polar bears would accomplish this, but should be stated clearly. -This seems counterintuitive. Disturbance to walrus aggregations may lead to injury/death of conspecifics. Seal aggregations do not. Need to be more conservative with walrus than with seals.	-BMP A-5: BLM requires use of oil pans (also called duck ponds) at refueling stations to contain any potential spills of hazardous liquids. All oil pans must be marked with the responsible party's name. -BMP C-1: There are only a few dogs trained to find seal birthing lairs. It has been shown that these dogs may result in disturbance to seals and may also lead polar bears to the lair. Therefore, use of dogs is not the preferred method for identifying lairs. Companies typically use subsistence advisors in the field experienced in identifying seal lairs and provide training to workers. -BMP F-1: Standard operations for point to point aircraft traffic is to fly at altitudes of at least 1,500 feet aboveground level to avoid disturbance to marine mammals, other than landing and takeoff. Companies require all workers (including pilots) to be trained in wildlife reporting, with a particular emphasis on polar bears. When a polar bear is sighted, workers must send in a report to the Environmental Coordinator within 24 hours. If those reports indicate cases of disturbance to aircraft, operators may adjust flight paths as necessary. -BMP H-3: This protects both sport (when approved) and subsistence. -LS/BMP K-6: It is agreed that disturbance to a group of walrus hauled out on shore may result in stampeding, which may result in injury or mortality to pups. However, the 0.5 mile is the recommended buffer by USFWS. Further, walrus are extralimital in the Beaufort Sea, only a few individuals have been observed in this region over the last 15 years, so there is very low probability that there would be a walrus haulout in the Project analysis area. Lairs of ringed seals are found in shorefast ice in early spring (March), so companies are generally required to commence work in this area prior to March 1 to avoid disturbance of lairs. The work planned for this Project does not require winter work in this area, so impacts to seals are not anticipated.	N
991	2	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	(Chapter 2, page 16) This page discusses Best Management Practices (BMPs) from the 2013 NPR-A EIS. Air quality BMPs A-9 and A-10 have been rewritten for the latest NPR-A EIS and ANWR Coastal Plain Lease Plan EIS to more accurately reflect agency authorities. Please consider using these updated BMPs (now ROPs) in the Willow EIS. At a minimum, please include the full text of BMPs A-9 and A-10 in the EIS document. Given the importance of air quality to the residents of Nuiqsut, it would be important to provide those in this document. Chapter 3, pages 44 and 55 offer a more completed discussion of BMPs and Chapter 2 should match the amount of detail provided.	Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections (typically, Section 3.X.2.1.1) in the Final EIS.	Y
991	15	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	(Appendix C, page 7) The fifth text box on the left side of this page reads Alaska Department of Conservation. The correct listing should be Alaska Department of Environmental Conservation.	This has been corrected.	Y
991	23	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	(Section I.1-8, Table I.1.2, No. 14, column 2, line 2) there is a repeated phrase: "to minimize impacts." Delete duplicate "to minimize impacts."	Typo was corrected in Table I.1.2.	Y
991	28	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	General comment on "Unavoidable Adverse, Irretrievable, and Irreplaceable Effects" These sections seem inconsistent throughout the document. These sections should address unavoidable impacts from the project as described with the addressed mitigation measures, BMPs, and other project requirements (i.e. reclamation). Several of these sections say things like "if reclamation did not occur" than these impacts would be unavoidable. This is misleading to the reader and not the intent of these sections. That statement in itself identifies that the impact(s) are avoidable if the applicant does reclamation.	Section 3.9.3, *Unavoidable Adverse, Irretrievable, and Irreversible Effects*, states that "if reclamation did not occur, including the removal of gravel fill, the loss would be irreversible. The loss would not be irreversible if reclamation occurred . . ." *Unavoidable Adverse, Irretrievable, and Irreplaceable Effects* sections in each resource section were reviewed and updated to be consistent with Section 3.9.3.	Y

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991	30	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	(Page 152, Section 3.17.6) This "Unavoidable Adverse, Irretrievable, and Irreplaceable Effects" section seems to be written from a different perspective then most other sections with the same heading. This section should focus on certain and known effects and should not speculate on potential scenarios and probable outcomes: "if reclamation does not occur," "may be irreversible," "depending on the extent of" are subjective outcomes. The title of this section accompanied by this subjective scenario/language noted above is very misleading to the reader/public. It appears that the impacts under 3.17.6 are avoidable if the applicant adheres to local, State, and Federal requirements . . . This section should only address "Unavoidable Adverse, Irretrievable, and Irreplaceable Effects" that will occur regardless of mitigation and BMPs rather than addressing impacts from a theoretical scenario of the applicant being non- compliant.	The EIS text states that the effects would be irreversible if reclamation did not occur, not unavoidable. Effects from the Project would be unavoidable during construction and operations. Because it is unknown if reclamation would occur (most gravel infrastructure on the North Slope is in use beyond its stated lifetime and has not be reclaimed), the EIS must disclose effects if reclamation did occur *and* if it did not.	N
991	36	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	General: Additional mitigation and BMPs Please make sure to consider if the impacts for additional requirements/BMP/monitoring/surveying reduce impacts to the resource you are attempting mitigate. . . . while many of those requirements are important there is also the potential that additional surveying and monitoring would be an additional/unnecessary impact. Please review and consider if the impacts from additional monitoring and/or surveying are worth the information being collected. (I.e., survey and monitoring that requires additional [otherwise not necessary] helicopter or fixed wing flights or requires some sort of presence/disturbance in a sensitive area that otherwise would not have happened without a specific/additional monitoring or survey requirement.)	BLM will consider suggested BMPs, any associated monitoring requirements, and public comments in its ROD.	N
991	38	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	(Page 18, Table I.1.3—Additional suggested BMP and mitigation) Please note that monitoring ice road impacts (including compression of soil and vegetation) is a requirement for both the NSB and DNR for ice road permitting. Is the intention of this requirement to go above and beyond what is already required by these entities and if yes why and how does BLM plan to manage this requirement in coordination with the appropriate permitting authority? Suggest removing duplicative requirement.	This measure is not duplicative with the ADNR's requirement to monitor active layer depth. Measure was retained.	N
991	39	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	(Page 20, Table I.1.3—Additional suggested BMP and mitigation) "Prior to the start of construction, undertake a thorough scientific review and risk assessment regarding impacts associated with the introduction of non-native species." This requirement seems to overlap and possible duplicate requirements from Storm Water Pollution Prevention Plan (SWPPP). Please explain how these requirements would be different. Seems that this part of 3.4 might be duplicating existing requirements. Suggest removing due to duplication.	SWPPPs include measures to reduce invasive species related to products used for erosion control (e.g., vegetation seed, straw waddles); other components of the Project could also introduce invasive species; thus, language was retained as is.	N
991	40	Bruno	Jeff	Alaska State, Department of Natural Resources	Avoidance, Minimization, or Mitigation	(Page 20, Table I.1.3—Additional suggested BMP and mitigation) "Monitor lake levels to ensure sufficient recharge is occurring and adjust future withdrawals accordingly to allow for sufficient recharge." This is a requirement of temporary water use authorizations (TWUA) and any water rights. Suggest removing duplicated requirement.	Measure was removed from Section 3.11 (*Birds*) and Appendix I.1 (*Avoidance, Minimization, and Mitigation*). Multiple years of recharge monitoring indicates recharge in lakes permitted for water withdrawal is sufficient (Michael Baker International 2014a, 2014b, 2014c, 2015; Michael Baker Jr. Inc. 2002a, 2002b, 2007a, 2007b, 2008, 2009, 2011, 2012, 2013a, 2013b).	Y
1302	39	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	In Section 3.3.3, BLM recommends a fugitive dust control plan, but nothing in the DEIS supports a conclusion that fugitive dust mitigation is necessary. Model-predicted PM_{10} and $PM_{2.5}$ impacts are no more than 80% of applicable AAQS even for the worst-case scenario, which is construction activity that is highly variable on space and time. Further, these impacts are the result of extremely conservative fugitive dust control assumptions (50% control) that ignore conditions on the North Slope. There is simply no demonstrated need for additional fugitive dust mitigation measures.	A dust control plan has been incorporated into the Final EIS and is provided as Appendix I.3 (*Dust Control Plan*).	N
1302	40	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	In Section 3.6.3, Noise (and in Appendix I), BLM proposes that ConocoPhillips "[c]onduct noise monitoring during construction and operations." It's unclear what components of construction and operations this is intended to apply to. This is also unprecedented, and in the absence of a fact-based justification and rationale, it is unreasonable to expect noise monitoring for a project on the North Slope. Indeed, the impact analysis of noise does not warrant this level of monitoring. . . . this proposed mitigation measure would monitor a potential effect that has already been demonstrated to be insignificant. . . . This proposed mitigation measure should be removed because it lacks a factual basis and would impose a burden without providing a corresponding benefit.	This was removed as a potential mitigation measure.	Y
1302	41	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	BLM proposes in section 3.8.3, Water Resources (page 71) that ConocoPhillips "[p]rovide annual surveillance of bridge, culvert, and pipeline river crossings[.]" Aside from water crossings, the Willow project is not located within an active floodplain. . . . the impact analysis described under the Water section of the DEIS does not anticipate an impact that would support this level of monitoring. The same objection applies to the proposed stipulation in Wetlands and Vegetation Section 3.9.3 (page 78) that ConocoPhillips Monitor vegetation damage, and compression of soil and vegetation in annual resupply ice road footprint. ConocoPhillips is already required to report any tundra disturbance and welcomes annual inspections from many regulatory agencies each summer after ice roads have melted, which accomplishes the apparent goal of these proposed measures, and these proposed measures would be additional to those required under the IAP. Vague mitigation measures that require monitoring, such as the two discussed here, tend to give rise to scope disputes and create collateral problems such as increased helicopter traffic, which is a concern to the local community. Moreover, BLM has provided no factual basis for asserting that such new measures are necessary.	The minimization measure in Section 3.8.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*, "Provide annual surveillance of bridge, culvert, and pipeline river crossings to confirm that structures are functioning properly and provide maintenance as required," is included in the Final EIS due to the lack of a basis of design for structures proposed by CPAI. As previously stated by BLM, if CPAI provides a basis of design, then effects as resulting mitigation could be described more definitively and narrowly. The minimization measure in Section 3.9.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*, "Monitor vegetation damage, and compression of soil and vegetation in annual resupply ice road footprint (footprints that are used consecutively each year)," is included in the Final EIS given that ice infrastructure placed in the same footprint cause more effects. As stated in Section 3.9.2.3.2, *Direct Vegetation Damage and Soil Compaction*, effects from ice roads are amplified by repeated use of the same route over multiple seasons (Yokel, Huebner et al. 2007). Proposed revisions to BMP C-2 stipulate that "ice roads may not use the same route each year; ice roads would be offset to avoid portions of an ice road route from the previous 2 years."	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1302	50	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	(Section 3.1.3, Birds - Mitigation) BLM proposes that ConocoPhillips "[l]imit water withdrawal to lakes without sensitive fish or breeding yellow-billed loons." (Page 97.) ConocoPhillips is not aware of any science or supporting data that would require this proposed mitigation measure. In fact, as noted earlier, a recently published study (Johnson, Wildman et al. 2019) found no displacement of nests or broods from long-standing territories by oil development. Moreover, several of the nest sites included in this study are from year-round water withdrawal sources for the Alpine field. BMP B-2 and the withdrawal limits set forth by the State of Alaska Department of Natural Resources and Department of Fish and Game for surface water withdrawals are sufficient to provide necessary protection of water levels for birds.	While it is true that yellow-billed loons continue to nest in water-source lakes in Alpine, that does not mean water withdrawals in all lakes would not negatively affect use for loon nesting. The problem is reduced water levels, not the water withdrawal itself. If lakes recharge to their original level and fish and invertebrates are conserved, then water withdrawal is not expected to have a negative impact. The nesting lakes on the CRD that are water-source lakes are regularly flooded by the Colville River and its channels, thus ensuring recharge annually. Yellow-billed loons do not nest in tapped lakes because of fluctuating water levels (North and Ryan 1989). Yellow-billed loons ceased nesting in a lake with a 10-year-plus nesting history that was breached by a channel of the Colville River in 2009, after which its water levels dropped to the same level as the river (Johnson, C. B., A. M. Wildman, J. P. Parrett, J. R. Rose, T. Obritschkewitsch, and P.E. Seiser. 2011. Avian studies for the Alpine Satellite Development Project, 2010. Eighth annual report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, by ABR, Inc., Fairbanks, AK. 69 pp). Water withdrawal from impoundments caused higher nest failures in Pacific loons (Kertell, K. 1996. Response of Pacific Loons [Gavia pacifica] to impoundments at Prudhoe Bay, Alaska. Arctic 49:356–366). Common loon nests in New Hampshire, Maine, and Minnesota had increased failure rates with water level fluctuations (see review in Evers, D.C. 2004. Status assessment and conservation plan for the Common Loon [Gavia immer] in North America. U.S. Fish and Wildlife Service, Hadley, Massachusetts). While BMP B-2 and State of Alaska restrictions on water withdrawal protect fish and water quality, they do not directly address maintenance of shoreline water levels for nesting birds.	N
1302	52	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	(Section 3.1.3, Birds - Mitigation) BLM also proposes that ConocoPhillips "[m]onitor lake levels to ensure sufficient recharge is occurring and adjust future withdrawals accordingly to allow for sufficient withdrawal." Monitoring recharge in lakes is typically a condition of higher than standard withdrawal limitations, which ConocoPhillips is not seeking. ConocoPhillips plans to abide by BMP B-2 and the State of Alaska water withdrawal limitations and therefore does not believe that monitoring recharge at all lakes used for water withdrawal is warranted or necessary. Additionally, as BLM notes on page 83 of this DEIS, "[h]abitat alterations in withdrawal lakes would be temporary and would last until spring breakup, when lakes recharge."	Measure was removed from Section 3.11 (*Birds*) and Appendix I.1 (*Avoidance, Minimization, and Mitigation*). Multiple years of recharge monitoring indicates recharge in lakes permitted for water withdrawal is sufficient (Michael Baker International 2014a, 2014b, 2014c, 2015; Michael Baker Jr. Inc. 2002a, 2002b, 2007a, 2007b, 2008, 2009, 2011, 2012, 2013a, 2013b).	Y
1302	53	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	(Section 3.17.5, Environmental Justice - Mitigation) The proposed mitigation measures 1 and 2 are vague and lack a foundation. The first proposal would require establishing a group to continue meaningful engagement. But ConocoPhillips already has an effective community outreach program and keeps Nuiqsut residents informed of our projects and operations. Our community engagement with Nuiqsut also provides us with feedback, information, and community concerns. We are not aware of any gap that the vague proposal is intended to fill. The second proposal would require a separate program to identify topics for additional review, and determine possible solutions for implementation. This seems to be a solution in search of a problem. ConocoPhillips continues to support the Kuukpik Subsistence Oversight Panel (KSOP), and community outreach and engagement, but we see no reason for BLM to impose additional, vague requirements and we oppose proposed mitigation measures 1 and 2.	The BLM added details to Section 3.17.3.1.4, *Additional Suggested Best Management Practices or Mitigation*, to clarify the measures.	Y
1302	71	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	The draft EIS states: "BLM is also recommending ConocoPhillips implement a fugitive dust control plan to mitigate impacts from fugitive PM 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. The fugitive dust control plan will be included as part of the Final EIS." The origin of this potential BMP is unclear as the analysis contained in the draft EIS does not support the need for fugitive dust mitigation beyond what ConocoPhillips has already committed to in their proposed action. . . . [T]hese impacts are well below the AAQS even though they were based on extremely conservative assumptions about fugitive dust control. This analysis would therefore suggest there is no need for additional fugitive dust mitigation measures.	A dust control plan has been incorporated into the Final EIS and is provided as Appendix I.3 (*Dust Control Plan*).	N
1302	138	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	"Restrict use of heavy equipment in summer to pads." Heavy equipment use in summer is already restricted to pads. This mitigation measure is not needed.	Because this is covered by BMP C-2, it was removed from the EIS.	Y
1302	148	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	BLM states that "all action alternatives would also place new VSMs along existing pipeline corridors due to pipe rack capacity limits (deviation to BMP E-5)." Installing new VSMs because of capacity concerns should not require a deviation to BMP E-5, which in itself simply requires an applicant to "minimize impacts of the development footprint." Reaching pipeline capacity and installing new VSMs can still be done while minimizing environmental footprint, consistent with the IAP Best Management Practice. This reference to a deviation from E-5 also occurs again on page 135 in the Subsistence Section 3.16.2.1.	BMP E-5 was removed from the deviation list for the Final EIS.	Y
1302	161	Dunn	Connor	ConocoPhillips	Avoidance, Minimization, or Mitigation	"Limit water withdrawal to lakes without sensitive fish or breeding yellow-billed loons." B-2 addresses this, and abiding by the recommended volumes of water use allowed in sensitive lakes makes this an unnecessary stipulation. Yellow billed loons don't breed in winter.	BMP B-2 does address water withdrawals. BMPs can be waived or have exceptions granted. BMP B-2e adds this contingent requirement: 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. Thus, the mitigation measure is nothing new. The suggested mitigation for monitoring lake recharge is not required, but for water-source lakes that are used by sensitive species (e.g., yellow-billed loons, red-throated loons, spectacled eiders), this mitigation would help protect these nesting species from habitat alteration.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
33	1	Krause	David	The Wilderness Society	Avoidance, Minimization, or Mitigation	If there is going to be meaningful, fair, and science-based administration of the NPR-A, we believe real conservation actions must be part of any Willow Master Development Plan approvals. . . . for this project to move forward and given the high ecological and cultural value of the NPR-A, the Wilderness Society expects there to be a robust package of conservation offsets associated with any approval. If industry gets this project with the numerous, unavoidable and significant impacts, we believe that there should be meaningful actions to protect areas of conservation importance. Such offsets must include large durably-protected areas of ecological value. These protections are not only necessary to ensure landscape-scale resilience in the face of a dramatically warming Arctic, but are also consistent with the laws that administer the NPR-A and the Record of Decision for the Greater Mooses Tooth 1 development project.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1). Avoidance, minimization, and mitigation measures (i.e., BMPs) were further developed in the Final EIS and will be included in the BLM's ROD. Details are included in throughout the resources sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*). The Willow MDP ROD will detail which of the measures will be implemented for the Project.	N
1295	4	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Avoidance, Minimization, or Mitigation	. . . [W]e recommend that the Final EIS include a draft compensatory wetland mitigation plan, with compensatory mitigation sufficient to replace lost aquatic resource functions and values, to the extent practicable. Council on Environmental Quality regulations implementing NEPA require that the alternatives and impacts analysis address mitigation measures, including measures that compensate for impacts. . . . In addition, . . . we understand that the Corps will be signing their own Record of Decision for the project and the analysis in the EIS will be used to inform future Corps permit decisions for the Project. Therefore, the inclusion of a draft compensatory wetland mitigation in the Final EIS would also help to improve the Corps' NEPA compliance for the project.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits, and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. The Public Notice was issued on March 26, 2020, and the comment period ended on May 11, 2020.	N
1295	17	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Avoidance, Minimization, or Mitigation	We recommend consideration of on-going health monitoring and health education as potential mitigation measures to establish a basis for accurately assessing Project impacts on residents' health over time, to function as a form of community engagement around this project, and to help reduce potential adverse impacts.	It is not clear which ongoing health monitoring and health education programs the commenter is referring to. Public health monitoring was added to Section 3.18.2.1.3, *Additional Suggested Avoidance, minimization, or Mitigation.*	Y
1295	18	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Avoidance, Minimization, or Mitigation	In addition, as acknowledged in Section 3.18 Public Health, Nuiqsut residents have expressed concerns about the potential for public health effects associated with oil and gas development on the North Slope. The Draft EIS includes an analysis of impacts to public health using the eight health effects categories defined in the Alaska Department of Health and Social Services Alaska Health Impact Analysis Technical Guidance; however, a complete Health Impacts Assessment was not performed for the project. To help mitigate the identified potential adverse impacts to public health, we recommend that a Health Impacts Assessment for Nuiqsut be considered as an additional suggested mitigation measure in Section 3.17.5.	Baseline health data for Nuiqsut are provided in Section 3.18.1, *Affected Environment.* A HIA conducted by the State of Alaska would not further inform BLM of the differences between the alternatives presented for the Willow MDP Project. Health impacts are analyzed in Final EIS Section 3.18, *Public Health*; BLM determined, in consultation with the State of Alaska, that an HIA was unnecessary.	N
1294	13	Nukapigak	Joe	Kuukpik Corporation	Avoidance, Minimization, or Mitigation	Not only does the Draft EIS not acknowledge these problems [potential shallowing of Harrison Bay from erosion of MTI], it downplays the negative consequences by suggesting that Fish Creek is no longer as important for subsistence purposes as it once was. (Volume 4, Appendix G, page 39) And remarkably, the Draft even attributes this purported decline at least in part to the difficulty people have navigating into Fish Creek from Harrison Bay. . . . Kuukpik believes Fish and Judy Creeks will both continue to be important subsistence access routes going forward, especially as more oil development is constructed in land-accessible areas. BLM should be encouraging and facilitating those kinds of shifts to help make up for areas lost to subsistence, not writing off areas just because they're harder to get to. Kuukpik has already suggested CPAI build boat ramps at Fish and Judy Creeks to provide just this sort of expanded access.	CPAI has proposed boat ramps at Fish and Judy creeks. This was analyzed in the SDEIS, and included in the Final EIS.	N
1294	18	Nukapigak	Joe	Kuukpik Corporation	Avoidance, Minimization, or Mitigation	The mine will be quite disruptive in summer, but its impacts on winter subsistence impacts should not be overlooked or downplayed. While it's true that the proposed mine area is used less during winter, winter activities that occur there tend to be particularly important. . . . The proposed mine location and areas to the west of there are also important to Nuiqsut's fur trappers. . . . [T]he mine (and the Willow Project generally) will have significant impacts on trapping . . . Those impacts would mostly occur in winter, again confirming that the mine poses a year-round and significant threat to subsistence activities. The Final EIS needs to make that clear, but also focus on ways to mitigate impacts from the mine. . . . This could mean things like including boat ramps for subsistence users at Fish or Judy Creek or both, and compensatory mitigation-type payments to subsistence hunters that are forced to "travel further with greater expense, effort, and risk," as BLM puts it.	CPAI has proposed boat ramps at Fish and Judy creeks. This was analyzed in the SDEIS, and included in the Final EIS.	Y
1294	27	Nukapigak	Joe	Kuukpik Corporation	Avoidance, Minimization, or Mitigation	(Volume 1, page 10, Section 2.5.3.1, Gravel Roads) This section states that gravel roads would be a minimum of 5 feet thick but average 7 feet thick due to topography. Kuukpik recommends exploring the feasibility of using insulating material (such as the rigid Styrofoam boards installed at the Nuiqsut runway this past summer) within the gravel roads in order to reduce the thickness and the amount of gravel needed. This could be added to the additional suggested mitigation measures at page 80.	CPAI is completing a pilot study to look at both rigid and spray foam insulation for road cores. This study is ongoing, and feasibility will not be determined until after the EIS ROD. At this time, it has not been included in the EIS due to not being technically proven.	N
1294	28	Nukapigak	Joe	Kuukpik Corporation	Avoidance, Minimization, or Mitigation	(Volume 1, page 10, Section 2.5.3.2.1, Bridges) This section generally describes the proposed bridges. Kuukpik would like to know what flood/high water data these designs are based on. Bridges should be high enough to allow subsistence users on Fish and Judy Creeks to pass below them in boats during normal (and somewhat higher than normal) water levels.	As stated in Appendix D.1 (*Alternatives Development*) Section 4.2.3.2.1, *Bridges*, bridges crossing Judy (Iqalliqpik) and Fish (Uvlutuuq) creeks would be designed to maintain a bottom chord clearance of at least 13 feet above the 2-year design flood elevation (open water) to provide vessel clearance.	N
1294	36	Nukapigak	Joe	Kuukpik Corporation	Avoidance, Minimization, or Mitigation	(Volume 1, page 42, Section 3.3.3, Additional Suggested Best Management Practices or Mitigation) The additional mitigation measures should include use of drilling rigs that meet Tier 4 final standards prior to use of "high-line" power.	Use of drilling rigs that meet Tier 4 final standards is a design feature and therefore not a mitigation measure.	N

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1294	44	Nukapigak	Joe	Kuukpik Corporation	Avoidance, Minimization, or Mitigation	(Volume 1, page 146, Section 3.16.3, Additional Suggested Best Management Practices or Mitigation) Flight restrictions and vehicle convoys should be considered as additional project-specific BMPs. Boat ramps at Fish and Judy Creeks should also be considered as mitigation actions. Kuukpik commented on these items at the October 2 Draft EIS meeting in Nuiqsut.	Flight and vehicle restrictions are required in proposed BMPs F2 through F-4, E-1, K-6, K-9, and M-1. These are described throughout the resource sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*) under *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections (typically, Section 3.X.2.1.1). Boat ramps have been added to the Project description for the Final EIS.	Y
1294	47	Nukapigak	Joe	Kuukpik Corporation	Avoidance, Minimization, or Mitigation	(Volume 1, page 176-78, Section 5.4, Proponent's Voluntary Mitigation) The discussion of CPAI's so-called "philanthropy program" is inaccurate. Several of the most important benefits listed in this section are not philanthropy at all, but rather, commitments that first ARCO and now CPAI are contractually obligated to provide as a result of agreements negotiated with Kuukpik over the years.	This section has been updated to reflect the differences between voluntary and nonvoluntary mitigation.	Y
1307	28	Pardue	Margaret	Native Village of Nuiqsut	Avoidance, Minimization, or Mitigation	A particular area of importance, among others, is the Colville (Kuukpik) River . . . With progress towards the finalization of the Colville River access road, which has taken decades to advance and will be completed at great cost, we believe that protecting the Colville is particularly important. As we have stated before, if the Colville River access road and boat ramp is going to be meaningful into the future, the areas it enables access to must be protected. Fish Creek is another especially important subsistence use area that is threatened by existing and planned development . . . Remaining undeveloped portions of the Fish Creek watershed should be protected, and access to these areas must be maintained. Areas identified for their subsistence importance should be meaningfully safeguarded so that oil companies and changes in administrative priorities cannot compromise the integrity of these places. BLM's decision to allow ConocoPhillips to violate the Fish Creek Buffer exemplified how discretionary protective measures fail to protect important places on the landscape. NVN would like a meaningful role in the stewardship of these protected subsistence use areas. This role can involve both management and monitoring efforts that provide employment opportunities for residents of the community. These jobs can be paid for by a compensatory mitigation fund.	Existing and proposed BMPs are designed to protect subsistence users, access, and resources. These include those listed in Table 3.16.4 of the Final EIS (Section 3.16, *Subsistence and Sociocultural Systems*), such as BMPs A-11, E-1, H-1, H-4, and more. Requiring employment opportunities as a mitigation measure for the Willow MDP Project would equate to compensatory mitigation, which BLM cannot require. CPAI has volunteered to provide the City of Nuiqsut access to a grant writer to assist with grant proposals that could be paid for out of the NPR-A Impact Grant Program.	N
1307	29	Pardue	Margaret	Native Village of Nuiqsut	Avoidance, Minimization, or Mitigation	NVN feels strongly that the entire mitigation hierarchy (avoidance, minimization, and compensatory offsets) must be employed for the proposed Willow MDP. The agency has failed to effectively avoid and offset the impacts of development in the region . . . The encroachment of GMT-1 and GMT-2 into Fish Creek, an area identified for its very high subsistence importance, exemplifies BLM's lack of commitment to effectively avoiding irreplaceable areas. . . . Steps should be taken through the RMS and through the Willow NEPA process to ensure that areas of traditional and cultural importance are protected from the impacts of development. Unavoidable impacts of development projects within the NPR-A must be accurately quantified and effectively offset through compensatory mitigation actions.	Avoidance, minimization, and mitigation measures (i.e., BMPs) were further developed in the Final EIS and will be included in the BLM's ROD. Details are included throughout the resource sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*). Steps to avoid, minimize, and mitigate potential impacts to areas of traditional and cultural importance are described in Section 3.16.2.1, *Avoidance, Minimization, and Mitigation*, and in Appendix F (*Section 106 Cultural Resources Findings: Process and Analysis*). BLM evaluated impacts quantitatively when practicable; if impacts are not described quantitively, they are described qualitatively. BLM policy prohibits the BLM from requiring compensatory compensation (IM 2019-018, Compensatory Mitigation, DOI 2019).	Y
5	5	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	One area of particular concern is the lack of appropriate consideration of mitigation measures in the EIS. Another concern is that this process denies the public or other federal, state, local and tribal agencies the opportunity to comment on CPAIs mitigation proposal and its adequacy to compensate for unavoidable impacts resulting from project implementation, construction and operation.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits, and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. The Public Notice was issued on March 26, 2020, and the comment period ended on May 11, 2020.	N
864	59	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BLM's analysis of mitigation measures is deficient for multiple reasons. First, it is unclear if BLM is authorizing any deviations from the lease stipulations and best management practices that BLM identifies as likely to occur. Additionally, BLM does not analyze the need for the potential deviations. Additionally, BLM fails to adequately identify and analyze additional mitigation measures to impose given the failure of existing lease stipulations and best management practices to actually mitigate from the impacts of oil and gas activities on Reserve resources and uses. We note that BLM is analyzing the project under the 2013 IAP stipulations and best management practices, not the proposed stipulations and required operating procedures being proposed for the revision of the IAP. BLM identified that Conoco is likely to receive "deviations" from one lease stipulation and five best management practices. We note that it is unclear if BLM is considering granting waivers, exceptions, or modifications for these requirements when it refers to deviations. BLM proposed course of action must be clarified now, as each option is different, with potentially different resulting impacts.	The deviations described in the Final EIS are exceptions (one-time exemptions to an LS or BMP determined on a case-by-case basis), applying only to the Willow MDP Project. A lessee may propose a deviation from the requirements and standards of stipulations and BMPs as part of an authorization application. Final EIS Section 2.5.12 (*Compliance with Bureau of Land Management Stipulations and Best Management Practices*) lists the likely deviations to include LS E-2 and four BMPs: E-7, E-11, K-1, and K-2. (Deviations from BLM BMPs are further detailed in the Final EIS Appendix D.1, *Alternatives Development*, by action alternative.) As noted in Section 2.5.12, each deviation would be reviewed as the Project design engineering advances for opportunities to conform to LSs and BMPs to the extent practicable. The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	Y
864	60	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	It is not clear if BLM is granting the deviations now, or if it will evaluate potential deviations in the future. BLM must be clear about whether it is granting deviations from these protective measures so that the public can understand the full impacts of the project and BLM's decision. While we assume that BLM is not actually granting the waivers now based on its lack of analysis, BLM must nevertheless fully evaluate the impacts of granting these deviations in this DEIS, regardless of whether it is in fact granting them, because the agency has identified that such deviations are likely.	Final EIS Section 2.5.12 (*Compliance with Bureau of Land Management Stipulations and Best Management Practices*) lists the likely deviations to include LS E-2 and four BMPs: E-7, E-11, K-1, and K-2. (Deviations from BLM BMPs are further detailed in the Final EIS Appendix D.1, *Alternatives Development*, by action alternative.) As noted in Section 2.5.12, each deviation would be reviewed as the Project design engineering advances for opportunities to conform to LSs and BMPs to the extent practicable. The EIS impact analysis assumed that these deviations would be granted.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	61	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	More fundamentally, there is considerable confusion in the DEIS about the application of the lease stipulations and best management practices because BLM makes contradictory statements. In some places, BLM indicates that deviations would be required. But then, in the same resource section, BLM states that [a]ll existing NPR-A IAP [lease stipulations] and [best management practices] would be implemented. It is, therefore, very unclear what BLM is considering, analyzing, or requiring. This must be corrected and a revised DEIS must be reissued. Additionally, while BLM indicates that the deviations are likely, it does not appear that BLM has analyzed the project and likely deviations to ensure that the objectives of the protective measures are still met, as required. . . . [I]n the DEIS, it does not appear that BLM considered the ability of the project to meet the objectives of the lease stipulations and best management practices that it deems likely to allow Conoco to not have to meet.	Final EIS Section 2.5.12 (*Compliance with Bureau of Land Management Stipulations and Best Management Practices*) lists the likely deviations to include LS E-2 and four BMPs: E-7, E-11, K-1, and K-2. (Deviations from BLM BMPs are further detailed in the Final EIS Appendix D.1, *Alternatives Development*, by action alternative.) As noted in Section 2.5.12, each deviation would be reviewed as the Project design engineering advances for opportunities to conform to LSs and BMPs to the extent practicable. All action alternatives would require deviations to the LSs and BMPs, which are common deviations for projects in the NPR-A and part of the reason that the BMPs are undergoing revision. Thus, the measures would likely not be met under another alternative. The language has been clarified in the Final EIS to specify that "all existing NPR-A IAP LSs and BMPs would be implemented *except for those where deviations are granted*." All resource sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*) list the applicable LSs and BMPs for that resource, followed by the deviations that would be required, and how that may affect that resource.	Y
864	63	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	An additional problem with BLM's approach to protective measures is that it focuses on the deviations that may be granted, but BLM does not take the necessary step of considering additional protective measures to impose to protect all likely resources that would be negatively impacted by the Willow development. . . . BLM purports to identify and consider additional mitigation measures in Appendix I by including a chart of suggested measures, but additional measures for key resources are absent. For example, there is no additional protective measure for air quality. . . . [T]here is nothing proposed to protect subsistence use and access. . . . More generally, there is no analysis of the proposed measures in the DEIS so it is unclear that what is proposed is sufficient to ensure that resources are protected. BLM generally just lists the suggested additional measures in both the Appendix I and includes that same list in the DEIS analysis, without analyzing if they are sufficient to protect the Reserves resources . . .	Avoidance, minimization, and mitigation measures were further developed in the Final EIS and will be included in the ROD. Details are included throughout the individual resource sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*). Air quality is permitted by the State, and additional mitigation measures may be imposed during permitting. State air quality specialists reviewed the air quality modeling (as a cooperating agency with special expertise) and did not identify additional BMPs beyond what are already in the EIS or implemented under the 2013 NPR-A IAP ROD or 2020 revisions (BLM 2013, 2020). The IAP already includes subsistence mitigation measures; the Project alternatives were developed in response to concerns over subsistence resources and access; the SDEIS and Final EIS include not only subsistence tundra access ramps but boat ramps intended to help mitigate impacts to subsistence users.	Y
864	92	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Because the Corps does not have a permit application and the necessary information to analyze this project, the draft EIS also does not contain appropriate mitigation measures for this project. . . . Pursuant to the Corps' permitting regulations, compensatory mitigation may be required to ensure that a permit complies with the 404(b)(1) Guidelines. The 2008 Mitigation Rule sets out how mitigation requirements are determined and provides the Corps with the authority to deny a permit if there is a "lack of appropriate and practicable compensatory mitigation." The 2008 Mitigation Rule also contains substantive provisions regarding the size and location of compensatory mitigation that are directly pertinent to the Corps' decision whether to permit this project.	A Section 404 permit application is not required to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020.	N
864	119	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BLM must also analyze the potential adverse effects of gravel mining to the Colville River Special Area. The proposed mine site is within the Colville River Special Area. . . . BLM failed to include current information on basin characteristics, streamflow data, channel geometry, and water quality to properly determine potential impacts and mitigate disturbances in this sensitive habitat. BLM also failed consider alternative sources of gravel, such as the Clover mine, as discussed above. BLM failed to describe how the objectives of the applicable IAP setbacks could be met through other means if it grants a deviation. In addition to the two-mile setbacks for the Colville River and its tributaries, BMP C-2(f) provides the following requirement: "Motorized ground-vehicle use within the Colville River Special Area associated with overland moves, seismic work, and any similar use of heavy equipment shall be minimized within an area that extends 1 mile west or northwest of the bluffs of the Colville River, and 2 miles on either side of the Kogosukruk and Kikiakrorak rivers and tributaries of the Kogosukruk River from April 15 through August 5, with the exception that use will be minimized in the vicinity of gyrfalcon nests beginning March 15. Such use will remain 1/2 mile away from known raptor nesting sites, unless authorized by the authorized officer." BLM should not waive this BMP. Furthermore, ConocoPhillips' map shows that the mine site would be located directly on the Tiŋmiaqsiuġvik (Ublutuoch) River. Gravel mine sites are typically located away from major streams and lakes. BLM failed to explain how this is consistent with protections for this waterway under Lease Stipulation/Best Management Practice K-1(g). BLM should also rely on BMP E-8 to ensure that ConocoPhillips minimizes the impacts of gravel mining on air, land, water, fish, and wildlife resources.	The gravel mine site would not be located in the CRSA or the 2-mile Colville River setback. Refer to Figures 2.4.1 through 2.4.3 in the Final EIS (Appendix A, *Figures*). The gravel mine site would be approximately 3.8 miles from the boundary of the CRSA, at the closest point. The Tiŋmiaqsiuġvik Mine Site would be located within the half-mile setback of the Ublutuoch (Tiŋmiaqsiuġvik) River (Final EIS Figure 2.5.4 in Appendix A, *Figures*), which would require a waiver for BMP K-1(g). Gravel resources are limited on the North Slope and within the NPR-A. CPAI identified a suitable material source (quality and volume) that could supply the needs for the entire Project and has continued mine site engineering; for the Final EIS, the total surface area impacts would be 149.7 acres over two distinct mine site cells. This is a reduction from up to 230 acres described in the Draft EIS; the reduction in footprint meets the objective of BMP K-1 to minimize the disruption of natural flow patterns. CPAI has provided a mine site plan, including mine site reclamation, consistent with BMP E-8. The mine site plan was developed with input from cooperating agencies and in consultation with BLM. The mine site plan is included with the Final EIS as Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*.	N
864	120	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BLM also failed to consider a full suite of mitigation measures to avoid and minimize impacts from the extensive gravel mining proposed as part of the Willow Plan. . . . There is no clear mine reclamation plan in the DEIS . . . Damage to permafrost from gravel mining would be permanent, which the draft EIS acknowledges. As stated by Terzi . . . "Addressing permanent impacts to at a minimum of 230 acres of permafrost from gravel mines through compensatory mitigation needs to occur. BLM fails to address these issues in the DEIS. Delaying a decision on this until formulation of reclamation plans is not consistent with the NEPA process and federal rules and regulations." In sum, BLM failed to consider the significant adverse impacts of gravel mining from the proposed Willow Plan. The draft EIS should be revised and reissued with an evaluation of the full scope of these impacts, a full reclamation plan, and mitigation to avoid, minimize, and compensate for unavoidable adverse impacts.	The Draft EIS analysis incorporated preliminary information provided by CPAI regarding how it proposes to restore the gravel mine site. The CPAI Willow Mine Site Mining and Reclamation Plan was developed following meetings with relevant cooperating agencies and in consultation with BLM. The mine site plan is included in the Final EIS as Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*. Impacts from mine site development are included in resource sections throughout Chapter 3.0 (*Affected Environment and Environmental Consequences*) of the EIS.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	162	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Finally, the draft EIS offers no compensation or mitigation plan to address these and other potential impacts to water resources and hydrology in the region. Rehabilitation at a future date is not consistent with federal rules and regulations and may not be effective. In addition, BLM has not provided enough information and baseline data to adequately design the infrastructure associated with this project, especially in terms of climate change and sustainability of the project into the future.	The Draft EIS analysis incorporated preliminary information provided by CPAI regarding how it proposes to restore the gravel mine site. The CPAI Willow Mine Site Mining and Reclamation Plan was developed following meetings with relevant cooperating agencies and in consultation with BLM. The mine site plan is included in the Final EIS as Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*. Impacts from mine site development are included in resource sections throughout Chapter 3.0 (*Affected Environment and Environmental Consequences*) of the EIS.	N
864	170	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Finally, the draft EIS fails to adequately consider mitigation to avoid, minimize and compensate for the significant, and likely permanent, losses of wetlands associated with the proposed Willow Plan. . . . The Draft EIS does not justify nor substantiate the assertion that functional loss would only occur absent reclamation, implying that reclamation can avoid such loss. BLM also does it discuss which functions could be impaired or lost and for how long. There is nothing presented that would validate BLM's claim that if reclamation occurred, lost and impaired wetland functions would be reversible and the wetlands, their functions impacted by the project would rebound, and impacts would not be permanent.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
864	255	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BLM should include monitoring data from past projects in this area to support any contention that existing BMPs, LSs and any additionally proposed BMPs (as cited above) are effective in quantifying and qualifying impacts from the project.	The NPR-A IAP considered the effectiveness of BMPs and is the reason that specific BMPs were selected in the ROD and are now required. Various BMPs require lessees to monitor specific resources; if monitoring indicates that BMPs are not effective, then BLM adaptively manages to reduce impacts. Proposed BMP H-5 requires that data and summary reports derived from North Slope studies be made easily accessible. This was added to the *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections throughout Chapter 3.0 (*Affected Environment and Environmental Consequences*) (typically, Section 3.X.2.1.1).	N
864	259	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BMP C-2: Protect stream banks, minimize compaction of soils, and minimize the breakage, abrasion, compaction, or displacement of vegetation. The requirement for this BMP would be: Tundra activities shall be allowed only when frost and snow cover are at sufficient depths to protect the tundra. [Low-ground-pressure] vehicles shall be selected and operated in a manner that eliminates direct impacts to tundra. Bulldozing of tundra mat and vegetation, or trails is prohibited. BLM needs to include this BMP in enforceable and measurable terms. BLM needs to set a threshold for sufficient depth in order to make this BMP meaningful and possibly minimize impacts from this project on climate change both individually and cumulatively.	The BLM has analyzed proposed revisions to ROP C-2 in the 2020 IAP Final EIS that would address specific thresholds and stipulates that: – Ground operations would only be allowed when frost and snow cover are at sufficient depth, strength, density, and structure to protect the tundra. Soils must be frozen to at least 23 degrees F at least 12 inches below the lowest surface height (e.g., inter-tussock space). Tundra travel would be allowed when there is at least 3 to 6 inches of snow (depending on the alternative). For alternatives B, C, and D: Snow depth and snow density must amount to no less than a snow water equivalent of 3 inches over the highest vegetated surface (e.g., top of tussock) in the NPR-A. – Snow survey and soil freeze-down data collected for ice road or snow trail planning and monitoring shall be submitted to the BLM. – Clearing or smoothing drifted snow is allowed to the extent that the tundra mat is not disturbed. Only smooth pipe snow drags would be allowed for smoothing drifted snow. – For alternatives B, C, and D: avoid using the same routes for multiple trips, unless necessitated by serious safety or environmental concerns and approved by the BLM. This provision does not apply to hardened snow trails or ice roads. – Ice roads would be designed and located to avoid the most sensitive and easily damaged tundra types, as much as practicable. For alternatives B, C, and D: ice roads may not use the same route each year; ice roads would be offset to avoid portions of an ice road route from the previous 2 years. Applicable BMPs considered in the revised IAP are included in the Final EIS as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections (typically, Section 3.X.2.1.1). The BLM has the discretion to include these in the ROD regardless of whether the revised IAP is approved.	Y
864	260	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BMP L-1: Protect stream banks and water quality; minimize compaction of soils; minimize the breakage, abrasion, compaction, or displacement of vegetation. On a case-by-case basis, BLM may permit low-ground-pressure vehicles to travel off gravel pads and roads during times other than those identified in BMP C-2a. It is unclear what BMP C-2a is and how it differs from BMP C-2. BMP L-1 allows deviation from BMP C-2 and there is no way to enforce this BMP nor are there any limits or sideboards on the deviation, making both of these BMPs, designed to address the potential effects of the project on climate change meaningless.	C-2a is a subpart of C-2. This was simplified to be consistently referred to as C-2 for the Final EIS.	Y
864	262	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Given the length of this project (projected out for decades) and the potential effects of climate change/global warming on the Arctic, in general, and permafrost specifically, it is incumbent upon BLM to address the potential impacts of this project into the future. It is evident that use of BMPs and LSs to address permafrost impacts is inadequate.	Section 3.2.1, *Affected Environment*, of the Final EIS addresses ongoing impacts of climate change on the environment, including in the Project area. Section 3.2.2, *Environmental Consequences: Effects of the Project on Climate Change*, and Section 3.19.4, *Cumulative Impacts to Climate Change*, analyze impacts that Project alternatives and cumulative actions may have on climate.	N
864	263	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Addressing permanent impacts to at a minimum of 230 acres of permafrost from gravel mines through compensatory mitigation needs to occur. BLM fails to address these issues in the DEIS. Delaying a decision on this until formulation of reclamation plans is not consistent with the NEPA process and federal rules and regulations.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020. The CPAI Willow Mine Site Mining and Reclamation Plan was developed in consultation with cooperating agencies and BLM. This plan is included with the Final EIS as Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*. The effects of mine site development and reclamation were considered in the analysis of resources throughout Chapter 3.0, *Affected Environment and Environmental Consequences*, in the development of the Draft and Final EISs.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	277	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Finally, BLM has failed to provide enforceable, measurable, and meaningful mitigation measures to compensate for project impacts, let alone cumulative impacts. A compensatory mitigation plan must be developed, submitted for review and approved by the agencies for BLM to make the assertions cited above.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020. Avoidance, minimization, and mitigation measures/BMPs were further developed in the Final EIS and will be included in BLM's ROD. Details are included throughout the individual resource sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*).	N
864	300	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	The DEIS notes that eventually the gravel mines could be reclaimed to provide off-channel wintering habitat for fish. If BLM/CPAI want to consider reclamation as compensatory mitigation for fish impacts, then they must prepare the reclamation plan for review and adequacy to compensate for fish and habitat impacts. Once approved, the plan must be subject to a special condition of the Corps Section 404/10 Permit for implementation, construction, monitoring and other relevant components of a compensatory mitigation plan. It is not appropriate to delay a decision on reclamation for 20 or 30 years into the future if this is being proposed as potential compensation for fish and fish habitat impacts. This is not consistent with 33 CFR Part 332.4(c).	The Draft EIS analysis incorporated preliminary information provided by CPAI regarding how they proposed to restore the gravel mine site. BLM has also met several times with CPAI and cooperating agencies to discuss the mining and restoration plan. The CPAI Willow Mine Site Mining and Reclamation Plan is included in the Final EIS in Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*. A Section 404 permit application is not required to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020. The CPAI Willow Mine Site Mining and Reclamation Plan was developed in consultation with cooperating agencies and BLM. This plan is included with the Final EIS as Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*. The effects of mine site development and reclamation were considered in the analysis of resources throughout Chapter 3.0, *Affected Environment and Environmental Consequences*, in the development of the Draft and Final EISs.	N
864	301	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	The DEIS also states that the Project could adopt the 6 additional BMPs suggested by NMFS for EFH for invasive species. This should not be discretionary. The FEIS must make it clear what is being proposed for avoidance, minimization and compensation and how it is adequate compensation.	Avoidance, minimization, and mitigation measures/BMPs were further developed in the Final EIS and will be included in BLM's ROD. Details are included throughout the resource sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*).	N
864	302	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Reclamation is touted as the compensation (maybe) in 30 years or so and the BLM is actually claiming this project only has "temporary" impacts if reclamation is done postproject. CPAI and BLM should give examples of ANY reclamation projects within the National Petroleum Reserve that have occurred to date and the success or failure of such actions. The DEIS proclaims that the ecosystem rebounds after fill is taken out (although they acknowledge that tundra ecotypes can take another 10 years to rebound after fill is taken out and a project is abandoned or decommissioned). Taking this into consideration, the DEIS asserts "temporary" impacts can exist in the landscape for 40 or more years. This is inconsistent with the very term temporary.	As stated in Section 3.9.3, *Unavoidable Adverse, Irretrievable, and Irreversible Effects*, the function associated with wetland loss would be irretrievable throughout the life of the Project until reclamation is complete. If reclamation did occur, the duration of vegetated wetland recovery after reclamation is expected to be greater than 20 to 30 years, or until more than 50% aerial cover of the wetland is hydrophytic vegetation and soils are saturated or inundated for more than 10 days during the growing season (Everett, Murray et al. 1985). Reclamation is not described as temporary anywhere in the EIS.	N
864	303	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	LSs and/or BMPs are only meaningful if they are enforceable, measurable, verifiable and transparent (understandable). In addition, Table I.1.2. Design Features to Avoid and Minimize Impacts do not have parameters that are enforceable or measurable so they are not meaningful. . . . BLM needs to clarify who will be responsible to ensure such a measure takes place and how would it be monitored, by who and when.	Table I.1.2 in Section I.2, *Design Features to Avoid and Minimize Impacts*, in Appendix I.1 (*Avoidance, Minimization, and Mitigation*), is not a listing of LSs or BMPs. The referenced table, as noted in the section text, summarizes a list of measures incorporated by CPAI to "avoid and minimize impacts into their Project design." Specifically, Measure No. 91 is not associated with an LS or BMP, but is noted as a stipulation of ADNR and ADEC regulations.	N
864	304	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Another BMP states "(m)onitor vegetation damage, and compression of soil and vegetation in annual resupply ice road footprint (footprints that are used consecutively each year)." BLM needs to explain the parameters of this monitoring, and if adverse impacts are noted, what the next steps would be. Without a specific monitoring plan, with performance standards, contingencies, adaptive management and other requirements typically included in a mitigation plan, then this measure is not meaningful nor enforceable in any way.	These types of specifications would be listed in the ROD.	N
864	305	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BMP E-11 states "minimize the take of species, particularly those listed under the Endangered Species Act and BLM Special Status Species, from direct or indirect interaction with oil and gas facilities." The Action required is noted as "(a)erial surveys for species will be conducted prior to construction." This BMP is useless for small mammals and fish.	BMP E-11 is specifically geared for the protection of birds and includes subsections for yellow-billed loons and spectacled and Steller's eiders. This BMP is not intended to protect fish or small mammals. Other BMPs and LSs are intended to protect fish and mammals (e.g., LS E-3).	N
864	306	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	BMP E-14 states (e)nsure the passage of fish at stream crossings. The Action Required is noted as "(t)o ensure that crossings provide for fish passage, all proposed crossing designs shall collect at least 3 years of hydrologic and fish data." BLM has not done so to date and needs to adhere to this BMP.	CPAI will have met these requirements (at least 3 years of hydrologic and fish data) by the time of construction.	N
864	308	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	The DEIS states in Chapter 3, Section 3.10.3 Additional Suggested Best Management Practices or Mitigation (in terms of reducing impacts to fish) could include adoption of BMPs suggested by NMFS for EFH for invasive species. Again, BLM does not explicitly state if they will include the BMPs or how to, or who will, provide the oversight to enforce them. For example, one of these BMPs states "Prior to the start of construction, undertake a thorough scientific review and risk assessment regarding impacts associated with the introduction of non-native species." This does not provide a clear timeframe for compliance or what constitutes a "scientific review and risk assessment." It is not clear whether this will be subject to approval by the BLM authorized officer, or how the adequacy of such a document will be determined. BLM needs to explain how this is an enforceable or valid BMP.	Avoidance, minimization, and mitigation measures/BMPs were further developed in the Final EIS and included throughout the individual resources sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*). Details will be included in the ROD. Consultations with the NMFS and the USFWS will be complete prior to the BLM issuing a ROD; any additional BMPs that are required as a result of consultations would be included in the ROD. The BLM monitors BMPs required by NMFS and USFWS, and the BLM has the discretion to halt operations if needed. The BMP stating, "Prior to the start of construction, undertake a thorough scientific review and risk assessment regarding impacts associated with the introduction of non-native species," has been removed from consideration. BMP M-2 addresses invasive specifies prevention and is included in Section 3.9.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	309	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	There are many more examples of how the LSs, BMPs, design features are not written with adequate sideboards to be enforceable, measurable and meaningful. BLM inappropriately relies on these mitigation measures to state that impacts will be avoided and minimized. In addition, there will be deviations to some of the most effective measures (as noted previously) to protect water resources, wetlands, and fish. Given the proposed deviations from certain BMPs and LSs, and as currently provided, the analysis by BLM is severely defective to demonstrate the proposed mitigation measures are adequate surrogates for a fully fleshed compensatory mitigation plan.	The NPR-A IAP considered the effectiveness of BMPs and is the reason that specific BMPs were selected in the ROD and are now required. Various BMPs require lessees to monitor specific resources; if monitoring indicates that BMPs are not effective, then BLM adaptively manages to reduce impacts. BMPs requiring waivers are detailed in Final EIS Appendix D.1 (*Alternatives Development*), Section 4.2.12, *Compliance with Bureau of Land Management Stipulations, Best Management Practices, and Supplemental Practices*. The BLM evaluated these deviations as a part of the Project design, and therefore, they are included in the EIS analysis. A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404.	N
864	310	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Chapter 5 of the DEIS is an overview of avoidance, minimization, and mitigation measures proposed to offset environmental impacts. BLM's existing LSs, BMPs, and design features to avoid and minimize impacts are the proposed mitigation measures, and although the DEIS states this also includes compensatory mitigation, the DEIS does not contain such provisions.	Final EIS Section 5.3, *Compensatory Mitigation*, provides an overview of compensatory mitigation for the Project. Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020. As described in Section 5.3, BLM considers other compensatory mitigation programs applicable to the Project and Project area (e.g., voluntary or state-mandated compensatory mitigation), in its determination of mitigation for impacts from the Project, including USACE's compensatory mitigation program under Section 404 of the CWA and the State's NPR-A Impact Grant Program.	N
864	311	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Table D.4.4.—Anticipated Deviations from National Petroleum Reserve in Alaska Lease Stipulations or Best Management Practices. These 6 proposed deviations from the standard LSs and BMPs increase the risk and likelihood of impacts to waters of the U.S. during project implementation, construction and operation. BLM must fully analyze these impacts.	The *Environmental Consequences* sections for individual resources in Chapter 3.0 (*Affected Environment and Environmental Consequences*) includes analysis of deviations to LSs and BMPs that the Project would require. Deviations that would affect specific resources are described in those resource sections under the *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* section (typically, Section 3.X.2.1.1).	N
864	312	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Activities and design features that may avoid and minimize impacts is NOT synonymous to compensation for functional and areal extent of loss of Waters of the U.S. There is no compensation proposed for the permanent, temporary, indirect and temporal loss of wetlands and other waters of the U.S. . . . There is no opportunity for the public or agencies to comment on a compensatory mitigation proposal and its adequacy to compensate for unavoidable impacts resulting from project implementation, construction and operation . . . If the Corps waits until the ROD to require, discuss and incorporate a compensatory mitigation plan into their ROD and Section 404/10 permit required for this project, then there would be no opportunity for comments from the public, agencies, and tribal entities. BLM and CPAI need to draft a compensatory mitigation plan and include it in the FEIS and in their application to the Corps so that the proposal can be subject to Public Notice, along with project details, and afford others the opportunity to review and provide comments.	A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020.	N
864	314	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	It is imperative for BLM and/or CPAI to demonstrate the proposed BMPs, LSs, eventual reclamation (including removal of all fill and connection of gravel pits to river for off-channel deep water fish habitat) and tundra wetland rebound after temporal impacts ranging anywhere from 10-40 years is adequate compensation. The DEIS is woefully inadequate in demonstrating this and is not compliant with the Federal Rule) and the 2018 Alaska MOA [Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency Concerning Mitigation Sequencing for Wetlands in Alaska under Section 404 of the Clean Water Act, June 15, 2018] . . . Compensatory mitigation in the form of restoration and/or preservation must be provided and a detailed compensatory mitigation plan addressing the 13 required components of such a plan as outlined in the Federal Rule (33 CFR Part 332.4 (c)(2)-(c)14) must be submitted for review and comment.	A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020. *Note*: Mine site engineering has advanced since the Draft EIS, and as described in the Final EIS, the mine site would not be connected to adjacent waterways to provide overwintering fish habitat. The Willow Mine Site Mining and Reclamation Plan is included with the Final EIS as Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*.	N
864	315	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	The Alaska MOA [Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency Concerning Mitigation Sequencing for Wetlands in Alaska under Section 404 of the Clean Water Act, June 15, 2018] states the following in terms of difficult to replace resources: "Technical Feasibility. In determining whether compensatory mitigation is practicable, issues associated with the technical feasibility of restoring, enhancing, or establishing wetlands and other aquatic resources are also relevant. In spite of significant advances in restoration science, the technical challenges associated with establishing and re-establishing certain difficult-to-replace aquatic resources, such as permafrost wetlands, remains high. Compensation for impacts to these types of resources should be provided, if practicable, through in-kind rehabilitation, enhancement, or preservation since there is greater certainty that these methods of compensation will successfully offset permitted impacts (see 33 CFR Part 332.3(e)(3) and 40 CFR Part 230.93(e)(3))." This statement is particularly relevant in terms of providing compensation for permafrost wetlands. Permafrost wetlands are not only defined as difficult-to-replace, but as acknowledged in the DEIS, are irreplaceable. Therefore, BLM must address the direct and indirect impacts to permafrost wetlands through preservation of high functioning permafrost wetlands at ratios no less that 5-10:1 replacement. If BLM deviates from standard ratios, they must provide adequate justification.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	316	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	Although there is no metric presented in the Federal Rule or the Alaska MOA for what constitutes a temporary impact, it is inconceivable that 30 to 40 years could ever be considered a temporary impact. The DEIS presents no rationale or logic for stating that the impacts are temporary if reclamation/fill removal/decommission of the project after some 30 or more years occurs. The assertion, throughout the DEIS, that impacts from the project will be reversible, temporary and minimal in nature is simply not justified.	As stated in Section 3.9.3, *Unavoidable Adverse, Irretrievable, and Irreversible Effects*, the function associated with wetland loss would be irretrievable throughout the life of the Project until reclamation is complete. If reclamation did occur, the duration of vegetated wetland recovery after reclamation is expected to be greater than 20 to 30 years, or until more than 50% aerial cover of the wetland is hydrophytic vegetation and soils are saturated or inundated for more than 10 days during the growing season (Everett, Murray et al. 1985). Reclamation is not described as temporary anywhere in the EIS.	N
864	319	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	The following scoping comments from EPA were not addressed adequately in the EIS, and should be addressed and included in the next iteration for the EIS: "The EPA recommends that the EIS identify the type of activities that would require mitigation measures during the construction, operation, and closure phases of this project. In addition, we recommend identifying whether implementation of each measure is required by BLM or any other governmental entity and which entity will be responsible for implementing the measure. To the extent possible, mitigation goals and measurable performance standards should be identified in the EIS to reduce impacts and adopted to achieve environmentally preferable outcomes. The CEQ guidance on Appropriate Use of Mitigation and Monitoring seeks to enable agencies to create successful mitigation planning and implementation procedures with robust public involvement and monitoring programs." There is no compensatory mitigation plan included in the DEIS nor has BLM included any information relative to the comment above.	Avoidance, minimization, and mitigation measures/BMPs were further developed in the Final EIS and will be included in the ROD. Details are included throughout the individual resources sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*). Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020. Draft and Final EIS Section 5.3.2, *Compensatory Mitigation for the Fill of Wetlands and Waters of the United States*, does provide an overview of USACE's requirements to consider compensatory mitigation and how this would be described in USACE's ROD for the EIS.	N
864	320	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, or Mitigation	The following scoping comments from EPA were not addressed adequately in the EIS, and should be addressed and included in the next iteration for the EIS: "An environmental monitoring program should be designed to assess both impacts from the project and whether mitigation measures being implemented are effective. We recommend the EIS identify clear monitoring goals and objectives, such as what parameters are to be monitored, where and when monitoring will take place, who will be responsible, how the information will be evaluated, and what actions (contingencies, triggers, adaptive management, correct actions, etc.) will be taken based on the information. We also recommend the EIS discuss public participation, and how the public can get information on mitigation effectiveness and monitoring results." Nothing in the DEIS addresses this comment. Monitoring protocols are typically included in a detailed compensatory mitigation plan, which is lacking in the DEIS.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020. Details regarding monitoring required by measures stipulated in the EIS would be provided in the ROD.	N
50	1	Simmonds	Isaac Thomas	—	Avoidance, Minimization, or Mitigation	But the pipeline concern about the equipment, construction work to make sure there are no tools leave behind on that area, . . . That's my concern about the (unclear) Nuiqsut and our village there that they go berry picking. But the things that are most important as labor to make sure that nothing leave behind after work. That's the safety work, tools or anything, including with the pipeline. But some way, in the line, it's got to be — on the line, it's got to be somebody watching out for that. Like security work for the wildlife.	BMP A-1 (Waste and Litter) stipulates that "areas of operation shall be left clean of all debris." The proposed changes to this BMP expand the requirement language: "All solid waste and industry-derived trash originating from permitted activities is required to be properly containerized while on-site or removed from the area of operation and activity." Applicable BMPs/ROPs considered in the revised IAP are included in the Final EIS as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections (typically, Section 3.X.2.1.1). The BLM Arctic Office conducts inspections at the start of winter operations or activity, typically the first winter inspection is in January and occurs monthly through the winter. After stick-picking is complete in the summer, the BLM inspects across the permitted area once via helicopter. Anything that is left, the BLM would attempt to pick up. Any notable observations are documented in the inspection reports, which are also shared with the operators.	N
85	7	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Avoidance, Minimization, or Mitigation	We had some confusion over which areas operated under which BMPs, but that should be easily clarified in the FEIS. Appendix D provides a list of expected exemptions from BMPs. We would like to see BLM and Conoco Phillips commit to tracking compliance with BMPs, and identify any deviations in a publicly accessible database.	BMPs requiring waivers are detailed in Final EIS Appendix D.1 (*Alternatives Development*), Section 4.2.12, *Compliance with Bureau of Land Management Stipulations, Best Management Practices, and Supplemental Practices*. Deviations for any activity the BLM authorizes in the NPR-A can be found in the associated NEPA documentation, as the BLM must analyze deviations under NEPA. The public may request inspection and monitoring reports from the Arctic District Office through FOIA.	N
85	9	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Avoidance, Minimization, or Mitigation	Commenters requested the EIS identify the responsible parties for implementing mitigation, monitoring requirements, and where the public can find mitigation effectiveness and monitoring results as they become available. Commenters encouraged the use of the mitigation hierarchy (avoidance, minimization, and compensatory offsets) to ensure that unavoidable impacts are effectively and meaningfully offset with appropriate mitigation. The DEIS identifies scores of environmental and operational variables that will be monitored by either Conoco Phillips or BLM over the life of the project . . . Lesser attention is given to monitoring the effectiveness of proposed mitigation measures, especially long-term. . . . Commenters' suggestions to employ a mitigation hierarchy (avoidance, mitigation, compensatory offsets) is a good idea, but we see little evidence of that approach reflected in the DEIS. Economic considerations appear to dominate.	Proposed BMP H-5 requires data and summary reports derived from North Slope studies be made easily accessible. This was added to the *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* section throughout the resource sections in Chapter 3.0 (*Affected Environment and Environmental Consequences*) (typically, Section 3.X.2.1.1) and to Appendix I.1 (*Avoidance, Minimization, and Mitigation*). The BLM requires weekly reports from operators on NPR-A activities during construction of surface development. The BLM Arctic Office conducts inspections at the start of winter operations or activity, typically the first winter inspection is in January and occurs monthly through the winter. After stick-picking is complete in the summer, the BLM inspects across the permitted area once via helicopter. Any notable observations are documented in the inspection reports, which are also shared with the operators. The public may request inspection and monitoring reports from the Arctic District Office through FOIA.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
85	11	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Avoidance, Minimization, or Mitigation	Mitigation and Best Management Practices (BMPs) . . . It was difficult for us to clearly discern what BMPs apply to what areas. For example, it appears BMP K-5 would be applied within the "Teshekpuk Lake Caribou Habitat Area." BMP K-9 would be applied within the "Caribou Movement Corridors," and BMP K-10 would be applied in the "Southern Caribou Calving Area." . . . [I]t would be helpful to clarify in the Willow FEIS with maps and definitions. It is unclear to us whether BMPs E-5, E-7 and F-1 will be applied throughout the Willow project area. We hope that is the case, but if not, please clarify in the FEIS which BMPs apply to what land areas. If Best Management Practices have any real force, applying just BMP E-5 (requiring that the development footprint be "minimized") would seemingly drive the FEIS to identify alternative D as the preferred. Because that is doubtfully the case, we wonder how broadly and firmly any BMPs are supposed to be applied. The FEIS should speak to this.	The boundaries of the CRSA and TLSA were added to the alternatives figures in Chapter 2.0, *Alternatives*, and to Figure 3.12.1 (the K-5 Teshekpuk Lake Caribou Habitat Area boundary was already displayed) in Section 3.12, *Terrestrial Mammals*. Proposed BMP F-3 (previously described as F-1) would require all aircraft to maintain specified altitudes that vary by alternative. Alternative E would require all aircraft to maintain a 1,500-foot minimum altitude throughout NPR-A. This was added to the Final EIS in Section 3.12.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. During selection of a preferred alternative, or of any alternative, the BLM looks beyond the scope of any one BMP. The purpose of NEPA is to provide decision-makers and other stakeholders with information they need to understand environmental impacts resulting from an action. The process includes the development of alternatives to an action, which allows decision-makers to consider information about the consequences and trade-offs associated with taking any given course action.	Y

4.2.4 Birds

Table B.2.7. Substantive Comments Received on Birds

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
991	29a	Bruno	Jeff	Alaska State, Department of Natural Resources	Birds	Page 97, Section 3.11.3, #9 Already required by State law. Please remove duplicative requirement.	Measure was removed from Section 3.11 (*Birds*) and Appendix I.1 (*Avoidance, Minimization, and Mitigation*).	N
1302	45	Dunn	Connor	ConocoPhillips	Birds	BLM's analysis of potential impacts to birds fails to account for important scientific research, and, as a result, presents some inaccurate and unsupported conclusions. First, an analysis area of 3.7 miles is excessive. Recent NEPA analyses conducted on the North Slope such as for the Nanushuk development and the GMT2 development analyzed impacts within 2.5 miles of gravel infrastructure, and there is no reason that Willow should be treated differently. We recommend re-evaluating the analysis area for birds to better align with the available literature and recent NEPA documents for North Slope projects. Specifically, we challenge the appropriateness of including the area around ice road routes in light of the fact that ice roads are a winter activity that takes place when few birds a present and would have minimal impacts on birds.	The extent of the analysis area is appropriate and includes the potential effects areas for disturbance, displacement, and predation. As described in Section 3.11, *Birds*, Liebezeit et al. (2009) estimated songbird nest survival was reduced within 5 km (3.1 miles) of oil field infrastructure and presented evidence from post hoc tests that all shorebirds combined had lower nest survival at even greater distances (16 km from infrastructure), but this distance was based on less widely accepted statistical testing. Predators such as foxes, gulls, and ravens may travel distances greater than 6 km, but little work has documented movements of predators around facilities on the North Slope. The EIS uses a conservative distance of 6 km that encompasses the predation effects documented by Liebezeit et al. (2009), plus an area to account for predation effects beyond those estimated for nesting songbirds. Ice road effects on bird habitat extend beyond the winter season. As described in Section 3.11.2.3.1, *Habitat Loss or Alteration*, ice infrastructure compacts vegetation, changes drainage patterns, and delays snowmelt. Thus, including ice infrastructure in the analysis area is necessary.	Y
1302	46	Dunn	Connor	ConocoPhillips	Birds	In section 3.11.2.3.5, BLM partially relies on the Johnson, Wildman et al. 2019 study to conclude that yellow-billed loons could be impacted by water withdrawal or human disturbance that occurs at nesting lakes due to high nest lake fidelity. However, BLM fails to mention that this study did not find a displacement of nests or broods from long-standing territories by oil development. Several of the nest sites included in this study are from year-round water withdrawal sources for ConocoPhillips Alpine oil field. This statement should be removed from the EIS because it is not consistent with the underlying scientific information.	Johnson, Wildman et al. (2019) found no displacement from active infrastructure, which implies that territories will not be lost when development occurs within 1 mile. However, the two nest lakes that had water withdrawal were not successful every year they were monitored, and the other territories within 1 mile of infrastructure had mixed success; it is not possible to say that these nest sites were less or more successful than other nest sites due to small sample size. Uher-Koch, Schmutz et al. (2015) found that human disturbance reduced nesting success. Text was added to Section 3.11.2.9, *Special Status Species*, to describe the findings of Johnson, Wildman et al. (2019) and Uher-Koch, Schmutz et al. (2015), which are not contradictory.	Y
1302	47	Dunn	Connor	ConocoPhillips	Birds	In section 3.11.2.3.2, BLM discusses disturbance and displacement of birds in relation to the proposed Willow development, but there is no mention of a recent study, conducted by the US Geological Survey (USGS). See Meixwell and Flint (2017) Effects of Industrial and Investigator Disturbance on Arctic-Nesting Goose. This study found that vehicular and aircraft disturbance at an Arctic industrial site did not impact nest attendance.	Johnson, Burgess, Lawhead, Neville et al. (2003); Meixell and Flint (2017); Rozell and Johnson (2020) and Murphy and Anderson (1993) were added to Section 3.11.2.3.2, *Disturbance or Displacement.* However, most of these reports only deal with nesting birds and not post-breeding birds, which tend to be more sensitive to disturbance.	Y
1302	48	Dunn	Connor	ConocoPhillips	Birds	ConocoPhillips has been conducting avian studies in and around North Slope oil fields for decades, but BLM did not include in the DEIS citations and results from annual reports that ConocoPhillips has distributed to BLM and also made publicly available on the North Slope Science Initiative website (northslopescience.org). For instance, in section 3.11.2.3.2, BLM discusses nesting spectacled eider buffer zones but does not note that avian researchers working in the Colville River Delta and NPR-A areas over the past 20 years of eider nest searching report that the species rarely flushes away from a nest when people are greater than 25 meters away.	Not all annual reports are cited, but the summary or most recent reports are cited with a selection from Willow, NPR-A, Colville, and Kuparuk. The reported details on disturbance observations for spectacled eiders were added to the text. However, disturbance to spectacled eiders is not only manifested in flight reactions; there are subtle physiological effects of stress, possible effects to incubation behavior (increased time off nests), lower nest survival, and displacement or separation of broods. Many species are more reactive to disturbance before and after breeding, when they are more mobile and not tied to a nest site. The buffer zones apply to portions of the pre-breeding period (when nest sites are being selected) and the brood-rearing period (after early July through the end of July or mid-August, depending on which Biological Opinion is applicable).	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1302	49	Dunn	Connor	ConocoPhillips	Birds	Finally, during the summer of 2018, a spectacled eider nest was observed about 75 meters from the Alpine CD3 runway. Monitoring of this nest indicated that the hen successfully hatched four chicks on July 16, 2018. The hen had an incubation constancy of 97.2%, averaging only 1.2 recesses per day, even with 45 airplane events (one landing or takeoff from a twin-engine turboprop CASA or Otter), while the eider was incubating her nest.* The data, along with the USGS report cited above, suggest that the disturbance zone for arctic nesting birds is much smaller than BLM's study area analyzed in the DEIS. *The report was provided to BLM and available via the North Slope Science Initiative site here: https://northslopescience.org/wp-content/uploads/2018_Eider_Nest_Searches_in_Alpine_Area.pdf.	Text was added to Section 3.11.2.9, *Special Status Species*, on the 2018 example (it is anecdotal but important), as well as other examples of successful spectacled eiders nesting near active infrastructure. There are instances reported in the study conducted at CD3 (Johnson, Parrett et al. 2008) and later (Seiser and Johnson 2018), but not all nests within 200 m hatched.	Y
1302	111	Dunn	Connor	ConocoPhillips	Birds	Paragraph at top of page "Hazing birds at or near airstrips would temporarily disturb or displace additional individual birds." The text should note that hazing birds near airstrips is critical for ensuring human life safety when aircraft are departing or approaching, and hazing birds would be done with proper State and Federal authorizations and permits, and as required by the FAA to ensure a safe operating environment.	Similar text was added as suggested to Section 3.11.2.3.2, *Disturbance or Displacement*.	Y
984	1	Hartsig	Andrew	Ocean Conservancy	Birds	These comments focus on the two sealift module delivery options, both of which would involve construction and use of a gravel island with a 5- to 10-year design life. As it considers the potential impacts from those modules, BLM must account for the unique and important marine habitat in the vicinity and ensure a robust analysis of alternatives. CPAI's Module Transfer Islands Would Be Built in Important and Sensitive Marine Habitat. The shallow depth and nutrient supply from the Colville River result in higher productivity on the Harrison Bay-Colville Delta region compared to other nearshore Beaufort Sea areas. The attached document—A Synthesis of Important Areas of the U.S. Chukchi and Beaufort Seas—includes additional information, references, and citations.	Marine habitat in the vicinity of Options 1 and 2 is described in Section 3.8.1.1.4, *Marine Waters*; Section 3.10.1, *Affected Environment*; Section 3.11.1.2, *Bird Habitats*; and Section 3.13.1, *Affected Environment*. Text about the IBAs in the analysis area was added to Section 3.11, *Birds*.	Y
984	2	Hartsig	Andrew	Ocean Conservancy	Birds	BLM must account for the unique and important marine habitat in the vicinity and ensure a robust analysis of alternatives . . . The shallow depth and nutrient supply from the Colville River result in higher productivity on the Harrison Bay-Colville Delta region compared to other nearshore Beaufort Sea areas. The attached document, A Synthesis of Important Areas of the U.S. Chukchi and Beaufort Seas, includes additional information, references, and citations. Harrison Bay constitutes important and sensitive marine habitat. Specifically, the Harrison Bay - Colville Delta area is: A major hotspot for marine birds. A summer (May through October) core area for WatchList bird species of concern. A globally significant International Bird Area (IBA). A hotspot for benthic-feeding seabirds in summer. Feeding and high-density denning habitat for polar bears. Identified by Alaska Department of Fish and Game in the Most Environmentally Sensitive Areas (MESA) program.	A description of the IBAs was added to Final EIS Section 3.11.1.2, *Bird Habitats*.	Y
864	154	Psarianos	Bridget	Trustees for Alaska	Birds	Noise from industrial activity can also impact birds causing stress, fright or flight, avoidance, [and] changes in behavioral habits like nesting and foraging, changes in nesting success, modified vocalizations, or interference with the ability to hear conspecifics or predators. The EIS should catalogue the existing noise in the project area, explain the changes in noise that will occur with the Willow Plan development, describe impacts that will occur for birds, and provide a method for addressing and monitoring this issue. The draft EIS falls short of this, simply noting that [a]ll action alternatives would require a deviation from BMP E-11 due to the proximity of Steller's eiders to the Project area. The draft EIS does not discuss impacts to these protected species as a result of noise from this project.	Ambient airborne noise and potential changes to it are described in Section 3.6, *Noise*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	178	Psarianos	Bridget	Trustees for Alaska	Birds	The ranking of habitat by number of bird species found within the habitat type is not useful for analysis or public understanding. The EIS uses the number of present bird species (species richness) to rank the importance of the various habitat designations. This is incomplete, because species richness is only one metric with which habitat value can be quantified. Habitats with lower species richness can and do support highly specialized species, which are the most acutely effected by climate change. Furthermore, many species that are ranked by the EIS within the most commonly used habitats are also shown as using the habitat types associated with lower species richness during portions of their life history, making these less commonly used areas still important for a species life cycle. These species displaying this pattern include Yellow-billed Loons and Spectacled Eiders, which are recognized by BLM as Species of Special Status. The agency should describe habitat use more fully. We also note that a substantial portion of the analysis area is categorized as unknown and unmapped, presumably because the analyses conducted did not investigate these regions. Without more information about the analyses conducted, it is possible that there will be more permanent loss, alteration, and damage and displacement acreages for unmapped habitat than is presently reported in the EIS. We urge the agency to provide more information on how the area was mapped.	Ranking habitat types by species richness is not the only way to compare habitats. With about 80 species of birds potentially in the analysis area, many of which do not have abundance or density data to describe their distribution in the NPR-A or the analysis area, the task of describing spatially explicit effects in the analysis area is constrained by what data are available. Detailed habitat mapping is available for the area where permanent infrastructure would be located. Summarizing individual species use of habitat types and aggregating for each habitat type to species richness provides a useful measure of the potential importance of each habitat type within the analysis area to the overall bird community; it does not factor in species abundance or the probability of a species occurring in the analysis area, because for most species, those data are not available. Relative abundance described in Table E.11.1, is based on the best-available information. Table E.11.2 summarizes the number of species using each habitat type, which was used to rank the habitats by species richness. This ranking is better than descriptive evaluations, as it is quantitative and based on a broad synthesis of the literature and field studies. Previous studies in the vicinity indicate that there is a correspondence between species richness and abundance of nests and broods (Tables 7, 9–11 in Burgess, Johnson et al. 2003; Tables 14 and 15 in Johnson, Burgess et al. 2005; Table 5 in Rozell, Johnson et al. 2020; Johnson, Lanctot et al. 2007; Bart, Brown et al. 2012; Bart, Platte et al. 2013). The habitats with most species and most nests and broods of waterbirds are Patterned Wet Meadow, Sedge Marsh, Old Basin Wetland Complex, Moist Sedge-Shrub Meadow, and Shallow Open Water with Islands or Polygonized Margins. The other habitats with high species diversity were either not very common in the analysis area (e.g., Open Nearshore Water, Salt Marsh, Deep Polygon Complex) or they were used by shorebirds and passerines, which use a broad range of habitats. We point out that many of the habitat types with low species richness (<10 species) occupy small portions of the analysis area and comprise minor amounts (<1%) of the area lost to direct and indirect effects (Tables E11.4 through E11.6). Many are not very abundant due to the location of the analysis area, which includes very little of the coast, or as in the case of Rivers, Streams, and associated habitat types, are narrow strips of habitat types without much areal extent. However, these habitat types are not necessarily rare in the ACP, nor would they be appreciably diminished or affected by the Project. All but two habitat types are used by at least one special status species, so use by special status species is not helpful to identify relative importance to the bird community. To address the concerns about not emphasizing habitats used by Sensitive Status Species, and not describing habitat use adequately, we added discussion and emphasized those habitats used by special status species in the tables of effects. The examples from the commenter (spectacled eiders and yellow-billed loons) actually do not prefer or use many of the habitat types with low species richness (<10 species); only one habitat type (Salt-killed Tundra, preferred by spectacled eiders) is used by <10 species. Tapped Lake with High Water Connection, which is preferred by spectacled eiders during breeding and preferred by yellow-billed loons for nesting and brood-rearing, is used by 10 species. Neither habitat type occurs in the Project footprint, and only one is intersected by the 200-m disturbance zone (Tables E.11.4 through E.11.6). However, those types are no more, or less, important to these species than the other habitat types they prefer or use as listed in Table E.11.1; these habitats are examples of the breadth of habitat use, not examples of specific types critical to sustain the species. Although the analysis area was not completely mapped for habitat, less than 1% of the Project footprint, <1% of the area of indirect effects from dust and other gravel impacts (328 feet), and <1% of the disturbance zone (656 feet) were in unmapped areas (Tables E.11.4 through E.11.6). Since the Draft EIS, we have added habitat mapping for the Kuparuk area, where Option 3 is located, which provides mapping for much of the gravel impacts and disturbance zone. The unmapped areas primarily include ice road routes for module delivery. Direct and indirect habitat impacts would be minor in unmapped areas; furthermore, indirect impacts in unmapped areas would be limited to the construction phase. Mapping is described in Section 3.9, *Wetlands and Vegetation*.	Y
864	179	Psarianos	Bridget	Trustees for Alaska	Birds	The EIS downplays the presence of special status species in the project area, The EIS states, "Stellers eiders, whimbrels, buff-breasted sandpipers, and red knots are unlikely to be affected by habitat loss, or disturbance or displacement, because they are rare in the vicinity of the Project." The EIS elsewhere states, "Seven additional species of birds listed as special status species by the Bureau of Land Management (BLM) yellow-billed loon, red-throated loon, dunlin, bar-tailed godwit, whimbrel, buff-breasted sandpiper, and red knot may also occur in the analysis area." This is either unnecessarily vague or misinformed, as there is substantial evidence to confirm that all listed species indeed to occur within the analysis area. The fact that a species may be rare in the study area does not ensure that it will not be affected; indeed, it likely increases the chances that any effects experienced would be more significant. For instance, Buff-breasted Sandpipers are a special concern, because they are rare to begin with. This rarity is exacerbated by the fact that additional important nesting habitats to the east are either developed (within the Prudhoe complex) or are at risk of being developed (within the Arctic National Wildlife Refuge). The EIS must correctly describe the presence of special status species in the area and note that these species may be more affected by habitat loss because of their rarity.	The quoted statements from the Draft EIS are accurate; the Willow MDP Project is in an area where these species are rare relative to other areas in the ACP. Whimbrels and buff-breasted sandpipers could occur and breed in the analysis area, red knots and Steller's eiders are not likely to occur there and even less likely to breed. Thus, the probability of these species would be affected by disturbance or displacement, given their rarity in the analysis area, is exceedingly low. Rarity lowers the chance the species would occur near infrastructure and if they are not near infrastructure and sources of disturbance or other adverse effects of development, they are "unlikely to be affected." The second quote that seven BLM special status species "may occur in the analysis area" is simply a statement that all of the species could possibly occur at some time and does not speak to their probability or rarity of occurrence. If a species was both rare and regularly occurring in the analysis area, we could expect the Project might have an impact, even a disproportional impact, but of the 4 species identified as unlikely to be affected, none are regular visitors to or breeders in the analysis area. We have added more descriptive text, with citations to supplement the information, on abundance, distribution, and habitat use by the special status species in Table E.11.1.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	180	Psarianos	Bridget	Trustees for Alaska	Birds	The EIS also downplays the potential for impact to wintering and marine species. The statement that Few species winter on the ACP [Arctic Coastal Plain] is dismissive and points to the lack of analyses performed regarding over-wintering species, which includes three Audubon Alaska WatchList species: the Snowy Owl, Rock Ptarmigan, and Willow Ptarmigan. Their inclusion in the WatchList is due to precipitous population declines due in large part to climate change. The importance of marine habitat to avian species in the proposed development area is not addressed. While there is mention of Harrison Bay in the section Marine Waters, there is no mention of Harrison Bays exceptional value for birds, especially sea ducks, loons, and shorebirds.	The statement that few species winter in the ACP is accurate. The comment that there are few studies of wintering birds in the ACP is also accurate. Impacts to wintering birds are primarily related to disturbance from ice road construction and subsequent traffic and construction activities. The species wintering in the analysis area are foraging and sheltering. All species are highly mobile at this time and able to move to alternative areas if disturbed. Willow ptarmigan are tolerant of human activity (Hannon, Eason et al. 1998), as are rock ptarmigan (Montgomerie and Holder 2008). The subspecies of willow and rock ptarmigan that achieved Audubon's Yellow List status do not occur in the ACP, and none are known to be in decline (Warnock 2017). Snowy owl numbers in the ACP are highly variable, and tracking small-mammal abundance and population growth rates over 32 years (1986 to 2017) and the latest 10 years do not differ significantly from equilibrium (Wilson, Larned et al. 2018). The marine habitat is very important, especially the lagoon areas; Open Nearshore Water is in the top tier of habitat types for species richness (22 species rely on it, mostly for post-breeding, migration, and foraging; Table E.11.1). The Project description for the Final EIS describes barge deliveries for every action alternative and module delivery option. However, activities related to barging and associated infrastructure would occur over a short time during four barging seasons (4 years over a 5-year span). A small area (12.1 to 14.1 acres) of the seafloor would be screeded each year of barge delivery. While the marine environment is crucial to many bird species, birds in nearshore areas are very mobile after nesting and can move if disturbed or foraging areas are temporarily altered. See research on long-tailed ducks and common eiders for a summary of impacts observed in the Prudhoe Bay area (Fischer, Tiplady et al. 2002; Flint, Reed et al. 2003). Substantial material was added on the subject of birds in the marine environment for the SDEIS and is incorporated in the Final EIS. The IBA designations are described.	Y
864	181	Psarianos	Bridget	Trustees for Alaska	Birds	The EIS does not accurately describe Spectacled Eider usage of the analysis area. The EIS states, "Small numbers of spectacled eiders occur in the analysis area annually during pre-breeding and post-breeding (Johnson et al. 2019; Sexson et al. 2014), but nesting has not been confirmed. Sexson et al. (2014) denotes areas of especially high importance to Spectacled Eiders." This study includes a substantial portion of the analysis area, which lies within the Western Beaufort Sea Important Area, defined by Sexson et al. (2014) as ". . . where [satellite transmitted] locations occurred in greater density as defined by 95% Gaussian kernel density isopleths." Additionally, it is misleading to suggest that nesting has not been confirmed, when many recent studies have indeed confirmed nesting, including implanting satellite transmitters on nesting Spectacled Eiders and surveying specifically for nesting Spectacled Eiders at Point Lonely, the Colville Delta and in broader survey efforts across the Arctic Coastal Plain. Similarly, the statement that "[Spectacled Eider] nesting has not been confirmed." is misleading, suggesting that there are no known examples of breeding Spectacled Eiders, which is clearly not the position of the authors, as they use much of page 7 of Appendix E.11 attempting to quantify the impact of each alternative to Spectacled Eider nests. By underestimating and downplaying the potential impact of this development to Spectacled Eiders, substantial detriment to an Endangered Species Act-listed species is more likely.	The Willow area, where the permanent gravel footprint would be located, supports small numbers of spectacled eiders as stated. The larger analysis area includes coastal areas used for module transport, which support higher densities of spectacled eiders, including those important areas determined by satellite tracking in the Sexson et al. (2014) study. Sexson, Pearce et al. (2014) identified important marine areas used by spectacled eiders, not onshore nesting areas. The module delivery sites do fall within the Barrow Canyon and Western Beaufort Sea Important Areas. Nesting does occur at Point Lonely, Oliktok Point, and probably at Atigaru Point, although we are not aware of any data from that last location. The text was revised to clarify where and how spectacled eiders use different parts of the analysis area. Nesting by spectacled eiders has not been confirmed in the Willow area, which is inland from the coast, nor have nests been found in the GMT-1 and GMT-2 areas, immediately east of the Project and equally inland. The analysis of nesting potential in Appendix E.11 (*Birds Technical Appendix*) is based on the overall density of pre-breeding eiders recorded in the Project area, where direct and indirect impacts from Project infrastructure could occur during the breeding season. Project activity at module delivery locations would occur in the open water season, in winter (gravel deposition for pad expansions and island building), and during summer from existing roads and pads. We have measured a disturbance zone (656 feet) around all new gravel infrastructure to estimate the area over which spectacled eiders that could be disturbed or displaced. The analysis is not based on nesting data in the area, because no research into nesting has been conducted in the Willow area, where nesting could be affected by summer construction, drilling, and operation activity. Nesting studies in the Kuparuk oil field provide a few nest locations near the road that would be used for module transport in Option 3, but have not sampled enough area to produce an estimate of numbers potentially affected by disturbance (see Attanas, L.B. and J.E. Shook. 2020. Eider surveys in the Kuparuk oil field, Alaska, 2019. Draft report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 40 pp.).	Y
864	182	Psarianos	Bridget	Trustees for Alaska	Birds	The description of the importance of the analysis area to Steller's Eiders is similarly incomplete. Steller's Eiders are known to have regularly nested in the analysis area before substantial declines reduced their breeding population westward, warranting their listing as Threatened under the Endangered Species Act. Because the purpose of the Endangered Species Act is "to protect and recover imperiled species and the ecosystems upon which they depend" any development action that would further impede the ability of the Steller's Eider to recolonize previously used habitat is incongruous with its ESA designation.	Text was added to address Steller's eider status. The USFWS has concluded that the last 3 oil fields (CD5, GMT-1, and GMT-2) constructed in the NPR-A would not likely adversely affect the Steller's eider because the species occurs in those areas sporadically, there are no records of breeding, and the BMPs in the 2013 NPR-A IAP/EIS would ameliorate many of the effects posed by the Project. Only a handful of Steller's eiders have been seen in the Willow area, CRD, and Kuparuk oil field in 28 years of aerial surveys. A figure to show those records was added to the Final EIS.	Y
864	183	Psarianos	Bridget	Trustees for Alaska	Birds	The EIS also fails to address the conservation of the Arctic-nesting subspecies of Dunlin (*Calidris alpina arcticola*)—a US Fish and Wildlife Bird of Conservation Concern— which has exhibited population declines in the last decade. The Willow development is in important nesting habitat for this subspecies population. The BLM-designated Teshekpuk Lake Special Area encompasses the lake and the wetland complex extending northeast to the coast, and *articola* Dunlin are one of the core nesting species. Liebezeit et al. (2011) describes shorebird nesting in the Teshekpuk Special Area by saying, "Overall nest densities at the Teshekpuk Lake site far exceeded those found at six other sites on the Arctic Coastal Plain, including the Prudhoe Bay oilfield site." The EIS should address this subspecies, analyze the impacts from the development, and articulate mitigation measures.	Arctic-nesting dunlin (*C. a. arcticola*) is one of the most numerous shorebirds nesting in the NPR-A, the TLSA, and the ACP (Andres, Johnson et al. 2012; Bart, Brown et al. 2012). It is almost five times more abundant on the outer coastal plain than the inner coastal plain (Andres, Johnson et al. 2012), and the majority of permanent infrastructure for the Willow MDP Project is inland from that inner coastal plain location. Liebezeit et al. (2009) found no difference in shorebird nest survival around development and Liebezeit, White et al. (2011) found no difference in nest survival between Prudhoe Bay and undeveloped Teshekpuk Lake. Bart, Platte et al. (2013) concluded that there was no conclusive evidence that oil development in Prudhoe Bay had caused declines in shorebird density or productivity. Declines in the *C. a. arcticola* population appear to be related to degradation and loss of wintering habitat (Warnock 2017; Warnock and Gill 1996). Impacts to the subspecies from oil development have not been documented. Direct habitat loss from gravel placement and habitat alteration from dust, gravel spray, impoundments and thermokarsting would affect nests within 100 m of roads, just as those habitat effects would impact other ground nesting species. Impacts and mitigation (by BMPs) would be the same as for other species of birds.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	184	Psarianos	Bridget	Trustees for Alaska	Birds	The data used to analyze impacts to Yellow-billed Loons appear inadequate, resulting in an inadequate impacts analysis. The nest location data and the associated lake/nest buffers in Figure 3.11.4 seem to be focused on areas of new development but do not include a substantial portion of proposed ice road construction in the vicinity of Teshekpuk Lake. Ice roads are known to cause impacts that persist beyond the winter. Ice roads compress and can damage tundra vegetation, alter timing of snowmelt, and can block streams during critical times such as spring flooding. We therefore expect nonresident birds, including loons, to also be impacted by ice roads. Moreover, it is difficult to tell whether the relatively fewer loon nests near the proposed Willow development may be due to due to lower survey intensity, or another artifact of data collection. Without access to the ABR reports containing the referenced data, it is impossible to find more information. The EIS should explain these issues in its analysis and also provide the referenced studies in an appendix or on the ePlanning website.	Data on yellow-billed loons were collected for 3 years as required by BMP E-11, which requires surveys for nests that could be within 1 mile of infrastructure. The area surveyed completely covered all lakes 10 hectares and larger in the vicinity of new permanent infrastructure, and the distribution of nests around the Project represents complete coverage by those surveys. Survey boundaries were added to Final EIS figures to make that clear. The survey area did not include all the ice roads for the action alternatives. Ice roads can affect vegetation and block streams, but standard mitigation is to cut slots in ice roads for all cross-drainage areas, mitigating that problem. Vegetation compaction has not affected nest sites in other locations in the GMT, CD5, or CRD areas, but routing ice roads away from nest sites and nesting lakes could be a beneficial mitigation measure and therefore was added to the Section 3.11.2.1.3 (*Additional Suggested Avoidance, Minimization, or Mitigation*). Yellow-billed loon reports were posted to BLM's ePlanning website for the commenter to access.	Y
864	185	Psarianos	Bridget	Trustees for Alaska	Birds	There are also numerous inconsistencies and omissions in the description of Best Management Practices (BMP) relating to Yellow-billed Loons. BMP B-2 fails to mention protection of fish-bearing lakes where Yellow-billed Loons are known to nest. While the proposed project appears to limit water withdrawal to only those lakes without sensitive fish or breeding yellow-billed loons the EIS also states, "Winter water withdrawals for ice infrastructure could occur from any permitted lake in the Willow area during construction." The EIS goes on to say, "Because yellow-billed loons have high nest lake fidelity (Johnson, Wildman et al. 2019; Schmutz, Wright et al. 2014), they likely would not move to other lakes" and could be impacted by withdrawals that occur at nesting lakes. The EIS should explain this contradiction, and correct the BMP to protect loon lakes. All alternatives waive the requirement to keep roads and infrastructure away from loon nests and nesting lakes and the EIS fails to provide any meaningful mitigation for this impact. BMP E-11 notes that infrastructure should adhere to the 1 mile (1.6 km) suggested buffer around all recorded Yellow-billed Loon nest sites lakes and a 1625-foot (500 m) buffer around the remaining shoreline of Yellow-billed Loon nest lakes. However, the EIS waives these requirements. . . . These waivers come without any meaningful mitigation or added conservation for Yellow-billed Loons. While the EIS states several times that a conservation plan for Yellow-billed Loons was adopted by federal, state, and local governments, it fails to mention that the conservation plan has now lapsed. By referencing an old conservation plan and waiving BMPs intended to protect loons, the agency has failed to provide meaningful conservation for loons.	BMP B-2 restricts water withdrawal from lakes to protect soils, hydrology, fish, and invertebrates; yellow-billed loons, other loons, waterfowl, and shorebirds would benefit from BMP B-2. Allowing water withdrawal from permitted lakes is not inconsistent with BMP B-2 if the lakes satisfy restrictions described and meet State of Alaska water withdrawal guidelines. BMP E-11 specifically protects yellow-billed loon nest sites and lakes, and the current Project alternatives would require waivers for infrastructure within buffers around specific nest sites and breeding lakes; a separate waiver or exception would be required to withdraw water from those lakes. The commenter is correct that the conservation agreement from 2006 has not been renewed; the text was revised to reflect that fact.	Y
864	186	Psarianos	Bridget	Trustees for Alaska	Birds	The impacts to molting geese are poorly described and mitigation of the impacts is unclear. BMP F-1 charges lessees to "Minimize the effects of low-flying aircraft on wildlife, subsistence activities, and local communities"; with an accompanying requirement to stating that: "Aircraft use (including fixed wing and helicopter) in the Goose Molting Area should be minimized from May 20 through August 20." But according to BMP K4a, "Within the Goose Molting Area, aircraft use (including fixed wing and helicopter) shall be restricted from June 15 through August 20. Other restrictions are specified." It is impossible to know from these contradictions whether flights over the Goose Molting Area are minimized, restricted, or prohibited; if there is a minimum altitude during these flyovers; and when they will or will not occur. This is concerning as there is significant evidence that aircraft overflights have negative impacts on molting geese. The EIS should reconcile these contradictions and clearly describe the aircraft activity prohibited in the Goose Molting Area.	Option 2 for module transport would overlap the GMA. Options 1 and 3 would avoid the GMA. Text regarding air traffic in the GMA was added to Option 2 (Section 3.11.2.7, *Module Delivery Option 2: Point Lonely Module Transfer Island*). There would be 5 to 12 total fixed-wing trips during the summer, for three summer seasons. If these flights stayed along the coast (not overland), they would not need waivers to either BMP F-1 or BMP K-4a to land at the Point Lonely airstrip.	Y
864	187	Psarianos	Bridget	Trustees for Alaska	Birds	The EIS contains statements regarding habitat loss, abandonment, and reclamation that are questionable, vague, or contradictory . . . In addition, the already-inadequate reclamation and recovery strategies described in the report also reveal that some gravel infrastructure may be left in place for future, post-project uses. The EIS should accurately describe the difficulties of restoration and reclamation, and explain where these mitigation measures will or will not take place. The EIS downplays habitat loss that would occur due to activities beyond construction. The EIS describes habitat due to gravel fill (e.g., 672.2 ac) but does not relate those losses to actual loss in avian productivity, an analysis that is particularly important for sensitive species. The EIS also states, "Habitat loss should affect small numbers of nesting birds due to the small area lost; most displaced birds could relocate to similar habitats available in the analysis area." There is no justification or citation supporting that assertion. And while the EIS states that habitat loss will be constrained to the construction period, in fact much of the habitat loss consequential to the proposed development actions would occur during the decades and centuries following construction, much of which is immitigable and effectively permanent . . . The EIS should accurately account for habitat loss in both the short-term and long-term.	The temporal scale of potential reclamation is described in Section 3.9, *Wetlands and Vegetation*. Though the life of the Project is stated as 30 years, much of the gravel infrastructure on the North Slope has lasted longer than its stated lifespan. Very little gravel has been reclaimed because it is still in use (i.e., not abandoned). Thus, the EIS assumes effects that are permanent. If abandonment were to occur, BMP G-1 would require reclamation by CPAI. The EIS describes acres of habitat lost to gravel placement and does not imply that is only a construction-period effect. It will last the life of the Project and likely be permanent. The acres of habitat altered indirectly by dust, gravel spray, thermokarsting, impoundments, and snow berms is described as long term, lasting the life of the Project or longer. The acres of disturbance and displacement is accounted for, and although greatest impacts would be during construction, they would continue as long as there is traffic and human activity and thus would be long-term for the life of the Project. Overflights under BMP F-1 restrictions should be at an altitude that does not disturb or displace birds, except in landing and take-off areas. As far as relating habitat loss to loss of avian productivity, there is not much information supporting that. Studies of geese (Johnson, Burgess, Lawhead, Neville et al. 2003) at Alpine and shorebirds in Prudhoe Bay (Troy and Carpenter 1990) have found displacement of nesting birds from new gravel pads but have not documented loss of birds or nests; rather, there appears to be resettlement with no loss in productivity (decline in nest success). Other studies of geese and spectacled eiders in the ACP have found no displacement or decline in productivity (nesting success) with vehicular or air traffic and human activity (Johnson, Parrett et al. 2008; Meixell and Flint 2017; Rozell and Johnson 2020). Territorial birds, such as yellow-billed loons, with specific habitat requirements and who are possibly habitat limited, may not have the same flexibility to move to unoccupied habitat. More discussion for the above literature and the special requirements of yellow-billed loons was added to Section 3.11, *Birds*.	Y

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864	189	Psarianos	Bridget	Trustees for Alaska	Birds	Impacts on predator/prey relationships will be substantially changed by this development, though the DEIS fails to describe those changes. For instance, there is little mention in the EIS of the potential for human development to attract increased numbers of predators, thereby impacting the breeding success of ground nesting birds. There is research that suggests a substantial increase in Common Ravens associated with infrastructure. An increase in Common Ravens can have disastrous effects on bird communities, as 19% of the Common Raven summer diet consists of birds. Additionally, the impact this development action will have on lemmings is poorly described, as is the effect this impact will have on breeding bird populations. There is substantial evidence that lemming populations are closely associated with many ground nesting bird species.	The effects on birds and bird nests from increases in predators attracted to facilities and human food are discussed in Section 3.11.2.3.4, *Attraction to Human Activity and Facilities*. More detail was added to that discussion. Ravens and glaucous gulls have increased over time, and ravens have increased with human development. Ravens, however, are not by themselves disastrous. Ravens were only ≤16% of the subsidized predators (those using human food or nest sites), whereas jaegers were the most prevalent predators (32%–77% of all predators) in the region-wide study of tundra-nesting birds by Liebezeit et al. (2009). In a recent study at CD5, ravens were only 2% of the predators counted on breeding bird plots; glaucous gulls were 50% and jaegers were 47% (Rozell and Johnson 2020). Ravens accounted for 10% of attacks on snow goose nests in Canada (Bêty, Gauthier et al. 2001). Thus, ravens, which are efficient nest predators, were not a large component of the nest predator community. Foxes were attracted to and subsidized by human food in Prudhoe during the 1980s and 1990s (Burgess, Rose et al. 1993; Eberhardt, Garrott et al. 1983; Eberhardt, Hanson et al. 1982; Garrott, Eberhardt et al. 1983). The attraction of foxes and gulls to recent development with better waste-handling practices is less clear, with no increase in foxes and gulls at Alpine (see Johnson, Burgess et al. 2003). Bart, Platte, et al. (2013) found no difference in number of foxes observed between Prudhoe Bay and NPR-A. Liebezeit et al. (2011) found no difference between Prudhoe Bay and Teshekpuk study areas in total predators counted on bird plots. Additionally, no relationship was found between number of predators and shorebird or passerine nest survival at various sites (Liebezeit, White et al. 2011; Liebezeit, Kendall et al. 2009). The case for lemmings having an indirect effect on bird productivity is suggestive but not clear-cut; evidence of lemming numbers affecting Steller's eider nesting success in Utqiaġvik (Barrow) has been mixed, and small-mammal abundance did not enter models of tundra-nesting bird nest survival at four sites (Liebezeit, Kendall et al. 2009) but was related to Lapland longspur (but not shorebird) nest survival at Teshekpuk Lake and Prudhoe Bay (Liebezeit, White et al. 2011). Lemmings have been documented as having a positive effect on nesting success of snow geese, a dense colony of nesting geese in Canada, where Arctic foxes were the primary predator (Bêty, Gauthier et al. 2001). However, the same relationship has not been demonstrated for dispersed nesting birds in the ACP. Thus, drawing a conclusion on the effect of development on lemmings (whatever those might be) and extending that to bird nesting in the Willow area is not supported by literature from the ACP.	Y

4.2.5 Climate Change

Table B.2.8. Substantive Comments Received on Climate Change

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
11	8	Baraff	Lisa	—	Climate Change	And a footnote — a Footnote A to Table E-13.6 states that there will be no underwater noise anticipated from sheet and pile driving since work would be done on and through bottom fast ice. Given climate change and the rapidly changing sea ice in freeze-up conditions, what are the plans, if there is no — or insufficient bottom fast ice?	Conditions are not expected to change before construction is complete.	N
1305	3	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	BLM overlooks the social cost of greenhouse gases metric that was designed by a federal Interagency Working Group (IWG) and allows BLM to contextualize the significance of the plans climate impacts as NEPA requires. BLM should use that metric to monetize the damages that will result from this master development plan.	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1305	5	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	In addition to its failure to analyze and disclose to the public the significance of the actual climate damages associated with the master development plan, BLM downplays the effect of these emissions by claiming that more than 95 percent of downstream emissions from new federal mineral production described in the plan would, absent the project, be offset by increased emissions in other locations. Yet this conclusion relies on several faulty assumptions that overstate this substitution effect. Most significantly, BLM assumes that global oil and gas demand will remain constant over the next 70 years, despite the fact that such a scenario would produce catastrophic climate damages and, for this reason, nations around the world are adopting policies to avert such a scenario. BLM also fails to recognize this substitution effect when describing the plans projected economic impacts, arbitrarily and impermissibly placing a thumb on the scale by discounting only the plans environmental harms.	BLM did analyze the Willow MDP Project's impact on climate in the form of GHG emissions. A sophisticated set of models were used to perform the GHG Emissions analysis that BOEM did for the BLM. Those results were disclosed. Downstream emissions were not downplayed; changes in domestic emissions as a result of the MDP approval were presented. The MDP production would displace other energy sources used to meet demand for energy. While overall energy consumption would increase due to prices falling slightly, the mix of energy sources used to meet that demand shifts as a result of the Willow MDP Project approval. For all three Alternatives, MDP production would displace 93.69% of its volume in existing oil supplied. It would also displace 1.98% and 0.71% of its energy value in existing supplied energy from natural gas and coal, respectively. Due to lower prices, demand increased by only a net 3.24% of the MDP production energy equivalent volumes: an increase of 5.39% for oil demand; and decreases of -1.49% in natural gas, -0.21% in coal, and -0.46% in electricity demand relative to MDP production energy equivalent volumes. The estimated emissions of the MDP production volume relative to the domestically displaced energy supplied was disclosed. Page 3 of the MarketSim documentation shows that both the domestic and global demand equations incorporate elasticity adjustment rate factors that allow both global and domestic assumptions made by the EIA to respond to price changes due to a domestic supply shock. Page 4 of this document shows that the domestic and global supply equations used by the model also incorporate price shock sensitivity and are therefore not constant. MarketSim documentation (Industrial Economics 2017) is available at https://espis.boem.gov/final%20reports/5612.pdf. These equations adjust supply and demand from the forecasted baseline provide by EIA, which itself incorporates shifts in demand over time. EIA's forecast looks at existing policies and does not forecast future laws or policies. The BOEM uses the EIA projections as the official Government estimates of future energy consumption. Any potential climate policy would be too uncertain at this stage to fully estimate in the model. BOEM's approach was to take a worst-case scenario and consider the maximum emissions and not account for future improvements for which future emission rates are unknown.	N
1305	7	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	BLM significantly understates the plans projected net emissions by applying an energy substitution analysis that irrationally inflates energy substitution effects, while artificially exaggerating the plans projected benefits relative to its environmental costs by inconsistently failing to project this substitution analysis to the economic benefits. We explain each of these points in turn below. I. BLM Impermissibly Fails to Disclose the Plans Actual Climate Impacts Despite the Presence of a Simple and Readily-Available Tool for Doing So: The IWGs Social Cost of Greenhouse Gases A. BLM Must Monetize the Social Cost of Greenhouse Gases in the DEIS NEPA, the statute under which environmental impact statements are required, directs agencies to fully and accurately analyze the environmental, public health, and social welfare differences between proposed alternatives, and to contextualize that information for decision-makers and the public. NEPA requires a more searching analysis than merely disclosing the amount of pollution. Rather, BLM must examine the ecological[,] economic, [and] social impacts of those emissions, including an assessment of their significance.	The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs. It may be more helpful to think of substitutions as displacements. Prior to any MDP production supply shock, there is an existing energy market with a forecasted domestic supply of energy (some of which is imported). In the event the Willow MDP Project is approved, demand for oil would increase slightly. With demand for Willow MDP Project volumes only going up slightly, the rest of the volumes must go somewhere. It displaces oil supplied (consumed), mostly imports, as well as other energy sources. That displaced energy is defined by the model and in the EIS as energy substitutes, from the perspective of a No Action Alternative. That displaced energy has emissions for which an estimation is made domestically. MarketSim is a very sophisticated model and the estimates it produces on energy substitutes are the most reliable estimates available. In response to the second portion of this comment: Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here.	N
1305	8	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	By failing to use available tools, such as the social cost of carbon, to analyze the significance of the greenhouse gas emissions resulting from the master development plan, BLM has violated NEPA. Monetizing Climate Damages Fulfills the Obligations and Goals of NEPA When a project has climate consequences that must be assessed under NEPA, monetizing the climate damages fulfills an agency's legal obligations under NEPA in ways that simple quantification of tons 40 C.F.R. 1508.8(b), 1502.16(a)(b). of greenhouse gas emissions cannot. NEPA requires hard look consideration of beneficial and adverse effects of each alternative option for major federal government actions. The U.S. Supreme Court has called the disclosure of impacts the key requirement of NEPA, and held that agencies must consider and disclose the actual environmental effects of a proposed project in a way that brings those effects to bear on [the agency's] decisions. Courts have repeatedly concluded that an environmental impact statement must disclose relevant climate effects. NEPA requires a reasonably thorough discussion of the significant aspects of the probable environmental consequences, to foster both informed decision-making and informed public participation. In particular, [t]he impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires, and it is arbitrary to fail to provide the necessary contextual information about the cumulative and incremental environmental impacts.	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here.	N

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1305	9	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	As this section explains, by only quantifying the volume of greenhouse gas emissions, agencies fail to assess and disclose the actual climate consequences of an action and misleadingly present information in ways that will cause decisionmakers and the public to overlook important climate consequences. Using the social cost of greenhouse gas metrics to monetize climate damages fulfills NEPAs legal obligations in ways that quantification alone cannot. BLM Must Assess Actual Incremental Climate Impacts, Not Just the Volume of Emissions The tons of greenhouse gases emitted by a project are not the actual environmental effects under NEPA. Rather, the actual effects and relevant factors that must be analyzed and disclosed to the public are the incremental climate impacts caused by those emissions, including: Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, 462 U.S. 87, 96 (1983) (emphasis added); see also 40 C.F.R. 1508.8(b) (requiring assessment of the ecological, economic, social, and health effects) (emphasis added). . . . [P]roperty lost or damaged by sea-level rise, coastal storms, flooding, and other extreme weather events, as well as the costs of protecting vulnerable property and resettling following property losses; changes in energy demand, from temperature-related changes to the demand for cooling and heating; lost productivity and other impacts to agriculture, forestry, and fisheries, due to alterations in temperature, precipitation, CO2 fertilization, and other climate effects; human health impacts, including cardiovascular and respiratory mortality from heat-related illnesses, changing disease vectors like malaria and dengue fever, increased diarrhea, and changes in associated pollution; changes in fresh water availability; ecosystem service impacts; impacts to outdoor recreation and other non-market amenities; and catastrophic impacts, including potentially rapid sea-level rise, damages at very high temperatures, or unknown events.*13* Even in combination with a general, qualitative discussion of climate change, by calculating only the tons of greenhouse gases emitted, an agency fails to meaningfully assess the actual incremental impacts to property, human health, productivity, and so forth. An agency therefore falls short of its legal obligations and statutory objectives by disclosing only volume estimates. To take an analogous example, courts have held that just quantifying the acres of timber to be harvested or the miles of road to be constructed does not constitute a description of actual environmental effects, even when paired with a qualitative list of environmental concerns such as air quality, water quality, and endangered species, when the agency fails to assess the degree that each factor will be impacted.	Current scientific knowledge cannot associate particular actions with specific climate effects, and a single project cannot significantly impact global GHG emissions; however, all projects may contribute cumulatively to the significant impact of global climate change. See Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), for a description of the method used to estimate GHG emissions. The social cost of carbon, a measure used to assess the economic cost of a project's or action's climate change effects, was not used in the EIS; the reasons for this are detailed in Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*. Direct and indirect GHG emissions due to the Project are assessed as a proxy for understanding the potential effects of the Project on climate change.	N
1305	10	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	By monetizing climate damages using the social cost of greenhouse gas metrics, BLM can satisfy NEPAs legal obligations and statutory goals to assess the incremental and actual effects bearing on the public interest. The social cost of greenhouse gases methodology calculates how the emission of an additional unit of greenhouse gases affects atmospheric greenhouse concentrations, how that change in atmospheric concentrations changes temperature, and how that change in temperature incrementally contributes to the above list of economic damages, including property damages, energy demand effects, lost agricultural productivity, human mortality and morbidity, lost ecosystem services and non-market amenities, and so forth. The social cost of greenhouse gases tool therefore captures the factors that actually affect public welfare and assesses the degree of impact to each factor, in ways that just estimating the volume of emissions cannot. Climate Damages Depend on Stock and Flow, But Volume Estimates Only Measure Flow The climate damage generated by each additional ton of greenhouse gas emissions depends on the background concentration of greenhouse gases in the global atmosphere. Once emitted, greenhouse gases can linger in the atmosphere for centuries, building up the concentration of radiative-forcing pollution and affecting the climate in cumulative, non-linear ways. As physical and economic systems become increasingly stressed by climate change, each marginal additional ton of emissions has a greater, non-linear impact. The climate damages generated by a given amount of greenhouse pollution is therefore a function not just of the pollutions total volume but also the year of emission, and with every passing year an additional ton of emissions inflicts greater damage.	Current scientific knowledge cannot associate particular actions with specific climate effects, and a single project cannot significantly impact global GHG emissions; however, all projects may contribute cumulatively to the significant impact of global climate change. See Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), for a description of the method used to estimate GHG emissions. The social cost of carbon, a measure used to assess the economic cost of a project's or action's climate change effects, was not used in the EIS; the reasons for this are detailed in Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*. Direct and indirect GHG emissions due to the Project are assessed as a proxy for understanding the potential effects of the Project on climate change.	N
1305	11	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	As a result, focusing just on the volume or rate of emissions, as BLM does here, is insufficient to reveal the incremental effect on the climate. The change in the rate of emissions (flow) must be assessed given the background concentration of emissions (stock). A percent comparison to national emissions is perhaps even more misleading. A project that adds 23 million additional tons per year of carbon dioxide would have contributed to 0.43% of total U.S. carbon dioxide emissions in the year 2012. In the year 2014, that same project with the same carbon pollution would have contributed to just 0.41% of total U.S. carbon dioxide emissions, a seemingly smaller relative effect, since the total amount of U.S. emissions increased from 2012 to 2014. However, because of rising background concentrations of global greenhouse gas stock, and because of growing stresses in physical and economic systems, the marginal climate damages per ton of carbon dioxide (as measured by the social cost of carbon) increased from $33 in 2012 to $35 in 2014 (in 2007$).Consequently, those 23 million additional tons would have caused marginal climate damages costing $759 million in the year 2012, but by 2014 that same 23 million tons would have caused $805 million in climate damages. To summarize: the percentage comparison to national emissions misleadingly implies that a project adding 23 million more tons of carbon dioxide would have a relatively less significant effect in 2014 than in 2012, whereas monetizing climate damages would accurately reveal that the emissions in 2014 were much more damaging than the emissions in 2012 almost $50 million more. Capturing how marginal climate damages change as the background concentration changes is especially important because NEPA requires assessing both present and future impacts.	Current scientific knowledge cannot associate particular actions with specific climate effects, and a single project cannot significantly impact global GHG emissions; however, all projects may contribute cumulatively to the significant impact of global climate change. See Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), for a description of the method used to estimate GHG emissions. The social cost of carbon, a measure used to assess the economic cost of a project's or action's climate change effects, was not used in the EIS; the reasons for this are detailed in Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*. Direct and indirect GHG emissions due to the Project are assessed as a proxy for understanding the potential effects of the Project on climate change.	N

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1305	12	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	Different project alternatives can have different greenhouse gas consequences over time. Most simply, different alternatives could have different start dates or other consequential changes in timing. Calculating volumes or percentages, especially on an average annual basis, is insufficient to accurately compare the climate damages of project alternatives with varying greenhouse gas emissions over time. Here, for instance, BLM reports only the total greenhouse gas emissions from each of the three action alternatives, misleadingly implying a proportional relationship between these volumetric estimates and the climate impacts of each alternative. Yet BLM fails to recognize that, because Alternative D calls for oil production to occur two years later than Alternatives B and C, its emissions will have a greater incremental climate impact than those alternatives. By reporting only volumetric greenhouse gas projections, therefore, BLM paints an incomplete and misleading portrait of the relative climate impacts of the master development plans various alternatives. This problem would be easily solved by applying the social cost of greenhouse gases metric, which seamlessly accounts for timing differences between different alternatives. By factoring in projections of the increasing global stock of greenhouse gases as well as increasing stresses to physical and economic systems, the social cost of greenhouse gas metrics enable accurate and transparent comparisons of projects with varying greenhouse gas emissions over time.	Current scientific knowledge cannot associate particular actions with specific climate effects, and a single project cannot significantly impact global GHG emissions; however, all projects may contribute cumulatively to the significant impact of global climate change. See Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), for a description of the method used to estimate GHG emissions. The social cost of carbon, a measure used to assess the economic cost of a project's or action's climate change effects, was not used in the EIS; the reasons for this are detailed in Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*. Direct and indirect GHG emissions due to the Project are assessed as a proxy for understanding the potential effects of the Project on climate change.	N
1305	13	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	Monetization Provides the Required Informational Context that Volume Estimates Alone Lack NEPA requires sufficient informational context. Yet the limited context that BLM provides for the plans projected greenhouse gas emissions, namely, comparing such totals to largely irrelevant volumes of greenhouse gas emissions including the U.S. greenhouse gas inventory provides a confusing and inadequate picture that attempts to minimize the impacts of the plans substantial emissions. Indeed, in a country of over 300 million people and over 6.5 billion tons of annual greenhouse gas emissions, it is far too easy to make highly significant effects appear relatively trivial. For example, presenting all weather-related deaths as less than 0.1% of total U.S. deaths makes the risk of death by weather event sound trivial, but in fact that figure represents over 2,000 premature deaths per year, hardly an insignificant figure. As the U.S. Court of Appeals for the Fifth Circuit recently observed, even a seemingly very small portion of a gargantuan source of [harmful] pollution may nevertheless constitute a gargantuan source of [harmful] pollution on its own terms. In other words, percentages can be misleading and can be manipulated by the choice of the denominator; what matters is the numerators actual contribution to total harm. For example, the presentation of the master development plans average annual emissions as just 0.135% of the U.S. greenhouse gas inventory makes a substantial and incredibly costly amount of emissions seem inconsequential. As described by Professor Cass Sunstein drawing from the work of recent Nobel laureate economist Richard Thalera well-documented mental heuristic called probability neglect causes people to irrationally reduce such small probability risks entirely down to zero. People have significant difficulty understanding a host of numerical concepts, especially risks and probabilities. By presenting large quantities of emissions more than 260 million metric tons as a tiny percentage representing less than 0.2% percent or a much larger total, the DEIS is likely to cause stakeholders to misunderstand the true significance of these emissions and treat them as meaningless. By comparison, through monetization it becomes clear that, for example, annual gross emissions from the project could cause about $500 million per year in climate damages. Economic theory also explains why monetization is a much better tool than mere volume estimates to provide the necessary contextual information on climate damages. Abstract volume estimates fail to give people the required informational context due to another well-documented mental heuristic called scope neglect. Scope neglect, as explained by Nobel laureate Daniel Kahneman, among others, causes people to ignore the size of a problem when estimating the value of addressing the problem. For example, in one often-cited study, subjects were unable to meaningfully distinguish between the value of saving 2,000 migratory birds from drowning in uncovered oil ponds, as compared to saving 20,000 birds. As the Environmental Protection Agency's website explains, abstract measurements of so many tons of greenhouse gases can be rather inscrutable for the public, unless translat[ed] . . . into concrete terms you can understand.	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here. Briefly, federal agencies are not required to consider the social cost of carbon in decision making, since 2017 when EO 13783 (Promoting Energy Independence and Economic Growth) was issued. NEPA does not require a cost-benefit analysis (40 CFR 1502.23) and has not been conducted in the Draft EIS. Inclusion of a global social cost of carbon without monetized estimates of other effects, including the social benefits of energy production, would be unbalanced and of limited use to the decision-maker. Given the uncertainties associated with assigning a specific, accurate value to the social cost of carbon resulting from the Willow MDP Project, BLM has elected not to use this tool in its analysis.	N
1305	14	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	By failing to contextualize greenhouse gas emissions in the DEIS, BLM potentially misleads the reader into believing that there would be no climate effects from the master development plan, or that the effects would be extremely limited. As a result of scope neglect, for instance, many decisionmakers and members of the public may be unable to meaningfully contextualize the impact of more than 8 million metric tons of carbon dioxide equivalent into the atmosphere each year. . . . Losing 2,000 lives prematurely to weather-related events is equivalent to a loss of public welfare worth over $19 billion per year. Decisionmakers and the public can certainly tell this is a non-zero number, without any context it may be difficult to weigh the climate risks to which this volumetric estimate equates. In contrast, the plans climate risks would be readily discernible through application of the social cost of greenhouse gas metrics. While the impact of releasing over 8 million metric tons of carbon dioxide equivalent annually into the atmosphere may seem indiscernible, that impact is clearly conveyed by explaining that such a figure represents approximately $500 million per year in annual climate damages. In general, non-monetized effects are often irrationally treated as worthless. On several occasions, courts have struck down administrative decisions for failing to give weight to non-monetized effects. Most relevantly, in Center for Biological Diversity v. National Highway Traffic Safety Administration, the U.S. Court of Appeals for the Ninth Circuit found it arbitrary and capricious to give zero value to the most significant benefit of more stringent [fuel-economy] standards: reduction in carbon emissions.	Current scientific knowledge cannot associate particular actions with specific climate effects, and a single project cannot significantly impact global GHG emissions; however, all projects may contribute cumulatively to the significant impact of global climate change. See Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), for a description of the method used to estimate GHG emissions. The social cost of carbon, a measure used to assess the economic cost of a project's or action's climate change effects, was not used in the EIS; the reasons for this are detailed in Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*. Direct and indirect GHG emissions due to the Project are assessed as a proxy for understanding the potential effects of the Project on climate change.	N

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1305	15	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	Monetizing climate damages provides the informational context required by NEPA, whereas a simple tally of emissions volume and a qualitative, generic description of climate change are misleading and fail to give the public and decisionmakers the required information about the magnitude of discrete climate effects. Thus, while BLM treats emissions . . . as a proxy for climate change impacts throughout the DEIS, the social cost of greenhouse gases metrics in fact convey the plans actual climate effects and contextualize the significance in ways that quantification alone cannot, and thus should be utilized to satisfy the agency's obligations under NEPA. Climate Effects Must Be Monetized If Other Costs and Benefits Are Monetized Though NEPA does not always require a full and formal cost-benefit analysis, agencies approaches to assessing costs and benefits must be balanced and reasonable. Courts have warned agencies, for example, that an agency cannot selectively monetize benefits in support of its decision while refusing to monetize the costs of its action. In High Country Conservation Advocates v. Forest Service, for instance, the U.S. District Court of Colorado found that it was arbitrary and capricious to quantify the benefits of the lease modifications and then explain that a similar analysis of the costs was impossible when such an analysis was in fact possible. The court explained that, to support a decision on coal mining activity, the agencies had weighed several specific economic benefits coal recovered, payroll, associated purchases of supplies and services, and royalties but arbitrarily failed to monetize climate costs using the readily available social cost of carbon protocol. Similarly, in Montana Environmental Information Center v. Office of Surface Mining (MEIC v. OSM), the U.S. District Court of Montana followed the lead set by High Country and likewise held an environmental assessment to be arbitrary and capricious because it quantified the benefits of action (such as employment payroll, tax revenue, and royalties) while failing to use the social cost of carbon to quantify the costs. High Country and MEIC v. OSM were simply the latest applications of a broader line of case law in which courts find it arbitrary and capricious to apply inconsistent protocols for analyzing some effects compared to others, especially when the inconsistency obscures some of the most significant effects. For example, in Center for Biological Diversity v. National Highway Traffic Safety Administration, the U.S. Court of Appeals for the Ninth Circuit ruled that, because the agency had monetized other uncertain costs and benefits of its vehicle fuel efficiency standard, like traffic congestion and noise costs, its decision not to monetize the benefit of carbon emissions reduction was arbitrary and capricious. Specifically, it was arbitrary to assign no value to the most significant benefit of more stringent [vehicle fuel efficiency] standards: reduction in carbon emissions. When an agency bases a decision on cost-benefit analysis, it is arbitrary to put a thumb on the scale by undervaluing the benefits and overvaluing the costs. Similarly, the U.S. Court of Appeals for the District of Columbia Circuit has chastised agencies for inconsistently and opportunistically fram[ing] the costs and benefits of the rule [and] fail[ing] adequately to quantify the certain costs or to explain why those costs could not be quantified; and the U.S. Court of Appeals for the Tenth Circuit has remanded an environmental impact statement because unrealistic assumptions misleading[ly] skewed comparison of the projects positive and negative effects. The DEIS monetizes economic benefits similar to those highlighted in High Country and MEIC, including government revenues such as taxes and royalties. BLM does not sufficiently justify this inconsistent approach to monetizing some effects but not others, but tries to skirt the precedent set in the cases discussed above by labeling taxes and royalties as economic impacts rather than costs or benefits. First, as explained in MEIC v. OSM, this is a semantical distinction without a difference. Indeed, NEPA regulations group all impacts including economic, social, ecological, and public health under the same category of effects, and NEPA requires the agency to discuss all of these effects in as much detail as possible. Whether an effect is a cost, benefit, or transfer, if monetization is the best way to assess that effects significance and contextualize its precise impacts, then monetization is also the best way to comply with NEPAs obligations. Second, BLM has effectively calculated the market value of oil and gas production through its estimate of the plans royalties. In a competitive market, like for coal, oil, and natural gas, the market price is typically thought to reflect aggregate willingness to pay based on social utility. Therefore, in calculating and reporting royalties, BLM has effectively presented a monetized estimate of the plans projected social benefits.	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here. BLM's analysis complies with EO 13783 (Promoting Energy Independence and Economic Growth) and 43CFR 1502.23. Assigning a specific, accurate value to the social costs of carbon resulting from the Willow MDP Project would be too speculative to inform the decision-maker. NEPA does not require a cost-benefit analysis (40 CFR 1502.23), and one has not been completed for this Draft or Final EIS. Inclusion of a global social cost of carbon without monetized estimates of other effects, including the social benefits of energy production, would be unbalanced and of limited use to the decision-maker.	N

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1305	16	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	As detailed further below, the IWGs approach presents a readily available tool to monetize the effects of greenhouse gas emissions based on peer-reviewed inputs and widely accepted assumptions. Agencies are every bit as capable of monetizing climate damages as they are of monetizing socioeconomic impacts. BLM therefore violates NEPA by monetizing social and economic effects in the DEIS while refusing to monetize climate impacts. B. The Social Cost of Greenhouse Gas Metric Is Appropriate for This Plan Seemingly anticipating the objections presented above, BLM argues that it cannot monetize the master development plans effects on greenhouse gas emissions because [i]t is not currently possible to determine the impact of a single project on global climate change. This statement, however, is simply incorrect: the social cost of greenhouse gas protocol is exactly such a tool to monetize the incremental climate impacts of specific projects or plans, and to contextualize the magnitude of those impacts. NEPA requires BLM to use the best available science to support its NEPA analysis, and the social cost metrics remain the best estimates yet produced by the federal government for monetizing the impacts of greenhouse gas emissions and are generally accepted in the scientific community. Monetization Is Appropriate and Useful in Any Decision with Significant Climate Impacts, Not Just Regulations BLM argues that use of the IWGs social cost metrics is inappropriate for this plan because it is not a rulemaking for which the [social cost of carbon] protocol was originally developed. But this argument misses the point: BLM fails to explain why those metrics should not be used in environmental impact statements when they provide the best method to convey the climate impacts of a plan that would contribute substantially to greenhouse gas emissions. Indeed, there is nothing in the development of the social cost metrics that would limit applications to other contexts. The social cost of greenhouse gases measures the marginal cost of any additional unit of greenhouse gases emitted into the atmosphere. The government action that precipitated that unit of emissions regulation, the granting of a permit, a project approval, or a master development plan is irrelevant to the marginal climate damages caused by its emissions. Whether emitted by a leaking pipeline or the extraction process, because of a regulation or a resource management decision, or in Alaska or Maine, the marginal climate damages per unit of emissions remain the same. Indeed, the social cost of greenhouse gases has been used by many federal and state agencies in environmental impact reviews and resource management decisions. The Social Cost of Greenhouse Gas Metrics Provide a Tool to Assess the Significance of Individual Physical Impacts The social cost of greenhouse gas methodology is well suited to measure the marginal climate damages of individual projects. These protocols were developed to assess the cost of actions with marginal impacts on cumulative global emissions, and the metrics estimate the dollar figure of damages for one extra unit of greenhouse gas emissions. This marginal cost is calculated using integrated assessment models. These models translate emissions into changes in atmospheric greenhouse concentrations, atmospheric concentrations into changes in temperature, and changes in temperature into economic damages. A range of plausible socioeconomic and emissions trajectories are used to account for the scope of potential scenarios and circumstances that may actually result in the coming years and decades. The marginal cost is attained by first running the models using a baseline emissions trajectory, and then running the same models again with one additional unit of emissions. The difference in damages between the two runs is the marginal cost of one additional unit. The approach assumes that the marginal damages from increased emissions will remain constant for small emissions increases relative to gross global emissions.	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here. Briefly, federal agencies are not required to consider the social cost of carbon in decision making, since 2017 when EO 13783 (Promoting Energy Independence and Economic Growth) was issued. NEPA does not require a cost-benefit analysis (40 CFR 1502.23), and one has not been completed for the Draft or Final EIS. Inclusion of a global social cost of carbon without monetized estimates of other effects, including the social benefits of energy production, would be unbalanced and of limited use to the decision-maker. Given the uncertainties associated with assigning a specific, accurate value to the social cost of carbon resulting from the Willow MDP Project, BLM has elected not to use this tool in its analysis.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1305	17	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	In other words, the monetization tools are in fact perfectly suited to measuring the marginal effects of individual projects or other discrete agency actions. Some of the incremental impacts on the environment that the social cost of greenhouse gas protocol captures and which the DEIS fails to meaningfully analyze include property lost or damaged; impacts to agriculture, forestry, and fisheries; impacts to human health; changes in fresh water availability; ecosystem service impacts; impacts to outdoor recreation and other non-market amenities; and some catastrophic impacts, including potentially rapid sea-level rise, damages at very high temperatures, or unknown events.*63* A key advantage of using the social cost of greenhouse gas tool is that each physical impact such as sea-level rise and increasing temperatures need not be assessed in isolation. Instead, the social cost of greenhouse gases tool conveniently groups together a multitude of climate impacts and, consistent with NEPA regulations,*64* enables agencies to assess whether all those impacts are cumulatively significant and to then compare those impacts with other impacts or alternatives using a common metric. The Tons of Greenhouse Gas Emissions at Stake Here Are Clearly Significant BLM quantifies upstream and downstream greenhouse gas emissions from the plan, amounting to more than 8 million metric tons per year. But BLM refuses to take the straightforward next step of applying the social cost of greenhouse gas values to those quantified tons, claiming that it cannot determine the effects of the master development plan on climate change and minimizing the significance of the plans emissions by presenting them as only a small percentage of the global concentration of greenhouse gas emissions. The threshold for monetization, to the extent that it exists at all, is well below the volumetric emissions estimates that BLM projects here. While the projected emissions in this plan total more than 8 million metric tons annually, numerous courts have held that far lower annual emissions totals warrant monetization. For instance, the court in High Country found that it was arbitrary for the Forest Service not to monetize the 1.23 million tons of carbon dioxide equivalent emissions [from methane] the West Elk mine emits annually. Likewise, in Center for Biological Diversity, the Ninth Circuit found that it was arbitrary for the Department of Transportation not to monetize the 35 million metric ton difference in lifetime emissions from increasing the fuel efficiency of motor vehicles: given the estimated lifetime of vehicles sold in the years 2008-2011 (sometimes estimated at about 15 years on average), this could represent as little 2 million metric tons per year. And in a recent environmental impact statement from the Bureau of Ocean Energy Management (BOEM), the agency explained that the social cost of carbon was a useful measure for a NEPA analysis of an action anticipated to have a difference in greenhouse gas emissions compared to the no-action baseline of about 25 million metric tons over a 5-year period, or about 5 million metric tons per year. While there may not be a bright-line test for significance, the emissions BLM estimates for this plan are significant and warrant monetization. This is especially true since, once emissions have been quantified, the additional step of monetization through application of the IWGs cost estimates entails a simple arithmetic calculation. It is difficult to understand how NEPAs mandate that an agency take a hard look at the environmental impacts of its actions can be satisfied if BLM fails to take the simple step of analyzing the impacts of the greenhouse gas emissions that it quantifies. Monetizing Climate Damages Is Appropriate and Useful Regardless of Whether Every Effect Can Be Monetized in a Full Cost-Benefit Analysis BLM further argues that use the social cost of greenhouse gases would be inappropriate because [w]ithout a complete monetary cost-benefit analysis, which would include the social benefits of the proposed action to society as a whole and other potential positive benefits, including only an SCC cost analysis would be unbalanced, potentially inaccurate, and not useful to the decisionmaker. This is mistaken for several reasons. First, as noted above, BLM has effectively monetized the full benefits of the plan as an input into its calculation of government royalties. BLM's repeated attempts to hide behind its failure to monetize the plans benefits therefore fails. But even accepting BLM's premise that it has not monetized the social benefits of the proposed plan, monetizing the plans negative climate impacts would still provide useful information for decision-makers and the public, and not skew the analysis. In particular, whether or not other effects are monetized, using the social cost of greenhouse gases will facilitate comparison between alternative options along the dimension of climate change. As discussed above, different alternatives could have varying greenhouse gas consequences over time, and monetization provides an appropriate means of comparing plan alternatives along the dimension of climate change. Monetizing the plans climate effects could also provide a framework for making decisions when some effects but not others are monetized, through what is not as break-even analysis. As described in the Office of Management and Budgets Circular A-4, which provides guidance to agencies on conducting economic analysis including methods for weighing monetized and qualitative costs and benefits, agencies should carry out a break-even analysis when it is not possible to.	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here. BLM's analysis complies with EO 13783 (Promoting Energy Independence and Economic Growth) and 43CFR 1502.23. Assigning a specific, accurate value to the social costs of carbon resulting from the Willow MDP Project would be too speculative in order to inform the decision-maker. NEPA does not require a cost-benefit analysis (40 CFR 1502.23), and one has not been completed for the Draft or Final EIS. Inclusion of a global social cost of carbon without monetized estimates of other effects, including the social benefits of energy production, would be unbalanced and of limited use to the decision-maker.	N

1305	18	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	Agencies simply need to multiply their estimate of tons in each year by the IWGs 2016 values for the corresponding year of emissions (adjusted for inflation to current dollars). If the emissions change occurs in the future, agencies would then discount the products back to present value. . . . [E]xpress in monetary units all of the important benefits and costs. Under such an analysis, the agency considers [h]ow small could the value of the non-quantified benefits be (or how large would the value of the non-quantified costs need to be) before the rule would yield zero net benefits. Such an analysis could be useful here: Even if BLM is unable to fully monetize all costs and benefits, it could consider whether the alleged benefits of this proposal are worth the roughly $500 million in annual climate costs. Moreover, even without using something as formal as a break-even analysis, it is clear that monetizing climate damages provides useful information whether or not every effect can be monetized in a full cost-benefit analysis. NEPA regulations acknowledge that when monetization of costs and benefits is relevant to the choice among environmentally different alternatives, that analysis can be presented alongside any analyses of unquantified environmental impacts, values, and amenities. In other words, contrary to BLM's argument against the use of the social cost of greenhouse gas metrics, the inability to monetize some impacts should not preclude the monetization of impacts like climate damages that can be readily monetized. C. BLM Should Use the Interagency Working Groups 2016 Estimates of the Social Cost of Carbon, the Social Cost of Nitrous Oxide, and the Social Cost of Methane In 2016, the IWG published updated central estimates for the social cost of greenhouse gases: $50 per ton of carbon dioxide, $1440 per ton of methane, and $18,000 per ton of nitrous oxide (in 2017 dollars for year 2020 emissions). Agencies must continue to use estimates of a similar or higher value in their analyses and decision-making. A recent Executive Order disbanding the IWG which BLM credits in part for its decision not to monetize climate impacts does not change the fact that the IWG estimates still reflect the best available data and methodologies. IWGs Methodology Is Rigorous, Transparent, and Based on the Best Available Data Beginning in 2009, the IWG assembled experts from a dozen federal agencies and White House offices to estimate the monetized damages associated with an incremental increase in carbon emissions in a given year based on a defensible set of input assumptions that are grounded in the existing scientific and economic literature. IWGs methods combined three frequently used models built to predict the economic costs of the physical impacts of each additional ton of carbon. The models together incorporate such damage categories as: agricultural and forestry impacts, coastal impacts due to sea level rise, impacts from extreme weather events, impacts to vulnerable market sectors, human health impacts including malaria and pollution, outdoor recreation impacts and other non-market amenities, impacts to human settlements and ecosystems, and some catastrophic impacts. IWG ran these models using a baseline scenario including inputs and assumptions drawn from the peer-reviewed literature, and then ran the models again with an additional unit of carbon emissions to determine the increased economic damages. IWGs social cost of carbon estimates were first issued in 2010 and have been updated several times to reflect the latest and best scientific and economic data. Following the development of estimates for carbon dioxide, the same basic methodology was used in 2016 to develop the social cost of methane and social cost of nitrous oxide estimates that capture the distinct heating potential of methane and nitrous oxide emissions. These additional metrics used the same economic models, the same treatment of uncertainty, and the same methodological assumptions that IWG applied to the social cost of carbon, and these new estimates underwent rigorous peer-review. IWGs methodology has been repeatedly endorsed by reviewers. In 2014, the U.S. Government Accountability Office concluded that IWG had followed a consensus-based approach, relied on peer-reviewed academic literature, disclosed relevant limitations, and adequately planned to incorporate new information through public comments and updated research. In 2016 and 2017, the National Academies of Sciences, Engineering, and Medicine issued two reports that, while recommending future improvements to the methodology, supported the continued use of the existing IWG estimates. And in 2016, the U.S. Court of Appeals for the Seventh Circuit held that the Department of Energy's reliance on IWGs social cost of carbon was reasonable. It is, therefore, unsurprising that leading economists and climate policy experts have endorsed the IWGs values as the best available estimates. Furthermore, uncertainty over the values or range of values included in the IWGs social costs of greenhouse gases metric is not a reason to abandon the social cost of greenhouse gas methodologies; quite the contrary, uncertainty supports higher estimates of the social cost of greenhouse gases, because most uncertainties regarding climate change entail tipping points, catastrophic risks, and unknown unknowns about the damages of climate change. Because the key uncertainties of climate change include the risk of irreversible catastrophes, applying an options value framework to the regulatory context strengthens the case for ambitious regulatory action to reduce greenhouse gas emissions. Not only was justifying omitted climate damages due to uncertainty rejected by the Ninth Circuit in Center for Biological Diversity while . . . there is a range of values, the value of carbon emissions reduction is certainly not zero but the range of values recommended by the IWG*93* and endorsed by the National Academies of Sciences is rather manageable. In 2016, the IWG recommended values at discount rates from 2.5% to 5%, calculated as between $12 and $62 for year 2020 emissions. Numerous federal agencies have had no difficulty either applying this range in their environmental impact statements or else focusing on the central estimate at a 3% discount rate. Most recently, in August 2017, BOEM applied the IWGs range of estimates calculated at three discount rates (2.5%, 3%, and 5%) to its environmental impact statement for an offshore oil development plan, and called this range of estimates a useful measure to assess the benefits of CO2 reductions and inform agency decisions. A Recent Executive Order Does Not Change the Requirements to Monetize Climate Damages In March 2017, President Trump disbanded the IWG and withdrew its technical support documents. Nevertheless, Executive Order 13,783 assumes that federal agencies will continue to monetiz[e] the value of changes in greenhouse gas emissions and instructs agencies to ensure such estimates are consistent with the guidance contained in OMB Circular A-4. Consequently, while federal agencies no longer benefit from ongoing	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here. BLM's analysis complies with EO 13783 (Promoting Energy Independence and Economic Growth) and 43CFR 1502.23. Assigning a specific, accurate value to the social costs of carbon resulting from the Willow MDP Project would be too speculative to inform the decision-maker. NEPA does not require a cost-benefit analysis (40 CFR 1502.23), and one has not been completed for the Draft or Final EIS. Inclusion of a global social cost of carbon without monetized estimates of other effects, including the social benefits of energy production, would be unbalanced and of limited use to the decision-maker.	N

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						technical support from the IWG on using the social cost of greenhouse gases, by no means does the new Executive Order imply that agencies should not monetize important effects in their environmental impact statements. The Executive Order does not prohibit agencies from relying on the same choice of models as the IWG, the same inputs and assumptions as the IWG, the same statistical methodologies as the IWG, or the same ultimate values as derived by the IWG. To the contrary, because the Executive Order requires consistency with Circular A-4, as agencies follow the Circulars standards for using the best available data and methodologies, they will necessarily choose similar data, methodologies, and estimates as the IWG, since the IWGs work continues to represent the best available estimates. The Executive Order does not preclude agencies from using the same range of estimates as developed by the IWG, so long as the agency explains that the data and methodology that produced those estimates are consistent with Circular A-4 and, more broadly, with standards for rational decision-making. Similarly, the Executive Orders withdrawal of the Council on Environmental Quality's guidance on greenhouse gases, does not and legally cannot remove agencies statutory requirement to fully disclose the environmental impacts of greenhouse gas emissions. As the Council on Environmental Quality explained in its withdrawal, the guidance was not a regulation, and [t]he withdrawal of the guidance does not change any law, regulation, or other legally binding requirement. In other words, when the guidance originally recommended the appropriate use of the social cost of greenhouse gases in environmental impact statements, it was simply explaining that the social cost of greenhouse gases is consistent with longstanding NEPA regulations and case law, all of which are still in effect today. Notably, some agencies under the Trump administration have continued to use the IWG estimates even following the Executive Order. For example, in August 2017, the BOEM called the social cost of carbon a useful measure and applied it to analyze the consequences of offshore oil and gas drilling. And in July 2017, the Department of Energy used the IWGs estimates for carbon and methane emissions to analyze energy efficiency regulation, describing the social cost of methane as having undergone multiple stages of peer review. Two agencies have developed new interim values of the social cost of greenhouse gases following the Executive Order. Relying on faulty economic theory, these interim estimates drop the social cost of carbon from $50 per ton in year 2020 down to as little as $1 per ton, and drop the social cost of methane from $1420 per ton in year 2020 down to $58. These interim estimates are inconsistent with accepted science and economics; the IWGs 2016 estimates remain the best available estimates. The IWGs methodology and estimates have been repeatedly endorsed by reviewers as transparent, consensus-based, and firmly grounded in the academic literature. By contrast, the interim estimates ignore the interconnected, global nature of our climate-vulnerable economy, and obscure the devastating effects that climate change will have on younger and future generations. BLM should not use the interim social cost of greenhouse gas estimates because of its methodological flaws. Uncertainty Supports Higher Social Cost of Greenhouse Gas Estimates, and Is Not a Reason to Abandon the Metric Generally, uncertainty is not a reason to abandon the social cost of greenhouse gas methodologies; quite the contrary, uncertainty supports higher estimates of the social cost of greenhouse gases, because most uncertainties regarding climate change entail tipping points, catastrophic risks, and unknown unknowns about the damages of climate change. Because the key uncertainties of climate change include the risk of irreversible catastrophes, applying an options value framework to the regulatory context strengthens the case for ambitious regulatory action to reduce greenhouse gas emissions.		

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1305	19	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	There are numerous well-established, rigorous analytical tools available to help agencies characterize and quantitatively assess uncertainty, such as Monte Carlo simulations, and the IWGs social cost of greenhouse gas protocol incorporates those tools. To further deal with uncertainty, the IWG recommended to agencies a range of four estimates: three central or mean-average estimates at a 2.5%, 3%, and 5% discount rate respectively, and a 95th percentile value at the 3% discount rate. While the IWGs technical support documents disclosed fuller probabilities distributions, these four estimates were chosen by agencies to be the focus for decision-making. In particular, application of the 95th percentile value was not part of an effort to show the probability distribution around the 3% discount rate; rather, the 95th percentile value serves as a methodological shortcut to approximate the uncertainties around low-probability but high-damage, catastrophic, or irreversible outcomes that are currently omitted or undercounted in the economic models. The shape of the distribution of climate risks and damages includes a long tail of lower-probability, high-damage, irreversible outcomes due to tipping points in planetary systems, inter-sectoral interactions, and other deep uncertainties. Climate damages are not normally distributed around a central estimate, but rather feature a significant right skew toward catastrophic outcomes. In fact, a 2015 survey of economic experts concludes that catastrophic outcomes are increasingly likely to occur. Because the three integrated assessment models that the IWGs methodology relied on are unable to systematically account for these potential catastrophic outcomes, a 95th percentile value was selected instead to account for such uncertainty. There are no similarly systematic biases pointing in the other direction which might warrant giving weight to a low-percentile estimate. Additionally, the 95th percentile value addresses the strong possibility of widespread risk aversion with respect to climate change. The integrated assessment models do not reflect that individuals likely have a higher willingness to pay to reduce low-probability, high-impact damages than they do to reduce the likelihood of higher-probability but lower impact damages with the same expected cost. Beyond individual members of society, governments also have reasons to exercise some degree of risk aversion to irreversible outcomes like climate change. The National Academies of Sciences, Engineering, and Medicine did recommend that the IWG document its full treatment of uncertainty in an appendix and disclose low-probability as well as high-probability estimates of the social cost of greenhouse gases. However, that does not mean it would be appropriate for individual agencies to rely on low-percentile estimates to justify decisions. While disclosing low-percentile estimates in a sensitivity analysis may promote transparency, relying on such an estimate for decision-making in the face of contrary guidance from the best available science and economics on uncertainty and risk would not be a credible, objective, realistic, and scientifically balanced approach to uncertainty, as required by Circular A-4. In short, the 95th percentile estimate attempts to capture risk aversion and uncertainties around lower probability, high-damage, irreversible outcomes that are currently omitted or undercounted by the models. There is no need to balance out this estimate with a low-percentile value, because the reverse assumptions are not reasonable: There is no reason to believe the public or the government will be systematically risk seeking with respect to climate change. The consequences of overestimating the risk of climate damages (i.e., spending more than we need to on mitigation and adaptation) are not nearly as irreversible as the consequences of underestimating the risk of climate damage (i.e., failing to prevent catastrophic outcomes). Though some uncertainties might point in the direction of lower social cost of greenhouse gas values, such as those related to the development of breakthrough adaptation technologies, the models already account for such uncertainties around adaptation; on balance, most uncertainties strongly point toward higher, not lower, social cost of greenhouse gas estimates. There is no empirical basis for any long tail of potential benefits that would counteract the potential for extreme harm associated with climate change. Moreover, even the best existing estimates of the social cost of greenhouse gases are likely underestimated because the models currently omit many significant categories of damages such as depressed economic growth, pests, pathogens, erosion, air pollution, fire, dwindling energy supply, health costs, political conflict, and ocean acidification, as well as tipping points, catastrophic risks, and unknown unknowns and because of other methodological choices. Consequently, uncertainty suggests an even higher social cost of greenhouse gases and so is not a reason to abandon the metric, which would misleadingly suggest that climate damages are worthless.	Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here. BLM's analysis complies with EO 13783 (Promoting Energy Independence and Economic Growth) and 43CFR 1502.23. Assigning a specific, accurate value to the social costs of carbon resulting from the Willow MDP Project would be too speculative to inform the decision-maker. NEPA does not require a cost-benefit analysis (40 CFR 1502.23), and one has not been completed for the Draft or Final EIS. Inclusion of a global social cost of carbon without monetized estimates of other effects, including the social benefits of energy production, would be unbalanced and of limited use to the decision-maker.	N

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1305	20	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	II. BLM's Energy Substitution Analysis is Flawed and Inconsistently Applied, Leading to a Likely Underestimation of Net Emissions and an Inflation of Economic Benefits In addition to its refusal to monetize the social cost of the master development plans projected greenhouse gas emissions, BLM also seeks to downplay the quantified emissions by asserting that approximately 95 percent of increased downstream greenhouse gas emissions would be substituted by additional emissions elsewhere under a no action scenario suggesting, in other words, that the plan is only actually responsible for 5 percent of its generated emissions.*114* But BLM does not release its full analysis, and its estimates are based on a model known as MarketSim that has significant structural flaws. BLM should not only release its full analysis to provide for meaningful public review, but should also reconsider its reliance on MarketSim in its present form. Given the models fundamental flaws and unexplained results, reliance on this model without further reassessment or disclosure would violate BLM's obligations under NEPA. BLM also inconsistently fails to apply any substitution analysis to its estimates of projected oil and gas revenues and other economic effects, thereby misleadingly inflating the plans purported economic benefits relative to its environmental harms.	Downstream emissions were not downplayed; changes in domestic emissions as a result of the Willow MDP Project approval were presented. The Willow MDP Project production would displace other energy sources used to meet consumption. While overall energy consumption would increase due to prices falling slightly, the mix of energy sources used to meet that demand shifts as a result of the Willow MDP Project approval, and the emissions from those other sources would decrease. Addressing the net change in emissions is in fact methodologically correct. For all three Alternatives, the estimated emissions of the MDP production volume relative to the domestically displaced energy supplied was disclosed. Key assumptions and data for the Project GHG emissions, indirect (GHG Lifecycle Model) emissions and MarketSim model emissions were provided in Draft EIS Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*), Appendix E.2A (*Climate and Climate Change Technical Appendix*), and Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), as well as Chapter 2.0 of Appendix E.3B (*Air Quality Technical Support Document*). Additional information is also provided in the Project GHG emission calculation spreadsheets that are available on request from BLM. The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs.	N
1305	21	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	BLM Should Release Its Full Substitution Analysis, Particularly in Light of MarketSim's Previously Inconsistent and Unexplained Results According to BLM's substitution analysis, only 3.26% of the oil and gas production called for under this plan represents new demand, meaning that the remainder 96.74%would be offset by substitute fuels at other locations under a no action alternative. However, while BLM reports that it obtained these results using a model developed by BOEM known as MarketSim, it does not release its full analysis or its runs of the simulation tool. BLM should provide such information to allow the public to meaningfully review and analyze the results. Full disclosure of all MarketSim runs is particularly critical because the tool has produced inconsistent results in the past. For instance, when BLM ran MarketSim for its recent draft resource management plan for Eastern Colorado, it found that the majority of increased oil and gas production would be replaced by onshore production a nearly inverse result from its MarketSim results earlier in the year for the now-finalized oil and gas leasing in the Arctic National Wildlife Refuge Coastal Plain, which found most substitution coming from increased foreign imports. In this case, BLM conspicuously fails to provide any breakdown of where the different substitutes would come from such as from increased foreign imports or additional onshore production making it impossible to determine whether its present results are consistent with any of BLM's previous substitution analyses. To facilitate meaningful public review, therefore, BLM should make all data models and runs of its substitution analysis available, and reopen public comment to provide adequate opportunity for all stakeholders to assess this data. If it refuses to do so, it should at least provide a summary of where the substitution would come from (onshore production, foreign imports, etc.) as it has for previous substitution analyses.	Key assumptions and data for Project GHG emissions, indirect (GHG Lifecycle Model) emissions, and MarketSim model emissions were provided in Draft EIS Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*), Appendix E.2A (*Climate and Climate Change Technical Appendix*), and Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), as well as Chapter 2.0 of Appendix E.3B (*Air Quality Technical Support Document*). Additional information is also provided in the Project GHG emission calculation spreadsheets that are available on request from BLM. The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs. The cited differences in MarketSim's estimated supply displacement for Coastal Plain oil and Eastern Colorado oil are an indication that MarketSim is properly adjusting for regional factors most relevant to location of the proposed production. Most, if not all, Coastal Plain oil would be transported by tanker to market, as it might be expected would be the case for most of the imported oil it would displace. On the other hand, it is reasonable to assume that oil produced in landlocked Eastern Colorado would largely displace other onshore production that would be transported primarily by pipeline. The documentation for MarketSim is publicly available, but BOEM has typically only released full analyses and specific model output when requested via FOIA.	N

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1305	22	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	Fundamental Problems with BLM's Substitution Analysis Cause Likely Underestimates of Net Downstream Emissions from the Proposed Plan and Counsel in Favor of Developing a New Model Before Finalizing the Environmental Impact Statement In addition to the above-mentioned concerns about BLM's lack of transparency and its inconsistent prior findings, there are also broader and more fundamental issues with MarketSim that skew its results, likely causing it to underestimate the substitution effects of decreased demand and thereby also underestimate a projects climate impacts. These errors, enumerated below, should be rectified in any final analysis, and any revision of MarketSim and new analysis of the environmental effects of the master development plan should be republished in draft form for public comment. 1) Agencies applications of MarketSim omit effects on foreign consumption and so grossly underestimate net downstream emissions BLM has followed BOEMs lead in applying MarketSim to assess energy substitution,*118* and so has copied a significant error from BOEM. Specifically, BOEMs applications of MarketSim have not accounted for changes in foreign oil and gas demand, *119* which drastically skews MarketSim's results since there is strong evidence that foreign demand is decreasing.*120* Indeed, while MarketSim estimates a foreign reduction in consumption . . . for oil, the simulations that BOEM and now BLM have run to estimate energy substitution in the no-action scenario seemingly do not account for any changes in foreign demand. Specifically, MarketSim finds that reducing U.S. oil production decreased foreign oil consumption by approximately 50% in a mid-price scenario a result that is consistent with economic literature. This 50% offset from reduced demand is significantly more than the 3.26% drop in U.S. demand that BLM reports, and so omitting the effects of global consumption may translate into a massive underestimate of the plans net downstream emissions effects. BLM offers no explanation for how it has approached, or ignored, changes in foreign demand. In the past, BOEM has claimed that [e]xcluding the foreign oil and gas markets is reasonable because BOEM does not have information related to which countries would consume less oil and so cannot make predictions about the changes in net emissions from changes in foreign consumption. In other words, according to BOEM, we should entirely ignore foreign reductions in demand for oil and gas that we know are occurring because it would be too difficult to translate those reductions into changes in net greenhouse gas emissions. This logic is unsound. The Department of the Interior hardly explains why it could not make a reasonable assumption about average emissions from total foreign consumption of oil, stating only that oil is consumed in a variety of products, which have a wide range of emissions factors. But there are numerous ways to rationally account for this uncertainty. In fact, the Department of Energy's National Energy Technology Laboratory recently published a methodology to study the impacts of U.S. energy exports on greenhouse gas generation around the world, comparing the greenhouse gas implications of electric power generation on different continents. And the emissions factors for oil that BLM has used elsewhere show a rather manageable range of between a low of 5.72 kilograms of carbon dioxide per gallon to a high end of 14.64 kilograms per gallon. BLM could easily apply either the U.S. Energy Information Administrations (EIA) tables of U.S. exports by petroleum product, or could simply give a lower-bound estimate of the net emissions effect. Either option would be much more accurate and reasonable than a complete omission. (Meanwhile, emissions factors for natural gas do not vary, and so there should be no bar whatsoever in calculating emissions reductions from a global drop in the consumption of gas.) While there may a range of values regarding the net greenhouse gas impacts of declining foreign oil consumption, the proper value is certainly not zero, which is what BLM has improperly assumed by excluding foreign oil and gas markets entirely. In short, the available information is more than sufficient to make reasonable estimates regarding the impacts of reductions in foreign demand on greenhouse gas emissions. By falsely concluding that this task is impossible and excluding such reductions altogether, BLM may be massively underestimating the net downstream emissions of the proposed master development plan.	It is unreasonable to extend BOEM's limited modeling of foreign oil markets used in establishing an equilibrium price in the model to global GHG emissions estimates comparisons between a Willow MDP Project alternative and a No Action Alternative. The issue is the uncertainty and lack of reliable data as to the likely distribution of demand changes among countries, the oil-substitutes available in other countries and those countries' incremental substitution patterns (cross-price elasticities) and resulting energy mix of oil and the various substitutes, and the GHG intensity of at least the major substitutes in each country. The incremental substitution patterns and the GHG emission rates for even the same class of fuels can vary significantly from country to country, and using broad averages in place of weighted averages can result in very different results, especially when the averages hide wide ranges in the underlying factors. Also, the D.C. Circuit has held that agencies are not required to model how their actions will affect global energy markets and how those market changes will, in turn, affect foreign GHG emissions. Sierra Club, 867 F.3d at 202. That kind of analysis is simply "too speculative" and infeasible to be required under NEPA. Id.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1305	23	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	MarketSim implausibly assumes near constant domestic demand for oil and gas over the next seven decades Because MarketSim ignores reductions in foreign demand altogether, it uses domestic oil and gas consumption projections as a proxy for worldwide consumption. But MarketSim unreasonably assumes near constant demand for domestic oil and gas for up to 70 years into the future. Accordingly, the model assumes a constant global demand for oil and gas throughout most of the century's remainder an assumption that is totally incompatible with international efforts to mitigate the impacts of climate change and would lead to unsustainable amounts of warming. The main assumption that the government makes in forecasting constant demand over 70 years that there will be no future changes in laws and policies is simply unreasonable given the realities of climate change. Indeed, the Interior Department has acknowledged that [a]s countries, including the U.S., address climate change with individual policy targets, this assumption could no longer hold, and that as new energy sources become more economically feasible, they could displace existing sources and/or alter the composition of energy supply. And sure enough, numerous states in recent years have adopted low- and zero-emission vehicle standards along with net-zero carbon emissions targets laws that would require oil and gas consumption within those states to decline precipitously. BLM's projection of constant demand over the next 70 years is based on the EIA reference case. But the EIAs reference case estimates are intended to reflect trends and are not necessarily firm predictions about the future; indeed, the EIA recently projected decreasing domestic demand for petroleum products through 2034. As such, these trends should not be used in isolation as point estimates; instead, agencies should conduct sensitivity analysis over reasonable assumptions and scenarios. For instance, BLM could provide oil and gas demand projections assuming that nations (including the United States) meet their commitments under the Paris Agreement. Instead of conducting sensitivity analysis over reasonable assumptions, BLM assumes the worst-case scenario outcome that demand for oil and gas will continue unabated for most of the century. Basing a model on what BLM admits is an extreme premise is not consistent with the agency's obligation under NEPA to make assumptions that are reasonable and based on the best available information. Particularly concerning is BLM's assumption that uncertainty about climate change should be used as a reason to trivialize net emissions, thereby using uncertainty as cover to promote policies like this plan that will exacerbate climate change. As discussed above, uncertainty about the rate and impacts of climate change should counsel for more restraint, not less. So long as BLM continues to assume near constant long-term energy demand through its use of MarketSim, it will significantly inflate the substitution effect of proposed energy projects and thereby underestimate their net greenhouse gas emissions.	The comment asserts that the model uses constant domestic and global demand, but this is not accurate. While the GHG Modeling documentation (Wolvovsky and Anderson 2016), available at: https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/Leasing/Five-Year-Program/2012-2017/BOEMOceanInfo/ocs_oil_and_natural_gas.pdf) outlines one of its key limitations on page 20 as, "Near Constant Demand is assumed . . . ," it also states that this "near constant demand" is taken directly from the EIA reference case. This reference case is not actually constant. BOEM models its analysis based on current policy rather than on speculations of what direction policy might take. Further, page 3 of the MarketSim Model documentation shows that the domestic and global demand equations incorporate elasticity adjustment rate factors that allow both global and domestic assumptions made by EIA to respond to price changes due to a domestic supply shock. Page 4 of this document show domestic and global supply equations also incorporate price shock sensitivity and are therefore not constant. MarketSim documentation (Industrial Economics 2017) is available here: https://espis.boem.gov/final%20reports/5612.pdf. These equations adjust supply and demand from the forecasted baseline provide by EIA. EIA's forecast looks at existing policies and does not forecast future laws or policies. BOEM uses the EIA projections as the official government estimates of future energy consumption. Any potential climate policy would be too uncertain at this stage to fully estimate in the model. BOEM's approach was to take a worst-case scenario and consider the maximum emissions and not account for future improvements for which future emission rates are unknown.	N
1305	24	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	MarketSim over-relies on a single experts opinion. For several parameters, MarketSim relies on the opinion from a single expert: Dr. Stephen Brown. While use of expert elicitation is acceptable when estimates are unavailable in the literature, it is not clear that the agencies have fully explored all the most current literature to check the accuracy of their parameters, and, furthermore, expert elicitations should not rely on a single author. Indeed, a recent study concluded that less than one-third of elicited experts produced statistically accurate assessments, thereby highlighting the need for validation from a multitude of experts. Accordingly, after a thorough review of the literature, BOEM and BLM should identify multiple experts to survey to develop a range of possible estimates, which can be further characterized by central values and variance. This would allow BLM to conduct an informed sensitivity analysis over these parameter values. Indeed, BOEM and BLM should be conducting more sensitivity analyses over all of their key parameters and assumptions, such as assumptions based on the EIA Energy Outlooks NEMS scenarios. The model should also break down non-U.S. producers in OPEC and non-OPEC nations, and conduct sensitivity analysis on whether OPEC will act competitively or non-competitively in response to changes in U.S. production. Given NEPAs public information requirements, BLM should be conducting more sensitivity analyses and then disclosing all relevant data, models, and runs, so the public can review these analyses.	MarketSim uses the best-available information for estimating elasticities. In cases where information is not available through published sources, Dr. Stephen Brown's expert opinion is used.	N
1305	25	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	MarketSim does not account for within-region substitution While it seems natural that much of the potential substitution of fossil fuel production from a given area would come from nearby areas, MarketSim's assumptions largely foreclose such results, since MarketSim holds the supply constant within the project areas region for the same resource when conducting its substitution analysis. This assumption is especially problematic given how broad some of the models regions are: for instance, onshore oil production from the continental United States constitutes a single region. This leads to the implausible result that energy substitution from a single project cannot come from the same resource in nearby areas and instead must come from more distant regions, when in reality the opposite is likely to be true. Such an assumption is irrational, and must be reassessed as part of a greater reevaluation of the MarketSim model.	MarketSim represents the best-available model to perform an analysis of the reasonably foreseeable GHG emissions resulting from the action. It is a sophisticated model that uses national baseline data, a supply shock, and elasticities to estimate changes on a national level.	N

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1305	26	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	MarketSim's elasticities are questionable Many of MarketSim's elasticities are out of date, not grounded in the literature, or based on inconsistent sources. The model assumes equality between onshore and offshore supply elasticities for the lower 48 states, and uses two-decade-old supply elasticities for the lower 48 states. Some elasticities are derived from different versions of NEMS, which may make them inconsistent. All elasticities should be derived from the same version of NEMS and should be consistent with the calibrations run for quantity and prices in each year.	MarketSim's approach to developing an energy model for policy evaluation is to represent the observed conditions prevailing at any moment in the market as observable short-run conditions that are the result of a market equilibrating process and the partial adjustment toward long-run demand and supply conditions. These long-run conditions are not directly observable, but can be inferred from observed market conditions and the underlying parameters of the model. The result is a model that is characterized by partial adjustment toward a long-run equilibrium in each time period. To create such a model, it is necessary to provide a set of assumed long-run elasticities and partial adjustment parameters. These are developed by reviewing the appropriate economic research, by using technology assessments, and by making comparisons across existing runs of NEMS to infer elasticities (see below). The supply and demand equations in the sections that follow show how MarketSim applies these partial adjustment parameters and long-run supply and demand elasticities. To the extent possible, MarketSim relies upon demand and supply elasticities obtained from peer-reviewed studies in empirical economics literature. Using peer-reviewed values is central to ensuring that MarketSim's simulation of energy markets reflects the best information available on the demand and supply responses that result from changes in energy prices. As suggested above, elasticity estimates were derived from NEMS outputs or from expert input provided by Dr. Stephen Brown (University of Las Vegas). To be useful in the MarketSim context, the elasticities need to cover the long-run. BOEM frequently updates its model and works to ensure the most recent information is available that provides the necessary elasticity. MarketSim's documentation (Industrial Economics 2017) is available at: https://espis.boem.gov/final%20reports/5612.pdf.	N
1305	27	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	MarketSim ignores upstream emissions MarketSim calculates only downstream emissions and omits any upstream emissions. While the DEIS calculates some upstream emissions from oil and gas production, the substitution analysis does not calculate comparable upstream emissions from substitute energy sources. The analysis is therefore necessarily incomplete, and BLM should rectify this omission and all of the others issues with MarketSim discussed above before finalizing the environmental impact statement.	MarketSim was used only for estimating downstream emissions and associated substitution effects, which are more uncertain than upstream emissions given the various market forces at play. Upstream emissions estimates were calculated separately based on Project-specific emissions estimates associated with Project design and operations, which are comparatively well known.	N

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1305	28	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	MarketSim irrationally ignores expected efficiency gains While MarketSim assumes that engines used to produce and consume oil and gas will not become more efficient, this assumptions ignores standard best practices for cost-benefit analysis that instruct agencies to make reasonable assumptions about technological growth. It can only be expected that as technology continues to improve and become more efficient, then engines used to produce and consume oil and gas will have lower energy footprints. The government should consider this flaw in MarketSim along with all the others discussed above and give the public another opportunity to comment on the environmental impact statement with its revamped substitution analysis.	While the assumptions section of the GHG Lifecycle Model methodology documentation (BOEM 2016) does state that "engines used for production, processing, and consumption of oil and gas will not become more efficient, and oil and gas will remain a primary energy source," BOEM does still acknowledge and incorporate changes in efficiencies in several ways. Further, efficiency gains are likely to impact emissions estimates under both the Action and No Action alternatives and will have little impact on the difference in the emissions. The GHG model documentation does suggest that improvements will be made in efficiencies and how those changes could impact results. This response outlines the different components of the GHG analysis conducted for BLM and the various ways efficiency changes are considered. The GHG Lifecycle Model is used in the BLM analysis to estimate the GHG emissions coming from mid and downstream activities. Midstream (refining and delivery): The GHG model uses the EPA's most recent emissions inventory for refining and transmission and storage of oil and gas. The model then multiplies that total by a ratio of offshore to total oil and gas for each stage and for each GHG (CO_2, CH_4, and N_2O). It does not assume a shift in either direction of the EPA inventory of emissions from these activities due to future changes in engine/refining efficiency. However, changes in engine/refining efficiency would affect the refining of both emissions from the No Action and action alternatives, and would likely have little impact on the difference in emissions associated with midstream components of the two alternatives. Downstream (end-user consumption of produced oil and gas): The GHG model states that improvements in energy and transport efficiency are likely to occur. It even suggests that these changes may change the ratios of the end products consumed from a barrel of oil (i.e., as of 2015, 47% of a barrel went towards gasoline, which would theoretically decrease if car efficiencies or alternative fuels became prevalent). It is this assumed ratio of the mix of end products (e.g., gasoline vs. lubricants vs. jet fuel vs. distillate fuel oil) that determines the estimated GHG factors for each barrel consumed. However, the model documentation also states that it is impossible to know how those efficiencies will manifest themselves in the ratios of end-products that come from a barrel of oil. Since those ratios have been steady over the near term, it asserts that using those ratios within the model, and updating them periodically as they change, is a reasonable practice. Similarly, major changes in how barrels of oil are used would have minor implications on the difference between the two alternatives. Within MarketSim, changes in efficiency are incorporated through EIA's production and consumption forecasts. EIA accounts for technology and energy density improvements in those runs which then serve as the basis for the comparison analysis between the No Action Alternative and the Action Alternatives. Given, and to the extent, that EIA does assume some increase in efficiency of engines in its NEMS runs, those assumptions were then incorporated into MarketSim, then into the GHG Lifecycle Model for the downstream analysis that was provided to BLM.	N
1305	29	Brooks; Cleetus; Grab; Hedges; Krause; Monahan; Nichols	Anne; David; Denise; Jeremy; Rachel; Rose; Susanne	Environmental Defense Fund; Institute for Policy Integrity at New York University School of Law; Montana Environmental Information Center; Sierra Club; The Wilderness Society; Union of Concerned Scientists; WildEarth Guardians	Climate Change	BLM Arbitrarily Inflates the Plans Economic Benefits by Failing to Apply Substitution Analysis Beyond the Plans Environmental Harms In addition to the above critiques of the methodology for substitution analysis, BLM also inconsistently applies energy substitution to the master development plans environmental harms without applying the same analysis to the plans economic benefits. BLM must apply substitution analysis consistently to all of the plans impacts, and cannot place its thumb on the scale by discounting only the plans environmental harms. BLM cannot have it both ways: On one hand, it discounts the plans environmental impacts by claiming that most of them would occur regardless as a result of substitute oil and gas production in other areas, while on the other it attributes a wealth of economic benefits to the plan without any mention of this substitution effect. Of course, if BLM is indeed accurate that most of the plans oil and gas production would be offset through increased production elsewhere under a no action alternative, this would also mean that many of the supposed economic benefits of the plan would also occur under the no action scenario due to this increased production. For instance, given that, according to BLM's calculations, more than 96% of oil and gas production would be replaced by additional production under a no action scenario, then that production would also produce tax revenues, employment income, and (because much fossil fuel development occurs on lands own by the federal or state governments) royalties meaning that the U.S. economy would still reap many of the plans supposed economic impacts. Yet BLM never acknowledges this reality, providing total government revenues from the master development plan and projected employment numbers without any recognition that most of these economic benefits would, under the logic of BLM's own substitution analysis, be offset through increased production elsewhere under the no action scenario. Under BLM's logic, in other words, this plan is responsible for all of its positive economic impacts but few of its environmental harms. This is a clear violation of NEPA. As stated above, agencies may not put a thumb on the scale by inconsistently and opportunistically fram[ing] the costs and benefits of a proposed project. Yet this is precisely what BLM is doing by using substitution analysis to offset the plans environmental costs without also offsetting the plans economic benefits. BLM must apply substitution consistently between the projects costs and benefits. By failing to do so, it adopts an inconsistent methodological approach to the plans economic benefits versus climate costs, further skewing their inconsistent treatment throughout the DEIS. For all the reasons further described herein, this incomplete, inconsistent, and misleading framing violates NEPA.	The EIS provides estimates of the potential economic output for each action alternative (Section 3.15, *Economics*), which is the anticipated economic activity. An economic impact stems directly from economic activity, but it may be perceived as a positive or negative impact depending on individual perspective. Section 3.15.2.2 (*Alternative A: No Action*) notes that "there would be no increase in employment or wages in Nuiqsut, the NSB or the state." The analysis for the No Action Alternative does not speculate on what sort of economic activity would occur or where it may occur. This is consistent with the analysis area for economics: Nuiqsut (local), NSB (regional), and the State of Alaska. This is not a cost-benefit analysis but is a disclosure of the anticipated economic impacts.	N

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989	21	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Climate Change	Page 25 & 26, 3.2.2.2 Alternative A: No Action and Appendix E.2B, Market Substitutions and Greenhouse Gas Downstream Emissions Estimates Market substitution of oil from this project with other energy sources is a very important topic. BLM addresses this topic in Appendix E.2B by looking at how much oil, natural gas, coal and biofuels would be displaced if the project is approved and developed. It appears this model (BOEM's Market Simulation Model or MarketSim) does not account for all the effects of market substitution. It needs to address where other energy production will likely occur if the project does not move forward and the associated environmental impacts and GHG emissions of such market substitution. If market substitution results in development in another state or country with less stringent environmental protections, it is possible net environmental impacts and GHG emissions will increase. The no action alternative could actually harm the environment when you take into account market substitution. BLM needs to answer the question: Does oil production on the North Slope produce more or less GHGs (and more or less environmental harm) than other oil and gas (or energy development) operations around the world? Appendix E.2B does not appear to answer this question.	The market substitution calculations are the best-available calculations to determine the changes in GHG emissions if the Project did not occur. The suggested need to determine whether North Slope oil production produces more or less GHG emissions than every other oil and gas operation around the globe is out of scope of this analysis.	N
1302	35	Dunn	Connor	ConocoPhillips	Climate Change	The DEIS states that "[t]he baseline used in MarketSim is a modified version of the EIAs 2018 Annual Energy Outlook reference case; the modification involves omission of new OCS lease sales starting in 2019." Appendix E.2B (page 1). We recommend that BLM clarify how the Project is treated in the reference case used by BLM. If the Project is included in the AEO 2018 projection, then the Project should be removed from the baseline projection for this analysis. If the Project is included but is not removed from the baseline, BLM should discuss the sensitivity and ramifications of this assumption.	According to EIA, the discovery year for Willow was 2017, which was too late for the Annual Energy Outlook 2018. Thus, the Willow MDP Project is not included in the reference case in the MarketSim analysis, and no further sensitivity analyses are required.	N
1302	37	Dunn	Connor	ConocoPhillips	Climate Change	Finally, but importantly, the proposed mitigation measures listed at Section 3.2.4, page 29, include . . . limiting flaring to pilot flares or emergency flares. Similar language is used for a similar proposed mitigation measure in Section 3.3.3. BLM should clarify that there are some limited, additional situations in which flares are used for non-emergency purposes (e.g., for initial well clean out and testing). The DEIS emission inventory did not limit flaring solely to pilot or emergency flares. The DEIS emissions inventory included process flares combusting pilot, purge, sweep and assist gas, and limited use of portable flares combusting pilot gas and vented gas during pre-production drilling. Since these emissions were included in the project emissions inventory and none of the impacts noted in the DEIS suggest that flare usage needs to be further limited, BLM should expand their description of flaring to be consistent with the project emissions inventory.	Since flaring is part of the Willow MDP Project emissions inventory that was shown to not have significant adverse impacts in the air quality analysis, this language has been removed from Final EIS Section 3.2.2.1.2, *Proponent's Design Measures to Avoid and Minimize Effects* (Draft EIS Section 3.2.4, *Additional Suggested Best Management Practices or Mitigation*). The activities that would result in flaring are described in Appendix D.1, *Alternatives Development*, Section 4.2.1.1, *Willow Processing Facility*.	Y
1302	112	Dunn	Connor	ConocoPhillips	Climate Change	The first paragraph (page 8, Section 3.1.2.3, Black Carbon Effects on Climate), ". . . there is a 'very high' probability that black carbon emissions have a positive forcing and warm the climate." It is unclear what is meant by "have a positive forcing."	Text was added to clarify positive forcing in Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 3.1.2.3, *Black Carbon Effects on Climate*.	Y
1302	114	Dunn	Connor	ConocoPhillips	Climate Change	Section 3.2.1 states: "Major GHGs from oil and gas development include carbon dioxide (CO2), nitrous oxide (N2O), and methane (CH4). GHG emissions are reported in units of carbon dioxide equivalent (CO2e) to account for the varying global warming potential (GWP) of pollutants." The discussion of GHG emissions in Section 3.2.1.3 mixes CO2 and CO2e in a way that is unclear. For example: "CO2 emissions associated with the combustion and extraction of fossil fuels from U.S. federal lands increased from 1,362 MMT CO2e in 2005 to 1,429 MMT CO2e in 2010 and then decreased to 1,279 MMT CO2e in 2014." The discussion would be clearer if CO2e units were consistently used for describing GHG emissions.	In some cases, the GHG emissions data in CO_2e are only available for CO_2 and not for the other GHGs. Additional text has been added to Section 3.2.1.3, *Trends in U.S. and Alaska Greenhouse Gas Emissions*, to clarify this.	Y
1302	115	Dunn	Connor	ConocoPhillips	Climate Change	In this section (page 6, Social Cost of Carbon), the Willow project is incorrectly referred to a "leasing action."	Text was removed from Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 2.4, *Social Cost of Carbon*.	Y
1302	116	Dunn	Connor	ConocoPhillips	Climate Change	Out of context, the third paragraph in this section suggests that direct GHG emissions were not estimated for the Project in the draft EIS. We recommend refocusing the paragraph to describe that the analysis methods described here are used specifically for the estimation of indirect GHG emissions, as opposed to what is not included in the analysis in this section.	Appendix E.2B, *Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*, is an original document produced by the BOEM, who drafted the *Market Substitutions and Downstream Emissions Estimates* report. This appendix (and report) only analyze indirect emissions (i.e., downstream emissions associated with processing and consumption of the oil produced by the Project). No changes to the BOEM report (Appendix E.2B). However, additional text has been added to Section 3.2.2, *Environmental Consequences: Effects of the Project on Climate Change*, to clarify that direct GHG emissions were calculated for the Project.	Y
75	1	Finocchio	David	—	Climate Change	While not stated directly, the level of detail and reference to oil and gas production in section 3.2.1.1, when read in the context of the Willow development project, leads the reader to believe the North Slope oil and gas development is a primary cause for North Slope climate change and related impacts. This contradicts the statement in 3.2.1 that clarifies that climate change is a global phenomenon that is caused by global release of CO_2 and other greenhouse gasses. When read in the context of this document I believe this presents a bias against the Willow development by overexaggerating the incremental impact of what is a relatively small project on the global scale. Furthermore, there is no way to know exactly how the oil produced from the Willow field will be used (i.e. as a fuel or as a chemical feedstock for creating of non-fuel products such as polymers or lubricants). Please consider revising this section by means of abbreviating the discussion or providing additional clarifying text highlighting the level of uncertainty and fractional incremental impact of the Willow project on the global climate change issue.	The introductory text in Section 3.2.1, *Affected Environment*, has been edited to confirm that the EIS is discussing climate change generally and not the impacts of the Willow MDP Project on the Project area. The uncertainty of the impact of the Willow MDP Project on global GHG emissions is covered in Section 3.2.2, *Environmental Consequences: Effects of the Project on Climate Change*.	Y

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84	8	Long	Becky	—	Climate Change	The exploration, production and burning of fossil fuels creates significant Greenhouse Gas (GHG) emissions. The 11/23/2018 United States Geological Survey report entitled FEDERAL LANDS GREENHOUSE GAS EMISSIONS AND SEQUESTRATION IN THE UNITED STATES: ESTIMATES FOR 2005-2014, Report 2018-5131 show this. This report is a first of its kind accounting for fossil fuel extraction emissions. Oil and gas drilling and production on federal lands and offshore contributes a yearly average of 23.7% of carbon dioxide emissions, 7.3% of methane emissions and 1.5% nitrous oxide emissions. This report can provide a context for future energy decisions as well as a basis to track future fugitive emissions from fossil fuel leasing. BLM needs to figure out the GHG emissions from this proposed project. Methane is a potent GHG emission which enters the atmosphere from flaring, venting, and infrastructure leaking of natural gas. Methane is the primary component of gas making up 87 to 97% by volume. Methane's warming effect is 87 times greater than carbon dioxide over a 20 year period and 36 times greater over a 100 year average. The current federal administration is gutting the EPA and BLM 2016 waste prevention rules that would have reduced 35% of methane emissions. Comprehensive leak detection and repair requirements, methane capture standards for various field equipment and common drilling practices and establish volume metrics and percentage based venting and flaring limits. But now we don't have that for federal lands. The oil and gas industry states that methane emissions from production are unavoidable. In a recent 12/18/2018 Alaska Oil and Gas Conservation Commission hearing on methane emissions, Kara Moriarty, the Executive Director of the Alaska Oil and Gas Association which is an industry trade lobbying group testified to the following. The venting or flaring of some natural gas is practically an unavoidable consequence of oil and gas development. Routine and continuous flaring of pilot and purged gas during the non-emergency situations is a key component to the safe development of oil and gas reserves. If this is so, it makes a good case to eliminate new leasing on public lands in the arctic. Natural gas flaring produces black carbon which is a known recognized localized warming impact on ice and snow thus creating more climate impacts. Flaring also produces particulate matter and toxics such as benzene which are known carcinogens. This affects the environment and human health. Black carbon pollution accelerates climate changing impacts on the North Slope. This is by darkening the surface of the sea ice and land. It is also the main ingredient in fine particulate matter pollution.	The USGS report (2018-5131) (Merrill, Sleeter et al. 2018) is cited in the Draft and Final EIS in Section 3.2.1.3., *Trends in U.S. and Alaska Greenhouse Gas Emissions*. GHG emissions from the Project are also quantified in Section 3.2.2.3, *Alternative B: Proponent's Project*, and the emissions inventory accounts for fugitive and downstream emissions. The GHG emissions disclosed in Section 3.2.2.3 for the Project are inclusive of additional activities that are not typically included in these reports, and therefore, it is not appropriate to compare the Project emissions as quantified in the EIS; however, the EIS does compare them to state and national totals. The Project would be developed with the LSs required by BLM for the NPR-A. Methane emissions are disclosed individually in the EIS emissions inventory, and the global warming potentials used for methane are listed in Section 3.2.2.3. Pilot and purge emissions would be a very small fraction of emissions from the Project. (*Note*: Natural gas–powered home hot-water heaters and gas heaters also use pilot lights as a constant ignition source. These are not significant emissions sources.) Please see Section 3.2.2, *Environmental Consequences: Effects of the Project on Climate Change*, for the Project's effects on black carbon and climate and black carbon's effects on the Project. Flaring impacts are addressed in the modeling, as are the impacts from benzene.	N
988	5	Peter	Enei Begaye	Native Movement	Climate Change	Additionally, climate change is not mentioned once within the entire Draft EIS. 90% of the global science community agrees that fossil fuel extraction and usage are the leading causes of climate change. The DEIS lack of climate change implications is irresponsible and must be addressed. Currently there are 12 villages in immediate need of relocate including Utqiaġvik due to climate change. All new fossil fuel extraction will aid in the increased warming of the permafrost, coastal erosion, and subsequent climate refugees from their traditional lands of the Arctic Slope.	Draft and Final EIS Section 3.2, *Climate and Climate Change*, and Appendix E.2A, *Climate and Climate Change Technical Appendix*, discuss climate change and the impacts of the Project on climate change.	N

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864	99	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM's analysis of the greenhouse gas emissions and associated climate change impacts of Willow is deficient in several fundamental respects and therefore does not comply with NEPA. First, the DEIS fails to evaluate the impacts of Willow in light of the urgent need to reduce greenhouse gas emissions. Second, the DEISs greenhouse gas emissions estimates are unsupported and inaccurate because (a) the DEIS fails to disclose key assumptions and data used in its models and it excludes the key variable of foreign consumption without any appropriate adjustment, and (b) BLM's finding that Willow will result in only a negligible increase in energy consumption and emissions is unrealistic, wildly inconsistent with other energy market substitution modeling, and flouts clear precedent rejecting perfect or near perfect fossil fuel substitution. Third, the DEIS fails to provide a meaningful analysis of the significance of the greenhouse gas emissions from Willow. Fourth, the DEIS fails to adequately consider the effects of the project in the context of a warming Arctic. Finally, the DEIS fails to quantify and adequately analyze the effects of black carbon.	In response to the first part of this comment, the Draft EIS evaluates Project impacts for the range of alternatives selected by BLM with input from cooperating agencies. In response to the second part of this comment, key assumptions and data for Project GHG emissions, indirect (GHG Lifecycle Model) emissions, and MarketSim model emissions were provided in Draft EIS Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*), Appendix E.2A (*Climate and Climate Change Technical Appendix*), and Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), as well as Chapter 2.0 of Appendix E.3B (*Air Quality Technical Support Document*). Additional information is also provided in the Project GHG emission calculation spreadsheets that are available upon request from BLM. The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil-producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs. It is reasonable to exclude foreign oil consumption in the context of market substitution because the oil produced by the Willow MDP Project would likely be consumed domestically; therefore, substitution sources for the Project would also be consumed domestically. In addition, oil consumption is different in each country, and information on which countries would consume less oil was not available. For gas consumption, we do not have information on how changes in the U.S. market would affect other countries. While there is uncertainty regarding consumption in different energy markets, in the short term, EIA tends to project continued demand. In response to the third part of this comment, the Project emissions have been disclosed and compared to state and national totals, similar to other EISs in the region and other BLM projects. As noted in Section 3.2.2, GHG emissions were assessed as a proxy for climate impacts. In response to the fourth part of this comment, we have considered the effects of the Project in the context of a warming Arctic; see Section 3.2.3, *Effects of Climate Change on the Project*. In response to the fifth part of this comment, Section 3.2.1, *Affected Environment*, includes information on black carbon and its potential effects on climate based on available, peer-reviewed literature. Although black carbon emissions from the Willow MDP Project are not explicitly quantified, black carbon is implicitly included as part of the Project $PM_{2.5}$ emissions inventory used in the air quality impact analysis. The effect of black carbon on Arctic climate is complex and still an active area of research. There are still many uncertainties to be resolved by the scientific community to better understand the complex mechanisms and feedbacks between black carbon and its effect on Arctic climate. Therefore, it is not possible to quantitatively assess the effect of a project's black carbon emissions on global climate change at this time.	Y
864	100	Psarianos	Bridget	Trustees for Alaska	Climate Change	NEPA Requires BLM to Accurately and Completely Analyze the Climate Consequences of the Willow Project. . . . It is well established that when an agency considers a decision that will result in greenhouse gas emissions, NEPA requires the agency to analyze and disclose the effects of these emissions, including emissions from fossil fuels that will be burned because they will be produced or delivered to market as a result of the agency's decision. Indeed, as the Ninth Circuit has explained, [t]he impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct. Numerous other courts have affirmed the necessity of analyzing the climate consequences of an action under NEPA, in a wide variety of contexts. Additionally, courts have rejected agency findings of perfect or near-perfect fossil fuel substitution, i.e., that emissions from a fossil fuel project will be negligible because other sources will simply fill in to meet demand. All of these sources point to BLM's duty under NEPA to perform a thorough and accurate accounting of Willows greenhouse gas emissions and their environmental effects. The DEIS does not fulfill BLM's obligations, as explained below.	The Draft and Final EIS includes an analysis of direct and indirect (i.e., upstream and downstream) GHG emissions, and modeled results are provided in Section 3.2, *Climate and Climate Change*, and Appendix E.2A, *Climate and Climate Change Technical Appendix*.	N

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864	101	Psarianos	Bridget	Trustees for Alaska	Climate Change	The DEIS Fails to Evaluate the Impacts of Willow in Light of the Urgent Need to Reduce Greenhouse Gas Emissions. Extensive research demonstrates the urgent need to reduce greenhouse gas emissions. For example, an October 2018 report from the Intergovernmental Panel on Climate Change (IPCC) quantified the devastating harms that would occur at 2C warming, highlighting the necessity of limiting warming to 1.5C to avoid catastrophic impacts to people and life on Earth. Consistent with that assessment, in November 2018, the U.S. Global Change Research Program released the Fourth National Climate Assessment, an authoritative assessment of the science of climate change that describes the economic costs of climate change. It concludes, among other things, that the impacts of climate change are intensifying across the country, and that climate related threats to Americans physical, social, and economic well-being are rising. These include more frequent and intense extreme weather and climate-related events, increasing temperatures, and rising sea levels, which are expected to disrupt the economy, resulting in annual losses in some economic sectors . . . [of] hundreds of billions of dollars by the end of the century more than the current gross domestic product (GDP) of many U.S. states. In its October 2018 report, the IPCC underscored the need for urgent emissions reductions on an unprecedented scale. To avoid exceeding 1.5C of warming, global net CO2 emissions reductions would need to decline by 45% relative to 2010 levels by 2030, and reach net zero by 2050. To keep warming below 2C, emissions would have to decline by 20% relative to 2010 levels by 2030, and reach net zero by 2075. According to the report, “[b]y the end of 2017, anthropogenic CO2 emissions since the preindustrial period are estimated to have reduced the total carbon budget for 1.5C by approximately 2200 + 320 GtCO2.” Further, [t]he associated remaining budget is being depleted by current emissions of 42 + 3 GTCO2 per year. Estimates of the remaining carbon budget to remain under 1.5C depend on the measure of temperature effects considered and the probability of success. For a 50% chance of successfully staying under 1.5C, estimates range from 580 to 770 GtCO2. For a 66% chance, estimates range from 420 to 570 GtCO2. The report explains that limiting global warming to 1.5C would require rapid and far-reaching transitions, including in energy, unprecedented in terms of scale. With high confidence, the report finds that, “[i]n 1.5C pathways with no or limited overshoot, renewables are projected to supply 70-85% (interquartile range) of electricity in 2050.” It also acknowledges that current Paris Agreement ambitions will fail to limit warming to 1.5C, even if additional aggressive emissions goals are pursued after 2030: Estimates of the global emissions outcome of current nationally stated mitigation ambitions as submitted under the Paris Agreement would lead to global greenhouse gas emissions in 2030 of 5258 GtCO2eq yr-1 (medium confidence). Pathways reflecting these ambitions would not limit global warming to 1.5C, even if supplemented by very challenging increases in the scale and ambition of emissions reductions after 2030 (high confidence). With high confidence, the report finds that, Pathways that limit global warming to 1.5C with no or limited overshoot show clear emission reductions by 2030. All but one show a decline in global greenhouse gas emissions to below 35 GtCO2eq yr-1 in 2030, and half of available pathways fall within the 2530 GtCO2eq yr-1 range (interquartile range), a 4050% reduction from 2010 levels. Alarmingly, the report also finds that “[p]athways reflecting current nationally stated mitigation ambition until 2030 are broadly consistent with cost-effective pathways that result in a global warming of about 3C by 2100, with warming continuing afterwards (medium confidence).” This necessary transition leaves no room in the global carbon budget for new fossil fuel extraction if we are to avoid the worst dangers from climate change. Instead, new fossil fuel production and infrastructure must be halted, and most existing production must be phased out. A 2019 global analysis found that carbon emissions from burning the oil, gas, and coal in the worlds currently operating fields and mines would exceed the carbon budget consistent with staying below 1.5C. The estimated U.S. carbon budget consistent with limiting temperature rise to 2C level of warming well above what the Paris Agreement requires ranges from 34 GtCO2 to 123 GtCO2. To stay well below 2C, the 2019 study recommends that no new fossil fuel extraction or transportation infrastructure should be built, and governments should grant no new permits for new fossil fuel extraction and infrastructure. Moreover, some fields and mines, primarily in rich countries, must be closed before fully exploiting their resources. Importantly, a 2015 scientific and economic study found that all Arctic [oil and gas] resources should be classified as unburnable, because development of [oil and gas] resources in the Arctic . . . [is] incommensurate with efforts to limit average global warming to 2 C. A U.S. Geological Survey report demonstrates that fossil fuels produced on federal lands account for a significant percentage of U.S. emissions, approximately 24 percent of national carbon dioxide, seven percent of methane, and two percent of nitrogen emissions from 2005-2014. The potential carbon emissions from already leased fossil fuel resources on U.S. federal lands would exhaust the remaining U.S. carbon budget consistent with the 1.5C target.	The BLM has prepared the EIS to inform decision making related to a proposed project to construct drill sites, processing facility, access roads, pipelines, and ancillary facilities to develop and transport petroleum from the Willow MDP Project production pads for shipment to market. Broader energy policy issues, such as the nation’s ongoing use of fossil fuels or other types of energy sources, are beyond the scope of the Project and are not included in the EIS. The comment also refers to an overall carbon budget which is no longer applicable given the decision by the United States to withdraw from the Paris Agreement in 2017.	N

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864	103	Psarianos	Bridget	Trustees for Alaska	Climate Change	The DEISs Net Greenhouse Gas Emissions Estimates are Inaccurate and Unsupported. The DEIS estimates that the proposed Willow development will result in a total of 261,419,000 metric tons of CO2e. This is an enormous contribution to emissions from a single project, equivalent to more than 4% of current annual emissions for the entire country. But BLM asserts that production from Willow will largely replace production of energy sources that would result in their own emissions. According to BLM, when this energy substitution is accounted for, the net greenhouse gas emissions from Willow will be substantially lower than its total direct and indirect emissions, only 36,262,000 metric tons of CO2e. The DEISs substitution modeling and its resulting net emissions estimates are critically flawed for two principal reasons. First, the DEIS fails to disclose key assumptions and data, and it excludes the key variable of foreign consumption without any appropriate adjustment. Second, BLM's finding that Willow will result in only a negligible increase in energy consumption and emissions is unrealistic, is inconsistent with other energy market substitution modeling, and flouts clear precedent rejecting perfect or near perfect fossil fuel substitution.	Key assumptions and data for Project GHG emissions, indirect (GHG Lifecycle Model) emissions, and MarketSim model emissions were provided in Draft EIS Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*), Appendix E.2A (*Climate and Climate Change Technical Appendix*), and Appendix E.2B (*Market Substitutions and Greenhouse Gas Downstream Emissions Estimates*), as well as Chapter 2.0 of Appendix E.3B (*Air Quality Technical Support Document*). Additional information is also provided in the Project GHG emission calculation spreadsheets that are available upon request from BLM. The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil-producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs. It is reasonable to exclude foreign oil consumption in the context of market substitution because the oil produced by the Willow MDP Project would likely be consumed domestically; therefore, substitution sources for the Project would also be consumed domestically. In addition, oil consumption is different in each country, and information on which countries would consume less oil was not available. For gas consumption, we do not have information on how changes in the U.S. market would affect other countries. While there is uncertainty regarding consumption in different energy markets, in the short term, EIA tends to project continued demand.	N
864	104	Psarianos	Bridget	Trustees for Alaska	Climate Change	The DEIS Fails to Consider Foreign Consumption The DEIS and supporting documents do not disclose all assumptions and data that BLM relies on as necessary to evaluate the accuracy of its emissions modeling. BLM must provide a complete disclosure of this information to satisfy its obligation to make relevant information available to the public. One assumption that BLM does disclose reveals a crucial weakness in its methodology. Although it acknowledges that Willow would affect both domestic and foreign energy consumption, BLM fails to account for how the Willow production will affect foreign energy consumption. The choice to exclude foreign markets greatly skews the results of the analysis to make the GHG consequences of Willow look much less significant than they are. BLM asserts that it excluded foreign consumption because it lacks the ability to estimate differences in emissions caused by changes in foreign consumption. First, it is not true that BLM lacks that ability. The MarketSim model itself is capable of estimating foreign consumption. Second, BLM cannot simply zero out a variable that is a key factor in a reasonable estimation of substitution. MarketSim models oil as a global market with supply and demand specified separately for the U.S. and the rest of the world. BOEM in fact used the same MarketSim models global market capabilities when it calculated the GHG pollution from the 2017-2022 Five Year Plan for offshore oil and gas in 2016. When BOEM modeled the true global market effect, rather than a falsely-created U.S. market effect, it found that, for each barrel of U.S. oil left undeveloped, global oil consumption would go down by about half a barrel. In the context of the 2017-2022 Five Year Plan, BOEM estimated that this reduction in foreign oil consumption is highly significant, amounting to roughly 50 percent of BOEMs estimated oil OCS production in those scenarios.	It is reasonable to exclude foreign oil consumption in the context of market substitution because the oil produced by the Willow MDP Project would likely be consumed domestically; therefore, substitution sources for the Project would also be consumed domestically. In addition, oil consumption is different in each country, and information on which countries would consume less oil was not available. For gas consumption, we do not have information on how changes in the U.S. market would affect other countries. While there is uncertainty regarding consumption in different energy markets, in the short term, EIA tends to project continued demand.	N
864	105	Psarianos	Bridget	Trustees for Alaska	Climate Change	Oil market analysis conducted by the Stockholm Environment Institute (SEI), and consistent with BOEM MarketSim parameters, has previously confirmed that a reduction in global oil consumption could be around 50 percent of the decrease in rest-of-world supply a highly significant portion of the carbon accounting for the project. As summarized by experts at SEI: The oil market is also highly global, with oil readily traded among countries, and substantial infrastructure in place to do so. The U.S. both imports and exports oil, and world and domestic oil prices very closely track each other (U.S. EIA 2016). For this reason, we expect that changes in U.S. oil production would affect an integrated global oil market, an assumption also made by many other analysts that have looked at changes in U.S. oil supply.414 Though in the past the oil market could be strongly influenced by cartel behavior among a small number of producers, many analysts now see the market as more likely to behave competitively (The Economist 2016; U.S. EIA 2016), meaning that increases or decreases in supply do translate into shifts in prices and, in turn, consumption. Zeroing out foreign consumption therefore results in a plainly inaccurate and misleading result. If BLM had properly accounted for foreign consumption, the reduction of greenhouse emissions in the no action alternative would have been in the range of fifteen times greater than the 3.26 % reduction that BLM's flawed model produced.	It is reasonable to exclude foreign oil consumption in the context of market substitution because the oil produced by the Willow MDP Project would likely be consumed domestically; therefore, substitution sources for the Project would also be consumed domestically. In addition, oil consumption is different in each country, and information on which countries would consume less oil was not available. For gas consumption, we do not have information on how changes in the U.S. market would affect other countries. While there is uncertainty regarding consumption in different energy markets, in the short term, EIA tends to project continued demand.	N

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864	106	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM's Finding of Near-Total Substitution is Unreasonable BLM's finding that nearly 97% of the oil produced at Willow would replace other energy sources is not consistent with reality. Numerous analyses show that near-perfect substitution for oil and gas production simply does not occur in the real world and is not a reasonable assumption. Oil and gas production operates in a global market where changes in U.S. production translate into shifts in global prices, global consumption, and associated GHG pollution. All other things being equal, analyses show that increasing U.S. oil and gas production lowers oil prices and increases global consumption, while leaving U.S. oil and gas undeveloped increases oil prices and decreases global consumption. In short, every barrel of oil and unit of gas that is left undeveloped results in a reduction in global oil and gas consumption with associated decreases in GHG pollution, as detailed below. A comprehensive analysis of the GHG consequences of ending new oil leasing on U.S. federal lands and waters, and avoiding renewal of existing leases for resources that are not yet producing, found that ceasing new oil leasing would result in a large GHG and climate benefit. Like BLM's analysis, this study accounted for the effects of substitution by other fuels for the oil that would be forgone by ending new leasing. The study estimated that for each unit (QBtu) of federal oil production cut, other oil supplies would substitute for about half a unit (0.56 QBtu) and net oil consumption would drop by nearly half a unit (0.44 QBtu). Additionally, about half of that drop in consumption (0.22 Qbtu) would be replaced by a mix of oil substitutes (such as biofuels or electricity, which SEI estimates to have 85 percent the carbon intensity of oil). In short, every barrel of federal oil left undeveloped would result in nearly half a barrel reduction in net oil consumption, with associated reductions in GHG pollution. The analysis estimated that ending new federal oil leasing would reduce 2030 global CO2 emissions from oil consumption by 54 million metric tons of CO2, with an increase in CO2 emissions from other fuels of 23 million metric tons of CO2, for a net emissions benefit of 31 million metric tons CO2. The analysis recommended that policy-makers should give greater attention to measures that slow the expansion of fossil fuel supplies.	The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil-producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs.	N
864	107	Psarianos	Bridget	Trustees for Alaska	Climate Change	An analysis of the effects of removing subsidies for U.S. oil and gas production similarly found that decreases in the U.S. oil and gas supply would result in substantial decreases in global oil and gas consumption. In the case of oil, the model estimated that a decrease of 600, barrels per day in U.S. oil supply, resulting from a drop in U.S. oil production due to subsidy removal, would lead to a decrease in global oil consumption of 300,000 to 500,000 barrels per day. In the model, the decreased U.S. oil supply is only partially replaced by other sources of U.S., OPEC, and other rest-of-world supply. In short, each U.S. barrel not developed would result in a net reduction in global oil consumption of 0.5 barrels to 0.8 barrels. Similarly, for natural gas, a 1.06 to 1.32 Tcf per year decrease in U.S. natural gas supply would lead to a net reduction in global gas consumption of 0.94 to 1.06 Tcf per year, which translates into a net reduction in global gas consumption of 0.7 to 1 unit for each unit of U.S. natural gas left undeveloped. An analysis by experts at Columbia University and the Rhodium Group on the effects of lifting U.S. crude oil export restrictions shows that U.S. oil production affects global crude oil prices, which is only possible if there is not perfect substitution. As illustrated in Figure 23 of the study, when U.S. crude oil exports are permitted, as they were by the lifting of the crude oil export ban in December 2015, all modeling groups agreed that the international oil market will respond to changes in U.S. production. Specifically, all modeling groups projected that global crude prices will decrease as U.S. production increases, resulting in an increase in global crude oil demand: a 1.2 million b/d increase in U.S. production due to removing current export restrictions could result in anywhere between a 0 and 1 million b/d increase in global crude demand. This study demonstrates that crude oil is sold and consumed in a global market, where increasing U.S. supply increases global consumption and results in more greenhouse gas pollution.	The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs.	N
864	108	Psarianos	Bridget	Trustees for Alaska	Climate Change	Several courts have also rejected agency findings of perfect or near-perfect fossil fuel substitution. For example, in WildEarth Guardians v. Bureau of Land Mgmt., the Tenth Circuit rejected BLM's argument that it could ignore the climate effects of extracting coal in Wyoming's Powder River Basin because if BLM had not issued the leases in question, demand would be met with coal from another source. BLM's conclusion that replacement coal was available at a comparable price lacked support in the administrative record. Moreover, the court found BLM's perfect substitution assumption irrational in part because it was contrary to basic supply and demand.	The MarketSim model used in the EIS is a highly sophisticated model that analyzes the energy market's response to production anticipated to emerge from oil and gas developments. In the substitution analysis based on MarketSim, the assumption is made that other oil-producing countries will supply oil for U.S. import without additional restraints due to GHG-related policies in those countries. This may not be true if other countries establish policies to reduce their GHG emissions in the future. Typically, a single project has a negligible impact on overall global GHGs.	N

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864	109	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM Must Provide a Meaningful Analysis of the Significance of the Greenhouse Gas Emissions from Willow NEPA requires that agencies discuss not only a proposed actions environmental effects, but also their significance. BLM incorrectly asserts that it is not currently possible to determine the impact of a single project on global climate change. While it may not be possible to directly associate particular actions with specific effects, as the DEIS acknowledges, all projects producing greenhouse gas emissions will contribute to the cumulative impact of climate change. And contrary to BLM's assertion well established methods exist to evaluate the significance of a projects greenhouse gas emissions. Indeed BLM acknowledged, and improperly rejected, one such method—the social cost of carbon. Although a cost-benefit analysis is not necessarily the ideal or exclusive method for assessing contributions to an adverse effect as enormous and potentially catastrophic as climate change, a tool to determine the costs of carbon pollution has been developed by the Interagency Working Group on Social Cost of Greenhouse Gases. The Interagency Working Group has produced estimates for the social cost of carbon in order to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions. The working group presented values for social costs from 2010 to 2050, assuming discount rates of 5 percent, 3 percent, 2.5 percent and the 95th percentile of the 3 percent discount rate. These values range from $10 to $212 (in 2007 dollars per metric ton of carbon dioxide), and can help in analyzing the costs imposed by the net greenhouse gas emissions that might eventually result from development, especially where BLM monetizes the purported economic benefits of the project. However, studies have demonstrated that the numeric value assigned to the social cost of carbon vastly underestimates the true cost. The social cost of carbon is therefore a minimum value. Developed by a federal interagency working group, the social cost of carbon is an estimate of the monetized damages from an incremental increase in carbon emissions in a given year, which includes but is not limited to climate-related changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services. An accurate estimate of net carbon emissions resulting from the proposed action is a prerequisite for applying a social cost of carbon analysis. A complete and accurate assessment of the costs of Willows impacts on the climate is even more essential to a reasoned decision because BLM takes into account the potential economic benefits of the project. For example, it states that total royalties from Willow would amount to approximately $4.95 billion; state taxes would be approximately $1.8 billion, and local property tax revenue would be about $1.9 billion. It is arbitrary for the agency to quantify certain economic benefits of Willow (and allude to others) without accurately disclosing the social cost of its likely carbon emissions.	Federal agencies are not required to consider the social cost of carbon in decision making, since 2017 when EO 13783 (Promoting Energy Independence and Economic Growth) was issued. NEPA does not require a cost-benefit analysis (40 CFR 1502.23) and a cost-benefit analysis has not been conducted in the Draft EIS. Inclusion of a global social cost of carbon without monetized estimates of other effects, including the social benefits of energy production, would be unbalanced and of limited use to the decision-maker. Given the uncertainties associated with assigning a specific, accurate value to the social cost of carbon resulting from the Willow MDP Project, the BLM has elected not to use this tool in its analysis. Section 2.4, *Social Cost of Carbon*, of Appendix E.2A, *Climate and Climate Change Technical Appendix*, provides a detailed discussion of why the social cost of carbon or similar monetization metrics are not required here.	N
864	110	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM Must Consider the Effects of the Project in the Context of a Warming Arctic BLM must consider the ongoing and increasing effects from climate change in the project area, including by incorporating the changing climate into the baseline against which the alternatives will be evaluated and evaluating how existing and increasing climate change impacts will act cumulatively and synergistically with effects from developing .	Text was added to Section 3.1.1, *Past and Present Actions*, to clarify that climate change is a part of the existing condition of the affected environment for all resources analyzed in Chapter 3.0 (*Affected Environment and Environmental Consequences*). Text was also added to Section 3.2.3, *Effects of Climate Change on the Project*, regarding design considerations for climate change. Text was added throughout Section 3.19, *Cumulative Effects*, regarding effects of the Project in combination with future climate change.	Y
864	112	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM Must Consider the Impacts of Climate Change on Terrestrial, Aquatic and Marine Habitats and Wildlife. The changes to temperature, sea ice, permafrost and ocean chemistry described above are already having, and are projected to continue to have, myriad profound effects on the biological environment. These climate effects include: Warming temperatures . . . Sea Ice Loss and Ocean Changes . . . Changes in Precipitation Timing and Amount . . . NEPA also requires BLM to evaluate how climate change will affect proposed activities in the Willow project. Warming temperatures are causing shorter ice road seasons, which are presenting challenges to current operations that will continue to worsen. Permafrost degradation may impair the integrity of oil and gas infrastructure and any gravel roadways used for access. Climate change is leading to increased storm intensity, which may make accessing remote sites by aircraft challenging in the event of an emergency. BLM must carefully consider how a changing climate will affect development in each alternative analyzed in the EIS. BLM states that climate change could affect the project by, among other things, permafrost thawing causing damage to infrastructure, shorter ice road seasons, and more extreme precipitation events increasing runoff.	EIS Section 3.2.3 (*Effects of Climate Change on the Project*) and EIS Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 3.2 (*Effects of Climate Change on the Project*), address the impact of climate change on the Project, including the impact of a shorter ice road season, permafrost thawing, and increased precipitation.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	113	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM must quantify and consider the effects of black carbon from Willow BLM fails to quantify or consider the impacts of black carbon emissions from Willow. Willows potential to affect the Arctic climate and melting sea ice is not limited to greenhouse gas emissions; BLM must also address black carbon in its NEPA analysis. According to EPA, black carbon is now recognized as an important climate-forcing agent with particular impact on the arctic region. Black carbon, or more colloquially, soot, is comprised of small dark particles that remain after incomplete combustion of fossil fuel or biomass. “Black carbon darkens the surface of snow and ice, directly absorbing light [and] reducing the reflectivity (albedo) of snow and ice, both of which are widely understood to lead to climate warming.” EPA has found that this increased absorption of solar radiation is a significant contributor to local warming, and importantly, to the hastening of snow and ice melt, and that [s]ensitive regions such as the Arctic . . . are particularly vulnerable to the warming and melting effects of [black carbon].” Indeed, [s]tudies have shown that [black carbon] has especially strong impacts in the Arctic, contributing to earlier spring melting and sea ice decline. The acceleration of melting due to black carbon deposition is believed to contribute significantly to the rapid melting of Arctic and Himalayan glaciers. [Black carbon]s short atmospheric lifetime (days to weeks) and heterogeneous distribution . . . result in regionally concentrated climate impacts, meaning the location of emissions releases is a critical determinant of [black carbon]s impacts, which is not the case for long-lived and more homogeneously distributed greenhouse gas like carbon dioxide. As a result, according to EPA, [t]here is general scientific consensus that mitigation of [black carbon] will lead to positive regional impacts and that [t]he Arctic . . . may benefit more than other regions from reducing emissions of [black carbon], with mitigation of sources near to or within the Arctic having particularly significant impacts per unit of emissions.	Draft EIS Section 3.2.1, *Affected Environment*, includes information on black carbon and its potential effects on climate based on available, peer-reviewed literature. Although black carbon emissions from the Willow MDP Project are not explicitly quantified, black carbon is implicitly included as part of the Project $PM_{2.5}$ emissions inventory used in air quality impact analysis (EIS Section 3.3, *Air Quality*). The effect of black carbon on Arctic climate is complex and still an active area of research. There are still many uncertainties to resolve in order to better understand the complex mechanisms and feedbacks between black carbon and its effect on Arctic climate. Therefore, it is not possible to quantitatively assess the effect of a project’s black carbon emissions on global climate change at this time.	N
864	114	Psarianos	Bridget	Trustees for Alaska	Climate Change	Several types of fuel sources, including fossil and biomass, emit black carbon, but in differing ratios. Diesel engines are a particularly important source, with up to 80% of its sub-2.5 micrometer particulate matter (PM2.5) composed of black carbon PM2.5 (and smaller), in addition to being a climate-forcing material through altered albedo, is also associated with human health impacts, particularly cardiovascular and respiratory ailments. The flaring of natural gas is another important source of black carbon, particularly in the Arctic, where it contributes 42% of the annual mean black carbon concentration, and 52% of the concentration in March, when it could have significant effects on early spring ice dynamics. Given these impacts, the eight-nation Arctic Council in April 2015 adopted a framework agreement to hasten reduction of black carbon and methane emissions, in which those nations (including the U.S.) committed to taking enhanced, ambitious, national and collective action to accelerate the decline in our overall black carbon emissions. The Framework established an Expert Group on Black Carbon and Methane, which met in 2017 and recommended that black carbon emissions be further collectively reduced by at least 25-33 percent below 2013 levels by 2025. BLM recognizes some of these concerns in the DEIS, but it fails to estimate the projects emissions of black carbon, discuss specific impacts, or identify potential mitigation measures when discussing air quality impacts and climate change.	Draft EIS Section 3.2.1, *Affected Environment*, includes information on black carbon and its potential effects on climate based on available, peer-reviewed literature. Although black carbon emissions from the Willow MDP Project are not explicitly quantified, black carbon is implicitly included as part of the Project $PM_{2.5}$ emissions inventory used in air quality impact analysis (EIS Section 3.3, *Air Quality*). The effect of black carbon on Arctic climate is complex and still an active area of research. There are still many uncertainties to resolve in order to better understand the complex mechanisms and feedbacks between black carbon and its effect on Arctic climate. Therefore, it is not possible to quantitatively assess the effect of a project’s black carbon emissions on global climate change at this time.	N
864	258	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM fails to address the risk climate change can, and likely will, have on the project in any real manner (e.g. see BMPs listed below). Climate change can impact not only the design of this project (e.g. designing the infrastructure to account for increased peak discharges) but could increase the projected impacts analyzed for this project. BLM must consider climate change in all aspects of this project and has not done so adequately.	Text was moved from Draft EIS Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 3.2, *Effects of Climate Change on the Project*, to Final EIS Section 3.2.3, *Effects of Climate Change on the Project*. Additional text was also added to Section 3.2.3 regarding design considerations for Project elements.	Y
864	285	Psarianos	Bridget	Trustees for Alaska	Climate Change	Because the life of this project is projected to be 30 or more years, the climate change factors increase the risk of recovery and rebound of ecosystems, as well as reclamation success if and when the project is abandoned and/or decommissioned. The design criteria outlined in the previous bullet may address some of the short-term climate change issues, but cannot fully address the potential long-term impacts of climate change to this project and does not address the potential significant impacts to the ecosystem especially in terms of wetlands, stream flows and permafrost thawing.	If localized climate change impacts begin to occur, such as thaw penetration and subsidence at the gravel surface, CPAI would perform maintenance as needed to increase the insulative value of the infrastructure, through additional gravel or other techniques, in the problem area(s). CPAI would adaptively manage all infrastructure in response to potentially changing climatic conditions. Specific areas where subsidence or other climate change effects may occur are unknown due to site complexity and uncertainties inherent in any model or projection. This text was added to Final EIS Section 3.2.3, *Effects of Climate Change on the Project*. When reclamation occurs in the future, CPAI would coordinate a reclamation plan with BLM that would accommodate for the current and expected future conditions at that time.	Y

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4	1	Schwarz	Anthony	—	Climate Change	This EIS . . . completely fails to address how climate will affect the project design and operating assumptions over the life of the project. To omit evaluating these predictable impacts as part of the project design abrogates the EIS purpose and process. Due to unexpectedly rapid global warming impacts numerous modifications have been required for existing facilities after the EIS process. These unplanned circumstances have limited the ability to consider environmental consequences. There is ample data available to support the assumption that detrimental environmental trends will continue into the future and specifically during the life cycle of the Willow Project. I have reviewed key sections of the DRAFT Willow Master Development Plan Environmental Impact Statement. Project development impacts due to future global warming are woefully missing from this report . . . To not consider these facts in evaluating the Willow and other future projects deprives decision makers of key information affecting the projects entire life cycle impacts. Section 3.0 of the draft report is titled, Affected Environment and Environmental Consequences, barely addresses the future impacts on the project. Specifically, Section 3.2.3, Effects of Climate Change on the Project gives the only vague reference in the entire report as follows: Key changes to anticipate as a result of a changing arctic climate are permafrost thawing, shorter ice road seasons, and changes to precipitation. Permafrost thawing and uneven settlement could cause damage to infrastructure such as gravel pads, roads, and pipelines. A shorter ice road season would affect the transport of materials and personnel that depend on ice roads; consequently, the impacts due to climate would be more substantial for Alternatives C and D due to their reliance on annual ice roads to connect the Project area to existing development during winter. Then in section 3.19.3 Past, Present and Reasonably Foreseeable Future Action the report only addresses the future of project impacts, not impacts on the project during the projects life cycle.	Text was moved from Draft EIS Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 3.2, *Effects of Climate Change on the Project*, to Final EIS Section 3.2.3, *Effects of Climate Change on the Project*. Additional text was also added to Section 3.2.3 regarding design considerations for Project elements. BLM evaluated ice road season duration (which has natural variability) over the last 20 years to consider the potential effects of climate change on ice road construction. Because the duration of the Alpine Ice Road season has not changed substantially over the last 20 years (CPAI 2020) despite climate change occurring, the design uses the existing ice road season. The Alpine Ice Road has remained open for an average of 92 days for the last 21 years and 99 days for the last 10 years; there is no apparent trend in increasing or decreasing duration. Thus, there is no basis to assume in the EIS that there would be a shortened ice road season, and our conclusions in the EIS on the effects of transport of materials and personnel are reasonable. Text regarding this was added to Final EIS Section 3.2.3.	Y
4	2	Schwarz	Anthony	—	Climate Change	Over the period from 1976 to recent times the Arctic has witnessed the following easily observed impacts: 1. Ocean Based Ice Road Availability: Ice roads historically established on the Arctic Ocean along the coast are no longer reliable. During the development of Point Thomson, these roads broke apart in mid-winter due to nearby open water and resulting surging action. After winter of 2010-11, ocean ice roads were no longer used, and land-based ice roads became the only winter connection to Point Thomson. Land based ice roads use added freshwater resources, additional construction equipment and associated emissions. Stream crossings and tundra can be permanently affected in some cases. 2. Land Based Ice Road Availability: Shorter or potentially no ice road availability will increase the need for air transport or additional permanent roads. Ice roads are used for construction of pipelines and other infrastructure as well as supply of critical heavy lift items that cannot be transported any other way. Historically ice roads were permitted starting in November or December, today road construction cannot be started until January or later and must be abandoned earlier in the spring of each year. Various public agencies have detailed historic records of permafrost temperatures which are used to determine annual ice road windows. This data is significant as it represents a trend that should be extrapolated into the future and be a part of this report.	Sea ice roads would only be used for Options 1 and 2 during construction (three winter seasons), during which time conditions are not expected to change to the point of not being able to build 1.8 to 7.2 miles of ice road as proposed. BLM evaluated ice road season duration (which has natural variability) over the last 20 years to consider the potential effects of climate change on ice road construction. Because the duration of the Alpine Ice Road season has not changed substantially over the last 20 years (CPAI 2020) despite climate change occurring, the design uses the existing ice road season. The Alpine Ice Road has remained open for an average of 92 days for the last 21 years and 99 days for the last 10 years; there is no apparent trend in increasing or decreasing duration. Thus, there is no basis to assume in the EIS that there would be a shortened ice road season, and our conclusions in the EIS on the effects of transport of materials and personnel are reasonable. Text regarding this was added to Final EIS Section 3.2.3, *Effects of Climate Change on the Project*.	Y
4	3	Schwarz	Anthony	—	Climate Change	Increased Road and Pad Thickness This report needs to address how increased tundra thawing will affect design and operation of the Willow Project. Referring again to the Point Thomson Project, there was considerable research and discussion regarding gravel road and pad thickness. Since the 1970s typical road and pad infrastructure called for gravel thickness to be a minimum of 5 feet above the native tundra. Recently the depth of the active zone (permafrost near the tundra surface which thaws each summer) has increased. This has led Arctic Civil Engineering experts, such as Bez Hazen, to recommend increasing the thickness of roads and pads to 6 feet or greater to help minimize damage to the tundra. This particular study was done about ten years ago and the tundra thawing issue continues to worsen.	Project gravel and pads would be a minimum of 5 feet thick to help insulate the underlying tundra, though they would average more than 7 feet thick due to the local topography. These design thicknesses include CPAI's observations from its historical operations in Kuparuk and at Alpine, while addressing the need to minimize the overall Project gravel footprint and its associated impacts. See Final EIS Appendix D.1 (*Alternatives Development*), Sections 4.3.6, 4.4.6, and 4.5.6 (all titled *Gravel and Other Fill Requirements*) for average pad thicknesses.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
4	4	Schwarz	Anthony	—	Climate Change	Reduction of Near Shore Sea Ice Barge docking and unloading activities will require more complex and environmentally impacting designs to deal with significantly increased surge and wave action. The lack of sea ice allows the near shore wind fetch to increase and thus enlarge the size of waves and tidal surge affecting the coastline. Many existing island and near shore projects like North Star Island and Endicott, among others, have had to make significant modifications to their infrastructure starting as long ago as 2010. This includes relocating facilities exposed to wave action along with added sea walls and gravel berms to defend the facilities from waves as large as 10 feet. Previous designs anticipated waves of 1-2 feet.	The MTI design water levels and wave conditions are based on the 100-year event, as presented in Resio and Coastal Frontiers Corporation (2019). This hindcast assessment of extreme water level and wave conditions indicates that storm surge and wave conditions have not changed appreciably in the recent past. Twenty westerly and twenty easterly storms that occurred from 1954 through 2014 were selected for inclusion in that study based on their potential to generate large waves. Only five of the westerlies and eight of the easterlies occurred after 2000, and only one westerly and three easterlies after 2010. Furthermore, the highest water level ever recorded at the Prudhoe Bay tide gage, which was established in 1990, occurred in August 2000 (based on the station information available at: https://tidesandcurrents.noaa.gov/stationhome.html?id=9497645). The MTI design considered the effects of declining ice cover in the Beaufort Sea. Because the predominant directions for storm winds are coast-parallel (easterly and westerly), the retreat of the pack ice to the north does not materially increase the fetch length. The fetch width (perpendicular to the wind direction) is indeed increasing, but the impact of fetch width on surge and wave generation is relatively minor compared to that of fetch length. As a result, the severity of nearshore surge and wave has not changed substantially. Coastal erosion rates are increasing due to higher air temperatures (thermal erosion of ice-bonded coastal bluffs) and longer open-water seasons (more wave energy), but these factors would not impact an armored structure such as Oliktok Dock or the MTI. As a point of additional clarification, fetch length does not impact tidal surge, which is astronomically driven rather than wind-driven. The response above assumes that storm surge was the term intended by the commenter. The slope protection systems on the Endicott Main Production Island, Endicott Satellite Drilling Island, and Endeavor Island, as well as the Northstar Production Island, have required periodic maintenance since their construction in 1985–1986 and 2000, respectively. However, no significant modifications have been made since 2010, including no additions of sea walls or gravel berms. Sacrificial gravel has been added to the North Leg of the West Dock Causeway on an annual basis, but this activity represents planned maintenance of unarmored sacrificial beaches rather than a significant modification. Maximum wave heights exceeding 10 feet were anticipated in the design of both Endicott and Northstar, based on hindcast analyses similar to that performed for the Willow MDP Project. The statement “previous designs anticipated waves of 1-2 feet” is inaccurate. As indicated above, maximum wave heights in excess of 10 feet were anticipated in the design of the Endicott and Northstar slope protection systems. This information was added to Final EIS Section 3.2.3, *Effects of Climate Change on the Project*.	Y

4.2.6 Cumulative Effects

Table B.2.9. Substantive Comments Received on Cumulative Effects

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
11	6	Baraff	Lisa	—	Cumulative Effects	And due to limited time — and I’m already rambling — there was one omission I also wanted to note in the reasonably foreseeable and future actions, and I looked at the map in the appendix for mapping out all the RFFAs. Harrison Bay had nothing in it. And there could well be something, and that’s the SALSA project, which is the Special Alaska Lease Sale Areas, or SALSA, and it includes a number of areas up for sale or for lease in Harrison Bay. Nothing sold last year, but those areas are up for sale again this fall. So, I think that that needs to be considered.	SALSA would not open any new areas to leasing or change management of those areas; thus, it is considered speculative. It is therefore not included as an RFFA.	N
986	6	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Cumulative Effects	Nuiqsut is at the center of oil and gas development in Alaska. Nearby development projects include Alpine, Kuparuk, Greater Mooses Tooth, as well as nearshore developments in the Beaufort (Ooguruk, Oliktok and Spy Island) and other foreseeable projects, including Nanushuk, Liberty, PUTU, Stoney Hill and now Willow. The cumulative effects from these development projects have taken a toll on the community. These effects include near constant construction, noise, increased vehicle and air traffic, air emissions and inversion, impediments to tundra travel, road dust, decreased visibility, impacts to water resources and thermokarsting. Residents have noted the following impacts: the disruption of wildlife, loss of traditionally used subsistence areas, degradation of air quality, increased vehicle and air traffic, increased travel time and expense associated with longer hunts, disruption and transformation of local lifestyle and impacts to water quality. CPAI and BLM must be cognizant of these issues and implement all practicable measures to minimize the impacts of continued exploration and development to our residents, wildlife and land.	Text acknowledging the recent trend in increased exploration and development near Nuiqsut were added to Section 3.19.3, *Reasonably Foreseeable Future Actions*. Avoidance, minimization, and mitigation for each resource are described in the Final EIS, typically in the sections numbered and titled Section 3.X.2.1, *Avoidance, Minimization, and Mitigation*.	Y
989	2	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Cumulative Effects	However, we are concerned that this project may impact our residents and their subsistence lifestyle. CPAI and BLM must give special attention to the increasing cumulative impacts around Nuiqsut, including the deflection of wildlife by air traffic, air emissions and road dust.	Additional details were added to Section 3.19.10, *Cumulative Impacts to Biological Resources*, to address cumulative effects to wildlife.	Y
989	35	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Cumulative Effects	Page 113, Section 3.13.2.3.2 - Disturbance or Displacement “Exposure of marine mammals to aircraft presence would occur throughout the life of the Project, but each occurrence would be temporary and of short duration and would result in brief behavioral responses.” Many “brief” responses may have a cumulative effect.	Most of the air traffic for the Project would occur near Willow; because the Willow airstrip would be 20 miles inland, it is expected to minimize effects to marine mammals. More text was added to clarify this in Section 3.13.2.3.2, *Disturbance or Displacement*.	Y

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989	38	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Cumulative Effects	Page 159-168, Section 3.19 - Cumulative Effects -This section could be improved. Cumulative effects analyses are typically ad hoc, unrepeatable and completely non-quantitative. . . . The cumulative effects analysis in the Willow DEIS is an example of the inadequacies typical of EISs. - . . . [T]he discussion in Section 3.19.4 about cumulative impacts with contributions from climate change is limited to two short paragraphs that entirely focused on greenhouse gases. This section should discuss the many other concerns, issues and impacts associated with climate change. - . . . The Willow project proposes to extend development farther to the west into areas that have never had pipelines or roads. There should be a substantial discussion and evaluation, which leads to improved mitigation, on cumulative impacts on caribou, waterfowl, and fish resources, especially those important for subsistence to Nuiqsut and other North Slope villages. -An adequate and repeatable analysis of cumulative impacts on all resources is needed. The methodology provided in Section 3.19.2.2 does not provide meaningful information that could allow someone else to take the same information about “past, present, and reasonably foreseeable future actions” and the biological resources and reach the same conclusions. . . . Decision makers and the public need to have additional information to adequately assess the cumulative impacts on North Slope resources that include possible impacts from the proposed Willow project.	Quantitative analysis was provided where feasible; otherwise, qualitative analysis was used. The cumulative effects of climate change on other resources are described throughout Section 3.19, *Cumulative Effects*, such as in Section 3.19.6, *Cumulative Impacts to Soils, Permafrost, and Gravel Resources*; Section 3.19.10, *Cumulative Impacts to Biological Resources*; and Section 3.19.13, *Cumulative Impacts to Environmental Justice*. Section 3.2.1, *Affected Environment*, of the Final EIS addresses ongoing impacts of climate change on the environment, including in the Project area. Section 3.2.2, *Environmental Consequences: Effects of the Project on Climate Change*, and Section 3.19.4, *Cumulative Impacts to Climate Change*, analyze impacts that the Project and cumulative actions may have on climate. The cumulative effects of roads and pipelines on caribou are described in Section 3.19.10, *Cumulative Impacts to Biological Resources* .	N
991	10	Bruno	Jeff	Alaska State, Department of Natural Resources	Cumulative Effects	Chapter 3, Page 161 The list of reasonably foreseeable future actions on this page includes both the Alaska LNG Project and the ASAP Pipeline Project. Only one of these projects, if any, will be constructed. Please make this clear in the table, otherwise it would appear that impacts would be twice what is being proposed.	Which of the two projects would be built, or even if only one would be built, is speculative at this time. Both are included in the NEPA analysis.	N
991	31	Bruno	Jeff	Alaska State, Department of Natural Resources	Cumulative Effects	Chapter 3.19, Page 159 Might be helpful to note that cumulative impacts are generally negative but can also be positive. (i.e. compensatory mitigation, NPR-A Mitigation Impact funds, scientific studies and research collected from the project) Chapter 3.19, Page 161, Table 3.19.1—Reasonably foreseeable future actions Concerning that NPR-A Impact Mitigation Grant Program projects are not included in this section. Past projects have been built within the project area, grants have been awarded and are presently being worked on within the project area, and up to $2.5 billion of additional projects would happen if the project were to be built. These projects are required to mitigate impacts from oil and gas development and should be included in the cumulative analysis and should discuss how this program will help reduce impacts from O&G development. Should be considered as a potential positive cumulative impact, past, present, and future.	The NPR-A Impact Grant Program was added to the list of RFFAs in Table 3.19.1 (Section 3.19, *Cumulative Effects*), and effects of the program were added to Section 3.19.11, *Cumulative Impacts to the Social Environment (Land Use, Economics, and Public Health)*.	Y
991	32	Bruno	Jeff	Alaska State, Department of Natural Resources	Cumulative Effects	Chapter 3.19, Page 161 Please change the language in ASTAR description. ASTAR is much more than roads and less than 5% of the projects identified are roads. ASTAR is any infrastructure needs. Additionally, the communities are in the process of identifying what they consider to be their priority projects and we should hold off at this time summarizing projects related to ASTAR. Planning level effort to identify North Slope community needs at a local and regional level (BLM 2008)~~; includes potential roads (seasonal ice, snow, or all- season gravel) that may connect communities to the Dalton Highway~~. Please consider removing from list altogether.	Additional information on ASTAR was added to Table 3.19.1.	Y
991	33	Bruno	Jeff	Alaska State, Department of Natural Resources	Cumulative Effects	Page 161, Section 3.19.1 For ASTAR in the column Distance to BT3 (miles) please mark it NA as it is a planning effort and has no physical location.	Distance of ASTAR to BT3 is stated as unknown.	N
1302	36	Dunn	Connor	ConocoPhillips	Cumulative Effects	In the section addressing cumulative effects, the DEIS states: “Cumulative GHG emissions include Willow direct and indirect emissions, existing GHG emissions sources on the North Slope (presented in Table 3.19.2), and GHG emissions from the Greater Willow potential drill sites 1 and 2 (figure 3.19.2). Together, the cumulative annual average GHG emissions are approximately 0.1% of the 2017 U.S. GHG inventory for all action alternatives.” DEIS 3.19.4, page 162. We recommend that BLM more clearly describe, in an appendix or a footnote, how the 0.1% figure is calculated.	Information has been added to Section 3.19.4, *Cumulative Impacts to Climate Change*, to explain the calculation of the 0.1% fraction.	Y
1302	113	Dunn	Connor	ConocoPhillips	Cumulative Effects	This section presents an inventory of GHG emissions on the North Slope and compares these emissions to the total U.S. GHG inventory, implying that the cumulative impact of the Project and other North Slope GHG sources is very small. However, Section 3.2.2 Environmental Consequences: Effects of the Project on Climate Change indicates that “It is not currently possible to determine the impact of a single project on global climate change; the USEPA has not set specific thresholds for GHG emissions. Current scientific knowledge cannot associate particular actions with specific climate effects, and a single project cannot significantly impact global GHG emissions; however, all projects may contribute cumulatively to the significant impact of global climate change.” This discussion is particularly relevant to the GHG summary presented in Section 3.19.4 and Table 3.19.2. and we recommend that Section 3.19.4 be updated to reflect these same ideas for context in understanding the information presented.	Section 3.19.4, *Cumulative Impacts to Climate Change*, has been updated with this additional information.	Y

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1302	117	Dunn	Connor	ConocoPhillips	Cumulative Effects	This section does not adequately address the beneficial economic impacts of cumulative actions such as of oil and gas developments, including substantial revenues to Nuiqsut, the NSB, and the State.	Section 3.19.11, *Cumulative Impacts to the Social Environment (Land Use, Economics, and Public Health)*, describes improved health care; jobs for construction, operations, and supporting services; and some new wages that would accrue in both the local and regional economy. Additional text was added regarding the NPR-A Impact Grant Program and its role to help support essential public services and facilities, as well as to offset direct, indirect, and cumulative effects of oil and gas development in the NPR-A.	Y
1302	120	Dunn	Connor	ConocoPhillips	Cumulative Effects	The text refers to Willow direct and indirect emissions and existing North Slope GHG emission sources, referring to Table 3.19.2, but that table only lists direct emissions from other North Slope sources. This discussion should be clarified.	The text, "presented in Table 3.19.2," only refers to the other existing North Slope sources. Text was clarified.	Y
9	5	Miller	Pamela	—	Cumulative Effects	I'm assuming that the numbers are per year for the 1.8 billion gallons of fresh water that will be needed for ice roads in Alternative B, or 2 million in C. The ground traffic of 3 million trips in Alternative B are 2.3 in Alternative C. Fixed-wing aircraft access, 35,000 flights; helicopter, 2,400 flights. Is that annual? What time period? Is that for the life of the field? Is it considering the cumulative impacts that will happen next once this oilfield project is built?	Freshwater use is presented as total gallons needed for the life of the Project. Traffic is presented as total trips for the life of the Project. More than 25 additional traffic details were added to Appendix D.1, *Alternatives Development*, to clarify ground, air, and vessel traffic. Quantitative descriptions of the gallons of water use and traffic trips for other projects (past, present, or reasonably foreseeable future actions) are not available to quantitatively describe cumulative values of the Project combined with other actions.	Y
9	11	Miller	Pamela	—	Cumulative Effects	The cumulative impacts analysis that was done for this project had a line around an area that was much smaller than the sprawl of current oilfield activities, aircraft flights, and activities that affect the fish, the wildlife, the birds, and the people on the North Slope and well beyond. Teshekpuk Lake Special Area will be affected by this project. It's not depicted very well on the maps that are here tonight, but Teshekpuk Lake is critically important for molting brant and geese.	The TLSA boundary was added to numerous figures in the Final EIS, such as those related to Section 3.12, *Terrestrial Mammals*, and Section 3.14, *Land Ownership and Use*.	Y
1294	46	Nukapigak	Joe	Kuukpik Corporation	Cumulative Effects	Volume I, pages 160-68, Section 3.19, Cumulative Effects Table 3.19.1 Reasonably Foreseeable Future Actions That May Interact with the Project. Page 161 incorrectly lists Eni as developing Nuna 2. CPAI now proposes to develop Nuna 1 and 2. The Colville River Access Road is being constructed by NVN and the NSB, not the City of Nuiqsut.	Edits made as suggested.	Y
1307	8	Pardue	Margaret	Native Village of Nuiqsut	Cumulative Effects	Exploration and development activities within the region continue to compromise Nuiqsut's irreplaceable subsistence use areas. Several hundred thousand more acres have been leased on adjacent state lands. With active exploratory drilling and production to the east, west, and north, our community is effectively surrounded by oil and gas development. BLM has taken no action to meaningfully protect subsistence resources and our remaining subsistence use areas from the impacts of oil development. . . . In scoping comments, we encouraged BLM to conduct robust analysis of how Willow and the cumulative effects of development in the region could further affect subsistence resources and practices. The DEIS's review is not sufficient.	Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*, has been updated to provide additional discussion of the cumulative impacts of continued exploration and development within traditional subsistence use areas.	Y
1307	12	Pardue	Margaret	Native Village of Nuiqsut	Cumulative Effects	BLM must also consider the effects of exploration and development on Native allotments. Native allotments were largely selected based on their proximity to abundant subsistence resources, and as discussed, noise and other industrial activities are effecting subsistence resources and practices in the region. These impacts are affecting the availability of resources that have traditionally been harvested at or near certain Native allotments. These impacts are harming individuals' use of these areas and compromising the value of individually selected lands.	Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*, has been updated to address potential cumulative effects on Native allotments.	Y
1307	19	Pardue	Margaret	Native Village of Nuiqsut	Cumulative Effects	NVN considers projects and land-management from a landscape-scale perspective, which means that cumulative impacts are a primary concern. The DEIS fails to adequately consider the cumulative effects of the Willow MDP and the many other past, present, and reasonably foreseeable future actions around Nuiqsut. . . . BLM must use a landscape-level analysis to conduct a comprehensive and meaningful cumulative effects analysis of oil and gas related activities, including exploration activities. This analysis should include CD-5, GMT-1, GMT-2, the Nanushuk Project, exploration drilling and associated activities in the NPR-A, the exploration activities and potential development of Smith Bay, the other Alpine developments in the Colville River Delta, oil and gas exploration and development in the Arctic National Wildlife Refuge, the Liberty project in Foggy Island Bay, and all other developments on state lands.	All the actions listed in the comment are included in the cumulative effects analysis, except the following: Smith Bay and Liberty. Smith Bay does not have funding or a partner for further actions and thus is speculative. Liberty is outside the area that would overlap with effects from the Willow MDP Project.	N
1307	20	Pardue	Margaret	Native Village of Nuiqsut	Cumulative Effects	Moreover, a meaningful analysis of cumulative impacts is not possible until BLM has finalized any revisions to the IAP. BLM acknowledges that it plans to revise the IAP, but the DEIS fails to provide any information about the potential changes that could result, including the potential for opening currently closed areas to development. BLM must consider the changes to the IAP in its analysis of cumulative effects and therefore should wait to take further action to permit the Willow project until any revisions to the IAP are approved.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1). The NPR-A IAP revisions are included in the cumulative effects analysis. Now that more details are available about the alternatives assessed in the NPR-A IAP revisions, those details were added to the analysis in Final EIS Section 3.19.10, *Cumulative Impacts to Biological Resources*.	Y
864	25	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	Additionally, because BLM has indicated its intent to shrink Special Areas and allow for more oil and gas development in the Reserve, BLM must analyze that scenario as part of its cumulative impacts analysis . . . BLM is evaluating the impacts of the proposed Willow project based on the premise that areas avoided in the IAP will continue to be avoided and that existing stipulations and best management practices will continue to be applied and enforced to future development projects. These assumptions are faulty if the agency changes those protections and mitigation measures. To only analyze the proposed Willow project under the existing land management plan while simultaneously undertaking a process to change that plan to make it less protective means that if permitting and the new plan is adopted, the cumulative impacts in the Reserve could be greater than anticipated. BLM must analyze those impacts now, particularly to determine if it needs to impose additional protective measures on the Willow project.	The NPR-A IAP revisions are included in the cumulative effects analysis. Now that more details are available about the alternatives assessed in the NPR-A IAP revisions, those details were added to the analysis in Final EIS Section 3.19.10, *Cumulative Impacts to Biological Resources*.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	54	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	The BLM's cumulative impacts analysis fails to contain the "quantified or detailed information" required. . . . The DEIS includes only a cursory and general discussion of cumulative impacts resulting from Willow and other past, present, and reasonably foreseeable future actions. Additionally, while the DEIS lists a number of reasonably foreseeable future actions that could interact with the project, the list is incomplete, most notably by excluding any past and present actions, and it includes only single sentence descriptions of the actions. BLM must identify and fully consider the potential indirect and cumulative effects of Willow, including considering all past, present, and reasonably foreseeable future actions that may flow from Willow development as well as unconnected actions that act cumulatively with the impacts of Willow.	Past and present actions are described in Section 3.1.1, *Past and Present Actions*, so that they can be used to establish existing conditions of the affected environment for all resources analyzed in Chapter 3.0 (*Affected Environment and Environmental Consequences*). Table 3.19.1 was updated to include additional RFFAs.	Y
864	55	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	BLM must also consider a number of foreseeable developments and decisions, including in areas currently closed to development, that could further exacerbate the impacts to the region in conjunction with Willow. Reasonably foreseeable ongoing and future actions that have not been adequately considered in the DEIS include, but are not limited to: -Development and production at ConocoPhillips' other Reserve projects, including Colville Delta 5 (CD-5), GMT-1, and GMT-2; -Winter exploration drilling and associated activities in the Willow area and adjacent parts of the Reserve; -Exploration, development, and production of recent oil and gas discoveries near the Reserve, including Caelus's Smith Bay and Oil Search's Pikka-Horseshoe; -State nearshore oil and gas lease sales, including Special Alaskan Lease Sale Areas, which are blocks of contiguous leases offered together with large amounts of related data and seismic information; -Oil and gas exploration, development, and production in the Arctic National Wildlife Refuge; -Potential reversal of protections in the IAP for Special Areas in the Reserve, including the Teshekpuk Lake Special Area, leading to oil and gas leasing, exploration, development, and production in sensitive areas immediately adjacent to the current Willow proposal; -Further development in the Reserve that may flow from the development of Willow, its potential central processing facility, and associated roads; -The Arctic Strategic Transportation and Resources (ASTAR) project where the State of Alaska is proposing to construct a series of gravel roads or rights-of-ways spanning portions of the North Slope Borough; -Oil and gas activities in Outer Continental Shelf areas of the Beaufort Sea, as well as the potential for additional leasing and oil and gas activities and infrastructure in those areas and additional support infrastructure and activities within or adjacent to the Reserve; -The Alaska Natural Gas Pipeline and other commercial natural gas pipelines and related activities; and -Increased vessel traffic in the Beaufort, Bering, and Chukchi seas.	CPAI's existing developments are described in Section 3.1.1, *Past and Present Actions*. Future actions at those sites are described in Table 3.19.1. Text describing the approach and analysis of exploration actions was added to Section 3.19.3, *Reasonably Foreseeable Future Actions*. SALSA would not open any new areas to leasing or change management of those areas; thus, it is considered speculative. It is therefore not included as an RFFA. Increased vessel traffic in the Beaufort, Bering, and Chukchi seas is not an RFFA in and of itself. However, most of the actions listed in Table 3.19.1 would incrementally add vessel traffic to the Beaufort, Bering, and Chukchi seas. These are included in the cumulative effects analysis, and more detail was added to Section 3.19.10, *Cumulative Impacts to Biological Resources*, about this. The rest of the actions described in the comment are already included in the cumulative effects analysis.	Y
864	56	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	The DEIS's failure to discuss BLM's plan to revise the Integrated Activity Plan (IAP) is especially problematic. BLM acknowledges that it is revising the IAP. Yet the DEIS fails to provide any information about the potential changes that could result, including the potential for opening additional areas to development. The primary target of any such effort could be the Teshekpuk Lake Special Area. . . . The 2013 IAP safeguards much of the Teshekpuk Lake Special Area from leasing and non-subsistence permanent infrastructure because of its high conservation and subsistence values. . . . Any efforts to expand industrial activity into these areas would have far-reaching direct, indirect, and cumulative impacts across the region. The DEIS completely fails consider the potentially enormous impacts that a decision to open additional areas to development could have on the entire region.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	Y
864	57	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	The DEIS also fails to disclose and analyze the cumulative impacts of roaded development in the Reserve. As we explained in scoping comments, an analysis of the true impacts of roaded development in the NPR-A is essential and long-overdue. The Reserve is the largest tract of roadless land in the United States. When the federal government decided to allow oil development there, it determined that any development must be without roads, in order to protect the rich biological resources in the Reserve. According to former Interior Secretary Bruce Babbitt, "[t]he problem with roads is that roads beget more roads beget more roads. A road becomes a network, becomes a spider-web of landscape fragmentation and destruction, with little use for wildlife." When BLM abandoned this plan for protecting the roadless character of the Reserve, it did so without taking full account of the impact of roads. BLM cannot avoid the full impacts of a roaded development scenario for Willow by ignoring the foreseeable impacts of development beyond Willow that will almost certainly follow the newly built road.	Section 3.19 (*Cumulative Effects*) of the Draft EIS and Final EIS analyze the cumulative effects of potential roads connecting NPR-A to the Dalton Highway, as well as roads connecting communities within NPR-A, as part of the RFFA ASTAR project.	N
864	58	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	BLM's analysis in the DEIS continues the historical pattern of underestimating the cumulative effect of oil development in the reserve . . . This failure to accurately represent impacts is unacceptable and deprives the public of the information necessary to understand the true impacts of the project. In assessing the indirect and cumulative effects, BLM must maintain a broad scope to avoid underestimating the effects of oil and gas projects across the North Slope. According to the National Research Council, "[t]he effects of industrial activities are not limited to the footprint of a structure or to its immediate vicinity; a variety of influences can extend some distance from the actual footprint." Thus, "[t]he common practice of describing the effects of particular projects in terms of the area directly disturbed by roads, pads, pipelines, and other facilities ignores the spreading character of oil development on the North Slope and the consequences of this to wildland values. All of these effects result in the erosion of wildland and other values over an area far exceeding the area directly affected."	The BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N

4.2.7 EIS Process and Timeline

Table B.2.10. Substantive Comments Received on EIS Process and Timeline

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1303	4	Christopherson	Jen	Defenders of Wildlife	EIS Process and Timeline	I urge BLM to slow this analysis process down to make sure that the agency is getting sufficient public input; properly analyzing issues raised by a cross-section of stakeholders; and especially sufficiently analyzing impacts to imperiled polar bears, ice seals, whales and other wildlife.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*. The BLM has analyzed potential impacts to polar bears, seals, whales, and other wildlife, including preparation of a Biological Assessment for threatened or endangered species. Detailed information about special status species can be found in Appendix E.13 (*Marine Mammals Technical Appendix*). BLM is also conducting Section 7 consultation with USFWS and the NMFS under the ESA.	N
31	2	Culliney	Susan	Audubon Alaska	EIS Process and Timeline	We are also concerned about the intersection of Willow and the IAP revision. The environmental review for the Willow project should not happen concurrently or just prior to the rewriting of the IAP. The Willow project will have far-reaching impacts on the Teshekpuk wetlands complex which is within the Teshekpuk Lake Special Area, an area of immense value to birds and wildlife, one of the most important bird habitats in the entire international Arctic. A new IAP poses the potential that — the potential that more acreage of the Teshekpuk area will be available for leasing. It is impossible to consider one impact to this critically important bird and wildlife area while the other is still pending and uncertain. Reviewing these two projects simultaneously will be confusing to the picture and will weaken the agency's analysis on both topics.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	N
84	2	Long	Becky	—	EIS Process and Timeline	The Process BLM's process to follow NEPA is out of order and is wrong legally. You should NOT have this DEIS process before BLM completes the Integrated Activity Plan (IAP)/DEIS. The scoping was in December 2018. To my knowledge there has been no DEIS. I have heard that the DEIS for IAP will probably come out right after the end of the comment period for the Willow Project. You should have completed the IAP EIS process which would change the 2013 IAP. This whole process is being rushed by the accelerated timeline. NEPA is being eroded. The public process is being curtailed. NEPA review is intended to discover significant individual or cumulative impacts created by the proposed development. The project sponsor must answer the concerns and make changes to mitigate the changes. This produces better projects and lessens impacts including costs to the public on down the line. The Call for Nominations and Comments 2019 NPR-A Oil and Gas Lease Sale, 84 Fed. Reg. 28854 is itself questionable legally. This step in the process is illegal and not conforming to the NEPA process. How can leasing move forward when the revision of the Integrated Activity Plan is just in the scoping phase. The IAP revision could change the mitigation measures for future leases.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	N
84	3	Long	Becky	—	EIS Process and Timeline	There are currently 3 lawsuits because BLM has been shoddy in following the NEPA process. In fact, I question if BLM is able to responsibly follow the NEPA process due to agency commitments to be the lead in so many industrial developments: Ambler Road EIS, Arctic National Wildlife Refuge Coastal Plain Leasing, Nominations for NPR-A, IAP/EIS process that erodes the habitat of the special management areas, the Willow Project, LNG Gas Line and the list goes on and on. Does BLM have the resources to do it right. Also, the question goes beyond whether BLM can do it right. All the different, simultaneous federal process have exhausted the public and the communities especially when commenters feel like they are being ignored. These massive projects have a huge impact on communities. We are being disenfranchised by these multiple processes which are occurring at rapid speed to benefit interested applicants. We are restricted.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Response*.	N
1297	1	Mazzola	Lisa	—	EIS Process and Timeline	BLM piled on project proposal documents and comment periods all at once—including those for Willow, the Ambler road, and the AKLNG gas line—making it impossible for people to weigh in on multiple proposals that interrelate, accumulate impacts, and will dramatically affect the entire Arctic region. BLM has made it hard for those most affected to participate in the public process.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Response*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
9	10	Miller	Pamela	—	EIS Process and Timeline	For the general person we cannot afford to print out the document to compare maps to see and process the information. At the very minimum that should be required for every community; I don't see a plain-language summary that would be helpful to the general person in a community, small or large. There's not a map available here that puts this project in context with all that is happening on the North Slope of Alaska in our changing Arctic climate. It does not show BLM's current EIS on the road to Ambler, nor the upcoming imminent final EIS on the Arctic Refuge Coastal Plain EIS, which will also impact resources used by the village of Nuiqsut and other people on the North Slope. There is currently a public comment period open on the FERC LNG Alaska Natural Gas Pipeline. That's a massive document. There are also other public comment periods related to lease sales on state lands and upcoming activities. Showing those maps on a map to put it in perspective would be helpful.	Hard copies of the Draft EIS were provided to the community of Nuiqsut, and to this commenter (after the meeting). The Draft EIS cumulative effects analysis (Section 3.19, *Cumulative Effects*) describes other past, present, and reasonably foreseeable future actions that may contribute to overall effects on certain North Slope resources. Figure 3.19.2 depicts the RFFAs considered in the Draft EIS.	N
58	2	Olemaun	Chastity	—	EIS Process and Timeline	I just wanted to know who in the BLM decided to make all the community meetings right when whaling season starts. A very poor decision.	In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Response*.	N
1307	1	Pardue	Margaret	Native Village of Nuiqsut	EIS Process and Timeline	BLM should not permit the Willow MDP at this time. NVN asks that BLM not permit the Willow MDP at this time. Development is happening too fast, and the full effects of the Alpine Satellite Field, including the Greater Mooses Tooth One (GMT-1) and Greater Mooses Tooth Two (GMT-2) projects, as well as numerous other nearby oil development projects, are still unfolding and have not been fully felt or understood by the community. The impacts of those projects are not yet known.	An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights.	N
1307	2	Pardue	Margaret	Native Village of Nuiqsut	EIS Process and Timeline	NVN also opposes permitting the Willow MDP at this time because there is significant uncertainty about the future management of the NPR-A and about ConocoPhillips' ultimate plan for developing Willow. BLM is planning to revise its Integrated Activity Plan (IAP) for the NPR-A, which could significantly change BLM's management of the region. And ConocoPhillips has signaled that it is uncertain about its plan for developing Willow; it is planning to conduct additional exploration and is pushing back the Willow MOP start date by at least 1-2 years.* ConocoPhillips also has not yet requested a Section 404 permit from the Army Corps of Engineers for this project. *E. Brehmer, ConocoPhillips announces busy plans for winter drilling, Alaska Journal of Commerce (Sept. 18, 2019), https://www.alaskajournal.com/2019-09-18/conocophillips-announces-busy-plans-winter-dri1ling.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1). CPAI has submitted its Section 404 permit to USACE. A Public Notice was issued by USACE on March 26, 2020, with a comment period through May 11, 2020.	N
1307	3	Pardue	Margaret	Native Village of Nuiqsut	EIS Process and Timeline	BLM's position that it must permit Willow now is unsupported and is inconsistent with its obligation under the NPRPA, NEPA, and ANILCA to fully consider the impacts of the project and to ensure that any development will not unnecessarily harm our community or resources in the NPR-A. Permitting the Willow MDP with such significant uncertainty about (a) the effects of already ongoing development; (b) the nature of potential future development; and (c) ConocoPhillips' final plan for the Willow MDP itself is not acceptable. We ask that any permitting for the Willow MDP be delayed for at least five years.	An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights. The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
3	3	Pavic	Karolina	—	EIS Process and Timeline	You collect data that was — you analyzed and modeled data that was collected by the company that is developing this project. I can't even believe I said that. I mean, that's unheard of.	It is common for federal agencies to reference data and studies conducted by the project proponent when developing an EIS. NEPA does not require federal agencies to conduct new studies and data collection; rather, NEPA requires the use of best-available data. The current NPR-A BMPs require project proponents to collect baseline data for certain resources and to provide that data to BLM. BLM's subject-matter experts conducted a thorough and independent review of all existing data and studies and referenced them, as appropriate, for the various EIS analyses.	N
864	2	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM failed to consider the significant negative environmental impacts of this project, and has not included a sufficient range of alternatives or mitigation measures. Our review of the draft EIS has identified numerous relevant resource issues that were either not addressed at all or were inadequately addressed. As the lead agency, BLM must ensure this process complies with the National Environmental Policy Act (NEPA), the Federal Land Policy and Management Act, the Endangered Species Act, and the legal and permitting requirements of its cooperating agencies. BLM's efforts to date fall far short of what is required. BLM's analysis is so lacking that BLM must revise the draft EIS and reissue it for public review and comment before it can proceed.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts, as well as potential mitigation measures, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	7	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	Additionally, the timing of this draft EIS is troubling. According to a recent article in the Alaska Journal of Commerce, ConocoPhillips is not confident about the geology and reservoir characteristics of the Willow development and therefore is pushing back the project's startup date by 1-2 years. BLM should not move forward with issuing a Master Development Plan, nor a final EIS, without the project being well enough defined to advance further. Doing so means that the project that BLM is considering now may not end up being the project that ConocoPhillips ultimately wants to develop. This leads to public confusion and a waste of agency resource, as it will likely require a supplemental NEPA process.	The Project as proposed by the proponent must be analyzed as required by regulation, along with alternatives. BLM cannot speculate about the intentions of the Project proponent with regard to current fluctuations in the price of oil and other economic considerations that may influence when they chose to apply for authorization. If CPAI chooses to change a BLM-approved Project design, the BLM would evaluate the change and determine whether the change would result in effects outside of the scope of what is analyzed in the EIS. Any Project changes that would result in effects outside of the scope of what was analyzed in the EIS would need additional NEPA analysis.	N
864	10	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	Additionally, BLM's notice of intent (NOI) for the Willow project contains an alarming predecisional statement: "Analyzing the entire proposed Willow development in a single [Master Development Plan]/EIS will allow the BLM to make determinations of NEPA adequacy when" individual applications for permits to drill are submitted. BLM expects this "to result in a quicker and more efficient process for the approval of applications for permits to drill." As Groups pointed out during scoping, BLM cannot predetermine that future applications associated with Willow will be sufficiently analyzed in this Willow Plan EIS, and that no new circumstances or information will arise in the interim, such that a determination of NEPA adequacy (DNA) would be appropriate. As written, this draft EIS is not at all adequate to support that type of process, particularly since it does nothing to address core elements like the Corps' obligations under the CWA. Although this DNA reference does not appear in the draft EIS, BLM has not affirmatively indicated that the agency has changed its approach regarding the application of DNAs to future Willow approvals nor indicated what NEPA mechanism could be used for future approvals or why such future approvals are necessary. BLM must be transparent about this process and clearly describe the agency's future intent.	The BLM did not make any decisions in the NOI. The statement this comment refers to ought to have been written to read, "would allow the BLM to . . ."; the use of the verb "will" is a mere typo. After approval of the Willow MDP Project, CPAI could submit an APD. An APD is required for each proposed well to develop a proponent's onshore lease. Prior to authorizing an APD, the BLM reviews the information in the APD package to ensure that it is accurate and addresses all requirements; during this time, the BLM also ensures that there is appropriate NEPA documentation. APDs submitted for proposed wells and associated infrastructure as part of the Willow MDP Project are analyzed in the Willow MDP EIS. Each APD would be checked against the existing NEPA documentation, using a DNA. If the BLM cannot document in a DNA that the existing NEPA documentation fully covers activities and the effects of those activities in an APD package, the BLM would require that additional analysis (either in an EA or an EIS) be completed to comply with the NEPA.	N
864	11	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM must be clear whether its ROD for the Willow Project will allow ConocoPhillips to move forward in applying for future permits without additional NEPA and where BLM will retain discretion to prohibit development of future Willow-related infrastructure. To the extent that BLM does not retain such discretion, the agency may not defer to future NEPA analyses to determine the impacts of this project. Because it is so unclear what BLM will be permitting in its ROD, it's very difficult for the public to determine if BLM is complying with legal mandates in its analysis. This should be clarified in a revised draft EIS.	This is described in Section 1.3.1, *Decision to be Made*.	N
864	12	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM and ConocoPhillips must also be clear regarding its timeframes for these future actions and approvals. As described above, it is concerning that ConocoPhillips does not intend to begin development on Willow until 2025–2026, raising serious questions as to why the company is pushing this project through on such an accelerated timeline now. DOI and ConocoPhillips should not be hastily permitting this process in order for the company to obtain permits under the current Administration; such an attempt to dodge basic legal and policy requirements of environmental permitting is inappropriate. As discussed later in these comments, this process is also insufficient to support the Corps' legal obligations under NEPA and the CWA since the Corps has yet to even receive a permit application. BLM and the Corps should not be segmenting out the review of this project into pieces that could illegally skew any analysis under the 404 Guidelines. This also implicates related concerns regarding the application of NEPA streamlining provisions to the Willow Plan EIS. As described below, the arbitrary time and page limits established by DOI for NEPA review are not appropriate for the Willow Plan EIS. If BLM adopts a streamlined NEPA analysis for this project, it is even more unlikely that DNAs will be sufficient in the future, because the initial analysis may have been truncated. The purpose of NEPA is to "ensure that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast. It would be contrary to the purposes of NEPA for the agency to truncate its analysis of this significant project, particularly given the agency's apparent predetermined decision to forego future NEPA analyses related to the specific components of this project.	The Final EIS includes an updated schedule for construction. A Section 404 permit application is not required to undertake the NEPA process; however, it should be noted that USACE issued its Section 404 Public Notice on March 26, 2020, and solicited comments through May 11, 2020. The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Response*.	N
864	14	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM cannot simply tier to the affected environment section considered in the IAP without considering whether the information there is adequate to evaluate the impacts of the Willow Plan, particularly in light of the significant developments that have occurred since and BLM's acknowledgment that impacts are greater than expected in the IAP. As pointed out during scoping, new studies are needed in light of changes to resources resulting from climate change and other new information related to the scale of potential developments and impacts in the region.	Baseline studies are continually updated throughout Northeast NPR-A, and the most recent studies were referenced for the Final EIS. Section 3.2.1 (*Affected Environment*) of the Final EIS addresses ongoing impacts of climate change on the environment, including in the Project area. Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) and Section 3.19.4 (*Cumulative Impacts to Climate Change*) analyze impacts that the Project and cumulative actions may have on climate.	N
864	16	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM should not proceed with authorizing ConocoPhillips' Willow Plan, and there is no basis in the law for the agency's assertion that it cannot delay project permitting. BLM should not conflate political pressure from ConocoPhillips and the Trump Administration with its own legal mandates.	An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights.	N
864	17	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	Groups pointed out in scoping comments that the time and page limits envisioned by DOI Secretarial Order 3355 and associated guidance memoranda are particularly inappropriate a project of this massive scale. Groups also pointed out that BLM did not have sufficient information on this project to fully consider the potential impacts, the timeline would not allow for sufficient time for consultation with affected tribal entities or input from remote communities in the region that will be directly affected, and that the agency would not have adequate time to do new studies or even fully consider existing data.	The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Response*. Baseline studies are continually updated throughout Northeast NPR-A. The EIS analysis did not identify major data gaps, or a need for additional studies.	N

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864	18	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM's timeframes for review of the draft EIS are insufficient to allow for meaningful public involvement. Ensuring that the public has sufficient time to receive and review all of the documents and understand their relationship to what is being proposed is essential to the public's ability to analyze and provide meaningful comments to the agency on the project. BLM has stated that it intends to issue a Final EIS in early 2020 and is rushing toward that goal at the expense of the public and a thorough analysis.	In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
864	21	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	*Four EIS documents were or are being released by the same federal agency during a time period which is critical to meet the subsistence needs of the communities in Arctic Alaska*. Finally, the comment period for the Alaska Liquefied Natural Gas pipeline, which involves extensive North Slope infrastructure, is scheduled to close on October 3, 2019. This schedule has resulted in a multitude of highly impactful and significant public comment or review periods for development projects in Arctic Alaska going on at the same, overlapping, or similar timeframes. *The manner in which DOI is operating appears to be specifically targeted at suppressing the public's ability to review and engage in the evaluation of these substantial projects, contrary to NEPA.* A core purpose of NEPA is to ensure public participation and involvement in agency decisions. There are countless requirements in applicable regulations designed to ensure agencies fulfil this core purpose by involving the public. Agencies are required to "[m]ake diligent efforts to involve the public in preparing and implementing their NEPA procedures," "[p]rovide availability of environmental documents so as to inform those persons and agencies who may be interested or affected," "solicit appropriate information from the public," and "[e]xplain in its procedures where interested persons can get information or status reports on environmental impact statements and other elements of the NEPA process. Under these requirements, BLM "must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA."	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
864	23	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM's adherence to the page limits in the Secretarial Order has led to the many documents simply being incorporated as appendices, resulting in a disjointed analysis that is hard for the public to follow. It has also resulted in less transparency in the analysis, more mistakes, and missing key data and analysis, as explained in detail below. BLM has also referred to or incorporated by reference numerous documents into its current analysis as a way of further truncating its analysis in the draft EIS. However, BLM often does so without any clear indication of how the analysis in the previous document applies in the context of the current proposal before the agency. This is improper and deprives the public of the ability to fully understand and comment on BLM's analysis and the potential impacts of the Willow project. Additionally, because BLM has not considered the full scope of impacts in the draft EIS, such as cumulative impacts from future development, meaningful mitigation measures, and meaningful analysis of differing impacts among alternatives, the public cannot review or comment on these issues.	The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment.	N
864	51	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	BLM Improperly Dismisses the No Action Alternative. NEPA and Council on Environmental Quality (CEQ) regulations mandate that the agency consider a no-action alternative in all environmental reviews. The no-action alternative provides a baseline against which the effects of the action alternatives may be measured. Groups advised BLM during scoping that BLM should closely analyze and consider a no-action alternative in the draft EIS, and not merely pay it lip service. The BLM points out that the No Action Alternative would not meet the Project's purpose and need. However, this statement appears to overlook the fact that BLM's purpose and need is to determine whether to authorize ConocoPhillips' application for permits to drill and associated rights-of-way consistent with its NPRPA mandate to authorize oil and gas leasing consistent with the protection of surface resources, and BLM's FLPMA mandate to avoid unnecessary and undue degradation to the public lands. According to BLM's NEPA Handbook: "The applicant's purpose and need may provide useful background information, but this description must not be confused with the BLM purpose and need for action. The BLM action triggers the NEPA analysis. *It is the BLM purpose and need for action that will dictate the range of alternatives and provide a basis for the rationale for eventual selection of an alternative in a decision*." Thus, BLM should not conflate its purpose and need to be ConocoPhillips' purpose and need. BLM must consider the option of selecting the No Action alternative should the agency find that it best protects surface resources and prevents unnecessary and undue degradation of lands within the Reserve. The draft EIS expressly states that the No Action alt is provided only to provide a baseline for the comparison of impacts of the action alternatives, and that BLM will not or cannot select it in its Record of Decision. BLM further asserts that on previously leased lands, the U.S. Court of Appeals has determined BLM has made an irrevocable commitment to allow some surface disturbances to support drilling and operations, for which BLM cites its own supplemental EIS for the GMT-2 project. BLM should clarify what U.S. Court of Appeals case the agency is citing, instead of citing its own NEPA document.	Under the NPRPA, the BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation; BLM may not preclude CPAI from developing its leases. The No Action Alternative would not meet the Project's purpose and need but is included for detailed analysis to provide a baseline for the comparison of impacts of the action alternatives as required by 40 CFR 1502.14(d). The Willow MDP Project was designed in accordance with requirements in the NPR-A IAP, which is consistent with both the NPRPA and FLPMA. The NPRPA, as amended, requires oil and gas leasing in the NPR-A and the protection of surface values to the extent consistent with exploration and development of oil and gas. NPR-A IAPs meet that mandate by designating numerous Special Areas within the NPR-A and closing certain sensitive areas to leasing while allowing for oil and gas leasing elsewhere. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Pursuant to Section 302(b) and Title V of FLPMA, proposed actions may not cause unnecessary or undue degradation.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	52	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	Finally, BLM's refusal to consider the viability of the No Action alternative is inappropriate because BLM is analyzing this project at the site-specific level and considering authorizing this project as proposed. This is not a programmatic decision subject to future NEPA. It is at this stage, when the agency makes a critical decision to act, that the agency is obligated fully to evaluate the impacts of the proposed action. It is a dangerous public policy for BLM to assert that it must approve any and all drilling and right-of-way applications received in the NPR-A, especially given that the agency does not conduct NEPA at the lease sale stage. An agency is required to fully evaluate site-specific impacts once it reaches the point of making "a critical decision . . . to act on site development." An agency reaches the threshold triggering site-specific review when it proposes to make an irreversible and irretrievable commitment of resources. BLM cannot do this without considering the changes to the environmental baseline, and meaningfully consider the potential benefits of the No Action alternative. The draft EIS must be supplemented and re-released for public comment after BLM has included meaningful consideration of the No Action alternative.	Under the NPRPA, the BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation; BLM may not preclude CPAI from developing its leases. The No Action Alternative would not meet the Project's purpose and need but is included for detailed analysis to provide a baseline for the comparison of impacts of the action alternatives as required by 40 CFR 1502.14(d).	N
1299	1	Strailey	Kaarle	—	EIS Process and Timeline	Firstly, I point out that it is inappropriate for the Bureau of Land Management to pile this project proposal, its documents, and comment periods all at the same time as those for the Ambler road and the AKLNG gas line—making it difficult to impossible for non-corporate entities to weigh in on these multiple proposals that interrelate, and accumulate and compound impacts, with the potential to dramatically affect the entire Arctic region. This is clearly a strategic effort to overwhelm the capacity of arctic residents and arctic advocates and makes a mockery of the due public process required by law for such policy decisions. BLM has made it exceptionally hard for those individuals most affected, local subsistence users, to participate in the public process.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Response*.	N
1300	4	Strasenburgh	John	—	EIS Process and Timeline	Under NEPA, the no action must be a viable alternative. The DEIS does at 6.1, states that the no action; is not a viable alternative. This is non-compliant with NEPA. Figure ES-3 of Appendix A shows the three action alternatives. They don't look to be different from each other in any material way. There is no point in having alternatives if they are all essentially the same nature and scale of development. Because the DEIS offers only alternatives that are essentially the same, it is non-compliant with NEPA	Under the NPRPA, the BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation; BLM may not preclude CPAI from developing its leases. The No Action Alternative would not meet the Project's purpose and need but is included for detailed analysis to provide a baseline for the comparison of impacts of the action alternatives as required by 40 CFR 1502.14(d). At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need.	N
1300	5	Strasenburgh	John	—	EIS Process and Timeline	I am also concerned about the process BLM is employing that has the effect of limiting the ability of the public to participate meaningfully in the NEPA process. Process: BLM has conducted at least two NEPA analyses concurrently. Although I have commented on Ambler Road, given this confluence of major projects, it is not possible to do either of them justice. I have no time to comment on AKLNG FERC DEIS. In addition, I have visited Kaktovik in September and have seen how busy folks are with whaling and hunting. It is really not fair to local communities to schedule a hearings and comment periods during this critical food gathering time. The purpose of a public comment period is to allow meaningful participation by those interested in or affected by the proposed action. Local knowledge is essential to making informed decisions on the path the development takes or mitigation measures that might be employed, so I am surprised that BLM has chosen to limit such input.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
59	6	Thomas	Sara	—	EIS Process and Timeline	And, finally, I'd just like to comment that to hold a public meeting, when there is a blessing for whaling, is immoral, and it is not a due process.	In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Response*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1301	1	Wood	Ruth	—	EIS Process and Timeline	Statement from BLM: Your review and comments are critical to the success of BLM decision making. If that is indeed the case, BLM should have allowed adequate time to read and review the Willow Draft EIS. Willow, Ambler, AKLNG (FERC), Katishna Road (NPS) all at the same time—really??? Like many Alaskans I care the remote places in our state. I care about fish and wildlife. Allowing me to participate means BLM must use reasonable comment periods. I cannot even find the time of day the comment period ends.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
1054	3	—	—	—	EIS Process and Timeline	It is completely illogical and dysfunctional to hurry the comment period for this DEIS before the BLM's own new Integrated Activity Plan and EIS for the entire NPR-A is released to the public. Comments on the Willow DEIS would benefit from the knowledge and structure of the IAP.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	N

4.2.8 Environmental Justice

Table B.2.11. Substantive Comments Received on Environmental Justice

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1307	6	Pardue	Margaret	Native Village of Nuiqsut	Environmental Justice	BLM has not given sufficient consideration to environmental justice. BLM is obligated to "make environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs" (Executive Order 12898 [1994]). . . . BLM is not currently fulfilling this obligation. At the core of environmental justice is equal access to the decision-making process. As discussed, BLM has not adequately involved NVN in decision-making on the Willow MDP. Part of the problem is that the pace of development is simply too fast. Currently, NVN is inundated with development proposals and planning exercises. NVN strives to be an active and engaged entity in these review processes, but the amount of planning currently underway in the region presents serious capacity challenges in our ability to have constructive and meaningful involvement. BLM must slow down the pace at which it is considering approving projects, including by delaying approval of the Willow MOP, to ensure that NVN can meaningfully participate.	An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights. Baseline studies are continually updated throughout Northeast NPR-A. BLM has had multiple consultation with NVN on the Willow MDP Project.	N
864	214	Psarianos	Bridget	Trustees for Alaska	Environmental Justice	BLM's environmental justice analysis fails to sufficiently evaluate whether Willow will have "disproportionately high and adverse human health or environmental effects . . . on minority populations and low-income populations." In the memorandum accompanying EO 12898, the President specifically recognized the importance of NEPA and stated that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities." The President recognized that "[m]itigation measures outlined or analyzed in an environmental assessment, environmental impact statement, or record of decision, whenever feasible, should address significant and adverse environmental effects of proposed Federal actions on minority communities and low income communities." Another key element is that federal agencies are required to "provide opportunities for community input in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of meetings, crucial documents, and notices." BLM has failed to meet these requirements on all fronts. It has not adequately identified the potential environmental justice impacts, considered impacts to all potentially affected populations, provided for adequate participation by impacted communities, or adequately addressed ways in which to reduce those impacts.	The BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts. Effects of the Willow MDP Project on environmental justice are analyzed in Section 3.17, *Environmental Justice*. This section also provides a summary of meaningful engagement with the community of Nuiqsut. The Draft EIS concludes that Willow MDP Project would result in disproportionately high and adverse environmental effects to the minority community of Nuiqsut. Table 3.17.2 summarizes the applicable existing LSs and BMPs intended to mitigate impacts to environmental justice. The communities of Utqiaġvik (Barrow), Anaktuvuk Pass, Atqasuk, Wainwright, and Point Lay were added to the analysis due to the overlap of Project effects with potential RFFAs in the cumulative effects analysis. These minority and low-income populations are described in detail in Section 3.4.5 and Appendix V of the NPR-A IAP Final EIS (BLM 2020). The Final EIS has been revised in response to comments on the Draft EIS, including its supplement, and new information, such as RFFAs.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	215	Psarianos	Bridget	Trustees for Alaska	Environmental Justice	BLM's timeframes for allowing communities to review the draft EIS have been insufficient to allow for meaningful public involvement. BLM has not been responsive to the multiple requests from communities and other entities asking for additional time to review and comment on the draft EIS. BLM instead provided only an additional two weeks—far short of what the Native Village of Nuiqsut and the North Slope Borough requested and needed for communities to weigh in on this massive project. This comment period occurred during a critical subsistence use time, when many individuals were unable to either attend meetings or participate in this process, and at a time when BLM was moving forward with multiple other relevant comment periods and projects that could impact Arctic communities. . . . BLM should not be moving forward with this rushed process without all the information about this project available to impacted communities. BLM is not moving forward in a transparent or inclusive manner with regard to the review of this project. . . . . . . In the GMT-1 decision, BLM found there would be a significant restriction to subsistence for the village of Nuiqsut based on the reduced access to subsistence use areas, reduced availability of subsistence resources, and hunter avoidance of industrial areas. Some of the specific concerns included hunter avoidance of infrastructure that would extend well beyond the direct GMT1 project area; noise, traffic, and infrastructure that could impact the availability of key resources such as caribou, wolves, and wolverine; the number of caribou use areas in the GMT1 project area; the diversion of caribou from the road and traffic; increased helicopter impacts on caribou hunting; increased risks to hunters and increased investments in time, money, fuel, equipment, and hunting success; and numerous sociocultural and socioeconomic impacts. These concerns are identical to and will be magnified by the Willow project. The GMT-1 project acknowledged that there would be significant environmental justice and other impacts, and that those impacts would only increase in light of other developments in the region: "The potential direct and indirect impacts of GMT2 would be very similar to that of GMT1 and these impacts would be additive. However, it is likely that development of GMT2 would make it feasible to develop other oil drill sites further west (i.e., most immediately in the Bear Tooth Unit). In that case, the impacts of GMT2 would be considered synergistic. Considered together with development east of the Colville Delta (Kuparuk and Prudhoe), in the Delta (CD1, CD2, CD3, and CD4), west of the Delta with CD5 and GMT1, and additional development further west, the cumulative impacts of GMT2 would include an extension of the corridor of industrial development between Nuiqsut and the coast. The westward expansion of industry could place Nuiqsut in an even more disadvantageous position regarding the Teshekpuk Herd. An access road to GMT2, like that to GMT1, would have some countervailing effects, but these would be outweighed by the adverse impacts of additional development within the area. If GMT1 is developed, it is likely that the pre-development GMT2 area will have an even higher value for subsistence because it will become one of the increasingly rare areas near town without industrial development." [GMT-1 SEIS, Appendix B]	The Draft EIS was released on August 28, 2019, for a 45-day public review period, which ended on October 15, 2019, consistent with 40 CFR 6.203(c)(5); the BLM extended the comment period to a total of 60 days (ending on October 29, 2019), to provide additional time for North Slope communities to comments during fall whaling season. An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights. Baseline studies are continually updated throughout Northeast NPR-A. A Section 404 permit application is not required to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. BLM conducted an ANILCA Section 810 Subsistence Analysis, which was published with the Draft EIS. Under each alternative, BLM prepared a finding that discloses limitations on subsistence user access may significantly restrict subsistence uses for the community of Nuiqsut. A revised version of the ANILCA Section 810 Subsistence Analysis was published with the SDEIS, which also concluded that limitations on subsistence user access may significantly restrict subsistence uses for the community of Nuiqsut.	N
864	217	Psarianos	Bridget	Trustees for Alaska	Environmental Justice	Despite this, BLM is continuing to move forward without a solid understanding of how broad these impacts will be or how it will be able to adequately mitigate against those impacts. In the GMT-1 decision, BLM acknowledged that the existing measures in the IAP were insufficient to fully mitigate the serious impacts to subsistence and sociocultural systems. As a result, it prepared a Regional Mitigation Strategy aimed at coming up with broader mitigation measures to better address the impacts to Nuiqsut. The handful of mitigation measures BLM has included in Table 3.17.2 do not go far enough to address the potential impacts. They are so high level and generalized as to be essentially meaningless, and they only scratch the surface of what BLM should consider to address those impacts. Those measures in no way directly address the serious impacts to subsistence ad health, or acknowledge the failure of similar measures to adequately address those impacts to date. Merely stating that there might be mitigation measures related to air developed at a later point or that there might be consultation with the community on certain issues provides zero indication that these impacts will actually be minimized. It would be contrary to EO 12898 to move forward with authorizing Willow as proposed since the project is likely to have substantial impacts to subsistence that have not been adequately addressed by the proposed mitigation measures. BLM claims in its analysis that the NPRA Working Group, which is claims was revived this past spring, is one of the ways in which it has provided engagement opportunities for Nuiqsut. However, as groups have previously flagged to BLM, there are significant concerns with how the NPRA working group has been operating, given that it appears to be an advisory group formed and operated in violation of the Federal Advisory Committee Act. While groups appreciate BLM's efforts to engage with communities on the North Slope, BLM has been less than transparent about the operations of this group and we have significant concerns about whether this entity has in fact been a meaningful platform for Nuiqsut to voice its concerns.	The BLM concluded in Section 3.17, *Environmental Justice*, that environmental justice impacts described in the EIS would be unavoidable and irretrievable during the life of the Project. Table 3.17.2 summarizes the applicable existing and proposed LSs and BMPs intended to mitigate impacts to environmental justice. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. The Final EIS includes additional suggested avoidance, minimization, and mitigation measures for related resources brought to the BLM through comment periods, consultations, and subject-matter-expert review. In addition to the NPR-A Working Group, throughout development of the EIS, the BLM has engaged with Nuiqsut through tribal consultation and consultation with ANCSA corporations, as well as through public meetings and a subsistence hearing.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	219	Psarianos	Bridget	Trustees for Alaska	Environmental Justice	BLM has not adequately analyzed potential alternatives that could minimize or address some of the environmental justice impacts from this project. For example, BLM failed to consider an alternative that would prohibit ConocoPhillips from building the MTI in Harrison Bay or engaging in module transfer activities that will directly cross the Teshekpuk Lake Special Area and sensitive habitat. Conoco's proposed MTI and the activities related to it are within an area heavily used by Nuiqsut residents for subsistence. Harrison Bay provides key habitat for multiple marine mammals that are important for subsistence use, such as bowhead whales and seals. BLM arbitrarily limited its analysis of potential environmental justice impacts to only Nuiqsut. However, there are broader impacts to minority and low income communities that should be considered and addressed as part of BLM's analysis. ConocoPhillips is proposing to build infrastructure and engage in substantial amounts of industrial activities in areas that provide important habitat for the multiple subsistence resources for communities in the region, including the Porcupine Caribou Herd, bowhead whales, bearded seals, ringed seals, and eiders. BLM's analysis fails to acknowledge or address the broader impacts to subsistence resources and other communities in addition to Nuiqsut that could occur from this project. . . . Despite this, BLM's analysis wholly omits any consideration of impacts to other communities who depend directly on these migratory resources. It also does not acknowledge other practices, such as community sharing, that could be harmed if there are negative impacts to subsistence resources.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1 (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. The environmental justice analysis was expanded in Section 3.19.13, *Cumulative Impacts to Environmental Justice*, to include communities that may experience cumulative effects of the Project in combination with RFFAs.	Y

4.2.9 Fish

Table B.2.12. Substantive Comments Received on Fish

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
87	4	Balsiger	James	National Oceanic and Atmospheric Administration (NOAA)	Fish	General Recommendations In accordance with Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, the BLM is required to consult with NMFS on activities that may adversely affect EFH. Although the BLM has conducted an analysis of the project, they have not conducted an EFH Assessment or made conclusions regarding the effects of the action on EFH or Federally managed species as required by 50 CFR Part 600.920(e). HCD offers the following information to BLM to facilitate the development of an EFH Assessment: -Any action that may adversely affect EFH requires a clearly referenced EFH Assessment in either a separate document or a support document (50 CFR Part 600.920(e)). -The mandatory contents of an EFH Assessment should be labelled accordingly and include: (i) a description of the action, (ii) an analysis of the potential adverse effects of the action on EFH and the managed species, (iii) the Federal agency's conclusions regarding the effects of the action on EFH, and (iv) proposed mitigation, if applicable. -Please note an EFH Assessment is to be completed by the action agency, if needed. Once an EFH Assessment is received by NMFS, HCD will then review and offer EFH Conservation Recommendations, if applicable. We recommend referencing the recent publication *Impacts to EFH from Non-fishing Activities in Alaska* when developing an EFH Assessment. -NMFS encourages the BLM to require permit holders to consider stream simulation design for culverts and bridges, at https://www.fws.gov/northeast/fisheries/pdf/fishpassage/NLF-Passage-Design-Guidelines.pdf. These designs allow for construction of a channel in new culverts at anadromous streams. This would further mitigate any adverse impacts to EFH in the project area.	BLM will provide NMFS with an EFH Assessment after the Draft EIS. Revisions to IAP BMPs (i.e., E-6) include adhering to a list of fish passage design guidelines (as described in Section 3.10.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*).	N
989	23	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Fish	Page 58-61, 3.8 - Water Resources This section should discuss the fish mold problem.	Edit made as suggested.	Y
989	26	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Fish	Page 79, 3.10 - Fish "After abandonment of the MTI, the island is expected to be reshaped by waves and ice and resemble a natural barrier island within 10 to 20 years (more details in 3.8.2.5.1, Option 1: Proponent's Module Transfer Island, in Section 3.8 Water Resources)." This citation should read 3.8.2.6.1. The EIS does not have a section 3.8.2.5.1.	Section reference was updated for the Final EIS.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
989	27	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Fish	Page 79, Section 3.10.1 - Affected Environment “Many of these species . . . migrate both locally and extensively. . . . Abundant stream-lake networks . . . seasonal waterbody connectivity and flow regimes influence habitat accessibility . . .” Please add the following phrase to the above paragraph so that it is clear that small drainages are also important: “are dependent on small tundra drainages.” This phrase comes from the following statement: “As with other Arctic populations of broad whitefish on Alaska’s North Slope, the population using the Teshekpuk Lake region appears dependent [*sic*] on small tundra drainages and lake systems both for feeding and to some extent for overwintering” (p. 36) in Technical Report No. 06-04, Seasonal Movements and Habitat Use of Broad Whitefish (Coregonus Nasus) in the Teshekpuk Lake Region of the National Petroleum Reserve-Alaska,2003-2005, by William Morris. In addition, due to the acknowledged extensive movement of fish “both locally and extensively,” there should be acknowledgment of the recent (2013 to present) recurring freshwater mold infection on broad whitefish in the Nuiqsut area. In addition to noting this in the text, there are two citations to add: -Sformo, Todd L., Billy Adams, John C. Seigle, Jayde A. Ferguson, Maureen K. Purcell, Raphaela Stimmelmayr, Joseph H. Welch, Leah M. Ellis, Jason C. Leppi, John C. George. Observations and first reports of saprolegniosis in Aanaakliq, broad whitefish (Coregonus nasus), from the Colville River near Nuiqsut, Alaska. 2017. Polar Science 14: 78-82. -Fuzzy Fish: Moldy fish in an Alaskan river threaten a community’s food supply Hakai Magazine. Hannah Hoag 7 August 2019. https://www.hakaimagazine.com/news/fuzzy-fish	This concept is addressed using local data (numerous references) throughout the EIS; in addition, the suggested source and wording were added. The information regarding fish mold and reference were added.	Y
1302	126	Dunn	Connor	ConocoPhillips	Fish	The text implies impacts to fish occur over the full length of the ice roads. For Alternative B, which has 372 miles of ice roads, less than 1 mile of the ice roads go over fish-bearing streams. Reporting the total number of ice road miles in this section overstates the impact. The text should be revised to reflect the mileage of ice roads that would traverse fish habitat.	All alternatives and options must be assessed in the same manner. Because fish habitat is not mapped for all options (e.g., ice road to Point Lonely), the suggested method could not be used. In addition, effects could extend downstream from an ice road crossing; thus, the suggested method would not accurately describe effects.	N
1302	127	Dunn	Connor	ConocoPhillips	Fish	“Fill in streams or lakes associated with culverts or pads placed during the open water season could impact fish. . . . The open-water season is the only time when steel plate culverts used for fish passage can be placed, due to the need to achieve adequate gravel compaction around them for structural support. If these are needed, ADFG open-water work windows would be followed.” This is not a proposed construction technique for any component of the Willow project and therefore we request BLM remove all text and impact analysis that examined open-water construction techniques. This is misleading to public readers and improperly inflates the appearance of impacts.	Text was amended based on new design provided in RFI 5c response.	Y
1302	128	Dunn	Connor	ConocoPhillips	Fish	If the reference to 120 dB is not a typo, please provide a citation to support the statement that the ambient noise level in Harrison Bay is 120 dB.	Citation provided.	Y
1307	22	Pardue	Margaret	Native Village of Nuiqsut	Fish	BLM’s effects analysis barely addresses impacts to fish and fishing. . . . Willow threatens serious and unavoidable harm to twenty-four fish species and fish habitat throughout the Teshekpuk Lake Special Area and beyond. . . . Given this reality, BLM’s analysis of how Willow will affect fish and fishing is wholly inadequate. In the two instances where BLM touches on impacts to fish, it makes sweeping, unsupported conclusions that impacts will not be significant. For example, BLM states that “[h]habitat loss and degradation could displace or cause individual mortalities of [waterfowl and fish], but the Project is not expected to cause population-level effects.” (DEIS, Appendix G) There is no citation for this assertion. BLM later states that “[w]hile construction activities and infrastructure (e.g., ice roads) may temporarily displace fish upstream and downstream, these impacts would be relatively localized and would not be likely to affect harvesting activities farther downstream along Fish (Uvlutuuq) Creek.” (DEIS, Appendix G) Further, “[w]ater withdrawals to support ice infrastructure construction could alter fish habitat, but these alterations would be temporary and are not expected to affect fish populations in Fish (Uvlutuuq) Creek.” (DEIS, Appendix G) For these two latter assertions, BLM points to the DEIS. . . . BLM has no scientific or technical analysis to back up these assertions. There is nothing in the DEIS to suggest that BLM relied on estimates of how many individuals will be affected or the thresholds for loss that each fish population/species can sustain. Without such information, the agency cannot rationally conclude that impacts to individuals will not affect populations or a species as a whole.	Physical loss of fish habitat is limited to fill at culverted stream crossings, piles in streams at bridge crossings and boat ramps. In terms of total habitat available within the Project area, these losses represent nearly zero loss of fish habitat and would not affect fish habitat quantities in the Project area and therefore would not affect fish populations. Fish habitat degradation from stream crossing structure construction would affect habitat for less than one full open-water season as construction would occur in winter when no fish are present at the majority of all sites. Only construction of the Ublutuoch (Tiŋmiaqsiuġvik) River boat ramp would occur in- water during winter and those specific impacts are evaluated in Section 3.10.2.3.1, *Habitat Loss or Alteration*. Given the numbers of fish in the analysis area streams during summer, their life histories, and their migratory patterns, the total number of fish that could be impacted by any Project component is minimal, such that conducting any numerical evaluation of population number impacts is not practical. Similarly, because water withdrawal would be spread throughout numerous lakes in the analysis area, and because use is limited from any given water source based on maintaining fish wintering habitat for fish residing in each lake, the potential for impacts to fish on a single lake level is low. Thus, the conclusion that effects at the population level would be even less likely than effects to individuals is accurate.	N
864	171	Psarianos	Bridget	Trustees for Alaska	Fish	The Willow Project threatens serious and unavoidable harm to the twenty-four fish species and fish habitat throughout the Teshekpuk Lake Special Area and beyond . . . The Project is likely to destroy and fragment fish habitat in dozens of areas; withdraw hundreds of millions of gallons of water from fragile waterbodies; degrade water quality due to water withdrawals, waste disposal, and chemical or oil spills; and extract substantial quantities of gravel next to high-use fish habitat. These impacts will adversely affect individual fish and threaten populations or species as a whole, particularly in conjunction with climate change and resulting changes to marine and freshwater habitat. The DEIS downplayed or ignored many of these impacts, and provided only a cursory and unsupported analysis of others.	Water withdrawal from lakes would be conducted consistent with state permit and BLM BMP conditions that limit winter water withdrawal based on fish species assemblages within each water body to ensure that fish wintering habitat quantity and quality are adequate for fish. Gravel removal would not be conducted from within fish habitat. All permanent gravel road stream crossings will be designed to maintain habitat quality in streams and to provide fish passage. Road design uses bridges to the extent practicable. Three years of site-specific fish sampling data have been used throughout the EIS to evaluate impacts based on fish species using the drainages.	N

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864	172	Psarianos	Bridget	Trustees for Alaska	Fish	First, the DEIS failed to include adequate information and key details about each species and its habitat in the affected area. The DEIS included only three pages of background information for all twenty-four fish species, and relied on crude information about fish and habitat in the area identifying only what broad habitat types are used by each species. But these species are diverse and have varying distribution patterns, habitat needs, and life history characteristics, all of which are necessary to understand before evaluating the effects of the project. Appendix E.10 acknowledged crude variations in the types of overwintering habitat for each species but failed to identify other seasonal or temporal differences in habitat for spawning, rearing, migration, and other life cycle needs for each species. . . . BLM should have considered the additional information that was available, such as that included in this groups scoping comments, or should have conducted additional surveys and information about fish and fish habitat. Without adequate baseline information, BLM failed to take a "hard look" at the impacts of the project on fish and fish habitat.	The numerous studies used to support the EIS are cited throughout Section 3.10, *Fish*, and Appendix E.10, *Fish Technical Appendix*. As stated in CEQ guidelines, an EIS need not be encyclopedic. The data included in the EIS are sufficient to evaluate and disclose potential effects of the Project.	N
864	173	Psarianos	Bridget	Trustees for Alaska	Fish	Second, the DEIS failed to comply with NEPA's requirement to discuss mitigation measures in sufficient detail, analyze their effectiveness, and disclose likely impacts. The DEIS devoted only two of the eight pages in its fish analysis to cataloging BMPs and lease stipulations and provided little detail and no information about the effectiveness or likely impacts for each measure. For example, the DEIS relied on mitigation measures to avoid considering and disclosing how water withdrawals will impact fish and fish habitat. The DEIS explained that water withdrawals can alter water quantity and quality in fish habitat, and that 1,874 million gallons of water will be withdrawn from "an unknown number of lakes" over the lifetime of the project. But the agency claimed, without any support or further discussion, that BMPs and permit stipulations will prevent population-level effects from such withdrawals. It was irrational for the agency to reach that conclusion without discussing how much water would be withdrawn each season and year and where, and how BMPs and stipulations would reduce the massive impacts of withdrawals. Moreover, the agency ignored this groups scoping comments that explained BMPs are inadequate to protect dissolved oxygen levels in tundra ponds, and that the agency needed to include physical and biological for each lake to determine suitability for water withdrawals. These examples illustrate how BLM's blind reliance on mitigation measures prevented the agency from taking a "hard look" at impacts of the project.	The NPR-A IAP considered the effectiveness of BMPs and is the reason that specific BMPs were selected in the ROD and are now required. Various BMPs require lessees to monitor specific resources; if monitoring indicates that BMPs are not effective, then BLM adaptively manages to reduce impacts. BMP B-2 addresses maintaining populations of fish. BMP B-2 restricts the withdrawal to a specific percentage of calculated volume with respect to fish presence. The BLM may require additional modeling or monitoring to assess lake water level, outlet flow, and/or water quality conditions before, during, and after water use from any lake of special concern. After review of Draft EIS comments and the Final IAP/EIS, ROP B-2 was added to the FEIS Section 3.10.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*. ROP B-2 would require that BLM must be notified within 48 hours of any observation of dead or injured fish on water source intake screens, in the hole being used for pumping, or within any portion of ice roads or pads. If observed at a particular lake, pumping must cease temporarily from that hole until additional preventive measures are taken to avoid further impacts on fish.	Y
864	174	Psarianos	Bridget	Trustees for Alaska	Fish	Finally, the DEIS lacks support for numerous conclusions it reached, ignored several important issues, and largely failed to connect the dots between likely impacts and what that means for a fish species as a whole. . . . The DEIS failed to fully or accurately describe how various impacts of the project will affect each fish species and its habitat. Instead, the DEIS largely lumped all species or habitat together when evaluating impacts, which masks impacts to individual species or populations . . . The DEIS repeatedly claimed that individual fish may be affected by the project but that such impacts will not rise to population level effects; these sweeping conclusions are unsupported and speculative. Neither the DEIS nor the Appendix E.10 suggest that BLM relied on estimates of how many individuals will be affected or the thresholds for loss that each fish population/species can sustain. Without such information, the agency cannot rationally conclude that impacts to individuals will not affect populations or a species as a whole.	BMPs and other state permitting requirements are designed to minimize impacts to fish and fish habitat regardless of species. Impacts were assessed based on life-history characteristics important for species propagation such as migration, spawning, and overwintering. Effects on those important life-history stages would be greater. Because potential effects would be primarily limited to short durations and would avoid substantial overwintering areas and spawning areas, key life-history phases would be avoided and impacts would be limited to low numbers of individuals. Low numbers of individuals would not affect populations within streams and rivers of the Project area, either in individual waterbodies or as a whole, given the highly migratory nature of most fish species in the analysis area and the specific habitats potentially affected. Population-level effects would be a reduction in numbers of fish using any given stream, or the Project area as a whole. We do not anticipate either level of population effect.	N
864	175	Psarianos	Bridget	Trustees for Alaska	Fish	The DEIS failed to analyze what differences between alternatives mean for fish and fish habitat. Most notably, the DEIS never explained how module delivery option 2—which requires twice as much freshwater to be withdrawn as option 1—will impact fish in the short- or long-term, claiming only that such a massive withdrawal "might" alter habitat in the future if lakes do not recover. Given the substantial quantities of water to be withdrawn under this alternative and the importance of water quantity to fish in the area, the agency needed to include a more thorough analysis of these impacts. The DEIS included a meager section on potential "injury or mortality" to fish that identifies only a single mechanism through which such harm would occur: burying of fish where waterbodies are filled. This improperly ignored the numerous other direct and indirect mechanisms through which the project threatens to injure or kill fish, including low water or dissolved oxygen levels, oil spills, destruction of habitat, and more. The DEIS also failed to estimate the number or scope of injuries or mortality expected and to which species, which made it impossible for the agency to accurately assess impacts on each species and population. As a result, the section on injury or morality is misleading and inaccurate.	Water withdrawal guidelines stipulate that not more than a specified percent of a lake's volume can be withdrawn. Thus, not all water withdrawal would occur from a single lake. The effects of withdrawing more water would cover a larger area (i.e., more lakes) but would not differ in the type, magnitude, or duration. This explanation was added to Section 3.10.2.7, *Module Delivery Option 2: Point Lonely Module Transfer Island*. Injury or mortality from habitat loss (i.e., bridge piers or culverts) is not expected and therefore not included in the EIS. Injury or mortality from potential spills is covered in Section 3.10.2.9, *Oil Spills and Other Accidental Releases*. Spills are not proposed and thus are described separately.	Y
864	176	Psarianos	Bridget	Trustees for Alaska	Fish	The DEIS downplayed the possibility oil spills, never discussed what spills would mean for fish, and failed to acknowledge the serious risks that spills of other chemicals like fracking fluids pose to fish. The DEIS should have discussed the impacts that potential oil spills or other accidental releases—particularly a worst-case scenario spill—may have on fish and fish habitat, rather ignoring impacts based on specious claims that such spills are unlikely to occur and/or negatively affect fish habitat. In several places, the DEIS failed to address how the timing of specific actions would coincide with any temporal or seasonal life cycle needs for fish. For example, the DEIS admitted that increased marine vessel traffic could disturb or displace marine fish and affect individuals but does not address whether such impacts will occur during seasons or times that certain species are particularly vulnerable to noise or disturbance. DEIS 3.10 at 86. The DEIS should have considered whether open-water seasons for vessels will overlap with key migration or spawning periods and thereby cause disproportionate impacts on certain populations or species. This and other deficiencies in the discussion of the temporal or seasonal nature of alternatives and fish needs is a serious flaw.	An EIS does not need to assess the worst-case scenario (according to CEQ guidelines); in this case, the BLM included analysis of a low-probability, high-risk event and discussed the extent of those potential impacts in Section 3.10.2.9, *Oil Spills and Other Accidental Releases*. The EIS considers timing of all Project activities, including vessel traffic, in assessing potential impacts to fish. Vessel traffic would overlap with spawning periods for some species of fish discussed in Section 3.10, *Fish*. However, the vessel route would cover a small area in relation to the amount of available marine habitat and would not traverse any known unique marine spawning grounds. Spawning habitat for freshwater species is only documented inland from the coast; therefore, these species would not be affected by marine vessel traffic. Nearshore vessel traffic could be avoided by fish migrating toward spawning grounds.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	177	Psarianos	Bridget	Trustees for Alaska	Fish	The DEIS claimed that unavoidable and irretrievable impacts to fish and fish habitat would not affect the long-term sustainability of fish resources. But neither the DEIS nor Appendix E.10 provided any support or rational explanation for such sweeping conclusions, which is a serious flaw. The DEIS disclosed that dozens of bridge piles would permanently remove freshwater fish habitat within their footprint, but never discussed how that will affect fish that use or rely on that habitat. The DEIS claimed, without explanation, that increased suspended sediment and turbidity levels in nearshore marine habitat during the summer construction season would not affect fish at the population level, explaining that such effects would be temporary and localized. However, the DEIS never identified the size of each population or the number and importance of the fish affected, which the agency needed to reach such conclusions about the populations as a whole. . . . [T]he analysis included an incomplete discussion of specific aspects of the alternatives, ignored cumulative impacts that are likely to occur, failed to fully and appropriately consider the impacts of climate change, and did not address scientific information and concerns about Arctic fish populations and habitat that were raised in the scoping comments. These universal flaws in the DEIS also render its analysis of fish inadequate.	Text was added to clarify that the amount of habitat loss (in both freshwater and marine areas) and screeding would be small in comparison to the amount of available habitat of similar types and qualities. For all effects described in the EIS, effects are stated to occur at the individual level. Because population-level effects are not expected, the long-term sustainability of fish would also not be affected. Table E.10.2 in Appendix E.10 (*Fish Technical Appendix*) shows the acres of fill that would be comprised of bridge piles, which would be small in comparison to the amount of habitat available to fish. The main functions of the habitats that would be filled by piles are migration and rearing. As stated in Section 3.10.2.3.1, *Habitat Loss or Alteration*, structures would be designed to ensure long-term fish passage, and they would be installed during winter when no fish habitat is present. The effects to fish from direct loss of habitat from pile placement are negligible and would be minor relative to total habitat available in each stream. The open-water season off the ACP in the Beaufort Sea is characterized by strong and nearly continuous wind. Nearshore habitats are highly turbid and characterized by high sediment transport. An increase in turbidity and suspended sediments would be immeasurable to ambient conditions. The nearshore ecosystem, especially near Oliktok Point, is one of high disturbance and turbidity. More text about these existing conditions were added to Section 3.10.2.3.1. Population abundance estimates are not available for the Project area. However, given the regularity of subsistence fishing, populations are likely more than a few individuals. Given that the sum of potential effects would only affect low numbers of individual fish and given the highly mobile nature of fish species in the Project area, population-level effects are not reasonably expected to occur.	Y
864	188	Psarianos	Bridget	Trustees for Alaska	Fish	The EIS fails to accurately analyze the effects of the Modular Transport Island (MTI), which would include the use of screeding. In many instances, the EIS describes process of screeding as having a substantial impact on the sea floor, benthic and epibenthic species, and the species that rely on them for food. . . . But the EIS does not provide any quantification or reference for the claim that the impact would be relatively small. The EIS should quantify the impacts of terraforming and provide evidence that the impact is small. The EIS is also contradictory as to whether the MTI would erode away over time. The EIS states, "The alteration of nearshore habitat would also be irreversible because even if the MTI is abandoned and reshaped, it would still exist. However, this statement contradicts Lease Stipulation G-1 (Table 3.4.1). The EIS should more clearly explain what will happen to the MTI after it is abandoned, and provide references or modeling that supports those claims.	The EIS does not state that screeding would have substantial impacts; to the contrary, all sections in which screeding is listed as a potential impact describe it as minor, temporary, and limited to the screeding footprint, which is quantified and varies by action alternative and module delivery option. The minor, temporary, and limited effects to fish that would be entrained in the screeding footprint would be irreversible because mortality is irreversible. The density and diversity of the screeding area was further described in Section 3.10.2.3.3, *Injury or Mortality*, to demonstrate that few individuals would be irreversibly killed. As described in Section 3.8.2.6, *Module Delivery Option 1: Atigaru Point Module Transfer Island*, the MTI is expected to be reshaped by waves and ice within 10 to 20 years, including potentially dropping below the water line as other abandoned human-made islands have done in the Beaufort Sea. Examples of these islands are provided. The MTI is not expected to erode away as the commenter suggests. As stated, habitat loss from the MTI would be irreversible because even if the MTI is abandoned and reshaped, it would still exist. The MTI would be located offshore in Harrison Bay, which is outside BLM jurisdiction. If the BLM approves the Willow MDP Project with module delivery Option 1 (Atigaru Point MTI), CPAI would need to obtain authorization from the State of Alaska. BLM LS G-1 does not apply to the MTI.	N
864	296	Psarianos	Bridget	Trustees for Alaska	Fish	There is no discussion in the DEIS concerning fish use in the wetlands that are proposed to be impacted. This is a glaring omission in the DEIS. BLM must articulate how highly migratory Arctic fishes, such as broad whitefish, use the project area to complete various life stages.	Fish studies conducted and referenced in the Draft EIS did investigate wetlands with potential to provide fish habitat, and those data are incorporated in the Draft EIS. The Draft EIS and referenced reports specifically considers the migratory nature of fish in the Project area and assess impacts based on that information. Wetlands with no connections to fish-bearing waterbodies do not support fish. Marginally connected wetlands were sampled, and data were used for evaluation.	N
864	297	Psarianos	Bridget	Trustees for Alaska	Fish	The proposal for the MTI includes screeding of the substrate and almost 13 acres of gravel fill that would certainly impact the nearshore marine environment, and cause irreversible direct mortality to fish and benthic organisms, and interrupt near shore processes. The DEIS states that the alteration of nearshore habitat would be irreversible because even if the MTI is abandoned and reshaped, it would still exist. But this paragraph also contends these impacts would not be irreversible and would not affect the long-term sustainability of fish resources. BLM and the Corps cannot rely on this rationale for any future determination that no compensatory mitigation would be required for marine/fresh water/wetland impacts to fish and fish habitat. The DEIS should have discussed removal of the MTI gravel pad, and should consider an alternative where the MTI is removed rather than left to erode. In addition, the rejection of certain alternatives which would eliminate the need for the MTI altogether, are not given enough consideration and analysis in the DEIS. The DEIS does not adequately demonstrate the MTI Option 1 proposal is the least environmentally damaging practicable alternative (LEDPA) under the 404(b)(1) Guidelines.	The Final EIS includes Option 3 (Colville River Crossing), which does not require an MTI.	Y
864	298	Psarianos	Bridget	Trustees for Alaska	Fish	The main focus of the mitigation proposal is application of BLM's Lease Stipulations (LSs) and Best Management Practices (BMPs). The Willow project as proposed will require deviations from these measures. The deviations are very relevant here since some deviations will occur to LSs and BMPs that are specifically designed to protect fish. The DEIS acknowledges that individual fish will be impacted and affected by multiple actions under the preferred alternatives, but impacts would not result in population level effects. This is NOT the threshold for compensatory mitigation for impacts to fish and fish habitat.	Compensatory mitigation is not required for NEPA and will be determined in the Section 404 permitting process.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	299	Psarianos	Bridget	Trustees for Alaska	Fish	BLM's assertion that the LSs and BMPs (listed in Table 3.10.1) are intended to mitigate impacts to fish from development activity and these measures would reduce impacts to fish habitat, subsistence hunting and fishing areas, and the environment, associated with construction, drilling and operation of oil and gas facilities is simply unfounded, unsubstantiated and not analyzed in terms of project footprint and destruction and/or impairment of EFH. Although the DEIS (Chapter 3, Section 3.10.2.3.1) discusses potential fish habitat loss, alteration, or creation, they assert the impacts will be temporary, even though they do expect fish impacts/mortality from project construction . . . BLM also acknowledges (although they state it would be in extreme and unlikely cases) longer lasting impacts on a local spawning population could occur if blockages caused substantial delays to migrating Arctic grayling during the spring spawning period and reduced fry production from that specific creek. Blocked passages could also affect whitefish species attempting to move upstream in spring and delay or prohibit them from reaching preferred feeding areas. These potential impacts to fish and EFH in the project area could be substantial, if not significant, and BLM does not explain or analyze how the listed LSs and BMPs would fully or partially compensate for impacts. BLM must describe how application of the LSs and BMPs is adequate compensation for degradation and/or destruction of habitat (including EFH), and injury and/or mortality to fish. The DEIS does not do so. It is unclear the required Essential Fish Habitat (EFH) consultation with National Marine Fisheries Service will address the need for compensatory mitigation for impacts to both anadromous and resident fish and their habitats because it is clear that permanent, direct, indirect, and temporary impacts will occur to fish from project implementation, construction and operation. The consultation information is lacking in the DEIS and needs to be included.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. If mitigation is needed for potential effects to EFH, that will be determined in the EFH consultation with NMFS. EFH is identified in Section 3.10.1.3, *Essential Fish Habitat*, and in Figure 3.10.1. Effects to EFH are described throughout Section 3.10, *Fish*, and identified in Section 3.10.2.10, *Effects to Essential Fish Habitat*. The BLM initiated consultation with NMFS on EFH in May 2020. It is not required under NEPA to include consultation documents in the EIS.	N

4.2.10 General Economics

Table B.2.13. Substantive Comments Received on General Economics

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
991	34	Bruno	Jeff	Alaska State, Department of Natural Resources	General Economics	Throughout the document there seems to be a misunderstanding of NPR-A grant funds. NPR-A Mitigation Grant funds are federal royalties and are not a State Royalty. This nuance has the potential to misinform the public, underestimate the federal government's efforts to mitigate the project, and overestimate the States royalty estimates from this project. The State does not consider this a State royalty. Please correct throughout the document.	Text updated in Final EIS Section 3.15, *Economics*, and in Section 5.3.1, *State of Alaska National Petroleum Reserve in Alaska Impact Grant Program*, to reflect that this is not a state royalty.	Y
991	35	Bruno	Jeff	Alaska State, Department of Natural Resources	General Economics	Please change heading to "NPR-A Impact Grant Program." That is the actual name of the program. (Page 177) It states in the first paragraph that "The federal government has no ability to influence the management of the fund or State-run grant program." There is federal oversight of the State run grant program and any changes in the program would need concurrence and coordination by federal agencies. (Page 177) It might be helpful to attach a link to the 2019 legislative report for this program: https://www.commerce.alaska.gov/web/Portals/4/pub/2019%20Report%20to%20the%20 Legislature.pdf (Page 178) Royalties associated to this grant are federal royalties not State royalties. Please make it clear that these are federal royalties used to mitigate impacts that the State of Alaska administers in the form of grant program. (Page 177) Please make sure to address the impacts from this grant fund throughout the document where appropriate and not just in this section. These funds will play huge role in helping the communities mitigate the impacts from surrounding development and help assist local communities/residents with developing their communities as they see appropriate, both in the short term and long term.	Text updated to change "NPR-A Impact Grant Funds" and "NPR-A Impact Mitigation Fund" to "NPR-A Impact Grant Program." Text updated in Final EIS Section 3.15, *Economics*, and elsewhere mentioned in the Final EIS, to clarify that the NPR-A Impact Grant Program funds are federal royalties used to administer mitigation for Project impacts through a state-run grant program, with federal oversight.	Y
991	29b	Bruno	Jeff	Alaska State, Department of Natural Resources	General Economics	Page 124, Table 3.15.3. Federal royalties administered by the State of Alaska grant program does not equal State Royalties. Please correct throughout the document.	Table 3.15.4 was updated to clarify that the NPR-A Impact Grant Program funds are federal royalties.	Y
1302	107	Dunn	Connor	ConocoPhillips	General Economics	DEIS states the population for Nuiqsut is 347, which is likely based on U.S. Census Bureau's American Community Survey. The NSB has expressed concerns that the U.S. Census numbers are too low. According to the 2019 NSB Comprehensive Plan, the population of Nuiqsut in 2015 was 449. We recommend acknowledging the NSB estimate for consistency with discussion in the Economics section.	While NSB believes that U.S. census data underestimate population and unemployment in the borough, the U.S Census data provide consistent data for conducting analysis. The preface to the NSB socioeconomic survey notes that there were challenges to collecting 2015 NSB socioeconomic survey data and that 75% of respondents in Nuiqsut refused to provide some of the income data requested (NSB 2016). Use of the U.S. Census versus NSB population data would not result in significant changes to impacts. No change to text. NSB. 2016. 2015 economic profile and census, North Slope Borough. North Slope Borough, Barrow, AK.	N
1302	121	Dunn	Connor	ConocoPhillips	General Economics	While project economic impacts are described further in the appendices, information in the table is a key part of the project impact and merits more discussion within the main text of the document.	Given the large amount of data, the information was retained in the appendix.	N
1302	123	Dunn	Connor	ConocoPhillips	General Economics	If escalation is applied to dollar values, it should be stated. Price and costs could all be escalated at a nominal rate.	A note was added to Table 3.15.4 in Final EIS Section 3.15, *Economics*, to state that "the values shown reflect the estimated total cumulative revenues through the end of the production life of the field."	Y
1302	124	Dunn	Connor	ConocoPhillips	General Economics	The profile of jobs during the construction phase is inconsistent with ConocoPhillips estimates provided to BLM.	Final EIS Section 3.15, *Economics*, Table 3.15.2 (Direct Construction Employment Estimates) was updated based on Table 5 (Estimated Number of Direct Construction Jobs: Proponent's Project Alternative) in Appendix E.15 (*Economics Technical Appendix*).	Y
1294	39	Nukapigak	Joe	Kuukpik Corporation	General Economics	Vol. I, p. 123, Section 3.15, Economics, 3.15.2.3.1, Construction and Drilling. The 4th passage states: "In addition to construction employment, drilling activities are estimated to generate 140 jobs per year." This figure is believed to actually refer to jobs per year per rig.	Text updated in Final EIS Section 3.15.2.3.1, *Construction and Drilling.*	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1294	40	Nukapigak	Joe	Kuukpik Corporation	General Economics	Vol. I, p. 124, Section 3.15.2.3.2, Operations. This section states, "Once the operations phase begins, the Project would add an estimated 350 jobs through the life of the Project." Since the bulk of these jobs would be on a rotational schedule, this information implies that around 175 people would be on site at any given time. Is this accurate? This information also calls into question the flight data and vehicle trips previously referenced.	The number of flights presented in the EIS include more than crew rotation.	N

4.2.11 Land Ownership and Use

Table B.2.14. Substantive Comments Received on Land Ownership and Use

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
55	1	Nungasak	Nelda	—	Land Ownership and Use	Do you know if you're going to impact any allotments on the road or if you know how close you are from any native allotments?	No Native allotments would be directly impacted by Project construction. The closest Project activity/feature that would be constructed would be the ice road required under Option 3 to cross the Colville River near Ocean Point; this ice road would be located within approximately 0.25 mile of a Native allotment. The following list provides some of the closest distances to Native allotments from different Project features (e.g., gravel roads, gravel pads, ice roads): -HDD gravel pad (west side of Colville), all alternatives: 1.4 miles -Gravel access road, Alternative B (Proponent's Project) and Alternative C (Disconnected Infield Roads): 10.4 miles -BT3 gravel pad, all alternatives: 18.5 miles -Mine site, all alternatives: 8.5 miles -Ice road, Option 2 (Point Lonely Module Transfer Island): 1.8 miles -Ice road, Option 1 (Atigaru Point Module Transfer Island): 9.4 miles -Ice road, all alternatives: 9.4 miles -Ice pad (HDD west pad), all alternatives: 1.4 miles	Y

4.2.12 Marine Mammals

Table B.2.15. Substantive Comments Received on Marine Mammals

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
11	9	Baraff	Lisa	—	Marine mammals	And also Footnote B states that the barges will travel from Southern Alaska, yet there are no analyses regarding that route, and which will likely take barges through critical habitat area for North Pacific right whales, and if I am still up to date, that last population estimate was 31. So that's of great concern. And also excluding potential impacts by barges and support vessels to species present between Point Lonely and Oliktok Point during the ice-free months, such as bowhead whales, and along the barge route and Southern Alaska is an oversight I encourage you to correct. Currently only sea—ice seals and polar bears are considered, and the table states that the route is outside—the migratory route of bowheads is outside of the route of these, and I would ask you to please look more closely at data, because bowhead whales, when transiting from the Eastern Beaufort west, don't just go way offshore and pass by these areas. They are known to stop and feed. And if you look at data which is available on daily as well as yearly reports for the National Marine Mammal Labs, the aerial surveys of Arctic marine mammals, you will see that over the years Harrison Bay has been pretty heavily used by bowhead whales.	Effects analysis of the barge transit route was added to Section 3.13, *Marine Mammals*.	Y
989	30	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Marine mammals	Page 109, Table 3.13.1 Marine Mammals Known to Occur in the Analysis Area It is very plausible that bowheads and belugas could also be present in the corridor. Certainly, the sound, if generated within the corridor, would travel much farther. See previous comment about underwater noise. Analysis area may be too narrow. This might be allowable for polar bears (maybe), but more aquatic species live in an acoustic sound-scape that is important to their ecology.	The distance to the 120-dB NMFS underwater threshold for behavioral disturbance was calculated using a source level for vessel noise of 170 dB rms at 3.28 feet and transmission loss of 15 log resulting in a distance of 7,067 feet (or 1.3 miles). This was conservatively rounded up to 1.5 miles for the offshore analysis area. These distances are consistent with other NEPA, ESA, and MMPA consultations in Alaska. Vessel noise is the loudest sound associated with in-water work, so this distance was used to calculate action area. Pile driving is all terrestrial, so these distances were not included in the offshore analysis area. Traditional knowledge and data from Aerial Surveys of Arctic Marine Mammals indicate that bowheads and belugas do not migrate in the shallow waters near Oliktok Dock but typically stay outside the barrier islands.	N
989	31	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Marine mammals	Page 110, 3.13.1.1 Special Status Species "[Bearded seals] are listed as threated and have no designated critical habitat." –Please specify that Bearded seals have no designated critical habitat at this time. We understand NOAA is currently working on designating critical habitat for Bearded seals and Ringed seals.	Critical habitat designations were added to Table 3.13.1.	Y
989	32	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Marine mammals	Page 110, 3.13.1.2, Spotted Seals Tag data indicate that spotted seals migrate south of the Bering Straits in the late fall, and winter in the Bering Sea. They are not as ice associated as ringed seals. Perhaps in the winter and early spring this association is "strong." As the season progresses, they become pelagic and more associated with terrestrial haulouts. Timing is important when characterizing their association with ice.	Table 3.13.1 was added to the Final EIS to summarize species occurrence in the analysis area and overlap with Project components. Spotted seals are identified as occurring in the Bering, Chukchi, and Beaufort seas, as well as the Oliktok Dock area, MTIs, and the CRD.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
989	33	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Marine mammals	Page 110, 3.13.2.1, Environmental Consequences I do think that there may be some overlap between Level A and Level B harassment. If Level B disturbances accumulate and cause a decline in body condition, or interfere with reproduction, has the seal been "injured?" The answer may be yes.	The Final EIS and Appendix E.13 (*Marine Mammals Technical Appendix*) use the NMFS 2018 Technical Guidance for assessing Levels A and B harassment. Distances to the thresholds described in the NMFS 2018 guidance using methods described for transmission loss and recommended source levels for different Project components are also provided in Appendix E.13. The EIS is consistent with NMFS policy. NMFS. 2018. Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. Seattle, WA: NOAA, NMFS.	N
989	35	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Marine mammals	Page 113, 3.13.2.3.2, Disturbance or Displacement "Exposure of marine mammals to aircraft presence would occur throughout the life of the Project, but each occurrence would be temporary and of short duration and would result in brief behavioral responses." –Many "brief" responses may have a cumulative effect.	Disturbance of polar bears and seals from air traffic is described in Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*. Cumulative effects are not expected because flights over the CRD would occur only during construction and in limited quantity.	N
1303	3	Christopherson	Jen	Defenders of Wildlife	Marine Mammals	These species are already experiencing significant effects from climate change and other oil and gas activities in the Alaskan Arctic. The DEIS understates impacts to polar bears and seals, and completely omits impacts to cetaceans including listed bowhead and beluga whales.	Cetaceans, including listed bowhead and beluga whales, are addressed in Final EIS Section 3.13, *Marine Mammals*.	Y
1302	134	Dunn	Connor	ConocoPhillips	Marine mammals	The DEIS states that bowhead whales and beluga whales were not analyzed because their migration corridor is outside of the analysis area. For comprehensiveness, we recommend that BLM explain more fully why additional analysis is unnecessary.	The Final EIS marine mammals analysis area was expanded to include the vessel route.	Y
1302	135	Dunn	Connor	ConocoPhillips	Marine mammals	"Ice infrastructure would cover 2,872.3 acres, which could alter foraging habitat during winter construction." Onshore habitat is rarely used in the winter for foraging by polar bears, and BLM notes on page 110 that polar bears may use terrestrial habitat for denning, scavenging, resting and travel between marine habitats. Therefore, it's unlikely that the acreage of ice infrastructure on land would impact foraging habitat. ConocoPhillips requests BLM update this metric to include only sea ice acreage. BLM also notes that approximately 442.7 acres of foraging habitat for polar bears would be permanently lost as a result of gravel infrastructure. ConocoPhillips finds it unlikely that the Willow roads and pads would have provided polar bear foraging habitat, particularly that far inland.	Edit made as suggested.	Y
1302	136	Dunn	Connor	ConocoPhillips	Marine mammals	There is an apparent typo in 3rd paragraph under 3.13.2.3.2: "Using the disturbance buffer of 1 mile for polar bear dens during operations, 85.3.5 acres would potentially be disturbed."	Sentence was updated for the Final EIS.	Y
1302	137	Dunn	Connor	ConocoPhillips	Marine mammals	This section discusses the potential for Level A harassment of marine mammals. For comprehensiveness, it may be prudent to include some discussion of the potential for Level B harassment.	Both Levels A and B harassment are discussed in the Final EIS in Section 3.13.2.3.2, *Disturbance or Displacement*, and in Appendix E.13 (*Marine Mammals Technical Appendix*), Section 1.3.2, *Applicable Noise Criteria*.	N
1294	14	Nukapigak	Joe	Kuukpik Corporation	Marine mammals	The Draft EIS also downplays or under-estimates the likely effects of introducing an unnatural island on bowhead whales and other aquatic species. As BLM knows, bowhead whales are a vital subsistence and cultural resource for Nuiqsut. Each spring, they migrate east to the north of the proposed MTI and pass it again during the westward migration in August or September. It's therefore nearly incomprehensible that BLM has summarily concluded that the MTI will not have any meaningful impacts on whales and whaling. In fact, it gets this whole analysis wrong by concluding that there wouldn't be any meaningful impacts because (i) the island would be outside Nuiqsut's hunting grounds, and (ii) BLM believes whales do not pass close enough to shore to be impacted by either the island or vessel traffic. Although it's true that the MTI location is not squarely within Nuiqsut's hunting grounds, the vessel traffic and noise associated with construction of the island, activities on the island, and delivering the modules could impact or deflect migrating whales, seal populations, and fish and other species. And even though the island itself would not be located in subsistence whaling areas, bowhead whales do pass through Harrison Bay in meaningful numbers, usually to rest or escape stormy seas. If the island and shipping activities associated with it impact the overall health of the bowhead whale, seals, and other populations, there would be real repercussions in Nuiqsut and Utqiaġvik (since the island is "upstream" from that community's whaling grounds) and across the North Slope. In other words, activities that harm bowhead whales outside of Nuiqsut's whaling grounds are nevertheless very, very relevant and important to Nuiqsut. The question is not just whether the MTI would actively displace hunting (it likely wouldn't); it's whether the impacts from the island, both short term and over time, could alter whale behavior or populations in ways that would impact subsistence users long-term . . . The Draft also doesn't pay enough attention to non-whaling impacts. Nuiqsut hunters, for example, target multiple species of seals in Harrison Bay, not that far from the proposed location of the island. The Draft EIS eases right past this potential conflict, downplaying the risk of "periodic displacement." 57	The Final EIS includes a third module delivery option (Option 3: Colville River Crossing) that does not include the construction of an MTI. Effects of all module delivery options are summarized in Table 3.13.4. The MTI at Atigaru Point or Point Lonely would increase noise in an area that currently does not have industrial noise sources, but it would be for only four seasons (thus, would not be a permanent noise source). Further, the MTI would be located in very shallow water, where bowheads are not expected. The type of activity that would occur at the MTI during those four seasons would be similar to existing activities at Oliktok Dock and West Dock, which are both closer to Cross Island, which has continued to be a successful whaling location.	Y
1294	37	Nukapigak	Joe	Kuukpik Corporation	Marine mammals	Vol. I, p. 109, Table 3.13.1, Marine Mammals Known to Occur in the Analysis Area. The indication that the Willow Project Area is completely outside the bowhead whale migration corridor is not entirely accurate, as explained in Kuukpik's comments. Nuiqsut whalers confirm the bowhead whales use Harrison Bay and pass near Atigaru Point.	Though bowhead whales may occur offshore from the MTI, they are not expected near the MTI. Their migration corridor is generally in depths greater than 60 feet, and the MTI would be in an approximately 8- to 10-foot water depth.	N
58	1	Olemaun	Chastity	—	Marine mammals	I'm wondering when the open water season is for the sealift barges, and what is the mitigation process for -- to not disturb the bowhead migration?	As described in Section 3.13.2.6.2, *Disturbance or Displacement*, bowhead whales are not expected to be affected by the Project, and thus, no mitigation is needed. Bowhead and beluga whales harvested near Utqiaġvik (Barrow) and Nuiqsut in fall and spring would not be disturbed by the increased vessel traffic between Atigaru Point and Oliktok Point because their migration corridor is generally in depths greater than 60 feet and all vessel traffic would occur in shallower water. Marine habitat would recover from noise almost immediately after construction and in-water work cease. Vessel traffic is not expected to result in injury or mortality of marine mammals because vessels would travel at speeds slower than 14 knots.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	197	Psarianos	Bridget	Trustees for Alaska	Marine mammals	BLM Must Expand the Marine Mammal Analysis Area. The DEIS states that: The analysis area for onshore activities for marine mammals is the area within 1 mile of onshore construction and operation activities and within 1.5 miles of construction activities and support vessel route for offshore construction (Figure 3.13.1). This area represents the maximum distance that underwater or airborne noise or vibration could affect marine mammals and their habitats (based on the USFWS polar bear den disturbance zone), and also represents the maximum distance from which polar bears may be attracted to Project facilities. BLM must expand this analysis area for several reasons. First, the one-mile buffer zone for onshore construction and operation activities should be increased substantially, to better reflect available science regarding disturbances to non-denning polar bears. Routine snow machine noise, for example, has been shown to prompt significant avoidance responses in polar bears at distances up to 3,272 meters over two miles. Second, the 1.5-mile offshore buffer similarly should be increased to reflect actual distances at which construction and vessel noise are known to impact other marine mammals. For example, BLM has elsewhere acknowledged that industrial noise can impact seals at a distance of 2.5-3.7 miles, depending on the nature of the source and other factors. Third, the referenced Figure 3.13.1 shows no support vessel route or associated analysis area. BLM must provide a description and map of support vessels that will be needed and the areas those vessels will traverse. It must include all marine mammals potentially impacted by those vessels and establish an analysis area based on distances from vessel noise at which marine mammals may be impacted. It must include the full vessel transit route, not just the areas in the immediate vicinity of the proposed construction, and examine potential impacts including vessel strikes. A non-exhaustive list of marine mammals which would need to be included in BLM's analysis include: right whale, orca, walrus, Steller sea lion, ribbon seal, humpback whale, gray whale, and harbor porpoise. Finally, the DEIS excludes bowhead and beluga whales from any analysis, claiming that the migration corridor for each species is outside of the analysis area. But both species occur in the project area. BLM must add bowhead and beluga whales to the list of impacted species and the DEIS must assess the projects impacts to both.	Regarding the onshore analysis area, the distance to the 100-dB NMFS airborne threshold for phocids (other than harbor seals) for behavioral disturbance was calculated using a source level of 101 dBA at 50 feet for pile driving and transmission loss of 20 log, resulting in a distance of 55 feet. There is no threshold for polar bear disturbance, other than for denning bears, for which a 1-mile buffer has been used. Therefore, this distance was used as the analysis area. Bears and hauled-out seals are likely able to detect industrial sounds at distances greater than this 1-mile buffer, but data are lacking regarding if distances greater than 1 mile cause disturbance. One mile was used to be consistent with current USFWS mitigation practices. Regarding the offshore analysis area, the distance to the 120-dB NMFS underwater threshold for behavioral disturbance was calculated using a source level for vessel noise of 170-dB rms at 3.28 feet and transmission loss of 15 log, resulting in a distance of 7,067 feet (or 1.3 miles). This was conservatively rounded up to 1.5 miles. These distances are consistent with other NEPA, ESA, and MMPA consultations in Alaska. Vessel noise is the loudest sound associated with in-water work, so this distance was used to calculate the analysis area. Pile driving is all terrestrial, so these distances were not included in the offshore analysis area. The estimated marine vessel route was added to the Final EIS as Figure 3.13.2. Effects analysis of the vessel route and affected species was added to Section 3.13, *Marine Mammals*. Table 3.13.1 added the list of known species to occur along barge route and marine construction area. We acknowledge that bowhead and beluga whales occur in the Beaufort Sea, but they do not occur in the shallow area of the planned marine construction area.	Y
864	199	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The DEIS Fails to Examine Critical Marine Ecosystem Effects of an Oil Spill Oil spills can harm marine mammals by reducing their prey. BLM fails to examine the negative impacts of oil at an ecosystem level as well as short- and long-term impacts to marine mammals such as polar bears, whales, and seals. Studies have concluded even a small spill can have both short and long-term substantial negative impacts. At the ecosystem level, for example, plankton, such as the fat-rich Arctic copepod *C. hyperboreus*, are part of the base of the marine ecosystem and a critical component for the food supply of marine mammals. When *C. hyperboreus* are exposed to small amounts of oil, their ability to graze, reproduce, and metabolize is significantly reduced. The effect on plankton further exacerbates other negative impacts of oil spills on marine mammals. Oil spills can also adversely affect fish and invertebrates of all developmental stages. Oil contamination of mollusks has been found to impair growth, fertilization, and development of embryos, kill gill tissue, and encourage cancerous growths. Hydrocarbons can cause larval deformation and death. Adult fish exposed to oil can suffer from reduced growth, enlarged liver, changes in heart and respiration rates, fin erosion, and reproductive impairment. The DEIS must properly acknowledge the risk of oil spills and needs to fully examine the ecosystem effects of oil spills—large and small—to marine mammals.	Text was added to Section 3.13.2.10, *Oil Spills and Accidental Releases*, to address the effects of spills on prey for marine mammals.	Y
864	200	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The DEIS Neglects to Examine Impacts of Oil Spills on Polar Bears Polar bears spend time both in the water and on land. This dual use of the environment makes polar bears particularly vulnerable to oil spills. Polar bears could come in to contact with oil in a variety of ways. Polar bears could directly come in to contact with spilled oil or by means of grooming themselves. An oiled bear could ingest significant amounts of oil through natural grooming. Polar bears could also experience consequences from oil spills indirectly, such as through contaminated prey. The imperiled SBS population of polar bears could suffer major impacts from an oil spill. The DEIS needs to specifically examine the adverse consequences of oil spills to polar bears, especially given their use of both terrestrial and marine habitats within the Project area.	Text was added to Section 3.13.2.10, *Oil Spills and Accidental Releases*, to address the effects of spills on polar bears.	Y

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864	201	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The DEIS Neglects to Examine Impacts of Oil Spills on Whales and Ice Seals Individual whales and seals can be affected by oil spills in numerous ways, many of which are not fully documented. However, documented stress on whales and seals includes decreased survival and reproductive rates, health effects, and disrupted normal behaviors such as foraging. These individual effects can result in population-level consequences. Long term post-exposure studies have demonstrated some of the population-level impacts that cannot always be readily observed immediately post oil-spill. In a long-term study following the Exxon Valdez Oil Spill, two different orca pods, a transient pod and a resident pod, suffered significant losses which contributed towards these distinct orca populations trajectory toward extinction. Likewise, the population of harbor seals in Prince William Sound declined 4.6% annually following the Exxon Valdez Oil Spill. Exposure to toxic fumes from hydrocarbons during oil spills has even been linked to mortality in cetaceans, years after the accidents; a 2015 report linked adrenal and lung lesions in bottlenose dolphins to the Deepwater Horizon oil spill, which led to an unusual mortality event from 2010 to 2014. Seal pups depend on scent to establish a mother-pup bond, and mothers often do not recognize their oil-coated pups. Oiled pups may be prematurely abandoned, reducing the pups chances of survival. During the nursing period, ringed, bearded, and spotted seals return to the water several times a day between nursing bouts, increasing the chances of repeated contact with oil. BLM must examine the long-term harm oil spills can have on whale and ice seal populations both near the Willow development and along the vessel and barge supply route.	Text was added to Section 3.13.2.10, *Oil Spills and Accidental Releases*, to address the effects of spills on marine mammals.	Y
864	202	Psarianos	Bridget	Trustees for Alaska	Marine mammals	The DEIS Fails to Adequately Consider Impacts from Disturbance and Displacement. Given polar bears declining population and increasing stressors, disturbance and displacement of bears from preferred habitats is becoming an increasingly significant consideration. Yet the DEIS scarcely considers it. BLM must better quantify the impacts of the Willow project, together with existing and other foreseeable developments, on polar bears. First, the DEIS estimates the area where the project could disturb polar bears at 853 acres. The analysis area shown in Figure 3.13.1, however, appears to encompass a significantly greater area, since it includes a one-mile buffer on either side of dozens of miles of roads and other project facilities. BLM must better explain its conclusion that the project would potentially disturb polar bears in a total of just 853.5, acres or must revise its calculation. The DEIS also understates the effect of the disturbance and displacement that will occur: The duration and frequency of impacts from construction would be continuous during construction and operation. Because activities would have a short duration and occur over a small area of denning and critical habitat relative to the entire North Slope, polar bears and seals are expected to find alternate similar habitat. There is no support for the conclusion that disturbed or displaced bears will simply find alternate habitat. It cannot be assumed that animals which move from their preferred site would not be subject to any impacts, especially if the animals are moving away from dens, mates, or other biologically important areas. Indeed, BLM has elsewhere acknowledged that possible impacts on polar bears exposed to noise potentially include disruption of normal activities, displacement from foraging and denning habitats, and displacement of maternal females and young cubs from dens. The bears denning in the NPRA are from the same population of SBS bears whose Arctic Refuge coastal plain denning habitat BLM soon plans to sell to the highest bidder. The impacts are significant and the alternate habitat is diminishing along Alaska's north slope. Other studies reinforce the impacts of industrial activity and noise on bears. As noted above, routine snow machine noise has been shown to prompt significant avoidance responses in polar bears at distances up to 3,272 meters over two miles. Bears in this study typically had a pronounced response and frequently fled snowmobiles and continued to flee the area at lengthy distances. Also, industrial activities produced measured noise higher than background levels at a distance of up to 1.24 miles from artificial dens, depending on the source. Displacement of a mother bear from her den will adversely affect the mother and result in death for any cubs. Displacement from preferred foraging areas near the project will increase the bears metabolic costs and nutritional stress. Together with displacement occurring due to other existing and proposed development in polar bear critical habitat, the impacts from Willow could be significant. BLM must take a hard look at the direct, indirect and cumulative impacts of the Willow project on polar bears.	Section 3.13.2.3.2, *Disturbance or Displacement*, was updated for the Final EIS. Calculations were updated and described by both critical habitat units and proximity to shore (i.e., onshore and offshore effects). As noted in the USFWS 2016–2021 ITRs for polar bears, polar bears have continued to use habitat near industrial activities for many years, including many instances of successful denning. Polar bears exhibit tolerance to oil and gas activity in this area.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	203	Psarianos	Bridget	Trustees for Alaska	Marine mammals	BLM Fails to Adequately Assess Increased Human-Bear Interactions. With increased oil and gas development activity occurring in Alaska's Arctic concurrent with bears spending more time on land, human-polar bear interactions have been increasing. These interactions can lead to displacement from preferred habitat, energetic loss, stress, and even mortality. The DEIS recognizes the increased likelihood of human encounters with nutritionally bears stressed but it does not detail the impact of these increased encounters on the polar bear population. The percentage of bears coming ashore and staying for at least 21 days has more than sextupled as those bears are arriving earlier, staying later, and staying longer than ever before. As bears spend more time onshore, the more likely bears are to be affected by industry expansion and more likely to encounter humans. Inland areas in the NPRA will become increasingly critical to the SBS population These factors combined could further elevate the significance of human-bear interactions. This higher rate of encounters will increase harassment of polar bears, adding stress to the bears and exacerbating the aforementioned consequences. Higher encounter rates conflict with BMPs A-8 (minimize conflicts between humans and bears) and M-1 (minimize disturbance and hinderance of wildlife, or alteration of wildlife movements through the NPR-A). Polar bears have extremely high energy demands and for this currently stressed population, conserving energy is vital to their survival. Increased human-bear interactions, even non-lethal encounters, could contribute to the hinderance of polar bear survival and reproduction. BLM must analyze the population-level risk of increased human-bear interactions in light of industry expansion in the NPRA and increasing polar bear use of terrestrial habitats.	The effects of the Project in combination with effects of climate change (such as bears spending more time onshore) is described in the Final EIS in Section 3.19.10.5, *Marine Mammals*.	Y
864	204	Psarianos	Bridget	Trustees for Alaska	Marine mammals	The DEIS Underestimates Impacts to Denning Bears. Polar bears build dens by excavating snow on land or sea ice. As sea ice dwindles, polar bears are increasingly denning on land. As previously mentioned, it is likely that inland areas of the NPR-A will become more critical to the SBS population. BLM appears to rely on the relatively few known polar bear den locations in and around the project area to determine likely impacts to denning bears. But den detection is very difficult, and the known dens almost certainly do not reflect all the dens that have occurred in the area. The DEIS does not indicate how the dens were located or cite any research designed to estimate the number of denning bears in the area. Given the increasing importance of terrestrial denning to SBS bears, BLM should anticipate greater use of denning habitat in the NPRA and estimate the number of dens and extent of impacts accordingly. The DEIS states, The nearest known polar bear maternal dens are approximately 3 miles from the proposed gravel infrastructure (in this case, the HDD pads) for all action alternatives, and less than 0.1 miles from the proposed ice road for the module delivery options (Durner et al. 2010; USGS unpublished data). It is notable that project infrastructure is fully expected to come extremely close to known polar bear dens, with ice roads and the proposed MTI virtually connecting the dots representing the known dens in the area. At a glance, even the impacts to known dens would require work to stop were those dens again occupied. But the larger problem is that the information presented about known dens is not sufficient to assess impacts of the Willow Project on denning polar bears. BLM must clarify how the known dens were identified and estimate, based on polar bear distribution and behavioral trends, an approximate number of denning bears anticipated in the project area over the life of the project. This estimate should also consider potential increased use of denning habitat in the NPRA outside of designated critical habitat. Estimated numbers of denning bears, and the limitations on the efficacy of den detection even in known denning areas, could serve as a basis to estimate the potential project impacts on denning bears. As discussed above, that analysis needs to take a much harder look at the sources of disturbance and displacement, and apply that to denning bears as well.	Potential terrestrial denning habitat displayed in the EIS was mapped using topographic features (Durner, Simac et al. 2013). The total amount of potential terrestrial denning habitat in the analysis area was estimated to be 3,126.6 acres. The acres of potential terrestrial denning habitat lost from Project gravel infrastructure for each action alternative are summarized in Final EIS Table 3.13.3. The Final EIS also identified the closest known historical den site to Project components but noted that this is not necessarily indicative of future den sites, as dens are not reused by bears. The oil and gas industry conducts aerial infrared surveys each year prior to the winter season to identify den sites, as well as trains all personnel to identify signs of dens. When a den is identified, strict measures are taken to avoid disturbance of the den. As summarized in the recent ITRs for polar bears, there are several examples of successful dens near industry. Therefore, the EIS analysis is appropriate and consistent with USFWS consultations.	Y
864	205	Psarianos	Bridget	Trustees for Alaska	Marine mammals	The DEIS wrongfully concludes that whales are outside of the analysis area. As a result, the DEIS not only fails to fully consider the range of cetacean species affected by the proposed development, but it also fails to consider multiple impacts on whales including ship strikes and noise impacts. i. The DEIS Fails to Consider the Possibility and Impacts of a Vessel Collision with Whales. The DEIS states that: "Impacts to marine mammals as a result of injury or mortality from vessel collision is not expected; therefore, the extent and duration that injury or mortality would occur is not included in this analysis." The risk of a collision with a marine mammal is always a possibility and a reasonably foreseeable impact that BLM must thoroughly consider within Harrison Bay, the Beaufort Sea, and along all vessel routes related to the project.	The Final EIS considers the potential impact of vessel strike on marine mammals in Section 3.13.2.3.3, *Injury or Mortality*.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	206	Psarianos	Bridget	Trustees for Alaska	Marine mammals	The DEIS Fails to Consider the Noise Impacts on Whales. The DEIS briefly acknowledges the Project will generate noise through various activities and discusses acoustic thresholds but fails to assess the impacts of the Projects noise on whales and other marine mammals. Instead, BLM states that "detailed information will later be analyzed further in a MMPA authorization request and associated ESA Section 7 consultation." Deferring this analysis to later processes is inadequate because MMPA authorizations are not necessarily required and section 7 consultations only apply to species listed as threatened or endangered under the ESA. BLM's EIS for the Willow project must take its own hard look at the impacts to marine mammals, including noise impacts. The injury and disturbance thresholds identified in Appendix E, moreover, no longer appear to represent the best available science: Level B takes . . . often occur well outside of our ability to directly observe the disruption, and typically outside the 1,000 m observation zones around such disruptive activities. The best available science clearly shows that behavioral disruptions occur at vastly lower noise exposure levels than the current regulatory thresholds for Level B disturbances, and at much larger distances than on-board Marine Mammal Observers or passive acoustic monitoring can document. Recent research has elucidated disturbance thresholds with respect to bowhead whales, beluga whales, and harbor porpoise. Bowhead whales increase call rates at initial detection of air guns at 94 dB, then decrease after 127 dB, and stop calling above 160 dB. Beluga whales isopleth are displaced from foraging areas beyond the 130 dB. Harbor porpoise buzz rates, a proxy for foraging success, decrease 15 percent with exposure to seismic air guns at 130 dB and above. BLM must present the likely project noise levels and incorporate the best available science to assess the impacts of project noise together with existing and reasonably foreseeable noise sources. That science includes recent research determining that whales such as bowhead and beluga are disturbed at lower levels than previously thought. Research has also revealed that noise pollution can be exacerbated through ocean acidification, which is a result of climate change. When carbon dioxide reacts in the ocean, it lowers pH, creating more acidic waters. The more acidic the water, fewer sound waves are absorbed. Noise impacts to marine mammals are predicted to increase with climate change, wherein the absorption of carbon dioxide by the ocean could create noisier oceans. Researchers predict that ocean acidification will reduce the intrinsic ability of surface seawater to absorb sound at frequencies important to marine mammals as much as 40 percent by 2050 due to ocean acidification. Such changes will only exacerbate the harms from noise pollution from the Willow Project, other oil and gas drilling operations in the Arctic, and other anthropogenic noise sources. BLM must take into account the effect of ocean acidification on the likely impacts of noise from Willow and existing and foreseeable projects on marine mammals.	The Final EIS and Appendix E.13 (*Marine Mammals Technical Appendix*) use the NMFS 2018 Technical Guidance for assessing Levels A and B harassment. Distances to the thresholds described in the NMFS 2018 guidance using methods described for transmission loss and recommended source levels for different Project components are also provided in Appendix E.13. The EIS is consistent with NMFS policy. The marine transit route overlaps with cetacean habitat but is limited to a few barges transiting slowly. Once sealift modules have been delivered via barge, the Project is terrestrial; therefore, impacts to cetaceans are not expected. NMFS. 2018. Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. Seattle, WA: NOAA, NMFS.	N
864	207	Psarianos	Bridget	Trustees for Alaska	Marine mammals	The DEIS Fails to Thoroughly Examine the Noise Impacts to Ice Seals and Other Pinniped Populations. As noted above, the DEIS relies on threshold levels for marine mammal disturbance that may no longer reflect the best available science as new research is supporting findings that seals are disturbed at much lower exposure levels than previously thought. The DEIS states simply that [d]isturbance and displacement would occur from on-ice work in winter and in-water work in summer, and from vessel traffic. Underwater and airborne noise would be created from equipment and marine vessels. Seals may temporarily be displaced from marine waters during construction, but ringed seals exhibit tolerance to construction. While seals may habituate to some sources of noise, this is a mischaracterization of this study, which found that the density of overwintering ringed seals near an artificial island was not significantly reduced by a variety of industrial activities over two seasons. This was an extremely localized study only concerned with one species of seal. This study is not sufficient for BLM to draw broad conclusions on effects to ice seals. Numerous other studies document the fact that noise does impact seals, regardless of how one might characterize their tolerance to construction. Small motorboats and helicopters have been shown to disturb hauled out seals. Ringed seals have also been found to be sensitive to aircraft noise Vessel and aircraft noise disturb hauled-out seals, causing the animals to quickly flee into the water from their resting states, and overall disrupting the animals normal behavior. Additionally, radio-tagged seals departed their lairs in response to snow machines within 2.8 km, human footfalls as far away as 600 m, a skier as far away as 400 m, and in response to a helicopter flying 5 km from the lair at an altitude of 152 m, and during helicopter landings or takeoffs as far away as 3 km. Seals also departed lairs by diving into the water in greater than 50% of instances when helicopters flew over at or below an altitude of 305 m. BLM must take a hard look at the likely noise impacts from the project on seals and use the best available science regarding acoustic thresholds and behavioral responses to noise in assessing those impacts.	The Final EIS and Appendix E.13 (*Marine Mammals Technical Appendix*) use the NMFS (2018) Technical Guidance for assessing Levels A and B harassment. Distances to the thresholds described in the NMFS 2018 guidance using methods described for transmission loss and recommended source levels for different Project components are also provided in Appendix E.13. The EIS is consistent with NMFS policy. The studies around Northstar were specific to ringed seals, but spotted seals were often observed, all exhibiting tolerance to the industrial activities at Northstar. Although this is one localized area, similar tolerances have been observed for the species of seals in the Beaufort Sea around West Dock, Oliktok Point, Northstar, and other industrial coastal areas. Lairs for iced seals are created after March 1, which is why NMFS mitigation measures require that all work in this habitat start prior to March 1 so that the disturbance has already occurred before seals create their lairs. Construction of the MTIs would start prior to March 1, in accordance with NMFS policy. Once the Project is constructed, all operations are in terrestrial habitat. This information was added to Section 3.13.2.6.2, *Disturbance or Displacement.*	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	208	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The DEIS Fails to Take A Hard Look at the Impacts of GHG Pollution from the Project on Polar Bear Recovery. The DEIS fails to properly analyze the effects of the greenhouse gas pollution resulting from the Willow Project in isolation, or in combination with other oil and gas activities in the Arctic, on the survival and recovery of polar bears. . . . While the DEIS acknowledges that polar bears are threatened by sea ice loss, it does not acknowledge how the direct, indirect, and cumulative impacts of how the Project will affect the likelihood of sea ice loss stabilizing at the established recovery thresholds. The DEIS otherwise fails to adequately consider the high probability of the extirpation of the SBS polar bear population without significant reductions in GHG pollution to stem sea ice loss . . . increased oil and gas development will increase GHG pollution, thereby increasing the primary threat to polar bears and frustrating recovery. BLM's DEIS fails to acknowledge this reality or otherwise address how the Willow project, in addition to other existing and proposed development also located in polar bear critical habitat, can be consistent with the recovery of polar bears.	Impacts on climate change are assessed by quantifying the potential direct GHG emissions for all Project components for the life of the Project; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope of Alaska and potential future development. GHG emissions are used as a proxy for the analysis of impacts on climate change and resources affected by climate change, given that the current state of climate science is incapable of attributing specific climate change impacts on resources like polar bears to any particular project or combination of projects that result in GHG emissions. The BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. The Project's effects on polar bears are analyzed in Chapter 3.0 (*Affected Environment and Environmental Consequences*) of the Final EIS; specifically, marine mammals are analyzed in Section 3.13 *(Marine Mammals*), climate change is analyzed in Section 3.2 (*Climate and Climate Change*), and cumulative effects are analyzed in Section 3.19 (*Cumulative Effects*). Polar bear recovery is addressed in the Project's Biological Assessment.	Y
864	209	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The DEIS Fails to Consider How Climate Change Will Exacerbate Threats to Whales and Ice Seals. . . . The DEIS acknowledges ice seals' dependence on sea ice, but fails to consider impacts of the loss of sea ice on seals. . . . Studies have documented a nearly 100 percent mortality rate when snow cover was insufficient to build snow caves. Recent studies also show that loss of sea ice is also leading to poor body condition in ringed seals. . . . MacIntyre et al. (2015) found that losses in ice cover may negatively impact bearded seals, not just by loss of habitat but also by altering the behavioral ecology of the population in the Beaufort Sea region. . . . But the DEIS fails to present this baseline information about the affected environment and address how the Willow project will exacerbate these effects. Cetaceans, including beluga and bowhead whales are long-lived, K-species, . . . are ill equipped to quickly adapt to a rapidly changing arctic climate. The DEIS has not analyzed how the Willow projects impacts will exacerbate climate related threats to cetaceans, notably threatened bowhead whales and belugas.	Section 3.19.10.5, *Marine Mammals*, was expanded for the Final EIS and describes the effects of the Project on marine mammals in combination with climate change. The Project would not exacerbate the effects of climate change on ice seals and whales because the Project would have minimal effects (limited to the marine vessel route) on those species.	Y

4.2.13 National Petroleum Reserve in Alaska Integrated Activity Plan

Table B.2.16. Substantive Comments Received on the NPR-A Integrated Activity Plan

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
11	5	Baraff	Lisa	—	IAP	The DEIS states . . . *Revisions to the BLM's NPRA IAP that are currently underway may change boundaries and stipulations associated with existing special areas such as the TSL . . . If areas are removed from special area designation, they will no longer have special protections for biological resources such as birds and caribou*. . . . because this is being done while the IAP is in revision, the stipulations and the BMPs would follow the current IAP, but I'm curious as to what will really happen to the surrounding areas when those BMPs and stipulations may not apply. . . . I wonder how BLM can move forward with this given what is known and what is likely to occur.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	N
990	5	Grijalva; Huffman; Lowenthal	Alan; Jared; Raul	U.S. House of Representatives, Committee on Natural Resources; U.S. House of Representatives, Subcommittee on Energy and Mineral Resources; U.S. House of Representatives, Subcommittee on Water, Oceans, and Wildlife	IAP	BLM must consider the impacts of the Willow Plan in the context of the NPR-A's Integrated Activity Plan (IAP). The IAP closed the majority of the Teshekpuk Lake Special Area . . . to leasing and other development activities. Unfortunately, the Willow Plan proposes construction of roads, pads, and pipelines within the Teshekpuk Lake Special Area, threatening the valuable resources the Special Area was established to protect.	Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. Like most or all previous NPR-A projects, much of the Project area overlaps previously undisturbed area. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA.	N

4.2.14 Noise

Table B.2.17. Substantive Comments Received on Noise

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	156	Psarianos	Bridget	Trustees for Alaska	Noise	[Noise] Mitigation is Inadequate. The draft EIS lists the following as additional suggested mitigation measures that "could" be implemented: . . . There is absolutely no discussion of how these measures may reduce noise impacts from this project. The draft EIS contains this list, and nothing further. This falls far short of BLM's obligation to consider meaningful mitigation measures. For instance, how would flight paths be altered—would there be a certain distance buffering the community of Nuiqsut? There is also no mechanism for enforcement of such a provision. The suggestion of using snow berms like likewise vague and does not explain where such snow berms would be constructed, whether there are any studies showing snow berms dampen noise in an Arctic environment, or consideration of countervailing adverse impacts from such berms to vegetation, hydrology, and subsistence access. Finally, monitoring is NOT mitigation, and BLM should not conflate these two independent and important requirements in considering ConocoPhillips' proposal.	More detail was added to Section 3.6.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*, to clarify measures and enforcement mechanisms. Text was also edited to clarify that measures listed may be for avoidance, minimization, or mitigation.	Y

4.2.15 Nuiqsut Economics

Table B.2.18. Substantive Comments Received on Nuiqsut Economics

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1294	34	Nukapigak	Joe	Kuukpik Corporation	Nuiqsut Economics	Vol. 1, p. 22 and 127, Table 3.16.1. These sections state that the Nuiqsut population is approximately 347 people. Per the NSB's 2015 Economic Profile and Census Report, the population of Nuiqsut is 449 people (in 2014). (see http://www.north-slope.org/assets/images/uploads/NSB Economic Profile and Census Report 20 I 5 FINAL.pdf). The DEIS should also reference that Nuiqsut is the only North Slope community that is connected to the state's gravel road system by ice road for about 4 months out of the year.	While NSB believes that U.S. census data underestimates population and unemployment in the borough, the U.S Census data provide consistent data for conducting analysis. The preface to the NSB socioeconomic survey notes that there were challenges to collecting 2015 NSB socioeconomic survey data and that 75% of respondents in Nuiqsut refused to provide some of the income data requested (NSB 2016). Use of the U.S. census versus NSB population data would not result in significant changes to impacts. No change to text. Added to text in Final EIS *Section 3.15.1.1, Local Economy (Nuiqsut)*: "It is the only North Slope community that is connected to the state's gravel road system by ice road for about 4 months out of the year."	Y
864	218	Psarianos	Bridget	Trustees for Alaska	Nuiqsut Economics	BLM's analysis of the economic impacts is flawed. It focuses exclusively on BLM's assertion that Nuiqsut residents are likely to receive income from development, either through jobs or Kuukpik dividends, and concludes the "effects on Nuiqsut's economics would not be highly adverse." This analysis ignores the fact that there are many residents in Nuiqsut who are not shareholders and will not receive dividends, and there are likely to be few jobs for Nuiqsut residents. It also ignores the fact that there are likely to be even greater adverse impacts to households from a reduction in access and abundance of subsistence resources—e.g., from hunters having a harder time harvesting subsistence resources in traditional areas or from them needing to travel further to obtain those resources.	Added text to Final EIS Section 3.15 (*Economics*) and Section 3.17 (*Environmental Justice*), stating that not all Nuiqsut residents are shareholders.	Y

4.2.16 Permitting

Table B.2.19. Substantive Comments Received on Permitting

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1307	30	Pardue	Margaret	Native Village of Nuiqsut	Permitting	NVN has significant concerns about the impacts that the Willow MDP will have on our community and the environment and resources we rely on. We request that BLM not permit this project until the effects of the project together with other current and future oil development activities are fully understood and until the future management of the NPR-A and details of ConocoPhillips' plans are known.	An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights.	N
5	1	Psarianos	Bridget	Trustees for Alaska	Permitting	I write to raise concerns about the absence of any Clean Water Act section 404 application during the timeframe for the public to provide comments on the draft Environmental Impact Statement (EIS) for ConocoPhillips Alaska, Inc.'s (CPAI) proposed Willow Master Development Plan (Willow Plan).	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
5	4	Psarianos	Bridget	Trustees for Alaska	Permitting	It is inappropriate for BLM and the Corps to be moving forward with the NEPA review for this project without a valid 404 permit application before the agencies . . . We understand that the Corps is a cooperating agency on BLM's National Environmental Policy Act (NEPA) process for the Willow Plan. . . . Separating out the EIS and 404 processes limits the agencies and the publics opportunity to review the full scope of impacts from CPAIs proposed Willow Plan. It also raises serious questions about the Corps abilities to fulfill its statutory mandates under both the Clean Water Act and NEPA. . . . As currently written, the EIS is missing the information and analysis necessary for the Corps to conduct its evaluation, to make the necessary findings under its Clean Water Act mandate, or to meet its own obligations under NEPA.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
5	6	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM and the Corps should not proceed with reviewing and authorizing this project without a complete 404 permit application. . . . BLM and the Corps decision to move ahead with the NEPA process prior to CPAI submitting its application to the Corps for the 404 process is contrary to both NEPA and the Clean Water Act. The above-listed groups request that the Corps and BLM suspend the NEPA process for the Willow Plan until CPAI submits its application for a 404 permit. If the Corps receives CPAIs application, the agencies will need to revise and reissue the EIS to fully incorporate the information and findings necessary to support the 404 decision-making process.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
5	7	Psarianos	Bridget	Trustees for Alaska	Permitting	During the Bureau of Land Managements (BLM) public meeting on the Willow Plan in Anchorage on September 12, 2019, I inquired about the status of the Clean Water Act 404 permit required for this project . . . Mr. Moore responded that the Corps had not yet received an application for the 404 permit from CPAI. . . . I understand based on this conversation that CPAI may wait until after BLM signs its Record of Decision before applying for its 404 permit with the Corps. . . . Mr. Wrobel confirmed that CPAI will apply for the entire Master Development Plan in a single 404 application, and will not be applying for multiple 404 permits for portions of the project in order of construction.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
864	4	Psarianos	Bridget	Trustees for Alaska	Permitting	We also question the ability of BLM to move forward with its review now given the status of the Clean Water Act 404 permit required for this project by the U.S. Army Corps of Engineers (Corps) . . . As currently written, the EIS is missing the information and analysis necessary for the Corps to conduct its evaluation, to make the necessary findings under its Clean Water Act mandate, or to meet its own obligations under NEPA. BLM and the Corps decision to move ahead with the NEPA process prior to ConocoPhillips submitting its application to the Corps for the 404 process is contrary to both NEPA and the Clean Water Act. The Corps and BLM should suspend this NEPA process for the Willow Plan until CPAI submits its application for a 404 permit.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
864	8	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM has not made it clear what the agency is actually approving through this Master Development Plan process. The draft EIS states: The ROD(s) associated with this EIS will not constitute the final approval for all actions, such as approval for subsequent individual applications for permits to drill and rights-of way associated with the Proposed Action. The EIS analysis does, however, provide the BLM and other federal agencies that have regulatory oversight and permitting authorities with information and NEPA analysis that could be used to inform final approvals for individual project components, such as permits to drill and rights-of-way. It is very confusing what BLM is actually considering and potentially approving, especially since key pieces of this project like the 404 permit application have yet to even be submitted to the agencies. This language does not provide a clear picture of what is going to be approved as a result of the EIS, and what exactly has to be approved subject to future permitting and analysis. BLM must be clear and transparent about what future authorizations and associated analyses it believes will be necessary so that the public can comment on the sufficiency of the agency's approach.	After approval of the Willow MDP Project, CPAI could submit an APD. An APD is required for each proposed well to develop a proponent's onshore lease. Prior to authorizing an APD, the BLM reviews the information in the APD package to ensure that it is accurate and addresses all requirements; during this time, the BLM also ensures that there is appropriate NEPA documentation. APDs submitted for proposed wells and associated infrastructure as part of the Willow MDP Project are analyzed in the Willow MDP EIS. Each APD would be checked against the existing NEPA documentation, using a DNA. If the BLM cannot document in a DNA that the existing NEPA documentation fully covers activities and the effects of those activities in an APD package, the BLM would require that additional analysis (either in an EA or an EIS) be completed to comply with the NEPA.	N
864	9	Psarianos	Bridget	Trustees for Alaska	Permitting	CPAI is already proposing significant changes to the project design which could greatly increase the amount of gravel fill needed. Agency employees indicated the significance of these changes could rise to the level of requiring a supplemental EIS; despite this, BLM is continuing to charge forward with permitting this project. The changes to the project design which BLM requested from CPAI by September 30, 2019 have not been made publicly available, which further underscores the lack of meaningful public participation described below. This also makes it entirely unclear what information is being considered in the current EIS and permitting process. BLM should not proceed further with the current permitting and NEPA process when it knows there will be significant changes to the proposal and where it is unclear precisely what is being proposed. All of that information should be considered in this NEPA analysis and available to the public for review prior to the agencies making any decisions.	In response to stakeholder concerns and public comments on the Draft EIS, CPAI submitted an updated Project proposal that includes new Project components. The updated Project proposal was received by BLM in November 2019, shortly after the comment period closed on the Draft EIS. The new proposal includes a third module delivery option, construction of a freshwater reservoir, and up to three boat ramps for subsistence use. While there are minor design optimizations across the Project area, the three new Project components had not been previously analyzed or shared with the public. Therefore, the BLM released the SDEIS to present the new information and subsequent analysis for a 45-day public comment period, which started March 20, 2020. The Final EIS includes a description and full analysis of all Project changes and design optimizations.	N
864	24	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM is currently engaging in a NEPA process to revise the IAP for the Reserve. BLM has stated its intent to revise the IAP to make more areas available for oil and gas leasing and activities. That is, the agency has stated its intent to weaken and remove existing protections in the Reserve, including shrinking Special Areas. This is not acknowledged or analyzed in the Willow draft EIS but must be. As an initial matter, BLM's timing of IAP revision while concurrently considering the Willow MDP is confusing and poorly explained to the public. BLM must be clear about what set of standards Willow is being permitting under. While BLM purports to say that its analyzing the proposed development under the existing IAPs stipulations and best management practices, which is appropriate, because BLM is not clear about what it is actually permitting at this time and/or in the future, it is not clear how BLM will evaluate future components of the Willow MDP that are considered in this EIS but not permitted until the future. It is also unclear what the Corps is reviewing at this stage since it has yet to receive a permit application. The agencies must be clear not only about what activities it is authorizing in this process, but also how they will consider future permit applications in light of a potentially revised IAP.	The BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to LSs from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1). A Section 404 permit application is not required to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	50	Psarianos	Bridget	Trustees for Alaska	Permitting	. . . BLM should have considered delaying permitting of this project until important baseline data could be established, and weighed the environmental benefits as an alternative. BLM must conduct new studies and modeling in the northeastern region of the Reserve to determine how a project of this scale is likely to change nearby air quality, hydrology, and habitat. Data are needed on the aquatic resources in the region and the potential impacts of a central processing facility, pads, roads, and proposed gravel mine. BLM needs to do further studies to understand the negative impacts this project will have on caribou migration, fish, and other wildlife. BLM should conduct a comprehensive study in Nuiqsut to fully assess the subsistence, socioeconomic, cultural, recreational, health and other negative impacts of this project combined with other ongoing and future projects. The BLM must evaluate the benefits that could arise from delaying approval of Willow in terms of improvements in technology, additional gathering of information on risks to resources in the northeastern NPR-A and ways to avoid those risks, and additional information on the impacts of climate change and ways to avoid or mitigate resulting changes to the affected environment. BLM cannot meaningfully evaluate the potential impacts and necessary mitigation measures without all of this information and considering delayed permitting as a project alternative.	An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights. Baseline studies are continually updated throughout Northeast NPR-A. Section 3.2.1, *Affected Environment*, of the Final EIS addresses ongoing impacts of climate change on the environment, including in the Project area. Section 3.2.2, *Environmental Consequences: Effects of the Project on Climate Change*, and Section 3.19.4, *Cumulative Impacts to Climate Change*, analyze impacts that the Project and cumulative actions may have on climate.	N
864	64	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM must adhere to the requirements of its Organic Act, the Federal Lands Policy Management Act (FLPMA) governing issuance of right-of-way permits. In a significant oversight, the draft EIS makes no mention of FLPMA whatsoever, or its procedural and substantive requirements. The draft EIS discusses rights-of-way generally, but . . . makes vague statements about when such rights-of-way may be permitted . . . Given that no information is contained in the draft EIS addressing BLM's obligations under FLPMA to grant rights-of-way, this draft EIS is wholly insufficient to inform final approvals for any rights-of-way. The DEIS fails to meet the strict public interest and environmental protection of FLPMA. Under FLPMA Title V, Section 504, BLM may grant a Right-of-Way (ROW) only if it (4) will do no unnecessary damage to the environment. BLM must adhere to the requirements of FLPMA governing issuance of ROW permits in addition to being the lead federal agency for the NEPA process. . . . BLM must require ConocoPhillips to submit ROW or other special use permit authorizations and require that all mandates of FLPMA Title V and its implementing regulations are adhered to.	As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Table C.1.1 in Appendix C (*Regulatory Authorities and Framework*) has been updated to reflect this. Pursuant to Section 302(b) and Title V of FLPMA, proposed actions may not cause unnecessary or undue degradation. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required.	N
864	65	Psarianos	Bridget	Trustees for Alaska	Permitting	Any Future Right-of-Way Grant Would Not Comply with FLPMAs Substantive Requirements. At least three important potential substantive requirements flow from the FLPMA's ROW provisions. First, BLM has a mandatory duty to impose conditions that will minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment . . . In addition, the obligation to impose terms and conditions that protect Federal property and economic interests requires that the BLM must impose conditions that protect not only the land crossed by the right-of-way, but all federal lands affected by the approval of the ROW. For the Willow plain, as noted herein, BLM failed to evaluate all aspects and ramifications of issuing the ROW for the Willow MDP by unreasonably limiting the scope of its analysis. In particular, the DEIS failed to consider the important missing baseline information, future oil and gas activity and infrastructure made possible by the ROW, and the extensive significant impacts to aquatic resources along the road corridors and at the gravel island site.	Conditions will be imposed to minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment. These measures are outlined in Chapter 5.0 (*Mitigation*) of the EIS. These measures are also described throughout Chapter 3.0 (*Affected Environment and Environmental Consequences*). This includes applicable BMPs/ROPs considered in the revised IAP, which are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Final EIS (typically, Section 3.X.2.1.1). When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Table C.1.1 in Appendix C (*Regulatory Authorities and Framework*) has been updated to reflect this.	N
864	66	Psarianos	Bridget	Trustees for Alaska	Permitting	Second, FLPMA mandates a BLM determination as to what conditions are "necessary" to protect federal property and economic interests, as well as "otherwise protect[ing] the public interest in the lands traversed by the right-of-way or adjacent thereto." This means that the agency can only approve the ROW if it "protects the public interest in lands" not only upon which the road would traverse, but also lands and resources adjacent to and associated with the ROW. The ROW contemplated here would have significant impacts on subsistence, air quality, and water quality in the community of Nuiqsut. It would also significantly impact resources in Harrison Bay. Thus, it is not clear that BLM would be able to make a finding that use of the lands surrounding by and served by the ROW would "protect the public interest".	The requirement for a finding that use of the lands surrounding and served by the ROW would protect the public interest would be applicable during the ROW permit review process. As noted in Section 1.3.1 (*Decision to be Made)* of the EIS, the ROD(s) associated with the EIS will not constitute the final approval for all actions, such as approval for subsequent individual applications for permits to drill and ROWs associated with the Proposed Action. The EIS analysis does, however, provide the BLM and other agencies that have regulatory oversight and permitting authorities with information and NEPA analysis that could be used to inform final approvals for individual Project components, such as permits to drill and ROWs. When an application is submitted for a ROW and/or APD for the Willow MDP Project, BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Table C.1.1 in Appendix C (*Regulatory Authorities and Framework*) has been updated to reflect this. Pursuant to Section 302(b) and Title V of FLPMA, proposed actions may not cause unnecessary or undue degradation.	N
864	67	Psarianos	Bridget	Trustees for Alaska	Permitting	Third, FLPMA requires that the right-of-way grant do no unnecessary damage to the environment and be consistent with any other applicable laws. This means that a grant of a ROW leading to the exploration and mining must satisfy all applicable laws, regulations and policies, including the Clean Air Act, Endangered Species Act, Clean Water Act, all state and local laws and regulations. As described below, it is not clear that this ROW authorization can comply with these important environmental laws. The BLM thus cannot issue a ROW that fails to protect the environment as required by FLPMA, including the environmental resource values in and not within the ROW corridor. FLPMA does not authorize BLM to consider of the interests of private interests as weighed against environmental interests such as protection of fish and wildlife habitat. [A]s BLM has held, it is not private interests but the public interest that must be served by the issuance of a right-of-way. Here, BLM does not acknowledge the failure of this ROW to provide for the public interest. The intent of this process and any future ROW grant is to aid ConocoPhillips in its westward expansion into the Reserve as quickly as possible; this is inappropriate and inconsistent with BLM's obligations under FLPMA.	BLM agrees that the Project cannot be permitted unless it can be demonstrated that it will satisfy all applicable laws, regulations and policies, including the CAA, ESA, CWA, and all state and local laws and regulations. The public benefits of the Project are primarily related to economic benefits, such as jobs for Alaskans, additional revenues for state and regional economies, additional property tax revenues for the NSB, and additional funding for the NPR-A Impact Grant Program, which provides funding opportunities to all North Slope communities (see Final EIS Section 3.15, *Economics*). When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Table C.1.1 in Appendix C (*Regulatory Authorities and Framework*) has been updated to reflect this. Pursuant to Section 302(b) and Title V of FLPMA, proposed actions may not cause unnecessary or undue degradation.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	68	Psarianos	Bridget	Trustees for Alaska	Permitting	Additionally, FLPMA expressly requires that all land-use authorizations contain terms and conditions to protect resources and the environment. As described above, the draft EIS fails to consider an adequate range of enforceable and meaningful mitigation measures, in violation of NEPA and FLPMA.	Avoidance, minimization, and mitigation measures were further developed in the Final EIS and will be included in the ROD. Details are included in the *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections throughout Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I.1 (*Avoidance, Minimization, and Mitigation*). When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Table C.1.1 in Appendix C (*Regulatory Authorities and Framework*) has been updated to reflect this.	Y
864	69	Psarianos	Bridget	Trustees for Alaska	Permitting	The Interior Department, interpreting FLPMA V and its right-of-way regulations, has held that: "*A right-of-way application may be denied, however, if the authorized officer determines that the grant of the proposed right-of-way would be inconsistent with the purpose for which the public lands are managed or if the grant of the proposed right-of-way would not be in the public interest or would be inconsistent with applicable laws.*" Here, to prevent the degradation of the important lands and resources of the western Arctic, BLM should refuse to issue any ROW applications submitted by ConocoPhillips for the Willow Project. At a minimum, BLM must at least consider such requirements in a revised or supplemental EIS.	As noted in Section 1.3.1 (*Decision to be Made*) of the EIS, the ROD(s) associated with the EIS will not constitute the final approval for all actions, such as approval for subsequent individual applications for permits to drill and ROWs associated with the Proposed Action. The EIS analysis does, however, provide the BLM and other agencies that have regulatory oversight and permitting authorities with information and NEPA analysis that could be used to inform final approvals for individual Project components, such as permits to drill and ROWs. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Table C.1.1 in Appendix C (*Regulatory Authorities and Framework*) has been updated to reflect this. Pursuant to Section 302(b) and Title V of FLPMA, proposed actions may not cause unnecessary or undue degradation.	N
864	70	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM Cannot Proceed with Permitting this Project Until ConocoPhillips Submits a Complete Right-of-Way Application. Similar to the necessary Clean Water Act 404 permit described below, it appears that ConocoPhillips has not applied for necessary rights-of-way for the Willow MDP. The draft EIS is totally insufficient for meeting FLPMA's procedurals requirements. The draft EIS falls short of rectifying these omissions, rendering BLM's analysis insufficient under NEPA and making issuance of a right-of-way by BLM inappropriate. A right-of-way that "may have significant impact on the environment" requires submission of a plan of construction, operation, and rehabilitation of the right-of-way. There is no question that this ROW will have significant impacts, thus BLM must require ConocoPhillips provide a complete plan of construction, operation, and rehabilitation, which it has yet to do.	As noted in Section 1.3.1 (*Decision to be Made*) of the EIS, the ROD(s) associated with the EIS will not constitute the final approval for all actions, such as approval for subsequent individual applications for permits to drill and ROWs associated with the Proposed Action. The EIS analysis does, however, provide the BLM and other agencies that have regulatory oversight and permitting authorities with information and NEPA analysis that could be used to inform final approvals for individual Project components, such as permits to drill and ROWs. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Table C.1.1 in Appendix C (*Regulatory Authorities and Framework*) has been updated to reflect this.	N
864	71	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM's regulation at 43 C.F.R. 2804.12(a) provides that a completed application must include a myriad of information. . . . [T]here is a vast amount of information missing in ConocoPhillips application to BLM that was posted on BLM's website. As a result, the draft EIS itself is deficient in its description of the project facilities, ConocoPhillips schedule moving forward, and reclamation plans. Thus far the only application provided publicly has been ConocoPhillips Summary and Request Letter, which do not fulfill the company's obligations to submit a complete ROW application. There is a substantial amount of information missing that must be gathered before BLM can meaningfully evaluate and the public can fully understand the potential impacts from the project.	As noted in Section 1.3.1 (*Decision to be Made*) of the EIS, the ROD(s) associated with the EIS will not constitute the final approval for all actions, such as approval for subsequent individual applications for permits to drill and ROWs associated with the Proposed Action. The EIS analysis does, however, provide the BLM and other agencies that have regulatory oversight and permitting authorities with information and NEPA analysis that could be used to inform final approvals for individual Project components, such as permits to drill and ROWs. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required.	N
864	77	Psarianos	Bridget	Trustees for Alaska	Permitting	The draft EIS fails to explain how BLM will comply with its substantive and procedural obligations under the Endangered Species Act (ESA). NEPAs implementing regulations require an EIS to state how alternatives considered in it and decisions based on it will or will not achieve the requirements [of NEPA] and other environmental laws and policies. Several species protected under the ESA inhabit the Willow project area, including polar bears, bowhead whales, ringed seals, bearded seals, spectacled eiders, and Steller's eiders . . . Here, BLM's draft EIS fails to acknowledge these important mandates or explain how BLM will comply with the ESAs substantive and procedural requirements when authorizing Willow. Procedurally, BLM broadly asserts that [c]onsultation under Section 7 of the Endangered Species Act (ESA) will occur between federal authorizing agencies and the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) as appropriate, for species listed under the ESA. This statement does not satisfy BLM's duty to show how it will comply with the ESA.	As stated in Section 1.9.1 of the Draft EIS and 1.10.1 of the Final EIS *(Endangered Species Act Consultation)*, consultation under Section 7 of the ESA occurs between federal authorizing agencies and USFWS and NMFS, as appropriate, for species listed under the ESA. Consultation between BLM and USFWS and NMFS has occurred parallel to the NEPA process. Additional avoidance, minimization, or mitigation measures agreed upon during that consultation process will be included in the ROD.	N
864	78	Psarianos	Bridget	Trustees for Alaska	Permitting	. . . BLM does not divulge on which species it will consult. This is especially concerning given the EISs artificial and unlawful narrowing of the analysis area to exclude some marine mammals, including ESA-listed bowhead whales, as well as its unwarranted exclusion of Steller's eiders, which historically nested in the Willow area. BLM is obligated to satisfy its consultation obligations on any action that may affect any listed species or its critical habitat. The threshold for triggering formal consultation is very low, and the burden is on the Federal agency to show that the action is not likely to affect adversely species or critical habitat and [a]ny possible effect triggers formal consultation requirements. Only if and when BLM obtains a written NLAA determination from a Service that the leasing program may affect, but is not likely to adversely affect, a particular listed species may BLM forego formal consultation on the effects of its action on such species. Otherwise, BLM must formally consult on all species that may be adversely affected by the agency's authorization of an oil and gas leasing program.	BLM consulted with the USFWS and NMFS under Section 7 of the ESA, as described in Draft EIS and Final EIS Section 3.13 *(Marine Mammals)* and Section 3.11 *(Birds)*. Additional avoidance, minimization, or mitigation measures agreed upon during that consultation process will be included in the ROD.	N

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864	79	Psarianos	Bridget	Trustees for Alaska	Permitting	It is also not clear how BLM's preferred alternative will meet the ESAs substantive mandate to avoid jeopardizing the continued existence of certain listed species and destroying or adversely modifying their habitat. For example, as described below, BLM's assessment of impacts to polar bears greatly underestimates potential impacts to denning bears and does not address or attempt to avoid these potential significant impacts through less harmful alternatives. Given the precarious status of the Southern Beaufort Sea (SBS) population of polar bears and the foreseeable significant cumulative effects from Arctic Refuge oil exploration and development, forcing even one mother/cub pair to abandon the den early could constitute jeopardy under the ESA. BLM must factor the ESAs mandates into its NEPA analysis and formulate alternatives that attempt to comply with the ESA.	BLM consulted with the USFWS and NMFS under Section 7 of the ESA, as described in Draft EIS and Final EIS Section 3.13 *(Marine Mammals)* and Section 3.11 *(Birds).* Additional avoidance, minimization, or mitigation measures agreed upon during that consultation process will be included in the ROD.	N
864	80	Psarianos	Bridget	Trustees for Alaska	Permitting	. . . [T]he ESA requires federal agencies to give first priority to the declared national policy of conserving endangered and threatened species. . . . BLM cannot lawfully authorize an oil and gas development project that is likely to jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. Nor can it engage or permit others to engage in activities that will result in unauthorized incidental take of listed species. These requirements are put into practice through the Section 7 consultation process. The draft EIS fails to explain how BLM will comply with these important substantive and procedural legal requirements, in violation of NEPAs implementing regulations. Before the agency can make its final decision as memorialized in the Record of Decision, it must complete consultations under Section 7 and obtain biological opinions (or written NLAA concurrences) from NMFS and FWS. It must also fully explain in the Final EIS how it has ensured that its alternatives and its ultimate choice of alternatives, as reflected in the ROD, will or will not achieve the requirements of the ESA.	BLM consulted with the USFWS and NMFS under Section 7 of the ESA, as described in Draft EIS and Final EIS Section 3.13 *(Marine Mammals)* and Section 3.11 *(Birds).* Additional avoidance, minimization, or mitigation measures agreed upon during that consultation process will be included in the ROD.	N
864	81	Psarianos	Bridget	Trustees for Alaska	Permitting	The draft EIS also fails to discuss how BLM will ensure compliance with the Marine Mammal Protection Act of 1972 (MMPA). . . . Here, BLM has not even explicitly acknowledged that the program will have to comply with the MMPA. Aside from a couple of passing references to a future MMPA authorization request, and reference to MMPA hearing thresholds BLM does seem to recognize the requirements of the MMPA. Just as the impacts to polar bears discussed below may jeopardize the continued existence of the polar bear in violation of the ESA, they may also constitute unlawful take under the MMPA. BLM has not shown how it will ensure compliance with the MMPA.	Additional text was added to Section 3.13.1, *Affected Environment*, regarding ESA and MMPA.	Y
864	82	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM and the Corps Cannot Proceed with Permitting This Project or Preparing this NEPA Analysis in the Absence of a Valid Section 404 Permit Application. The Corps of Engineers Section 404 permit is a core component of this project and review of the 404 permit should not be segmented out from BLM's NEPA analysis in the draft EIS. . . . BLM and the Corps should suspend further activities on the draft EIS until ConocoPhillips submits its 404 application and the agencies revise this draft EIS to account for the full range of findings and other information necessary for the Corps to comply with the 404 Guidelines.	A Section 404 permit application is not required to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
864	83	Psarianos	Bridget	Trustees for Alaska	Permitting	A number of the undersigned groups submitted a letter to the Corps and BLM on October 4, 2019, expressing substantial concerns about the agencies moving forward with the environmental review process for the Willow project in the absence of a CWA Section 404 permit application. . . . ConocoPhillips has not yet applied for a 404 permit from the Corps, and stated that the company had no timeline for doing so. We understand based on this conversation that ConocoPhillips may wait until after BLM signs its Record of Decision before applying for its 404 permit with the Corps. . . . Mr. Wrobel confirmed that ConocoPhillips will apply for the entire Master Development Plan in a single 404 application, and will not be applying for multiple 404 permits for portions of the project in order of construction.	A Section 404 permit application is not required to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
864	84	Psarianos	Bridget	Trustees for Alaska	Permitting	It is inappropriate for BLM and the Corps to be moving forward with the NEPA review for this project without a valid 404 permit application before the agencies. . . . Separating out the EIS and 404 processes limits the agencies and the publics opportunity to review the full scope of impacts from ConocoPhillips proposed Willow Plan. It also raises serious questions about the Corps abilities to fulfill its statutory mandates under both the Clean Water Act and NEPA.	A Section 404 permit application is not required to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application prior to issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
864	85	Psarianos	Bridget	Trustees for Alaska	Permitting	. . . in a communications record dated September 11, 2019. . . . Mr. Moore documents a communication with Mr. Wrobel, wherein they discussed concerns raised by Kuukpik Corporation and other issues which could impact both 404 application submittal timing and the EIS process itself. CPAI is referring to these changes as project optimizations. These include changes that increase wetlands impacts from ConocoPhillips preferred alternative by 124 acres, with additional acres of fill under all action alternatives. . . . All of this reflects that there will potentially be substantial changes to the project that have not been considered as part of this NEPA process and have not been shared with the public. The conversation record also indicates there are likely to be other significant changes to the project, including the addition of a new pipeline with VSMs between Willow and GMT2 and changes to the MTI. . . . In other words, CPAI is still changing its project design in unknown ways which would significantly increase potential impacts to jurisdictional wetlands from increased gravel fill, additional pipelines, and changes to the offshore gravel island. All of these changes underscore the need the agencies to issue a revised EIS for this project after the Corps files a completed 404 permit. The NEPA process and the 404 permitting process should not be bifurcated. That is particularly important here, where the project proponent is continuing to make substantial changes to the project that have not been considered by the agencies as part of this process.	BLM carefully considered the Project optimizations and design changes submitted by CPAI in November 2019, and determined that three new Project components had not been previously analyzed in the Draft EIS. These new Project components (the third module deliver option, construction of a freshwater reservoir, and up to three boat ramps for subsistence use) were determined to require additional analysis, and thus, the SDEIS was prepared and distributed for public review on March 20, 2020. Potential effects from the other design optimizations were previously analyzed in the Draft EIS. Further rationale for which Project components were analyzed in the SDEIS is contained in Section 1.2 *(Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement)* of the SDEIS.	N

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864	86	Psarianos	Bridget	Trustees for Alaska	Permitting	"It is inappropriate for BLM to move forward with the draft EIS when the agency understands there will be significant design changes to the project and where the agencies have recognized there are substantial problems related to the delayed submission of the 404 permit. None of the proposed changes to the project that the agencies are already aware of have been made public, and as shown by the FOIA records, the agencies have yet to know the full scope of changes that CPAI is likely to propose. BLM should halt this entire process until CPAI provides its final project design and a complete 404 application has been submitted to the Corps. There is no requirement for BLM to move forward in the absence of complete information about this project and, in fact, the opposite is true. BLM should not continue moving forward with the current NEPA process when there are such significant gaps in the agencies and the publics ability to meaningfully evaluate this project. Doing so would be contrary to NEPA and the Clean Water Act.	The SDEIS released for public review on March 20, 2020, describes the Project changes and provides additional analysis of new effects from the three main changes to Project components (the third module delivery option, construction of a freshwater reservoir, and up to three boat ramps for subsistence use).	N
864	87	Psarianos	Bridget	Trustees for Alaska	Permitting	The Corps has distinct, substantive obligations under the Clean Water Act, which in turn extend out into its obligations under NEPA. When a project is not water dependent, as in the case of the Willow project, and the project would fill special aquatic sites, including wetlands, the Corps regulations create a rebuttable presumption that there are practicable and environmentally preferable alternatives, and such alternatives are presumed to have less adverse impact unless clearly demonstrated otherwise. This substantive requirement mandates the Corps to select the least environmentally damaging practicable alternative (LEDPA). . . . The regulations presume that less environmentally damaging alternatives are available to the applicant and practicable, unless the applicant clearly demonstrates otherwise. In the absence of such a clear showing, the Corps is required to deny the permit application.	The BLM Section 404 of the CWA requires a permit before dredged or fill material may be discharged into WOUS. The Section 404 program is administered by USACE, which has provided a public comment period on the Section 404 permit application. USACE issued its Public Notice on March 26, 2020.	N
864	88	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM and the Corps cannot move forward with this EIS at this time and without a valid 404 permit application since this process could constrict the Corps ability to select the LEDPA and meet its 404 obligations. As currently written, the EIS is missing the information and analysis necessary for the Corps to conduct its evaluation, to make the necessary findings under its Clean Water Act mandate, or to meet its own obligations under NEPA. One area of particular concern is the lack of appropriate consideration of mitigation measures in the EIS. Another concern is that this process denies the public or other federal, state, local and tribal agencies the opportunity to comment on ConocoPhillips mitigation proposal and its adequacy to compensate for unavoidable impacts resulting from project implementation, construction and operation. BLM and the Corps should not proceed with reviewing and authorizing this project without a complete 404 permit application. . . . BLM and the Corps decision to move ahead with the NEPA process prior to ConocoPhillips submitting its application to the Corps for the 404 process is contrary to both NEPA and the Clean Water Act. The Corps and BLM should suspend the NEPA process for the Willow Plan until ConocoPhillips submits its application for a 404 permit. If and when the Corps receives ConocoPhillips completed application, the agencies will need to revise and reissue the EIS to fully incorporate the information and findings necessary to support the 404 decision making process.	The Section 404 permit application was submitted by CPAI. USACE issued its Public Notice on March 26, 2020.	N
864	89	Psarianos	Bridget	Trustees for Alaska	Permitting	The Draft EIS is Insufficient to Support the Corps Obligations Under NEPA and the CWA. The Corps is lacking this key information necessary to inform its analysis under the 404 Guidelines.	The Section 404 permit application was submitted by CPAI, and USACE issued its Public Notice on March 26, 2020.	N
864	90	Psarianos	Bridget	Trustees for Alaska	Permitting	There are numerous gaps in the analysis in the draft EIS with regard to the analysis of impacts to wetlands, hydrology, permafrost, waterway, and other impacts. . . . filling and degrading sensitive tundra wetlands is likely to have a wide range of negative impacts on a range of resources and functions over the short and long term. . . . There is no information on the wetlands general habitat suitability. . . . [T]he DEIS specifically lacks information about impacts to fish habitat that the wetlands may provide. Even to the limited extent the draft EIS addresses fish impacts in Appendix E.10, it does nothing to correlate that back to the wetland impacts. -Native plant richness and diversity of wetland types - there is nothing that discusses this factor in Appendix E.9 other than to say it is a very complex system. The draft EIS fails to do a sufficient analysis of these impacts, both for purposes of NEPA and the Corps CWA obligations. The Corps does not have sufficient information to make the necessary findings under the 404 Guidelines.	Because wetlands are abundant on the North Slope and the wetlands that would be impacted by the Project are not unique, the indirect effects to fish would likely not be measurable. USACE administers permits under Section 404 of the CWA. The Section 404 permit application was submitted by CPAI, and USACE issued its Public Notice on March 26, 2020.	N
864	94	Psarianos	Bridget	Trustees for Alaska	Permitting	Additionally, it is unclear what ConocoPhillips is planning regarding completion of a full aquatic site assessment or what ConocoPhillips is planning for purposes of wetland mitigation. ConocoPhillips requested the Corps concurrence with the company's proposal to use Arctic Slope Regional Corporation ANSRAM methodology in a potential / future Section 10/404 evaluation process, and specifically in regard to potential mitigation needs for the Willow project. However, the Corps states unequivocally that use of the ANSRAM methodology as provided by ConocoPhillips for Willow is not appropriate and we are unable to concur with its use in this way. It does not appear that ConocoPhillips has completed an appropriate aquatic site assessment since that time. This is all crucial information that is necessary to the agencies consideration of this project and necessary mitigation measures. EPA pointed out a number of these gaps during scoping that have yet to be filled. These include information about the expected change in the function and condition of the resources; identification and description of all wetlands and surface waters, including ephemeral and intermittent streams, that could be affected by oil and gas activities; acreages, channel lengths, habitat types, values and functions of the waters; and information on the types of activities that would require mitigation measures during construction, operation, and closure phases of the project. The Corps is also missing a wide range of data about the timing and magnitude of peak flows in multiple waterbodies that will be essential to not only the Corps 404 permit, but also the Rivers and Harbors Act authorizations, which requires agencies to maintain navigation on navigable waterways.	An aquatic site assessment is not required for NEPA.	N

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864	95	Psarianos	Bridget	Trustees for Alaska	Permitting	The draft EIS does not contain any provisions addressing compensatory mitigation for this project, despite the fact that there will be substantial direct, indirect, and cumulative impacts. Instead, the draft EIS states in Section 5.3.2 that mitigation measures required by the Corps will be described in the Corps record of decision for this project. . . . If the Corps waits until the ROD to require, discuss and incorporate a compensatory mitigation plan into their ROD and Section 404/10 permit required for this project, then there would be no opportunity for comments from the public, agencies, and tribal entities.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020.	N
864	96	Psarianos	Bridget	Trustees for Alaska	Permitting	The Corps cannot wait until the point of issuing a record of decision to analyze the mitigation measures for this project and present that analysis to the public. That is contrary to NEPA. The Corps is required to analyze those measures and their effectiveness in a NEPA analysis. . . . the draft EIS does not demonstrate that the proposed best management practices, lease stipulations, or reclamation are adequate to mitigate the impacts of this project or that compensatory mitigation should not be required. Because of the lack of mitigation presented or analyzed in the draft EIS, there is a serious risk of significant degradation from the proposed project that the Corps has failed to adequately address. All of this information is critical to the Corps ability to properly analyze this project and develop appropriate mitigation measures. Despite that, this information is wholly missing from this process because Conoco has yet to submit a complete 404 application. The Corps and BLM cannot move forward with analyzing this project in the draft EIS without having all of this information, which is necessary for the Corps to meet its obligations under the 404 Guidelines and NEPA.	Avoidance, minimization, and mitigation measures are described in Chapter 5.0 (*Mitigation*) of the EIS. Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020.	N
864	97	Psarianos	Bridget	Trustees for Alaska	Permitting	BLM Should Not Approve Sales of Mineral Materials to Support Willow . . . These gravel mines and material sales contracts are governed by 43 CFR Part 3600. Under these Mineral Material Disposal regulations: No disposal is authorized by the statute where it would be detrimental to the public interest. 30 U.S.C. 601 (2000); 43 CFR 3601.6(a). In addition, the regulations preclude BLM from disposing of mineral materials if it determines that the aggregate damage to public lands and resources would exceed the public benefits that BLM expects from the proposed disposition. . . . . . . BLM did not consider any potential alternative sites for gravel mines for this project, nor did BLM consider an alternative which would reduce the gravel footprint for the Willow project. Yet, the potentially significant impact to water quality within the Ublutuoch (Tiŋmiaqsiuġvik) River 0.5-mile setback (up to 184.1 acres) is essential to BLM's alternatives review, as impacting water quality in a high-use subsistence area is a highly relevant factor BLM must consider in exercising its discretion to choose the no-action alternative in order to meet the FLPMA and Part 3600 public interest mandates . . . [T]hese gravel mines are detrimental to the public interest due to their short-and-long-term damage to the environment. . . . BLM must undertake a full review of the impacts from these mines under FLPMA and NEPA, and include such an analysis in a revised or supplemental EIS.	As described in Appendix D.1 (*Alternatives Development*), Section 3.1.5.1, *Use of the Clover Mine Site*, the use of the Clover Mine Site was considered and dismissed from detailed analysis.	N
864	116	Psarianos	Bridget	Trustees for Alaska	Permitting	. . . [A]ny BLM approval of gravel mines must be conducted under BLM mineral material sales regulations, which contain strict limits to protect the public interest. . . . These gravel mines and material sales contracts are governed by 43 CFR Part 3600. Under these Mineral Material Disposal regulations, no disposal is authorized by the statute where it would be detrimental to the public interest. In addition, the regulations preclude BLM from disposing of mineral materials if it determines that the aggregate damage to public lands and resources would exceed the public benefits that BLM expects from the proposed disposition . . . At a minimum, the likelihood of significant impacts to subsistence resulting from gravel mining within an important setback area precludes their approval.	As described in Table D.3.2 in Appendix D.1 (*Alternatives Development*), the use of the ASRC Mine Site as a Project component was considered (No. 26) and eliminated from detailed analysis.	
864	271	Psarianos	Bridget	Trustees for Alaska	Permitting	The most glaring inadequacy in this technical appendix [E.9, Vegetations and Wetlands Technical Appendix] is the lack of a functional assessment or impact analysis for wetlands in the DEIS or supporting information. The ITU wetland mapping methods document does not contain a functional assessment or impact analysis for wetlands. This is completely inconsistent with Corps regulations.	An aquatic site assessment is not required for NEPA.	N
987	1	Seris	David	United States Coast Guard, Waterways Management Branch	Permitting	In order for the Coast Guard, as a cooperating agency, to adopt the bridge related portions of this DEIS, the document must include an analysis of the impacts and associated mitigation related to the construction and operation of those bridges that will require Coast Guard bridge permits. Alternative B, which is noted as the preferred alternative, anticipates the construction of seven bridges spanning Judy (Iqalliqpik and Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4A and Willow Creek 8. Alternatives C and D (Disconnected Infield Roads and Disconnected Access respectively) would require the construction of six (rather than seven) bridges. Anticipated impacts to the human environment specific to bridge construction/operation include hydrologic changes/erosion; potential contamination of fish thereby decreasing subsistence resource availability as well as associated habitat loss; increased noise during construction; and changes to the previously undisturbed characteristics of the visual landscape. Pile driving associated with bridge construction will result in substantial levels of impulsive noise, but for relatively short periods limited to a series of days or weeks at the noted locations. Moreover, the installation of bridge piles (56 in total for Alternative B) would effectively remove EFH in 52 locations within each individual pile footprint (as well as commensurate scouring).	The U.S. Coast Guard decided not to act as a cooperating agency and will be conducting a separate permit review process outside of the EIS process.	N

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987	3	Seris	David	United States Coast Guard, Waterways Management Branch	Permitting	The DEIS does not address potential impacts relevant to the following laws: the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601-4604 et seq.); the Bald and Golden Eagle Protection Act (16 U.S.C. 668); the Resource Conservation and Recovery Act (42 U.S.C. 9601); and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. 103). In order for the Coast Guard, as a cooperating agency, to adopt the bridge related portions of this DEIS, the document must include an analysis of the impacts and mitigation associated with these laws.	The U.S. Coast Guard decided not to act as a cooperating agency and will be conducting a separate permit review process outside of the EIS process. More detail was added to Table C.2.1 of Appendix C (*Regulatory Authorities and Framework*) regarding the laws mentioned in the comment.	Y

4.2.17 Project Description

Table B.2.20. Substantive Comments Received on Project Description

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
11	7	Baraff	Lisa	—	Project Description	And this has to do with the delivery islands in Atigaru Point and Point Lonely sites will see six sealift barge trips and 224 support vessel trips with more miles of barge travel for the former and far more miles to support vessel travel for the latter. Although the table in the appendix shows the differences between those; I have not been able to find anything that shows what the total miles will be for each of those alternatives, and nor have I seen a map that actually shows what the routes will be from Oliktok Point or from Point Lonely, and I think it would be helpful in doing analyses to see those.	Exact barge and support vessel routes details are not known. Routes would be determined based on consultation with USFWS to minimize impacts to marine mammals. A new figure has been added to the Final EIS, Figure 3.13.2, Estimated Barge Transit Route, that displays an approximation of the likely barge transit route between Dutch Harbor and Oliktok Dock. The approximate distance from Oliktok Dock to the Atigaru Point MTI would be 45.0 miles, and the distance from Oliktok Dock to the Point Lonely MTI would be 84.4 miles. *Note*: All traffic values have been updated for the Final EIS.	Y
989	14	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Project Description	Page ES-4, 6.5 Sealift Module Delivery Options How was the design life of 5-10 years for the MTI calculated?	The design life is based on CPAI's engineering. This time period covers the intended time the MTI would be needed before decommissioning would be completed.	N
989	15	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Project Description	Page ES-4, 6.5.1 Proponent's Module Transfer Island "It is anticipated the top of the island would drop below the water surface in 10 to 20 years following abandonment as it is reshaped by ice and waves." This may not be correct. BLM should reanalyze the bathymetry in this area. Some areas have not changed since the 1950s.	The 10- to 20-year period was identified based on previously abandoned-in-place offshore constructed islands (Resolution and Goose islands). The erosion of the island would be generated by waves and ice.	N
989	18	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Project Description	Page 12, 2.5.4.7 Solid Waste Can solid waste be landfilled within the NPR-A?	BLM NPR-A BMP A-2 prohibits the burial of garbage in the NPR-A.	N
989	19	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Project Description	Page 15, 2.5.9 Abandonment and Reclamation This section should include discussion of CPAI's abandonment and reclamation plans for the Modular Transfer Island and the BLM's analysis of these plans. What is the predicted life of the project? This seems like something that should be included.	The EIS separates the Project's onshore components (i.e., action alternatives) from the module delivery components (i.e., module delivery options.) As noted in Section 2.6.1, *Option 1: Atigaru Point Module Transfer Island*, details regarding MTI decommissioning are described in Final EIS Appendix D.1 (*Alternatives Development*), Sections 4.7.1.3 and 4.7.2.3, both titled *Module Transfer Island Maintenance and Decommissioning*. The life of the Project is estimated to be 30 years (Alternatives B and C) and 31 years (Alternative D). The design life of the MTI is 5 to 10 years; it is anticipated that within 10 to 20 years following decommissioning, the top of the island would disappear below the water surface.	N
989	20	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Project Description	Page 17, 2.7 Sealift Module Delivery Options Why is the design life of the MTI 5-10 years?	The design life is based on CPAI's engineering. This time period covers the intended time the MTI would be needed before decommissioning would be completed.	N
991	1	Bruno	Jeff	Alaska State, Department of Natural Resources	Project Description	Chapter 2, page 12, Section 2.5.4.8 This page discusses drilling waste. The draft EIS does not specify areas or plans for storage of drilling waste prior to disposal. This section notes that reserve pits would not be used. It is unclear to us how they plan to address wastes after they are produced and before they are disposed of.	Temporary storage cells (typically lined, wooden structures) would be constructed for staging drilling muds and cuttings prior to disposal. Text added to Final EIS Section 2.5.4.8, *Drilling Waste*; text expanded for clarity in Final EIS Appendix D.1, *Alternatives Development*, Section 4.2.4.8, *Drilling Waste*.	Y
1302	12	Dunn	Connor	ConocoPhillips	Project Description	ConocoPhillips is proposing that a Colville River ice road crossing in the vicinity of Ocean Point be considered as an Option 3 for module delivery. Under this approach, modules would be delivered to the existing Oliktok Dock at Kuparuk and staged on existing gravel pads within the Kuparuk oil field until ice roads can be constructed. During winter, the modules would be transported first on existing gravel roads through the Kuparuk oil field to drill site 2P, and then onto a specially made ice road that includes a crossing of the Colville River in the vicinity of Ocean Point. Once across the river, the ice road would continue until it connects with the gravel road roughly around the GMT2/MT7 pad. This approach would avoid the need for an MTI and the need for an ice road across the Teshekpuk Lake Caribou Habitat Area.	Comment noted. Option 3 (Colville River Crossing) is included in the SDEIS and Final EIS.	N
1302	108	Dunn	Connor	ConocoPhillips	Project Description	No discussion of incinerator except for Alt. D. The discussion of project facilities should note that under all alternatives, an incinerator would be used for waste disposal. This avoids attracting animals with food waste.	The use of an incinerator is noted in the Draft and Final EIS Appendix D.1, *Alternatives Development*, Section 4.2, *Project Components Common to All Action Alternatives*: Section 4.2.1.3, *Willow Operations Center*; and Section 4.2.4.7, *Solid Waste*. Text was expanded in the Final EIS Section 4.2.4.7, *Solid Waste*, to note that incinerator use is intended to prevent attracting animals.	Y
1302	109	Dunn	Connor	ConocoPhillips	Project Description	Page 10 states the HDD pipelines will be installed 70 feet below the river channel and page 66 states 85 feet below ground. Change wording on page 66 to "70 feet below the river channel."	Edited as suggested.	Y

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1302	110	Dunn	Connor	ConocoPhillips	Project Description	Missing values for flights to/from Point Lonely provided on April 15, 2019 and on July 15, 2019 in RFI 62a. Same comment also applies to Table D.4.37. However, these flights appear to have been included in Table E.11.09 and E.11.11 in Appendix E 11. Note that Point Lonely Flights are included in Table ES-11 (page ES.1) but the total provided does not include the Point Lonely Flights. A similar comment also applies to Table 2.8.2 on page 21.	All traffic values and tables have been updated for the Final EIS; this includes additional traffic comparison tables in Appendix D.1, *Alternatives Development*, Chapter 5.0, *Summary Comparison Tables for Analysis*. Flight locations specific to the module delivery options (e.g., Atigaru, Point Lonely, Kuparuk) have been added to appropriate tables throughout the Final EIS.	Y
1302	125	Dunn	Connor	ConocoPhillips	Project Description	(Table ES.1) It's unclear what the point is of listing the various resources affected if those specific resources aren't then analyzed in the next columns by Alternative. For instance, "disturbance and displacement of birds, caribou, and polar bears" is cited for several project components, but the Alternative analysis columns then only recites project footprints, etc. This is not the correct metric for something like "polar bear habitat." Having 267.0 miles of pipeline doesn't mean that's 267 miles of displacement of polar bears.	The intention is to briefly tie the Project component (e.g., ice infrastructure, pipelines, gravel roads) to the environmental resource that would be impacted using available quantified data to assist reviewers in comparing alternatives. While 267.0 miles of pipeline would not displace 267.0 miles of polar bears, the associated construction activity (winter) has the potential to disturb polar bears. Consequently, alternatives with more miles of pipelines would impact polar bears differently from the construction of pipeline (e.g., setting VSMs, welding pipeline).	N
1302	129	Dunn	Connor	ConocoPhillips	Project Description	(Page 2, Section 1.3, Purpose and Need) We recommend that BLM clarify the phrase transportation to market as used in the DEIS statement of purpose and need. The phrase refers to transportation to a common carrier pipeline, not the final point of sale to a consumer.	The purpose and need adequately covers the intent of CPAI to produce and sell the oil in the marketplace.	N
1302	156	Dunn	Connor	ConocoPhillips	Project Description	(Page 11, Section 2.5.4.1, Ice Pads) Revise paragraph two to read: "Multi-season ice pads would be used on a limited basis to stage construction materials between winter construction seasons; this avoids the need to place gravel fill to support temporary activities. Multi-season ice pad (MSIP) construction utilizes a base of ice with structural insulated panels (SIPs) above and rig mats on the surface. Once the MSIP is no longer needed, the rig mats, SIPs and associated materials will be removed and the ice will be excavated to within 12 inches of the tundra surface. "	Edited as suggested.	Y
1302	157	Dunn	Connor	ConocoPhillips	Project Description	(Page 11, Section 2.5.4.1, Ice Pads) Revise paragraph three to read: "Three 10.0-acre multi-season ice pads would be used during Project construction: near GMT-2, near the WOC (South WOC under Alternative C), and at the Tiŋmiaqsiuġvik Mine Site. These pads would allow for equipment staging in support of ice road construction, gravel mining, and other tasks which would support early access at the beginning of each winter season, while minimizing gravel fill."	Commenter's suggested text edit is editorial and does not change the information conveyed in the existing text. No changes to text.	N
1302	158	Dunn	Connor	ConocoPhillips	Project Description	(Page 13, Section 2.5.5, Water Use) Add sentence in italics: "Approximately 0.25 MG of water is used to construct 1 acre of ice pad. (Note: 0.25 MG of water per acre is a high-level estimate for multi-season ice pads.) *MSIPs use base thicknesses of ice of 3 feet and beyond. IE, the MSIP near Kuukpik pad is ~6 feet thick. The water required can be simply calculated by cubic feet of ice. It is Much greater than 0.25 MG.*"	The multi-season ice pad description water requirements in Chapter 2.0, *Alternatives*, and Appendix D.1, *Alternatives Development*, has been updated to reflect that multi-season ice pads require 0.25 million gallons of freshwater per acre, per foot of thickness.	Y
1302	162	Dunn	Connor	ConocoPhillips	Project Description	(Pages 66-67, Section 3.8.2.3.6, Water Withdrawal) Water withdrawal volume does not appear to account for water used for drilling	All quantitative values have been updated for the Final EIS based on CPAI's Project revisions.	Y
1302	170	Dunn	Connor	ConocoPhillips	Project Description	(Page 77, Section 3.9.2.6.1, Alternative C: Disconnected Infield Roads) The second sentence states that a second airstrip and camp would be located near BT1 or BT2. To clarify, the north WOC and north airstrip would be located near BT2.	Edited as suggested for clarity.	Y
47	1	Leavitt	Joe		Project Description	What's the height on the pipeline going to be?	Pipeline heights would vary throughout the Project area due to terrain and topography, but the lowest point for new pipelines would be a minimum of 7 feet above the surrounding tundra. *Note*: In select areas where new pipelines would be installed on and share existing vertical and horizontal pipeline support members, new pipelines would match the existing heights.	N
1294	21	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. I, p. ES-4, Section 6.5, Sealift Module Delive1y Options. The Draft EIS claims it would take 10-20 years for the top of the MTI to drop below the water surface. This time frame is more realistic than earlier claims of 5 years, but it's still optimistic. The information arguably supporting that estimate is questionable at best because even the examples provided, Goose and Resolution Islands, may only be at or just below the water surface after 30 and 16 years, respectively. See Vol. I, p. 69. Resolution Island was in the Sag River delta, so it experienced more water movement than would be expected near Atigaru Point. Kuukpik continues to believe the proposed MTI will not dissolve as quickly as BLM thinks it will, if ever.	The Draft EIS does not state that the MTI would dissolve but does state that "the island is expected to be reshaped by waves and ice within 10 to 20 years similar to Resolution and Goose islands, two Beaufort Sea exploratory islands constructed in water depths similar to the [Options 1 and 2] MTI" (Draft EIS Section 3.8.2.6.1, *Option 1: Proponent's Module Transfer Island*). And Draft EIS Section 3.13.4, *Unavoidable, Irretrievable, and Irreplaceable Effects*, notes that "the alteration of nearshore habitat would be irreversible because even if the MTI is abandoned and reshaped, it would still exist." Comparable sections in the FEIS are Section 3.13.2.6.1, *Habitat Loss or Alteration*, and Section 3.13.3, *Unavoidable, Irretrievable, and Irreplaceable Effects*.	N
1294	24	Nukapigak	Joe	Kuukpik Corporation	Project Description	Also, on page ES-11, the DEIS states that there would be 200 fixed wing flights in winter for the Atigaru Point alternative and 320 flights (with 96 in summer) for the Point Lonely alternative. Why are no summer flights indicated for the Atigaru Point option? Why are there more fixed wing flights overall for the Point Lonely option? Both options have the same number of helicopter flights.	Traffic values have been clarified for the Final EIS, and the level of detail has been expanded. Module delivery Options 1 and 2 (Atigaru Point and Point Lonely) reflect the same number of helicopter, fixed-wing aircraft, and marine vessel trips. Although there would be no year-round runway at Atigaru Point (Option 1), fixed-wing aircraft would be used for site security and monitoring during summers; helicopters would be used to deliver personnel or equipment to the island during summer, as needed. *Note*: All traffic values have been updated for the Final EIS. See Final EIS Appendix D.1, *Alternatives Development*, Chapter 5.0, *Summary Comparison Tables for Analysis*, for traffic values by year and season for each action alternative and module delivery option.	N
1294	25	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. I, p. 9, Section 2.5.2.3, Other Import/Export Pipelines. This section indicates that the new seawater pipeline will run from Kuparuk CPF2 all the way to the WPF (under the Colville River via HDD). Why is the diesel pipeline not expected to connect all the way to the WPF? trucking this (and potentially others) substance (and potentially others) seems inefficient and will unnecessarily increase vehicle traffic.	Under Alternatives C and D, the diesel pipeline would extend to the WPF. Under Alternative B, the diesel pipeline would extend to the Alpine development. Because the BLM considered extending the diesel pipeline to the WPF in the EIS, the BLM has the discretion to require this in the ROD.	N

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1294	26	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. 1, p. 10, Section 2.5.3.1, Ice Roads. This section states that ice roads would generally be 8 inches thick. Kuukpik believes this is different from the usual 6 inches. Why the change? This section also states that a 70 foot wide ice road just for transferring the modules would be build alongside a 35 foot wide ice road for general traffic. Why is a separate road necessary? It seems like the 70 foot wide ice road could either be expanded an additional 15-20 feet or include pullouts to allow general traffic to use the same road as the modules instead of building a separate 35 feet wide ice road.	Ice road design has been updated for the Final EIS and is now noted as being "at least 6 inches thick." Additionally, ice road widths have been further refined (Final EIS, Appendix D.1, *Alternatives Development*, Section 3.1.6.4.5, *Ice Road Widths and Water Use Updates*); module haul ice roads have been narrowed to a single 60-foot-wide ice road for all module delivery options.	N
1294	29	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. I, p. 11, Section 2.5.4.2, Camps. The existing Arctic Wolf (or Arctic Fox) camp north of the Kuukpik Hotel should also be cited here.	The Project proponent (CPAI) determines what commercial camps it may contract with to support the Project.	N
1294	30	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. 1, p. 12, Section 2.5.4.6, Domestic Wastewater. CPAI is leaving the option open to discharge treated wastewater to the ground until the UIC disposal well is available. Kuukpik opposes surface discharge of such wastewater.	Comment noted. Treated wastewater would be hauled to another disposal site (e.g., Alpine) until the Project's UIC well is operational; though in an emergency, there may be permitted surface discharge.	N
1294	31	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. 1, p. 13, Section 2.5.5, Water Use. This section states that 1.5 million gallons of water per mile will be used for construction of a 35 foot wide ice road. The "standard" figure is 1 million gallons per mile. We believe this figure needs to be corrected and calculations based on it must be updated to present an accurate picture of water use related to ice roads.	Ice road design has been updated for the Final EIS (Appendix D.1, *Alternatives Development*, Section 3.1.6.4.5, *Ice Road Widths and Water Use Updates*). As noted in Section 4.2.5.3, *Water Use*, of Appendix D.1, "ice road widths would be 35 feet, 50 feet, or 70 feet; the volume of freshwater required to construct these ice roads is approximately 1.0 MG [million gallons], 1.4 MG, and 2.0 MG, respectively."	Y
1294	32	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. 1, p. 15-16, Sections 2.5.10, Schedule and Logistics. The dates shown are now off by at least 1 year in light of CPAI's public announcement that the Willow project would be delayed by at least 1 year.	Project schedules have been updated to reflect CPAI's refinements to engineering design and planning; schedules reflect CPAI's current development plans.	Y
1294	38	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. I, p. 119, Section 3.14.2.2, Action Alternatives and Module Delivery Options. Where does Alternative B cross through a mile of the Colville River Special Area? BT4 is no longer located within the Teshekpuk Lake Caribou Habitat Area.	Roads and pipelines extending southwest from GMT-2 would cross a corner of the CRSA; BT4 is not located in the K-5 Teshekpuk Lake Caribou Habitat Area, but it is located in the TLSA. Both areas have been added to alternatives figures for the Final EIS (Chapter 2.0, *Alternatives*, and Appendix D.1, *Alternatives Development*).	N
1294	43	Nukapigak	Joe	Kuukpik Corporation	Project Description	Vol. I, p. 145, Section 3.1.6.2.6.1, Proponent's MTI. This section states, "During construction, peak ground traffic levels associated with the MTI would reach up to 8,900 trips daily, averaging 370 trips per hour in winter (Table E.11.10 in Appendix E.11, Birds Technical Appendix)." This data seems incorrect. Even if CPAI staged gravel somewhere between the Ublutuoch Mine Site and the island location (which hasn't been proposed as far as we know), this would equate to 6.6 trips per minute. Gravel trucks can't offload gravel in less than 10 seconds per load and get out of the way for the next truck.	Traffic trips are estimates provided by CPAI and are based on its logistics and construction planning effort. The EIS further breaks down total trips to daily and hourly distributions (using noted assumptions) to further aid reviewers in understanding the potential impacts for alternatives and module delivery options. No gravel staging areas are proposed as part of the Project. The Final EIS provides updated trip values based on further engineering and planning by CPAI.	N
41	3	Pardue	Marie	—	Project Description	Diesel equipment - You put structures up for employees. Why not go as far as building garages for day/night shifts so they don't run unused equipment 24/7 during the coldest months.	Construction of garages or other buildings to house vehicles and equipment would expand most gravel pads to accommodate the additional structures, which would result in its own impacts. The BLM is currently revising the NPR-A IAP, including potential changes to required BMPs (described as ROPs in BLM [2020]). Applicable BMPs/ROPs considered in the revised IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* in the Willow MDP Final EIS (typically Section *3.X.2.1.1* in most resource chapters). This includes 2020 NPR-A IAP ROP A-14 (Vehicle Idling Standards), which includes the following requirement: "All permanent camps are required to use vehicle plug-ins for engine block heaters. When vehicles are not in use, they shall be powered off and plugged in where plugs are available." The Willow MDP ROD will detail which of the measures will be implemented for the Project.	N
864	72	Psarianos	Bridget	Trustees for Alaska	Project Description	As noted during scoping, the size and gravel footprint of the five drill sites, the Willow Central Processing Facility, and the infrastructure pad is not indicated. ConocoPhillips' Summary and the draft EIS only provide estimates that there will 50 or more wells per pad and does not indicate if that number includes only producing wells or injection wells. Further, ConocoPhillips makes the improbable assumption that each drill site will be identical in gravel footprint and infrastructure, when in reality each drill site pad will vary depending on its equipment needs. BLM must require more information to determine the scope of the project and its facilities, as required by FLPMA. Further, ConocoPhillips must provide site-specific specific information for the proposed Willow Central Processing Facility including, but not limited to, its exact location, equipment needs, power generation, processing activities, and infrastructure needs. BLM requires this information not only to adequately evaluate ConocoPhillips' ROW request, but also to evaluate potential alternatives to that proposal and environmental impacts as required by NEPA.	The Draft EIS and Final EIS identify the sizes of individual pads under each action alternative and in the summary comparison table (see Appendix D.1, *Alternatives Development*). The Final EIS includes additional Project refinements based on ongoing CPAI engineering; all gravel pad sizes have been adjusted accordingly. As noted in the Final EIS, the Project would have 251 total wells (including injection and production), with 40 to 70 wells at each drill site. Final EIS Appendix D.1, Section 4.2.1.1., *Willow Processing Facility*, includes a description of some of the activity that would occur at this facility as well as a description of the types of equipment that would be found at the facility. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required.	N
864	73	Psarianos	Bridget	Trustees for Alaska	Project Description	Additionally, there is very little information on the length or location of the roads, or the amount of gravel needed. As described in more detail below, gravel infrastructure has major impacts on hydrology, vegetation, and permafrost conditions. Any new roads will increase habitat fragmentation in this sensitive area, and further encircle the community of Nuiqsut. The length of the roads will dictate the amount of gravel needed for construction, and the locations of roads and drill sites will affect the necessary maintenance of roads. ConocoPhillips must provide specific information in order for BLM to properly evaluate the environmental and social impacts of this gravel infrastructure and to grant any ROW for this project.	The Draft EIS and Final EIS include road lengths (miles) and footprint (acres), as well as the acres for each drill site pad; see Appendix D.1, *Alternatives Development*. All proposed gravel roads are also depicted on accompanying EIS figures. The required gravel volume for each alternative and module delivery option is also provided in Appendix D.1. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required.	N

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864	74	Psarianos	Bridget	Trustees for Alaska	Project Description	We are also concerned about the lack of detail on the proposed bridges and water crossings. Judy Creek, Fish Creek, Willow Creek 4, and Kalikpik River would appear to all require massive bridges with piers located in the riverbeds. ConocoPhillips Summary and the draft EIS does not adequately describe how these will be constructed and the draft EIS is equally vague. For instance, the draft EIS merely states that "[b]ridges would range from 40 to 500 feet in length," but doesn't clarify the various lengths at different crossings. The draft EIS is also inconsistent in describing whether there will be span bridges across other streams or whether culvert batteries will be used, and the draft EIS states, in a table summary, that 18 crossings would be needed: 7 bridges and 11 culvert batteries. The specific crossings are not identified in the EIS, however, simply the number. This is unacceptably vague, and it is not clear how BLM can issue a ROW under FLPMA without sufficient information regarding which waterbodies will be crossed.	All bridged crossings and culvert batteries are described in the Draft and Final EIS, as well as depicted on EIS figures; see Appendix D.1, *Alternatives Development*, for details on the bridge crossings. Each action alternative description includes a table noting the crossing location, bridge length, number of piles below ordinary high water, and the crossing location coordinates. Culvert batteries are depicted on alternatives figures. *Note*: The number of piles required below ordinary high water has been updated in the Final EIS based on ongoing engineering refinements by CPAI. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required.	N
864	75	Psarianos	Bridget	Trustees for Alaska	Project Description	Information is also sparse regarding ConocoPhillips' timing for this massive development, as required by 43 C.F.R. § 2804.12(a)(2) ("estimated schedule for constructing, operating, maintaining, and terminating the project"). ConocoPhillips' Request Letter simply states that there will be "an inter-related series of infrastructure components that would be constructed over an approximately 10-year period for the purpose of oil and gas development in the NPR-A." The draft EIS is likewise vague in its description of timing of construction and operation, as described herein. ConocoPhillips' Summary indicates that BT1, BT2, BT3, the Willow Central Processing Facility, Infrastructure Pad, MTI, air strip and associated roads (and we assume bridges) would be constructed first based on its projections of gravel use, with BT4 and BT5 constructed sometime after 2028. The draft EIS states that "ConocoPhillips proposes to construct the Project over approximately 7 to 9 years (depending on the alternative) beginning in the first quarter (Q1) of 2021. The WPF is anticipated to come online the fourth quarter (Q4) of 2024 (first oil) for Alternatives B and C [note this timeline is unclear given ConocoPhillips' recent media statements], and in Q1 of 2026 for Alternative D. Operations would run to the end of the Project's field life, which is estimated to be 2050 (Alternatives B and C) or 2052 (Alternative D)." The draft EIS does not clarify the "phased" approach contemplated in ConocoPhillips' Summary document submitting to BLM, and appears inconsistent. This is insufficient under FLPMA and is not clarified in the draft EIS. ConocoPhillips must clearly define its development plans as the pace of development will influence impacts. For instance, ConocoPhillips' Summary provides only an estimate for the number of winter seasons which will be needed for construction, but significantly more information is needed for purpose of any ROW grant by BLM.	Draft EIS Appendix D.1, *Alternatives Development*, notes that the alternatives contain "phased development," with construction of drill sites and other infrastructure being completed over an extended period of time; this text has been updated for clarity. The EIS primarily uses "phase" to describe the three primary activity phases of the Project: construction, drilling, and operations. Each action alternative and module delivery option includes a narrative description of planned activity and a graphic of the associated schedule. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required.	Y
864	76	Psarianos	Bridget	Trustees for Alaska	Project Description	Additionally, reclamation, including infrastructure and road removal, are barely discussed, despite being critical to both BLM's NEPA analysis and ROW permit obligations at 43 C.F.R. § 2804.12(a) (3) ("The estimated life of the project and the proposed construction and reclamation techniques"). ConocoPhillips' Summary and the draft EIS essentially state that infrastructure may or may not be simply left in place or removed. Reclamation is necessary for the Willow Plan, and BLM should ensure that all steps are taken to reclaim the area to its natural state. These activities necessitate more equipment and disturbance, but simply abandoning infrastructure in place will cause additional permanent damage to the landscape. While some of this massive new infrastructure may be considered "temporary" (e.g., the ice roads and the gravel island) that does not mean the temporary infrastructure will not have significant impacts to wildlife and subsistence from their construction and use. BLM must analyze the impacts of this ongoing disturbance if facilities and roads are left in place, and the impacts from eventual road removal and reclamation efforts. In sum, the lack of substantive information in ConocoPhillips' Summary and lack of a FLPMA application raises serious questions about ConocoPhillips' ability to move forward with this massive project in an environmentally responsible manner and severely limits the public's ability to analyze the potential impacts of this proposal. BLM needs all of this information in order to fully assess the site-specific impacts of this project and to issue a ROW consistent with the agency's legal obligations under FLPMA.	Reclamation requirements are included under the NPR-A IAP ROD as LS G-1, which requires the following: "Prior to final abandonment, land used for oil and gas infrastructure—including but not limited to well pads, production facilities, access roads, and airstrips—shall be reclaimed to ensure eventual restoration of ecosystem function. The leaseholder shall develop and implement an abandonment and reclamation plan approved by the BLM. The plan shall describe short-term stability, visual, hydrological, and productivity objectives and steps to be taken to ensure eventual ecosystem restoration to the land's previous hydrological, vegetative, and habitat condition. The BLM may grant exceptions to satisfy stated environmental or public purposes." Additionally, BLM requires a bond from companies conducting activities in the NPR-A to ensure that the company will cover the full cost of reclamation efforts; reclamation standards are determined by the BLM authorized officer at the time of reclamation. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. When an application is submitted for a ROW and/or APD for the Willow MDP Project, the BLM will review the application for completeness and determine whether the scope of the Project falls within what was analyzed in the EIS, and if any further NEPA analysis is required.	N
864	98	Psarianos	Bridget	Trustees for Alaska	Project Description	The Draft EISs Description of Pipeline Inspections are Not Compliant with Federal Pipeline Safety Regulations. The draft EIS states that "ConocoPhillips is required to conduct visual examinations of pipelines and facility piping at least monthly during operations. ConocoPhillips would provide aerial overflights as necessary to allow inspection both visually and with the aid of FLIR technology, when required." For federally regulated pipelines including pipelines downstream of the Willow Processing Facility and any project-related diesel pipelines, this schedule does not meet the 49 CFR Section 195.412(a) requirement for more frequent pipeline inspections. That section reads: "Each operator shall, at intervals not exceeding 3 weeks, but at least 26 times each calendar year, inspect the surface conditions on or adjacent to each pipeline right-of-way. Methods of inspection include walking, driving, flying or other appropriate means of traversing the right-of-way."	CPAI North Slope operations currently follow, and would follow for the Willow MDP Project, all federal and state regulations regarding pipeline inspection and aerial overflights, including 49 CFR 195.412(a), Subpart F; 18 AAC 75.055(a)(3); and 18 AAC 75.425(e)(2)[E], by conducting aerial overflights at least every 7 days. Text updated for clarity (Final EIS, Appendix H, *Spill Summary, Prevention, and Response Planning*, Section 2.3, *Spill Response Training and Inspections*): "CPAI is required to conduct visual examinations of pipelines and facility piping with a frequency defined under 49 CFR 195.412 and 18 AAC 75.055 during operations at a minimum interval not exceeding three weeks."	Y
864	115	Psarianos	Bridget	Trustees for Alaska	Project Description	BLM Failed to Adequately Consider the Impacts of Gravel Mining. The draft EIS provides that two 114.8-acre gravel mines sites within the Tiŋmiaqsiuġvik area are being evaluated by ConocoPhillips for the potential to supply some or all of the gravel required to construct the Project. As an initial matter, the draft EIS is suspiciously vague in its description of these mines, referring to them as "cells" in order to characterize two mines, on either side of an important waterway, as though they are a single mine. It is only by studying Figure 2.5.4 that the presence of two mines is apparent. The result is a complete disregard for the significant impacts to this important subsistence area that would result from having two massive gravel mines on either side of a river. Further, the mine sites appear to be located on BLM-managed lands, although this is not expressly stated in the draft EIS. BLM must clarify the location of these mines, because their location on BLM-managed lands triggers a suite of regulatory requirements.	The Draft EIS and Final EIS do describe a single mine site with two distinct cells; the mine site is clearly portrayed as being within the NPR-A (i.e., on BLM-managed lands) and as containing two distinct cells in EIS figures. BLM has coordinated with CPAI on development of its mine site plan to ensure that it meets the requirements of its separate permitting process. The mine site plan covers both the development of the mine and the intended reclamation activities. The mine site plan is used in the analyses of resource impacts. *Note*: For the Final EIS, the mine site plan has been updated based on ongoing engineering efforts, and the mine site cells footprints have been reduced to 109.3 acres and 40.4 acres (149.7 total acres between the two adjacent mine site cells).	N

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864	117	Psarianos	Bridget	Trustees for Alaska	Project Description	Gravel mining will directly cause additional ground disturbance and habitat destruction above and beyond what will be associated with the Willow Plan footprint and needs to be considered as a connected action in this EIS, not downplayed across resources. Gravel extraction is generally done in large, open pit mines. Open pit mines require extensive overburden removal—for example, over 50 feet of vegetation and soil needed to be excavated to reach suitable gravel in the mines created for Kuparuk. The resulting overburden stockpile disturbs tundra, and the gravel pit itself causes permanent changes to the areas thermal regime due to thaw bulbs forming in the permafrost around the unfrozen water during flooding. Indirect effects such as these have led some researchers to approximate that a one acre gravel pit may affect as much as 25 acres surrounding the site. As explained in the attached Terzi report, these gravel mines would irreversibly alter permafrost and it is clear the impacts will likely exceed the 230 acres of direct impact depicted in the DEIS. The impacts will likely exceed the 230 acres of direct impact depicted in the DEIS, which only focuses on surface disturbance and fails to consider long-term impacts from changes to the thermal regime and the potential indirect and secondary impacts from the gravel mines BLM failed to fully consider all of these impacts in the context of the mines sizes, which will are substantial.	Gravel mine site engineering on the North Slope has advance since Kuparuk development began. The Tiŋmiaqsiuġvik Mine Site footprint has been reduced based on additional engineering (from "up to 230 acres" to 149.7 acres across two distinct mine site cells). The mine site would use ice pads to store overburden during the first season of gravel mining operations; subsequent seasons would stockpile overburden within the mine site cell. A perimeter berm would be constructed at the top of the mine site cells to promote thermal stability. A detailed Mine Site Rehabilitation Plan is provided in Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*. The potential for effects from the mine site, such as permafrost thaw, are discussed in EIS Section 3.4.2.3.1, *Thawing and Thermokarsting*. A quantitative estimate of permafrost thaw would be inaccurate and speculative.	N
864	118	Psarianos	Bridget	Trustees for Alaska	Project Description	Moreover, the proposed site of the gravel mine based on ConocoPhillips' map raises a host of concerns. The draft EIS shows the proposed mine directly southwest of the Clover mine site and approximately five miles from the community of Nuiqsut, even closer to the community than the existing CD-5 pad or the nearly completed GMT-1 pad. The existing Arctic Slope Regional Corporation gravel mine is approximately 4.5 miles northeast of Nuiqsut and the noise impacts from blasting reverberate throughout the community regularly. This proposed gravel mine site will further exacerbate the air quality and noise impacts to the community of Nuiqsut. As described further below, BLM also failed to fully consider impacts from siting large gravel pits close to rivers and streams and within their floodplains.	The ASRC Mine Site is approximately 3.9 miles east of Nuiqsut; the Tiŋmiaqsiuġvik Mine Site would be approximately 7.0 miles west of Nuiqsut. Use of the Tiŋmiaqsiuġvik Mine Site would reduce impacts to Nuiqsut; for example, noise impacts would be less due to the greater distance (versus the ASRC Mine Site), and air quality and noise impacts would be less because gravel-hauling vehicles would not travel near Nuiqsut.	N
864	165	Psarianos	Bridget	Trustees for Alaska	Project Description	As described in the Terzi report, it is not possible to disturb one site in isolation from the rest of the ecosystem, or confine the disturbance to a single detached location and then subsequently reclaim or reverse the impacts. BLM claims ConocoPhillips will reclaim the mine sites in the future, however, there is no detailed analysis or reclamation plans. Thus, there is no way to determine the extent of permanent environmental impacts from these gravel mines. The draft EIS must be revised to add such analysis.	A detailed Mine Site Rehabilitation Plan is included in Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*, of the Final EIS. This development and rehabilitation plan was developed by CPAI and revised based on BLM review of and comments on the drafts.	N
864	252	Psarianos	Bridget	Trustees for Alaska	Project Description	The DEIS mentions, but does not quantify, potential impacts from the following activities and/or secondary impacts to aquatic resources resulting from construction, implementation, and construction of the proposed project: Seawater Pipeline: It is not clear from the DEIS (nor the schematic figure depicting this pipeline) where the intake for the 67.1 mile seawater pipeline would be located and whether there would be marine (and other) impacts associated with the construction and operation of this pipeline. The DEIS states (Chapter 2, Section 2.5.2.3) the seawater pipeline would transport seawater from the Kuparuk River Unit Central Processing Facility to the Willow Processing Facility. The DEIS also mentions that the seawater pipeline would be placed by Horizontal Directional Drilling (HDD) under the Colville River, but provides little else to describe the potential impacts of this proposed feature. BLM must include this information and analysis in the EIS.	The seawater pipeline would be constructed between the existing Kuparuk CPF2 and the WPF. Seawater would be sourced from the existing seawater treatment plant in Kuparuk and transported to Kuparuk CPF2 using existing pipelines. Appendix D.1 (*Alternatives Development*), Section 4.2.2.3, *Other Pipelines*, describes the HDD crossing of the Colville River in additional detail. The HDD activity is analyzed throughout relevant EIS resource sections in Chapter 3.0, *Affected Environment and Environmental Consequences* (e.g., Section 3.8.2.3.5, *Pipelines*).	N
864	266	Psarianos	Bridget	Trustees for Alaska	Project Description	The gravel mines would be located within the floodplains of Bill's Creek, and on either side of the Ublutuoch (Tiŋmiaqsiuġvik) River. There is no discussion in the DEIS analyzing the potential impacts from constructing these gravel pits and placing overburden piles and ice pads within the floodplain. Mine Site Area 1 is within 266 feet of Bills Creek and within 310 feet of Ublutuoch (Tiŋmiaqsiuġvik) River. The DEIS states the mine site design is ongoing. BLM must finalize the design and allow public and agency comment. There are no detailed plans, but rather one schematic figure depicting this potentially significant impact. Impacts from large gravel pits close to rivers and streams and within their floodplains are well documented in the literature (NMFS, 2005).	The gravel mine site cells would be located adjacent to the floodplains of Bill's Creek and the Ublutuoch (Tiŋmiaqsiuġvik) River; floodplain data have been added to the Final EIS Chapter 2.0, *Alternatives*, Figure 2.5.2. Single-season ice pads would ring the mine site cells to support mining activity; due to topography, these ice pads would be located mostly above the floodplain. Final EIS Section 3.8.2.3.1, *Gravel Mining*, describes potential mine site impacts to water resources.	Y
864	268	Psarianos	Bridget	Trustees for Alaska	Project Description	NMFS (2005) states that without restoration, stream recovery from gravel mining can take decades. However, NMFS recommends that reliance on restoration be put into proper perspective. It is important to acknowledge that there are significant gaps in our understanding of the methodology and effectiveness of restoration of streams and anadromous fish habitat affected by gravel extraction activities. As an example, gravel extraction in California is regulated under the concept of "reclamation," which is derived from open-pit surface mining, such as large coal mines. Although the definition and implementation of reclamation may vary among states, Kondolf (1993, 1994b) states the concept of reclamation, as applied to open-pit mines, often assumes that the environmental impacts are confined to the site; therefore, site treatment is considered in isolation from changes in the surrounding terrain. Kondolf (1993, 1994b) suggests that this definition treats the site as an essentially static feature of the landscape. He argues that, while these assumptions may work for extraction operations located in inactive stream or river terraces, active channels and floodplains are dynamic environments, where disturbances can spread rapidly upstream and downstream from the site during and after the operation. Thus, it is not possible to disturb one site in isolation from the rest of the ecosystem, or confine the disturbance to a single detached location and then subsequently reclaim or reverse the impacts. BLM claims they will reclaim the pits in the future there is no detailed analysis or reclamation plans. Thus, there is no way to determine the extent of environmental impacts and whether reclamation can be a surrogate for compensation as proposed by BLM.	The Tiŋmiaqsiuġvik Mine Site cells would not be located in active stream channels or floodplains. Please see Final EIS Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*, for additional details on mine site development and reclamation plans. The mine site plan was used in the analyses of mine site impacts to resources in the Final EIS.	N
67	2	Smith	Al	—	Project Description	And your gravel source, do you know what the size of the pit is going to be? Is it going to be a 20-acre pit, 100-acre pit?	Gravel mine site engineering for the Tiŋmiaqsiuġvik Mine Site has advanced since the Draft EIS, and the footprint has been reduced from "up to 230 acres" to 149.7 acres across two distinct mine site cells. See Final EIS Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*, for additional mine site development details, including planned dimensions.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
63	1	—	—	—	Project Description	I had noticed you guys just found gravel around lower Alaska, not in the North Slope. Is there any preferences to any gravel closer?	Comment not clear. The Project would develop a Project-specific mine site near the Ublutuoch (Tiŋmiaqsiuġvik) River. See Final EIS Appendix D.1 (*Alternatives Development*), Section 4.2.6, *Gravel Mine Site*, for additional details.	N

4.2.18 Public Health

Table B.2.21. Substantive Comments Received on Public Health

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1307	16	Pardue	Margaret	Native Village of Nuiqsut	Public Health	Toxic contamination in our water, air, and food is a critical concern to NVN and the broader Nuiqsut community. Nuiqsut is now surrounded by oil and gas infrastructure, and construction is nearly constant. Neither BLM nor our state or local governments have provided adequate information to the community about the levels of toxic pollution in the environment from all of this activity. Among other issues, community members have been seeing signs of sick and contaminated fish in rivers and lakes. Contamination from petroleum hydrocarbons (PH), including polycyclic aromatic hydrocarbons (PAH) has been identified in sediment and fish in the NPR-A. These compounds can harm fish and can have serious health effects for people who eat contaminated fish. The DEIS fails to adequately consider the cumulative effects of PH and PAH contamination in the environment. BLM should not permit additional development in the NPRA until existing levels of contamination and the extent of additional contamination that could occur from Willow are understood.	Text regarding PAHs was added to Chapter 4.0, S*pill Risk Assessment*.	Y
1307	27	Pardue	Margaret	Native Village of Nuiqsut	Public Health	A comprehensive Health Impact Assessment (HIA) should be completed for our community. Our community has repeatedly asked for this analysis to occur, and we expect a thorough analysis to be completed as part of this process. The HIA must comprehensively study the risks of oil development and its impacts on important environmental, social, and cultural drivers of health. If our community is going to have faith in this assessment, the HIA must be completed by an independent third party with no conflicts of interest.	Baseline health data for Nuiqsut are provided in Section 3.18.1, *Affected Environment*. A full HIA conducted by the State of Alaska would not further inform BLM of the differences between the alternatives presented for the Willow MDP Project. Health impacts are analyzed in Final EIS Section 3.18, *Public Health*; BLM determined, in consultation with the State of Alaska, that an HIA was unnecessary.	N
1307	31	Pardue	Margaret	Native Village of Nuiqsut	Public Health	Toxic contamination in our water, air, and food is a critical concern to NVN and the broader Nuiqsut community. Nuiqsut is now surrounded by oil and gas infrastructure, and construction is nearly constant. Neither BLM nor our state or local governments have provided adequate information to the community about the levels of toxic pollution in the environment from all of this activity. Among other issues, community members have been seeing signs of sick and contaminated fish in rivers and lakes. Contamination from petroleum hydrocarbons (PH), including polycyclic aromatic hydrocarbons (PAH) has been identified in sediment and fish in the NPR-A. These compounds can harm fish and can have serious health effects for people who eat contaminated fish. BLM should consider baseline data collected by the Arctic Monitoring and Assessment Program in 1998. The DEIS fails to adequately consider the cumulative effects of PH and PAH contamination in the environment. In the years since the last study of these contaminants, construction, development, and ice roads have increased dramatically. BLM should not permit additional development in the NPRA until existing levels of contamination and the extent of additional contamination that could occur from Willow are understood.	Text regarding PAHs was added to Chapter 4.0, *Spill Risk Assessment*.	Y
864	221	Psarianos	Bridget	Trustees for Alaska	Public Health	How deviations from LSs and BMPs will impact public health should be discussed in greater detail. Simply listing LSs and BMPs and briefly articulating why some cannot be achieved does not explain why they are relevant to particular public health outcomes. A column should be added alongside the LSs and BMPs to describe the connection to communities public health and wellbeing. For example, BMP E-9s objective is to minimize disruption of caribou movement and subsistence use. How altered herd movement and harvest success within the project area may impact residents health should be described in detail.	Because deviations from LSs and BMPs must meet the objectives of the respective protective measures, environmental impacts would not be expected to appreciably change. The environmental consequences analysis in Chapter 3.0 (*Affected Environment and Environmental Consequences*) accounts for proposed deviations. Table D.4.4 in Appendix D.1 (*Alternatives Development*) provides additional information regarding the proposed deviations, including a description of the objectives of the protective measures and the need for deviations. A deviation is not proposed for BMP E-9.	N
864	232	Psarianos	Bridget	Trustees for Alaska	Public Health	The Draft EIS also fails to take a hard look at the direct, indirect, and cumulative impacts of induced seismicity from drilling and fracking under the Willow project. There are some studies that link seismicity directly to fracking. For instance, fracking has been inferred to trigger the majority of injection-induced earthquakes in western Canada. However, in the United States, wastewater disposal associated with oil and gas extraction is considered the primary triggering mechanism, although fracking is sometimes implicated as well. Atypical seismic activity has been documented extensively in the central and eastern United States. There, earthquake count has increased dramatically over the last decade, with more than 300 earthquakes with M = 3 between 2010 and 2012, or an average of 100 events/year, compared with an average rate of 21 events/year for the period spanning 1967 to 2000. . . . Weingarten et al. (2015), in a study evaluating seismicity in multiple states, found a relationship between Class II wells and seismicity. The mechanisms linking wastewater injection and earthquakes are understood: injection induced increases in fluid pressure within aquifers and fault lubrication by injected fluids have the potential to destabilize well bores and cause preexisting faults to slip. Injection-induced earthquakes pose a threat to public health both through the inherent destructiveness of earthquakes and the potential for earthquakes to jeopardize the integrity of oil and gas wells and create new pathways for fluid flow. New pathways for fluid flow could bring wastewater fluids or oil and gas into contact with the ground or surface water on which so many rely. Yet the Draft EIS fails to examine such risks. Such failure is particularly glaring in light of new information indicating the North Slope is seismically active, including a 6.4 earthquake that occurred in 2018, followed by a 6.0 aftershock.	Hydraulic fracturing of conventional oil formations on the North Slope is not the same as fracturing operations for unconventional (shale) oil, which is the common fracturing operation used in the Lower 48. North Slope operations typically use less water, less proppant, less pumping horsepower, have shorter durations, and lesser potential for contamination. • The volumes of water typically used (30,000 barrels versus 300,000 barrels) • The volumes of proppant (e.g., sand, ceramics) used (less than 2,000 tons versus 2,000 to 8,000 tons) • The required pumping horsepower (3,000 versus 16,700) • The length of the operation (1 day versus 2 to 7 days) • The potential for freshwater contamination is greatly reduced due to the thick layer of permafrost which extends beyond 1,000 feet in depth throughout the Project area. The AOGCC regulates well construction in Alaska and has implemented regulations governing hydraulic fracturing (20 AAC 25.283). AOGCC regulations specifically require disclosure of the chemicals used in the hydraulic fracturing fluids; operators are required to post well information and chemical disclosure to a publicly searchable database (www.fracfocus.org).	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1032	10	–	–	–	Public Health	I would also like to note the increase of respiratory illness in children and adults in the Arctic communities near the "oil fields" (also known as our traditional homelands) have gone up at a very alarming rate. Which brings me to my next concern: ConocoPhillips—the organization that stands to benefit most from this project—is in charge of collecting data on air quality. I request that an unbiased 3rd party agency be involved in the process of collecting data on air quality.	It is common for federal agencies to reference data and studies conducted by the project proponent when developing an EIS. NEPA does not require federal agencies to conduct new studies and data collection; rather, NEPA requires the use of best-available data. The current NPR-A BMPs require project proponents to collect baseline data for certain resources and to provide that data to BLM. BLM's subject-matter experts conducted a thorough and independent review of all existing data and studies and referenced them, as appropriate, for the various EIS analyses.	N

4.2.19 Purpose and Need

Table B.2.22. Substantive Comments Received on Purpose and Need

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1302	6	Dunn	Connor	ConocoPhillips	Purpose & Need	Section 1.3, Purpose and Need, should be revised to read as follows: The purpose of the proposed action is to enable safe production and transportation to market of NPR-A oil and gas resources from existing leaseholds, consistent with the Proponent's federal oil and gas lease and unit obligations. Production and transportation will require new infrastructure such as wells, pipelines, and related facilities. The need for federal action (i.e., issuance of permits and authorizations for the infrastructure) arises from federal agency responsibilities under various federal statutes, including the NPRPA (as amended), which requires an expeditious program of oil and gas leasing in the NPR-A, and the Clean Water Act.	Although safe production and transportation is assumed to be part of the purpose and need of any alternative considered, in accordance with NEPA regulations, BLM has strived to avoid describing the purpose and need in unnecessarily narrow terms, so as to ensure that a full reasonable range of alternatives is considered and evaluated.	N
1302	7	Dunn	Connor	ConocoPhillips	Purpose & Need	Section 1.3.1, addressing the decision to be made should be revised to clarify that the decision is whether to approve the Willow MDP and the associated issuance of permits for the construction of the development plan, in whole or in part, based on the analysis contained within this EIS. If the Proposed Action is clarified as recommended above, then few edits to Section 1.3.1 (which references the Proposed Action) would be required.	Section 1.3.1, *Decision to be Made*, has been revised consistent with the comment.	N
864	30	Psarianos	Bridget	Trustees for Alaska	Purpose & Need	While the BLM is permitted to take the applicant's purposes into consideration, it cannot adopt private interest to draft a narrow purpose statement that restricts the consideration of alternatives. Federal courts have routinely found that NEPA prevents federal agencies from effectively reducing the discussion of environmentally sound alternatives to a binary choice between granting and denying an application. . . . Thus, BLM should not conflate it purpose and need to be ConocoPhillips' purpose and need. Here, BLM improperly conflates its federal purpose and need with the project applicant's purpose and need. The draft EIS states that: *The purpose of the Proposed Action is to construct the infrastructure necessary to allow the production and transportation to market of federal oil and gas resources under leaseholds in the northeast area of the NPR-A, consistent with the proponent's federal oil and gas lease and unit obligations. The need for federal action (i.e., issuance of authorizations) is established by BLM's responsibilities under various federal statutes, including the NPRPA (as amended); Mineral Leasing Act, and the Federal Land Policy and Management Act, as well as various federal responsibilities of cooperating agencies under other statutes, including the Clean Water Act (CWA). Under NPRPA, the BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). The BLM is required to respond to the Proponent's requests for an MDP and related authorizations to develop and produce petroleum in the NPR-A.*	The purpose and need for action is tiered to and was developed under the 2012 NPR-A IAP, which states the following: "The Naval Petroleum Reserves Production Act of 1976, as amended, and its implementing regulations require oil and gas leasing in the NPR-A and the protection of surface values consistent with exploration, development, and transportation of oil and gas." The stated purpose and need for action for the Willow MDP EIS is appropriate for a project-specific oil and gas development proposal consistent with the IAP. The purpose and need of a BLM action that responds to a development proposal from an oil and gas lessee necessarily must take into account the nature of the lessee's proposed action; however, the stated purpose and need is that of BLM. The stated purpose and need allows for a reasonable range of alternatives. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1 (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives.	N
864	31	Psarianos	Bridget	Trustees for Alaska	Purpose & Need	BLM's failure to acknowledge its protective mandates under the NPRPA is unacceptable. As properly expressed, BLM's purpose and need for this is project is for BLM to consider whether to approve the Willow Plan and if so, under what circumstances to ensure compliance with federal statutes, including NPRPA's mandates to allow for oil and gas leasing while ensuring maximum protection of surface resources and BLM's FLPMA mandate to avoid unnecessary and undue degradation to the public lands. Even more galling is the statement in the following paragraph that the Corps' purpose is "to construct infrastructure to safely produce, process, and transport commercial quantities of liquid hydrocarbons to market via pipeline from the Willow reservoir." This is no way reflective of the Corps' legal mandate under the Clean Water Act, which imposes substantive mandates to protect against the destruction of wetlands and select the least environmentally damaging practicable alternative, which is discussed in more detail below. This unreasonably narrow purpose and need has resulted in a draft EIS that fails to analyze multiple reasonable alternatives to ConocoPhillips' proposed action, as discussed in detail in the next section.	The Willow MDP Project was designed in accordance with requirements in the NPR-A IAP, which is consistent with both the NPRPA and FLPMA. The NPRPA, as amended, requires oil and gas leasing in the NPR-A and the protection of surface values to the extent consistent with exploration and development of oil and gas. NPR-A IAPs meet that mandate by designating numerous special areas within the NPR-A and closing certain sensitive areas to leasing, while allowing for oil and gas leasing elsewhere. As described in Section 1.3, *Purpose and Need*, FLPMA would apply to any authorization BLM issues for the Project. Pursuant to Section 302(b) and Title V of FLPMA, proposed actions may not cause unnecessary or undue degradation. The BLM avoids unnecessary and undue degradation to these public lands through applicable LSs and BMPs. See Appendix D.1 (*Alternatives Development*), Section 2.1 (*Lease Stipulations and Best Management Practices in the National Petroleum Reserve in Alaska*) for applicable LSs and BMPs. A reasonable range of alternatives was evaluated. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. Issues identified during scoping, such as impacts to caribou and subsistence, were considered while developing alternatives to the proponent's Project. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1 (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All alternatives meet the Project's purpose and need.	N

4.2.20 Request for Extended Comment Period

Table B.2.23. Substantive Comments Received on Request for Extended Comment Period

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
31	1	Culliney	Susan	Audubon Alaska	Request for Extended Comment Period	Audubon is concerned with the pace and timing of this environmental review. There are multiple Arctic projects happening at once now and into the fall. There are so many meetings, all happening at an already busy time of year for Alaskans. . . . The Willow DEIS comment period is happening concurrently with the wetlands permit, although I suppose that has not been issued yet. The Ambler Road DEIS, Alaska LNG, the final decision for the Arctic Refuge and the DEIS for the NPR-A IAP revision is likely coming soon. Thank you to BLM for the two-week extension on the Willow comment period, but a project of this scale at a time of so many quickly developing and related projects requires much more time, closer to 90 days total.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Engagement and Comment Responses*.	N
990	7	Grijalva; Huffman; Lowenthal	Alan; Jared; Raul	U.S. House of Representatives, Committee on Natural Resources; U.S. House of Representatives, Subcommittee on Energy and Mineral Resources; U.S. House of Representatives, Subcommittee on Water, Oceans, and Wildlife	Request for Extended Comment Period	Finally, we object to the limited timeframe provided to the public to comment on the DEIS. The BLM posted the DEIS to its planning website in the afternoon of Friday, August 23, without any announcement in the Federal Register, and with a comment period only extending through mid-October. The Native Village of Nuiqsut, the North Slope Borough, and environmental organizations all requested a two-month comment extension period to ensure meaningful participation, but only two weeks were granted. Given the complexity of the issues and thousands of pages contained within the DEIS, and the overlap with several other comment periods for Arctic infrastructure projects, it is questionable whether the BLM has met its National Environmental Policy Act obligations to provide robust participation by the interested public.	The Draft EIS was posted to the ePlanning website prior to the NOI being published, in order to allow people who were checking the ePlanning site an additional week for review (above and beyond the standard EIS review period). The process of publishing the NOI in the *Federal Register* takes about a week. Cooperating agencies, including the NVN and NSB, were notified that it would be posted on the ePlanning website a week early, if they wanted to take advantage of that extra review time. The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
33	2	Krause	David	The Wilderness Society	Request for Extended Comment Period	In conclusion, we encourage BLM to slow down and at a minimum to extend the comment period for an additional 60 days. As we have heard tonight, there are many, many major Arctic projects currently underway, and the project needs time to meaningfully engage in these processes.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
9	2	Miller	Pamela	—	Request for Extended Comment Period	I request 30 more days at the end of the comment period in order to have time to review a hard copy of the document.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
39	1	Miller	Pamela	—	Request for Extended Comment Period	I request 30 more days in the public comment period (after Oct. 29) in order to adequately review this major action.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
864	19	Psarianos	Bridget	Trustees for Alaska	Request for Extended Comment Period	BLM posted the draft EIS to its planning website in the afternoon of Friday, August 23, without any announcement in the Federal Register. Environmental groups, the Native Village of Nuiqsut, and the North Slope Borough requested a minimum 62-day and 45-day extension, respectively, to submit comments. This extension was meant to ensure meaningful participation by local communities and the interested public in this process, given that the comment period falls during important whaling and other subsistence harvest seasons. Instead, BLM provided only two additional weeks.	The Draft EIS was posted to the ePlanning website prior to the NOI being published, in order to allow people who were checking the ePlanning site an additional week for review (above and beyond the standard EIS review period). The process of publishing the NOI in the *Federal Register* takes about a week. Cooperating agencies, including NVN and NSB, were notified that it would be posted on the ePlanning website a week early, if they wanted to take advantage of that extra review time. The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
864	20	Psarianos	Bridget	Trustees for Alaska	Request for Extended Comment Period	BLM is also referring to or incorporating by reference numerous documents that collectively amount to thousands of pages. BLM has refused to provide GIS files online, despite being requested to do, frustrating our ability to review and analyze the various alternatives and impacts. Further, BLM posted updates to important appendices as late as October 16, 2019, less than two weeks before the end of the comment period. . . . Allowing the public ample time to gather information and provide analysis is essential. Additional time is also necessary to account for the multiple public comment periods for development activities in the Arctic that overlapped with this comment period.	The data used for the Project are proprietary confidential material of CPAI. Digital data will not be made available to the public. Please refer to the maps in Appendix A (*Figures*) (Volume 2). The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*. The comment regarding the posting of updated appendices after the posting of the rest of the Draft EIS is referring to an unintended omission of supporting documents for the air quality analysis. This unintentional omission was rectified as soon as it was brought to BLM's attention.	N
864	22	Psarianos	Bridget	Trustees for Alaska	Request for Extended Comment Period	Given the complexity of the issues involved, the issuance of this document during the summer and fall when many key staff are unavailable for much of the comment period and when many local communities are engaged in subsistence activities, and the overlap of other comment periods for development projects on public lands in Arctic Alaska, a much longer public comment period was justified.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
992	6	Perry	Sharla	—	Request for Extended Comment Period	I find it very inconsiderate that the BLM held their draft Master Willow Project hearings during whaling season. To not consider the conflict of holding a hearing on a massive project on Iñupiat land during the busiest time of the year is unethical and kind of seems like it's done deliberately to ensure the least amount of participants and public testimony. Respectively, I demand a more appropriate and functional time to hold these hearings so folks do not have to choose between having a seat at the table in decisions made on their homeland or important cultural celebrations and ceremony.	In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N

4.2.21 Request for New Alternative

Table B.2.24. Substantive Comments Received on Request for New Alternative

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
31	3	Culliney	Susan	Audubon Alaska	Request for New Alternative	The range of alternatives should include an alternative without a modular transport island. In the appendix, the agency does not provide a good explanation of why it excluded such an alternative. The reason for a range of alternatives is to analyze those varying environmental impacts, so we would encourage a reanalysis, including an option without an MTI.	The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
1296	7	Imm	Teresa	Arctic Slope Regional Corporation	Request for New Alternative	ASRC shares similar concerns raised by its stakeholders regarding the applicants preferred option for the Module Delivery Options as proposed in DEIS. The proposed 13 acre gravel island, using 396,000 cubic yards of gravel fill will be constructed in Harrison Bay near Atigaru Point. There is a firm local opposition to this proposed Module Transfer Island (MTI) option and valid concerns the gravel island would cause sedimentation of subsistence use areas and pollution from the sandbags used to secure the island in place. ASRC encourages ConocoPhillips to work with the community on viable options that will address their concerns meet the community needs and use existing infrastructure whenever possible.	The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
1296	10	Imm	Teresa	Arctic Slope Regional Corporation	Request for New Alternative	Project Footprint The biggest drivers of negative impacts from the Willow MDP are twofold: the sheer size of the project as compared to more recent project like GMT1 and GMT2, its potential to disrupt subsistence practices and the pace of development and local concerns of development surrounding the community. The Willow MDP will have a gravel footprint of over 400 acres without considering the MTI gravel island. The size of this project is comparable to the Alpine development and the resulting impression on our native lands is profound. ASRC strongly recommends Conoco to look at Alternatives that will use minimal gravel for construction and potentially offer lesser levels of impacts to the environment.	Alternatives C and D were developed in part to reduce the overall gravel footprint, in addition to impacts to other resources. The Final EIS includes further Project design and engineering refinements aimed specifically at reducing the overall gravel footprint, such as infield roads to drill sites BT3, BT4, and BT5 being narrowed from 32 feet wide at the surface to 24 feet wide.	N
69	1	Mekiana	Effie	—	Request for New Alternative	And we talked to the village and they are seeing little changes about that herd diverting other way, because all of these are coming out, your drill pads and your operation and all these heavy equipment disturbing their route to come this way. So, it is changing the route of the caribou from all of these drilling things you guys want to drill. It shouldn't be drilled every year; it should be drilled every other year so the caribou can pass by. So that it's changing our caribou route like he said. There's got to be al — another alternative to do this so we can survive [unclear] years.	Halting drilling and operations every other year would affect the economic feasibility of the Project, as the drill rig would have to be mobilized, rigged up, drill, and demobilized frequently. Drilled wells pumping and processing oil would need to be stopped and restarted, which increases the risk of spills. This would also extend the impacts many decades. This would substantially increase drilling costs, increase spill and safety risks, and spread impacts of drilling over a longer period of time. In addition, limiting drilling to every other year would not be reasonable regulation under the lease rights granted to CPAI; leases are subject to a limited term of years, for which BLM cannot unreasonably delay project proposals.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1294	1	Nukapigak	Joe	Kuukpik Corporation	Request for New Alternative	Based on the current design and Draft EIS analysis. Kuukpik does not believe the proposed Willow Project is balanced and environmentally responsible, or that it adequately protects the land and the wildlife resources on which Nuiqsut depends for subsistence. More specifically, the Draft EIS's analysis of Alternatives C and D confirms that the proposed alternatives for a roadless BT4 and/or BT5 should have been carried forward Eliminating the road connections to BT4 and BT5 looks increasingly like one of the better alternatives available, but the Draft EIS inexplicably doesn't analyze either option despite repeatedly confirming that the proposed 25 mile north-south road system would disrupt and deter migrating caribou, particularly those moving east from Teshekpuk Lake towards Nuiqsut. . . . Despite all these potential benefits, the Draft EIS doesn't analyze the impacts of eliminating roads to BT4 and BT5 or either one individually. Instead, that alternative is summarily dismissed without enough explanation to even really know why . . . Although Kuukpik acknowledges that a roadless BT4 and/or BT5 would require a slightly larger drill pad and an airstrip, it's unlikely that the net increase in the gravel footprint of two roadless satellites would be 30 acres *larger* than about 12 total miles of gravel road. If BLM believes otherwise, it should "show its work" so to speak because we suspect this calculation could only be reached by vastly over-stating how large the roadless satellites would need to be under this alternative. . . . Particularly in the instances of BT4 and BT5, a little more air traffic may well have substantially less impacts than the same or lesser acreage of an active infield road. . . . Kuukpik also believes the roadless BT4 and/or BT5 option could be better overall than either Alternative C or D because it would offer the maximum amount of road access to both substance users and CPAI, while nevertheless eliminating very significant portions of road that are not as useful to either CPAI or subsistence resources. For all these reasons and more, Kuukpik strongly urges BLM to analyze the alternative of constructing BT4 and BTS as roadless satellites.	Though the elimination of a road would aid caribou movements in the area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. In the case of BT4, the airstrip would be close to the high-density calving area, with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and have some impacts on caribou movements during other times of the year. Making BT4 and BT5 roadless would mean two additional airstrips, one at each drill site. The impacts of additional fill (and the multitude of associated impacts of the fill) and additional air traffic (and the additional indirect effects of that traffic) would be greater than the impacts of building an infield road to these sites; therefore, it would not be included in detailed analysis. The increase in air traffic for a roadless alternative is substantial. The addition of one more airstrip under Alternative C would add 7,473 more fixed-wing trips and 489 helicopter trips over the life of the Project (62% more fixed-wing traffic and 20% more helicopter traffic than having a road).	N
1294	3	Nukapigak	Joe	Kuukpik Corporation	Request for New Alternative	Kuukpik has also long advocated for an alternative that would eliminate the proposed Module Transfer Island ("MTI"). But the Draft EIS doesn't analyze a single alternative to that plan. That is truly astonishing. No other project in the history of the North Slope has required constructing a relatively permanent offshore gravel island just to deliver the production modules, but this project can't be built any other way? That's just not credible. Kuukpik is absolutely confident that CPAI can devise a way to safely transport its modules to the Willow area without building an island that will create long term safety and navigational issues for subsistence users trying to access Fish Creek. . . . The Final EIS needs to delve into those alternatives if BLM wants to find an alternative that is balanced and responsible and meets legal requirements for NEPA and for the various permitting standards at the federal, State, and local levels. None of the options in the Draft EIS look like they meet those standards, perhaps least of all the preferred alternative.	The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
1294	5	Nukapigak	Joe	Kuukpik Corporation	Request for New Alternative	For BT4 especially, there would also be a heightened impact on calving. All caribou are known to be affected by traffic rates exceeding 15 vehicles per hour. And most maternal caribou in particular do not habituate to road traffic, which would affect caribou in the project area for at least three weeks every spring/summer. The fact that BT4 in particular and its proposed access road is now located just outside the Teshekpuk Lake Caribou Habitat Area is a helpful change but does not eliminate the impact on calving. Figure 3.12.5 shows BT4 and about a mile or more of its access road lying within the medium calving density area. The rest of that access road is still shown to be within a lower density calving area. . . . . A moderately larger BT4 with no permanent gravel road connection would almost certainly cause less impacts on the ground than a slightly smaller drill site with a 7 mile access road. The Final EIS needs to look at this option in detail so stakeholders can compare the site specific impacts of expanding BT4 against the potential benefits of eliminating the access road to that site. . . . The Draft EIS estimates that BLM's preferred Alternative B would generate about 1,190 *new* flights per year, which comes out to about 3-4 flights per day (though that's not a precise number since flights would fluctuate during construction and production). What's particularly interesting. though, is that Alternative C is only estimated to require about 400 more flights than Alternative B over the entire the life of the project. Based on the assumed 30 year lifespan, that's only about one extra flight per month in exchange for eliminating the road between the Willow Processing Facility and BT1. That could be the kind of tradeoff Nuiqsut residents are willing to make.	Though the elimination of a road would aid caribou movements in the area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. In the case of BT4, the airstrip would be close to the high-density calving area, with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and have some impacts on caribou movements during other times of the year. Making BT4 and BT5 roadless would mean two additional airstrips, one at each drill site. The impacts of additional fill (and the multitude of associated impacts of the fill) and additional air traffic (and the additional indirect effects of that traffic) would be greater than the impacts of building an infield road to these sites; therefore, it would not be included in detailed analysis. The increase in air traffic for a roadless alternative is substantial. The addition of one more airstrip under Alternative C, would add 7,473 more fixed-wing trips and 489 helicopter trips over the life of the Project (62% more fixed-wing traffic and 20% more helicopter traffic than having a road). Traffic values have been updated for the Final EIS based on refined Project engineering and logistics planning; over 26 new tables detailing traffic have been added to Appendix D.1, *Alternatives Development*.	N

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1294	12	Nukapigak	Joe	Kuukpik Corporation	Request for New Alternative	The Draft EIS does nothing to dispel the concerns Kuukpik has always had about building the MTI in the already-shallow waters of Harrison Bay. First, the offshore area in and near the island's proposed location is very shallow and already difficult to navigate for boaters trying to access Fish Creek. Constructing and then abandoning a gravel island in this area will only make that worse, especially as (or "if") the gravel disperses to the east and south towards (and across) the mouth of Harrison Bay and towards the Fish Creek Delta. This is a real navigational concern considering the gravel island alone would introduce close to half a million cubic yards of gravel into an area where navigation is already challenging because of unpredictable sand and gravel bars and ice flows and generally shallow water. The point of that information was to emphasize that already-existing navigational problems at the mouth of Fish Creek will only get worse if the MTI is constructed, especially if the island is just abandoned and allowed to fester as a navigational obstruction and then as a source of additional silt to clog the mouth of Fish Creek and other areas used by Nuiqsut subsistence boaters. The Draft EIS mentions this concern in passing, but concludes there's nothing to worry about. But the Draft doesn't cite any scientific study or information to dispel Nuiqsut's concerns. It just notes the issue and then blithely concludes that no problems are expected to occur without any evidence to support that "expectation." But that "expectation" isn't even consistent with impacts other offshore operators have acknowledged, which is that artificial nearshore islands *do* affect currents and sedimentation by producing artificial shoaling that affects navigation. . . . [S]edimentation around these nearshore islands is a problem, and the MTI would only exacerbate those problems in an area that is already shallow and difficult to navigate.	The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. Currents and potential accretion and shoaling for the Atigaru Point MTI are described in Section 3.8.2.6, *Module Delivery Option 1: Atigaru Point Module Transfer Island*. The MTI would be 2 miles offshore and is not expected to impact navigation near the mouth of Fish Creek, nor is that gravel expected to drift 2 miles toward the mouth of a river in an aggregated form.	N
1294	17	Nukapigak	Joe	Kuukpik Corporation	Request for New Alternative	Kuukpik previously described its concerns with the proposed mine site just 7 miles away from Nuiqsut. The Draft EIS mostly confirms those fears, and in fact increases some of them. For one thing, it appears CPAI now believes it will need to blast for 5 years instead of the 4 that Kuukpik and Nuiqsut previously understood were likely . . . One of Nuiqsut residents' other chief concerns is that CPAI plans on blasting a total of at least 4 seasons (2020-2023 for BT1 through BT3 and main infrastructure, then again in 2027-28 for BT4 and BT5). The proposed site is just 2-3 miles farther from the village than the ASRC Mine Site, where blasting rattles the windows in Nuiqsut and effectively drives some residents to travel out of town during periods of mining activity. Though the impacts in town from blasting at the proposed new mine should be somewhat less than that, they may still be considerable. And based on the reaction to this past year's gravel mining, there is likely to be considerable resistance in Nuiqsut to the idea of three consecutive years of blasting. CPAI and BLM need to look at alternatives to reduce these impacts to both subsistence users and the village itself. The Draft EIS does not seem to include any discussion of alternatives that would speed up the mining process or require it to be accomplished in fewer seasons. The Final EIS should explore such options.	The Tiŋmiaqsiuġvik Mine Site would be 7 miles from Nuiqsut, which is 4 miles farther from Nuiqsut than the ASRC Mine Site. As described in Section 3.6.2.3, *Alternative B: Proponent's Project*, sound from blasting at the mine site would attenuate to 59 dBA in Nuiqsut, which is roughly the volume of conversational speech (as described in Table 3.6.1). In order to complete mining operations in fewer years, gravel would need to be stockpiled in large volumes for placement over the following season(s), resulting in additional impacts, or an all-season gravel road would need to be constructed to the mine site, which would also result in additional impacts. As described in Table D.3.1. and Table D.3.2., BLM considered use of the ASRC Mine Site and use of alternative methods to blasting. These options were eliminated for a variety of reasons described in those tables.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1307	21	Pardue	Margaret	Native Village of Nuiqsut	Request for New Alternative	BLM considered a no-action alternative and three alternatives that do not differ in any meaningful way in terms of impacts to subsistence. All of the alternatives BLM considered result in a finding of significant restrictions to subsistence. (DEIS, Appendix G) According to BLM, "[t]he long-term differences in direct impacts between Alternatives B and C are considered minimal because both alternatives would involve similar overall amounts of air and ground traffic, and both would include a year-round access road to the west of the Nuiqsut's core caribou hunting grounds" (DEIS, Appendix G). For Alternative D, BLM states that "Alternative D may result in fewer impacts on caribou availability than Alternative B due to the lack of a year-round gravel access road connecting the Project to existing development (e.g., GMT-2, Alpine), however, the BLM still anticipates a major redistribution of resources would occur under this alternative" (DEIS, Appendix G). Further, "[m]any benefits of reduced deflection from the lack of an access road would be offset by the aircraft traffic (including take offs and landings of large fixed-wing aircraft) in addition to the combined effects of a linear pipeline along the route between GMT-2 and the Project, parallel pipeline racks between GMT-2 and Alpine facilities, Project infield roads, drill sites, and the WPF, the location of and activity at the gravel mine site, and other disturbances described above for Alternative B" (DEIS, Appendix G). There is therefore no alternative other than the no action alternative—which BLM asserts it cannot choose—that reduces impacts to subsistence. Section 810 requires an agency to consider *all* feasible alternatives, not just those that satisfy all of the project proponent's wishes. (City of Tenakee Springs, 915 F.2d at 1311) . . . BLM should consider the following alternatives: -An alternative where no gravel island is constructed and existing roads and infrastructure, as well as ice roads, are used for construction of the Willow project; -An alternative considering seasonal (i.e., winter-only) drilling; -An alternative eliminating infrastructure from within the Teshekpuk Lake Special Area; -An alternative considering a different gravel mine location; -Any alternative configurations for the layout, size or location of project's drilling pads or the Willow Central Processing Facility; -Any alternative using an existing airstrip rather than construction of at least one new airstrip for the Willow project; -Use natural gas and renewable energy for Project purposes with minimal backup diesel, rather than relying on diesel for facility operations, eliminating the need for diesel pipelines; and -Delayed project permitting.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. Specific to an alternative where no gravel island is constructed: The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. Specific to an alternative considering seasonal (i.e., winter-only) drilling: Drilling only during the winter season would reduce drilling to approximately 2 months per year; the ice road season is only about 4 months, and the drill rig would have to be mobilized, rigged up, drilled, and demobilized in that time period. This would affect the economic feasibility of the Project. This would also effectively extend the impacts many decades. (*Note*: CD3 includes its own airstrip and its own river access.) See Appendix D.1 (*Alternatives Development*), Section 3.1.5.2, *Ice Road or Tundra Access Only*. In addition, limiting drilling to every other year would not be a reasonable regulation under the lease rights granted to CPAI; leases are subject to a limited term of years, for which BLM cannot unreasonably delay project proposals. This would substantially increase drilling costs and spread impacts of drilling over a longer period of time. The BLM has also evaluated this scenario before. The BLM considered a roadless alternative with seasonal drilling in detail in the GMT-1 Supplemental EIS, but eliminated use of that alternative in the GMT-2 Supplemental EIS. Part of the BLM's criteria for reasonableness includes the economic viability of each project alternative; for the GMT-2 Supplemental EIS, a roadless alternative with seasonal drilling was ruled out based on economic viability. The BLM included the economic analyses used to screen out a roadless alternative with seasonal drilling in GMT-2 Supplemental EIS, Appendix O. Specific to an alternative eliminating infrastructure from within the TLSA: The purpose and need cannot be met without any infrastructure in the TLSA. Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. Like most or all previous NPR-A projects, much of the Project area overlaps previously undisturbed area. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA. Specific to an alternative considering a different gravel mine location: Table D.3.1 and D.3.2 in Appendix D (*Alternatives Development*) addresses other gravel mine sites considered. In addition, Section 3.1.5.1, *Use of Clover Mine Site*, in Appendix D.1 describes why the Clover Mine Site was determined not preferable to the proposed site, primarily due to an insufficient quantity of material and closer proximity to Nuiqsut, as well as additional impacts. Specific to alternative configurations for the layout, size, or location of Project drilling pads or the WPF: This was discussed during the Alternatives Development Workshop with the cooperating agencies, and an alternative location for the processing facility (approximately 5 miles to the east of where the Project proponent proposed it) was included in BLM's Alternative C . The Project proponent examined this alternative location, and agreed that it would minimize impacts; thus the proponent changed the central processing facility location for its Project (Alternative B) in the Final EIS. The layout and size of the drilling pads was also discussed, and it was determined that the Project proponent had already optimized these Project components to minimize impacts to wetlands and other environmental resources, while still being able to access the target resources. Also, moving the location of drill pads would not allow CPAI to exercise its rights under its leases to extract all the oil and gas possible within the leased areas. Specific to any alternative using an existing airstrip rather than construction of at least one new airstrip for the Willow MDP Project: Use of existing airstrips was considered and dismissed. The rationale for this is documented in Table D.3.1 and D.3.2 in Appendix D.1. Specific to alternatives to use natural gas and renewable energy for Project purposes rather than diesel: natural gas–powered vehicles have not proven reliable at the cold temperatures faced on the North Slope. Renewable energy would be out of scope of CPAI's Project. There is not a renewable energy market on the North Slope. Specific to delayed Project permitting: Under the NPRPA, the BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation; BLM may not preclude CPAI from developing its leases or delay the permitting process.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
43	1	Person	Brian	—	Request for New Alternative	Regarding the Willow Development project, I guess, you know, I tend to be in favor of alternative B and the pad off of Atigaru Point, although, I do have some concerns about that pad where you're going to do the barge lift transfer or module transfer. One at — in the EIS and in the discussions with ConocoPhillips, they suggest that that island will, eventually, erode away when, in fact, their data that ConocoPhillips collected, the symmetry of that area suggests that it hasn't changed since the 1950s. So, I think wave action will take the top of that island off, eventually, and it's just going to turn it into a navigational hazard for the hunters of Nuiqsut and Barrow, as well. And so, I think either the project — the operator should either maintain that island or remove it completely back to the beach. I understand that it can't be put on the tundra, because it's going to be contaminated, itself, and you don't want to kill the tundra. But, I think, one, it's a huge navigational hazard; and, two, it's a complete waste of an enormous amount of gravel that could be used for beach erosion or for, you know, or beach protection or potentially other projects that may occur in this area in the future.	These concerns are discussed in the Final EIS Section 3.16.2.6 (*Module Delivery Option 1: Atigaru Point Module Transfer Island*) and in Section 3.8.2.6 (*Module Delivery Option 1: Atigaru Point Module Transfer Island*). It should also be noted that the SDEIS and FEIS describe a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
864	27	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	The draft EISs range of alternatives is inadequate for multiple reasons. The draft EIS fails to meaningfully consider the No Action alternative, as required by NEPA. Further, BLM failed to consider reasonable alternatives that would eliminate the proposed gravel island in Harrison Bay, avoid impacts in Special Areas, avoid additional airstrips, or utilize seasonal roadless drilling to decrease impacts to important surface resources. Importantly, the new and revised alternatives that will be necessary to remedy these significant gaps will not be minor variation[s] of the existing alternatives that are qualitatively within the spectrum of alternatives that were discussed in the draft. To remedy the inadequate range of alternatives, a revised draft EIS is necessary.	The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. Under the NPRPA, the BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation; BLM may not preclude CPAI from developing its leases. The No Action Alternative would not meet the Project's purpose and need but is included for detailed analysis to provide a baseline for the comparison of impacts of the action alternatives as required by 40 CFR 1502.14(d). Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. Like most or all previous NPR-A projects, much of the Project area overlaps previously undisturbed area. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. It should be noted that the SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
864	29	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	BLM has failed to include any alternative that is sufficiently protective of surface resources as a result of the agencies failure to accurately characterize the purpose of their federal action according to their own legal mandates. Instead, the agencies merely parrot the project applicants purpose. A draft EIS must give full and meaningful consideration to all reasonable alternatives to the action. The alternatives considered may not be entirely driven by a private applicants preferences. Here, by narrowing its purpose and need statement, BLM considered an unreasonably narrow range of alternatives.	The purpose and need statement and the range of alternatives follow NEPA regulations and the guidelines in BLM's NEPA Handbook (H-1790-1) (DOI 2019). The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need.	N
864	32	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	BLM has failed to consider a reasonable range of alternatives. BLM improperly limited its consideration of alternatives based on screening criteria which appear to be primarily preferences of the project proponent to reduce costs, not considerations to meet BLM's legal mandates. All of the action alternatives involve the same pad size and placement, the same road and/or pipeline alignments (where no infield road exists), the same pad size and amount of infrastructure at the new Willow processing facility, a massive offshore gravel island to barge in modules, a new airport west of Nuiqsut, a gravel mine is inside the Ublutuoch (Tiŋmiaqsiuġvik) River 0.5-mile setback; infrastructure within the Colville River Special Area; and infrastructure inside of the Teshekpuk Lake Special Area. BLM has unreasonably limited its range of alternatives such that all of the alternatives are nearly identical to ConocoPhillips proposed action.	The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1) (DOI 2019); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The overall gravel footprint (pad and road size and location) were scrutinized to minimize development and impacts within the CRSA and TLSA. It should be emphasized that the development proposed in the TSLA is within an area that is specifically available to oil and gas leasing. At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	33	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	BLM has improperly dismissed alternatives based on ConocoPhillips initial evaluation described in Appendix D, Section 3.1.5. In essence, this section describes ConocoPhillips success in limiting BLM's consideration of alternatives before the BLM's NEPA process had even begun. For instance, ConocoPhillips eliminated the Clover material site from BLM's consideration of a potential alternative source for some the gravel required for the project. While the proposed mine site is closer to the project area and further from Nuiqsut, Clover is located outside of the Ublutuoch (Tiŋmiaqsiuġvik) River 0.5-mile setback, meaning there may have been environmental tradeoffs that BLM did not even consider. Additionally, ConocoPhillips had previously eliminated any concept requiring only ice road or tundra access within the project area. Because development with access other than gravel road or air would not provide continuous access to the Project area, it would not satisfy the project purpose and need to support production and transportation of petroleum resources. BLM should not unreasonably interpret the projects purpose and need statement to eliminate alternatives before considering them in a NEPA analysis. As explained further below, it's not clear why continuous access via road is necessary, or why activities could not be limited to the winter season to eliminate the need for additional gravel infrastructure and aircraft traffic.	Alternatives, including roadless alternatives, were fully vetted by the BLM, in coordination with the cooperating agencies. The reasons for dismissing the Clover Mine Site are discussed in Appendix D.1, *Alternatives Development*, Section 3.1.5.1, *Use of the Clover Mine Site*. These reasons included the site only being able to provide approximately 10% of the required gravel quantity, the closer proximity to Nuiqsut (resulting in increased noise impacts from mining activity), poorer quality material (resulting in a much larger disturbance footprint), impacts to several streams and drainages, and longer gravel haul trips. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need.	N
864	35	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	BLM refused to consider eliminating the module transfer island and requiring ConocoPhillips to transport equipment via existing infrastructure over the Colville River ice bridge. The rationale in the draft EIS in Table D.3.2 includes statements that this approach would increase the overall Project footprint because of the need to construct on-site fabrication facilities, and would increase the overall amount of vehicle traffic near Nuiqsut during the already busy ice-road season when the annual Alpine resupply ice road is in operation. But meaningful details are not provided. How much would the project footprint really increase, given the massive amount of gravel needed to construct an offshore gravel island? How much would vehicle traffic increase at Alpine over and above the baseline? What would that increased vehicle traffic actually mean in terms of impacts to air quality, when it would offset significant amounts of gravel mining? Additionally, what about the benefits to Alaska in terms of jobs if smaller modules were used, potentially constructed at the Port of Anchorage as was the case for the Northstar project in the Beaufort Sea, and then the smaller modules could be connected onsite at Willow? What about the offsets to impacts to subsistence resources like marine mammals and caribou, which will be negatively impacted by the gravel island and transport of modules through the Teshekpuk Lake Special Area? Where are these numbers and how did BLM determine them? Statements such as these about resource impacts appear to be woven in as afterthoughts in this table, which largely addresses issues such as technical and economic feasibility with language that seems to have originated from ConocoPhillips, the project applicant. In sum, BLM cannot disregard alternatives in this manner, without taking a hard look at the environmental tradeoffs in a NEPA document.	At the beginning of the EIS process, CPAI asserted that it was not technically feasible to transport modules across the Colville River during the winter. However, through new hydrologic data collected for Ocean Point, CPAI has since determined the crossing location to be feasible. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
864	39	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	The draft EIS purports to include alternatives to the proposal, but these slight changes to the project description cannot be considered a meaningful range of alternatives. BLM is not limited to the project descriptions described by ConocoPhillips, and is legally obligated to explore and evaluate reasonable alternatives in its EIS beyond those identified by the project proponent. BLM has failed to do this. Table D.3.2 in the draft EIS summarizes BLM's rationale for eliminating a host of alternatives without full consideration. In this table, BLM disposes of 26 alternative components with merely a few sentences each. An agency must [r]igorously explore and objectively evaluate all reasonable alternatives to a proposed action. Though an agency must briefly discuss the reasons for eliminating alternatives, here BLM dismisses many alternatives that should have been subject to a NEPA review to determine their potential environmental tradeoffs, and to allow for public comment and input on the potential benefit of these alternatives over ConocoPhillips proposed action.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need.	N
864	41	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	Seasonal Drilling: As groups pointed out during scoping, BLM should have considered a roadless alternative that provides for winter season-only drilling, similar to what takes place at Colville Delta 3 (CD-3). Development that avoids drilling during the snow-free months would mitigate industrial disturbance impacts on nesting birds, caribou fall migration, and summer/fall subsistence activities during these critical times. It also would reduce well blowout risks to open water in wetlands and floodplains. Automatic shut-off valve requirements for pipelines, as well as effective and redundant leak detection, would greatly reduce the need for a road to address potential pipeline spills. Year-round drilling activity is likely to involve additional infrastructure, increased impacts from flights, more noise and pollution, and other impacts that would not necessarily be present for a seasonal roadless alternative. Drill rigs for a seasonal drilling alternative potentially can be shared in the non-drilling months with ConocoPhillips at other pads, or with another operator (e.g., Oil Search on state lands) to greatly reduce operator costs (similar to what was done when constructing the roadless drill pad, CD-3). Seasonal drilling should have been considered as an alternative, particularly given the vast amount of gravel resources contemplated for this project. Such an operation would likely have the fewest impacts on aquatic ecosystems, which is relevant for the Corps permitting requirements to identify and select the LEDPA. Seasonal drilling is not even discussed among the alternatives considered but eliminated from further consideration in Appendix D of the draft EIS. While ConocoPhillips rejected ice road only operations out of hand, a seasonal drilling alternative involving air access at Willow is reasonable alternative raised by the public during scoping was disregarded by the agency entirely. BLM should supplement or revise its draft EIS and reissue it so that the public has a chance to weigh in on such a seasonal drilling alternative.	Drilling only during the winter season would reduce drilling to approximately 2 months per year; the ice road season is only about 4 months, and the drill rig would have to be mobilized, rigged up, drilled, and demobilized in that time period. This would eliminate the economic feasibility of the Project. This would also effectively extend the impacts many decades. (*Note*: CD3 includes not only its own airstrip but its own river access.) This is described in Appendix D.1, *Alternatives Development*, Section 3.1.5.2, *Ice Road or Tundra Access Only*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	45	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	The agency failed to consider any alternatives that adjusted the placement of infrastructure onshore at all. All Project road and bridge alignments and pad locations are the same across all action alternatives, regardless of BLM BMPs and stipulations regarding setbacks for sensitive areas. The only indication that BLM considered this issue is found in the agency's dismissal of a suggestion to reduce the size and/or number of drill pads. BLM's rationale is as follows: Would not meet the purpose and need to recover the maximum extent of the targeted hydrocarbon resources. Drill pads have already been optimized to the minimum size needed for the proposed activity. Drill pad locations have already been optimized to provide maximum accessibility to the resources based on existing extended-reach drilling technology and reservoir location and characteristics. Besides improperly invoking the project proponents purpose and need, BLM's justification also lacks any description of why extended reach drilling could not be used within this project area. What is the maximum length possible for extended reach drilling? Or even more basic, how far apart are the pads within the Willow field planned to be? That simple information on the project design, which is relevant to a host of impacts, is not readily apparent in the draft EIS. BLM's conclusory statements that ConocoPhillips has optimized the drill pad size and locations do not meet the agency's obligation under NEPA.	It should be noted that the Project proponent had already worked to optimize its road and bridge alignments and pad locations to minimize wetland impacts and to comply with BLM stipulations, setbacks, and BMPs. While other alignments and facility locations were considered and discussed briefly during the alternatives development workshop with cooperating agencies, those that clearly had greater environmental impacts were dismissed during the workshop, and no further documentation was warranted.	N
864	62	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	BLM indicates that the deviations would be applicable to all alternatives. BLM's problematic purpose and need statement and its limited range of alternatives is reinforced by the fact that all of the alternatives would need the same deviations. BLM did not consider an alternative that would not require deviations or would require fewer or minimal deviations, but it should.	Many of the alternatives considered but dismissed had greater environmental impacts, and would have required more deviations. As described in Appendix D.1, *Alternatives Development*, Section 3.1.2, *Alternative Components Considered during Alternatives Screening Process*, additional alternative components evaluated and dismissed by CPAI were reviewed by the BLM during the alternatives development process and dismissed due to screening criteria; these are described in CPAI's Environmental Evaluation Document (CPAI 2018). This included an alternative with fewer deviations, but that alternative would have provided fewer environmental or human impacts and thus was not carried forward for detailed analysis. This was erroneously left out of the Draft EIS and was added to Final EIS Table D.3.1 and Table D.3.2 in Appendix D.1 (*Alternatives Development*).	N
864	128	Psarianos	Bridget	Trustees for Alaska	Request for New Alternative	The Results of BLM's Analysis Show Significant Air Quality Impacts from the Proposed Project. The air pollutant impacts across the various Alternatives considered in the DEIS (A, B, C, D) are generally similar in magnitude, with a couple notable exceptions: (1) significant $PM_{2.5}$ impacts are predicted to result from routine operations activities under Alternative C; and (2) PM_{10} impacts from construction activities vary widely, ranging from 56% of the NAAQS under Alternative C to as high as 96% of the NAAQS under Alternative D. The range of Alternatives considered in the DEIS fails to incorporate project design factors and mitigations that would meaningfully affect air quality impacts. The air quality impacts from drilling activities are virtually the same across Alternatives B, C, and D for all pollutants and the NOx impacts from all activities (i.e., construction, drilling, and operations) are virtually the same across Alternatives B, C, and D. BLM should consider an Alternative aimed at minimizing air quality impacts, e.g., one that would incorporate factors aimed at reducing short term NOx emissions from drilling.	Air quality analysis (i.e., modeling) has been updated for the Final EIS to address Project refinements and updates as proposed by the Project proponent; see Final EIS Section 3.3 (*Air Quality*) and Appendix E.3 (*Air Quality Technical Appendix*), for detailed results and impacts discussion. All action alternatives meet NAAQS and AAAQS as designed and analyzed for the Final EIS. NEPA requires the disclosure of impacts; the State of Alaska is the permitting authority for air quality. Air quality impacts are similar across action alternatives because the action alternatives reflect similar activity: construction and operation of an oil and gas development, reflecting the same number of wells and oil processing volumes.	N
85	2	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Request for New Alternative	A number of issues raised in public seeping comments could have been addressed, or evaluated, by including one or more conservation-oriented alternatives. Features of those alternatives could include strengthened BMPs for caribou and other wildlife, fewer drill sites (accessing same oil using directional drilling), and a significantly smaller gravel footprint and infrastructure.	Additional BMPs in the Final EIS were added in response to public comments and input from subject-matter experts. Information regarding other alternatives mentioned in this comment (e.g., fewer drill sites and smaller gravel footprint), as well as the rationale for dismissing those alternatives, is included in Appendix D.1, *Alternatives Development. Note*: The Project would employ extended reach drilling.	N
85	5	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Request for New Alternative	Commenters requested that at least one alternative be developed and evaluated in the EIS that is specifically aimed at minimizing impacts to caribou, such as modifying some of the infield road alignments to run parallel, instead of perpendicular, to caribou migration patterns, or an elevated loop system to reduce caribou deflection. It appears two of the alternatives (C and D) were developed with some forethought to minimizing impacts on caribou. The main difference among alternatives appears to be how different elements of the development are linked together (ice road versus gravel road, and road transport versus air transport). Unfortunately, the DEIS sends mixed signals about whether these "caribou-friendly" alternatives really benefit caribou. For example, the DEIS offers the following conclusion about Alternative D: "Effects to subsistence, sociocultural systems, and public health under Alternative D would be similar to those described under Alternative B. This alternative would have the least impact to caribou availability. This would eliminate the potential for subsistence harvesters to access new areas via road and would increase the level of air traffic, adding to the adverse effects. The effects on subsistence, sociocultural systems, and public health may be highly adverse (emphasis added) and would be disproportionately borne by the Nuiqsut population" (3.17.3.5). If alternative D (fewest roads, smallest footprint) and alternative B (the Conoco Phillips alternative) will have similar effects on subsistence, and those effects are painted as potentially "highly adverse," what possible alternative should a concerned caribou hunter in Nuiqsut be drawn to? Is there any meaningful difference among any of the three action alternatives? If not, as this conclusion suggests, the requirements of a meaningful NEPA analysis has not been satisfied.	Caribou data do not show a clear east-west migration. However, east-west migration might be a common behavior at the times and places where subsistence hunting occurs. Because the majority of the TCH winters on the coastal plain, the herd does not display the same annual migratory patterns typical of other barren-ground caribou herds. The portion of the herd that winters in the Brooks Range typically moves northwest to southeast in the fall and southeast to northwest in the spring, but there is considerable variation depending on where the animals are located prior to migration. Thus, an alternative with roads that were east-west and not north-south would not necessarily have lesser impacts to caribou. Ramps and elevated loops in pipelines can aid caribou movements if placed in strategic locations, but elevating pipelines to a minimum height of 7 feet and separating roads and pipelines have been shown to allow caribou movements, although the possibility of delays or deflections is larger in caribou without previous exposure to pipelines. Pipelines that are elevated to a minimum of 7 feet aboveground, typically have sections that are much higher than 7 feet near creeks or other areas of topographic relief. Text in Section 3.16.2.4, *Alternative C: Disconnected Infield Roads*, and Section 3.16.2.5, *Alternative D: Disconnected Access*, was revised to clarify that Alternative D would have similar types of effects as Alternative B but that the magnitude of effects would be different. Text in Section 3.17.3.4, *Alternative C: Disconnected Infield Roads*, and Section 3.17.3.5, *Alternative D: Disconnected Access*, was revised similarly.	Y

4.2.22 Request for New Analysis

Table B.2.25. Substantive Comments Received on Request for New Analysis

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
989	17	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Request for New Analysis	Page 10, 2.5.3.2.1 Bridges We would like more analysis on bridge crossings. A clearance of four feet may be insufficient due to ice jams.	Information on bridges is provided in Final EIS Appendix D.1 (*Alternatives Development*), Section 4.2.3.2.1 (*Bridges*). Available information on ice conditions in the streams where bridges are proposed is provided in Appendix E.8 (*Water Resources Technical Appendix*), Section 1.2, *Hydrology of Rivers and Streams in the Willow Area*. Effects analysis of bridge crossings is provided in Final EIS Section 3.8.2.3.4, *In-Water Structures (bridges, culverts, water intakes, boat ramps*), and Appendix E.8, Section 1.3.1.1, *Bridge Crossings*. All action alternatives would include bridges that would be designed 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. Bridges crossing Judy (Iqalliqpik) and Fish (Uvlutuuq) creeks would be designed to maintain a bottom chord clearance of at least 13 feet above the 2-year design-flood elevation (open water) to provide vessel clearance. Water surface elevations would be analyzed with regard to snow and ice impacts, as well as open-water conditions. Design analysis would be based on observations and measurements and modeled conditions (e.g., ice and snow effects) and would vary from crossing to crossing based on site-specific conditions. Analysis regarding how the Colville River ice bridge in module delivery Option 3 might contribute to ice jams downstream in the Colville River was added to the SDEIS and the Final EIS (Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*).	N

4.2.23 Soils and Permafrost

Table B.2.26. Substantive Comments Received on Soils and Permafrost

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	256	Psarianos	Bridget	Trustees for Alaska	Soils and Permafrost	Damage to permafrost from gravel mining would be permanent (229.6 acres). . . . The application of BMPs and LSs are the main focus of curtailing potential impacts to permafrost, but do not adequately address the permanent and irreversible impacts for this impact. The only mitigation measure for impacts to permafrost would be total avoidance because once impacts occur, there is no way to rectify the impact through rehabilitation or restoration. And the BMPs and LSs are not specific enough (and how they would be monitored and enforced is a big gap that BLM must address) to ascertain whether any of the measures would be effective at minimizing direct and indirect impacts to permafrost wetlands.	Additional avoidance, minimization, and mitigation measures were added to Section 3.4.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*.	Y

4.2.24 Spills

Table B.2.27. Substantive Comments Received on Spills

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
11	4	Baraff	Lisa	—	Spills	According to the DEIS, approximately 80,000 to 150,000 barrels of seawater would be needed per day during drilling, and this would come from the seawater treatment plant Oliktok Point and would be transported to the project via a new seawater pipeline, which would go under the Colville River. And that is, I find, concerning for a lot of reasons. And there's also permafrost impacts and other impacts to tundra, and I imagine that the grounds and groundwaters there are being affected. And by putting a pipe under the river, I think, opens up a great potential for spills of diesel and seawater and encroaching into the Colville, and that's too great a risk to take. And I don't think there are any safety measures that can guarantee that this will never occur.	Text was added to Section 4.3, *Potential Spills during Drilling and Operations*, to clarify the risk of spills from the HDD crossing. The proposed HDD crossing would be similar in design and size to the existing Alpine HDD crossing. There have been no reported spills from pipelines that cross rivers via HDD technology (ADEC 2020). Because the HDD crossing would include built-in secondary containment (i.e., outer casing) and extensive leak detection technology, the potential for a spill or release from the Project HDD crossing of the Colville River is very low.	Y
989	37	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Spills	Page 115, 3.13.2.7 Oil Spills and Accidental Releases There does not appear to be any mention of drilling mud (i.e., drilling fluid). Depending on the type of drilling mud, this may be an issue. Managing drilling mud is an issue BLM should address.	Additional details on the drilling mud composition (including the Colville River HDD crossing and production and injection wells) have been added to Section 4.2 (*Potential Spills during Construction*) and Section 4.4 (*Hazardous Materials*).	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1302	54	Dunn	Connor	ConocoPhillips	Spills	Within the DEIS discussion on spills from aboveground storage tanks (ASTs), the BLM identifies an expected very low to low frequency of occurrence of spills for the Project and states that analysis of Alaska Department of Environmental Conservation spill data provides no indication that any of the reported loss of integrity spills associated with petroleum development infrastructure escaped secondary containment. The discussion continues, however, to include information from the Alpine Oil Discharge Prevention and Contingency Plan (ODPCP) spill response scenario for an AST rupture, which is a hypothetical, worst-case incident where the spill escapes secondary containment. Within the Alpine ODPCP scenario, the volume of discharge that escapes secondary containment is an arbitrary value only for planning purposes to demonstrate ConocoPhillips robust spill response capabilities and is in by no means modelled (as stated by the BLM) under any actual conditions or operational parameters. BLM then states similar results would be expected from the Project. BLM's statement about similar results refers to a hypothetical planning scenario and implies spills could escape secondary containment at Willow. That statement has no factual basis and contradicts BLM's previous conclusion that spill risk from ASTs would be very low to low. These statements about similar results to a hypothetical planning scenario should be removed or revised. ConocoPhillips provides secondary containment with sufficient capacity to retain the total volume of an AST, as required by state and federal regulations; and, as the data shows, a spill is unlikely to escape secondary containment.	Text was clarified in Section 4.3, *Potential Spills during Drilling and Operations*.	Y
1302	55	Dunn	Connor	ConocoPhillips	Spills	The DEIS addresses risk of spills from pipelines and states expected rate of occurrence of spills to be very low. Estimated spill volume at select waterway crossings is provided for the infield produced fluids and produced water injection pipelines (i.e., Tables 4.3.2 and 4.3.3). However, no such spill volume estimation is provided for the Willow Pipeline. The potential for spills from the Willow Pipeline (export) is discussed in text on page 172 and within Appendix H Table H.1.1, but no spill volume is estimated and the Willow Pipeline is not included in a table similar to Tables 4.3.2 or 4.3.3. For completeness, we recommend adding such information into the Spill Risk Assessment section, along with discussion on the potential effects of a larger spill volume on streams or channels and shoreline habitat downstream from the leak source, and the potential to reach Harrison Bay. The Willow Pipeline would be similar to existing sales-quality crude oil transmission pipelines on the North Slope and would have similar or lower likelihood of spills and, as BLM states in section 4.5, would not present a uniquely or an unusually high likelihood of a large or very large spill.	The estimated spill volumes for the Willow MDP Project export pipeline have been added to Section 4.3, *Potential Spills during Drilling and Operations*, as suggested.	Y
1302	56	Dunn	Connor	ConocoPhillips	Spills	Additionally, the DEIS addresses risk of spills from reservoir blowouts and states the expected relative rate of occurrence of a blowout event to be very low. Reservoir blowout modeling is presented in the DEIS and includes approximate distance and width of oil fallout for a blowout of 225,000 barrels in Table 4.3.1. Figures 4.3.1 through 4.3.5 illustrate the blowout modeling at the proposed Willow drill sites. However, the figures incorrectly depict the width of the oil fallout plume. Considering the scale on the figure, the plume appears to be over a mile wide, which is about two times the width described in Table 4.3.1. This gives the impression the area of impact is greater than that determined by the blowout modeling. A common mistake when mapping a geographic extent of the blowout oil fallout plume is to measure out the linear distance from the well down a center line of the hypothetical plume and then extend the toe out on each side by the full width. Instead, the toe of the plume should extend out from the center line by only half the width on each side to ensure the full width equals the width determined by the blowout model. A graphic depiction of this mistake is included in Attachment B to this letter. This mistake should be corrected.	The figures (Figure 4.3.1 through 4.3.5) have been updated, as suggested.	Y
1295	19	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Spills	Spill Prevention and Response We recommend that the Final EIS analyze how the proposed spill prevention and response measures, including inspection and leak detection, would help to mitigate potential leaks and spills through prompt detection and repair. We appreciate that the Draft EIS includes a Spill Risk Assessment in Section 4.0 and discloses potential spill risk as well as plans for spill prevention and response. Information related to spill and leak detection and prevention and the environmental consequences of potential spills can also be found in the Alternatives and Environmental Consequences Sections of the EIS and in associated appendices. Due to number of separate places in the document where information on spills can be found, it is challenging to understand the likely environmental impacts from these potential spills and leaks. For example, Section 4.0 states that "Leaks from produced fluids pipelines could result in spills sizes ranging from very small spills to medium-large spills. The expected duration of these types of spills could be very short (less than 4 hours) or continue for a period of days to weeks depending on the type and location of the leak." It is not clear from this statement how the spill prevention and response measures proposed for the project would be able to reduce the likely size or duration of a spill.	For the Final EIS, spill prevention strategies and techniques that would help minimize the potential for spills to occur, as well as specific response techniques that would mitigate the effects of potential spills if they occur, were consolidated in Appendix H, *Spill Summary, Prevention, and Response Planning*. These strategies and techniques, coupled with training of spill response personnel and regular inspections of pipelines and other key infrastructure, would be used and/or implemented throughout the life of the Project.	Y
1295	20	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Spills	We additionally recommend that information regarding spill prevention, including spill and leak detection, and spill response be consolidated in Section 4.0, and cross-referenced elsewhere in the document, to improve understanding for decision makers and the public and to simplify the EIS analysis. Information on leak detection can be found in multiple places in the EIS: Section 2.5.8 discloses that CPAI would "maintain a corrosion control and inspection program that includes ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection and geometry pigs, and forward-looking-infrared technology"; leak detection for pipelines crossing under the Colville River is briefly described in Appendix D Section 4.2.8.1; and a discussion of anticipated forward-looking infrared leak detection requirements can be found in Appendix H Section 2.3. Information on spill response can also be found in multiple places in the document.	For the Final EIS, spill prevention strategies and techniques that would help minimize the potential for spills to occur and specific response techniques that would mitigate the effects of potential spills if they occur were consolidated in Chapter 2.0 (*Spill Prevention and Response Planning*) of Appendix H, *Spill Summary, Prevention, and Response Planning*.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1295	21	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Spills	Underground Injection Control When discussing pipeline construction under the Colville River, the Draft EIS states that "Drill cuttings and drilling fluids (also called mud) from the [horizontal directional drilling] process would not be discharged to surface water or the tundra but would be transported to an existing permitted UIC well for disposal or would be temporarily stored until an on-site Class I UIC disposal well is operational." We support the goal of avoiding surface discharge of drilling wastes as it reduces environmental impacts; however, we note that the operator may only inject drill cuttings into a UIC Class I non-hazardous well if the fluid containing the cuttings is either RCRA non-hazardous or RCRA-exempt exploration and production associated waste. Drill cuttings resulting from pipeline construction would not be RCRA exempt exploration and production associated waste. We therefore recommend that the Final EIS describe the make-up of the drilling fluid and clarify whether it would be RCRA non-hazardous waste. The EPA UIC Program would be available to assist if more information regarding allowable Class I injection under the Safe Drinking Water Act is needed.	Additional details on the drilling mud composition (including the Colville River HDD crossing and production and injection wells) have been added to Section 4.2 (*Potential Spills during Construction*) and Section 4.4 (*Hazardous Materials*). CPAI would use RCRA nonhazardous materials for drilling mud during the Colville River HDD operations.	Y
988	2	Peter	Enei Begaye	Native Movement	Spills	Of particular concern to us is an area that has been protected in the Integrated Activity Plan (IAP) of the National Petroleum Reserve in Alaska (NPR-A). This area has been designated a sensitive wetland area for key species of molting birds and it is the birthing and migration haven for the Teshekpuk Caribou herd. The BLM's Draft EIS findings articulate a high probability of oil spills throughout this project and in every alternative other than No Action. Oil spills on or near this biodiverse area would cause irreversible damage. Three communities surrounding this area would be directly rely on the subsistence use of the eider duck and caribou for their food security which would also be threatened by this project. The NPR-A IAP currently protects the specific areas that the proposed Willow Master Development project would irreversibly impact.	The EIS finds that the likelihood of very small to small spills occurring is very high to high; the likelihood of medium to large spills is medium to high. The high-likelihood spills are expected from vehicles, equipment, and facility piping. These spills would likely occur on gravel infrastructure, making them quick to detect and easy to clean up. Appendix H (*Spill Summary, Prevention, and Response Planning*) also addresses the measures that CPAI would undertake to comply with BLM LSs and BMPs related to fuels and hazardous materials handling and storage, spill prevention, and spill response activities.	N
864	121	Psarianos	Bridget	Trustees for Alaska	Spills	BLM's Spill Risk Assessment is Inadequate. BLM's Spill Risk Assessment is inadequate because it fails to use the most updated spill data from the Alaska Department of Environmental Conservation (ADEC), it does not include a quantified analysis, and it does not provide specifics on North Slope blowout incidents so it is impossible for the public to know if BLM's analysis is complete. ADECs Prevention Preparedness and Response office has an Oil and Hazardous Substance Spills Database that is queryable. In order to develop an adequate Spill Risk Assessment, it is possible to obtain and analyze ADEC spill reports until the present date to obtain the most up-to-date spill rates, and BLM did not do that and should have for all types of infrastructure including aboveground tanks and hazardous substance spills.	A quantitative oil spill risk analysis is beyond the scope of the EIS. The qualitative oil spill risk assessment as presented is sufficient for agencies that are responsible for approving the Willow MDP Project to have a clear understanding of the relative risks associated with accidental oil spills that may occur from construction, drilling, and operations activities, and to allow them to make informed decisions as to how spills may affect the environment. This same approach has been used on a number of North Slope EISs for similar types and sizes of projects (e.g., Nanushuk project). Information and data used for the qualitative assessment include oil spill data associated with North Slope petroleum development activities from July 1995 through 2011 (15.5 years) as compiled and presented by ADEC (2010, 2013), as well as other recent technical studies and EISs relative to North Slope oil and gas activities (see Chapter 4.0, *Spill Risk Assessment*), and ADEC's SPILLS database. Information presented in these reports, studies, and databases is sufficient to assess the potential risks for oil spills and the potential effects they may pose to the environment associated with the Project.	N
864	122	Psarianos	Bridget	Trustees for Alaska	Spills	Additionally, BLM provided only qualitative information in its Spill Risk Assessment of the likelihood of spills, e.g., Very Low, Low, Medium, etc. Instead, BLM should have utilized ADEC spill data and combined it with oil production information to develop a quantified spill rate (e.g., number of spills of a particular size range per million barrels produced). Those rates then could be multiplied by the likely production at Willow to obtain the probable number of spills for each spill size range for crude oil, produced water and hazardous substances.	The qualitative oil spill risk assessment as presented in the Final EIS is sufficient for the public and decision-makers to understand the relative risks associated with accidental oil spills that may occur from construction, drilling, and operations. The same approach has been used on a number of North Slope EISs for similar types and sizes of projects (e.g., Nanushuk project).	N
864	123	Psarianos	Bridget	Trustees for Alaska	Spills	Additionally, because well blowouts are serious events, it is important for the EIS analysis of blowouts to be both transparent and complete. The draft EIS states that "Only seven shallow-gas blowouts have occurred on the North Slope since 1974. Although it is conceivable that a shallow-gas blowout could occur during drilling, the expected relative rate of occurrence of such an event would be very low. In the event one did occur, it would likely have a duration of 1 to 2 days and affect approximately 20 to 25 acres of tundra adjacent to the well pad (USACE 2018). Spilled material would include drilling fluids (i.e., mud), but not crude oil." Nowhere does the draft EIS list which blowouts were included in this statement, nor does the draft EIS discuss the worker safety aspects of such occurrences. Notably, in recent years there have been several incidents where thawing permafrost on the North Slope has resulted in uncontrolled releases from BP wells, posing both safety and environmental hazards. While not everyone calls these uncontrolled releases blowouts, they meet the Schlumberger Oilfield Glossary definition of a blowout: 1. n. [Drilling] Uncontrolled flow of formation fluids from a well. An uncontrolled flow of formation fluids from the wellbore or into lower pressured subsurface zones (underground blowout). Uncontrolled flows cannot be contained using previously installed barriers and require specialized services intervention. A blowout may consist of water, oil, gas or a mixture of these. Blowouts may occur during all types of well activities and are not limited to drilling operations. In some circumstances, it is possible that the well will bridge over, or seal itself with rock fragments from collapsing formations downhole. Because of their serious nature, these BP incidents should be included in BLM's EIS analysis of blowouts, however the public has no way to know whether they were.	It is assumed that the comment is referring to two incidents (one in 2017 and the other in 2019) where two old production wells were "jacked" up out of the ground a few feet and leaked small quantities of oil and gas before they were contained. No oil escaped the drilling pad in either of these instances. Both of the wells in question were drilled and installed in the 1970s. Significant improvements to well and casing designs have been made since those wells were completed, as well as other measures (e.g., adequate well spacing) implemented to help maintain the integrity of the underlying permafrost layer beneath well pads. Therefore, the two incidents described above are not relevant to the Willow MDP Project as potential oil spill events and, therefore, have not been addressed in the EIS.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	198	Psarianos	Bridget	Trustees for Alaska	Spills	The DEIS Fails to Consider Impacts of an Oil Spill on Marine Mammals Chapter 4 and section 3.13 of the DEIS report that an oil spill could occur in the marine environment and along existing marine waterways, but fail to assess the likely impacts to the marine environment and to marine mammals if a spill were to actually happen. Any spill that contacts marine mammals directly or indirectly through the marine environment can be expected to have an adverse impact. BLM must disclose the likely impacts to marine mammals in the event of reasonably foreseeable oil spills, large or small. The DEIS also does not explore the efficacy of oil spill cleanup methods, and does not distinguish between spills in the terrestrial and marine environments in terms of cleanup operations or likelihood of success. There are no proven methods to clean up oil on ice. Efforts to rehabilitate animals after exposure to oil are largely ineffective. BLM must take a hard look at all the foreseeable impacts from oil spills, which are certain to accompany the Willow project.	Potential spills in the marine environment are described in Section 4.2, *Potential Spills during Construction*. Effects of spills on marine mammals are described in Section 3.13.2.10, *Oil Spills and Accidental Releases*. The primary route by which oil could enter the marine environment is through barging of materials or during construction of the MTI. Barging of materials would occur over four summer seasons, and spills would only occur if the vessel ran aground or sinks or if its containment compartment(s) were breached and the contents released. Construction of the MTI could create very small to small spills from support vessels; spills would be limited to refined products (e.g., diesel, lubricating oil), localized to the immediate area of the MTI, and short in duration (less than 4 hours). If an onshore spill were to occur, oil would be unlikely to reach Harrison Bay due to the distance to the drill sites and the sinuous nature of the streams in the area.	N

4.2.25 Stakeholder Engagement

Table B.2.28. Substantive Comments Received on Stakeholder Engagement

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1296	1	Imm	Teresa	Arctic Slope Regional Corporation	Stakeholder Engagement	ASRC has not yet committed to an alternative due to local concerns and wishes to discuss BLM's analysis and community concerns further in the ANCSA Consultation. ASRC shares similar concerns as the local stakeholders regarding the proposed Alternatives and Modular Transfer options and requests BLM to work with the operator on creative solutions to address them.	The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. CPAI has changed its Project to include this module delivery option rather than the two previously considered offshore MTIs. BLM has reached out to ASRC to offer ANCSA consultation.	N
1296	2	Imm	Teresa	Arctic Slope Regional Corporation	Stakeholder Engagement	As stated in BLM's Notice of Intent (NOI) the Willow EIS will be prepared in accordance with recently issued guidance on streamlining and improving the NEPA process, ASRC urges BLM to closely examine and devote adequate time to the concerns brought up by the local stakeholders. Specifically regarding the overall gravel footprint of the project, location and proximity of the BT2 and BT4 drill sites to the Teshekpuk Lake Special Area (TLSA) and the Teshekpuk Lake Caribou Habitat Area (TLCHA), the orientation of the infield road connecting BT1, BT2 and BT4 drill sites and its potential to disrupt caribou movement, the construction of the offshore island in shallow waters of Harrison Bay, the implementation of high-powered lines as technically fast as possible and the location of the proposed gravel mine site.	The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts, including those described by the commenter, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments from local stakeholders and the general public on the Draft EIS, including its supplement. The issues raised by this commenter were all carefully considered by BLM and the cooperating agencies during the alternatives workshop. Alternatives to the Project included in the Draft EIS address many of these concerns, including reduction of the overall gravel footprint (Alternatives C and D), and the orientation of the infield road connecting BT1, BT2, and BT4 and its potential to disrupt caribou movement (Alternative C includes disconnected gravel infield roads to offset this potential impact). However, there are trade-offs in the potential impacts. Though the elimination of a gravel road connection would aid caribou movements in that area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. Elimination of the gravel road connection between BT2 and BT4 was dismissed from further consideration because the airstrip would be close to the high density calving area with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and have some impacts on caribou movements during other times of the year. Regarding the TLSA, while it is true that parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing, all else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. CPAI has changed its Project to include this module delivery option rather than the two previously considered offshore MTIs. Regarding the gravel mine site, BLM and cooperating agencies did request that CPAI provide detailed information as to the availability of alternative gravel mine site options. There were no other practicable and feasible sites that could provide the amount and quality of gravel necessary, without causing greater environmental impacts. This information was provided in Appendix D.1, *Alternatives Development*.	N
1296	4	Imm	Teresa	Arctic Slope Regional Corporation	Stakeholder Engagement	ASRC expects that BLM consider the history of Traditional Knowledge (TK) throughout the EIS and their review of the Willow project. In addition to the environmental data that has been collected over the decades supporting this project, traditional knowledge should be a key source of information in assessing impacts and also supporting appropriate mitigation to minimize potential impacts to the environment and animals, especially those terrestrial animals and birds harvested for subsistence. ASRC recommends that BLM work closely with the local Kuukpik Corporation, Native Village of Nuiqsut, City of Nuiqsut, and ASRC and the NPR-A Working Group in order to incorporate Traditional Knowledge more fully into their decision-making and management of the NPRA.	Text regarding how traditional knowledge was used in the EIS was added to Final EIS Section 3.1, *Introduction and Analysis Methods*. Proposed BMP H-1 would require that a Subsistence Plan be developed and that CPAI describe how it would communicate and coordinate with the community.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1296	9	Imm	Teresa	Arctic Slope Regional Corporation	Stakeholder Engagement	ASRC supports several of the Potential Mitigation Measures listed by BLM, but ASRC encourages ConocoPhillips to continue to work with the community on ways impacts can be further reduced, especially with regards to boat ramps at Fish Creek and Judy Creek. As noted above, ASRC encourages ConocoPhillips to continue evaluating the slope of subsistence ramps, height of the Access Road, and work with local subsistence hunters on continually evaluating impacts to subsistence users and subsistence resources from the Alpine, GMT1, and GMT2 development. Through this collaboration, local subsistence hunters can express their concerns directly to the operator and the operator can directly address concerns whenever appropriate.	Comment noted. CPAI is working with the community with regard to the boat ramp(s) design and location. The Project changes in the Final EIS include changes to subsistence ramps due to collaboration with the community.	N
1296	13	Imm	Teresa	Arctic Slope Regional Corporation	Stakeholder Engagement	BLM correctly notes the burdensome permitting process creates sociocultural impacts on the community of Nuiqsut. ASRC has raised this impact to BLM several times. To alleviate this impact on the community, ASRC urges BLM to host the required, mandatory meetings in the community of Nuiqsut or when requested by the Native Village of Nuiqsut or Kuukpik Corporation. ASRC encourages BLM to maintain alignment with ANILCA with respect to public meetings and adhere to the input from Kuukpik and the Native Village of Nuiqsut on ways to minimize BLM's permitting footprint in the community which has caused unnecessary anxiety and exhaustion.	Pursuant to ANILCA Section 810(a)(1) and (2), BLM conducted hearings in North Slope communities to gather comments regarding potential impacts to subsistence use resulting from the alternatives considered in the Draft EIS. A list of the meetings and meeting dates are provided in Appendix B (*Public Engagement and Comment Response*). In order to capture all relevant comments, the entirety of the public meetings in North Slope communities were captured by a court reporter and reviewed for substantive comments. BLM has met requirements under NEPA for meaningful public engagement. Proposed BMP H-1 would require that a Subsistence Plan be developed and that CPAI describe how they would communicate and coordinate with the community.	N
1294	45	Nukapigak	Joe	Kuukpik Corporation	Stakeholder Engagement	Volume 1, page 152, Section 3.17.5, Additional Suggested Best Management Practices or Mitigation. These three suggestions sound like just more public meetings that may or may not provide any value for Nuiqsut at all. Nuiqsut is already "over-met," and Kuukpik doesn't believe these types of meetings are likely to serve the beneficial purposes BLM seems to suggest by including them here.	BLM will coordinate with NVN on final BMPs for the ROD.	N
1307	4	Pardue	Margaret	Native Village of Nuiqsut	Stakeholder Engagement	BLM has not adequately considered NVN's input and feedback in the DEIS. In scoping comments, NVN made clear that it would like to play an active role in the decision-making process and in the management of the region's natural resources. We feel that our feedback and concerns were not effectively heard in this DEIS process. BLM and other federal agencies involved in the management of the NPR-A must take steps to more meaningfully involve NVN and consider our feedback. Steps the agency should take to improve the government-to-government relationship in the EIS process include: -Setting out specifically how the government-to-government consultation and cooperating agency process will occur for the Willow MDP EIS; -Explaining how BLM will address and respond to NVN's comments and suggestions; -Requiring incorporation of traditional knowledge in decision making; -Sharing information and studies with NVN in a meaningful and accessible way; and -Explaining what happens if NVN and BLM disagree on a proposal, finding, or decision.	BLM considers consultation with tribal entities and other federal agencies to be a critical part of the EIS process. BLM has conducted multiple consultation meetings during the development of the EIS with NVN and the Naqsragmiut Tribal Council (see Final EIS Section 1.10.4, *Tribal Consultation*) Comments and input received during those meetings have been carefully considered as part of the overall analysis of alternatives, as well as development of potential mitigation measures. In particular, the new overland module delivery option was developed specifically to address concerns raised by NVN regarding potential impacts from the offshore module delivery options. BLM will continue to consult with NVN and provide updates on studies and analyses through regular correspondence with all the cooperating agencies, as well as through specific government-to-government consultation with NVN. NVN and BLM have a cooperating agency MOU related to the NEPA process for the Willow MDP Project, which sets out the cooperating agency process.	N
864	3	Psarianos	Bridget	Trustees for Alaska	Stakeholder Engagement	Public participation is a core purpose of NEPA but has not been achieved to date. Instead, the manner in which BLM and the Department of Interior are operating appears to be specifically targeted at suppressing the public's ability to review and engage in the evaluation of these substantial projects, contrary to NEPA. The BLM must ensure adequate time and opportunity to engage the public in each step of this process. A 9-week comment period during the summer and fall on the draft EIS is insufficient to meet BLM's NEPA obligations to provide robust participation by the interested public, given the sensitive resources, the complexity of the issues and analysis required, and the timing of the proposal review. Multiple public comment periods for development activities in the Arctic overlapped with this comment period. Three massive EIS documents were released by BLM during a time period which is critical to meet the subsistence needs of the communities in Arctic Alaska. BLM's decision to release all of these analyses in nearly overlapping timeframes reflects a complete failure by the agency to involve the public meaningfully in these NEPA processes.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*.	N
65	4	Riley	Stanley	—	Stakeholder Engagement	There's a lot of families that have been using these areas for time immemorial, you know. And so, I was wondering, is there anybody on staff that has traditional knowledge?	Text regarding how traditional knowledge was used in the EIS was added to Final EIS Section 3.1, *Introduction and Analysis Methods*.	Y
1054	4	—	—	—	Stakeholder Engagement	The obvious rush to approve development all over the Arctic and the State of Alaska by the Trump Administration and its BLM has stacked many major developmental EIS and planning documents together within a similar time period, rendering it impossible for commenters to comment thoroughly on so many projects. This virtual disallowance of full public availability to read, research, and comment on the documents in the established overlapping comment periods flies counter to the spirit of the legal requirements to provide for public comment. Please offer us a more complete, more comprehensive, effective, conservation-minded, and far-sighted plan and EIS instead of what we have before us.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. In accordance with NEPA regulation 40 CFR 1506.10(c), the BLM published the Willow MDP Draft EIS for a 45-day public comment period. The BLM extended the comment period by 15 additional days (60 total days) to accommodate the needs of the public and North Slope residents (who noted it was whaling season in Nuiqsut and Utqiaġvik [Barrow]). The Willow MDP EIS was prepared under Secretarial Order 3355, which directs the BLM to strive to complete each EIS within 1 year from the issuance of an NOI. The secretarial order implements NEPA regulation 40 CFR 1500.5(e), which requires agencies to reduce delays by establishing appropriate time limits for the EIS process. Notwithstanding the secretarial order, the Final EIS was published approximately 2 years after the NOI was published, during which time BLM provided three public comment periods, with public meetings. Public participation was very robust; the BLM received numerous public comments during EIS development, and public meeting attendance was high. See Final EIS Appendix B, *Public Engagement and Comment Responses*. The BLM prepared the Draft EIS according to 40 CFR 1502 and the BLM's NEPA Handbook (H-1790-1); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N

4.2.26 Subsistence and Alaska National Interest Lands Conservation Act Section 810 Analysis

Table B.2.29. Substantive Comments Received on Subsistence and Alaska National Interest Lands Conservation Act Section 810 Analysis

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
986	7	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Subsistence, ANILCA 810	The chief complaint amongst resident hunters has been air traffic and this development will increase air traffic. BLM and CPAI should identify measures to consolidate and reduce air traffic and minimize noise. Furthermore, caribou may have difficultly crossing the elevated industry roads to the Willow production facility and drill sites, especially in the winter when snow builds up alongside the road. Our residents have also noted the difficulty of crossing these elevated industry roads in winter. Industry maintains that these roads must be steep to support industrial traffic. We ask that the BLM require CPAI to work with local residents to modify standard road designs or identify other means to mitigate road-related impacts to tundra travel.	The BLM reviewed all scoping comments and considered them when drafting the EIS. The impact of air traffic and infrastructure on subsistence resources and activities, including physical obstructions posed by roads, is described in Section 3.16.2.3.2 (*Resource Availability*) and Section 3.16.2.3.3 (*Harvester Access*). The BLM has conducted several Native consultations with Kuukpik and NVN in which the BLM collected input on how to mitigate impacts to subsistence and considered that input in the EIS (see Section 1.10.4, *Tribal Consultation*, and Section 3.17.2, *Meaningful Engagement*). The BLM also extracted suggested mitigation from public comments and considered it in the EIS. BMP/ROP H-11 of the IAP requires the lessee/permittee to coordinate directly with affected communities in the NPR-A to prevent unreasonable conflicts between subsistence uses and other activities.	N
989	11	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Subsistence, ANILCA 810	Nuiqsut's hunters use the Willow prospect area to hunt caribou, as well as wolves and wolverines. Construction, additional infrastructure and increased aerial and ground traffic could deflect these species from the area, resulting in decreased availability, requiring hunters to travel further to access these resources. The chief complaint amongst resident hunters has been air traffic and this development will increase air traffic. BLM and CPAI should identify measures to consolidate and reduce air traffic and minimize noise.	Measures to avoid, minimize, and mitigate effects to wildlife from air and ground traffic are described in Section 3.12.2.1, *Avoidance, Minimization, and Mitigation*. Proposed BMPs F-2 through F-4 address air traffic. Ground traffic is addressed in proposed BMP M-1. Consolidating and reducing air and ground traffic should be part of the Aircraft Use Plan or Vehicle Use Plan required in these BMPs.	N
989	39	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Subsistence, ANILCA 810	Page 166, Section 3.19.11 - Cumulative Impacts to Subsistence and Sociocultural Systems Please address the following: While the Kuukpik Spur Road has provided access to residents and the road system has seen increased use in every year since its construction, there is an acknowledged decrease in use of roads the further away the roads are from the community. In addition, there is a substantial decrease in accessing roads east of Nigliq Channel: "only 10% reported using roads crossing east of the Nigliq Channel toward the CDl and CD4 developments" (Willow MDP EIS Section 3.16. See also Appendix G ANILCA 810 Analysis Page 21). The reasons for the "[d]ecreased use of roads to the east of Nigliq Channel could be due to a relatively lower abundance of resources in that area, or due to heightened concerns about safety due to the greater concentration of infrastructure and human activity." A cumulative effects analysis should be based on the concentration of development east of Nigliq Channel (using actual quantitative measurements) and the quantitative association of effect (i.e., only 10% reported . . .) in order to predict consequences of past, present, and RFFA development on the community west of the Nigliq Channel.	Discussion has been added to Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*, to further explain the cumulative impacts of road access on subsistence. Because data on road use are limited, it is not possible to draw quantitative conclusions regarding road use and association with concentration of development.	Y
1302	13	Dunn	Connor	ConocoPhillips	Subsistence, ANILCA 810	BLM's analysis of impacts to caribou, especially in DEIS Sections 3.16.2.3 does not match the analysis of terrestrial mammals in DEIS Section 3.12.2.3. This is an inconsistency that detracts from one of the most important subjects of the DEIS subsistence and therefore this is an important matter for BLM to address and improve in the final EIS. While the problem is most apparent and significant in the analysis of caribou, it persists in the analysis of other subsistence resources throughout Section 3.16. A key issue with Section 3.16 is that in multiple instances it purports to identify potential negative impacts on subsistence without a basis in available science or experience. One illustrative example is that in subsistence section 3.16.2.3.1 (page 136), BLM identifies blasting at the mine site as one of the Project activities that may cause direct mortality to individual animals. But potential mortality to fish, birds, or caribou from mine site blasting is discussed only in the subsistence section, not in the sections analyzing project impacts on fish (DEIS Section 3.10.2.3.3; Fish, Injury or Mortality), birds (DEIS Section 3.11.2.3.3; Birds, Injury or Mortality), or caribou (DEIS Section 3.12.2.3.3; Terrestrial Mammals, Injury or Mortality). Blasting (which will occur only in the winter) will not occur in fish-bearing waters, or during the summer season when waterfowl are present, or in the event caribou are present at the mine site, so it is sensible that blasting is not identified in those other sections of the DEIS as a potential source of mortality. To our knowledge, no mortality of any fish or wildlife species has ever occurred from gravel mine site blasting on the North Slope. Since blasting is not a significant source of mortality on the animals, it cannot be a significant source of animal mortality negatively impacting subsistence. Accordingly, BLM should remove references to blasting from Section 3.16.	While many of the conclusions of the subsistence section regarding caribou availability (Section 3.16.2.3.2.1, *Caribou*) are based on the analysis provided in the terrestrial mammals section (Section 3.12.2, *Environmental Consequences*), additional impacts may occur that are not addressed in the biological resources section. Impacts that may seem minimal from a biological perspective, and are therefore not addressed in the biological resources sections, can have greater impacts on resource availability for subsistence users. Thus, the biological resources section and subsistence section sometimes address impacts at different scales. Impacts regarding resource abundance should be consistent with the biological resources sections. The study team reviewed the subsistence analysis regarding potential resource mortality and resource availability to ensure consistency with biological sections. Specifically, removed reference to blasting as it pertains to resource injury or mortality in Section 3.16.2.3.1, *Resource Abundance*, and Section 3.16.2.3.2, *Resource Availability*. Sections 3.16.2.3.2.1 (*Caribou*), 3.16.2.3.2.2 (*Furbearers*), and 3.16.2.3.2.3 (*Waterfowl*) do address blasting, but only as it pertains to disturbance or displacement. For the EIS, winter is defined as November through April; waterfowl hunting begins in April, and therefore, it is possible that there could be some impacts from mining.	Y
1302	33	Dunn	Connor	ConocoPhillips	Subsistence, ANILCA 810	After revising analysis of subsistence issues in Section 3.16 and Appendix G, BLM should propagate changes in the analysis and conclusions into the other sections that rely on the subsistence analysis, including Environmental Justice (3.17.3.3, 3.17.7), Public Health (3.18.23) and Cumulative Effects (3.19.11 and Table 3.19.4). BLM should also propagate changes to Appendix E.16, and especially Tables E.16.18 and E.16.19.	Section 3.17 (*Environmental Justice*), Section 3.18 (*Public Health*), and Section 3.19 (*Cumulative Effects*), as well as Appendix E.16 (*Subsistence and Sociocultural Systems Technical Appendix)*, were updated to reflect updates to the subsistence analysis.	Y
1302	118	Dunn	Connor	ConocoPhillips	Subsistence, ANILCA 810	This table asserts a high likelihood of reduced resource availability in the cumulative case. This statement is not supported by the analyses conducted in the Terrestrial Mammals section (either for the project alone, or cumulatively). The potential impacts described in preceding sections, particularly the biological sections, do not mention any reduction in abundance of subsistence resources. Furthermore, published literature supports a history of coexistence of subsistence lifestyle and industrial development on the North Slope.	Conclusions regarding impacts on resource availability are not based on the biological sections alone; impacts that may seem minimal from a biological perspective can have larger impacts on subsistence users. The conclusions regarding subsistence resource abundance in Appendix G (*ANILCA Section 810 Analysis*), Section 8 (*Evaluation and Finding for the Cumulative Case*), have been revised to be consistent with the biological resources sections which concluded that there will be a reduction in the overall abundance of resources in the NPR-A IAP/EIS Alternative D or E scenario. Published literature supports a history of impacts on subsistence and adaptation by subsistence users. While harvests have continued to be stable in many cases, development has also been shown to reduce harvests in certain regions of the state. The ability of residents to adapt to the presence of development does not mean that impacts are not occurring.	
1302	155	Dunn	Connor	ConocoPhillips	Subsistence, ANILCA 810	(Page 139, Section 3.16.2.3.2.4, Subsistence and Sociocultural Systems) Culvert installation would occur during winter ice road season when any fish are located in deeper overwintering locations.	Section 3.16.2.3.2.4, *Fish*, was edited to reflect that the effect would be relatively infrequent, based on the Project description text (Final EIS Appendix D.1, *Alternatives Development*, Section 4.2.3.2.2, *Culverts*).	Y

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1302	175	Dunn	Connor	ConocoPhillips	Subsistence, ANILCA 810	In a number of places in Chapter 3, the analysis of impacts does not acknowledge that construction would primarily occur during winter. For example, subsistence activity peaks during June through August; therefore, impacts from construction activities would not overlap with peak subsistence activity, lessening impact. Bird behavioral impacts would also be reduced with much of construction occurring in winter. Noise associated with gravel mining, which would take place only in winter, would not affect waterfowl or waterfowl harvest.	While it is true that subsistence activities as a whole peak in June through August, certain activities (e.g., furbearer and upland bird hunting) occur or peak in the winter, and subsistence uses within the Project area primarily occur in winter; thus, winter construction and development activities are a primary source of direct impacts. For the EIS, winter is defined as November through April; waterfowl hunting begins in April, and therefore, it is possible that there could be some impacts from mining. Reviewed subsistence discussion to ensure that the timing of construction and development activities are adequately addressed and revised for clarity in Section 3.16.2.3.2 (*Resource Availability*).	Y
1296	8	Imm	Teresa	Arctic Slope Regional Corporation	Subsistence, ANILCA 810	Additional concerns raised at the public meeting in Nuiqsut was the timing of the Willow MDP decision-making prior to understanding the impacts from the recent GMT1 and GMT2 development. Specifically, ASRC notes that local hunters are wary of impacts to subsistence from GMT1 and GMT2 that may not be fully realized prior to the Willow MDP Record of Decision. With respect to this concern, ASRC recommends that ConocoPhillips to work directly with Nuiqsut Trilateral Group, local hunters, and the NPRA Working Group to closely examine any impacts from GMT1 and GMT2 and proactively address these with respect to Willow MDP. . . . The working relationship between hunters and industry does not end with BLM's NEPAs permitting process but should be maintained throughout life of Willow MDP. To this end, ASRC recommends that ConocoPhillips engage hunters directly and jointly examine how lessons learned from GMT1 and GMT2 can inform the development of Willow MDP outside and beyond the permitting process.	Proposed revisions to BMP H-1 (Subsistence Plan) would require that the Proponent provide BLM with a plan of how it would communicate and coordinate with the community. BLM agrees that there could be a benefit from incorporating lessons learned from prior projects.	N
47	2	Leavitt	Joe	—	Subsistence, ANILCA 810	And if you build the pipeline, how are the hunters going to get across the pipeline? Do they have to drive all the way around to get around the pipeline? And, you know, is there going to be caribou crossings?	Reviewed EIS discussion in Section 3.16.2.3.3, *Harvester Access*, and added references to pipeline height and passability.	Y
1294	2	Nukapigak	Joe	Kuukpik Corporation	Subsistence, ANILCA 810	Throughout the Draft EIS and ANILCA 810 analysis, there is information showing that Alternatives C and D would likely reduce impacts to caribou migration by removing roads and road connections in certain high value areas. BLM even concludes . . . that reducing those on-the-ground impacts would probably be worth accepting some marginal additional air traffic. Whether the community of Nuiqsut ultimately agrees with that conclusion or not (and the community's evaluation of those competing interests should certainly be given far more weight than anyone else's), that conclusion conflicts with and deeply undercuts BLM's decision to prefer Alternative B. The bulk of the Draft's analysis shows that other alternatives would have less impacts on subsistence and Nuiqsut generally. How then can BLM continue to prefer Alternative B? Furthermore, how can it summarily reject other semiroadless options (like a roadless BT4 and/or BT5) that Kuukpik has asked BLM to analyze? . . . Alternatives C and D would reduce the impacts that Kuukpik and Nuiqsut are most concerned about, compared to the preferred alternative. Minimizing caribou deflection should be at the top of BLM's list when it comes to selecting a preferred alternative. . . . But if BLM intends to select an alternative that appears the most likely to negatively impact subsistence, it must explain that decision in detail.	Reviewed discussion of magnitude of impacts between alternatives for consistency with other relevant resource sections, including Section 3.10 (*Fish*), Section 3.11 (*Birds*), Section 3.12 (*Terrestrial Mammals*), and Section 3.15 (*Economics*). Revised subsistence discussion in Sections 3.16.2.3 through 3.16.2.8 (Alternatives B through D and module delivery Options 1 through 3) accordingly. Though the elimination of a road would aid caribou movements in the area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. In the case of BT4, the airstrip would be close to the high-density calving area, with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and have some impacts on caribou movements during other times of the year. Making BT4 and BT5 roadless would mean two additional airstrips, one at each drill site. The impacts of additional fill (and the multitude of associated impacts of the fill) and additional air traffic (and the additional indirect effects of that traffic) would be greater than the impacts of building an infield road to these sites; therefore, it would not be included in detailed analysis. The increase in air traffic for a roadless alternative is substantial. The addition of one more airstrip under Alternative C would add 7,473 more fixed-wing trips and 489 helicopter trips over the life of the Project (62% more fixed-wing traffic and 20% more helicopter traffic than having a road).	Y
1294	9	Nukapigak	Joe	Kuukpik Corporation	Subsistence, ANILCA 810	The Draft EIS-and the ANILCA 810 analysis . . . predicts that proceeding with the preferred alternative could have dire consequences. First, there's the direct impacts from building a series of drill sites and production facilities in an area that the Draft EIS acknowledges is "heavily used by Nuiqsut residents for subsistence, particularly for harvesting of caribou and furbearers (wolf and wolverine) . . . ." In fact, it's suggested that between 5-19% of annual caribou harvests by Nuiqsut hunters occur directly in the project area. . . . Historical data showed that very few caribou have traditionally been harvested within 5 miles of an oil development, and only slightly more at a distance of 6-17 miles. Three of the proposed Willow drill sites (BT1, BT2, and BT3) are about 5-6 miles apart from each other, meaning they are each within the general distance that is historically effectively unused for subsistence. In short, avoidance will eliminate most of the Willow project area from being used much for subsistence. If BLM's information is correct, that could mean an immediate loss of up to 19% of Nuiqsut's caribou harvests in a given year. But in fact, the number is probably higher because the Draft EIS only calculates avoidance on a 2.5 mile radius rather than the 5 miles BLM has previously cited and which Kuukpik has long believed to be more appropriate.	The Draft EIS subsistence section does not calculate avoidance on a 2.5-mile radius, or any radius. The 2.5-mile buffer is for documenting direct (i.e., same time and place) effects. While the commenter cites historic data showing few caribou being harvested within 5 miles of oil development, these data are from a time period prior to oil and gas development in the CRD and when infrastructure was outside the community of Nuiqsut's core subsistence harvesting area for caribou. More recent data indicate that the avoidance effect is not as strong, in terms of distance from development, as development moves closer to the community, and harvests continue to occur at similar levels within 2.5 miles of infrastructure. The data show that complete avoidance of industry of up to five miles is unlikely when development is close to a community and connected by road to that community. In addition, avoidance behavior varies by the individual. While some avoid development altogether, others may avoid development at times of high activity, or they may use industry roads to hunt. Thus, it is unlikely there will be total avoidance of the area and total loss of subsistence harvests in that area.	N
1307	23	Pardue	Margaret	Native Village of Nuiqsut	Subsistence, ANILCA 810	While BLM finds that the cumulative case will alter the distribution of subsistence resources and limit access by subsistence harvesters, it asserts that "the cumulative case is not expected to result in a large reduction in the abundance (population level) of caribou or any other subsistence resource" (DEIS, Appendix G). It is hard to see how BLM could come to any conclusions about the cumulative case, given that it devotes fewer than three pages to the question and does not specifically look at the impacts of Willow in conjunction with specific ongoing and foreseeable projects. Moreover, BLM's meager analysis suggests that there actually will be population-level effects to caribou: "[i]f development continues westward into the core calving area for the TCH, or if it reduces access to key insect relief habitats, then the herd could experience an overall decline in productivity and abundance" (DEIS, Appendix G). BLM must find that the cumulative case may result in a large reduction in the abundance of caribou, or support its conflicting conclusion.	The BLM did not analyze potential westward development into the NPR-A because development has not been proposed and therefore is speculative; westward expansion in this context does not meet the criteria of an RFFA. For this reason, the BLM did not have the rationale required to reach a "may significantly restrict" finding for subsistence uses due to a reduction in the abundance of caribou in the August 2019 ANILCA Section 810 Analysis published with the Draft EIS. The evaluation of cumulative impacts on subsistence in terms of resource abundance has been revised in Appendix G (*ANILCA Section 810 Analysis*), Chapter 8.0 (*Evaluation and Finding for the Cumulative Case*), to address the potential for development within the TCH calving area under the NPR-A IAP/EIS Alternative D scenario.	Y

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1307	26	Pardue	Margaret	Native Village of Nuiqsut	Subsistence, ANILCA 810	BLM's Tier 1 analysis under section 810 of ANILCA is inadequate because it does not consider alternatives that would reduce impacts to subsistence and because its effects analysis is deficient in several key respects. We therefore request that BLM cure these defects and hold a new ANILCA section 810 public hearing so that we may have the full suite of information when we comment.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1 (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All alternatives meet the Project's purpose and need. Consistent with the policy and guidance set forth in BLM IM-AK-2011-008, only those alternatives or options that are reasonable, physically and technically possible, economically feasible, and capable of reducing or eliminating the proposed action from lands needed for subsistence purposes were considered for evaluation under ANILCA Section 810(a).	N
1307	25	Pardue	Margaret	Native Village of Nuiqsut	Subsistence, ANILCA 810	BLM's analysis of Module Delivery Option 2 is also flawed. Option 2, which places the module near Point Lonely, is intended to reduce impacts to Nuiqsut's high subsistence use area. However, as explained in the conservation group comments, it is likely to have more significant impacts on caribou, harming our subsistence opportunities. As the DEIS recognizes, caribou pass repeatedly through narrow corridors on either side of Teshekpuk Lake to access critical insect relief and foraging habitat during the summer (DEIS, Volume 1, page 99). While the ice road proposed to support Option 2 likely would be gone by this time, other activity would still take place, such as helicopter landings to support stick picking. These would occur at a crucial time for caribou, right in a narrow movement corridor. BLM must consider these potential impacts and whether they would cause significant restriction, beyond just the recognition that "air traffic for Option 2 would cause markedly more disturbance of caribou than Option 1"(DEIS, Volume 1, page 108).	Reviewed analysis of Option 2 and revised discussion in Section 3.16.2.7, *Module Delivery Option 2: Point Lonely Module Transfer Island*, to clarify the greater potential for displacement and indirect impacts to caribou subsistence harvesting activities.	Y
864	233	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	BLM's Alaska National Interest Lands Conservation Act (ANILCA) section 810 analysis is inadequate because it does not consider alternatives that would reduce impacts to subsistence and because its analysis of effects to subsistence is flawed in several key respects. . . . BLM's Tier 1 ANILCA section 810 analysis is flawed in several respects. First, the alternatives analysis is flawed because it does not evaluate alternatives that would reduce the project's impact on subsistence. Second, the effects analysis is flawed because: 1) it does not give appropriate attention to impacts to fish and fishing, resulting in an unsupported conclusion that there will be no population level effects to fish; 2) its conclusion that there will be no population-level effects to subsistence species from the cumulative case is inconsistent with its own analysis; 3) its conclusions that the module alternatives will not significantly restrict subsistence are unsupported and contrary to its own analysis; and 4) even for areas where BLM acknowledges significant effects to subsistence, it downplays the level of significant effects.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1 (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All alternatives meet the Project's purpose and need. Potential impacts to fish and fishing are addressed in the Section 810 Analysis sections on *Subsistence Resource Abundance* and *Subsistence Resource Availability*. Based on the available subsistence data for the community of Nuiqsut, fishing occurs downstream from the Project, and therefore, most impacts would be indirect. The analysis provides the most detailed discussion of resource uses which could be directly affected, such as wolf/wolverine hunting and caribou hunting. Reviewed discussion of potential impacts to fish availability and revised text in Appendix G (*ANILCA Section 810 Analysis*), Section B.2.a, (*Displacement of Other Resources*), for additional context and clarity. Conclusions regarding abundance and displacement of fish are based on the biological analysis of impacts to fish resources (see EIS Section 3.10.2, *Environmental Consequences*). The conclusions in the subsistence section (Section 3.16.2.3.2.4, *Fish*) regarding potential impacts to fish abundance and availability, including the potential for population-level effects, are consistent with Section 3.10 (*Fish*). The evaluation of cumulative impacts on subsistence in terms of resource abundance has been revised in Appendix G (*ANILCA Section 810 Analysis*), Section B.8 (*Evaluation and Finding for the Cumulative Case*), to address the potential for development within the TCH calving area under the NPR-A IAP/EIS Alternative D or E scenario. In addition to the three action alternatives analyzed in the Draft EIS, two sealift module delivery options are analyzed. These module delivery options (Options 1 and 2) would not be constructed independently but rather would be paired with an action alternative, all of which the BLM concluded may significantly restrict subsistence uses. Although each of the module delivery options could potentially impact the abundance, availability, and access of subsistence uses and resources, the BLM finds that such impacts would not result in any additional significant restriction of subsistence uses, such that its positive Tier I findings for the three action alternatives would be altered. The BLM appropriately analyzed and prepared findings for each action alternative in the ANILCA Section 810 Analysis. The ANILCA Section 810 analysis documents a "may significantly restrict" conclusion for all action alternatives and the cumulative case, thereby triggering public notice and hearings pursuant to Section 810(a)(1)-(2). These conclusions are consistent with the policy and guidance set forth in BLM IM-AK-2011-008, which requires the BLM to make "a distinct Finding that the proposed action and alternatives may or will not significantly restrict subsistence uses for identified subsistence communities or groups."	Y

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864	234	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	BLM's ANILCA Section 810 Analysis Failed to Consider Alternatives That Would Reduce Impacts to Subsistence. . . . An agency must consider all feasible alternatives that would "minimize the impact of a proposed project on resources which rural village residents of Alaska use for subsistence." An agency cannot decline to consider alternatives or consider only a no action alternative where feasible alternatives exist. This requirement applies to all actions subject to ANILCA, regardless of whether the action would significantly restrict subsistence uses. Here, BLM considered a no-action alternative and three alternatives that do not differ in any meaningful way in terms of impacts to subsistence. All of the alternatives BLM considered result in a finding of significant restrictions to subsistence . . . There is therefore no alternative other than the no action alternative—which BLM asserts it cannot choose—that reduces impacts to subsistence. Section 810 requires an agency to consider all feasible alternatives, not just those that satisfy all of the project proponent's wishes. Many of the alternatives suggested above in the Alternatives section of this comment letter would reduce impacts to subsistence. BLM must consider these alternatives as part of its ANILCA evaluation, as well as its NEPA analysis.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for the Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1 (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. Consistent with the policy and guidance set forth in BLM IM-AK-2011-008, only those alternatives or options that are reasonable, physically and technically possible, economically feasible, and capable of reducing or eliminating the proposed action from lands needed for subsistence purposes were considered for evaluation under ANILCA Section 810(a).	N
864	235	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	BLM's ANILCA Section 810 Effects Analysis is Flawed. . . . BLM's analysis of how Willow will affect fish and fishing is wholly inadequate. In the two instances where BLM touches on impacts to fish, it makes sweeping, unsupported conclusions that impacts will not be significant. For example, BLM states that "[h]abitat loss and degradation could displace or cause individual mortalities of [waterfowl and fish], but the Project is not expected to cause population-level effects." There is no citation for this assertion. BLM later states that "[w]hile construction activities and infrastructure (e.g., ice roads) may temporarily displace fish upstream and downstream, these impacts would be relatively localized and would not be likely to affect harvesting activities farther downstream along Fish (Uvlutuuq) Creek." Further, "[w]ater withdrawals to support ice infrastructure construction could alter fish habitat, but these alterations would be temporary and are not expected to affect fish populations in Fish (Uvlutuuq) Creek. For these two latter assertions, BLM points to the DEIS. However, . . . BLM has no scientific or technical analysis to back up these assertions. There is nothing in the DEIS to suggest that BLM relied on estimates of how many individuals will be affected or the thresholds for loss that each fish population/species can sustain. Without such information, the agency cannot rationally conclude that impacts to individuals will not affect populations or a species as a whole.	BMPs and other state permitting requirements are designed to minimize impacts to fish and fish habitat regardless of species. Impacts were assessed based on life-history characteristics important for species propagation, such as migration, spawning, and overwintering. Effects on those important life-history stages would be greater. Because potential effects would be primarily limited to short durations and would avoid substantial overwintering areas and spawning areas, key life-history phases would be avoided and impacts would be limited to low numbers of individuals. Low numbers of individuals would not affect populations within streams and rivers of the Project area, either in individual waterbodies or as a whole, given the highly migratory nature of most fish species in the analysis area and the specific habitats potentially affected. Population-level effects would be a reduction in numbers of fish using any given stream, or the Project area as a whole. We do not anticipate either level of population effect.	N
864	236	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	BLM's Conclusion that there Will be No Population-Level Effects to Subsistence Species from the Cumulative Case is Incorrect and is Contradicted by its Own Analysis. BLM's cumulative analysis falls far short of adequately considering the impacts of other past, present, and reasonably foreseeable future actions in conjunction with Willow. Its conclusion that the cumulative case will not result in a large reduction in the abundance of subsistence resources is therefore unsupported and, in fact, contrary to its own meager analysis. . . . While BLM finds that the cumulative case will alter the distribution of subsistence resources and limit access by subsistence harvesters, it asserts that "the cumulative case is not expected to result in a large reduction in the abundance (population level) of caribou or any other subsistence resource." It's hard to see how BLM could come to any conclusions about the cumulative case, given that it devotes fewer than three pages to the question and does not specifically look at the impacts of Willow in conjunction with specific ongoing and foreseeable projects. Moreover, BLM's meager analysis suggests that there actually will be population-level effects to caribou: "[i]f development continues westward into the core calving area for the TCH, or if it reduces access to key insect relief habitats, then the herd could experience an overall decline in productivity and abundance." BLM must find that the cumulative case may result in a large reduction in the abundance of caribou, or support its conflicting conclusion.	The conclusions regarding subsistence resource abundance are based on and consistent with the cumulative analysis for biological resources. The evaluation of cumulative impacts on subsistence in terms of resource abundance (Appendix G [*ANILCA Section 810 Analysis*], Section B.8 [*Evaluation and Finding for the Cumulative Case*]) has been revised to address the potential for development within the TCH calving area under the NPR-A IAP/EIS Alternative D or E scenario. The BLM finds that reductions in the abundance of caribou for the cumulative case and selection of the 2020 Final NPR-A IAP/EIS Alternative D or E may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik (Barrow), Atqasuk, Wainwright, and Anaktuvuk Pass (BLM 2020).	Y
864	238	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	Even Where BLM Acknowledges Significant Restrictions, its Analysis Omits Many Significant Effects. BLM concluded that all of the project alternatives except the no action alternative would significantly restrict Nuiqsut's subsistence activities by reducing the availability of subsistence resources and limiting subsistence user access. However, it is not enough to come to the correct conclusions; BLM must also provide a full assessment of impacts, with supporting scientific literature. According to BLM's own guidance, "adequate discussion must be contained within the Section 810 Evaluation to support the findings, so that the public can adequately review the findings and provide input during the DEIS meeting(s) or the ANILCA Hearing(s), if required." As explained throughout this letter, BLM's analysis of impacts to important subsistence species—including caribou, fish, birds, and marine mammals—is deficient. Without a thorough and honest accounting of Willow's effects to these important subsistence resources, BLM cannot meet its obligations under ANILCA.	The comment does not specify what is missing from the analysis of impacts. The Section 810 conclusions are based on the analyses in the EIS; it is not necessary to repeat the analysis provided in the EIS at the same level of detail. For a more detailed analysis of biological impacts to subsistence species, see the relevant sections in the EIS. Appendix G (*ANILCA Section 810 Analysis*) has been revised for consistency with the biological analyses, as appropriate.	Y
49	6	Williams	Vera	—	Subsistence, ANILCA 810	And, also, are you guys going to be thinking about all the residents that do hunt for the impact from deterring, you know, our food sustain — sustainability if our hunting gets really distracted, either in Barrow or Nuiqsut or Anaktuvuk or Atqasuk, if the caribou, somehow, gets stuck somewhere, the impact. Are — is Conoco going to have some kind of plan to talk with all the tribal entities or the corporation to set up, to assist the hunters that are going to go way far to go hunt, if the caribou is not here? If we have to go further to go hunting — and we are in Barrow, we pay $5.90 a gallon right now, and I think at Anaktuvuk it's $12 a gallon; every village is going to — that's going to be affected. You guys need to think about compensating the residents that are going to hunt and go that far to try to get food on the table. So, I'd like Conoco to think about this, to put that on the table, to do a compensation for each community that's going to be affected within the NPR-A.	Pursuant to IM 2019-018 (DOI 2019) the BLM must not require compensatory mitigation from public land users, except where the law specifically requires it. The BLM will only consider voluntary proposals for compensatory mitigation or state- and federally-mandated compensatory mitigation.	N

4.2.27 Terrestrial Wildlife

Table B.2.30. Substantive Comments Received on Terrestrial Wildlife

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
989	12	Brower, Jr.	Harry	North Slope Borough, Office of the Mayor	Terrestrial Wildlife	Furthermore, caribou may have difficultly crossing the elevated industry roads to the Willow production facility and drill sites, especially in the winter when snow builds up alongside the road. Our residents have also noted the difficulty of crossing these elevated industry roads in winter. Industry maintains that these roads must be steep to support industrial traffic. We ask that the BLM require CPAI to work with local residents to modify standard road designs or identify other means to mitigate road-related impacts to tundra travel, such as designing a pad or stopping area at the top of ramps before the road to allow our residents a better view of on-coming traffic before entering the road.	CPAI is working with local residents to improve design of subsistence access ramps. These changes were incorporated into the Project design in the Final EIS.	Y
1302	146	Dunn	Connor	ConocoPhillips	Terrestrial Wildlife	ConocoPhillips disagrees with BLM's analysis area of 3.7 miles from construction or operation activities and structures for these reasons: 1) Recent EIS analyses in the NPRA have only used a 2.5 mile distance (e.g. Greater Mooses Tooth Two SEIS, 2018). BLM should be consistent with their other, recent NEPA documents. 2) The Cameron, Reed et al. 1992 paper did not observe a decreased density of caribou within the 5-6km distance from roads, and in fact found an increase in density within this distance from roads. It's also important to note that this study only examined effects out to 6 km. 3) The Cronin, Ballard et al. 1994 paper only described a reduced density of calves up to three weeks after peak calving period for a distance of 0.6 to 1.2 miles, and not up to 3.7 miles as BLM suggests by including this citation in this statement in Section 3.12. Additionally, this paper described that the mean relative abundance of caribou nearly tripled in the zones of 2.5 to 3.7 miles from the road. 4) The Dau and Cameron 1986 paper involves the same study as the first cited paper, Cameron, Reed et al. 1992. It's important for BLM to recognize that the study area was out to 6km, and not that caribou density decreased out that far and this distinction should be made clear in the EIS should BLM choose to still use this study area. Otherwise, this incorrectly assumes a larger impact zone, for the reader who won't look these studies up and read themselves. 5) The Lawhead 1988 paper makes no mention of documented decreased density of maternal caribou out to 6km. 6) The Lawhead, Byrne et al. 1993 study makes no mention of examining maternal caribou near active roads and infrastructure during the weeks after calving. In fact, this study examined caribou movements in July and August, during insect harassment season and noted that stationary caribou occurred within 100 m of structures, and those results primarily reflect the attraction of caribou to pads and structures when flies are active. Additionally, this study noted that the majority of caribou groups observed in 1991-1992 did not display overt reactions to oilfield facilities or activities. 7) The Lawhead, Prichard et al. 2004 study noted reduced density of cows and calves as far away as 4 km, but by two weeks after estimated peak calving, maternal females with calves no longer avoided roads. Based upon our analysis of the reports cited, we do not believe that it's a correct statement that there is a "documented decreased density of maternal caribou within 0.6 to 3.7 miles (1 to 6 km) of active roads and pads" and that in fact, BLM misinterpreted some studies and incorrectly cited others to bolster this statement.	Different studies have reported somewhat different distances of lower-density use by maternal caribou of the CAH during calving, but these distances have been consistently between 1and 5 km. Lawhead (1988) reported that "few caribou were present within 3-5 km of the Oliktok Point and Milne Point Roads during and after peak calving in that year. This localized avoidance was especially marked for cows with calves." More recently, Johnson, Golden et al. (2019) estimated that CAH caribou were at lower-than-expected density within 5 km of infrastructure. These distances may vary for different roads and by factors such as calving density or traffic levels (Lawhead, Prichard et al. 2004). Based on all the research conducted on the CAH, a 4-km displacement for maternal caribou during the 2 to 3 week calving period is a reasonable estimate of displacement for conditions similar to the Kuparuk oil fields. The addition of hunting along roads in the TCH range adds additional uncertainty. In addition, some impacts such as potential overgrazing could occur in areas 4 to 6 km from roads. For these reasons, the use of a 6-km analysis area, assuming some displacement occurs to 4 km, is justified. Additional references were added to Section 3.12, *Terrestrial Mammals*, to demonstrate the rationale for the analysis area.	Y
1302	147	Dunn	Connor	ConocoPhillips	Terrestrial Wildlife	Den surveys will not be conducted prior to construction for grizzly bears. This statement needs to be corrected.	Text in Appendix E.12, *Terrestrial Mammals Technical Appendix*, was updated as requested.	Y
1302	149	Dunn	Connor	ConocoPhillips	Terrestrial Wildlife	"Behavioral disturbance can cause immediate responses in caribou, including startle or flight responses" (Murphy, Russell et al. 2000; Reimers and Colman 2009). The Murphy, Russell et al. paper does not make reference to flight or startle responses; rather, it states that "under a realistic development exposure scenario, however, an individual animal probably does not spend >25% of their time in a high disturbance zone; at 25% the model predicts <2% loss of body mass." This study also suggests that insects "significantly affect caribou behavior" as compared to oilfield disturbances. The Reimers and Colman paper states "In most cases, energetic implications appear moderate and small compared to other natural, biotic influences such as disturbance (and death) caused by insect and/or predator harassment."	Disturbance of caribou near roads and pads results in changes in caribou activity budgets including startle or flight response (Curatolo and Murphy 1986; Lawhead, Prichard et al. 2004). Murphy and Curatolo (1987) found that 62% of caribou had a severe reaction (i.e., running) when crossing a road and pipeline in an area with heavy traffic. Lawhead, Prichard et al. (2004) found that about 50% of caribou groups within 100 m of the Meltwater Road had a moderate or strong reaction to traffic. Caribou have a low energetic cost of locomotion (Fancy and White 1987); therefore, low-frequency disturbance events alone are unlikely to have substantial energetic impacts unless they result in a decrease in foraging (Murphy, Russell et al. 2000), which did not appear to occur near roads in Kuparuk (Murphy and Curatolo 1987). Text was added to Section 3.12.2.3.2, *Disturbance or Displacement*, to clarify this.	Y
1302	150	Dunn	Connor	ConocoPhillips	Terrestrial Wildlife	While deflections and delays may occur, it is important to note that not all individuals would react to the presence of a road in the same way. In fact, Wilson et al. (2016) found that less than 30% of caribou (and 0% of TCH individuals) were delayed or altered their movements when encountering a road. This suggests that most individuals that encounter the road, which again would be less than 1% of all TCH individuals, would not be measurably affected. We recommend these important caveats be added to the text.	Text was added to Section 3.12.2.3.2, *Disturbance or Displacement*, to clarify that not all caribou would be deflected or delayed. The proportion of deflections or delays would likely vary with level or exposure to infrastructure, could increase for roads with hunting, and can be partially mitigated with proper road and pipeline design. It is incorrect that less than 1% of the TCH would encounter a road. This may be referring to the proportion of the TCH range in the area, but a much higher proportion of animals can move through that area over time.	Y
1296	11	Imm	Teresa	Arctic Slope Regional Corporation	Terrestrial Wildlife	Additionally, the proposed new 115 acre mine site would be in close proximity of Nuiqsut (around 7 miles west of the village). ASRC recognizes that a substantial amount of gravel will be required for the construction of roads and pads. It is our understanding that a significant risk arises from starting a new gravel mine for wildlife and subsistence users. ASRC requests BLM to include impacts of Avoidance caused by the proposed new mine in its analysis.	The impacts of the gravel mine on caribou are discussed in Section 3.12.2.3.1, *Habitat Loss or Alteration*, and Section 3.12.2.3.2, *Disturbance or Displacement*. These will include direct loss of habitat and displacement and disturbance for some distance during construction and operation. This area has low to moderate densities of caribou during different seasons. Potential avoidance of the mine site by subsistence hunters is discussed in Section 3.16.2.3.3, *Harvester Access*; text was added noting that residents may avoid the mine site as a result of the noise associated with the mine and reduced availability of resources.	Y

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68	1	Jensen	Just	—	Terrestrial Wildlife	There's no guarantee that the calving area in Teshekpuk won't be disturbed. Can you say that — guarantee that there won't have any impact on the caribou? No, my main concern is that if, since — I mean, nobody really knows what kind of effect it's going to have on these calving grounds, but you won't really know until all this is said and done, and if it does have an impact, then it's too late. And I know that — you know, every fall, that, you know, even in Anaktuvuk Pass, were waiting for the caribou to come in from the north and its — the main caribou herd that comes down is from Teshekpuk. And heaven forbid that this project is going to impact that caribou migration, pushing them further; they'll be further west. Then the possibility that the caribou of not coming here is — I mean, could be very real. And the other thing is that, you know, I mean, Sollie and Tommy can speak more to it than I can, but, you know, they — there is evidence that the pipeline and the haul road has impacted some of the caribou; they used to come into this village. I'm just concerned that this is the unknown. We don't know if what — what kind of impact this is going to have. And it can have a major impact on this village if, all of a sudden, the caribou migration decides to move further west. When they come north, they're not going to hit this valley or Chandalar; they're going to be further west to a point where we can't go and get them. And that's a major problem for us. . . . This is Just Jensen, again. I — and I was looking on the map that — you know, we get these (unclear) caribou and see, you know, from the map. A lot of times, they congregate right outside of Fish Creek, and Fish Creek is one of the main areas where they're going to be doing the drilling. And then I'm looking on the map here, I see all these roads and platforms where they're going to drill and I remember there was talk about Red Dog Mine where they had the road, and there was a study about the caribou, actually migrating south, and they were avoiding that road for a long, long time. And there was people in Ambler, down in (unclear) that were waiting for the caribou and they came really, really late and not really right at (unclear) that it changed the direction from that. And the study later showed that the caribou were really reluctant to pass this gravel road. And with all these roads up here, it's bound to change the caribou migration pattern. They're going to — they're going to move somewhere else. And I'm looking at all the — the flights that are proposed to being in this area, I mean, in the fall, we have a no-fly zone area going up north from here, hoping that they won't scare away the caribou. And with 43,000 flights that you have in this — I don't know if that's a year, or is that the life of the project, I mean, to me, it certainly will have an impact on caribou. So, I don't know what the answer is going to be. I — just is kind of worried about that it's going to have irreversible damage to that caribou migration that were always waiting for here.	Caribou of the CAH continue be partially displaced from areas within approximately 4 km of active oil field infrastructure during calving, with less avoidance of infrastructure during other seasons. Some migrating WAH caribou exhibited large changes in movements near the Red Dog road, but there are also many examples of caribou herds crossing roads successfully. The evidence on calving displacement and road crossing success is discussed in the EIS in Section 3.12.2, *Environmental Consequences*.	N
2	9	Maupin	Siqiniq	—	Terrestrial Wildlife	There has also been a decline in the Teshekpuk herd, 50 percent in the last ten years.	Text on the changes in herd size was added to Section 3.12.1, *Affected Environment*.	Y
1294	6	Nukapigak	Joe	Kuukpik Corporation	Terrestrial Wildlife	This is a high use area for caribou during multiple seasons, but especially during the spring migration and post-calving seasons. The animals moving north of the village (and GMT1 and GMT2) are also the most likely to be successfully targeted by subsistence hunters accessing the Alpine road system via the Spur Road north of Nuiqsut. So, eliminating the northern road segment (between BT2 and BT4) would be particularly beneficial because there would be less disturbance to the herd generally (during spring and calving season), and because animals would be more likely to continue using their traditional migration route closer to Nuiqsut. In fact, because Nuiqsut is almost directly east of BT2, ending the road there would eliminate the road barrier extending to the north of the village in this migration corridor. BT4 itself would still cause some disturbance, of course, but the linear migration barrier would be reduced significantly. Caribou would be much more likely to continue passing through Nuiqsut and the areas ten or so miles to the north.	Though the elimination of a road would aid caribou movements in that area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. In this case, the airstrip would be close to the high density calving area with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and have some impacts on caribou movements during other times of the year.	N
1294	8	Nukapigak	Joe	Kuukpik Corporation	Terrestrial Wildlife	A road with regular traffic creates more impact than an infrequently (probably mostly seasonally) used airstrip. That is especially true in light of the information above about the impacts of roads on calving caribou. Of course, Nuiqsut residents very concerned about increased air traffic. The impact are of a low-flying airplane frightening caribou and disrupting a hunt is immediate and highly visible. The impact of a road blocking and diverting caribou migration and reducing calving is less visible to an individual hunter in an immediate sense, but when the caribou incrementally stop coming to a particular area because of migration diversions, the disruption is greater even if less immediately visible and less clearly attributable to a particular facility. Particularly in the instances of BT4 and BT5, a little more air traffic may well have substantially less impacts than the same or lesser acreage of an active infield road. But the Draft EIS doesn't analyze whether a little more air traffic in the BT4 or BT5 areas would have less impacts than an access road. In light of the magnitude of the impacts these roads are expected to have on subsistence, that failure is not acceptable.	Though the elimination of a road would aid caribou movements in that area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. In this case, the airstrip would be close to the high-density calving area, with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and to have some impacts on caribou movements during other times of the year. Making BT4 and BT5 roadless would mean two additional airstrips, one at each drill site. The impacts of additional fill (and the multitude of associated impacts of the fill) and additional air traffic (and the additional indirect effects of that traffic) would be greater than the impacts of building an infield road to these sites; therefore, it would not be included in detailed analysis. The increase in air traffic for a roadless alternative is substantial. The addition of one more airstrip under Alternative C would add 7,473 more fixed-wing trips and 489 helicopter trips over the life of the Project (62% more fixed-wing traffic and 20% more helicopter traffic than having a road).	N
1294	15	Nukapigak	Joe	Kuukpik Corporation	Terrestrial Wildlife	There would also be real impacts onshore [from construction of the MTI]. BLM estimates that up to 94% of Nuiqsut subsistence hunters could be "directly affected" by CPAI's proposed island because caribou would be displaced and disturbed to the point where they would be less available to subsistence users. The alternative island location at Point Lonely fares no better. This is not surprising because the entire shoreline of Harrison Bay out to Pont Lonely is some of the most critical caribou habitat in this area, particularly for fly relief during the summer. Yet the Draft elsewhere downplays these impacts by treating the impacts as if they would only occur in winter. But there would be significant summer work at the island, including the module delivery itself, which by definition must occur during open water season when caribou are most likely to be active along the coastline. There is simply no way that either of these MTI options can avoid having significant impacts on caribou resources.	The area between Teshekpuk Lake and the Beaufort Sea coast is heavily used by caribou for mosquito-relief during mid-summer, and caribou are likely to be disturbed within some distance from any activity occurring at the MTI during that period. Caribou also move the most at this time and are highly motivated to get to mosquito-relief habitat. The CAH is reported to use areas within 1 km of roads less than expected during the mosquito season (Johnson, Golden et al. 2019), but they will cross roads frequently (approximately two times per day during periods of insect harassment) during that season (Prichard, Macander et al. 2019). Because the MTI is offshore, the area of disturbance will also be partially offshore, limiting the impacts.	N

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1294	22	Nukapigak	Joe	Kuukpik Corporation	Terrestrial Wildlife	Vol. I, p. ES-8, Table ES.I, Summary of Key Impacts by Alternative. Note that Alternative C is expected to have the lowest number of vehicle trips (2,340,368) compared to Alternative B (3,009,993). The daily number of expected vehicle trips for Alternative B would be about 275 vehicle trips per day (3,009,993 trips divided by 30 year project life). That's an [enormous] amount of vehicle traffic. Kuukpik will want to see much more information on where and when all these trips will occur and explore a multitude of options to reduce the overall number and the impacts they will have on the ground (such as requirements to caravan and to stop traffic when 25 or more caribou appear to be approaching the road).	All traffic data have been updated for the Final EIS based on further Project engineering and refinement by CPAI. The Executive Summary only provides a high-level overview of the Project; see Final EIS Appendix D.1, *Alternatives Development*, for additional details. Appendix D.1 includes a new chapter for the Final EIS, Chapter 5.0, *Summary Comparison Tables for Analysis*, which includes over 25 new tables that break down traffic by year and season and allow direct comparison of action alternatives. Road traffic greater than 15 vehicles per hour has been reported to lower crossing success of caribou, and even low levels of traffic result in displacement of maternal caribou from areas near roads during the calving period. Traffic convoying, stopping vehicles during crossing events, and driver education could be effective for increasing crossing success. CPAI has included the following design measure to help mitigate impacts to caribou and subsistence users (Final EIS Appendix I.1, *Avoidance, Minimization, and Mitigation*, Table I.1.2): ". . . 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."	N
988	2	Peter	Enei Begaye	Native Movement	Terrestrial Wildlife	Of particular concern to us is an area that has been protected in the Integrated Activity Plan (IAP) of the National Petroleum Reserve in Alaska (NPR-A). This area has been designated a sensitive wetland area for key species of molting birds and it is the birthing and migration haven for the Teshekpuk Caribou herd. The BLM's Draft EIS findings articulate a high probability of oil spills throughout this project and in every alternative other than No Action. Oil spills on or near this biodiverse area would cause irreversible damage. Three communities surrounding this area would be directly rely on the subsistence use of the eider duck and caribou for their food security which would also be threatened by this project. The NPR-A IAP currently protects the specific areas that the proposed Willow Master Development project would irreversibly impact.	Chapter 4.0, *Spill Risk Assessment*, identifies a high to very high likelihood of very small to small spills and a medium to high likelihood of medium to large spills on-pad. On-pad spills of all sizes would be of short duration (less than 0.5 day) and would remain on the pad or within secondary containment; damage to areas adjacent to pads would not be anticipated.	N
864	111	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	BLM Must Consider the Effects of Climate Change on the Terrestrial and Aquatic Environment. As BLM acknowledges in the DEIS, warming has been especially significant in the Arctic . . . Despite acknowledging these and other climate impacts, the DEIS includes almost no analysis of Willow's impacts in the context of these and other ongoing climate impacts, and it fails to include discussion of the best available science. BLM's analysis of these cumulative effects must be in-depth and must incorporate the best available science. The harmful effects of climate change will act cumulatively and synergistically with the direct and indirect effects of Willow, leading to an increase in threats to Arctic species and ecosystems. Moreover, BLM must grapple with the fact that these threats will grow over time, as the impacts from climate change become more severe, and the survival of many Arctic species becomes more and more precarious.	Section 3.2.1, *Affected Environment*, of the Final EIS addresses ongoing impacts of climate change on the environment, including in the Project area. Section 3.19.4, *Cumulative Impacts to Climate Change*, and Section 3.19.10, *Cumulative Impacts to Biological Resources*, analyze impacts the Project and cumulative actions may have on climate and biological resources.	N
864	153	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	Noise affects caribou. Experiments testing the response of wild woodland caribou to simulated seismic exploration found that caribou responded to noise disturbance by increasing movement rates, displacement distances, and energy expenditure, though effects were relatively short-lived. A study of response to simulated drilling noise by white tailed deer found that deer avoided areas near loud noise sources but did not increase their home range sizes or movement rates relative to control animals. BLM must carefully evaluate the impacts of noise from fixed wing aircraft and helicopters on caribou. A variety of studies have also shown that caribou respond to aircraft overflights, with cows with young calves reacting most strongly, especially during calving and post-calving seasons. Alaska Native communities have long voiced concerns regarding the effects of aircraft noise and activity on caribou, given corresponding impacts to subsistence. The Willow Plan should account for the noise disturbances on caribou when considering the development and implantation of Willow, not limit its consideration to only impacts from gravel mining. Shortcomings of the draft EIS's analysis of impacts to caribou, including noise impacts, are discussed further in section IX.I of these comments.	Additional text on aircraft and noise was added to Section 3.12.2.3.2, *Disturbance or Displacement*, although there are limited data available on aircraft effects on caribou behavior under similar circumstances and with similar aircraft.	Y
864	190	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	The analysis area for terrestrial mammals is too small to adequately represent the full suite of potential impacts. The analysis area is defined as that "within 3.7 miles of construction or operation activities and structures…based on research that documented decreased density of maternal caribou within 0.6 to 3.7 miles (1 to 6 km) of active roads and pads during a 2- to 3- week calving period when cows are giving birth or have young calves with lower mobility" (V1, p.98). This distance is too small to reflect the full array of annual impacts on a highly mobile species. For example, the DEIS describes 3.7 miles as the distance in which there is decreased density of caribou, but there are also potential ecological effects of increased caribou density beyond this distance, such as forage depletion, that appear not to be considered in the DEIS. There may also be impacts at greater distances in other seasons. For example, studies of road responses by caribou have found winter effects at distances up to 15 km. The calving period is indeed a critical time for caribou but impacts in the DEIS need to be considered across the full annual cycle of the Teshekpuk Caribou Herd (TCH). The DEIS itself indicates the insufficiency of the analysis area when it states that development of the Willow project would also increase road traffic along existing Alpine and Greater Mooses Tooth roads, so that "impacts related to roads would extend beyond the alternatives analysis area" (V4, Appendix G, p.17). Similarly, it states that "[a]ir traffic could cause direct and indirect disturbance to caribou availability both within and outside of the Project area" (V4, Appendix G, p.23). Such statements raise questions as to why the analysis area was not defined to be larger. The analysis area should be expanded to encompass the full scope of potential impacts.	The Alpine and GMT roads are included in the analysis area, although the impacts from the Willow MDP Project will be greater from new construction than from changes in traffic on existing roads. Most literature on displacement from roads during calving has estimated a displacement distance of 2 to 5 km. Dau and Cameron (1986) and Cameron et al. (1992) found higher caribou densities at distances of 4 to 6 km. The presence of hunting from Project roads increases the uncertainty in caribou responses, but response distances as far as 15 km from roads have not been observed for the CAH or TCH and are unlikely to occur on similar oil field roads where most human activity is confined to roads or the immediate area around roads.	N

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864	191	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	Related to the above point, the DEIS aligns with current scientific understanding in acknowledging that hunter pressure could increase displacement from roads beyond what is seen in places without hunting (V1, p.105). However, it does not incorporate this recognition into calculation of acres and percentages of potential displacement (e.g., V3, Appendix E, Tables E.12.7 – E.12.8), relying instead on studies from the Central Arctic Herd (CAH) in Prudhoe Bay and Kuparuk where hunting is not allowed. At the least, the DEIS should explicitly acknowledge that stated acreages are minimums and should take this into account when assessing potential impacts on the TCH. As a further example of insufficient consideration of the zone of influence of development and human activity on caribou, the DEIS contains insufficient discussion of gravel mining effects. The DEIS states that blasting would disturb and displace caribou from around the gravel mine site (V1, p.105) but does not say anything about the distances at which such displacement is likely to occur. Multiple studies have been done related to mining impacts and displacement distances for caribou. These should be referenced and discussed. While some may question the applicability of such studies to gravel mines associated with oil and gas infrastructure, they nonetheless remain the best available studies of which we are aware of mining impacts on caribou and should be included in the EIS. It is important that such studies and their potential applicability be discussed in the document, rather than ignored.	The uncertainty of some impacts near roads associated with use by local hunters was added to Section 3.12.2, *Environmental Consequences*. Studies of large-scale open-pit mines with extensive dust deposition (Boulanger, Poole et al. 2012) are not applicable to gravel mining associated with oil fields. The Ekati diamond mine has a footprint of 29.9 square kilometers and extensive dust deposition extending several kilometers away.	Y
864	192	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	There are also issues for caribou with the proposed options for the module transfer islands (MTIs). Option 2, which places the MTI near Point Lonely, is intended to reduce impacts to Nuiqsut's high subsistence use area (V1, p.ES-4). However, it is likely to have stronger impacts on caribou, affecting subsistence opportunities for Nuiqsut. As the DEIS recognizes, TCH caribou pass repeatedly through narrow corridors on either side of Teshekpuk Lake to access critical insect relief and foraging habitat during the summer (V1, p.99). While the ice road proposed to support Option 2 likely would be gone by this time, other activity would still take place, such as helicopter landings to support stick picking. These would occur at a crucial time for caribou, right in a narrow movement corridor. More specific description is needed of these potential impacts and their expected effects, beyond just the recognition that "air traffic for Option 2 would cause markedly more disturbance of caribou than Option 1" (V1, p.108). In addition, greater emphasis is needed of the winter activity associated with the MTI and its potential impacts on caribou. The DEIS states that "[p]eak ground traffic levels associated with the MTI would reach up to 8,900 trips daily" (V4, Appendix G, p.47). The statement that this "could have a high potential for disturbance" vastly underestimates the true magnitude of such levels of traffic. Such a traffic volume equates to just over six trips per minute. This would result in a constant stream of vehicles. There is no way caribou or other species, let alone subsistence hunters, could cross ice roads with such traffic levels. Winter is a critical time for caribou. Foraging opportunities are limited during the winter and caribou rely on body stores of energy for survival and gestation. Studies in other ungulate species of displacement and altered habitat use due to energy development have noted that fitness costs are likely greater during winter, when individuals already exhibit a negative energy balance. Further energetic costs at such a time may lead to loss of body mass and depletion of vital energy reserves. There has been little study of winter responses by caribou to industrial development and activity in Alaska. Nonetheless, studies from Canada reveal that disturbances can lead to flight responses in caribou, causing them to expend additional energy, and that caribou may avoid human infrastructure and disturbance in the winter. Such factors can have greater effects in years of high snow depth, when energetic costs of movement increase and foraging opportunities are reduced. Any extra expenditure of energy that caribou undertake as a result of interaction with oil and gas activity or developments is of concern as reproductive success in caribou is strongly correlated with nutritional stress. Late winter body mass of female caribou has been strongly linked to calf production and survival, potentially influencing population growth rates. It is thus crucial that BLM fully analyze the potential consequences for caribou of winter disturbances as intense as those described associated with the MTI.	Additional text on aircraft and ice road impacts, as well as energetic impacts of winter disturbance for Option 2, was added to Section 3.12.2, *Environmental Consequences*. The analysis of Option 2 was also revised in Section 3.16.2.7, *Module Delivery Option 2: Point Lonely Module Transfer Island*, to clarify the greater potential for displacement and indirect impacts to caribou subsistence harvesting activities. The discussion of impacts under Option 1 acknowledges the peak traffic levels and the high potential for impacts to both caribou and caribou harvesters.	Y
864	193	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	Treatment of the potential for habituation by caribou to infrastructure and human activity was mixed in the DEIS. We appreciate BLM's recognition, in line with the best available science, that "except perhaps for a small proportion of the most tolerant females, maternal caribou with young calves do not habituate to road traffic" (V1, p.104). However, BLM goes on to insufficiently apply this recognition and to provide contradicting and/or unsupported statements at other points in the DEIS. For example, the DEIS states that "TCH animals have already been exposed to winter ice roads in this area and may have habituated to some degree" (V1, p.107). While it cannot be denied that TCH animals have been exposed to winter ice roads, there is currently no evidence of habituation. Notably, no citations are provided for this statement. This needs to be justified with references from the scientific literature or removed. The ANILCA 810 Analysis in Appendix G is especially egregious with respect to assuming habituation and should be updated. It says that "the TCH has shown more habituation than the WAH in the case of the [Delong Mountain Transportation System]" (V4, Appendix G, p.17). This is not an accurate statement. That was one possible hypothesis put forth by Wilson et al. to explain differences observed between the two herds, though the paper was clear that had not been demonstrated. The earlier language in Appendix G is more tentative on potential habituation, this instance needs to similarly be changed to be clear that this has not been demonstrated. The text goes on to state that "caribou can habituate to disturbance" (V4, Appendix G, p.25). No references nor support are given for this statement. It should be removed or altered to align with Chapter 3 of the DEIS. Similar statements occur in other places in Appendix G, which should also be revised or removed.	Maternal caribou of the CAH continue to avoid active infrastructure during calving after 4 decades of exposure to oil fields; however, avoidance decreases soon after calving (Haskell, Nielson et al. 2006; Johnson, Golden et al. 2019; Lawhead, Prichard et al. 2004; Smith, Byrne et al. 1994). CAH caribou cross roads and pads frequently when mosquitoes are active (Murphy and Lawhead 2000; Prichard, Lawhead et al. 2019) and will use gravel roads and pads for oestrid fly relief in late July and early August (Pollard, Ballard et al. 1996; Prichard, Lawhead et al. 2019). TCH caribou have been exposed to some development activity and therefore may have more tolerance to infrastructure (outside the calving season) than naive animals. The text regarding the Red Dog road in Section 3.12, *Terrestrial Mammals*, was revised to clarify that this is not evidence of habituation. The reference to TCH habituation was deleted in Appendix G (*ANILCA Section 810 Analysis*), Section G.2.a (*Subsistence Resource Availability*) and Section G.2.d (*Findings*), and revised related text for consistency with Section 3.12, *Terrestrial Mammals*.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	194	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	There is need for additional discussion and analysis in the DEIS regarding caribou responses to aircraft activity associated with the Willow Project. One important addition would be further analysis of the tradeoffs between impacts of air traffic and road traffic on caribou. The ANILCA 810 Analysis in Appendix G states that "The increase in air traffic [under Alternative D] would not be enough to outweigh the benefits of reduced deflection of caribou as they migrate toward the [*sic*] Nuiqsut's core hunting grounds to the west of the community" (V4, Appendix G, p.27). This, however, is stated not demonstrated. No citations or clear rationale for this statement are given. The tradeoff between aircraft and road activity seems to be a key tradeoff between alternatives B and D in terms of their impacts to caribou, and thus resulting impacts for subsistence hunters. Better support is needed for the statements that are given to align with the best-available science and to allow the public adequate opportunity to compare between alternatives. Questions also remain about the ability of proposed aircraft restrictions to protect caribou. BMP F-1 sets aircraft restrictions over caribou winter range from Dec 1 – May 1 and over the Teshekpuk Lake Caribou Habitat Area from May 20 – Aug 20 (V4, Appendix I, p.4). It is unclear whether any restrictions on aircraft altitude will exist from May 2 – 19 and Aug 21 – Nov 30 in these important caribou areas. Caribou can be present in the area throughout the entire year, making it important for protections from aircraft disturbance to likewise cover the whole year and all of the northeastern NPR-A. BLM should expand upon existing BMPs to better seek to protect caribou year-round. Furthermore, it is unclear in the DEIS whether proposed protections really will be effective for protecting caribou. While the DEIS claims that "aircraft would maintain minimum altitudes consistent with best management practice (BMP) F- 1" (V1, p.11), the project design features provided by ConocoPhillips Alaska Inc. (ConocoPhillips) say that they will comply with BMP F-1 "when feasible" (V4, Appendix I, p.11). Among the potential reasons for deviation they say "[s]ome air traffic would be required to support the Project," as well as for regulatory compliance and post-ice road cleanup. They do not specify what "Project support" elements would be included here, but this could be interpreted broadly, questioning whether impacts really will be avoided.	Additional information on caribou response to aircraft was added to Section 3.12.2, *Environmental Consequences*, although there is limited information from similar circumstances (e.g., much of the literature is for military jets). In addition to minimum flight altitudes specified for certain locations and seasons, BMP F-1 requires the following: "Land user shall submit an aircraft use plan as part of an oil and gas development proposal. The plan shall address strategies to minimize impacts to subsistence hunting and associated activities, including but not limited to the number of flights, type of aircraft, and flight altitudes and routes, and shall also include a plan to monitor flights." Added text to Appendix G (*ANILCA Section 810 Analysis*), Section B.4 (*Evaluation and Finding for Alternative D*), to provide additional rationale for the overall decrease in impacts under Alternative D, based on reports of road-related impacts and avoidance and changes in hunting patterns since construction of roads in the area. As noted in the sentence prior to the one referenced, air traffic generally causes localized disturbances, while roads can have larger impacts on caribou behavior and distribution.	Y
864	195	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	Several factors in the DEIS raise concerns about the lack of meaningful analysis of mitigation effectiveness. For example, the Cumulative Effects section of the DEIS acknowledges that the NPR-A Integrated Activity Plan (IAP) is in the process of being revised and mentions that protections could be reduced, increasing impacts on caribou (V1, p.165). There is not, however, any analysis of altered impacts. Rather, descriptions in the DEIS assume that all existing stipulations and BMPs would be implemented to protect caribou and other resources (V1, p.109). The DEIS already acknowledges that the Willow Project will play a facilitative role on future projects (V4, Appendix G, p.43). Potential impacts of such projects under an IAP with reduced protections for caribou and key habitat would be logical to likewise include. A statement should also be included in the Willow EIS that stipulations and BMPs will be held to the stricter of the existing or revised IAP provisions, to avoid reduced protection for caribou. Another example of the lack of analysis of mitigation effectiveness is the failure of the DEIS to quantify impacts of anticipated deviations to stipulations and BMPs. For example, the DEIS lists that deviations to BMP E-7 about minimum distances between pipelines would be needed "where roads and pipelines converge on a drill site pad or at narrow land corridors between lakes where it is not possible to maintain 500 feet separation between pipelines and roads without increasing potential impacts to waterbodies" (V3, Appendix D, p.47). To better demonstrate the potential impacts of such deviations, the DEIS should quantify how often this will occur in terms of both number of expected deviations and miles of deviation out of total miles of pipeline. Similar quantification should be done for other expected deviations.	Language was added to Section 3.12.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*, to clarify the role of the IAP revisions. Deviations to BMPs and LSs are quantified in Table D.4.30 (Summary Comparison of Impacts by Action Alternative) in Section 4.3.10, *Compliance with Best Management Practices*, of Appendix D.1 (*Alternatives Development*).	Y

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864	196	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	There are several other instances where the DEIS is internally inconsistent, erroneous, or lacks important information needed by the public to determine impacts. First, additional information is needed for Figure 3.12.4, which depicts seasonal movements of the TCH (V2, p.44). The current figure does not give any description of what data or methods were used to produce the maps beyond reference to an industry report that does not appear to be publicly available online. This is insufficient to allow interpretation and public review of the DEIS. Second, Figure E.12.2. depicts seasonal distributions of the CAH (V3, Appendix E, p.6), however it appears that the same kernel is shown for each season. This was most likely a simple error but should be corrected to provide an accurate picture of seasonal variability for the CAH. Third, multiple citations are given for Reimers and Colman 2009, however the appropriate year for this citation, given the information in the References section, is 2006 not 2009. Fourth, the ANILCA 810 Analysis cites displacement distances of between 1.2 – 2.5 miles from roads for maternal caribou, referencing Chapter 3 (V4, Appendix G, p.17). In reality, the text of Chapter 3 acknowledges a bigger range of displacement, up to 3.7 miles (V1, p.98). Appendix G should be updated to conform to the range listed in Chapter 3. Fifth, shapefiles or other spatial data suitable for loading into a geographic information system that depict infrastructure locations under the various alternatives were not provided with the DEIS. When we requested these data from BLM, we were informed that they were proprietary information belonging to ConocoPhillips and would not be shared. This is unacceptable if the public is to be able to evaluate the proposed alternatives and their potential impacts on Federal public lands and resources. Simply referring to the maps published with the DEIS is insufficient to allow the public to consider other data or depictions of data and more meaningfully compare between proposed alternatives. Such a decision also does not align with prior practice by BLM with other EIS processes where shapefiles of proposed infrastructure, stipulation areas, etc. were provided along with the DEIS for public review (e.g., Arctic National Wildlife Refuge Coastal Plain Oil and Gas Leasing DEIS and FEIS, Ambler Mining District Industrial Access Project DEIS). It is crucial that spatial data be provided for this and other future NEPA processes that will allow the public adequate opportunity to evaluate the proposed alternatives and their potential consequences.	Additional information on the methods used to produce Figure 3.12.4 was added to the figure notes. Figure E.12.2 was corrected to show seasonal distribution (it was renumbered to Figure 3.12.5 in the Final EIS). Reimers and Colman (2009) and Reimers, Loe et al. (2009) references will be corrected. The potential displacement of calving caribou will be changed to 2 to 5 km based on the best-available references, including Johnson, Golden et al. (2019). Displacement distances in Section 3.16.2.3.2.1, *Caribou*, were revised for consistency with Section 3.12, *Terrestrial Mammals*. With regard to releasing CPAI shapefiles, the Trustees for Alaska has already requested these data from the BLM. The BLM's response has not changed. After consulting with the DOI's Regional Solicitor's Office, CPAI's GIS data constitute confidential commercial information under the Supreme Court's recent decision in *Food Marketing Institute v. Argus Leader Media*, 139 S. Ct. 2356 (June 24, 2019), which overturned 40 years of FOIA case law on the subject. The court held that where commercial or financial information is both customarily and actually treated as private by its owner and provided to the government under an assurance of privacy, the information is "confidential" within FOIA Exemption 4's meaning. CPAI's GIS data meet this test. Further, under the Trade Secrets Act, it can be a criminal violation for agency employees to release commercial confidential records falling under Exemption 4. The BLM has welcomed questions from Trustees of Alaska and has taken every opportunity to clarify or talk through questions regarding infrastructure placement.	Y
65	5	Riley	Stanley	—	Terrestrial Wildlife	But, yeah, the thing that scares me about this whole thing is that something that's never brought to attention on this — on this meeting that you guys held together is the fact that it's a humongous calving ground. That wasn't even spoken about, that it was, you know, the largest calving ground in the state of Alaska. And that's what really scares me about the whole thing is my family, for, you know, thousands of years have been — depended on these animals. And so before, like, the haul road came in, for instance, my family lived in Oolah, which is Wiseman now. My family don't live there anymore since the haul road came through. Ever since that haul road went through, too, that Porcupine herd used to come through Ungavik (ph) and it doesn't come through there anymore. And that's the biggest herd, so this is the next biggest herd, right. And so, like, that's — that's like the worry — that worries me.	The WAH and Porcupine Herd are the two largest herds in the state. The TCH is substantially smaller than those two herds, but it is an important subsistence herd for North Slope communities. The primary calving area is near Teshekpuk Lake; the Willow MDP Project is outside the highest-density calving areas, but potential impacts on calving caribou and potential changes in caribou movements are discussed in the EIS in Section 3.12.2, *Environmental Consequences*.	N
20	1	Sell	Russell	PRL Logistics	Terrestrial Wildlife	And I just had a quick question regarding deflection. I have been going to the North Slope for 50 years. And I've had all-stop on the roads countless times for caribou crossing back and forth. The comment on deflection or the study on deflection, is that deflection intended to be an impact during construction or is it intended to be an impact post-construction during the operation of the life? Because I don't see that on the North Slope. And I was just wondering if there is a difference between the two and what was stated.	Deflection could occur during any phase of the Project.	N
85	3	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Terrestrial Wildlife	Quantifying Impacts on Caribou. Table ES.1 offers a summary comparison of key impacts by alternative. Although caribou are an important resource that drove alternative development (C and D), one cannot discern from this table how caribou are going to be affected in a quantitative sense. If the proposed development will have a significant impact on the ability of Nuiqsut residents to harvest caribou, will it simply take another few days to harvest what they need, or might they only harvest half of what they need? How are caribou populations and distribution likely to change in 10 years, 30 years, or 50 years given cumulative impacts of this and other developments, along with climate change? The DEIS is silent on such questions. BLM does identify features in each alternative that are arguably "better" for caribou in some qualitative sense. We can perhaps rank-order the alternatives with respect to caribou welfare (e.g., Dis better than C is better than B-although even that is not certain). But the DEIS falls far short of displaying how caribou numbers and distribution might change, and how that will affect harvest opportunity today and in the future. A quantitative analysis would better inform the public, and improve the subsistence analysis required by ANILCA. Such quantitative analyses involve a fair amount of work, but the development of scientifically defensible models has already been accomplished for caribou on the North Slope. Russell and Gunn (2019) recently quantified the impacts of proposed oil and gas development on caribou populations in the 1002 area of the Arctic National Wildlife refuge. The report concluded: 1. The potential impacts, under average climate, were 19% higher risk of a herd decline with 1002 development after 10 years when the starting herd size was the current size (218,000). The risk increased to 26% if the starting herd size was similar to population estimates in the early 1970s (100,000 caribou). 2. The risk to the Porcupine Caribou Herd from 1002 development affects the subsistence role of caribou in the lives of aboriginal people. With an initial herd size of 100,000 and average climate there was a 23% higher risk that herd size would fall below thresholds requiring severe harvest restrictions. The amount and quality of data on the Teshekpuk Caribou Herd (TCH) and the Central Arctic Caribou Herd is similar to that existing for the Porcupine Caribou Herd in the Arctic Refuge and Canada. The same model, or one similar, could be used to generate quantitative projections for how each of the three action alternatives is likely to affect caribou numbers, distribution, and harvest by residents of Nuiqsut and Utqiaġvik. The FEIS should consider including a quantitative analysis along these lines.	Quantifying specific impacts is very difficult and requires specific knowledge or assumptions about how caribou will react to different infrastructure during different seasons. The models of Russell and Gunn (2019) assume that caribou will forage less whenever they are within the Coastal Plain project area. They further assume that this decline in foraging rates and how the change will vary under different alternatives are specifically known and that these impacts occur long distances from development over long periods. These specific values, times, and distances have little support in the literature. Murphy and Curatolo (1987) found that although movement rates increased, there was no decline in foraging rate for CAH caribou close to busy roads. In addition, some caribou are likely to be displaced from infrastructure during calving rather than changing their foraging rate, which will result in different impacts than those modeled. The relative impacts of development are discussed in the EIS, but specific predictions are speculative with the available data.	N

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85	4	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Terrestrial Wildlife	[The DEIS states:] *Commenters requested that the EIS evaluate potential adverse effects of air/ground traffic, blasting/mining activities, and project infrastructure (including roads, gravel island, haul routes, gravel mine, or pipelines) on caribou migration patterns and other species of wildlife, and the resulting impacts to subsistence hunting, fishing, or whaling, especially for the Nuiqsut community. Nuiqsut community members requested that mitigation should be provided for any adverse impacts to Nuiqsut subsistence hunting.* We believe the DEIS does a good job of reviewing pertinent literature and describing the ecology of the species and how infrastructure and development activities may affect caribou. The effects of the alternatives on caribou populations, however, (future numbers, trends, and related subsistence harvest) is vague and somewhat muddled. Should Nuiqsut residents be worried, or not? How will it specifically impact their hunting? Will the BMPs be broadly applied, and how effective will those be as mitigation? These questions are poorly answered in the DEIS.	The specific impacts of development are difficult to quantify. We can make general inferences about how caribou will react to infrastructure based on the experience of other herds, but how behavioral changes will translate into population-level effects is generally not clear. There is still debate on what the population-level impacts of development have been on the CAH 40 years after development. The EIS provides the relevant information on how caribou may respond and attempts to provide information on the relative impacts of different alternatives and mitigation methods. The NPR-A IAP considered the effectiveness of BMPs and is the reason that specific BMPs were selected in the ROD and are now required. Various BMPs require lessees to monitor specific resources; if monitoring indicates that BMPs are not effective, then BLM adaptively manages to reduce impacts.	N
85	6	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Terrestrial Wildlife	[The DEIS states:] *Commenters requested that the EIS evaluate potential impacts to wetlands and caribou and other wildlife species and habitats within the TLSA, and any resulting subsistence impacts to North Slope communities. Respondents stated that the EIS should also describe protections for the TLSA and how the project complies with applicable use or development restrictions.* We find the DEIS provides a fairly comprehensive review of pertinent literature on caribou natural history and research related to effects of development. The treatment of other species is less complete, perhaps understandably given administrative dictates on document length.	Species other than caribou are described in Appendix E.12, *Terrestrial Mammals Technical Appendix*.	N
85	8	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Terrestrial Wildlife	[The DEIS states:] *Commenters requested that the EIS consider long-term and cumulative effects of climate change, including potential changes in weather, vegetation, seismic activity, or sea-level rise/flooding. In addition, commenters requested that the EIS discuss the relationship between thermokarst and climate change and how this might have a cumulative effect on environmental resources when combined with project-related impacts.* The DEIS Section 3.2 offers a good description of how climate change is affecting snow and ice-cover, precipitation, and air-temperature and the active layer. There is much less discussion about how climate change is likely to affect habitat (vegetation) and wildlife (nutritionally by changes in vegetation, and timing mismatch). These impacts are reasonably foreseeable, and should be covered in the FEIS, at least for caribou. We offer some citations that describe expected climate-related changes with regard to northern caribou populations.	More citations were added to Section 3.19.10.4, *Terrestrial Mammals*, regarding climate change effects on caribou. Climate change is anticipated to change vegetation communities through an increase in taller deciduous shrubs (Naito and Cairns 2014). Naito, A. T., and D. M. Cairns. 2014. Patterns of shrub expansion in Alaskan Arctic river corridors suggest phase transition. Ecology and Evolution 5(1):87–101.	Y
85	12	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Terrestrial Wildlife	ANILCA section 810 Subsistence finding Section 810(a) of ANILCA, 16 USC 3120(a), requires that an evaluation of subsistence uses and needs must be completed for any federal determination to “withdraw, reserve, lease, or otherwise permit the use, occupancy or disposition of public lands.” The DEIS at page 136 concludes “Habitat loss and disturbance could reduce calving and nesting rates and survival for caribou and waterfowl in the vicinity of Project infrastructure and activity but would not have population-level effects on subsistence resources harvested within or downstream from the Project area . . .” This latter conclusion about no population-level effects seems baldly asserted, with no empirical or modelled basis in the DE IS (that we could find). The conclusion may be based on the small size of the development footprint, and the large size of the caribou populations in question . . . but that rationale should be explicitly stated. And we’d urge a bit of caution here. An analysis of likely impacts of oil-field development on caribou in the nearby Arctic National Wildlife Refuge (1002 area), in combination with climate change, did project a population level effect. A similar analysis in the Willow project area might show the same. The DEIS analysis concludes that: [2] “. . . [D]irect and indirect impacts on caribou availability within the area west of Nuiqsut could have substantial impacts to subsistence users.” We might quibble with use of the word “could” in this statement. Anything “could” happen. We assume the finding is that substantial impacts on subsistence users are “expected,” and that language might be substituted. This finding that the proposed action is expected to significantly restrict subsistence uses imposes requirements to (1) notify the State of Alaska and appropriate regional and local subsistence committees, (2) hold hearings in affected communities, and (3) make the following determinations before BLM can authorize the use of public lands: Such a significant restriction of subsistence uses is necessary and consistent with sound management principles for the use of the public lands. The proposed activity would involve the minimal amount of public lands necessary to accomplish the purposes of the use, occupancy, or other disposition. Reasonable steps would be taken to minimize adverse effects upon subsistence uses and resources resulting from such actions (16 USC 3120(a)). [3] Assuming this same conclusion is reached in the preferred alternative in the FEIS, the FEIS should make a special effort to quantify the effects on subsistence users in terms that are most relevant to the hunters (e.g., reduced bag, reduced season length, increased travel distance, more hunting days to be successful etc.), and whether they can expect to harvest “amounts of caribou reasonably necessary for subsistence” (per Braem 2017). It should also explain why the projects could not be scaled back (e.g., smaller footprint, directional drilling, more stringent BMPs) to improve the lot of subsistence users while still achieving the main purpose of the project.	The analysis of impacts of oil-field development on caribou in the Arctic National Wildlife Refuge (1002 area) that did project a population-level effect is from a summary for Alternative B of the Coastal Plain EIS, which would limit development in a larger area than under the current management plan. This analysis is not directly applicable to the Willow MDP Project. If the analysis mentioned is the report by Russell and Gunn (2019), that report assumes specific declines in foraging rates over an extended time period and over long distances. While some changes in foraging rate may occur, the degree of changes is not known with this level of specificity and some caribou may avoid roads rather than change their foraging rates resulting in other, unquantified, effects. The conclusions in the Section 810 Analysis regarding population-level effects are based on and consistent with the conclusions of the biological resources sections of the EIS. Potential impacts to subsistence uses are quantified where data are available, in terms of the percentage of harvesters affected; percentage of harvesters who may avoid the development area; and percentage of caribou harvests potentially affected. Data are not available to quantitatively predict the increased travel distance, changes in season length, or number of d+I81ays to be successful. Based on the significance determination of the Section 810 Analysis, BLM notified the State of Alaska and appropriate regional and local subsistence committees and held hearings for the affected communities. At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to a proponent’s proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. The BLM will select an alternative and provide rationale for the selection of that alternative in the ROD.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
85	10	Svoboda	Nathan	The Wildlife Society Alaska Chapter	Terrestrial Wildlife	Climate Change Effects There has been a large body of scientific literature produced in the last 15 years on the effects of climate change. The DEIS does an adequate job of reviewing this literature with an eye to arctic systems especially. But there are some important papers about the likely effects of climate change on caribou that deserve consideration in the FEIS. 1. Joly et al. (2011) predicted that climate change would lead to loss of lichens from increased fire, and loss of upland dwarf birch tussock-shrub from thermokarst and shrub expansion. The combined effects would reduce foraging habitat to the detriment of caribou. 2. Fauchald et al. (2017) predicted evidence of a climate-driven shift in caribou-plant interactions from one previously driven by low plant biomass and cyclic populations, to one driven by low-quality forage (increasing shrubs) and diminishing herds of migratory caribou. 3. Mallory and Boyce (2018) examined the literature related to the many environmental factors that limit caribou and reindeer populations, and how these might be affected by a warming climate. They suggest observed declines in many caribou populations around the world are being driven in significant ways by climate change. 4. Gustine et al. (2017) examined climate-induced effects on forages growing in the summer and autumn ranges of caribou. They suggest the window of time to examine the match-mismatch framework in Arctic ungulates is not at parturition but in late summer-autumn, when the multiplier effects of small changes in forage quality are amplified by forage abundance, peak forage intake, and resultant mass gains in mother-offspring pairs. These are just a few examples of recent studies aimed at quantifying the effects of climate change on caribou. Others of note include Van Hemert et al. (2015) and Russell and Gunn (2019). When climate change effects are compounded by costs associated with development, the effect on caribou populations in the future may be even more significant. The FEIS should more fully explore and explain how climate change is likely to affect the two caribou herds using this planning area in both the near and more-distant future.	More citations were added to Section 3.19.10.4, *Terrestrial Mammals*, regarding climate change effects on caribou.	Y
81	3	Swearingen	Christin	—	Terrestrial Wildlife	The proposal is within and next to the Teshekpuk Lake Special Area, one of the most productive wetland complexes in the Arctic and an important calving ground for the Teshekpuk Lake Caribou Herd, an important food and cultural foundation for communities on the North Slope.	Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA.	N

4.2.28 Visual Resources

Table B.2.31. Substantive Comments Received on Visual Resources

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	157	Psarianos	Bridget	Trustees for Alaska	Visual Resources	The Willow MDP will have very significant impacts on the visual resources of the northeast NPR-A. The Willow project will change the visual qualities of millions of acres of public lands. As described in Appendix E.7A, 214,277 acres of Class II inventory lands will be impacted in the analysis area and 184,689 acres will be impacted in the project viewshed. Moreover, 1,974,862 acres of Class III lands will be impacted in the analysis area and 1,432,126 will be impacted in the Project viewshed. The significance and scale of these impacts is another residual impact that must be offset through meaningful actions to ensure that areas of high visual resource value are protected. Like so many other elements of this DEIS, the lack of meaningful project alternatives presents limitations in effectively considering the impacts and trade-offs of various project designs. Less than a sentence is used to describe the differences between the preferred alternative and Alternative C and Alternative D. Here, more significant changes in project alternatives would have added rigor and potentially helped identify creative solutions to reduce impacts to these and surrounding public lands.	The Final EIS expanded Section 3.13.2.1, *Avoidance, Minimization, and Mitigation*, to describe numerous measures that would ensure that effects to visual resources are avoided, minimized, or mitigated. These measures include existing and proposed LSs and BMPs, CPAI's design measures to avoid and minimize impacts, and additional suggested measures. The range of alternatives was developed by resource specialists from BLM and cooperating agencies, and from comments received during scoping. During alternatives development for Willow MDP Project, the BLM considered issues identified during scoping, such as impacts to caribou and subsistence. Alternatives development is described in Chapters 3.0 and 4.0 of Appendix D.1 (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All alternatives meet the Project's purpose and need.	Y

4.2.29 Water Resources

Table B.2.32. Substantive Comments Received on Water Resources

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
991	10	Bruno	Jeff	Alaska State, Department of Natural Resources	Water Resources	Chapter 3, page 149 BMP A-2 on this page references NPDES permits. Since the Alaska Department of Environmental Conservation assumed full authority to permit wastewater discharges in the State of Alaska, this should reference the Alaska Pollutant Discharge Elimination System (APDES).	Because the referenced text is directly summarizing an existing NPR-A BMP from the IAP, the text was not changed. The text does say "unless authorized by a National Pollutant Discharge Elimination System or state permit."	N
984	2	Hartsig	Andrew	Ocean Conservancy	Water Resources	BLM's NEPA analysis must carefully consider direct, indirect, and cumulative impacts to the biological resources of Harrison Bay. This analysis must include the potential impacts from all aspects of CPAI's proposed activities, including increased vessel traffic and other impacts associated with construction and operation of an artificial island. Construction of an artificial island, either near Atigaru Point or Point Lonely, would be a significant undertaking. It would change the physical oceanography in the area, but the DEIS does not analyze how it could affect currents in the Harrison Bay area. BLM should remedy this deficiency and consider how such a change could affect ocean currents and biological processes. In so doing, BLM should consider whether existing western science and traditional knowledge are sufficient to answer these questions, or if more research is needed.	Potential effects of the MTI on the marine nearshore area are described in Final EIS Section 3.8.2.6, *Module Delivery Option 1: Atigaru Point Module Transfer Island*. Based on data for western Harrison Bay, current speeds are too low to cause significant, permanent scour of the sea bottom surrounding the MTI (Coastal Frontiers Corporation 2018). Average rates of shoaling in the area are low (CPAI 2019). Other human-made islands in the Beaufort Sea experience small amounts of shoaling on the leeward side. Similar amounts would be expected at the MTI and would not affect the stability of the MTI or the coastal processes around it. No accretion or further shallowing of the MTI area would be expected to occur. The SDEIS added a third module delivery option (Option 3: Colville River Crossing), based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1295	7	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Water Resources	Impacts of Accidental Wastewater Discharge In order to sufficiently analyze the potential environmental impacts of accidental wastewater releases, we recommend that the EIS include additional detail characterizing each of the potential waste streams, including describing pollutants of concern, and discuss the potential environmental impacts of an accidental release. Section 3.8.2.3.7, Wastewater Disposal, discloses each of the potential waste streams and how they will be disposed (i.e., underground injection with applicable permit, surface water discharge with applicable permit). While the analysis discloses the potential impacts of an accidental release of domestic wastewater, similar information is not provided for other potential waste streams.	Text was added to Section 3.8.2.3.7, *Wastewater Disposal*, to clarify that drilling fluids and wastes would be transported to the UIC via tanker truck. Accidental releases from these trucks could contain sediment and petroleum products and would be cleaned up in accordance with ADEC guidelines. Spills of this type are usually small (less than 20 gallons) and would typically occur on ice or gravel infrastructure during pumping or transferring or could result from frozen lines rupturing.	Y
1295	21	Nogi	Jill	U.S. Environmental Protection Agency Region 10	Water Resources	Underground Injection Control When discussing pipeline construction under the Colville River, the Draft EIS states that "Drill cuttings and drilling fluids (also called mud) from the [horizontal directional drilling] process would not be discharged to surface water or the tundra but would be transported to an existing permitted UIC well for disposal or would be temporarily stored until an on-site Class I UIC disposal well is operational." We support the goal of avoiding surface discharge of drilling wastes as it reduces environmental impacts; however, we note that the operator may only inject drill cuttings into a UIC Class I non-hazardous well if the fluid containing the cuttings is either RCRA non-hazardous or RCRA-exempt exploration and production associated waste. Drill cuttings resulting from pipeline construction would not be RCRA exempt exploration and production associated waste. We therefore recommend that the Final EIS describe the make-up of the drilling fluid and clarify whether it would be RCRA non-hazardous waste. The EPA UIC Program would be available to assist if more information regarding allowable Class I injection under the Safe Drinking Water Act is needed.	Additional details on the drilling mud composition (including the Colville River HDD crossing and production and injection wells) have been added to Section 4.2 (*Potential Spills during Construction*) and Section 4.4 (*Hazardous Materials*). CPAI would use RCRA nonhazardous materials for drilling mud during the Colville River HDD operations.	Y
41	2	Pardue	Marie	—	Water Resources	"No effects on water quality are expected." Explain to us how there will be no effects. They are removing water from different lakes, ponds, streams and placing them in a direct path/location creating new or more wetlands when the ice roads and ponds melt.	Because 94% of the field-verified portion of the wetlands and vegetation analysis area is wetlands, it is unlikely that meltwater from ice infrastructure would create new wetlands. Wetlands require a frequency and duration of water inundation or saturation that would not occur with a single occurrence of meltwater.	N
864	48	Psarianos	Bridget	Trustees for Alaska	Water Resources	Further, in its analysis of bridge and culvert designs, BLM utilized a 100-year design flood for its bridge specifications and a 50-year flood event for its culvert design specifications. BLM does not explain why it allowed ConocoPhillips to use different hydrologic standards for these design decisions. With a changing climate where increased precipitation is a strong possibility, it might be prudent for BLM to require bridges to meet 50-year design flood specifications. BLM should have considered alternatives with different flood design specifications.	A 100-year design flood is larger than a 50-year design flood. Additionally, it should be noted that in Section 3.8.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*, the following criteria are suggested for culverts and bridges: – "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." – "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 nondesignated flood hazard areas."	N
864	159	Psarianos	Bridget	Trustees for Alaska	Water Resources	The proposed Willow project would have significant impacts to water resources in the northeastern Reserve that are underestimated in the draft EIS . . . Much of the information about these project components is vague and difficult for the public to understand, making it challenging to meaningfully consider impacts. For instance, it is not clear where the intake for the seawater pipeline would be located and whether there would be marine (and other) impacts associated with the construction and operation of this pipeline. The DEIS states that the seawater pipeline would transport seawater from the Kuparuk River Unit Central Processing Facility to the Willow Processing Facility, and this pipeline would be placed by Horizontal Directional Drilling (HDD) under the Colville River but provides little else to describe the potential impacts of this proposed feature. BLM must include this information and analysis in the EIS to properly explain these impacts.	As stated in Appendix D.1 (*Alternatives Development*), Section 4.2.2.3, *Other Pipelines*, the seawater pipeline would begin at Kuparuk CPF2, from which existing infrastructure connects to the Kuparuk Saltwater Treatment Plant at Oliktok Point. No new marine infrastructure or intake would be required.	N
864	161	Psarianos	Bridget	Trustees for Alaska	Water Resources	Further, it is alarming that gravel infrastructure would be permanently located in the 50- or 100-year floodplain of Fish (Uvlutuuq) Creek, Judy (Kayyaaq) Creek, Judy (Iqalliqpik) Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4A, and Willow Creek 8. . . . Although the Draft EIS acknowledges gravel roads or pads may lead to water impoundment, changes in flow direction, channel instability or a change in alignment, thermokarsting, erosion, and sedimentation, it does not fully address the site-specific impacts of each of these crossings or attempt to mitigate the impacts in a meaningful way. The draft EIS acknowledges that such impacts "could" occur and that "rehabilitation" may be required at some future date, but this does not constitute the requisite hard look under NEPA. BLM should not permit ConocoPhillips to permanently locate infrastructure in the 50- or 100-year floodplains of any of these waterbodies. The draft EIS is estimates that there would be a 39% chance that the design flood would be exceeded – this is unacceptable. Other federal agencies have expressly recognized that critical infrastructure should be elevated to the 500-year flood elevation. These proposed crossings are located in an area that is vulnerable to climate change, and several crossings also involve pipelines crossing the road. The proposal to construct crossings in such a manner should be flatly rejected by BLM.	The EIS evaluated CPAI's conceptual plan in the EIS. More specific design details are typically developed during the design phase of the Project, after the ROD; this would address site-specific details. With regard to the frequency of flood suggested for use in the design of culverts, bridges, and pipelines (described in Section 3.8.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*), the culvert and bridge criteria are similar to those used by the Alaska Department of Transportation and Public Facilities. The criterion for pipeline crossings is similar to what has generally been used on the North Slope of Alaska for common carrier pipelines. The EIS team is not familiar with any government requirement to design these structures for floods larger than have been suggested.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	265	Psarianos	Bridget	Trustees for Alaska	Water Resources	The DEIS, in Chapter 3, Section 3.8.2.3.3 acknowledges that the floodplains for Fish (Uvlutuuq) Creek and Judy (Iqalliqpik) Creek are wider and would encompass the gravel road on either side of the crossing. . . . The draft EIS further acknowledges that thermokarsting that resulted from water impoundments resulting from blockages would create a depression that would last indefinitely. If the blockage caused a change in flow direction, channel instability, erosion of the tundra or stream channel, or resulted in deposition of sediment on the tundra or in the stream channel, the resulting impact would be measurable and require rehabilitation. The impact could be visible for many years, even with rehabilitation. In sum, these impacts could be permanent. Although the DEIS acknowledges these potential impacts could occur and that "rehabilitation" may be required at some future date, they offer no compensation or mitigation plan to address this potential impact. Rehabilitation at a future date (and possibly ineffective) is not consistent with federal rules and regulations (see 33 CFR 332.4(c)). In addition, BLM has not provided enough information and baseline data to adequately design the infrastructure associated with this project, especially in terms of climate change and sustainability of the project into the future.	Because it is unknown if the effects would occur, or what the extent of the effects would be if they did occur, the effects must be managed with adaptive BMPs and permit stipulations, such as those described in Section 3.8.2.1, *Avoidance, Minimization, and Mitigation.* Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A Compensatory Mitigation Plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404.	N
864	267	Psarianos	Bridget	Trustees for Alaska	Water Resources	BLM must address the potential impacts listed below in the EIS: -Extraction of alluvial material from within or near a stream bed has a direct impact on the stream or rivers physical habitat parameters such as channel geometry, bed elevation, substrate composition and stability, instream roughness elements, depth, velocity, turbidity, sediment transport, stream discharge, and temperature. -Channel hydraulics, sediment transport, and morphology are directly affected by gravel mining. The immediate and direct effects are to reshape the boundary, either by removing or adding materials. The subsequent effects are to alter the flow hydraulics when water levels rise and inundate the altered features. This can lead to shifts in flow patterns of sediment transport. Local effects also lead to upstream and downstream effects. -Altering habitat parameters can have deleterious impacts on instream biota, food webs, and the associated riparian habitat. Impacts to anadromous and resident fish populations due to gravel extraction can include: reduced fish populations in the disturbed area, replacement of one species by another, replacement of one age group by another, or a shift in the species and age distributions, as well as altering competitive interactions within and among species. -Stockpiles of overburden and gravel left or abandoned in the channel or floodplain can alter channel hydraulics during high flows. -Wet pit mining in floodplains may reduce groundwater elevations, reduce stream flows, increase water temperature and create potential for fish entrapment. o Destruction of the riparian zone during gravel extraction operations can have multiple deleterious effects on anadromous fish habitat.	The mine pits would not be in the floodplain. The perimeter ice pad of Mine Area 2 would extend into the floodplain, as shown in Figure 2.5.4. The effects of ice infrastructure in floodplains are described in Section 3.8.2.3.2, *Ice Infrastructure*.	N
864	269	Psarianos	Bridget	Trustees for Alaska	Water Resources	The Bureau of Reclamation (2005) contains a Table (taken from Grindeland and Hadley, 2003) that summarizes the potential impacts caused by floodplain gravel pit capture. BLM needs to analyze and address the potential impacts listed above and presented in the Table (attached) and include the detailed analysis in the EIS. Without having this analysis of potentially significant impacts to the floodplains, rivers and streams due to the gravel mining project implementation, construction and operation, there is no way to ascertain BLM's assumption that reclamation is appropriate compensation for these impacts.	The mine pits would not be in the floodplain. The perimeter ice pad of Mine Area 2 would extend into the floodplain, as shown in Figure 2.5.4. The effects of ice infrastructure in floodplains are described in Section 3.8.2.3.2, *Ice Infrastructure*.	N
864	284	Psarianos	Bridget	Trustees for Alaska	Water Resources	The influence of climate change on flow appears to indicate there could be impacts that are exacerbated by climate change, including increased flooding and/or evapotranspiration which could affect the size, depth, and areal extent of thaw lakes. Though section 3.2 and Appendix E.2.A of the DEIS describe certain design features to account for climate change, CPAI's design is not sufficiently site-specific for these waterbodies. Further, Appendix E.8 of the DEIS states "(t)hough climate change is occurring it is unknown how it might impact flood-peak magnitude and frequency in the Arctic." Appendix E.8 also states "(i)t is unknown to what flood event or ice conditions the HDD boring and the pipeline crossings would be designed." This is unacceptable and BLM must provide this information and correlate it to risk and uncertainty in terms of stability and functionality for structures in, above, and below WOUS, including wetlands.	Because it is unknown how climate change might impact flood-peak magnitude and frequency, the design of structure in water and in the floodplain must be managed with adaptive BMPs and permit stipulations, such as those described in Section 3.8.2.1, *Avoidance, Minimization, and Mitigation*.	N
864	286	Psarianos	Bridget	Trustees for Alaska	Water Resources	It is unclear why riverbed elevations and hydraulic roughness determinations for water resources within the project area and footprint are relying on 2001 and 2002 data. . . . Twenty year old data may not be reliable especially in consideration of climate change, highly erodible and dynamic systems, and other factors likely affecting channel and bed stability within the project area. The DEIS needs to explain the validity and reliability of this old data to the project. More recent data should be obtained and collected prior to project construction in project waterways. As stated in the DEIS "(t)he interaction of the water-sediment mixture and the sand bed can create different bed configurations, such as ripples, dunes, transition, and antidunes. The type of bed form present affects both the hydraulic roughness and the rate of sediment transport, which affects the water velocity, depth of scour, and water surface elevations." Because the waterways in the project area are highly dynamic systems and are affected by a multitude of factors, including climate change, it is imperative for BLM to gather and utilize current data and information to inform their design for infrastructure in, over, adjacent to, and under project waterways.	The data quoted by the reviewer were presented to provide a general characterization of the rivers. It is not known if this information is being used by CPAI to design the structures or not, since design for Project structures is not complete (typically occurs after the ROD). To our knowledge, no newer information of this type is available within the Project area.	N

4.2.30 Wetlands and Vegetation

Table B.2.33. Substantive Comments Received on Wetlands and Vegetation

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
1306	1	Moore	Steve	USACE	Wetlands and Vegetation	Ch. 3.9.1 Wetlands and Vegetation pg.72 statement, "Project's 404 permit process is occurring concurrent with the NEPA process," is incorrect as we have not received a 404 application. Please remove or revise.	The 404-process is now underway and the public notice for the application was published concurrently with the SDEIS release. No change to text.	N
1306	2	Moore	Steve	USACE	Wetlands and Vegetation	Change to "existing wetlands would be converted to lacustrine."	Edited as suggested.	Y
1306	3	Moore	Steve	USACE	Wetlands and Vegetation	Change to "…would also reduce impacts to the long-term sustainability of wetland function"	Edited as suggested.	Y
1306	4	Moore	Steve	USACE	Wetlands and Vegetation	Couple of references to separate BLM and USACE RODs, but no reference to a JROD.	Due to uncertainty with ROD timing, mention of the joint ROD was removed from the EIS.	N
864	91	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	These substantial gaps are reflected in the lack of adequate analysis in the EIS, which provides an insufficient basis to meet the Corps' NEPA obligations. For example, as discussed in Terzi's report, the draft EIS mentions, but does not quantify, the potential direct impacts from numerous activities and secondary impacts that will result to aquatic resources from construction and implementation of the proposed project, including from the following: -Impacts from gravel infrastructure and culverts, which "could alter surface flows and result in ponded water upgradient of the structures which could induce subsidence, particularly as permafrost temperatures increase with climate change. There are numerous related effects that have not been adequately analyzed and quantified, including potential delays in plant growth from altered flows; conversion of vegetated tundra to lakes; increased surface water depths upgradient of gravel fills, which could transform tundra types; and the potential for drainage patterns and vegetation communities to be interrupted downgradient from any infrastructure; -Damage to permafrost from gravel mining and infrastructure; -Impacts from gravel infrastructure that would be permanently placed in the 50- and 100-year floodplain for Fish (Uvlutuuq) Creek, Judy (Kayyaaq) Creek, Judy (Iqalliqpik) Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4A, and Willow Creek 8; and -Impacts to riffle/pool complexes, which are a special aquatic site.	Indirect effects of gravel infrastructure are discussed in Section 3.9.2.3.3, *Indirect Change in Wetland Composition*. Damage to permafrost from gravel mining is described in Section 3.4.2.3.1, *Thawing and Thermokarsting*. Impacts of gravel in the floodplain are described in Section 3.8.2.3.3, *Gravel Infrastructure*. Riffle/pool complexes would not be impacted.	N
864	93	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	The Corps does not have sufficient information on the distribution and functions of the wetlands across the project area to determine appropriate mitigation measures or to adequately assess the proposed project. Given the prevalence of jurisdictional wetlands throughout the project area, the Corps needs to ensure that impacts are mitigated appropriately. Here, there is no indication that ConocoPhillips has provided a functional assessment or impact analysis for wetlands in the draft EIS or supporting information. Conducting functional assessment is critical to determining what functions particular wetlands perform, and their capacity to perform those functions. As acknowledged in the draft EIS, the Corps is missing finer scale mapping and other detailed information about the wetlands in the vicinity of the proposed project footprint that is necessary for its 404 analysis.	There is no regulatory requirement that an Aquatic Site Assessment is needed for NEPA. The functional assessment will occur during the 404 permitting process, and the public will have an opportunity to comment on it during the public comment period for the permit application.	N
864	160	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	Additionally, as noted in the attached Terzi report, gravel infrastructure and culverts could alter surface flows and result in ponding, subsidence, delayed plant growth, and conversion of vegetated tundra to lakes if the impoundments become permanent. Increased surface water could transform the vegetation community composition into wetter tundra types and thus increase grass and sedge cover, decrease shrub cover, or lead to plant mortality. During spring snowmelt, natural drainage patterns could be interrupted resulting in decreased soil moisture and subsequent changes in vegetation communities, such as an increase in shrub cover and a decrease in grass and sedge cover, as well as conversion from a wetland to an upland. As explained in the attached Terzi report: *Although the DEIS acknowledges the potential for these impacts to occur, BLM does nothing to correlate or quantify the impacts back to the project. Chapter 3 of the DEIS includes Best Management Practices (BMPs) and Lease Stipulations (LSs) to avoid and minimize these impacts, but without a finer scale analysis of the wetland impacts, including potential secondary impacts, as listed above, there is no way to ascertain whether the avoidance and minimization measures may be effective. Chapter 3, Section 3.9.3, Additional Suggested Best Management Practices or Mitigation, states BLM "could" include other measures to reduce wetland and vegetation impacts. If the BLM chooses to implement this BMP (or [ConocoPhillips] is required to do so through the Section 404 permit process) then it may provide information for future projects but would do nothing to reduce impacts from this project. If the monitoring demonstrated there were permanent direct or indirect impacts, BLM would need to address those impacts through some sort of contingency plan, a required component of any compensatory mitigation plan which is completely lacking in the DEIS.* BLM should include monitoring data from past projects in this area to support any contention that existing BMPs, LSs and any additionally proposed BMPs (as cited above) are effective in quantifying and qualifying impacts from the project.	The NPR-A IAP considered the effectiveness of BMPs and is the reason that specific BMPs were selected in the ROD and are now required. Various BMPs require lessees to monitor specific resources; if monitoring indicates that BMPs are not effective, then BLM adaptively manages to reduce impacts. Proposed ROP C-2 would stipulate that ice roads may not use the same route each year. ROP H-5 would stipulate that data and summary reports derived from North Slope studies be made easily accessible. The Willow MDP ROD will describe which LSs and BMPs would apply to the Project. Text revised in Section 3.9.2.1.4, *Additional Suggested Avoidance, Minimization, or Mitigation*, to state the following: "If Alternative C or D is selected, monitor vegetation damage and the compression of soil and vegetation in the annual resupply ice road footprint (footprints that are used consecutively each year). . . ." BLM policy does not allow for consideration of compensatory mitigation (IM 2019-018, Compensatory Mitigation, DOI 2019). The BLM does not require monitoring for informational purposes only. All BMPs must be tied to mitigation of specific impacts, and any monitoring required must do so to monitor the effectiveness of existing mitigation measures.	Y
864	168	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	Further, the DEIS fails to consider the full suite of direct, indirect and cumulative impacts to wetlands and vegetation resulting from this project. As described herein, much of the detail required for such an analysis is missing, likely due to ConocoPhillips' withholding of its Clean Water Act 404 permit. As a result, critical information needed to fully determine impacts to wetlands and water hydrology in the region are absent in the draft EIS.	All the detail necessary for NEPA analysis is included in the Draft EIS. There is no regulatory requirement that an Aquatic Site Assessment is needed for NEPA. The functional assessment will occur during the 404 permitting process, and the public will have an opportunity to comment on it during the public comment period for the permit application.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	253	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	Gravel infrastructure and culverts could alter surface flows and result in ponded water upgradient of the structures which could induce subsidence, particularly as permafrost temperatures increase with climate change. An increase in water impoundments could delay plant growth or contribute to conversion of vegetated tundra to lakes if the impoundments become permanent. Increased surface water depth and duration of inundation on the upgradient side of gravel fill areas could transform the vegetation community composition into wetter tundra types and thus increase grass and sedge cover and decrease shrub cover. It could also lead to plant mortality if the increased inundation becomes permanent and a potential waterbody is created. During spring snowmelt, impoundments could occur on the upgradient side of gravel fill, and natural drainage patterns could be interrupted on the downgradient side of fill. The effects may include decreased soil moisture and subsequent changes in vegetation communities, such as an increase in shrub cover and a decrease in grass and sedge cover, as well as conversion from a wetland to an upland. Although the DEIS acknowledges the potential for these impacts to occur, BLM does nothing to correlate or quantify the impacts back to the project. Chapter 3 of the DEIS includes Best Management Practices (BMPs) and Lease Stipulations (LSs) to avoid and minimize these impacts, but without a finer scale analysis of the wetland impacts, including potential secondary impacts, as listed above, there is no way to ascertain whether the avoidance and minimization measures may be effective.	The effects of climate change in combination with the Project are discussed in Final EIS Section 3.19.10.1, *Wetlands and Vegetation*.	Y
864	254	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	Chapter 3, Section 3.9.3, Additional Suggested Best Management Practices or Mitigation, states BLM could include other measures to reduce wetland and vegetation impacts. For example: (m)onitor vegetation damage, and compression of soil and vegetation in annual resupply ice road footprint (footprints that are used consecutively each year) is listed as one such BMP. If the BLM chooses to implement this BMP (or is required to do so through the Section 404 permit process) then it may provide information for future projects but would do nothing to reduce impacts from this project. If the monitoring demonstrated there were permanent direct or indirect impacts, BLM would need to address those impacts through some sort of contingency plan, a required component of any compensatory mitigation plan which is completely lacking in the DEIS.	Avoidance, minimization, and mitigation measures were further developed in the Final EIS and will be included in BLM's ROD. Measures related to wetlands are described in Final EIS Section 3.9.2.1, *Avoidance, Minimization, and Mitigation*.	Y
864	257	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	BLM should specifically examine this impact from a climate change perspective: Artic peatlands, glacier forelands, rivers, lakes, wet tundras, seashores and shallow bays make up the largest part of the Arctic (at least 60% of the surface) and constitute a significant part of the worlds wetlands and freshwater resources. Arctic wetlands store enormous amounts of carbon in frozen peat and soil, as long as the insulation by an undisturbed peat layer is preventing the underlying permafrost from melting. Accelerated climate change in the Arctic provokes rapid environmental change, easier access to oil and gas, minerals and fisheries. This threatens ecosystems through the retreat of sea ice, permafrost thawing, atmospheric warming, habitat fragmentation, desynchronization of predator-prey life cycles, overharvesting of wildlife and of globally migratory bird and mammal populations, and ocean acidification (Ramsar 2014).	Carbon sequestration is one of the many functions provided by wetlands. To clarify that wetland functions are removed by direct loss, the words "and wetland function" were added to the first sentence in Section 3.9.2.3.1 (*Direct Loss and Alteration of Wetlands*). The link between a loss of carbon sequestration and accelerated climate change is outside the scope of assessing impacts to wetlands.	Y
864	275	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	In addition, Arctic tundra environments are far from invulnerable, displaying sensitivity to human disruptions and as noted previously, climate change. The tundra is also slow to repair itself from physical disturbances such as tire tracks from heavy equipment (Nunez 2019). Chapter 3 of the DEIS, Section 3.9.1. states "(t)he field-verified portion of the analysis area is 76% wetlands. Previous disturbance and fill of wetlands in the analysis area is limited to gravel and ice infrastructure from the GMT and Alpine oilfields, the community of Nuiqsut, and decommissioned Distant Early Warning Line sites. The existing infrastructure and development activities have altered some wetlands functions, contributed dust and sediment to wetlands, and increased the potential for spills entering wetlands." Given these statement in the DEIS, it appears that BLM's assertion that impacts to wetlands will be "temporary" is not supported or documented. Compensatory mitigation must be provided to offset the potentially significant impacts to wetlands and other WOUS. In addition, without a wetland impact analysis and functional assessment there is no way to determine how much, and for what lost and/or impaired wetland functions, compensatory mitigation should address. An impact analysis and functional assessment must be provided for this project and a compensatory mitigation plan prepared to address all potential impacts.	Temporary impacts to wetlands are limited to ice-based infrastructure, as stated in Section 3.9.2.3.1 (*Direct Loss and Alteration of Wetlands*) and Section 3.9.2.3.2 (*Direct Vegetation Damage and Soil Compaction*), because while disturbed, wetlands affected by ice pads and roads would still retain the characteristics (hydric soil, hydrophytic vegetation, wetland hydrology) necessary to meet the USACE definition of a wetland. There is no regulatory requirement for a Compensatory Mitigation Plan to be included in the EIS. Potential compensatory mitigation would be determined through the Section 404 permitting process.	N
864	276	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	Table E.9.4 - Direct Loss by Watershed and Action Alternative includes % of Watershed that would be impacted from the proposed project for the Colville River Delta-Frontal Harrison Bay; Kalikpik River; Outlet Fish Creek; Outlet Judy Creek; Ublutuoch River. The % impacted is listed as <0.1 except for Outlet Judy Creek (0.1%) and Ublutuoch River (0.2%). Even though the impacts in each watershed may be small in comparison to the size of the watershed, the data presented is meaningless unless correlated to total impacts within the watershed cumulatively. And even so, these watersheds are enormous. . . . Impacts in this system, even if under 0.1% of the watershed could still have significant impacts to this productive and sensitive ecosystem. If the DEIS is claiming that impacts will be minor and mitigated by reclamation, abandonment and removal of the gravel infrastructure because so little of the watershed is being impacted, then the DEIS must provide discussion and rationale for this assertion based on current science, not some arbitrary numbers for huge watersheds encompassing hundreds to thousands of square miles.	The rationale for the conclusions are provided in Section 3.9.2.3.1, *Direct Loss and Alteration of Wetlands*.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
864	313	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	The DEIS states the following (page 79): "(s)ome loss of wetlands and vegetation would be unavoidable. The function associated with those wetlands would be irretrievably lost throughout the life of the Project until reclamation is complete. If reclamation did not occur, including the removal of gravel fill, the loss would be irreversible. The loss would not be irreversible if reclamation occurred, which would also prevent impacts to the long-term sustainability of wetland function in the fill footprint." The DEIS does not justify nor substantiate these comments, nor does it discuss which functions could be impaired or lost and for how long. There is nothing presented that would validate BLM's claim that if reclamation occurred, lost and impaired wetland functions would not be irreversible and the wetlands and their functions impacted by the project would rebound and impacts would not be long-term (in fact the DEIS states the opposite in Chapter 3, Section 3.9.1, page 72 where it states "(t)he existing infrastructure and development activities have altered some wetlands functions, contributed dust and sediment to wetlands, and increased the potential for spills entering wetlands"). BLM must provide detailed plans, examples of long-term sustainability of wetlands lost and damaged after decades, and why reclamation is adequate compensatory mitigation. A detailed reclamation plan must be submitted and approved for BLM to assert that this is compensation.	The section discusses unavoidable loss (permanent impacts), and the statement in Section 3.9.3 (*Unavoidable Adverse, Irretrievable, and Irreversible Effects*) is a summary of the preceding text; therefore, a discussion of specific functions is not necessary. Wetlands provide a wide array of functions (i.e., regulates water quality, removes pollutants/sediments, provides habitat), and all functions would be lost (i.e., for wetlands within the fill footprint) until reclamation activities occur. In response to the effect of reclamation on wetlands, the effect of reclamation on the ability of wetlands to return to areas where gravel fill has been removed is described in the introductory paragraph of Section 3.9 (*Wetlands and Vegetation*), citing two reports supporting this assertion. There is no regulatory requirement for compensatory mitigation to be included in the EIS. Potential compensatory mitigation would be determined through the Section 404 permitting process.	N

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Willow Master Development Plan

Appendix B.3
Supplement to the Draft EIS Comments and BLM Responses

August 2020

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Table of Contents

List of Tables

List of Acronyms

—	no data
AAAQS	Alaska Ambient Air Quality Standards
ACP	Arctic Coastal Plain
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
AQRV	air quality related value
AQTSD	Air Quality Technical Support Document
ASRC	Arctic Slope Regional Corporation
ASTAR	Arctic Strategic Transportation and Resources project
BA	biological assessment
BLM	Bureau of Land Management
BMP	best management practice
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
CAH	Central Arctic Herd
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CFWR	constructed freshwater reservoir
cm	centimeters
COVID-19	coronavirus disease 2019
CPAI	ConocoPhillips Alaska, Inc.
CRD	Colville River Delta
CRSA	Colville River Special Area
CWA	Clean Water Act
CWAT	Community Winter Access Trail
dB	decibels
DOI	Department of the Interior
DS2P	Kuparuk Drill Site 2P
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERoEI	energy returned on energy invested
ESA	Endangered Species Act
FLIR	forward-looking infrared
GHG	greenhouse gas
GIS	geographic information system
GMT-1	Greater Mooses Tooth 1
GMT-2	Greater Mooses Tooth 2
HIA	health impact assessment
IAP	Integrated Activity Plan
IPCC	Intergovernmental Panel on Climate Change
ITR	Incidental Take Regulation
km	kilometers
Kuukpik	Kuukpik Corporation
LOA	Letter of Authorization
m	meters
MDP	Master Development Plan
MI	miscible injectant
MMPA	Marine Mammal Protection Act
MTI	module transfer island
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPR-A	National Petroleum Reserve in Alaska
NPRPA	Naval Petroleum Reserves Production Act
NSB	North Slope Borough
NVN	Native Village of Nuiqsut
OCS	outer continental shelf
RFFAs	reasonably foreseeable future actions
ROD	Record of Decision
ROPs	required operating procedures
ROW	right-of-way
SBS	Southern Beaufort Sea (population of polar bears)
SDEIS	Supplement to the Draft EIS
SPMT	self-propelled module transporter
TCH	Teshekpuk Caribou Herd
TLSA	Teshekpuk Lake Special Area

UN	United Nations
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOUS	Waters of the United States

1.0 SUPPLEMENT TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT PUBLIC ENGAGEMENT PROCESS

The Willow MDP Supplement to the Draft EIS comment period began on March 20, 2020, with the publication of a Notice of Availability in the Federal Register. The comment period was open for 45 days ending on May 4, 2020. The public comment period for the Project was also announced via a BLM news release and the Bureau of Land Management's (BLM) Project website.

In April 2020, the BLM held eight virtual public meetings to receive comments on the Supplement to the Draft EIS. Because of State and local mandates regarding COVID-19 that restricted travel and in-person meetings, BLM delivered virtual meetings to reach audiences across the State. Two of the virtual public meetings gave priority to North Slope residents and two meetings gave priority to Nuiqsut residents. The meetings included public hearings for comments regarding the Project's potential impact to subsistence resources and activities as per the Alaska National Interest Lands Conservation Act (ANILCA) Section 810. All meetings were also accessible by phone. A copy of the presentation was translated into Iñupiaq and aired 6 times on KBRW radio, which broadcasts to the North Slope communities of Barrow, Point Hope, Point Lay, Wainwright, Atqasuk, Nuiqsut, Prudhoe Bay, and Kaktovik. Hard copies of the presentation were sent to post office boxes in Nuiqsut and to entities in communities that were open to receive packages during the COVID-19 restrictions, such as city or tribal offices. Details concerning dates, times, and locations of the meetings were announced through local news media, newspapers, radio, email, and the Alaska BLM Project website. Verbal comments given at public meetings and the public hearing were documented in formal transcripts for each individual meeting. The presentation used during public meetings, transcripts of each meeting, comment received during the public comment period, and a comment summary report are available on the BLM Willow MDP ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/109410/510.

BLM received written comments by mail, fax, email, online comment form via ePlanning, and verbal testimony at public meetings. BLM received a total of 31,015 submissions during the Supplement to Draft EIS public comment period. Of the submissions, 456 were unique (i.e., original submissions that did not have identical or almost identical wording as another submission); 98% of the submittals received were part of organized letter writing campaigns.

The BLM will not issue its decision on the Project until at least 30 days after the Notice of Availability of the Final EIS is published in the Federal Register.

2.0 COMMENT ANALYSIS

The BLM received a total of 31,015 submissions during the public comment period. (A submission is defined as a single email, letter, webform submission, or speaker in written transcripts.) These were received via email, online, or mailed-in letters, or comments submitted verbally at public meetings. Of the submissions, 456 were unique (i.e., original submissions that did not have identical or almost identical wording as another submission) with the remainder submitted as "form" (i.e., submissions containing identical content) or form submissions with slight modifications (e.g., one or two unique sentences added, but otherwise identical to a form) or unique comment submissions (i.e., original submissions that did not have identical or almost identical wording as another submission). The form submissions all originated from a total of five unique form masters, some of which shared overlapping phrases or bullet points.

Not all respondents noted if they were affiliated with an organization or were providing comments as an individual. Of those that indicated an affiliation, nearly all respondents were individuals. Tribes/tribal corporations, organizations, and governmental agencies (or personnel that commented and provided this information) are shown in Table B.3.1. The Center for Biological Diversity submitted one comment letter with 25,499 individual submissions from their members. Each of these were broken out and included in the submissions count discussed above. Alaska Wilderness League submitted one letter with 4,311 signatures from their members; these were also included in the submissions count discussed above. Individuals who provided their business title or employer information in their letter or testimony but did not state that they were an official representative were counted as individuals, not businesses or organizations.

Table B.3.1. Respondent Group Types

Respondent Group Type	Respondent Title	Respondent Title (continued)
Tribes/tribal corporations	Arctic Slope Regional Corporation ASRC Energy Services, LLC Doyon, Limited	Native Village of Nuiqsut Tribal Council Kuukpik Corporation
Businesses and Organizations	Alaska Crane Ltd. Alaska District Council of Laborers Alaska Eskimo Whaling Commission Alaska Oil and Gas Association Alaska Petroleum Joint Crafts Council Alaska Wilderness League (and members) Anchorage Chamber of Commerce Associated General Contractors of Alaska Associated General Contractors of Alaska Center for Biological Diversity (and members) ConocoPhillips Alaska	Flowline Alaska, Inc. Greater Fairbanks Chamber of Commerce Greenberry International Union of Operating Engineers LIUNA Lynden N C Machinery Inc Natural Resources Defense Council Northern Alaska Environmental Center Petrotechnical Resources of Alaska, LLC Resource Development Council for Alaska, Inc. STG Inc. Trustees for Alaska Udelhoven Oilfield Systems Services, Inc.
Government agencies and government officials	North Slope Borough State of Alaska Alaska State Legislature US Environmental Protection Agency	Alan Lowenthal, Member of Congress Deb Haaland, Member of Congress Jared Huffman, Member of Congress Raul M. Grijalva, Member of Congress Ruben Gallego, Member of Congress

Within each comment letter or verbal transcript, individual comments (i.e., stand-alone comments that relate to a single issue, idea, or conclusion) were identified and grouped into one or more of the categories listed in Table B.3.2. Comment categories are either defined by individual resources that may be affected by the Project, individual elements of the Project, or specific phases and aspects of the EIS or NEPA process (Table B.3.2). Categories are intended to describe the main topic or resource that is discussed in the comment, regardless of whether the comment is expressing opposition or support for the Project as it relates to that topic. Any comments identified within form letters were categorized only once and counted as a single comment no matter how many form letters with that same comment were submitted.

Table B.3.2. Substantive Comment Categories

Resource Topics	Project Element Topics	EIS or NEPA Process Topics
Air quality Birds Climate change Environmental justice Fish General economics Land ownership and use Marine mammals Noise Public health Soils and permafrost Spills Subsistence and ANILCA Section 810 analysis Terrestrial wildlife Visual resources Water resources Wetlands and vegetation	Avoidance, minimization, and mitigation National Petroleum Reserve in Alaska Integrated Activity Plan Project description	Alternatives development process Cumulative effects Draft EIS comments EIS process or timeline Permitting Purpose and need Request for comment period extension Request for new alternative Request for new analysis Stakeholder engagement process

Note: Not all categories were used in coding and are therefore not summarized below. ANILCA (Alaska National Interest Lands Conservation Act); EIS (environmental impact statement); NEPA (National Environmental Policy Act).

Although the BLM diligently considered each comment letter, the comment analysis process involved determining if a comment was substantive or non-substantive. In performing this analysis, BLM relied on Section 6.9.2, *Comments*, in the BLM NEPA Handbook H-1790-1 (2008) to determine what constituted a substantive comment. All substantive comments will be responded to in this report.

Substantive comments do one or more of the following:

- Question, with reasonable basis, the accuracy of information in the EIS or environmental assessment (EA)
- Question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis
- Present new information relevant to the analysis
- Present reasonable alternatives other than those analyzed in the EIS or EA
- Cause changes or revisions in one or more of the alternatives

Additionally, the BLM's NEPA handbook identifies the following types of substantive comments:

- Comments on the Adequacy of the Analysis—Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate are considered substantive; they may or may not lead to changes in the Final EIS. Interpretations of analyses should be based on professional expertise. Where there is disagreement within a professional discipline, a careful review of the various interpretations is warranted. In some cases, public comments may necessitate a reevaluation of analytical conclusions. If, after reevaluation, the BLM Authorized Officer responsible for preparing the EIS does not think that a change is warranted, the response should provide the rationale for that conclusion.
- Comments That Identify New Impacts, Alternatives, or Mitigation Measures—Public comments on a Draft EIS that identify impacts, alternatives, or mitigation measures that the draft did not address are considered substantive. This type of comment requires the BLM Authorized Officer to determine if it warrants further consideration; if so, he or she must determine if the new impacts, new alternatives, or new mitigation measures should be analyzed in the Final EIS, in a supplement to the Draft EIS, or in a completely revised and recirculated Draft EIS.
- Disagreements with Significance Determinations—Comments that directly or indirectly question, with a reasonable basis, determinations on the severity of impacts are considered substantive. A reevaluation of these determinations may be warranted and may lead to changes in the Final EIS. If, after reevaluation, the BLM Authorized Officer does not think that a change is warranted, the BLM's response should provide the rationale for that conclusion.

Comments that are not considered substantive include the following:

- Comments in favor of or against the proposed action or alternatives without reasoning that meet the criteria listed above (such as "we disagree with Alternative Two and believe the BLM should select Alternative Three")
- Comments that only agree or disagree with BLM policy or resource decisions without justification or supporting data that meet the criteria listed above (such as "more grazing should be permitted")
- Comments that don't pertain to the project area or the project (such as "the government should eliminate all dams," when the project is about a grazing permit)
- Comments that take the form of vague, open-ended questions

In response to substantive comments, the BLM could do the following:

- Modify alternatives including the proposed action
- Develop and evaluate alternatives not previously given detailed consideration by the agency
- Supplement, improve, or modify its analyses
- Make factual corrections
- Explain why the comments do not warrant further agency response, citing appropriate sources or authorities

Comments that merely express an opinion for or against the Project were not identified as requiring a response because they meet the BLM NEPA handbook definition for a non-substantive comment. Many comments received throughout the comment analysis process expressed personal opinions or preferences, had little relevance to the adequacy or accuracy of the Draft EIS, or represented commentary on management actions that are outside the scope of the EIS. These commenters did not provide specific information to assist the BLM in making a change to the existing action alternatives, did not suggest new alternatives, and did not take issue with methods used in the Draft EIS; the BLM did not address these comments further in this document.

The BLM read, analyzed, and considered all comments of a personal or philosophical nature and all opinions, feelings, and preferences for one element or one alternative over another. Because such comments were not substantive, the BLM did not respond to them. It is also important to note that, while the BLM reviewed and considered all comments, none were counted as votes. The NEPA public comment period is neither an election nor does it result in a representative sampling of the population. Therefore, public comments are not appropriate to be used as a democratic decision-making tool or as a scientific sampling mechanism.

Within the 456 unique submissions, 532 substantive comments were identified. There were 28 comments that asked to extend the comment period, 54 comments that expressed support for how the BLM conducted stakeholder engagement, and 122 comments that expressed concern for how BLM conducted stakeholder engagement. Chapter 3.0, *Substantive Comment Summary*, provides a summary of the substantive comments received by comment category. Chapter 4.0, *Substantive Comments and Responses*, identifies the substantive comments received on the Draft EIS and provides BLM's response. Subject matter experts reviewed comments that recommended additional studies, data, or scientific literature to be incorporated into the analysis; new information and citations were incorporated into the Final EIS as appropriate.

3.0 SUBSTANTIVE COMMENT SUMMARY

3.1 Air Quality

Commenters requested additional detailed analysis and mitigation for the proposed project's impact on air quality. Commenters request that air quality be addressed in terms of individual and cumulative impact, specifically citing the cumulative impacts of the proposed project with existing oil field projects. To adequately assess air quality impacts, commenters requested an updated independent baseline study of air quality be completed for the Nuiqsut area.

Concerns were raised that the SDEIS does not analyze air quality and greenhouse gas emissions associated with key project components sufficiently because emissions are being remodeled and will be included in the Final EIS. Commenters requested that the revised modeling consider all of the proposed project updates and modifications, not only those analyzed in the SDEIS. Commenters are concerned that the public would lack an opportunity to review or provide comments during the public comment period, especially if the new analysis results in substantial changes.

Commenters expressed concerns about the air quality analysis in the SDEIS. They cited concerns the revised project description by ConocoPhillips is not expected to substantially change air quality, despite failing to provide an assessment of how the level, type, and location of emissions could change from the analysis concerned in the Draft EIS. Commenters requested that the SDEIS update its air quality analysis to include the new module delivery option as these changes will change the projects impacts on air quality. Commenters repeated concerns from the Draft EIS including technical questions about the scientific accuracy of air quality monitoring and requested that BLM should explain whether these deficiencies are being addressed as part of the remodeling efforts as the original modeling underestimated air quality impacts.

Commenters expressed concern that the revised Project components would change the level and location of emissions associated with the Project and shift the air quality impacts closer to Nuiqsut. Commenters questioned why the shift of GMT-2 production would not substantially change the air quality analysis and requested that the modeling incorporate that shift and that the revised design information be clarified and incorporated into the air quality modeling.

3.2 Alternatives Development Process

Commenters noted that the Draft EIS and SDEIS differ in their conclusions on the feasibility of an ice road river crossing alternative. In addition, commenters requested technical clarifications to the alternatives descriptions in the SDEIS.

3.3 Avoidance, Minimization, and Mitigation

Commenters requested that the BLM include a mitigation plan for wetland impacts, including compensatory mitigation and mitigation as will be required by the Section 404 CWA permit. Commenters also requested that BLM consider how wetland mitigation may benefit Nuiqsut residents. Commenters requested additional mitigation measures for impacts to surface water resources, including a request for an adaptive surface water management plan.

In addition, commenters stated the following concerns:

- The SDEIS failed to account for the NRP-A Regional Mitigation Strategy.
- The SDEIS does not clearly state how the proposed mitigation measures would reduce impacts associated with the ice bridge and boat ramps.
- The mitigation measures presented in the SDEIS are inadequate because the SDEIS fails to take into account public comments on the Draft EIS mitigation measures.
- The mitigation measures identified for birds are inadequate.

Commenters also requested specific technical edits and clarifications to mitigation measures.

3.4 Birds

Commenters stated the SDEIS omitted Golden Eagles in the bird analysis. Commenters requested additional research and requested the inclusion of detailed analysis of each project alternative. Commenters also provided information and studies to be included and incorporated into the revised analysis.

Commenters reiterated comments and concerns about the analysis in the Draft EIS stating data presentation is incomplete and the SDEIS lacks meaningful analysis of impacts to birds and their habitat. Commenters stated that presentation of bird habitat use in the SDEIS is not useful for analysis and does not provide meaningful information about the impacts to birds. Commenters stated the SDEIS must analyze impacts and compare impacts across all alternatives. Commenters specifically call out the proposed boat ramp and analysis of Option 3 and stated that impacts to birds are not fully analyzed. Commenters requested the level of probable use be modeled and studied or the SDEIS should utilize a similar situation as a proxy for its analysis.

Commenters stated the impacts to bird habitats form the Constructed Freshwater Reservoir are not well explained or analyzed. Commenters requested a clarification on which waterbirds would benefit from habitat gained from the reservoir as stated in the SDEIS because fish would be prevented from entering the reservoir.

Commenters requested that acres of different habitat types lost or altered be included in the Final EIS to calculate the total wetlands lost for compensatory mitigation and that compensatory mitigation measures be included.

Commenters requested clarification to the differences in species-specific effects due to different species densities at Oliktok Point versus Atigaru Point or Point Lonely stating it is unclear which species are variable between the locations, if this is referring to disparate effects, or whether the differences in species-species effects are due to different densities or differences in activities.

Commenters requested additional explanation and support for the statement in the SDEIS that Option 3 would result in less habitat loss from gravel fill, as there is no explanation how this would impact different species of birds in different ways and locations.

Commenters requested additional analysis, clarifications, and citations regarding the impacts of ice roads associated with the different alternatives on wintering birds. Commenters stated that the SDEIS fails to adequately analyze impacts to special status species, including migratory birds. Commenters noted that the analysis focuses on gravel infrastructure and activity and fails to analyze the impact of ice roads from altered vegetation and hydrology changes on habitat. Commenters requested additional detailed analysis on the potential impacts form the three new project components in terms of impacts to habitats, species, disturbance, displacement, injury and mortality and seasonal impacts.

Commenters are concerned the SDEIS does not adequately analyze cumulative impact to birds by failing to consider additional project infrastructure and their compounding effects, other North Slope infrastructure, and ongoing IAP revisions.

Commenters also requested specific technical edits and clarifications to this section.

3.5 Climate Change

Commenters raised concerns that the analysis in the SDEIS did not adequately address how climate change has the potential to impact the Project and the resources in the Project area.

Commenters stated that the SDEIS analysis did not address Draft EIS comments on climate change requested additional analysis. Commenters noted the SDEIS is inadequate for failing to include project emissions of black carbon and greenhouse gas emissions, including requesting additional analysis. Commenters further stated that the greenhouse gas emission estimates are unsupported and inaccurate because the SDEIS failed to disclose key assumptions and data or used faulty assumptions/inputs in its models.

Commenters stated that SDEIS fails to account for subsurface marine and methane deposits.

Commenters expressed concerns about the analysis of key project components and their associated greenhouse gas contributions and air quality analysis. Commenters are concerned about their lack of ability to review the analysis and provide public comments.

Commenters raised concerns that the BLM did not include a discussion of the economic costs of greenhouse gas emissions from the Project.

Commenters raised concerns that the SDEIS did not adequately consider the effects of climate change and how that would affect transporting large equipment via ice roads.

Commenters raised concerns that the SDEIS did not analyze the cumulative impact of climate change on oil development in the Arctic and the oil and gas burned over the life of these project.

3.6 Cumulative Effects

Commenters stated that the cumulative effects analysis does not adequately take into consideration other developments occurring across the arctic, including previous oil and gas development, future proposed projects, and BLM's plans for expanding oil and gas leasing. Additionally, there were comments that stated the cumulative analysis does not adequately consider the full range of alternatives in the Integrated Additivity Plan (IAP) EIS and the likely environmental impacts of those alternatives.

Commenters stated that the analytical framework for the cumulative analysis in the SDEIS is flawed and has the effect of minimizing the project's total cumulative effects. Comments note that the list of reasonably foreseeable future action and potentially affected resources was improperly narrowed in the SDEIS. Commenters stated the cursory discussion of reasonably foreseeable future actions and cumulative impacts in the Draft EIS and SDEIS is not comprehensive enough to allow for meaningful analysis of cumulative impacts. Commenters additionally stated that the SDEIS cumulative impacts analysis is flawed because it fails to account for similar cumulative impact analysis comments provided on the Draft EIS.

Commenters requested revisions and clarifications to the list of reasonably foreseeable future actions and a revised cumulative effects analysis that is reflective of the revised list.

Comments questioned the inclusion of the IAP Alternative D as a reasonably foreseeable future action prior to the BLM selecting a preferred IAP alternative. Commenters requested that the BLM update the analysis once an alternative is selected, or that BLM take a more resonated approach to analyzing the IAP's alternative scenarios.

3.7 Draft Environmental Impact Statement

Comments were received on the Draft EIS during the comment period for the Supplement to the Draft EIS. These comments expressed concerns about effects to the Colville River delta, marine habitats, polar bear critical habitat, and air quality.

3.8 Environmental Impact Statement Process or Timeline

Commenters requested that the BLM consult with Alaska Native corporations pursuant to federal executive orders, laws and regulations, and Department of Interior policies.

Commenters stated that it was appropriate for the BLM to prepare a SDEIS that analyzes the substantive changes to the proposed action.

3.9 Environmental Justice

Commenters recommended that mitigation should be included to ensure that environmental justice impacts to subsistence, public health, and sociocultural systems are reduced and advocated for the continued engagement with affected environmental justice communities.

3.10 Fish

Commenters stated that the SDEIS analysis of fish impacts is inadequate because it failed to provide information of how the potential impacts from the new elements exacerbate or combine with impacts analyzed in the Draft EIS. Commenters noted that the SDEIS treats the new project elements as occurring in isolation from other oil and gas infrastructure, thereby failing to analyze whether the potential impacts from the construction and/or operation of the reservoir and other project components are additive to one another or how they otherwise intersect. Commenters expressed concerns that the SDEIS does not address inadequacies found in the Draft EIS in addressing potential impacts to fish injury, mortality, or habitat.

Commenters requested that the SDEIS include additional detail about which fish would be impacted from changes to habitat due to the location of crossings in overwintering fish habitat which may impeded movement of fish. Commenters also requested that the impact of water withdrawals as a part of crossing design be analyzed.

Commenters requested additional detail on how crossing sites may change due to bathymetric conditions and flow and seasonal conditions and weather events within the large watershed and how this would be managed prior to construction, during construction, during operations and after operations. Commenters requested that that the BLM revisit the issue of fish being diagnosed with saprolegnia fungi to see if there was a spike in contaminations back in 2005 due to the construction of ice roads in the area for development and winter exploration. Commenters requested that the revised SDEIS include approximate temperatures and address the prevent of supercooling of freshwater fish from freezing. Commenters questioned how monitoring of fish would occur during supercooling.

Commenters stated that BLM failed to thoroughly address impacts to fish and hydrology from the construction of the freshwater reservoir by noting in the SDEIS that the reservoir would not result in effects to fish different from the Draft EIS, stating that water levels would remain unchanged.

Commenters recommended the FEIS provide additional detail on how data on fish presence at the proposed Colville River crossing site will be collected to address the lack of baseline data on discharge and fish use, as well as discuss the potential for fish eggs to be in the gravel or fish to be in pools within the footprint of the ice bridge. Commenters also noted that the FEIS should provide additional information about fish species that may need to be transported around the ice bridge and how this would be done.

Commenters requested technical edits and revisions to clarify information in this section.

3.11 General Economics

Commenters requested the SDEIS address the current economic situation with lower oil and gas prices and reduced demand for transportation fuels and how this could impact the viability of the Willow MDP.

Commenters noted the economic significance of the project to ANCs and the local community benefits to communities and subsistence culture. They note the production from Willow would be critical for the TAPs operation and these regional benefits from the NPR-A Fund should be fully considered in the analysis. clarification about NPR-A grant funds.

Commenters questioned the economic benefits of this proposal considering the public and environmental costs associated with its development.

3.12 Land Ownership and Use

Commenter stated the SDEIS repeated Draft EIS's omissions and errors concerning landownership and use which mischaracterized impacts to this resource and failed to include impacts to Teshekpuk Lake Special Area's recreation and wilderness values. Commenter requested technical edits to this section.

Commenters requested technical edits to this section.

3.13 Marine Mammals

Commenters raised concerns that the SDEIS failed to explain how the BLM will comply with the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) and requested this be explained in the Final EIS.

Commenters expressed concerns that the SDEIS underestimates impacts to polar bears and other marine mammals. Commenters stated the SDEIS fails to acknowledge risks to polar bears from habitat and noise disturbances associated with Option 3 and impacts to barrier island critical habitat from the construction and use of reservoir and boat ramps. Commenters also requested mitigation to minimize these impacts.

Commenters noted that the cumulative impact analysis overlooks the regional significance of RFFA oil and gas development on polar bear critical habitat. Commenters requested that cumulative impacts from other environmental stressors be accurately assessed and recommended mitigation be included. Commenters specifically requested that the BLM estimate additional induced mortality due to increased access to polar bear habitat from the Willow Project and RFFAs.

Commenters expressed concerned that the SDEIS fails to analyze the impacts of new project components on marine mammals. Commenters noted that the SDEIS provided no new injury or mortality analysis or analysis of potential population-level impacts. Specifically, comments stated that the SDEIS failed to analyze potential impacts of new project elements to denning and non-denning members the Southern Beaufort Sea (SBS) population of polar bears. Commenters noted that the SDEIS provides no information on how the number of dens in the analysis area were identified.

Commenters requested that the BLM quantify increases in vessel traffic for each proposed alternative and assess to assess the likelihood of increased vessel strikes. Commenters expressed concerns that the analysis in the SDEIS fails to analyze other marine mammals, including beluga and bowhead whales. Commenters noted concerns about the impacts of marine vessel traffic and barges, noise, and the socioeconomic importance of whaling.

Commenters expressed concerns with the analysis of impacts to bears from the reservoir and boat ramps. Commenters recommended that BLM should estimate induced uses of the reservoir and boat ramps and use a two mile radius around those public uses involving skiffs or other motorized access to delineate the disturbance zone for non-denning bears.

Commenters expressed concerns that comments on the Draft EIS regarding marine mammals were not addressed in the SDEIS.

Commenters requested technical edits and revisions to this section. In particular commenters noted errors and requested revisions in the habitat disturbance buffer for polar bears.

3.14 National Petroleum Reserve in Alaska Integrated Activity Plan

Commenters stated that the BLM should not be permitting this project while simultaneously revising the Integrated Activity Plan (IAP). Specifically, commenters note that the IAP will include revised mitigation measures that BLM should consider applying to this project. Commenters requested technical clarifications on the applicability of the IAP lease stipulations and best management practices to the proposed project.

3.15 Noise

Commenters noted technical flaws in the noise analysis and requested technical revisions.

3.16 Permitting

Commenters stated that the BLM proceeding with the SDEIS was inappropriate since a “valid” permit application under Section 404 of the CWA has not been submitted to the USACE and that the SDEIS did not provide the information or analysis necessary for the USACE to comply with the CWA. Commenters also note that mitigations associated with the Section 404 permit are unknown and therefore cannot be adequately commented on by the public.

Commenters requested that the BLM delay permitting the project for several reasons, including the potential for cumulative effects from development on local communities, uncertainty around BLM’s revisions to the IAP, and uncertainty around oil process due to the global pandemic. A five-year delay in permitting was requested.

3.17 Project Description

Commenters requested additional information be provide that specifically details the location of all proposed project components and their construction methods. Additional details were primarily request for the location of boat ramps and engineering details for the boat ramps and river crossing, including details related to water flow and fish passage. Commenters noted that this requested project description information is needed to fully inform the effects analysis and public disclosure.

Commenters also requested specific technical edits and clarifications to the applicant’s proposed project components.

3.18 Public Health

Commenters expressed concerns about public health impacts to vulnerable and indigenous communities from proximity to extractive industries. They requested inclusion of analysis on public health concerns such as respiratory illness from air pollution and expressed concerns about the well-being of indigenous and local communities.

Commenters raised concerns about how project impacts to air, water, food, and wildlife would affect public health from contamination, mentioning that community members already are seeing signs of sick or contaminated fish. Commenter requests additional analysis in the SDEIS of the direct impact and cumulative impact of environmental contamination. Commenters raised concerns about respiratory illnesses and asthma rates.

Commenters raised criticisms of the SDEIS similar to those raised for the Draft EIS in that it failed to include a health impact assessment and questioned the lack of the baseline health data. Commenters would like to see protocols implemented to prevent emerging health impacts from oil and gas development and requested 24-hour air quality monitoring with real time instrumentation.

3.19 Request for Comment Period Extension or New Public Hearing

Commenters requested a comment period extension, comment period pause, additional opportunities for providing public testimony, and/or in-person public hearings, additional public outreach after the comment period ends and additional in-person participation for locally affected residents, including Nuiqsut and other North Slope residents. Commenters stated that the timing of the meetings did not allow for meaningful engagement because the public, including residents of Nuiqsut and other potentially affected communities, were occupied with health concerns during the COVID-19 pandemic.

3.20 Request for More Detail

Commenters requested more detail on the design and location of the boat ramps, more detail on the design of the Colville River crossing near Ocean Point, including measures for maintaining water flow and fish passage.

Commenters stated that the SDEIS does not adequately present, in narrative form, all the benefits of Option 3 and requested that further details be added.

3.21 Request for New Alternative

Commenters requested that the BLM consider the alternative options suggested during the Draft EIS public comment period, including such options as restrictions on infrastructure in special areas, seasonal drilling, and roadless options. Additionally, there were requests that the BLM consider an alternative gravel road segment from Alpine to GMT-2.

3.22 Request for New Analysis

Commenters made the following requests for analysis:

- A new supplemental analysis that accounts for the changes in oil prices and economic conditions in light of current public health events.
- That traditional knowledge be incorporated throughout the analysis, including in the assessment of impacts and consideration of mitigation measures.
- That the BLM present a comparative analysis of all module delivery options in a single document.
- New analysis of the impact of injections on hydrological and biological resources as well as climate change.

Requests for new analysis stated that:

- The SDEIS arbitrarily focuses on certain proposed action changes and potentially affected resources, despite broader proposed action changes that may warrant additional detailed analysis. Commenters requested comprehensive analysis of all proposed action changes for all resources potentially affected.
- The BLM failed to take a hard look at impacts of the proposed project because analysis relies on applicant-provided baseline data.
- That the SDEIS inadequately discloses potentially significant impacts because the SDEIS analysis does not incorporate updates made to the Draft EIS in response to public comments.

3.23 Soils and Permafrost

Commenters expressed concerns that the SDEIS continued the Draft EIS' flawed analysis of potentially significant impacts to this resource by failing to analyze the impacts of the added project components in a systematic fashion in addition to limiting the scope of the analysis and cross-referencing the Draft EIS analysis.

Commenters are concerned that the SDEIS omits analysis regarding how impacts could intersect with the changes in permafrost caused by climate change and requested additional detail to support the design of the constructed freshwater reservoir to minimize thermal impacts.

Commenters also requested specific technical edits and clarifications to this section.

3.24 Spills

Commenters requested that the BLM clarify that spill risk would be reduced under Option 3.

Commenters are concerned that spills or accidents will be magnified due to the remote location of the project and that existing laws for spills would not be enforced due to the public health pandemic.

Commenters stated that the SDEIS's reliance on the current National Contingency Plan is inadequate because the plan has not been recently updated.

3.25 Stakeholder Engagement Process

Commenters expressed concern regarding the use of the virtual meeting platform for public meetings. Commenters felt the platform did not allow members of the public without internet access to meaningfully engage in the EIS process. Commenters stated that the agency did not allow enough time and space for questions, that it was not clear how many and which BLM personnel were participating, and that many participants experienced technical difficulties that may have prevented them from testifying and engaging.

Commenters expressed support for the virtual meeting platform for public meetings. Commenters felt the platform allowed for meaningful engagement while meeting state and federal requirements to avoid in-person meetings during the COVID-19 pandemic. Commenters stated that the platform allowed people from across the state to participate and indeed increased meeting participation, that the platform was easy to use, and that the meetings were well moderated and easy to follow.

3.26 Subsistence and Alaska National Interest Lands Conservation Act Section 810 Analysis

Commenters expressed concerns that the BLM failed to address subsistence concerns raised in comments on the Draft EIS and stated that the SDEIS failed to integrate community feedback on subsistence.

Commenters expressed many concerns about impacts to subsistence regarding food security and overall risk to communities that rely on subsistence activities and fishing. Commenters also noted concerns about contaminants that are being consumed by fish and caribou and suggested that the Native Village of Nuiqsut perform studies on subsistence. Commenters are especially concerned the reliance on Teshekpuk Caribou Herd for subsistence and threats to the traditional lifestyle of these communities.

Commenters expressed concern that the analysis in the SDEIS fails to disclose significant effects from project changes by failing to address uncertainty and potentially significant effects to subsistence from the Colville River Crossing ice bridge, the new module delivery option ice road. Commenters also requested the BLM present the subsistence impacts from the module delivery options in comparative form.

Commenters stated that the SDEIS failed to analyze impacts to furbearers and furbearer harvesting.

Commenters are concerned the project would serve as an impediment to caribou and affect the availability of subsistence harvest. Commenters expressed concerns that the SDEIS did not meaningfully analyze impacts to subsistence by failing to provide detailed effects on caribou, analyze the potential impact of freshwater reservoir to subsistence, how any of the three new components may have population-level effects on subsistence species, and analyze impacts to fish from construction of a new gravel mine near Nuiqsut. Commenters recommended that the comparison of Option 3 against other module delivery options be included in the Final EIS, as this would impact both the Central Arctic Herd and the Teshekpuk Caribou Herds.

Commenters expressed many concerns about mitigation of subsistence impacts. Commenters stated that the BLM failed to include meaningful mitigation measures for subsistence. Commenters encouraged the BLM to issue mitigation measures to help the caribou movement and to address the concerns of the community about subsistence harvest. Commenters recommended the BLM consider restrictions on both vehicles and aircraft during critical during critical times of caribou movement and bird nesting periods. Commenters recommended residents be allowed access to additional project roads for subsidence. Commenters also support the construction vehicle pull out pads and boat ramps to mitigate against project related impacts and recommended local input be gathered to identify the best locations and designs for subsidence.

Commenters expressed support for the Project stating that Nuiqsut residents would have access to Project infrastructure for subsistence purposes, which would result in the following ancillary benefits: reduced air travel, improved emergency response, and improved safety and community access for movement, subsidence and recreational activities. Commenters noted existing subsistence infrastructure was designed with local input and this should be continued to provide desired results for the community in the form of subsistence enhancements.

Commenters expressed concerns about cumulative impacts to caribou herd populations and subsistence. Commenters noted that these potential long-term impacts of the Willow Project and development around

Teshekpuk Lake Area on subsistence resources are not accounted for in the cumulative analysis and need to be analyzed in the Final EIS.

Commenters requested technical edits, clarifications, and revisions to improve the subsistence analysis. Commenters also noted areas where BLM should revise the Final EIS so it is consistent with other NEPA documents.

Commenters requested the subsistence analysis be revised to account for seasonality in ice road use and subsistence activities, particularly in clarifying the description of seasonal project activities that minimize impacts on subsistence activities.

Commenters stated that the ANICLA Section 810 Analysis does not account for cumulative effects on subsistence. Specific concerns include cumulative effects on fish harvests and inadequacy of baseline data. Additionally, commenters are concerned with the cumulative analysis reliance on alternatives contained in the IAP Draft EIS. Commenters stated that there are flaws in the cumulative effect's analysis conclusions in the SDEIS ANICLA Section 810 Analysis regarding the project's subsistence effects on communities that are far removed from the project area and the effects of the IAP.

Commenters are concerned that the BLM will not consider the conclusion of the ANICLA Section 810 Analysis and impacts to subsidence in the decision-making process.

Commenters are concerned with BLM's procedural noticing of the ANILCA Section 810 Analysis in the Federal Register.

Commenters requested several technical edits and clarifications to the ANILCA Section 810 Analysis.

3.27 Terrestrial Wildlife

Commenters expressed concerns regarding impacts of air and road traffic on caribou (e.g., deflection, migration diversions, and tradeoffs between road and air impacts) and effectiveness of proposed mitigation. Commenters stated the SDEIS failed to include this level of detail and requested that BLM and the Applicant mitigate impacts to caribou through vehicle restrictions and limiting the number of flights to limit caribou disturbance.

Commenters noted the SDEIS fails to address impacts of climate change on Arctic species and ecosystems.

Commenters expressed concerns that the SDEIS needs to consider alternatives that are protective of sensitive resources and include additional analysis to protect wildlife and wetland ecosystems, including the Colville River and Teshekpuk Lake Special Area.

Commenters requested the analysis for caribou and wildlife consider the direct, indirect, and cumulative impacts on ecology, hydrology, vegetation, and wildlife of affected areas. Commenters believe these impacts have been minimized in the Draft EIS and SDEIS and that the impacts of the Project components on these resources should not be considered in isolation.

Commenters expressed concerns that the SDEIS failed to incorporate comments on caribou and wildlife made in the Draft EIS. Examples include the analysis area used for terrestrial mammals is too small and should be expanded to capture the full area of potential impacts. Commenters specifically disputed the use of a 3.7-mile buffer from active roads and pads and requested review of additional literature. Commenters questioned the effectiveness of aircraft restrictions for protecting caribou.

Commenters expressed concern that the SDEIS failed to include analysis impacts of the Project on wildlife species other than caribou.

Commenters expressed concern over impacts of Option 3 on caribou, especially regarding overwintering impacts. Commenters requested that the SDEIS be revised and clarified to analyze impacts on caribou displacement, disturbance, and forage. Commenters stated that the SDEIS downplays these impacts by incorrectly assuming all impacts would be limited to winter. Commenters also requested additional analysis of winter activity associated with Option 3 and its potential impacts on caribou (e.g., taking caribou's winter energy balance into account). Commenters specifically noted the SDEIS fails to address impacts of ice roads on caribou.

Commenters expressed concerns regarding caribou calving density data and analysis and requested that this be revised and clarified for consistency and accuracy. Commenters noted the implications of this data in the ANICLA 810 analysis and implications on the abundance of caribou available for subsistence use.

Commenters requested technical edits and revisions to this section to improve the analysis and fix consistency issues.

3.28 Visual Resources

Commenters requested technical edits to this section.

3.29 Water Resources

Commenters noted several different types of potential impacts to waterways and aquatic species that they state have not adequately been evaluated in the SDEIS.

Commenters requested more information on surface water flows of Willow Creek 3 and impacts to these flows from the construction freshwater reservoir.

Commenters requested additional information and analysis on the potential for needing water management and fish passage during construction and use of the proposed ice bridge, including the effects of such management actions on water resources and fish. Commenters also requested an evaluation of potential alternative measures that may be implemented to address these management concerns. Commenters requested that existing baseline data and local knowledge be incorporated in the planning of the ice bridge abandonment to reduce potential environmental impacts.

Commenters requested additional analysis of boat ramp floodplain impacts that were not previously analyzed in the Draft EIS and requests consideration of mitigation measures for those effects.

Commenters stated that the water resources analysis of impacts associated with the Colville River crossing ice bridge is inadequate due to a lack of baseline data on ice flows and uncertainties regarding design of the crossing. Commenters stated that the BLM has not adequately attempted to obtain the necessary baseline data or resolve uncertainties. Commenters also provide suggestions for alternative modeling of baseline flow at the crossing location.

Commenters requested that existing baseline data on ice jams and annual ice-break up for the Colville River delta be incorporated into the analysis. Commenters requested that the BLM further describe the likelihood of water resource impacts to occur from gravel infrastructure.

Commenters requested several technical edits or clarifications to the SDEIS water resources analysis.

3.30 Wetlands and Vegetation

Commenters expressed concerns about the use of the impervious cover model to predict watershed degradation due to wetland losses. Commenters recommended the EIS include analysis of impacts to aquatic resource functions and values at site-specific scale, which can also be used to inform appropriate mitigation.

Commenters requested miscellaneous editorial revisions throughout the wetlands and vegetation chapter.

4.0 SUBSTANTIVE COMMENTS AND RESPONSES

4.1 How to Read This Volume

The BLM assigned a letter number to every unique communication received during the Draft EIS public comment period. The following tables contain all substantive comments with the BLM's responses; they are organized by the comment topic (or code). Commenter names and applicable organization or agency are provided for letter submissions. Complete transcripts of public meetings and copies of all comment letters are available on the BLM's ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/109410/510.

4.2 Comments and Responses

There were 150 substantive comments on 2 comment themes that are responded to in the text below. The remaining 382 substantive comments are responded to in the tables in Section 4.2.3 (*Other Substantive Comments*).

4.2.1 Request for Comment Period Extension or New Public Hearing

There were 28 comments that asked to extend the comment period. Commenters requested a comment period extension, comment period pause, additional opportunities for providing public testimony, and/or in-person public hearings, additional public outreach after the comment period ends and additional in-person participation for locally affected residents, including Nuiqsut and other North Slope residents. Commenters stated that the timing of the meetings did not allow for meaningful engagement because the public, including residents of Nuiqsut and other potentially affected communities, were occupied with health concerns during the COVID-19 pandemic. In addition, commenters stated that the meetings were held during the initiation of the spring whaling season, which may have kept members of the community from attending the meetings.

The BLM released a targeted Supplement to the Draft EIS, based on public comments received during the Draft EIS review. The Supplement to the Draft EIS was limited to only three specific aspects of the Project and was 70 pages in length, making a 45-day day review period adequate.

4.2.2 Stakeholder Engagement Process

There were 122 comments that expressed concern for how BLM conducted stakeholder engagement and that the use of the virtual meeting platform for public meetings did not allow members of the public without internet access to meaningfully engage in the EIS process. Commenters stated that the agency did not allow enough time and space for questions, that it was not clear how many and which BLM personnel were participating, and that many participants experienced technical difficulties that may have prevented them from testifying and engaging.

Though not counted as substantive, there were also 54 comments that expressed support for how the BLM conducted stakeholder engagement. These are summarized in Section 3.27 (*Stakeholder Engagement Process*).

Following guidance put forth by the White House, the CDC, and state and local health authorities the BLM implemented teleworking, social distancing, and limited public access to BLM facilities. The health and safety of the public, affected communities, and our employees is our highest priority; therefore, the BLM determined it was not appropriate to hold in-person meeting and instead utilized virtual meeting tools to fulfill the requirements of our important, statutory duties under NEPA and Section 810 of ANICLA.

Internet was not required to attend a virtual public meeting. The BLM offered a telephone-only option for these public meetings, which was specifically intended to meet the needs of individuals who may not have access to the internet; these individuals were also able to register by phone.

All participants that registered for a meeting and wanted to provide testimony were able to do so. Additionally, the BLM established a toll-free telephone line to record up to 10 minutes of testimony for those that choose not to testify at the meeting or that wanted to provide additional testimony.

4.2.3 Other Substantive Comments

Tables B.3.3 through B.3.30 provide the substantive comments on the SDEIS and BLM's responses.

4.2.3.1 Air Quality

Table B.3.3. Substantive Comments Received on Air Quality

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26707	16	Baca	Andrew	US Environmental Protection Agency	Air Quality	The SDEIS does not include an updated air quality analysis, stating that "The three Project changes are not expected to substantially change the air quality analysis. Key Project components and their associated emissions are being remodeled and the results will be included in the Final EIS." We support the BLM's commitment to provide updated air quality modeling for the FEIS. It will be important that the revised modeling take into account all of the proposed project updates and modifications, not only those analyzed in the SDEIS. We look forward to reviewing updated emissions inventory and air quality modeling information in our capacity as a cooperating agency, to support the BLM in preparation of the FEIS.	The Final EIS analyzes impacts to air quality from key Project components, taking into account all Project updates and modifications as reflected in the revised emissions inventory and near-field modeling. The Final EIS analysis, like the Draft EIS analysis, is not restricted to those changes listed in the SDEIS.	N
216	5	Bruno	Jeff	State of Alaska	Air Quality	The Draft SEIS notes in Chapter 1, page one that Production from the neighboring Greater Mooses Tooth 2 (GMT-2), which is currently under construction, may shift from the Alpine Processing Facility to the Willow Processing Facility. Chapter 3, page 12, further notes that the three project changes (Chapter 2 Alternatives) are not expected to substantially change the air quality analysis. Key project components and their associated emissions are being remodeled and the results will be included in the Final EIS. Suggestion: Please clarify in the Final EIS why a shift of GMT-2 production from Alpine to Willow would not substantially change the air quality analysis. The Final EIS needs to document and explain how this production shift was analyzed or accounted for in the current air quality analysis.	The revised AQTSD (Appendix E.3B, *Air Quality Technical Support Document*) explains in Section 1.1, *Willow Master Development Plan*, that the Project emissions inventory and near-field modeling analysis account for the potential for the Willow Processing Facility to process oil produced at GMT-2.	N
130	8	Karro	Loren J	—	Air Quality	The possible problems of air quality are barely addressed in the DEIS, and are not addressed in the SDEIS at all. To say they will be further remodeled and included in the FEIS denies the public and other agencies a chance to see what the findings are, and to comment on them before they are in the final document. Air quality must be addressed in terms of the individual and cumulative impacts, as problems with asthma flare-ups are already being linked to windblown particulates from oil operations.	The Draft EIS provided a comprehensive analysis of air quality impacts, as detailed in the main body of the Draft EIS and in the appendices, which included an extensive AQTSD (Appendix E.3B, *Air Quality Technical Support Document*) detailing the Project emissions inventory and Project and cumulative impact assessments for 1) criteria air pollutants for individual and combined phases of development, 2) prevention of significant deterioration, 3) impact assessments for hazardous air pollutants, and 4) impacts to visibility and deposition. As stated in the SDEIS, key Project components were remodeled and results are provided in the Final EIS. The Final EIS air quality analysis was revised based on public and agency comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess impacts on air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, the overall approach used to assess air quality impacts in the Draft EIS is the same for the Final EIS. Resulting air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted. Project-specific and cumulative impacts to air quality, including windblown dust and airborne particulate matter, were analyzed in both the Draft EIS and the Final EIS.	N
130	13	Karro	Loren J	—	Air Quality	The possible negative impacts on air quality of the proposed project, both standing alone and cumulatively with existing oil field projects, must be examined in detail and mitigation efforts, if any, must be laid out.	Project-specific and cumulative impacts to air quality, including existing oil field projects and other planned development, were analyzed in both the Draft EIS and the Final EIS. Related to the request for mitigation measures, the purpose of NEPA is to analyze the Project, as proposed by the proponent, and alternatives to inform the selection of an alternative. Since air quality modeling results show that impacts for all action alternatives would be below all applicable NAAQS and AAAQS and established thresholds for AQRVs, no significant air quality impacts would occur. Therefore, additional prescriptive mitigation measures are not required for protection of air quality. As stated in the SDEIS, key Project components were remodeled and results are provided in the Final EIS. The Final EIS air quality analysis was revised based on public and agency comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess impacts on air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, the overall approach used to assess air quality impacts in the Draft EIS is the same for the Final EIS. Resulting air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted.	N
168	11	O'Reilly-Doyle	Kathleen M	—	Air Quality	Air Quality. This SDEIS addresses the issue of Air Quality in just two sentences. It concludes emissions are being remodeled and the results will be included in the Final EIS. This does not allow an opportunity to provide review or comment during this public comment period.	As stated in the SDEIS, key Project components were remodeled and results are provided in the Final EIS. The Final EIS air quality analysis was revised based on public and agency comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess impacts on air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, the overall approach used to assess air quality impacts in the Draft EIS is the same for the Final EIS. Resulting air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26705	11	President	Acting	Native Village of Nuiqsut Tribal Council	Air Quality	BLM must update its air quality analysis to consider the new module delivery option. BLM has not updated its air quality analysis to include the Colville River crossing module delivery option. This option includes roads in different locations and different levels of traffic, among other changes relative to the other module delivery options, which will change the project's impacts on air quality. Yet, without any explanation, the SDEIS states that the changes flare not expected to substantially change the air quality analysis."	The Final EIS does assess the air quality impacts associated with the new module delivery option (Option 3: Colville River Crossing). Impacts are presented in Final EIS Section 3.3.2.4.5 (*Module Delivery Options*), as well as in the AQTSD (Section 3.7, *Module Delivery Option 3*, of Appendix E.3B, *Air Quality Technical Support Document*). The impacts from Option 3 would be similar to Option 2 (Point Lonely Module Transfer Island), and impacts are below all applicable NAAQS and AAAQS.	N
520	31	Psarianos	Bridget	Trustees for Alaska	Air Quality	One glaring example of BLM's failure to undertake an adequate analysis of impacts in the supplemental draft EIS can be seen in the agency's refusal to consider changes to impacts to air quality. BLM states that ConocoPhillips redone project description is not expected to substantially change the air quality analysis. Key Project components and their associated emissions are being remodeled and the results will be included in the Final EIS. As an initial matter, Groups raised serious technical questions about the scientific accuracy of the air quality modeling performed for the draft EIS. The air quality modeling analysis performed by the BLM for the draft EIS indicates that significant adverse impacts on air quality could occur, making this an important resource for consideration in the supplemental draft EIS. BLM should explain whether these deficiencies are also being rectified as part of its remodeling efforts, as its original modeling effort underestimated air quality impacts.	The Final EIS was developed based on public and agency comments provided on the Draft EIS and the SDEIS. Importantly, the approaches used to assess impacts on air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, the overall approach used to assess air quality impacts in the Draft EIS is the same for the Final EIS. Resulting air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted. Related to the technical questions provided in comments on the Draft EIS, responses to those comments are provided in the Final EIS (Appendix B.2, *Draft EIS Comments and BLM Responses*). The Final EIS was revised to address comments when warranted. Specifically, related to comments about an underestimate in air quality impacts, additional text was added to the AQTSD (Appendix E.3B, *Air Quality Technical Support Document*) to explain the near-field modeling scenarios in more detail, and the development drilling near-field modeling scenario was revised to include construction emissions. In the Draft EIS, predicted impacts from all alternatives and scenarios were below NAAQS and AAAQS and established thresholds for AQRVs, except for Alternative C Routine Operation, which was predicted to exceed the $PM_{2.5}$ 24-hour NAAQS and AAAQS. As shown in the Final EIS, impacts from the revised Project are predicted to be below all applicable NAAQS and AAAQS and established thresholds for AQRVs for all action alternatives and scenarios, including Alternative C Routine Operations. Therefore, there would not be significant impacts on air quality.	N
520	32	Psarianos	Bridget	Trustees for Alaska	Air Quality	BLM provides no assessment of how the level, type, and location of emissions could change the impacts of the Willow project from what was considered in the draft EIS. This is unacceptable. Construction of ConocoPhillips proposed gravel island versus construction of an annual ice bridge across the Colville would be likely to shift air quality impacts closer to Nuiqsut. Further, the list of project changes arbitrarily excluded by BLM from analysis in the supplemental draft EIS are likely to substantially change the air quality impacts from what was modeled in the draft EIS. Aircraft and vehicle traffic patterns, the location of the central processing facility and airstrip, the location of ice road routes, and adding new project equipment and modules would all change the level and location of emissions for the project. Further, the supplemental draft EIS considers shifting production on the neighboring GMT-2 pad from the Alpine processing facility to the Willow Processing Facility. In addition to pipeline modifications, this change would shift air pollution from Alpine to the Willow area. Air pollution modeling for the Willow project must incorporate that shift. The revised design information at whichever distance is used needs to be both clarified and incorporated into air pollution modelling for the Willow project. Considering these differences is critical; sweeping such changes under the rug with conclusory statements violates NEPA.	As stated in the SDEIS, key Project components were remodeled and results are provided in the Final EIS. The Final EIS was developed based on public and agency comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess impacts on air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, the overall approach used to assess air quality impacts in the Draft EIS is the same for the Final EIS. Resulting air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted. As shown in the Final EIS, the level, type, and locations of emissions are relatively similar between the Final EIS and the Draft EIS. The air quality impacts at Nuiqsut are estimated to be insignificant for all module delivery options, as well as any action alternative. The Final EIS analyzes impacts to air quality from key Project components, including aircraft, vehicles, Willow Processing Facility, airstrips, ice roads, module delivery, processing oil produced at GMT-2, and many other associated Project activities. The Final EIS analysis, like the Draft EIS analysis, is not restricted to those changes listed in the SDEIS.	N
844	4	O'Reilly-Doyle	Kathleen	—	Air Quality	Air quality: This draft EIS addresses the issue of air quality in just two sentences. It concludes emissions are being remodeled and the results will be included in the final EIS. This does not allow an opportunity to provide review or comment during this public period.	As stated in the SDEIS, key Project components were remodeled and results are provided in the Final EIS. The Final EIS was developed based on public and agency comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess impacts on air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, the overall approach used to assess air quality impacts in the Draft EIS is the same for the Final EIS. Resulting air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted.	N
117	12	—	Bruce	—	Air Quality	I note that among the Infield Lines noted in 2.4.3.1 of the proposed project and alternatives, it says that Miscible-injectant (MI) pipeline MI transported from the WCF for injection to support enhanced oil recovery. WHAT SORTS OF GASES AND CHEMICALS COMPOSE THE MISCIBLE-INJECTANT PROPOSED TO BE INJECTED AT THE WILLOW MRP? It appears that the MI will come from the proposed WCF, so you should be able to detail the exact constituents in MI proposed for use as part of the Willow MDP! Seeing that carbon dioxide is sometimes used in MI, and seeing that carbon dioxide is a significant global greenhouse gas, what impact will injecting such have on the hydrological and biological resources of the area as well as on local and global climate?	MI has been used in North Slope oil production activities for more than 30 years to support enhanced oil recovery. MI is a blend of lean injection gas (primarily methane) and heavier liquid components (generally C3–C6), which is injected into the reservoir to act as a solvent and remove additional oil from the rock pores. This process is currently being used by CPAI at its Alpine facilities (Alpine Oil Discharge Prevention and Contingency Plan; CPAI 2018), and a similar process with similar stream composition is expected to be used for the Willow MDP Project. MI, as blended at Alpine and as proposed at Willow, does not contain carbon dioxide. All infield flowlines, including those used for MI, would be designed, constructed, and monitored consistent with compliance measures outlined in 18 AAC 75.047. The likelihood of spills occurring along infield flowlines are addressed in Chapter 4.0 (*Spill Risk Assessment*) and in Appendix H (*Spill Summary, Prevention, and Response Planning*), and the potential effects to hydrological and biological resources in the unlikely event a flowline spill does occur are addressed in relevant resource sections presented in Chapter 3.0 (*Affected Environment and Environmental Consequences*).	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26705	12	President	Acting	Native Village of Nuiqsut Tribal Council	Air Quality	As detailed in our comments on the DEIS, the cumulative effects of development within our region have severely compromised our air quality, causing significant health problems. Adequate information about the current air quality in Nuiqsut does not exist, and additional exploration and development activities increase the threat of toxic air pollution from normal operations as well as blowouts and other accidents. An up-to-date, independent study of air quality must be completed before BLM approves the Willow MDP. After such study is completed, an evaluation of the project's air quality impacts must include a comparative assessment of the air-quality consequences for each alternative and option, including the Colville River module delivery option.	Related to the comments on the Draft EIS, responses to those comments are provided in Final EIS Appendix B.2, *Draft EIS Comments and BLM Responses*. The Final EIS was revised to address comments when warranted. Specifically, comments about the current air monitoring program in Nuiqsut and hazardous air pollutants and blowouts resulted in responses to clarify the quality assurance procedures used when collecting air quality data at Nuiqsut and explanation about the predicted hazardous impacts at Nuiqsut. The Final EIS does assess the air quality impacts associated with the new module delivery option (Option 3: Colville River Crossing). Impacts are presented in the Final EIS Section 3.3.2.4.5 (*Module Delivery Options*), as well as in the AQTSD (Section 3.7, *Module Delivery Option 3*, of Appendix E.3B, *Air Quality Technical Support Document*). The impacts from Option 3 are similar to Option 2 (Point Lonely Module Transfer Island), and impacts are below all applicable NAAQS and AAAQS.	N
26705	16	President	Acting	Native Village of Nuiqsut Tribal Council	Air Quality	The SDEIS also indicates that BLM is reanalyzing greenhouse gas emissions and air quality associated with key project components, and that the results will be included in the final EIS. If these reanalyses result in substantial changes, they must be included in a supplemental draft EIS with the opportunity for public review and comment.	As stated in the SDEIS, the Final EIS presents revised GHG emissions and air quality analysis for key Project components. As is shown in the Final EIS, results are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted.	N

4.2.3.2 Alternatives Development Process

Table B.3.4. Substantive Comments Received on Alternatives

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	46	Dunn	Connor	ConocoPhillips Alaska	Alternatives	2. 2.2.1 - Alternatives -Constructed Freshwater Reservoir "The CFWR would be excavated during winter (16.3 total acres) . . ." Totaling the acreage shown in Table 2.2.1 shows that CFWR excavation is a total of 16.4 AC, not 16.3.	The discrepancy noted by the commenter is related to rounding; this SDEIS table is not used in the Final EIS. No change to text.	N
717	47	Dunn	Connor	ConocoPhillips Alaska	Alternatives	3. 2.2.2 -Alternatives -Boat Ramps for Subsistence Users "[Boat ramps] would likely be constructed the same time as the adjacent gravel road." ConocoPhillips has refined the timing of boat ramp construction. The Tiŋmiaqsiuġvik ramp would be constructed during the first year of construction. The boat ramps at Judy Creek and Fish Creek would be constructed within 2 years of constructing the BT1 and BT4 access roads, respectively, after site visits and input from local stakeholders.	Edit made to Final EIS Section 4.2.13, *Boat Ramps for Subsistence Users*, of Appendix D.1 (*Alternatives Development*).	Y
717	50	Dunn	Connor	ConocoPhillips Alaska	Alternatives	6. 2.3.6 - Alternatives - Water Use In Table 2.3.3, under Camp Supply- Freshwater The value for 2026 (Summer) should be changed from 0 to 0.3 and the total for all years should be changed from 6.1 to 6.4.	Values corrected for Final EIS (Appendix D.1, *Alternatives Development*, Table D.4.46)	Y
717	51	Dunn	Connor	ConocoPhillips Alaska	Alternatives	7. 2.3.9 - Alternatives - Summary Overview of Option 3 ConocoPhillips recommends adding a note to clarify that length of the proposed ice road from DS2P to GMT2 is 40.1 miles, and it will be constructed during two seasons.	The construction of the 40.1-mile-long ice road between Kuparuk DS2P and GMT-2 is explicitly described as being constructed twice (total 80.2 miles) in Final EIS Appendix D.1 (*Alternatives Development*), Section 4.7.3.4, *Other Infrastructure*. Clarifying text was added to Option 3 summary table in Final EIS Appendix D.1.	Y
805	4	Lowenthal; Haaland; Huffman; Grijalva; Gallego	Alan; Deb; Jared; Raul M.; Ruben	United States Congress	Alternatives	Neither the draft EIS nor the SDEIS is sufficient to fulfill BLM's NEPA requirement to consider a reasonable range of alternatives.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies and from comments received during scoping. During alternatives development for the Willow MDP Project, BLM considered issues identified during scoping, such as impacts to caribou and subsistence, while developing alternatives to the proponent's Project. Alternatives development is described in Chapter 3.0 (*Alternatives Development*) and Chapter 4.0 (*Reasonable Range of Alternatives*) of Appendix D.1, (*Alternatives Development*), including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need.	N
807	3	Major	Mark	—	Alternatives	One other point I'd like to make clear for everybody on the line, it was a question that I posed about the action A alternative [*sic*], and the response was that the action A was primarily put into the document for baseline. But let me translate that for everybody. What that means is the BLM cannot select alternative A, the no action alternative. They must pick something between alternatives B and D. We've also previously made — at least I have also made previous comments before on the Colville River crossing. Personally, that sounds like it's better than the module transfer island, but we do have concerns with some of the information that's been provided in the supplement to the EIS.	Alternative A (No Action) would not meet the Project's purpose and need but is included in the EIS for detailed analysis to provide a baseline for the comparison of impacts of the action alternatives.	N
30	1	Patrick	Judy	—	Alternatives	It only has a wintertime ice road. And this Willow project seems like it's an extension of Alpine. I think it makes sense to connect it to Alpine with a gravel road. I mean, the road already goes to GMT-2, so it doesn't have that much further to go. Adopt alternative B.	The support for Alternative B is noted.	N

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520	10	Psarianos	Bridget	Trustees for Alaska	Alternatives	Third, BLM's failure to analyze a reasonable range of alternatives also necessitates a revised EIS. NEPA requires that an EIS analyze a range of reasonable alternatives. . . . The range of alternatives considered for the Willow MDP is inadequate for multiple reasons. The supplemental draft EIS considers only three project components added by ConocoPhillips since publication of the draft EIS: module delivery via sealift barge at Oliktok Dock with a crossing over the Colville River, a constructed freshwater reservoir (CFWR), and up to three boat ramps for subsistence access. BLM did not consider any of the alternatives proposed in comments on the draft EIS. BLM failed to consider reasonable alternatives that would eliminate the proposed gravel island in Harrison Bay, avoid impacts in Special Areas, avoid additional airstrips, or utilize seasonal roadless drilling to decrease impacts to important surface resources. BLM continues to ignore reasonable alternatives suggested by the public during scoping and on the draft EIS, only considering certain changes to the project proposed by the applicant. This is unacceptable when other reasonable alternatives exist. Importantly, the new and revised alternatives that will be necessary to remedy these significant gaps will not be minor variation[s] of the existing alternatives that are qualitatively within the spectrum of alternatives that were discussed in the draft. To remedy the inadequate range of alternatives, a comprehensive revised draft EIS is necessary.	BLM prepared the Draft EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
520	14	Psarianos	Bridget	Trustees for Alaska	Alternatives	The draft EIS fell far short of BLM's legal obligation and NEPAs core mandate to study in depth and disclose the environmental consequences of reasonable alternatives to the agency's preferred course of action. . . . The inclusion of an additional alternative barging modules to Oliktok Dock for transport over the Colville River via ice bridge does not cure the draft EISs deficiencies. BLM still fails to consider a reasonable range of alternatives. BLM improperly limited its consideration of alternatives based on screening criteria which appear to be primarily preferences of ConocoPhillips to reduce costs, not considerations to meet BLM's legal mandates. All of the action alternatives involve the same pad size and placement, the same road and/or pipeline alignments (where no infield road exists), the same pad size and amount of infrastructure at the new Willow processing facility, a new airport west of Nuiqsut, two gravel mines inside the Ublutuoch (Tiŋmiaqsiuġvik) River 0.5-mile setback; infrastructure within the Colville River Special Area; and infrastructure inside of the Teshekpuk Lake Special Area. Changes to these project components such as the size, location, and layout of facilities, among others, have not been made public or considered by BLM, but there is no indication that BLM is considering varying these elements between alternatives. Indeed, the newly proposed layout and location of the project is not analyzed in the supplemental draft EIS, nor have Willows resources been sufficiently delineated by ConocoPhillips, making it impossible to determine whether different locations for the project may be feasible. BLM has unreasonably limited its range of alternatives such that all of the alternatives are nearly identical to ConocoPhillips proposed action.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies and from comments received during scoping. During alternatives development for the Willow MDP Project, BLM considered issues identified during scoping, such as impacts to caribou and subsistence, while developing alternatives to the proponent's Project. Alternatives development is described in Chapter 3.0 (*Alternatives Development*) and Chapter 4.0 (*Reasonable Range of Alternatives*) of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. The SDEIS added a third module delivery option (Option 3: Colville River Crossing) based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
520	15	Psarianos	Bridget	Trustees for Alaska	Alternatives	Groups vehemently objected to BLM's Alternatives Screening Process because BLM improperly dismissed alternatives based on ConocoPhillips initial evaluation, as described in the draft EIS. Indeed, Appendix D of the draft EIS describes ConocoPhillips success in limiting BLM's consideration of alternatives before the BLM's NEPA process had even begun. As a result of BLM's failure to consider reasonable alternatives in the draft EIS, such as those suggested by the public and BLM's own agency experts, the agency has been forced to issue a supplement. We do not highlight this fact solely to point out that we told you so, but also to stress the importance of public involvement and input in the NEPA process, consistent with the purposes of that statute. We also highlight this fact to reinforce that BLM continues to overlook reasonable, viable alternatives in the supplemental draft EIS as a result of its improper screening process.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies and from comments received during scoping. During alternatives development for the Willow MDP Project, BLM considered issues identified during scoping, such as impacts to caribou and subsistence, while developing alternatives to the proponent's Project. Alternatives development is described in Chapter 3.0 (*Alternatives Development*) and Chapter 4.0 (*Reasonable Range of Alternatives*) of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to the Project proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses.	N
520	16	Psarianos	Bridget	Trustees for Alaska	Alternatives	It is perplexing that the draft EIS characterizes ConocoPhillips proposal to barge modules to Oliktok Dock for transport over the Colville via ice routes and existing infrastructure unfeasible and states that it could not be implemented. But that is what is now proposed. The supplemental draft EIS offers no explanation as to how the safety concerns, allegedly egregious environmental consequences, and lack of economic feasibility outlined in the draft EIS are no longer at issue or have been mitigated to such an extent as to warrant inclusion of this alternative in the supplemental draft EIS. It also does not offer why this particular option was selected, as opposed to other alternative components which would have also eliminated the need for the proposed gravel island in Harrison Bay.	Option 3 (Colville River Crossing) as described in the SDEIS and Final EIS was not previously deemed unfeasible. As described in Appendix D.1 (*Alternatives Development*), Tables D.3.1 and D.3.2 (and clarified further in the Final EIS), BLM evaluated crossing the Colville River via a grounded ice bridge near Umiat (the only location for which there were existing flow data). Because there was flow year-round at Umiat, grounding an ice bridge there or anywhere downstream was considered infeasible. Based on public comments, CPAI continued to look for a feasible crossing location and, with additional data collection, was able to locate a crossing where an ice bridge could be partially grounded and still allow some flow in small channels. More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 to clarify that the proposed ice bridge in Option 3 would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1).	Y

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520	17	Psarianos	Bridget	Trustees for Alaska	Alternatives	We reiterate that differences in resource impacts among alternatives are meant to be considered in the NEPA analysis itself, not discussed behind closed doors by BLM in close coordination with the project applicant. There is no discussion as to how BLM quantified any of the differences for the alternatives it is still refusing to consider in the supplemental draft EIS, or why the Oliktok Dock option is the only new alternative component up for consideration. Table D.3.2 in the draft EIS appears to be the agency's attempt to address some of its criteria for elimination; however, it only provides a few brief sentences that do not explain all of these bullet points. Nor is it clear where any of this information originated and there are no citations for assertions, leaving the public to assume they are arguments offered by ConocoPhillips with no independent analysis by the agency. The alternatives considered may not be entirely driven by a private applicants preferences. . . . We are disappointed that BLM has continued to limit its range of alternatives in the supplemental draft EIS and considers only one additional alternative option. Given that ConocoPhillips deemed its current Option 3 to be unfeasible during the screening process, but has since reneged on that statement, it is rational to assume that other unfeasible alternatives are in fact feasible and possibly environmentally preferable. The Ninth Circuit highlights that an applicant cannot define a project in order to preclude the existence of any alternative sites and thus make what is practicable appear impracticable. We encourage BLM to independently revisit its screening criteria and overall approach to alternatives, and comprehensively revise its EIS to include a range of alternatives that are meaningfully different from ConocoPhillips application.	Option 3 as described in the SDEIS and Final EIS was not previously deemed unfeasible. As described in Appendix D.1 (*Alternatives Development*), Tables D.3.1 and D.3.2 (and clarified further in the Final EIS), BLM evaluated crossing the Colville River via a grounded ice bridge near Umiat (the only location for which there were existing flow data). Because there was flow year-round at Umiat, grounding an ice bridge there or anywhere downstream was considered infeasible. Based on public comments, CPAI continued to look for a feasible crossing location and, with additional data collection, was able to locate a crossing where an ice bridge could be partially grounded and still allow some flow in small channels. More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 to clarify that the proposed ice bridge in Option 3 would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1).	Y
407	3	Rose	Garett	Natural Resources Defense Council	Alternatives	Compounding this, BLM continues to fail to analyze a reasonable range of alternatives. Instead, the SDEIS maintains the three functionally identical alternatives that the DEIS analyzed. And BLM pursues this approach despite commenters on the DEIS informing the agency of several viable, specific alternatives that would reduce potentially significant impacts.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies and from comments received during scoping. During alternatives development for the Willow MDP Project, BLM considered issues identified during scoping, such as impacts to caribou and subsistence, while developing alternatives to the proponent's Project. Alternatives development is described in Chapter 3.0 (*Alternatives Development*) and Chapter 4.0 (*Reasonable Range of Alternatives*) of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. The SDEIS added a third module delivery option (Option 3: Colville River Crossing) based on stakeholder feedback to include an alternative that would not construct an offshore gravel island.	N
407	18	Rose	Garett	Natural Resources Defense Council	Alternatives	Compounding the SDEISs myriad failures to meaningfully consider how the actions considered therein would increase potential impacts to the Western Arctic's resources, BLM also fails to consider any new alternatives that would significantly reduce such impacts. The DEIS purported to analyze four alternatives, but the three action alternatives were functionally identical in terms of impacts. The additional components included in the SDEIS further reduce the marginal differences between the analyzed alternatives. BLM's failure to revise its alternatives analysis in the SDEIS is a violation of the agency's obligation under NEPA to consider all reasonable alternatives. BLM must consider additional alternatives that would meaningfully reduce potentially significant impacts, many of which were suggested by commentators and remain viable, and recirculate its analysis for public comment.	The range of alternatives was developed by resource specialists from BLM and cooperating agencies and from comments received during scoping. During alternatives development for the Willow MDP Project, BLM considered issues identified during scoping, such as impacts to caribou and subsistence, while developing alternatives to the proponent's Project. Alternatives development is described in Chapter 3.0 (*Alternatives Development*) and Chapter 4.0 (*Reasonable Range of Alternatives*) of Appendix D.1, *Alternatives Development*, including options considered but eliminated from detailed analysis and the screening criteria for those alternatives. All action alternatives meet the Project's purpose and need. The SDEIS added a third module delivery option (Option 3: Colville River Crossing) based on stakeholder feedback to include an alternative that would not construct an offshore gravel island. BLM is required to "objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated" (40 CFR 1502.13). Reasonable alternatives are those that substantially meet the agency's purpose and need. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint. Reasonable alternatives that substantially meet the purpose and need are not necessarily alternatives that reduce significant effects across all resources. At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to the Project proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. Roadless portions of oil and gas developments inherently require more air traffic in order to provide necessary access. Objectively evaluating all reasonable alternatives inherently includes comparing and contrasting the effects of the alternatives and disclosing the trade-offs between alternatives.	N

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407	19	Rose	Garett	Natural Resources Defense Council	Alternatives	The DEISs original alternatives did not cover a meaningful range. . . . [A]ll the alternatives involve the same pad size, the same approximate pad location, the same road and/or pipeline alignments, the same amount of infrastructure at the Willow processing facility, a new airport, a gravel mine inside the Ublutuoch (Tiŋmiaqsiuġvik) River 0.5-mile setback, development within the Colville River Special area, and development within the Teshekpuk Lake Special Area. . . . BLM's addition of Option 3 does not bring the agency into compliance with NEPA's mandate that it assess all reasonable alternatives. First, by BLM's own design, Option 3 does not change the configuration of any of the core alternatives it is a method of getting infrastructure to the Project that can be plugged into any of the alternatives. Second, BLM's analysis of Option 3 does not allow the public or decisionmakers to evaluate the comparative merits of the Option as compared to the other Options or in the context of the alternatives. BLM does not meaningfully disclose, for instance, the impacts of Option 3 as compared to Option 2, or the impacts of Option 3 when plugged into Alternative D as compared to Option 2 plugged into Alternative B. Third, BLM, after rejecting a Colville River crossing option as unfeasible in the DEIS, does not disclose what allayed its original concerns, other than to state that CPAI is now confident that transporting sealift modules via an ice road across the Colville River near Ocean Point is feasible and have made this option part of their proposed project. . . . While new Option 3 would eliminate the gravel island element of the Project, it creates a host of additional potentially significant impacts, including an even more significant intrusion into the Colville River Special Area. This approach to alternatives continues the trend, noted by commentators on the DEIS, of BLM blindly following CPAIs lead. In the original analysis, BLM's selected alternatives were guided by what CPAI deemed feasible and acceptable. Likewise, as noted, the only stated reason for considering the new components in an SDEIS is because CPAI believed they were feasible and necessary; none of the elements were added and analyzed under BLM's initiative.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to the Project proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. Roadless portions of oil and gas developments inherently require more air traffic in order to provide necessary access. Option 3 as described in the SDEIS and Final EIS was not previously deemed unfeasible. As described in Appendix D.1 (*Alternatives Development*), Tables D.3.1 and D.3.2 (and clarified further in the Final EIS), BLM evaluated crossing the Colville River via a grounded ice bridge near Umiat (the only location for which there were existing flow data). Because there was flow year-round at Umiat, grounding an ice bridge there or anywhere downstream was considered infeasible. Based on public comments, CPAI continued to look for a feasible crossing location and, with additional data collection, was able to locate a crossing where an ice bridge could be partially grounded and still allow some flow in small channels. More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 to clarify that the proposed ice bridge in Option 3 would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1). SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." All Project components are described and compared in the Final EIS.	Y
26710	8	Smith	Louise	USFWS	Alternatives	Alternative D (Disconnected Access) with Module Transfer Option 3 (Colville River Crossing), presented in the SDEIS, has the fewest potential impacts to Service trust resources. We believe this Alternative/Transfer Option will minimize impacts of well-field expansion as well as potential ancillary impacts to the Colville River Delta while still allowing for development of the National Petroleum Reserve-Alaska (NPR-A). Alternative D uses the same layout of infield infrastructure as Alternative B (CPAI's Preferred Alternative), however with no year-round road connection to the Greater Mooses Tooth (GMT) or Alpine (Colville Delta) developments. The proposed Willow Development consists of infield roads to drill sites, a processing facility, operations center, and a 5,200-foot airstrip. Therefore, there is no reason to connect the development to the GMT road system, and hence the Alpine developments. There is no all-season road-access from the Alpine developments to the oilfields east of the Colville Delta (Kuparuk Development, Spine Road, or Dalton Highway). Hence, a connection from the proposed Willow Development to the Alpine development will not provide access to the eastern North Slope or the state highway system.	Though the elimination of a road in Alternative D would aid caribou movements in that area and decrease the amount of total fill needed for the Project, the increase in traffic to the roadless development would increase overall disturbance of caribou and birds. The increase in traffic for a roadless alternative is substantial. Alternative D would have 37% more total ground traffic (1,187,968 more trips) and 57% more total air traffic (6,937 trips) than Alternative B (Tables D.4.16, D.4.17, D.5.5, and D.5.9 in Appendix D.1, *Alternatives Development*). In addition, the annual ice road required for Alternative D throughout the life of the Project could have longer-lasting effects on water levels in water-source lakes used by nesting waterbirds.	N
26710	9	Smith	Louise	USFWS	Alternatives	Module Transfer Option 3, CPAI's preferred option, would transport the sealift modules from Oliktok Point to DS2P on existing infield roads within the Kuparuk oil fields. This is more efficient than Module Transfer Option 1 (Module Transfer Island (MTI) adjacent to Atigaru Point) . . . As gravel is a very limited commodity within the NPR-A, the Service is concerned that constructing and then abandoning the MTI (within 3 to 5 years) is not the best use of this scarce resource, and its mining and transportation will significantly impact valuable habitat for our trust species. Therefore, we support Module Transfer Option 3, the applicant's preferred option.	Option 3 (Colville River Crossing) is BLM's preferred module delivery option.	N

4.2.3.3 Avoidance, Minimization, and Mitigation

Table B.3.5. Substantive Comments Received on Avoidance, Minimization, and Mitigation

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
159	13	Kenning	Erik	ASRC	Avoidance, Minimization, and Mitigation	Mitigation measures should be designed into the project utilizing all the knowledge gained since the start of the Prudhoe Bay development. Pipeline heights of at least 7 feet, anti-reflective pipeline coatings, pipeline/road separations, and traffic calming measures should all be incorporated into the final project design.	These BMPs have been incorporated into the Project or have been included as suggested BMPs; see Chapter 5.0 (*Mitigation*) and Appendix I (*Avoidance, Minimization, and Mitigation Technical Appendix*).	N
159	14	Kenning	Erik	ASRC	Avoidance, Minimization, and Mitigation	Under the U.S. Corps of Army Engineers 404 permit, any required compensatory mitigation should be geared towards providing direct benefits to the residents of Nuiqsut. ASRC is encouraged to see CPAI's willingness to offer projects to that end and we request the BLM also support those types of projects that benefit the residents of Nuiqsut as well as the surrounding wetlands.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020.	N
520	26	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, and Mitigation	BLM's Proposed Mitigation and its Analysis Are Still Insufficient. In our comments on the draft EIS, we provided detailed comments regarding the deficiencies and gaps in BLM's analysis of proposed mitigation measures. The supplemental draft EIS does not remedy the problems we identified; those all still remain deficiencies with BLM's analysis. BLM includes two additional suggested mitigation measures in the supplemental draft EIS. It is unclear if BLM is actually going to mandate these measures. BLM does not explain what it means by suggested or otherwise indicate that these would be required for the project.	Avoidance, minimization, and mitigation measures/BMPs were further developed in the Final EIS and will be included in BLM's ROD. Details are included in the individual resource sections of Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I (*Avoidance, Minimization, and Mitigation Technical Appendix*).	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26707	3	Baca	Andrew	US Environmental Protection Agency	Avoidance, Minimization, and Mitigation	In addition, to ensure a complete NEPA analysis that sufficiently addresses direct, indirect, and cumulative impacts from the proposed project, we continue to recommend that the FEIS include a draft compensatory wetland mitigation plan, with compensatory mitigation sufficient to replace lost aquatic resource functions and values, to the extent practicable.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A compensatory mitigation plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404. USACE issued its Public Notice on March 26, 2020.	N
26707	11	Baca	Andrew	US Environmental Protection Agency	Avoidance, Minimization, and Mitigation	Mitigation of Impacts to Surface Water Resources We continue to recommend that the FEIS evaluate and discuss whether the projects design features and additional suggested mitigation measures will be sufficient to mitigate potential impacts to surface water resources as a result of hydrologic impacts from project infrastructure, and that additional measures be added if needed.	Avoidance, minimization and mitigation measures/BMPs were further developed in the Final EIS and will be included in BLM's ROD. Details are included in the individual resource sections of Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I (*Avoidance, Minimization, and Mitigation Technical Appendix*).	N
26707	12	Baca	Andrew	US Environmental Protection Agency	Avoidance, Minimization, and Mitigation	We also continue to recommend that the FEIS include an adaptive management plan that provides detail regarding how Conoco Phillips Alaska, Inc. will identify and correct any unanticipated surface water flow blockages as quickly as possible, to avoid lasting environmental impacts.	Language was added to the suggested measure to collect baseline water resources data at Ocean Point, in Section 3.8.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*.	Y
717	116	Dunn	Connor	ConocoPhillips Alaska	Avoidance, Minimization, and Mitigation	72. 5.0 - Mitigation This paragraph should include wording on Page 10 and Page 51 proposed mitigation measure on coordinating access on the module haul ice road with NSB CWAT and local residents.	Change made as suggested.	Y
520	27	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, and Mitigation	Additionally, it is not clear how the suggested measures would actually reduce impacts. The first is primarily an information gathering requirement. . . . It also sounds like the information is already required: continue to collect baseline data. . . . If it is already required, it is unclear why it is presented as an additional measure. BLM needs to more clearly explain this. The second measure is to [i]nclude erosion mitigation features or options in boat ramp designs to prevent or minimize erosion at boat ramps. It is unclear what specific requirements will be applicable to this mitigation measure. No specific features or options are identified or proposed. And no analysis of the unspecified features or options is included. This does not meet NEPA's mandates.	Details of what would be required in each avoidance, minimization, or mitigation measure will be provided in the ROD. Additional details regarding measures related to water resources are in Section 3.8.2.1, *Avoidance, Minimization, and Mitigation*. Though some BMPs require data collection (such as proposed BMP E-6, which requires 1 year of fish sampling for stream crossings), the measures proposed in the Final EIS as additional suggested measures either are not covered by existing (or proposed 2020) BMPs or expand those existing (or proposed) BMPs.	Y
520	28	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, and Mitigation	Further, the supplemental draft EIS fails to account for the NPR-A Regional Mitigation Strategy. The document lacks required mitigation offsets, including the use of the Regional Mitigation Strategy for the Northeastern NPR-A. The GMT-1 Record of Decision required the completion of a Regional Mitigation Strategy (RMS) to offset future projects enabled or assisted by the existence of GMT-1. As a formal requirement of the GMT-1 ROD and because of the scale and scope of the Willow MDPs impacts, the RMS must be implemented through a transparent and meaningful public process. . . . In order to offset and manage the impacts to subsistence, sociocultural systems, air quality, water quality, public health, birds, fish, terrestrial mammals, and threatened and endangered species, . . . core areas of high ecological and cultural importance must be durably protected for a least as long as the life of this projects impacts. By not utilizing the RMS, BLM fails to ensure these protections.	Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). Numerous avoidance, minimization, and mitigation measures would apply to the Willow MDP Project to mitigate impacts to and protect these resources.	N
520	41	Psarianos	Bridget	Trustees for Alaska	Avoidance, Minimization, and Mitigation	Mitigation measures for birds in the SDEIS are inadequate and incomplete. . . . The SDEIS only adds one mitigation measure: Construct upgrades to Kuparuk roads before or after the nesting season (June 1 through July 31), if possible, to avoid impacts to tundra-nesting birds, and loss of eggs, nestlings, or both. The included caveat that the measure will only occur if possible renders this measure effectively meaningless. But beyond that, there are no mitigation measures analyzed for avoiding or lessening impacts from new infrastructure components, such as the boat ramps. These factors require analysis.	Numerous avoidance, minimization, and mitigation measures for birds are described in Section 3.11.2.1, *Avoidance, Minimization, and Mitigation*.	N
26710	7	Smith	Louise	USFWS	Avoidance, Minimization, and Mitigation	While the Service does not object to the construction of the subsistence boat ramps, we recommend development of a maintenance plan to ensure long-term viability and use of the site(s) while minimizing impacts to the adjacent waterbodies. We recommend the plan include the following points at a minimum: • Identify entity (CPAI, Kuukpik, Native Village of Nuiqsut, etc.) 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; and • Removal/mediation of toxic spills.	Suggestion was added to Final EIS Section 3.8.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*.	Y

4.2.3.4 Birds

Table B.3.6. Substantive Comments Received on Birds

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	78	Dunn	Connor	ConocoPhillips Alaska	Birds	34. 3.11.2.1 - Birds - Alternatives B, C, and D ConocoPhillips recommends adding the information that the boat ramps at Ublutuoch River and Judy Creek would be located within the BMP E-11 yellow-billed loon nest site and nest lake setbacks.	Text added to Section 3.11.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*, and Section 3.11.2.9, *Special Status Species*.	Y
717	79	Dunn	Connor	ConocoPhillips Alaska	Birds	35. 3.11.2.2 - Birds - Module Delivery Option 3: Colville River Crossing In the first sentence of the fifth paragraph, remove text in parentheses because road upgrades are not limited to the 2 miles between Oliktok Dock and the staging pad.	Text removed as suggested in Final EIS Section 3.11.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	80	Dunn	Connor	ConocoPhillips Alaska	Birds	36. 3.11.2.2 - Birds - Module Delivery Option 3: Colville River Crossing ConocoPhillips recommends text be added to the last paragraph to disclose that birds are unlikely to collide with vehicles in the winter. Additionally, Option 3 should be compared to and put in context of the other alternatives, which would include significantly more air, ground, and marine traffic.	Final EIS Section 3.11.2.8, *Module Delivery Option 3: Colville River Crossing*, clarifies that effects would be lower on winter birds than the other options due to shorter ice roads and less traffic.	Y
117	23	Campbell	Bruce	—	Birds	The spectacled eider is sometimes harmed or killed when a shipping vessel with blinding lights bumps into such birds. Its social activity and at least marginal habitat on the current North Slope needs to be recognized.	Effects of vessel traffic and lighting on spectacled eiders are described in Section 3.11.2.3.2, *Disturbance or Displacement*, and Section 3.11.2.3.3, *Injury or Mortality*.	N
130	7	Karro	Loren J	—	Birds	The DEIS did not mention Golden Eagles in their bird analysis. Immature Golden Eagles are known to utilize the NPR-A for 2 years prior to breeding, and this includes the area of the proposed Willow Project. This is not mentioned in the SDEIS either. Further research is needed on this, and consideration of the possible effects of the project on the Golden Eagle need to be included in an SDEIS.	Section 3.11.2, *Environmental Consequences*, was updated for the Final EIS with a short discussion and includes these citations: -McIntyre et al. 2008 -McIntyre et al. 2018 -Eisaguirre et al. 2019	Y
130	12	Karro	Loren J	—	Birds	Research is conducted on the statewide movement of Golden Eagles including their use of the NPR-A, and the possible effects of the proposed Willow Project on the Eagles is analyzed for each alternative.	Section 3.11.2, *Environmental Consequences*, was updated for the Final EIS with a short discussion and includes these citations: -McIntyre et al. 2008 -McIntyre et al. 2018 -Eisaguirre et al. 2019	Y
658	4	Long	Becky	—	Birds	The No Action Alternative is the only alternative that has No Drilling or Infrastructure Oil and Gas leasing in Teshekpuk Lake Special Area This area is the largest wetland complex and one of the most important goose molting habitats in the circumpolar North. Bird populations from all 7 continents are present during certain life stages. The area is globally important habitat. A portion of the area recently was designated Qupaluk Flyway Network for the East Asian Australasian Flyway Partnership. More than a dozen Watch List species nest, molt, and rear in the wetland complex including King Eiders, Red throated Loons, Dunlins, and Buff Breasted Sandpipers. A specific concern is Yellow Billed Loons that nest on deep fish bearing lakes and considered listing under the Endangered Species Act. The current lack of migratory bird protections means this Special Area and its protections is especially needed globally The Migratory Bird Treaty Act of 1918 encouraged industries to collaborate with the federal government on minimizing bird deaths. It protected birds without being an onerous burden for industry. However, a new legal opinion within the Department of Interior cancels the bird protections for migratory birds. This roll back means the Act will not be enforced. Now the energy industry can END bird-friendly practices. This area is also an important calving and insect relief area for the Teshekpuk Lake Caribou Herd and critical habitat for polar bears.	Under the NPRPA, BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation; BLM may not preclude CPAI from developing its leases. The No Action Alternative would not meet the Project's purpose and need but is included for detailed analysis to provide a baseline for the comparison of impacts of the action alternatives, as required by 40 CFR 1502.14(d).	N
844	3	O'Reilly-Doyle	Kathleen	—	Birds	Section 3.11, the section on birds: Statewide movement of non-territorial golden eagles indicate they are located in the National Petroleum Reserve. I will be providing additional information on this research in my written comments, but wanted to address the lack of mention or analysis on golden eagles in this draft EIS.	Section 3.11.2, *Environmental Consequences*, was updated for the Final EIS with a short discussion and includes these citations: -McItyre et al. 2008 -McIntyre et al. 2018 -Eisaguirre et al. 2019	Y
168	9	O'Reilly-Doyle	Kathleen	—	Birds	Birds Section 3.11 section regarding Birds is incomplete. Statewide movements of Nonterritorial Golden Eagles, indicate they are located in the National Petroleum Reserve, and additional information is needed to understand the areas and resources they use. Although there are studies available, I do not see them referenced in this SDEIS. The following is an abstract on the research available on Golden Eagles, that should be referenced in this analysis: Connectivity of Pre-Adult, Non-territorial Migratory Golden Eagles During the Nesting Season in Alaska Carol L McIntyre, Stephen B Lewis, Todd E Katzner, Tricia A Miller, Michael Lanzone, Michael W Collopy, David C Douglas Citation: McIntyre, C.L., S.B. Lewis, T.E. Katzner, T.A. Miller, M. Lanzone, M.W. Collopy, and D.C Douglas. 2019. Connectivity of Pre-Adult, Non-Territorial Migratory Golden Eagles During the Nesting Season in Alaska. Abstract only. Oral Presentation, Migratory Connectivity of Alaskan Birds Symposium, 137th Stated Annual Meeting American Ornithological Society, Anchorage, Alaska, June 2019.	Section 3.11.2, *Environmental Consequences*, was updated for the Final EIS with a short discussion and includes these citations: -McIntyre et al. 2008 -McIntyre et al. 2018 -Eisaguirre et al. 2019	Y
168	10	O'Reilly-Doyle	Kathleen	—	Birds	In addition, the following references provide additional information on Golden Eagles that should be considered and incorporated in the analysis of this SDEIS: Mauer, F. 1985. Distribution and relative abundance of Golden Eagles in relation to the Porcupine Caribou herd calving and post-calving periods, 1984. Page 114-144 In Arctic National Wildlife Refuge Coastal Plain Resource Assessment, 1984 Update Report Baseline Study of the Fish, Wildlife and their Habitats, Volume I, Section 1002C, Alaska National Interest Lands Conservation Act. U.S.D.I, U.S. Fish and Wildlife Service, Region 7, Anchorage, Alaska. McIntyre, Carol L. And Stephen B. Lewis. 2018. Statewide Movements of Non-territorial Golden Eagles in Alaska During the. Breeding Season: Information for Developing Effective Conservation Plans. Alaska Park Science - Volume 17, Issue 1. Migration: On the Move in Alaska. Denali National Park and Preserve. https://www.nps.gov/articles/ aps-17-1-10.htm Ritchie, B. 2014. Raptor surveys at lakes in the Foothill-Coastal Plain Transition, Colville to Kuk Rivers, NPR-A, Alaska, July 2012 and 2013. Unpublished report. ABR, Inc., Fairbanks, Alaska and Bureau of Land Management, Fairbanks, Alaska. Ritchie, R.J., A.M. Wildman, and D.A. Yokel. 2003. Aerial surveys of cliff nesting raptors in the National Petroleum Reserve-Alaska, 1999, with comparisons to 1977. Technical Note 413, U.S.D.I., Bureau of Land Management, Fairbanks, Alaska. Shook, J.E. and R.J. Ritchie. 2017. Raptor surveys at lakes in the Foothill-Coastal Plain Transition, Colville to Kuk Rivers, NPR-A, Alaska, July 2016. Unpublished report. ABR, Inc., Fairbanks, Alaska and Bureau of Land Management, Fairbanks, Alaska. Stehn, R.A. 2013. Analysis of aerial survey indices monitoring waterbird populations of the Arctic Coastal Plain, Alaska, 1986-2012. Unpublished report. USFWS, Migratory Bird Management, Anchorage, Alaska.	Section 3.11.2, *Environmental Consequences*, was updated for the Final EIS with a short discussion and includes these citations: -McIntyre et al. 2008 -McIntyre et al. 2018 -Eisaguirre et al. 2019	Y

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520	39	Psarianos	Bridget	Trustees for Alaska	Birds	The SDEIS Bird Section Contains the Same Deficiencies as the Draft EIS. The presentation and analysis for impacts to birds and their habitat remains nonsensical and almost entirely devoid of meaningful analysis. Figure 3.11 (Bird Habitat Use and Analysis Area) documents the number of species using different areas, and Tables 3.11.2 and 3.11.3 document acres of bird habitat lost or altered. We reiterate the points we made in our comment letter on the draft EIS, explaining that this data presentation is incomplete. But moreover, from these tables, it's not clear what species are impacted. For example, the impacts to the Dune Complex habitat would reportedly only impact one species. A reader is forced to go back to Appendix E.11 in the Draft EIS, scroll down to the bottom of Table E.11.1 to figure out that the code DUCO means Dune Complex, and then find the one row in the table where a single bird (Black-bellied Plover) has DUCO listed among its Habitats Used. This is onerous on the reader and suppresses public understanding. It's also not clear why impacts to the Dune Complex habitat and the Black-bellied Plover are not worth analyzing further, or why habitats with higher species numbers are deemed more important.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications. Other Project changes (e.g., minor changes in gravel pad sizes, changes to the location of Project components and minor shifts in gravel road alignments, changes in ground traffic and air traffic numbers) are not expected to substantively change the overall analysis or results described in Chapter 3 of the Draft EIS." All Project components are detailed in the Final EIS. Summarizing individual species use of habitat types and aggregating for each habitat type to species richness provides a useful measure of the potential importance of each habitat type within the analysis area to the overall bird community; it does not factor in species abundance or the probability of a species occurring in the analysis area, because for most species, those data are not available. Relative abundance described in Table E.11.1 in Appendix E.11 (*Birds Technical Appendix*) is based on the best available information. Table E.11.2 in Appendix E.11 summarizes the number of species using each habitat type, which was used to rank the habitats by species richness. This ranking is better than descriptive evaluations, as it is quantitative and based on a broad synthesis of the literature and field studies. Previous studies in the vicinity indicate that there is a correspondence between species richness and abundance of nests and broods (Tables 7, 9–11 in Burgess, Johnson et al. 2003; Tables 14 and 15 in Johnson, Burgess et al. 2005; Table 5 in Rozell, Johnson et al. 2020; Johnson, Lanctot et al. 2007; Bart, Brown et al. 2012; Bart, Platte et al. 2013). The habitats with the most species and most nests and broods of waterbirds are Patterned Wet Meadow, Sedge Marsh, Old Basin Wetland Complex, Moist Sedge-Shrub Meadow, and Shallow Open Water with Islands or Polygonized Margins. The other habitats with high species diversity either were not very common in the analysis area (e.g., Open Nearshore Water, Salt Marsh, Deep Polygon Complex) or were used by shorebirds and passerines, which use a broad range of habitats. We point out that many of the habitat types with low species richness (<10 species) occupy small portions of the analysis area and comprise minor amounts (<1%) of the area lost to direct and indirect effects (Tables E11.4 through E11.6 in Appendix E.11). Many are not very abundant due to the location of the analysis area, which includes very little of the coast, or as in the case of Rivers, Streams, and associated habitat types, they are narrow strips of habitat types without much areal extent. However, these habitat types are not necessarily rare in the ACP, nor would they be appreciably diminished or affected by the Project.	N
520	40	Psarianos	Bridget	Trustees for Alaska	Birds	This method of presenting the bird habitat use data does not give the reader meaningful information about impacts to these birds. For example, Table 3.11.2 indicates that Deep Open Water without Islands (code DOW in Appendix E.11) is a habitat used by only 11 species, and therefore is not indicated as an area with the highest potential for avian occurrence. But DOW habitat is used by Yellow-billed Loons and other birds. Yet, the reader has no indication from the table or the narrative as to whether the impact to DOW habitat will be harmful to Yellow-billed Loons in the area. Nor is it clear why DOW habitat is deemed less important solely because it is used by fewer bird species, even though it is used by a special status species and others. The acreage of habitat loss within different habitat types used by various numbers of birds is almost entirely meaningless and not useful in either BLM's analysis or the public's understanding of that analysis. Moreover, Table 3.11.2 in the SDEIS does not include total acreage lost by habitat type, so even the most basic purpose of this table is not fulfilled. This problem existed in the draft EIS, and now persists in the SDEIS, which carries forward this less than meaningful analysis.	Summarizing individual species use of habitat types and aggregating for each habitat type to species richness provides a useful measure of the potential importance of each habitat type within the analysis area to the overall bird community; it does not factor in species abundance or the probability of a species occurring in the analysis area, because for most species, those data are not available. Relative abundance described in Table E.11.1 in Appendix E.11 (*Birds Technical Appendix*) is based on the best available information. Table E.11.2 in Appendix E.11 summarizes the number of species using each habitat type, which was used to rank the habitats by species richness. This ranking is better than descriptive evaluations, as it is quantitative and based on a broad synthesis of the literature and field studies. Previous studies in the vicinity indicate that there is a correspondence between species richness and abundance of nests and broods (Tables 7, 9–11 in Burgess, Johnson et al. 2003; Tables 14 and 15 in Johnson, Burgess et al. 2005; Table 5 in Rozell, Johnson et al. 2020; Johnson, Lanctot et al. 2007; Bart, Brown et al. 2012; Bart, Platte et al. 2013). The habitats with the most species and most nests and broods of waterbirds are Patterned Wet Meadow, Sedge Marsh, Old Basin Wetland Complex, Moist Sedge-Shrub Meadow, and Shallow Open Water with Islands or Polygonized Margins. The other habitats with high species diversity either were not very common in the analysis area (e.g., Open Nearshore Water, Salt Marsh, Deep Polygon Complex) or were used by shorebirds and passerines, which use a broad range of habitats. We point out that many of the habitat types with low species richness (<10 species) occupy small portions of the analysis area and comprise minor amounts (<1%) of the area lost to direct and indirect effects (Tables E11.4 through E11.6 in Appendix E.11). Many are not very abundant due to the location of the analysis area, which includes very little of the coast, or as in the case of Rivers, Streams, and associated habitat types, they are narrow strips of habitat types without much areal extent. However, these habitat types are not necessarily rare in the ACP, nor would they be appreciably diminished or affected by the Project. Tables E.11.4 through 11.6 in Appendix E.11 provide quantification of each type of habitat lost or affected by alternative. In the case of yellow-billed loons, deep lakes are their primary breeding habitat, but loons are very specific about which deep lakes are used and which are not. Table E.11.9 in Appendix E.11 presents the number of lakes and number of nest sites within 1 mile of Project facilities, which is the most specific indicator of sites that could be disturbed if BMP E-11 is not implemented. BMP E-11 would provide 1-mile separation of oil and gas facilities from yellow-billed loon nests and 500-m separation from breeding lakes. The impacts of facility construction within the E-11 protection buffers are discussed in Section 3.11.2.9, *Special Status Species*.	N
520	43	Psarianos	Bridget	Trustees for Alaska	Birds	BLM must properly analyze impacts and compare impacts across all alternatives. The impacts to bird habitat from the Constructed Freshwater Reservoir are not well explained or analyzed. The SDEIS states that the construction of this reservoir would remove and alter acres of bird habitat, but goes on to state that the reservoir would become water habitat and result in . . . a gain in habitat for waterbirds. But it's not clear which waterbirds would benefit from this reservoir, particularly because fish would be prevented from entering the reservoir.	The CFWR would be the same across all action alternatives; thus, no comparison of effects is provided in the SDEIS or Final EIS. The SDEIS quantifies habitats lost by the CFWR berm and access road in Table 3.11.2, and quantifies habitats altered by the CFWR in Tables 3.11.3 and 3.11.4. These effects are also presented in the Final EIS Appendix E.11, *Birds Technical Appendix*, Table E.11.4, which quantifies habitats lost (including by the CFWR berm and access road). Table E.11.5 and E.11.6 of the Final EIS quantify habitats altered, including by the CFWR. Final EIS Section 3.11.2.3.1, *Habitat Loss or Alteration*, describes that both the CFWR and the mine pit would result in a loss of habitat for tundra-nesting birds and a gain in habitat for waterbirds. Tundra-nesting birds and waterbirds (and the habitats they use) in the analysis area are identified in Table E.11.1 in Appendix E.11. Not all waterbirds eat fish. A reference to Table E.11.1 was added to Section 3.11.2.3.1.	Y

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520	44	Psarianos	Bridget	Trustees for Alaska	Birds	The proposed boat ramp is not studied nor fully compared across the alternatives, and therefore impacts to birds are not fully analyzed. The SDEIS states that the number of potential users of each boat ramp is unknown but speculates that one ramp may concentrate use compared to three boat ramps. The level of probable use should be modeled and studied, or the SDEIS should use a similar situation as a proxy, rather than speculating about use and impact without any evidence or rationale. Moreover, Table 3.11.4 only provides estimated acres of bird disturbance caused by three boat ramps, rather than also including acres of disturbance for one ramp, and provides no metric for intensity. Nor does the SDEIS compare the boat ramps across the alternatives, apparently assuming, without explicitly stating or explaining its rationale, that cursorily analyzing impacts from three boat ramps will suffice for analysis of three boat ramps versus one boat ramp.	The boat ramps would be used by Nuiqsut residents, of which there are 347. Thus, use of the boat ramps is not anticipated to be more than that. (Not all residents own or are old enough to drive a boat.) Modeling is not needed to analyze effects to birds for this level of boat ramp use. As described in Final EIS Section 3.16.2.3.3, *Harvester Access*, roads farther away from the community receive less subsistence use than roads closer to the community, though use of farther-away roads is increasing. The distance of the boat ramps to the community would likely limit casual use. As described in SDEIS Section 3.16.2.1.3, *Harvester Access*, of the three proposed boat ramps, residents would be most likely to use the Ublutuoch (Tiŋmiaqsiuġvik) River boat ramp, as it is closest to the community and would provide more immediate access to the lower, most heavily used portions of Fish (Iqalliqpik) Creek where most traditional camps are located. The boat ramps on Judy (Iqalliqpik) Creek and Fish (Uvlutuuq) Creek are located in areas that are not commonly accessed by boat, according to available subsistence use area data (SRB&A 2010, 2019).	N
520	45	Psarianos	Bridget	Trustees for Alaska	Birds	The SDEIS does not grapple with differences between the different options, and thus does not properly analyze differences across options and alternatives. This was a problem that first appeared in the draft EIS and now is illuminated by the SDEIS. The following are failures or gaps in the analysis of Option 3 that require further consideration: The SDEIS states that more birds of some species could be affected by Option 3, but that the types and magnitude of effects would be less than from Options 1 and 2 because no pile driving or in-water work is required at Oliktok Dock and the screeding area is 2.4 acers smaller. But nowhere in the analysis is an explanation of which impacts, exactly, would be either non-existent or lower in magnitude under Option 3. Nor are there any citations to either the draft EIS or the scientific literature to support these claims.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." All Project components are detailed in the Final EIS. Final EIS Section 3.11.2.8, *Module Delivery Option 3: Colville River Crossing*, clarifies what effects would be greater for Option 3 and why.	N
520	46	Psarianos	Bridget	Trustees for Alaska	Birds	The SDEIS states that [d]ifferences in species-specific effects are due to different species densities at Oliktok Point versus Atigaru Point or Point Lonely. But it is not entirely clear from the text which species are variable between the various locations. Nor is it clear whether this sentence is referring to the disparate effects described in this section, or whether there is a data table somewhere showing the different effects and bird species affected by the different options. Nor is it clear whether the differences in species-specific effects are entirely due to different species densities, or whether there are some differences that are due to the differences in activities. There are also no citations to either the draft EIS, other sections of the SDEIS, or to the scientific literature to help the reader unpack this claim.	Final EIS Section 3.11.2.8, *Module Delivery Option 3: Colville River Crossing*, clarifies what effects would be greater for Option 3 and why.	Y
520	47	Psarianos	Bridget	Trustees for Alaska	Birds	The SDEIS states that Option 3 would have less habitat loss from gravel fill. But there is no reference to any data table that would document the different gravel use among the options and alternatives, nor any explanation for how this would impact different species of birds in different ways and in different locations.	Final EIS Section 3.11.2.8, *Module Delivery Option 3: Colville River Crossing*, clarifies what effects would be greater for Option 3 and why.	Y
520	48	Psarianos	Bridget	Trustees for Alaska	Birds	The SDEIS states that [i]ce roads can alter bird habitats and that constructing an ice road under Option 3 would impact birds in ways that disturb and displace them near construction areas. But other than noting that winter birds apparently congregate at a particular point along the Option 3 ice road route, there is no comparison of impacts from the Option 3 ice road, versus impacts from the other options. Given that the ice roads in different options would traverse different areas, and therefore different types of bird habitat, it stands to reason that the options would have different impacts. Yet the SDEIS does not provide any of this comparative analysis.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." All Project components are detailed in the Final EIS. Final EIS Section 3.11.2.8, *Module Delivery Option 3: Colville River Crossing*, clarifies what effects would be greater for Option 3 and why.	Y
520	49	Psarianos	Bridget	Trustees for Alaska	Birds	The SDEIS states that [t]he Option 3 ice road may encounter more wintering birds at Ocean Point than other locations. . . . But there is no explanation of where this information comes from, nor any citation to data, a report, or a published article stating why Ocean Point is a wintering bird hotspot. It is also unclear whether the increase in wintering birds at Ocean Point is in comparison to other points along the same ice road route in Option 3, other points along the Colville River, or in comparison to the other ice road routes in Options 1 or 2. This confusion and lack of data renders it meaningless for BLM to conclude that Option 3 winter activities would have minimal impacts on birds because fewer birds are present during winter than in summer. If Ocean Point is truly a place where winter birds congregate for some unstated reason, then routing the ice road through that area would likely have a disproportionate impact on winter birds, which, while they are indeed mobile and in small numbers, may be relying on some unique features of this area to survive.	Clarification was added to Section 3.11.2.8, *Module Delivery Option 3: Colville River Crossing*. Willow ptarmigan are the predominant bird wintering on the North Slope. Willow ptarmigan use valley bottoms and willow thickets during winter, feeding on willow and other shrub buds. They burrow in snow, which is deeper and less compacted by wind in river bottoms (Hannon, Eason et al. 2020). They prefer Tall, Low, or Dwarf Shrub habitat in winter. Although Ocean Point is not in the area mapped for habitat, willow cover becomes thicker and taller upstream of the Colville Delta, and it is expected to support higher numbers of ptarmigan in winter than the open tundra where they breed. The Ocean Point area is not unique, but it likely supports more ptarmigan in winter than do the other ice road routes connecting coastal transfer options.	Y
520	50	Psarianos	Bridget	Trustees for Alaska	Birds	This analysis is extremely cursory and does not expand on what these differences mean for birds in the project area. The SDEIS notes that Alternative B would include three boat ramps, while Alternatives C and D would only include the boat ramp on the Ublutuoch (Tiŋmiaqsiuġvik) River. A couple paragraphs down from this acknowledgement, the SDEIS also notes that the boat ramp on Judy (Iqalliqpik) Creek (only in Alternative B) would be within 500 feet of two lakes that are habitat for yellow-billed loon. But this two-sentence section does not explain how a boat ramp in that area would affect Yellow-billed Loons or their habitat, nor does the SDEIS explain the differences in boat ramp impacts between the alternatives. Adequate explanation for these differences is necessary to order to understand and weigh the environmental impacts of the alternatives.	Final EIS Section 3.11.2.9, *Special Status Species*, describes effects to special status species, including yellow-billed loons, from gravel infrastructure and human activity. Section 3.11.2.4, *Alternative C: Disconnected Infield Roads*, and Section 3.11.2.5, *Alternative D: Disconnected Access*, describe differences among alternatives.	N
520	51	Psarianos	Bridget	Trustees for Alaska	Birds	Analysis of special status species like Yellow-billed Loons is inadequate. The minimal analysis of Yellow-billed Loons is focused on the gravel infrastructure and activity. But ice roads cause impacts to habitat that persist beyond the winter, by altering vegetation and hydrology. The SDEIS does not analyze impacts to Yellow-billed Loons from ice road construction and hydrological alteration. Nor is there any comparison of these impacts from ice roads between the options and alternatives. BLM must analyze impacts to all special status species.	The Draft EIS and Final EIS Section 3.11.2.3.1, *Habitat Loss or Alteration*, includes ice roads as a potential impact to yellow-billed loon nesting sites. Routing ice roads around identified yellow-billed loon nest sites and nesting lakes to avoid vegetation compaction at nest sites and delayed melt-out of nesting lakes is listed in the Final EIS Section 3.11.2.1.4, *Additional Suggested Avoidance, Minimization, or Mitigation*.	N

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520	52	Psarianos	Bridget	Trustees for Alaska	Birds	BLM fails to analyze impacts to Golden Eagles. The only place that Golden Eagles are even mentioned in the draft EIS or the SDEIS is in Table E.11.1 entitled Bird Species that may Occur in the Analysis Area. Golden Eagles are found within the project area, and many of these individuals are sub-adult birds. Golden Eagles can be impacted by oil and gas operations through collisions with vehicles and aircraft, and through ingestion of oiled birds. The subadult Golden Eagles observed in the project area and across the Arctic Coastal Plain are important to the long-term survival of breeding populations of Golden Eagles across Alaska, and potentially populations in the Lower 48. Sub-adult Golden Eagles spend several years maturing and waiting for a breeding territory to open up, and the health and survival of these younger birds is a key component in the health and survival of future adult breeding populations. As a result, the habitats where these younger birds spend their non-breeding summers becomes critically important. The draft EIS and SDEIS should consider impacts to Golden Eagles within the project area, as well as the ramifications of these impacts to Golden Eagle breeding populations elsewhere in Alaska and the U.S.	Section 3.11.2, *Environmental Consequences*, was updated for the Final EIS with a short discussion and includes these citations: -McItyre et al. 2008 -McIntyre et al. 2018 -Eisaguirre et al. 2019	Y
520	53	Psarianos	Bridget	Trustees for Alaska	Birds	Analysis of cumulative impacts is essentially absent. The SDEIS simply does not analyze cumulative impacts to birds that would add up and compound among the boat ramps, the reservoir, or the ice road and Colville River ice bridge crossing at Ocean Point. Nor is there any mention of cumulative impacts of Option 3 with other North Slope infrastructure. Perhaps most glaringly, the SDEIS does not even consider cumulative impacts from ongoing IAP revisions. In particular, if BLM opens the Teshekpuk area to leasing, this would potentially create a slew of impacts that would accumulate with the impacts from Willow. Birds like Brant, Yellow-billed Loons, Pacific Loons, Dunlin, and other shorebirds and water birds would experience higher levels of impacts under multiple scenarios of a new IAP. This consideration is not even included in the SDEIS, despite the fact that the recent publication of the draft IAP proposed these changes.	Additional detail was added to Final EIS Section 3.19.10.3, *Birds*, regarding cumulative effects to birds, including effects from changes to the IAP.	Y
407	11	Rose	Garett	Natural Resources Defense Council	Birds	Birds BLM's discussion of potentially significant impacts to birds in the SDEIS is fatally defective. The discussion lacks the detail that NEPA demands when describing potential impacts from the three new components. And it particularly ignores potential impacts to species falling under special designations. In these ways and others, BLM is again extending the failures of the DEIS into the SDEIS. The SDEIS fails to meaningfully analyze potentially significant impacts to birds. For example, the discussion of potential impacts from the reservoir and ramps notes that aspects of both would create dust and gravel spray that could alter adjacent habitats with a cross-reference to the DEIS. This description does not provide any detail on how the Projects components would alter the specific habitat in the area or how particular species utilizing those areas might thus be affected. And the cross-reference to the DEIS does not provide further illumination: that document simply asserts that gravel and dust could displace small numbers of birds or reduce the quality of forage or nesting cover, and would be ephemeral (early thaw) and permanent (changes in vegetation composition and structure). The purported analysis of disturbance and displacement and injury and mortality from the reservoir and boat ramp similarly forgo detailed discussion of potential impacts to specific species that utilize those areas. . . . The SDEISs failings are similar with regard to its discussion of Option 3. In attempting to describe potential impacts, BLM again deploys generalities. It states, for example, that screeding, barging, and boat traffic would likely not result in avoidance or changes in distribution or activities of birds, but it bases this general conclusion on a study of long-tailed ducks. Relatedly, the SDEIS provides no particularized analysis of the potential impacts of Option 3 on spectacled eiders or other special status species, despite appearing to acknowledge in the immediately preceding clause that there might be such impacts. And the SDEIS simply asserts that Option 3 winter activities would have minimal impacts on birds because fewer birds are present during winter than in summer, despite stating immediately beforehand that Option 3 may encounter more wintering birds at Ocean Point than other locations. These errors compound similar errors found in the DEIS. The discussion of potential impacts generally provides no meaningful details on how such impacts affect the specific species that utilize the analysis area. The discussion of habitat loss or alteration, for instance, provides no details on how such loss or alteration could affect species health or productivity. And the discussion of injury or mortality is similarly devoid of such analysis. Even where BLM seemingly provides these details as in the discussion of disturbance or displacement the discussion remains cursory. . . . And, more broadly, the SDEIS provides no meaningful discussion of how the Project might affect the presence of local avian populations, which is particularly important in light of the presence of several special status species.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." Table 3.11.3 in the SDEIS (Table E.11.6 in Appendix E.11, *Birds Technical Appendix*, in the Final EIS) provides a quantified list of habitats that would be affected by dust. Table E.11.1 describes what birds use those habitats and their status. The Draft EIS and Final EIS both detail the effects of dust on birds.	N
26710	1	Smith	Louise	USFWS	Birds	Upgrades to the Kuparuk gravel road system . . . The Service has concerns regarding the timing of these road upgrades as they may impact tundra-nesting birds and result in loss of eggs and/or nestlings. We suggest road upgrades involving wetland fill occur before or after the nesting season (June 1-July 31) if possible.	Suggestion was added to Final EIS Section 3.11.2.1.4, *Additional Suggested Avoidance, Minimization, or Mitigation*.	Y

4.2.3.5 Climate Change

Table B.3.7. Substantive Comments Received on Climate Change

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
23965	7	Bentley	Judith	Center for Biological Diversity	Climate Change	It fails to comprehensively evaluate the role of the Willow project in fueling the climate crisis, in light of scientific evidence showing that all Arctic fossil fuels must remain untapped for society to meet international climate goals.	Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) analyzes the Project's direct and indirect GHG emissions, thereby analyzing potential effects on climate change. The comment regarding leaving Arctic fossil fuels untapped cannot be responded to without more detailed information, such as a supporting reference.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
12244	1	Berndt	Michael	Center for Biological Diversity	Climate Change	It fails to account for subsurface and marine methane deposits, which could trigger runaway climate crises, if released.	Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) analyzes the Project's direct and indirect GHG emissions, including methane emissions. The cumulative effects of the GHG emissions associated with the North Slope development, including methane emissions, and the oil and gas that would be combusted over the life of the Willow MDP Project are analyzed in Final EIS Section 3.19.4 (*Cumulative Impacts to Climate Change*).	N
25775	3	Dieterich	Michele	Center for Biological Diversity	Climate Change	It fails to analyze the effects of climate change and the addition of these greenhouse gases and the effects of destroying this area.	Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) analyzes the Project's direct and indirect GHG emissions, thereby analyzing potential effects on climate change.	N
5855	2	Harrison	David	Center for Biological Diversity	Climate Change	It also fails to fully assess the climate impacts of the Willow project.	Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) analyzes the Project's direct and indirect GHG emissions, thereby analyzing potential effects on climate change.	N
2186	1	Howard	Lisa	Center for Biological Diversity	Climate Change	Burning the estimated 590 million barrels of oil to be extracted during the life of the project would result in nearly 254 million metric tons of greenhouse gases the equivalent of 65 coal plants operating for a year. The supplemental draft environmental impact statement for this project fails on many levels. If fails to adequately analyze harm to wildlife that is already being impacted by global warming. It fails to consider the cumulative impact of other oil development in the Arctic. It fails to adequately address the role of the project in fueling the climate crisis.	The cumulative effects on wildlife from the Project in combination with climate change are addressed in Final EIS Section 3.19.10, *Cumulative Impacts to Biological Resources*. The cumulative effects of the GHG emissions associated with the North Slope development and the oil and gas that will be combusted over the life of the Willow MDP Project are analyzed in Final EIS Section 3.19.4 (*Cumulative Impacts to Climate Change*). Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) analyzes the Project's direct and indirect GHG emissions, thereby analyzing potential effects on climate change.	N
658	5	Long	Becky	—	Climate Change	Increased Polluting Emissions from Proposed Supplement to the Willow Project Scientists have known since the early 1990s that Prudhoe Bay emissions travel hundreds of miles west over communities such as the Native Village of Nuiqsut (NVN). The cool arctic air can trap pollutants closer to the ground level. Pollutants then build up over a wide area. The exploration, production and burning of fossil fuels creates significant Greenhouse Gas (GHG) emissions. The 11/23/2018 United States Geological Survey report entitled FEDERAL LANDS GREENHOUSE GAS EMISSIONS AND SEQUESTRATION IN THE UNITED STATES: ESTIMATES FOR 2005-2014, Report 2018-5131 show this. This report is a first of its kind accounting for fossil fuel extraction emissions. Oil and gas drilling and production on federal lands and offshore contributes a yearly average of 23.7% of carbon dioxide emissions, 7.3% of methane emissions and 1.5% nitrous oxide emissions. This report can provide a context for future energy decisions as well as a basis to track future fugitive emissions from fossil fuel leasing. BLM needs to figure out the GHG emissions from this proposed project. Methane is a potent GHG emission which enters the atmosphere from flaring, venting, and infrastructure leaking of natural gas. Methane is the primary component of gas making up 87 to 97% by volume. Methane's warming effect is 87 times greater than carbon dioxide over a 20 year period and 36 times greater over a 100 year average. The current federal administration is gutting the EPA and BLM 2016 waste prevention rules that would have reduced 35% of methane emissions. Comprehensive leak detection and repair requirements, methane capture standards for various field equipment and common drilling practices and establish volume metrics and percentage based venting and flaring limits. But now we don't have that for federal lands. The oil and gas industry states that methane emissions from production are unavoidable. In a recent 12/18/2018 Alaska Oil and Gas Conservation Commission hearing on methane emissions, Kara Moriarty, the Executive Director of the Alaska Oil and Gas Association which is an industry trade lobbying group testified to the following. The venting or flaring of some natural gas is practically an unavoidable consequence of oil and gas development. Routine and continuous flaring of pilot and purged gas during the non-emergency situations is a key component to the safe development of oil and gas reserves. If this is so, it makes a good case to eliminate new leasing on public lands in the arctic. Natural gas flaring produces black carbon which is a known recognized localized warming impact on ice and snow thus creating more climate impacts. Flaring also produces particulate matter and toxics such as benzene which are known carcinogens. This affects the environment and human health. Black carbon pollution accelerates climate changing impacts on the North Slope. This is by darkening the surface of the sea ice and land. It is also the main ingredient in fine particulate matter pollution.	The Final EIS cites Report 2018-5131 (Merrill, Sleeter et al. 2018) in Section 3.2.1.3 (*Trends in U.S. and Alaska Greenhouse Gas Emissions*). In addition, GHG emissions are quantified for all Project components for the life of the Project, including direct GHG emissions; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope of Alaska and potential future development. If the Willow MDP Project is authorized, the GHG emissions produced by the Project would also be likely quantified and included in subsequent GHG emissions reports by USGS, if they are developed. GHG emissions estimates include methane and calculate the carbon dioxide equivalent of methane by accounting for its global warming potential over both a 20-year time period and a 100-year time period. GHG emissions estimates account for current federal requirements and the activities anticipated to occur as part of the Willow MDP Project, including flaring. Venting of natural gas is not expected as part of the Project. Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 3.2.1 (*Black Carbon Effects on Climate*), explains the effects of black carbon on climate and the substantial uncertainty that exists regarding the warming potential of black carbon. Emissions of particulate matter and toxics, including benzene, are estimated from flaring and other activities and are presented in Section 3.3.2.2. (*Air Emissions Inventory*).	N
658	8	Long	Becky	—	Climate Change	Climate Change Impacts inadequately considered. The production timeline for this project means it will be happening at the very time when the scientific realities of climate change show that there needs to be a transition away from fossil fuels. The average annual temperature in the Arctic (land above the Arctic Circle) has increased twice as fast as the rest of the world in the last 50 years. Thus, we are seeing climate change stress in the North Slope. Global climate warming must be kept to only 1.5 degrees C in the next 12 years in order to prevent extreme weather events that affect the well-being of the planet. Emissions must drop by 55% by 2030 in order to prevent this. The DEIS and SEIS only contributes to climate warming.	The current conditions and climate trends are presented in Section 3.2.1 (*Affected Environment*). The discussion includes recognition of the effects of climate change in the Arctic. This section has been revised to include IPCC (2018) estimates of global GHG emissions reduction targets.	Y
4832	7	McAllistrr	Angus	Center for Biological Diversity	Climate Change	Third, it does not accurately evaluate the role of the Willow project in accelerating the current climate crisis, the scientific analysis of which shows with negligible room for doubt that all Arctic fossil fuels must remain untapped for society to meet international climate goals.	Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) analyzes the Project's direct and indirect GHG emissions, thereby analyzing potential effects on climate change. The comment regarding leaving Arctic fossil fuels untapped cannot be responded to without more detailed information, such as a supporting reference.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
323	2	McCarron	Christopher	—	Climate Change	The draft EIS only notes that: The three Project changes (Chapter 2.0, Alternatives) are not expected to substantially change the climate change analysis. Key Project components and their associated greenhouse gas contributions are being reanalyzed and the results will be included in the Final EIS. This does not address climate change in any scientific manner or meaningful way, and nothing is cited to show evidence for the claim it will not substantially change analyses. The fact that the EIS can show that Caribou or Yellow-Billed Loons will not be directly affected is completely irrelevant because they will all be indirectly affected by warming. Infrastructure and subsistence lifestyles for many Alaskans will also be indirectly affected by this, which is not addressed in the EIS.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." Final EIS Section 3.2, *Climate and Climate Change*, describes the effects of all Project components on climate change and describes the effects of climate change on the Project. The cumulative effects of the Project with climate change were added to Final EIS Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*.	Y
590	1	McCarron	Christopher	—	Climate Change	This project would increase fossil fuel production by an initial projection of 200,000 barrels per day for a minimum of 30 years and its impacts on global warming are not addressed in Chapter 3 section 2, even in the slightest. The draft EIS only notes that: The three Project changes (Chapter 2.0, Alternatives) are not expected to substantially change the climate change analysis. Key Project components and their associated greenhouse gas contributions are being reanalyzed and the results will be included in the Final EIS. This does not address climate change in any scientific manner or meaningful way, and nothing is cited to show evidence for the claim it will not substantially change analyses. Reanalyzing means they are not aware of the consequence at this time and cannot provide sufficient evidence to back up their claims for public comment. These two sentences are contradictory. What is known is that it is physically impossible to reduce atmospheric carbon emissions, as recommended by the NCA, the IPCC, and 97% of those in the scientific community (Cook et al. 2016) if we continue to expand pipelines and drill sites. Nobody can refute this; it is fact that is based on fundamental principles of physics and chemistry. The fact that the EIS can show that Caribou or Yellow-Billed Loons will not be directly affected is completely irrelevant because they will all be indirectly affected by warming. Infrastructure and subsistence lifestyles for many Alaskans will also be indirectly affected by this, which is not addressed in the EIS. . . . Testimony by Rick W Whitbeck on the 29th of April 2020, noted that this development would create only 2,000 nonpermanent jobs and only 300 permanent jobs. This is not a project that is good for all Alaskans, it is good for the executives, lobbyists, and shareholders of the fossil fuel industry with a small group of workers being thrown what amounts to scraps. This will ultimately be worse for Alaska in losses in other economic sectors, as documented in the NCA. This EIS is fundamentally incomplete and this project should not proceed at any point in time.	Final EIS Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 1.5 (*Projected Climate Trends and Impacts in the Project Area*), has been revised to include IPCC global GHG emission reduction targets from the 2018 special report *Global Warming of 1.5°C (IPCC 2018)*. A discussion of climate feedback processes is included in Section 3.2.1 (*Affected Environment*). Section 3.2.1.2 (*Projected Climate Trends and Impacts in the Arctic and on the North Slope*) and Section 3.2.3 (*Effects of Climate Change on the Project*) analyze the effects of thawing permafrost. The decision to not analyze the social costs of carbon is explained in Appendix E.2A, Section 2.4 (*Social Cost of Carbon*). As explained in responses to other comments, the Final EIS was developed based on public comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess Project impacts on climate change in the Final EIS were not materially different from the Draft EIS. Therefore, an additional review of climate change impacts for the SDEIS was not warranted. The Final EIS analyzes the direct, indirect, and cumulative GHG emissions attributable to the Project and provides context about the trends in climate change in the Arctic. The general effects of climate change in the Arctic (e.g., specific species, existing infrastructure, subsistence lifestyles) is not Project-specific and thus is not informative to the selection of an alternative. Some construction jobs and supporting service jobs would likely be filled by NSB residents, positively impacting the local and regional economy. Local oil industry support companies, such as those owned by Kuukpik or ASRC, would earn revenues on the Project, which would indirectly affect local incomes through increased dividends. Assuming an average salary of $57,000 for indirect and induced jobs throughout the Alaska economy, indirect and induced wages would total $131.1 million per year. While direct employment and wages generated by construction activities on the North Slope would account for only 1% to 2% of total employment in the state, indirect effects would accrue throughout the state as wages earned on the North Slope would be spent on goods and services in workers' home communities throughout the state.	Y
850	1	McCarron	Christopher	—	Climate Change	The U.N. Intergovernmental Panel on Climate Change report in 2019, stated there needed to be a 50 percent reduction in carbon emissions by 2030, and the globe needs to be carbon neutral by 2050 to avoid catastrophic consequences of climate change, both environmental and economic. The Arctic is warming at a faster rate than any other place on earth, and even the United States own Fourth National Climate Assessment released in 2018 noted, there needs to be a reduction in carbon emissions. Ripple, et al., 2019, published a petition of 11,000 scientists with a letter urging to — for the reduction of fossil fuel infrastructure. A study done originally in 1997, updated in 2009 by Constanza, et al., showed that ecosystem services value is an average of $46 trillion a year. The Fourth National Climate Assessment noted that feedback loops due to warming in the Arctic and increased permafrost melting is already becoming an issue, but will become more of a problem over the 21st century. Increasing fossil fuel and drilling is, therefore, not in the public interest for any reason due to current and future effects this will have for local, national, and the global community. This will affect both the environment locally and subsistence resources, but also globally. These are not substantially addressed issues in the draft EIS. There's only three lines that note the project changes are not expected to substantially change climate change analysis. Key project components and their associated greenhouse gases contribute — gas contributions are being re-analyzed, and the results will be included in the final EIS when nobody can comment on this. It is physically impossible to reduce atmospheric carbon emissions by half if we continue to expand pipelines and drill sites as recommended by the National Climate Assessment, the IPCC and 97 percent of the scientific community. Nobody at these hearings will be able to refute what I have said. This is a fact. We need to stop burning fossil fuels, period. This is — this basic fact makes this project unacceptable.	Final EIS Appendix E.2A (*Climate and Climate Change Technical Appendix*), Section 1.5 (*Projected Climate Trends and Impacts in the Project Area*), has been revised to add IPCC global GHG emission reduction targets from the 2018 special report *Global Warming of 1.5°C (IPCC 2018)*. The Final EIS has not been revised to include reference to the petition by scientists related to the reduction of fossil fuel infrastructure, as a petition is not a scientific analysis. The decision to not analyze the social costs of carbon is explained in Appendix E.2A, Section 2.4 (*Social Cost of Carbon*). A discussion of climate feedback processes is included in Section 3.2.1 (*Affected Environment*). As explained in responses to other comments, the Final EIS was developed based on public comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess Project impacts on climate change in the Final EIS were not materially different from the Draft EIS. Therefore, an additional review of climate change impacts for the SDEIS was not warranted.	Y
792	1	Notari	Angelica E	—	Climate Change	The most recent IPCC report noted that we need to reduce emissions but 50% by 2030 and become carbon neutral by 2050 to avoid catastrophic consequences of climate change. Expanding fossil fuel infrastructure is therefore a horrible and irresponsible decision.	The current conditions and climate trends are presented in Section 3.2.1 (*Affected Environment*). The discussion includes recognition of the effects of climate change in the Arctic. This section has been revised to include IPCC (2018) estimates of global GHG emissions reduction targets.	Y
3	4	Merendino	Caleb	—	Climate Change	. . . [S]upplemental draft environmental impact statement is deeply inadequate on multiple fronts: 3) It fails to comprehensively evaluate the role of the Willow project in fueling the climate crisis, in light of scientific evidence showing that all Arctic fossil fuels must remain untapped for society to meet international climate goals.	The impacts on climate change are assessed by describing current and projected future climate impacts on the North Slope and quantifying the potential direct GHG emissions for all Project components for the life of the Project; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope of Alaska and potential future development. The climate change analysis is not limited to an evaluation of individual drill pads. The commenter does not explain what analysis is lacking for a comprehensive evaluation.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
29	3	O'Donnell	Gretchyn	—	Climate Change	The monumental environmental impacts, direct and indirect, as a result of this project, are not adequately answered for in the EIS, nor in this presentation. Fossil fuel is, in fact, the leading cause of climate change. The EIS mentions no plan of mitigation of climate change, and how that will definitely foil any plans of transporting large equipment via ice roads.	The commenter does not explain what aspects of the direct and indirect analysis were inadequate. Final EIS Section 3.2.3, *Effects of Climate Change on the Project*, describes the measures the Project proponent would use to adjust to the effects of climate change on ice roads, among other things affected by climate change. The impacts on climate change are assessed by describing current and projected future climate impacts on the North Slope and quantifying the potential direct GHG emissions for all Project components for the life of the Project; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope of Alaska and potential future development.	N
520	33	Psarianos	Bridget	Trustees for Alaska	Climate Change	BLM Failed to Properly Consider the Direct, Indirect, and Cumulative Impacts of the Willow Project in Light of Climate Change and Greenhouse Gas Emissions As we explained in comments on the agency's draft EIS, BLM's analysis of the greenhouse gas emissions and climate impacts from the Willow project fails to take the requisite hard look at the numerous impacts from this massive fossil fuel project, particularly in light of the significant climate change-related harms already facing the Arctic. Specifically, the draft EIS failed to evaluate the impacts of the Willow project in light of the urgent need to reduce greenhouse gas emissions; failed to adequately consider the effects of the project in the context of a warming Arctic; failed to consider the impacts of black carbon; made arbitrary, unsupported estimates regarding greenhouse gas emissions from the project; and otherwise failed to provide a meaningful analysis of the significance of the projects greenhouse gas emissions. BLM's supplemental draft EIS fails to remedy any of these considerable legal errors. Instead, BLM summarily states that the agency does not expect the project changes to substantially change the climate change analysis of the draft EIS. BLM did not reexamine its estimates of greenhouse gas emissions from the Willow project, or any other aspect of its climate change analysis. Moreover, BLM flippantly declares that the ability of federal agencies to influence the processes thought to be responsible for climate change (such as greenhouse gas emissions) is extremely limited at present, absent an effective worldwide response to the problem. In fact, greenhouse gas emissions are known not merely thought to be responsible for climate change, federal land-management decisions will be a significant part of and courts have confirmed that federal agencies must consider the climate change consequences of their actions.	The direct, indirect, and cumulative impacts of the Willow MDP Project on climate change were evaluated in the Draft EIS, and the analysis in the Final EIS is not materially different. Impacts on climate change are assessed by quantifying the potential direct GHG emissions for all Project components for the life of the Project; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope of Alaska and potential future development. Section 3.2.1 (*Affected Environment*) and Appendix E.2A (*Climate and Climate Change Technical Appendix*), Chapter 1.0 (*Affected Environment*), explain the current climate conditions, climate trends in the Arctic, and the relationships between GHG emissions and climate change. Section 3.2.1 (*Black Carbon Effects on Climate*) of Appendix E.2A explains the effects of black carbon on climate and the substantial uncertainty that exists regarding the warming potential of black carbon. The development of the GHG emissions inventory is detailed in Attachments C and D to Appendix E.3B (*Air Quality Technical Support Document*). As stated in the SDEIS, key Project components were reanalyzed for climate change and remodeled for the assessment of air quality impacts, and results are provided in the Final EIS. The Final EIS was developed based on public comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess Project impacts on climate change and air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, and GHG emissions estimates were reexamined, the overall approach used to assess climate change and air quality impacts in the Draft EIS is the same for the Final EIS. Resulting climate and air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted. The Project's impact on climate change is considered during the BLM's decision process in combination with impacts to all resources.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
520	34	Psarianos	Bridget	Trustees for Alaska	Climate Change	These failures are particularly glaring considering that numerous reports released since we submitted our comments in October 2019 underscore the urgent need to rapidly transition away from fossil fuels, including by halting the approvals of new oil development projects. First, the United Nations November 2019 Emissions Gap report reiterated the need for urgent action to cut fossil fuel emissions. According to the report, if the world is to limit global warming to 1.5C, countries must cut emissions by at least 7.6% per year over the next decade, for a total emissions reduction of 55% between 2020 and 2030. The United Nations November 2019 Production Gap report shows that countries like the United States are on course to extract vastly more fossil fuels than what is allowed to meet a 1.5C or even 2C target. Countries current fossil fuel production plans would lead to 120% more fossil fuel emissions by 2030 than would be consistent with a 1.5C pathway, and 210% more by 2040. The United States is a primary contributor to this dangerous over-production of fossil fuels as the world's largest oil and gas producer and second largest coal producer, with current policies projected to lead to a 30% increase in oil and gas production by 2030. Together these reports make clear that, to limit the worst damages of climate change, the United States must begin rapidly phasing out its fossil fuel production. Second, the Energy Information Administration released its Annual Energy Outlook for 2020 that contains energy-related projections through 2050. The report indicates that without significant policy changes and a rapid transition away from fossil fuels, annual U.S. greenhouse gas emissions are projected to begin rising again by the 2030s. This means that the United States will not be anywhere close to where scientists say it needs to be to reduce its contributions to the climate crisis and avert the most catastrophic impacts of climate change. Third, the National Oceanic and Atmospheric Administration released its 2019 Arctic Report Card. The report highlights the unprecedented changes as a result of warming air temperatures, declining sea ice, and warming waters that are threatening species and ecosystems in Arctic regions. A prominent 2019 review of the risks from climate tipping points warned that a tipping point for Arctic sea ice loss could be triggered at low levels of global warming, with abrupt shifts projected to occur between 1.5C and 2C. The study concluded that the evidence from tipping points alone suggests that we are in a state of planetary emergency: both the risk and urgency of the situation are acute. The 2019 State of the Climate Report from the World Meteorological Organization found that 2019 was the second hottest year on record and ended the hottest decade on record, ocean heat content reached a record high, and Arctic summer sea ice extent dropped to the second lowest level on record, among other harms from the climate crisis. In a statement accompanying the report, UN Secretary-General Antonio Guterres warned that [t]ime is fast running out for us to avert the worst impacts of climate disruption and protect our societies. Fourth, new scientific studies highlight the importance of immediately halting all new fossil fuel infrastructure projects to preserve a livable planet. One study found that phasing out all fossil fuel infrastructure at the end of its design lifetime, starting immediately, preserves a 64 percent chance of keeping peak global mean temperature rise below 1.5C. This means replacing fossil fuel power plants, cars, aircraft, ships, and industrial infrastructure with zero carbon alternatives at the end of their lifespans, starting now. The study found that delaying mitigation until 2030 reduces the likelihood that 1.5 C would be attainable to below 50 percent, even if the rate of fossil fuel retirement were accelerated. In other words, every year of delay in phasing out fossil fuel infrastructure makes lock-in more difficult to escape and the possibility of keeping global temperature rise below 1.5C less likely. The study concluded that although difficult, 1.5C remains possible and is attainable with ambitious and immediate emission reductions across all sectors. Another recent study similarly concluded that no new fossil fuel infrastructure should be permitted and existing infrastructure may need to be retired early in order to meet the Paris Agreement climate targets. Other studies have demonstrated that the urgency of curtailing oil and gas development is enhanced by recent findings that methane emissions from such development have been dramatically underestimated. Together these reports (along with those referenced in our comments on the draft EIS) make clear that, to limit the worst damages of climate change, the United States must begin rapidly phasing out its fossil fuel production. Yet, the Willow project a new oil development project that would lead to oil production for many years would do just the opposite and undermine the need to move swiftly away from dependence on carbon-based fuels. BLM must issue another supplemental draft EIS for public notice and comment that adequately considers, analyzes, and discloses the Willow projects role in fueling the climate crisis. Its failure to do so would be unlawful.	Final EIS Appendix E.2A (*Climate and Climate Change Technical Appendix*), Chapter 1.0 (*Affected Environment*), has been revised to include references to the UN *Emissions Gap Report* (UNEP 2019), the updated U.S. Energy Information Administration's *Annual Energy Outlook 2020I* (USEIA 2020), the National Oceanic and Atmospheric Administration's 2019 *Arctic Report Card* (Richter-Menge, Druckenmiller et al. 2019), the World Meteorological Organization's 2019 *State of the Climate Report* (World Meteorological Organization 2020), and the two citations published in *Nature* (Smith, Forster et al. 2019; Tong, Zhang et al. 2019). The Pandey et al. study analyzes abnormal conditions (a well blowout) and is therefore not included in the Final EIS. The Final EIS was developed based on public comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess Project impacts on climate change and air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, and GHG emissions estimates were reexamined, the overall approach used to assess climate change and air quality impacts in the Draft EIS is the same for the Final EIS. Resulting climate and air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
407	7	Rose	Garett	Natural Resources Defense Council	Climate Change	Climate Change and Air Quality The SDEIS inappropriately states that the impacts analysis for both climate change and air quality are being redone and will be included in the Final EIS. Commentators on the DEIS, however, noted serious flaws with both analyses. Of particular note, the climate change analysis eschewed any discussion of the economic costs of greenhouse gas emissions from the Project (despite available methodological tools and an accounting of economic benefits elsewhere in the DEIS), and erroneously concluded that the Projects production would almost entirely replace production from other sources, ignoring economic analyses showing that approximately 50% of new supply does not displace existing sources. And the air quality analysis relied on non-public baseline data to generate models that treated each phase of the Project in isolation, rather than occurring in overlapping phases. These analytic missteps constitute fundamental errors that prevent the public and decisionmakers from meaningfully analyzing the potentially significant impacts of the Project on climate change and air quality. Any appropriate correction necessitates revising and reissuing the analysis.	As stated in the SDEIS, key Project components were reanalyzed for climate change and remodeled for the assessment of air quality impacts, and results are provided in the Final EIS. The Final EIS was developed based on public comments provided on the Draft EIS and SDEIS. Importantly, the approaches used to assess Project impacts on climate change and air quality in the Final EIS were not materially different from the Draft EIS. While input data changed and the specifics of the analysis were revised for the Final EIS based on updated Project design information, the overall approach used to assess climate change and air quality impacts in the Draft EIS is the same for the Final EIS. Resulting climate and air quality impacts in the Final EIS are predicted to be similar or lower than the Draft EIS. Since the Final EIS approach and results are not materially different from the Draft EIS, and the comments provided on the Draft EIS were able to inform the air quality impact analysis, an additional review of air quality impacts for the SDEIS was not warranted. Related to the comments on the Draft EIS, responses to those comments are provided in Final EIS Appendix B, *Public Engagement and Comment Responses*. The Final EIS was revised to address comments when warranted. Specifically, related to comments about the economic costs of GHGs and methods used by the MarketSim model to estimate production displacement, responses were provided to explain BLM's decision-making process. Related to the reliance on nonpublic baseline data in the air quality impact analysis, data used in the air quality impact analysis are publicly available upon request. Related to the concern that the modeling treated each phase of the Project in isolation, text has been added to the AQTSD (Final EIS Appendix E.3B, *Air Quality Technical Support Document*) to explain the near-field modeling scenarios in more detail; in particular, text was added to explain that the development drilling scenario analyzes combined activities. Further, the development drilling near-field modeling scenario in Appendix E.3B was revised to include construction emissions.	N
343	1	Sarfeh	Jamie	—	Climate Change	The draft EIS only notes that: The three Project changes (Chapter 2.0, Alternatives) are not expected to substantially change the climate change analysis. Key Project components and their associated greenhouse gas contributions are being reanalyzed and the results will be included in the Final EIS. This does not address climate change in any scientific manner or meaningful way, and nothing is cited to show evidence for the claim it will not substantially change analyses. Reanalyzing means they are not aware of the consequence at this time and cannot provide sufficient evidence to back up their claims for public comment. These two sentences are contradictory. The fact that the EIS can show that Caribou or Yellow-Billed Loons will not be directly affected is completely irrelevant because they will all be indirectly affected by warming. Infrastructure and subsistence lifestyles for many Alaskans will also be indirectly affected by this, which is not addressed in the EIS.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." Final EIS Section 3.2, *Climate and Climate Change*, describes the effects of all Project components on climate change and describes the effects of climate change on the Project. The cumulative effects of the Project with climate change were added to Final EIS Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*.	Y
2880	5	Skiba	Gary	Center for Biological Diversity	Climate Change	No real cumulative impacts of oil development in the Arctic, with other expansions in the area being considered. Failing to adequately address climate change.	The cumulative effects of the GHG emissions associated with the North Slope development and the oil and gas that would be combusted over the life of the Willow MDP Project are analyzed in Final EIS Section 3.19.4 (*Cumulative Impacts to Climate Change*).	N
9837	1	Tuominen	L.K.	Center for Biological Diversity	Climate Change	It fails to comprehensively evaluate the role of the Willow project in fueling the climate crisis, in light of scientific evidence showing that all Arctic fossil fuels must remain untapped for society to meet international climate goals.	Section 3.2.2 (*Environmental Consequences: Effects of the Project on Climate Change*) analyzes the Project's direct and indirect GHG emissions, thereby analyzing potential effects on climate change. The comment regarding leaving Arctic fossil fuels untapped cannot be responded to without more detailed information, such as a supporting reference.	N
20	2	Utley	Kathryn	—	Climate Change	[I]t is going to have a substantially negative impact locally. And then when you add to it that, even as we build and continue to drill for oil, we're raising the temperature of the Arctic. So, all that permafrost that we're trying to engineer our way around is going to be melting and releasing methane into the atmosphere, and all that ice that everybody is using to build with is not going to be there. So, this just seems like not our best use of our resources, not the best direction for us to go in. Preserving this area and building up subsistence there seems like a much better idea.	Section 3.2.1.2 (*Projected Climate Trends and Impacts in the Arctic and on the North Slope*) and Section 3.2.3 (*Effects of Climate Change on the Project*) analyze the effects of thawing permafrost.	N
26709	7	Warren	James	—	Climate Change	The same problem applies to BLM analysis of climate change. Your documents always claim that the individual drilling pads won't affect climate change greatly. But that is because one drilling pad or 50 drilling pads or 200 drilling pads is not actually the correct way of looking at climate change. The right way to address climate change in the Arctic is globally, with analysis not of the Colville River crossing ice bridge or the drilling pad or the gravel pit or even the five boat ramps, not even the "screeding" of the ocean bottom at the Point. These "improvements" for human development of industrial infrastructure all contribute to global climate change, certainly. And global climate change is an existential threat to the planet—certainly, and without doubt. But where in the Draft EIS or this new Supplement does BLM actually consider the cumulative effects of all of the North Slope development, and the oil and gas that will be burned over the life of these projects (30-31 years, in the latest Supplement document)? Nowhere. There is no modeling of what this actually means for the planet. There is no sense of global responsibility. Nowhere in these documents does BLM address its own responsibility to take global climate change into account in its decision-making process—rather, the approval process. It is an approval process because the approval is a done deal. "The path to energy dominance leads through Alaska." We remember those words. They say that BLM is helping to clear the path to energy dominance.	The impacts on climate change are assessed by describing current and projected future climate impacts on the North Slope and quantifying the potential direct GHG emissions for all Project components for the life of the Project; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope and potential future development. The climate change analysis is not limited to an evaluation of individual drill pads. The commenter does not explain what analysis is lacking for a comprehensive evaluation.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
570	5	P Warren	James	—	Climate Change	The same problem applies to BLM analysis of climate change. Your documents always claim that the individual drilling pads won't affect climate change greatly. But that is because one drilling pad or 50 drilling pads or 200 drilling pads is not actually the correct way of looking at climate change. The right way to address climate change in the Arctic is globally, with analysis not of the Colville River crossing ice bridge or the drilling pad or the gravel pit or even the five boat ramps, not even the "screeding" of the ocean bottom at the Point. These "improvements" for human development of industrial infrastructure all contribute to global climate change, certainly. And global climate change is an existential threat to the planet—certainly, and without doubt. But where in the Draft EIS or this new Supplement does BLM actually consider the cumulative effects of all of the North Slope development, and the oil and gas that will be burned over the life of these projects (30-31 years, in the latest Supplement document)? Nowhere. There is no modeling of what this actually means for the planet. There is no sense of global responsibility. Nowhere in these documents does BLM address its own responsibility to take global climate change into account in its decision-making process—rather, the approval process.	The impacts on climate change are assessed by describing current and projected future climate impacts on the North Slope and quantifying the potential direct GHG emissions for all Project components for the life of the Project; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope of Alaska and potential future development. The climate change analysis is not limited to an evaluation of individual drill pads. The analysis includes all aspects of the Project, including activities at drill sites, production facilities, operations center, vehicles, construction, module delivery, maintenance, and all other activities associated with the Project, that are expected to emit GHGs. The cumulative effects of the GHG emissions associated with the North Slope development and the oil and gas that will be combusted over the life of the Willow MDP Project are analyzed in Section 3.19.4 (*Cumulative Impacts to Climate Change*) of the Final EIS. BLM analyzes the impact of the Project on climate using GHG emissions. It is not currently possible to determine the impact of a single project on global climate change. The impact to climate is considered during BLM's decision process in combination with impacts to all resources.	N
4	6	P Warren; Warren	James; Jim	—	Climate Change	The same problem applies to BLM analysis of climate change. Your documents always claim that the individual drilling pads won't affect climate change greatly. But that is because one drilling pad or 50 drilling pads or 200 drilling pads is not actually the correct way of looking at climate change. The right way to address climate change in the Arctic is globally, with analysis not of the Colville River crossing ice bridge or the drilling pad or the gravel pit or even the five boat ramps, not even the "screeding" of the ocean bottom at the Point. These "improvements" for human development of industrial infrastructure all contribute to global climate change, certainly. And global climate change is an existential threat to the planet—certainly, and without doubt. But where in the Draft EIS or this new Supplement does BLM actually consider the cumulative effects of all of the North Slope development, and the oil and gas that will be burned over the life of these projects (30-31 years, in the latest Supplement document)? Nowhere. There is no modeling of what this actually means for the planet. There is no sense of global responsibility. Nowhere in these documents does BLM address its own responsibility to take global climate change into account in its decision-making process—rather, the approval process. It is an approval process because the approval is a done deal. "The path to energy dominance leads through Alaska." We remember those words. They say that BLM is helping to clear the path to energy dominance.	The impacts on climate change are assessed by describing current and projected future climate impacts on the North Slope and quantifying the potential direct GHG emissions for all Project components for the life of the Project; indirect GHG emissions from the transportation, refining, and combustion of the produced oil; and cumulative GHG emissions associated with the Willow MDP Project in combination with other existing GHG emissions on the North Slope of Alaska and potential future development. The climate change analysis is not limited to an evaluation of individual drill pads. The analysis includes all aspects of the Project, including activities at drill sites, production facilities, operations center, vehicles, construction, module delivery, maintenance, and all other activities associated with the Project, that are expected to emit GHGs. The cumulative effects of the GHG emissions associated with the North Slope development and the oil and gas that will be combusted over the life of the Willow MDP Project are analyzed in Section 3.19.4 (*Cumulative Impacts to Climate Change*) of the Final EIS. BLM analyzes the impact of the Project on climate using GHG emissions. It is not currently possible to determine the impact of a single project on global climate change. The impact to climate is considered during BLM's decision process in combination with impacts to all resources.	N
7	3	Wier	Carly	—	Climate Change	I have deep concerns about climate change and about the impact climate change has on infrastructure, especially infrastructure that's built on ice.	The effects of climate change on Project infrastructure are analyzed in Final EIS Section 3.2.3 (*Effects of Climate Change on the Project*).	N

4.2.3.6 Cumulative Effects

Table B.3.8. Substantive Comments Received on Cumulative Effects

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
23965	6	Bentley	Judith	Center for Biological Diversity	Cumulative Effects	It fails to properly consider the cumulative impacts of the project in light of other oil development in the Western Arctic and the Bureau's proposal to significantly expand nearby areas available for oil and gas leasing.	Potential future oil and gas projects that meet the criteria to be considered RFFAs are included in the cumulative effects analysis, including revisions to the NPR-A IAP.	N
117	13	Campbell	Bruce	—	Cumulative Effects	The Supplement to the Draft EIS for the Willow MDP was necessitated by the dropping of the proposed island to be built in I believe it was Harrison Bay which instead will be replaced by moving modules via sealifting barges and building an ice road across the Colville River to transport modules and other items. However, more site-specifics are needed about likely impacts from the Willow MDP both in general, and in particular pertaining to the watercourses / waterbodies that would be impacted by the shift in work away from building the island and instead moving modules by sealift barge to current dock at Oliktok Point and by building an ice road cross the Colville River.	The Final EIS includes analysis of three module delivery options: Option 1 (Atigaru Point Module Transfer Island), Option 2 (Point Lonely Module Transfer Island), and Option 3 (Colville River Crossing). Effects to waterbodies from Option 3 are described in Final EIS Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*.	N
117	14	Campbell	Bruce	—	Cumulative Effects	What will cumulative impacts of the Willow MDP be on waterbodies and on species of the Colville River (including its tributaries and its delta) including anadromous fish species?	Cumulative effects of the Willow MDP Project considered with past, present, and reasonably foreseeable future actions are described in Section 3.19.9, *Cumulative Impacts to Water Resources*, and Section 3.19.10, *Cumulative Impacts to Biological Resources*.	N
25775	2	Dieterich	Michele	Center for Biological Diversity	Cumulative Effects	It fails to consider the cumulative impacts in conjunction with other proposed projects and leases.	Potential future oil and gas projects that meet the criteria to be considered RFFAs are included in the cumulative effects analysis, including revisions to the NPR-A IAP.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	37	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	BLM Should Reconsider and Revise the Cumulative Case Analysis in Appendix C The ANILCA Section 810 analysis in Appendix C, Section B.8 should be reconsidered and revised for the final EIS because it incorrectly implies that the Willow MDP would significantly restrict subsistence uses in communities far removed from the project location. Specifically, ConocoPhillips is concerned by the finding that [r]eductions in the abundance of caribou described above for the cumulative case and selection of the 2019 Draft NPR-A IAP EIS Alternative D may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik, Atqasuk, Wainwright, and Anaktuvuk Pass. SDEIS Appendix C, page 52. Notably, BLM did not reach a similar conclusion in the ANILCA Section 810 analysis contained in the draft EIS, and there is no information regarding the Willow project modifications canvassed in the SDEIS (i.e., the CFWR, subsistence access boat ramps, or Option 3 for module delivery) that significantly restricts subsistence uses in these communities. To the contrary, BLM's analysis recognizes the boat ramps are likely to increase access to desirable areas for subsistence activities. (See SDEIS Appendix C, page 19). Additionally, BLM states that Option 3 for module delivery would reduce direct impacts to Nuiqsut and Utqiaġvik coastal and marine subsistence uses. (See Appendix C, page 42). Yet, BLM counterintuitively concludes in the SDEIS ANILCA Section 810 analysis that, in the cumulative case,15 significant restrictions on subsistence uses may occur for the communities of Atqasuk, Wainwright, and Anaktuvuk Pass, in addition to Nuiqsut and Utqiaġvik. (See Appendix C, page 52).	Between the August 2019 ANILCA Section 810 Analysis published with the Draft EIS and the publication of the March 2020 ANILCA Section 810 Analysis in the SDEIS, circumstances have changed. Examples, as the commenter points out, are the addition of subsistence boat ramps to CPAI's Project and the publication of the 2019 Draft NPR-A IAP/EIS (BLM 2019), which evaluates Alternative A and three action alternatives (Alternatives B, C, and D). These alternatives differ in the areas that would be made available for NPR-A oil and gas leasing and infrastructure and would contribute to the cumulative effects of the Project in different ways. BLM found that selection of Alternatives A, B, and C of the 2019 Draft NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways, while selection of Alternative D (or Alternative E as presented in the 2020 Final NPR-A IAP/EIS, BLM 2020) would likely result in greater cumulative impacts on subsistence. NPR-A IAP/EIS Alternative D or E would increase development infrastructure on the North Slope and would continue to cause alteration and degradation of habitats for key subsistence resources, including caribou, furbearers, fish, and goose. Over time, these changes could affect the health and abundance of different subsistence resources on the North Slope. If development continues westward into the core calving area for the TCH, or if it reduces access to key insect relief habitats, then the herd could experience an overall decline in productivity and abundance. Such a scenario could occur if the BLM selects Alternative D or E in the 2020 Final NPR-A IAP/EIS. Alternative D or E would make areas surrounding Teshekpuk Lake available to oil and gas leasing and infrastructure development. Under this scenario, impacts related to the health and abundance of the TCH would likely extend to subsistence users of the herd, including Nuiqsut, Utqiaġvik (Barrow), Anaktuvuk Pass, Atqasuk, and Wainwright. The BLM did not revise the ANILCA Section 810 Analysis based on this comment.	N
717	38	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	BLM's rationale for this new conclusion is not based on the potential effects of the Willow project, for which no direct or indirect subsistence impacts on the communities of Atqasuk, Wainwright, or Anaktuvuk Pass are identified. Instead, BLM concludes that there may be potential restrictions on subsistence uses in these three communities based on the possibility that BLM might in the future approve a revision to the NPR-A IAP, which could in turn lead to increased leasing which could lead to development that could displace the TCH caribous that are harvested by subsistence users in these communities. BLM's new approach artificially amplifies the cumulative case analysis for the Willow MDP. The assumption that an unmodified Alternative D will be selected for the IAP revision effectively assumes the worst case scenario for impacts to subsistence uses and unnecessarily conflates the Willow MDP analysis with that of the NPR-A IAP, which has its own distinct NEPA process and ANILCA Section 810 analysis. For these reasons, as described further below, BLM should reconsider and revise its cumulative case portion of the ANILCA Section 810 analysis.	As a result of comments received on the ANILCA Section 810 Analysis for the Draft EIS, the updated ANILCA Section 810 Analysis published with the SDEIS included a consideration of the potential effects on subsistence uses of each of the alternatives analyzed in the 2019 Draft NPR-A IAP/EIS (BLM 2019), given that it is a current BLM proposed action and therefore its finalization and implementation constitutes a reasonably foreseeable action for the Willow MDP Project (SDEIS Section 3.19.3, *Past, Present, and Reasonably Foreseeable Actions*). This approach is consistent with BLM-IM-AK-2011-008, which states that "an 810 Evaluation is not constrained to only consider EIS alternatives [but] could be a mixture of alternative sites and alternative parameters." All the 2019 Draft IAP/EIS alternatives (A, B, C, and D) were given equal consideration, as it was unknown which 2019 Draft NPR-A IAP/EIS alternative would be selected in the associated ROD. BLM found that the selection of Alternatives A, B, and C of the 2019 Draft NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways, such that no alteration to the findings was warranted. However, it was determined that the selection of Alternative D would likely result in greater cumulative impacts to the abundance of subsistence resources. This determination was made on the basis that Alternative D, which would make approximately 18.6 acres of the NPR-A open to fluid mineral leasing, including all of the TLSA (within which Willow MDP Project infrastructure would occur), would result in increased development of infrastructure on the North Slope that "would continue to cause alteration and degradation of habitats for key subsistence resources including caribou." Such impacts would be felt not only by Nuiqsut and Utqiaġvik (Barrow) but also by Atqasuk, Wainwright, and Anaktuvuk Pass whose subsistence needs and uses are dependent on the caribou that migrate through the NPR-A, including the TCH in particular. Accordingly, BLM determined that "reductions in abundance of caribou described … for the cumulative case and the selection of the 2019 Draft NPR-A IAP EIS Alternative D may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik, Atqasuk, Wainwright, and Anaktuvuk Pass." Since the publication of the Final IAP/EIS (BLM 2020), Alternative E was added to the analysis and found to have similar cumulative effects as Alternative D. In response to subsistence concerns from the community of Nuiqsut and the public, CPAI has incorporated up to three boat ramps in the Project design that would improve access for subsistence users. Impacts related to an increase in watercraft and hunting (specifically, potential for increased spills and increased mortality of wildlife) would be an indirect result of construction of the boat ramps and would not be within CPAI's control.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	39	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	As a threshold matter, ConocoPhillips questions whether a planning document revision alternative that has not been selected or even identified as a preferred alternative can be deemed reasonably foreseeable consistent with standard NEPA practices. When considering the cumulative effects of a project for purposes of NEPA analysis, the Ninth Circuit defines reasonably foreseeable future actions as including only proposed actions. The Draft NPR-A IAP EIS evaluates four different project alternatives, a no-action alternative and three alternatives with various levels of development in the NPR-A. BLM is still in the process of responding to public comments on the draft NPR-A IAP EIS and will publish a final EIS during summer of 2020. Accordingly, at this point, Alternative D is not approved by BLM nor identified as a preferred alternative. Yet, without explanation, BLM proceeds to analyze the potential additional cumulative impacts under Alternative D only in the new ANILCA Section 810 analysis, noting that [w]hile selection of Alternatives A, B, and C of the 2019 Draft NRP-A IAP/EIS would contribute to the cumulative effects of the project in similar ways, selection of Alternative D would likely result in greater cumulative impacts on subsistence. See Appendix C, page 50. This issue is likely to become moot because BLM is expected to publish a final IAP EIS before the final Willow EIS. Accordingly, it is imperative that BLM's analysis in the final ANILCA Section 810 analysis for the Willow project be modified to reflect the actual NPR-A IAP Selected Alternative.	As a result of comments received on the ANILCA Section 810 Analysis for the Draft EIS, the updated ANILCA Section 810 Analysis published with the SDEIS included a consideration of the potential effects on subsistence uses of each of the alternatives analyzed in the 2019 Draft NPR-A IAP/EIS (BLM 2019), given that it is a current BLM proposed action and therefore its finalization and implementation constitutes a reasonably foreseeable action for the Willow MDP Project (SDEIS Section 3.19.2, *Past, Present, and Reasonably Foreseeable Actions*). This approach is consistent with BLM-IM-AK-2011-008, which states that "an 810 Evaluation is not constrained to only consider EIS alternatives [but] could be a mixture of alternative sites and alternative parameters." All the 2019 Draft IAP/EIS alternatives (A, B, C, and D) were given equal consideration, as it was unknown which 2019 Draft NPR-A IAP/EIS alternative would be selected in the associated ROD. BLM found that the selection of Alternatives A, B, and C of the 2019 Draft NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways, such that no alteration to the findings was warranted. However, it was determined that the selection of Alternative D (or Alternative E, as published in the 2020 Final NPR-A IAP/EIS, BLM 2020) would likely result in greater cumulative impacts to the abundance of subsistence resources. This determination was made on the basis that Alternative D (or E), which would make approximately 18.6 acres of the NPR-A open to fluid mineral leasing, including all of the TLSA (within which Willow MDP Project infrastructure would occur), would result in increased development of infrastructure on the North Slope that "would continue to cause alteration and degradation of habitats for key subsistence resources including caribou." Such impacts would be felt not only by Nuiqsut and Utqiaġvik (Barrow) but also by Atqasuk, Wainwright, and Anaktuvuk Pass whose subsistence needs and uses are dependent on the caribou that migrate through the NPR-A, including the TCH in particular. Accordingly, the BLM determined that "reductions in abundance of caribou described … for the cumulative case and the selection of the 2019 Draft NPR-A IAP EIS Alternative D may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik, Atqasuk, Wainwright, and Anaktuvuk Pass." The 2020 Final NPR-A IAP/EIS found the same determination for Alternative E. In response to subsistence concerns from the community of Nuiqsut and the public, CPAI has incorporated up to three boat ramps in the Project design that would improve access for subsistence users. Impacts related to an increase in watercraft and hunting (specifically, potential for increased spills and increased mortality of wildlife) would be an indirect result of construction of the boat ramps and would not be within CPAI's control.	Y
717	40	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	Separate from the foreseeability issue, ConocoPhillips submits that the approach taken by BLM on cumulative impacts does not reflect a measured, balanced analysis of the Willow MDP. Of the four alternatives considered in the NPR-A IAP draft EIS, Alternative D would make available the greatest amount of land for oil and gas leasing and infrastructure development. See NPR-A IAP EIS Appendix E, page 19. By assuming BLM will adopt an unmodified Alternative D as the result of the NPR-A IAP revision process, BLM has effectively assumed a worst case scenario, for restrictions to subsistence uses, which courts have expressly disapproved for purposes of NEPA analysis. Although BLM preliminarily finds that Alternative D would make approximately 75 percent of the calving range of the TCH available for oil and gas leasing and development, Alternatives A, B, and C are not expected to cause large-scale changes in the abundance of caribou. See Appendix C, page 53; NPR-A IAP EIS Appendix E, page 19, 33. ConocoPhillips submitted comments supportive of a modified version of Alternative D that would protect against impacts on caribou and other subsistence resources. Rather than presuming the most impactful Alternative will be selected during the IAP process, a more logical approach would assume a middle of the road alternative (such as Alternative C) to avoid making both best-case and worst-case assumptions. If BLM had taken a more measured approach to the cumulative case analysis, it is doubtful the agency would have found the NPR-A IAP poses significant restrictions to subsistence uses for the communities of Atquasuk [*sic*], Wainwright, and Anaktuvuk Pass. In any case, the BLM should be clear that such an analysis relates almost entirely to the IAP, not to the Willow MDP.	As a result of comments received on the ANILCA Section 810 Analysis for the Draft EIS, the updated ANILCA Section 810 Analysis published with the SDEIS included a consideration of the potential effects on subsistence uses of each of the alternatives analyzed in the 2019 Draft NPR-A IAP/EIS (BLM 2019), given that it is a current BLM proposed action and therefore its finalization and implementation constitutes a reasonably foreseeable action for the Willow MDP Project (SDEIS Section 3.19.2, *Past, Present, and Reasonably Foreseeable Actions*). This approach is consistent with BLM-IM-AK-2011-008, which states that "an 810 Evaluation is not constrained to only consider EIS alternatives [but] could be a mixture of alternative sites and alternative parameters." All the 2019 Draft IAP/EIS alternatives (A, B, C, and D) were given equal consideration, as it was unknown which 2019 Draft NPR-A IAP/EIS alternative would be selected in the associated ROD. BLM found that the selection of Alternatives A, B, and C of the 2019 Draft NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways, such that no alteration to the findings was warranted. However, it was determined that the selection of Alternative D (or Alternative E, as published in the 2020 Final NPR-A IAP/EIS, BLM 2020) would likely result in greater cumulative impacts to the abundance of subsistence resources. This determination was made on the basis that Alternative D (or E), which would make approximately 18.6 acres of the NPR-A open to fluid mineral leasing, including all of the TLSA (within which Willow MDP Project infrastructure would occur), would result in increased development of infrastructure on the North Slope that "would continue to cause alteration and degradation of habitats for key subsistence resources including caribou." Such impacts would be felt not only by Nuiqsut and Utqiaġvik (Barrow) but also by Atqasuk, Wainwright, and Anaktuvuk Pass whose subsistence needs and uses are dependent on the caribou that migrate through the NPR-A, including the TCH in particular. Accordingly, the BLM determined that "reductions in abundance of caribou described … for the cumulative case and the selection of the 2019 Draft NPR-A IAP/EIS Alternative D may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik, Atqasuk, Wainwright, and Anaktuvuk Pass." The 2020 Final NPR-A IAP/EIS found the same determination for Alternative E.	Y

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717	41	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	In sum, BLM's approach to the ANILCA Section 810 cumulative case analysis for the project inappropriately conflates the subsistence impacts of the Willow MDP with those of the NPR-A IAP. Even if unintentional, the attribution of potential subsistence effects from IAP revisions to the Willow project may cause confusion and unnecessary apprehension in communities that will not be directly or indirectly impacted by the Willow MDP. Indeed, the BLM's revision to the NPR-A IAP is undergoing a distinct NEPA process with an independent ANILCA Section 810 analysis. See NPR-A IAP/EIS Appendix E. Accordingly, the subsistence impacts of IAP revisions are more appropriately considered as part of that independent environmental review process.	As a result of comments received on the ANILCA Section 810 Analysis for the Draft EIS, the updated ANILCA Section 810 Analysis published with the SDEIS included a consideration of the potential effects on subsistence uses of each of the alternatives analyzed in the 2019 Draft NPR-A IAP/EIS (BLM 2019), given that it is a current BLM proposed action and therefore its finalization and implementation constitutes a reasonably foreseeable action for the Willow MDP Project (SDEIS Section 3.19.3, *Past, Present, and Reasonably Foreseeable Actions*). This approach is consistent with BLM-IM-AK-2011-008, which states that "an 810 Evaluation is not constrained to only consider EIS alternatives [but] could be a mixture of alternative sites and alternative parameters." All the 2019 Draft IAP/EIS alternatives (A, B, C, and D) were given equal consideration, as it was unknown which 2019 Draft NPR-A IAP/EIS alternative would be selected in the associated ROD. BLM found that the selection of Alternatives A, B, and C of the 2019 Draft NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways, such that no alteration to the findings was warranted. However, it was determined that the selection of Alternative D (or Alternative E, as published in the 2020 Final NPR-A IAP/EIS, BLM 2020) would likely result in greater cumulative impacts to the abundance of subsistence resources. This determination was made on the basis that Alternative D (or E), which would make approximately 18.6 acres of the NPR-A open to fluid mineral leasing, including all of the TLSA (within which Willow MDP Project infrastructure would occur), would result in increased development of infrastructure on the North Slope that "would continue to cause alteration and degradation of habitats for key subsistence resources including caribou." Such impacts would be felt not only by Nuiqsut and Utqiaġvik (Barrow) but also by Atqasuk, Wainwright, and Anaktuvuk Pass whose subsistence needs and uses are dependent on the caribou that migrate through the NPR-A, including the TCH in particular. Accordingly, the BLM determined that "reductions in abundance of caribou described … for the cumulative case and the selection of the 2019 Draft NPR-A IAP/EIS Alternative D may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik, Atqasuk, Wainwright, and Anaktuvuk Pass." The 2020 Final NPR-A IAP/EIS found the same determination for Alternative E. In response to subsistence concerns from the community of Nuiqsut and the public, CPAI has incorporated up to three boat ramps in the Project design that would improve access for subsistence users. Impacts related to an increase in watercraft and hunting (specifically, potential for increased spills and increased mortality of wildlife) would be an indirect result of construction of the boat ramps and would not be within CPAI's control.	Y
717	106	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19.2 - Cumulative Effects - Past, Present, and Reasonably Foreseeable Future Actions The cumulative impacts analysis in the SDEIS should be updated to focus BLM's analysis on Reasonably Foreseeable Future Action (RFFA) that appreciably add to or synergistically interact with other past, present, or (actual) RFFAs. The updated analysis should account for recent information; and consider existing analyses of potential impacts for other projects. CPAI further recommends that BLM specifically disclose uncertainty associated with planning documents, such as the NPR-A IAP/EIS, and provide a range of potential conclusions that reflects both positive and negative potential effects of activities that are allowable, but not otherwise authorized, under those plans. In order to update this analysis, BLM must: (1) update Table 3.19.1 to remove those projects that cannot be considered RFFAs, (2) substantively revise the cumulative impacts analysis, and (3) substantively revise Appendix C, Part B.8, to reflect a cumulative case that is consistent with Section 3.19. Deleting in-text references to invalid RFFAs but failing to re-analyze cumulative impacts and the cumulative case in the ANILCA Section 810 Analysis based on these changes, would not constitute the necessary substantive revisions.	Table 3.19.1 (Section 3.19, *Cumulative Effects*) was reviewed, and the Mustang project was found not to meet the RFFA criteria as defined by BLM policy (BLM NEPA Handbook H-1790) (BLM 2008); it is now considered a present action. Nine projects were added in the SDEIS as RFFAs, and those projects are considered under the cumulative case in the ANILCA Section 810 Analysis published with the SDEIS. BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19 (*Cumulative Effects*).	Y
717	107	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19 - Cumulative Effects Table 3.19.1 Reasonably Foreseeable Future Actions That May Interact with the Project. First row. The description for the Outer Continental Shelf (OCS) Leasing Program states that "revisions to leasing plan for Chukchi and Beaufort Seas could open more areas to leasing. Under 43 USC 1331-1656b, a new plan is under development." There are both administrative and legal barriers to future OCS oil and gas leasing in the Chukchi and Beaufort Seas. As of April 25, 2019, Department of Interior Secretary Bernhardt directed the Bureau of Ocean and Energy Management to suspend development of a programmatic agreement for the 2019-2014 OCS Oil and Gas Leasing Program (national); that EIS is no longer in progress. The subordinate area-specific EIS for the 2019 Beaufort Sea Oil and Gas Lease Sale has also been suspended, as a result of the national program deferment. This is in addition to the closure of 119 million acres of OCS lands to future oil and gas leasing enacted during President Obama's administration under the Antiquities Act on Dec. 20, 2016; and Federal District Judge Sharon Gleason's ruling that the closures cannot be overturned by President Trump's subsequent April 28, 2017, issuance of the "America-First Offshore Energy Strategy," which attempted to rescind the closure. By all reasonable measures, additional oil and gas activities in the Beaufort and Chukchi Sea areas are unlikely to occur at this time and therefore should be removed from the list of RFFAs. BLM will need to revise the assumptions regarding impacts to marine mammals and subsistence activities that served as the basis for the Draft EIS's cumulative impacts analysis and Appendix C: ANILCA Section 810 Preliminary Analysis for the cumulative case. ConocoPhillips anticipates that this modification will alter BLM's conclusions regarding the availability of marine mammals for the North Slope communities.	DOI has appealed the District Court's decision to the U.S. Court of Appeals for the Ninth Circuit. Should it prevail, DOI may ultimately pursue a leasing program in the OCS areas currently closed to leasing. Such potential Chukchi and Beaufort Sea leasing has been conservatively included as an RFFA, so as to ensure that cumulative impacts are not underestimated in the event that such leasing ultimately occurs.	Y
717	108	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19.2 - Cumulative Effects - Past, Present, and Reasonably Foreseeable Future Actions The final EIS should include an updated table of reasonably foreseeable future actions. The 2020 Plan of Development for the Colville River Unit (submitted in March) notes that a preliminary engineering and design study for CD8, a potential new gravel drill site, will be progressed in 2020.	Additional text was added to Final EIS Section 3.19.3, *Reasonably Foreseeable Future Actions*, to clarify what RFFAs were included and what BLM considered speculative.	Y

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717	109	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19 - Cumulative Effects Table 3.19.1 Reasonably Foreseeable Future Actions That May Interact with the Project. BLM defines a reasonably foreseeable future action (RFFAs) as "a project for which there is an existing proposal, a project currently in the NEPA process, or a project to which a commitment of resources (such as funding) has been made." (Willow SDEIS, Table 3.19.1). This definition notably fails to address how such projects relate to the proposed Willow development and/or resources potentially affected by Willow, which has led to the inclusion of proposed projects that meet the RFFA definition but do not in fact appreciably add or synergistically interact with Willow's potential impacts. In order to address this, BLM should: (1) update Table 3.19.1 to remove projects that can no longer be considered RFFAs, (2) substantively revise the cumulative impacts analysis, and (3) substantively revise Appendix C, Part B.8, to reflect a cumulative case that is consistent with Section 3.19 after revisions.	Table 3.19.1 (Section 3.19, *Cumulative Effects*) was reviewed, and the Mustang project was found not to meet the RFFA criteria as defined by BLM policy (BLM NEPA Handbook H-1790) (BLM 2008); it is now considered a present action. Nine projects were added in the SDEIS as RFFAS, and those projects are considered under the cumulative case in the ANILCA Section 810 Analysis published with the SDEIS. BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19, *Cumulative Effects*.	Y
717	110	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19 - Cumulative Effects Table 3.19.1 Reasonably Foreseeable Future Actions that may Interact with the Project. Fourth and fifth rows. In 2019, the State of Alaska withdrew funding support for the proposed Alaska Stand Alone Pipeline (ASAP) in favor of pursing the Alaska Liquified Natural Gas line project (Alaska LNG). The two projects are redundant and have always been presented as either/or proposals; there is no circumstance in which both projects would be constructed. BLM should remove ASAP from the list of RFFAs. The Federal Energy Regulatory Commission (FERC) prepared the Alaska LNG EIS and analyzed potential impacts of the proposed action on resources that are addressed in BLM's cumulative impacts analysis. Because BLM fails to reference the proposed Alaska LNG Project anywhere else in Section 3.19, it is unclear how the agency has incorporated FERC's analysis and conclusions, if at all. If BLM did not consider the relatively minor portion of the proposed Alaska LNG Project that would be located on the North Slope in its cumulative impacts analysis, it should also be removed from Table 3.19.1.	The choice of what pipeline project would be built is speculative. No changes made.	N
717	111	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19 - Cumulative Effects Table 3.19.1 Reasonably Foreseeable Future Actions that may Interact with the Project. Sixth, ninth, and eleventh rows. BLM currently describes includes three programmatic documents that do not meet the definition of an RFFA and should be evaluated separately from the listed series of proposed projects. A planning tool should not be treated the same as a project proposal.	Programmatic documents are included because changes to how lands are managed and what activities are allowed to occur on them could produce effects that would appreciably add or synergistically interact with the Willow MDP Project's potential impacts. No changes made.	N
717	112	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19 - Cumulative Effects Table 3.19.1 Reasonably Foreseeable Future Actions that may Interact with the Project. Sixth row. BLM should correct this entry to be consistent with the agency's own nomenclature, which currently describes the "[o]il and gas leading program for the Arctic National Wildlife Refuge in Area 1002" as the Arctic National Wildlife Refuge Oil and Gas Leasing Program. Per Section 20001 of the 2017 Tax Cuts and Jobs Act (Public Law 115-97, Dec. 22, 2017), BLM prepared an EIS for the Coastal Plain Oil and Gas Leasing Program. Oil and gas leasing is not allowed in the majority of the Arctic Refuge.	The nomenclature in Table 3.19.1 (Section 3.19, *Cumulative Effects*) was updated. The Coastal Plain Oil and Gas Leasing Program was included in the cumulative effects analysis because it meets BLM's definition of an RFFA as defined by BLM policy, which states the following: "Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends" (BLM NEPA Handbook H-1790) (BLM 2008). The Coastal Plain Oil and Gas Leasing Program constitutes a formal proposal and thus needs to be analyzed.	N
717	113	Dunn	Connor	ConocoPhillips Alaska	Cumulative Effects	3.19.3.5 - Cumulative Effects - Cumulative Impacts to Environmental Justice. The Draft EIS (DEIS) and Supplemental Draft EIS (SDEIS) document potential for direct and indirect impacts to Nuiqsut and Utqiaġvik. The Draft EIS states that "indirect subsistence and sociocultural impacts of the Project could extend to other North Slope communities such as Atqasuk and Anaktuvuk Pass if the Project results in large-scale changes in the abundance or availability of subsistence resources such as caribou that are used by those communities. (p.125)" The DEIS does not document large-scale changes in abundance or availability of subsistence resources. The analysis in the SDEIS does not alter the conclusions described in the DEIS, i.e., the addition of the boat ramps, CFWR, and Option 3 would not result in "large-scale changes in the abundance or availability of subsistence resources." ConocoPhillips recommends clearly separating discussion of cumulative effects on Nuiqsut and Utqiaġvik, for which the DEIS and SDEIS document direct and/or indirect effects from the Willow Project, from discussion of cumulative effects on Anaktuvuk Pass, Atqasuk, Point Lay, and Wainwright. BLM has not identified direct or indirect impacts on Anaktuvuk Pass, Atqasuk, Point Lay, and Wainwright from the Willow Project; ConocoPhillips recommends clarifying that changes to the potential cumulative effects on these communities appear to be the result of the NPR-A IAP revision.	Changes in the abundance or availability of subsistence resources would occur from the Project as a whole, not only as a result of the CFWR and the boat ramps. Because the Final EIS addresses all Project components, this is described in Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*.	Y
1379	2	Higgins	Bruce	Center for Biological Diversity	Cumulative Effects	However, if the Trump administration chooses continue to consider ConocoPhillips proposal, BLM should at least revise the SDEIS to fully describe and evaluate the following: 1) the cumulative adverse impacts of the proposed project on wildlife already struggling to survive, on already stressed wetlands, on air pollution, and on subsistence values; 2) the potential synergistic effects of the proposed project and all other oil and gas activities in the Western Arctic, including BLM's proposal to significantly expand nearby areas available for oil and gas leasing; and 3) the role of the proposed Willow project in fueling the climate crisis, in light of scientific evidence showing that fossil fuels must remain untapped for society to meet international climate goals.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19, *Cumulative Effects*. The Final EIS analyzes climate change in Section 3.2, *Climate and Climate Change*.	N
5162	6	Jeffery	Karin	Center for Biological Diversity	Cumulative Effects	Neither does it properly consider the cumulative impacts of the project in light of other oil development in the Western Arctic and the Bureau's proposal to significantly expand nearby areas available for oil and gas leasing.	Potential future oil and gas projects that meet the criteria to be considered RFFAs are included in the cumulative effects analysis, including revisions to the NPR-A IAP.	N
816	4	Johnson	Alex	—	Cumulative Effects	BLM has also not fully considered the cumulative impacts of this and concurrent development across the western Arctic. This is a complex and far-reaching infrastructure proposal that is likely to have significant impacts on the region and the entire NPRA, above and beyond the numerous impacts on the Teshekpuk Lake special area. This area is one of the most productive wetland complexes in the Arctic, and an important calving ground of the Teshekpuk Lake caribou herd, an essential subsistence resource for communities on the North Slope.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19, *Cumulative Effects*.	N

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658	7	Long	Becky	—	Cumulative Effects	The Supplement did not consider the cumulative impacts of further development in the western Arctic specifically the Greater Mooses Tooth 1 and 2.	GMT-1 and GMT-2 are included in the analysis as past and present actions (described in Section 3.1.1, *Past and Present Actions*).	N
805	3	Lowenthal; Haaland; Huffman; Grijalva; Gallego	Alan; Deb; Jared; Raul M.; Ruben	United States Congress	Cumulative Effects	BLM has failed to recognize the cumulative infrastructure and development impacts ConocoPhillips oil and gas project will have on the region.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19, *Cumulative Effects*.	N
4832	6	McAllistrr	Angus	Center for Biological Diversity	Cumulative Effects	It takes little account of the further impacts of the project in view of other oil development in the region, and the Bureau's proposal to expand significantly nearby areas available for oil and gas leasing.	Potential future oil and gas projects that meet the criteria to be considered RFFAs are included in the cumulative effects analysis, including revisions to the NPR-A IAP.	N
3	3	Merendino	Caleb	—	Cumulative Effects	The supplemental draft environmental impact statement is deeply inadequate on multiple fronts: 2) It fails to properly consider the cumulative impacts of the project in light of other oil development in the Western Arctic and the Bureau's proposal to significantly expand nearby areas available for oil and gas leasing.	Revisions to the NPR-A IAP are included in the cumulative effects analysis (Section 3.19, *Cumulative Effects*).	N
26705	19	President	Acting	Native Village of Nuiqsut Tribal Council	Cumulative Effects	We request that BLM not permit this project until the effects of the project together with other current and future oil development activities are fully understood and until the future management of the NPR-A and details of ConocoPhillips' plans are known.	An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. Placement of a moratorium on such activities is not reasonable regulation and thus is in contradiction to the lease rights. Baseline studies are continually updated throughout the Northeast NPR-A.	N
520	18	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	E. The Supplemental Draft EIS Fails to Fully Disclose or Analyze the Cumulative Impacts from Willow. In our comments on the draft EIS, we explained how BLM failed to adequately disclose and analyze the indirect and cumulative effects of Willow. The supplemental draft EIS has not remedied the problems we identified; the agency has still done only a cursory and general discussion of cumulative impacts resulting from Willow and other past, present, and reasonably foreseeable future actions. No additional detail or analysis was added for the multiple past, present, and reasonably foreseeable future projects that we identified as having deficient analysis. To comply with NEPAs mandate to consider the cumulative impacts of a project, cumulative impacts analysis requires some quantified or detailed information; . . .[g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided. Agencies must do more than just catalogue relevant past projects in the area. This means a discussion and an analysis in sufficient detail to assist the decisionmaker in deciding whether, or how, to alter the program to lessen cumulative impacts.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19 (*Cumulative Effects*). Quantitative analysis was provided where feasible; otherwise, qualitative analysis was used.	N
520	19	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	The Supplemental Draft EIS Provides an Insufficient Cumulative Effects Analysis. BLM's approach to cumulative impacts in the supplemental draft EIS is confusing and problematic. BLM has expanded the list of reasonably foreseeable future actions in its chart from the draft EIS. However, that list is still incomplete. Additionally, the list includes only single sentence descriptions of the actions. It does not include actual analysis for many of these projects. Instead, BLM focuses on a narrow set of resources that it determined would be impacted by the three new project components. This is inexplicable, given the fact that additional projects are now included on the list that were not included, and therefore not analyzed, in the draft EIS for the cumulative impacts to all resources.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19 (*Cumulative Effects*).	N
520	20	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	For the resources that are considered in the supplemental draft EIS, the analysis remains deficient. Very brief statements are included minimally describing future projects, and only the most basic statements are included indicating what the impacts could be to some biological resources. But there is no analysis of what the cumulative impacts of the future actions and the Willow project are. The reader is left without any dots being connected or an understanding of how Willow and the identified projects could impact these resources and uses cumulatively.	As noted in SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, ongoing design refinement and engineering is typical during the NEPA process. The SDEIS evaluated three substantive elements added to the Project description since the Draft EIS. The SDEIS limited the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS. Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment, and they are detailed in the Final EIS and included in the overall analysis of potential effects. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19 (*Cumulative Effects*). BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
520	21	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	Regarding BLM's analysis of the cumulative impacts to the social environment, subsistence and sociocultural systems, and environmental justice, BLM mistakenly focuses on Alternative D in the draft IAP as having the potential to allow development to the west and around Teshekpuk Lake. As we explained in our comments on that document, the protections provided in the other alternatives are illusory; all action alternatives could result in impacts that need to be considered as part of the Willow analysis.	The cumulative effects analysis focuses on potential changes to the NPR-A IAP that could 1) overlap with effects from the Willow MDP Project and 2) result in new effects or changes to the magnitude, duration, or extent of effects already described.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
520	23	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	BLM is contemplating opening substantial areas to oil and gas development immediately adjacent to Willow and shrinking Special Area protections, which could further exacerbate the serious impacts to subsistence users and other resources in the area. BLM has also failed to analyze these impacts in light of the most recent NPR-A lease sale, where a subsidiary of Armstrong Energy leased a substantial number of acres along the southern border of Teshekpuk Lake, beginning from ConocoPhillips existing block of leases and extending west, all the way to Atqasuk. BLM needs to analyze these changes and provide a more in-depth assessment of the likely cumulative impacts in a revised Willow EIS.	BLM considered potential cumulative impacts of the Willow MDP Project in the context of the 2020 Final NPR-A IAP/EIS (BLM 2020) alternatives. BLM's 2020 Final NPR-A IAP/EIS addresses the potential impacts of a no action alternative (see Final EIS Section 3.19.3, *Reasonably Foreseeable Future Actions*). BLM evaluated Alternative A and four action alternatives (Alternatives B, C, D, and E) of the 2020 Final NPR-A IAP/EIS, which differ in the areas that would be made available for NPR-A leasing and infrastructure and which would contribute to the cumulative effects of the Project in different ways. BLM found that selection of Alternatives A, B, and C of the 2020 Final NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways; selection of Alternative D or E would likely result in greater cumulative impacts on subsistence. NPR-A IAP/EIS Alternative D or E would increase development infrastructure on the North Slope and would continue to cause alteration and degradation of habitats for key subsistence resources, including caribou, furbearers, fish, and goose. Over time, these changes could affect the health and abundance of different subsistence resources on the North Slope. If development continues westward into the core calving area for the TCH, or if it reduces access to key insect relief habitats, then the herd could experience an overall decline in productivity and abundance. Such a scenario could occur if the BLM selects Alternative D or E in the 2020 Final NPR-A IAP/EIS. Alternative D or E would make areas surrounding Teshekpuk Lake available to oil and gas leasing and infrastructure development. Under this scenario, impacts related to the health and abundance of the TCH would likely extend to subsistence users of the herd, including Nuiqsut, Utqiaġvik (Barrow), Anaktuvuk Pass, Atqasuk, and Wainwright. Simply purchasing a lease does not meet the definition of an RFFA. Just because land is leased does not mean it would be developed. When and where commercial discoveries of oil and gas occur, if production development would occur, the type and extent of petroleum technology advances, and economic uncertainties related to global oil prices are all speculative. This is supported by the low probability that commercial production development would occur on a lease tract offering. ADNR reports that half of the tracts (49.7%) offered in state oil and gas lease sales in northern Alaska are actually leased (Kornbrath 1995); of these, approximately 11% have been drilled. About 5% of the tracts leased have been commercially developed for oil and gas production. The percentage is even smaller for tracts offered in federal lease sales in Alaska (Kornbrath 1995).	N
520	24	Psarianos	Bridget	Trustees for Alaska	Cumulative Effects	The revised IAP could also lead to an expanded network of so-called community roads that could also have severe impacts that have not been adequately analyzed in the Willow draft EIS. All three action alternatives in the revised IAP allow community roads in areas closed to oil and gas leasing and development or subject to no surface occupancy stipulations on oil and gas leases and all action alternatives would allow for a potential community road connecting Nuiqsut and Utqiaġvik that is routed north of Teshekpuk Lake. So-called community roads would not be paid for by the oil industry, however they could be paid for by ANCSA corporations and oil industry vehicles could travel those roads. As the ice road season shortens due to climate change, the oil industry will have increasing interest in utilizing gravel roads, including community roads. It is foreseeable these roads will be open to and used by industry to access a wide range of areas, such as Smith Bay. The State is also proposing to build gravel roads that could connect communities on the North Slope to the existing road system at Prudhoe Bay. BLM does not adequately account for or analyze the impacts of these roads in light of Willow, including the impacts they will have if allowed in particularly sensitive areas, such as north of Teshekpuk Lake, and the potential level of use by the oil industry. BLM needs to update and substantially revise its impacts analysis for all resources to account for the likely impacts the IAP revision will have in combination with the Willow project.	Section 3.19 (*Cumulative Effects*) of the Draft EIS and Final EIS analyze the cumulative effects of potential future community access roads that could be constructed under the ASTAR project. The specific locations of such roads are speculative at this time, given that no applications have been submitted for any particular road project.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
407	16	Rose	Garett	Natural Resources Defense Council	Cumulative Effects	Cumulative Impacts While the SDEIS attempts to expand upon the limited analysis contained in the DEIS, it falls well short of meaningfully disclosing and analyzing potentially significant cumulative impacts. The SDEIS explicitly fails to revise analyses for several resource categories. Where it does make gestures toward additional analysis, it repeats the DEISs error of failing to meaningfully analyze the potential cumulative impacts of Willow with other activities in the level of detail demanded by NEPA. And in the limited areas where it does purport to provide more detail about other activities, the SDEIS analyses are inadequate. The SDEIS dismisses without meaningful explanation revised analysis of the potentially significant cumulative impacts of the Project. It glosses over or ignores cumulative impacts to climate and climate change, air quality, soils, permafrost and gravel resources, contaminated sites, noise, visual resources, water resources, wetlands and vegetation, landownership and use, and economics. These omissions compound the DEISs wholly cursory examination of potential cumulative impacts to permafrost, soils, and gravel resources, which merely concludes without support that the Project will contribute to cumulative effects but not change cumulative impacts. And it extends the absence of any analysis of potential cumulative impacts to water resources, which is especially notable given the uniqueness and ecological importance of the Western Arctic's hydrological systems. BLM's failure here is made even starker by the agency's expansion of the list of reasonably foreseeable future actions. Where the SDEIS discusses potential cumulative impacts, it generally fails to do so with the requisite degree of specificity demanded by NEPA. The analysis lists twenty-one categories of reasonably foreseeable future actions. The analysis, however, proceeds to analyze potential cumulative impacts from only a small minority of them. For example, the SDEIS includes the Arctic National Wildlife Refuge Oil and Gas Leasing Program in its list. But there is no analysis of how potential impacts from the Project might cumulate with impacts from the Refuges program. This omission is particularly striking given that both projects could include portions of the Central Arctic Herds range and the potential impacts from the operation of both on North Slope air quality. Moreover, where the SDEIS does highlight a specific future action, its discussion often fails to meaningfully discuss how the potentially significant impacts of Willow will combine with the potentially significant impacts from those actions. Instead, the discussions tend to focus on the potential impacts of the other projects and, if at all, reference potential cumulative impacts only generically. When discussing impacts from seismic, for example, after noting some of the direct impacts of seismic exploration to plants and snow, the SDEIS simply asserts that impacts of seismic on forage plants would be in addition to direct loss of forage from gravel roads and pads. Relatedly, at several points when discussing the ongoing revisions to the IAP, a draft of which was submitted for public comment and the final version of which will be available in summer 2020, BLM simply states that such revisions could increase vessel traffic and/or oil and gas development, which the Project could combine with to have cumulative impacts on marine mammals, alongside a sentence without analysis about potential impacts to subsistence if increased offshore activity causes deflections or behavioral changes in whales. Similarly, the SDEISs discussion of potentially significant cumulative impacts to biological resources remains inadequate. In the context of caribou, while the SDEIS suggests the potential for population-level impacts, it notes that such impacts are difficult to predict and declines to pursue additional analysis. Similarly, while the marine mammals analysis has been revised to more clearly specify types of potential cumulative impacts, there is no analysis of potential population-level impacts. And the SDEIS, like the DEIS, provides no detailed discussion of potential cumulative impacts to fish, birds, and non-caribou terrestrial mammal populations.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." Because there were no changes to the cumulative effects described in the Draft EIS for climate and climate change, air quality, soils, permafrost and gravel resources, contaminated sites, noise, visual resources, etc., they were not described in the SDEIS.	N
10	3	Thomas	Sarah	—	Cumulative Effects	This is unacceptable, and your agency's supplemental draft environmental impact statement is deeply inadequate on multiple fronts: 1) It fails to sufficiently analyze the project's harm to wildlife already struggling to survive in a warming Arctic, damage to wetlands, air pollution and loss of subsistence values. 2) It fails to properly consider the cumulative impacts of the project in light of other oil development in the Western Arctic and the Bureau's proposal to significantly expand nearby areas available for oil and gas leasing. 3) It fails to comprehensively evaluate the role of the Willow project in fueling the climate crisis, in light of scientific evidence showing that all Arctic fossil fuels must remain untapped for society to meet international climate goals.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. The Project's effects on wildlife are analyzed in Chapter 3.0 (*Affected Environment and Environmental Consequences*) of the Final EIS; specifically, fish are analyzed under Section 3.10 (*Fish*), birds are analyzed under Section 3.11 (*Birds*), terrestrial mammals are analyzed under 3.12 (*Terrestrial Mammals*), and marine mammals are analyzed under Section 3.13 (*Marine Mammals*). Climate change is analyzed under Section 3.2 (*Climate and Climate Change*). Cumulative effects of the Willow MDP Project are analyzed under Section 3.19 (*Cumulative Effects*).	N
822	3	Van Dam	Brie	—	Cumulative Effects	BLM and cooperating agencies — or cooperating agencies have not yet adequately considered climate change projections into their assessment of the cumulative impact of all the proposed infrastructure and activity associated with this project. proposed here relies on ice roads, ice bridges, and is located on or near permafrost, all of which are extremely vulnerable I'd like to see the BLM and cooperating agencies include a thorough analysis of the feasibility of proposed infrastructure, like ice roads and bridges, in light of climate change in the future. And thank you for the opportunity to provide comment.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19, *Cumulative Effects*. The Draft EIS acknowledges and addresses climate change impacts on the Project in Section 3.2.3, *Effects of Climate Change on the Project*. Appendix E.2 (*Climate and Climate Change Technical Appendix*) discusses how CPAI would accommodate climate change considerations in its Project design.	N
26709	9	Warren	James	—	Cumulative Effects	So, the sharpest conclusion I have to draw is that BLM is simply minimizing cumulative impacts by ignoring them completely or by treating them not in their cumulative totality but as independent, isolated impacts. But that is logically inconsistent and incoherent. The analysis, in other words, is fundamentally flawed. It adopts an analytical framework in order to undermine ecological perspectives, which stress interdependence and global, cumulative effects. It draws no meaningful conclusions from its own considerable accumulation of analytical work.	BLM prepared the Draft EIS and SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts, including cumulative impacts, that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. Cumulative effects of the Willow MDP Project are analyzed in Section 3.19, *Cumulative Effects*.	N

4.2.3.7 Draft Environmental Impacts Statement

Table B.3.9. Substantive Comments Received on the Draft Environmental Impact Statement

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
117	17	Campbell	Bruce	—	DEIS	WHAT SPECIFIC IMPACTS WOULD CARRYING OUT THE PROPOSED WILLOW MDP HAVE ON THE COLVILLE RIVER AND TRIBUTARIES (including in the Ocean Point area), ON FISH CREEK, ON JUDY CREEK, AND ON OTHER WATERCOURSES OF THE NORTHEASTERN NPR-A? ALASKA DFG notes that Harrison Bay constitutes important and sensitive marine habitat. Specifically, the Harrison Bay Colville Delta area is: 1. A major hotspot for marine birds; 2. A summer (May through October) core area for Watchlist bird species of concern; 3. A globally significant international Bird Area (IBA); 4. A hotspot for benthic-feeding seabirds in summer; 5. Feeding and high-density denning habitat for polar bears; and 6. Identified by Alaska Department of Fish and Game in the Most Environmentally Sensitive Areas (MESA) program. Are any of these facts being considered in your formulation of plans for the NPR-A? I will also note that the plan is to have the approved Willow MDP along with a new Integrated Activities Plan in order to supersede current law which is in the form of the IAP/EIS Record of Decision of 2013 as well as to supersede (depending upon alternative) the Colville River Special Area established in 2008.	The revision of the IAP considers the things pointed out by the commenter with regard to the important habitats provided by the Colville River and its tributaries, as well as the CRD. The Willow MDP Project is subject to lease stipulations from prior IAPs, which do not change when a new IAP is issued. Stipulation K-1 provides setbacks for important rivers, including the Colville River, within which permanent oil and gas facilities are prohibited. Applicable revisions to BMPs considered in the IAP are included as *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	N
117	19	Campbell	Bruce	—	DEIS	Besides the various carcinogens related to oil and gas fields even before fracking chemicals entered the picture (such as benzene, toluene, and xylene), I notice various non-clean and non-safe materials mentioned in the documents. Under drill sites, chemical injection facilities (including tanks, containment, small pumps, and exterior tank fill connection), plus temporary tanks, production operations storage tanks, production operations stand-by tank, and transformer platforms (oil insulated). Things would also be bad at the Willow Operations Center where there would be, among other things, wastewater and water treatment plants, water tanks, and chemical storage, at least two Class I underground injection control disposal well(s) (Class I disposal wells), hazardous waste accumulation and storage, diesel and jet fuel tanks and pump skids (I will point out that diesel fuel has over 40 known carcinogens within that fuel mix), and municipal solid waste incinerator. Will there be any attempts to seek to reduce dioxin contaminant emission from such an incinerator? Will toxic waste be burned too, or just alleged municipal solid waste?	Final EIS Section 4.0, *Spill Risk Assessment*, describes the types of hazardous materials that would be used for the Project and the types and likelihood of spills. As stated therein, “it is expected that hazardous material spills would be localized and contained within required secondary containment or contained in the immediate area of the spill on the gravel pad. Hazardous materials spills are not expected to extend beyond gravel or ice infrastructure.”	N
117	21	Campbell	Bruce	—	DEIS	I noticed on a DOI website that there are 75 comment periods which end today. I CALL FOR THE DISCLOSURE IN THE NEXT SUPPLEMENTAL DOCUMENT (OR ELSE THE FINAL EIS) OF E-MAIL COMMUNICATIONS BY TRUMP ADMINISTRATION, DOI, AND BLM PERSONNEL IN REGARDS TO ARRANGING FOR MORE OR LESS SIMULTANEOUS TIMING FOR THE WILLOW MDP, THE INTEGRATED ACTIVITIES PLAN FOR THE WHOLE NPR-A, AND FOR THE 404 CLEAN WATER ACT PERMIT. It would be good both for thoroughness of the review, as well as for gauging site-specific cumulative impacts from a range of activities relating to the Willow MDP, if the agencies working on each document could have given more site-specific comments once they realized the extent of project design changes for the Willow MDP. The various agencies need serious site-specific input as far as what is proposed where, versus what species are there now and what the needs for their life cycles are to continue to live and perhaps recover such species.	The public comment period for the Willow MDP Draft EIS was scheduled to minimize overlap with review periods for other Arctic projects. BLM provided all information to the cooperating agencies regarding the Project changes in fall 2019. BLM also held a specific meeting with the Interdisciplinary Team and cooperating agencies, before issuance of the SDEIS, during which the Project proponent reviewed all proposed changes in detail. BLM worked within national, state, and local guidance to minimize the risk of COVID-19 transmission while delivering our services to the greatest extent practicable. Using virtual meeting technology allows for communities to request meetings at their convenience without concerns for weather or logistical costs, creating a more efficient way to provide information and receive feedback with minimal cost to the American taxpayer.	N
117	22	Campbell	Bruce	—	DEIS	I shall now quote from the Digital Journal what pointed out that in a new study authored by scientists from the Environmental Defense Fund, Harvard University, Georgia Tech, and the SRON Netherlands Institute for Space Research, and published today in the journal Science Advances, it was found that oil and gas operations in Americas Permian Basin are releasing methane at twice the average rate found in previous studies. The main scientist at EDF Dr. Steven Hamburg pointed out that [t]hese are the highest emissions ever measured from a major U.S. oil and gas basin. There’s so much methane escaping from Permian oil and gas operations that it nearly triples the 20-year climate impact of burning the gas they’re producing. WHAT MEASURES WILL CONOCO-PHILLIPS ALASKA USE IN ORDER TO SEEK TO NOT ALLOW MUCH METHANE TO ESCAPE FROM THE OIL AND GAS OPERATIONS RELATED TO THE WILLOW MDP?	Methane is a GHG. Measures used to reduce GHG emissions are described in Section 3.2.2.1, *Avoidance, Minimization, and Mitigation*.	N
132	2	Lish	Christopher	—	DEIS	This human-made, modular island just off-shore and north-east of the Teshekpuk Lake Special Area would impact polar bear critical habitat and likely would also impact to threatened ice seals and whales. These species are already experiencing significant effects from climate change and other oil and gas activities in the Alaskan Arctic. The DEIS understates impacts to polar bears and seals, and completely omits impacts to cetaceans including listed bowhead and beluga whales.	Effects to polar bears and seals from the MTI are described in Section 3.13.2.6, *Module Delivery Option 1: Atigaru Point Module Transfer Island*, and Section 3.13.2.7, *Module Delivery Option 2: Point Lonely Module Transfer Island*. The MTI for Options 1 and 2 would be located in shallow waters and thus is not expected to affect bowhead or beluga whales, except for barge traffic associated with the island, which would originate in Dutch Harbor and could transit through areas used by whales. This text was added to Section 3.13.2.6, *Module Delivery Option 1: Atigaru Point Module Transfer Island*.	Y

4.2.3.8 Environmental Impact Statement Process and Timeline

Table B.3.10. Substantive Comments Received on the Environmental Impact Statement Process and Timeline

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
159	18	Kenning	Erik	ASRC	EIS Process and Timeline	ANCSA Corporation Consultation: In adherence to Executive Order 13715, Congressional mandate, DOI Policy on Consultation with ANCSA Corporation and DOI Policy on Consultation with Indian Tribes, DOI and its agencies are required to consult with ANCSA Corporations in a meaningful manner on any Departmental action that could have substantial direct effect or limit the ANCSA Corporations ability to participate in Departmental programs. Consultation is intended to create effective Federal decision-making and to help ensure Federal action is achievable, comprehensive, long-lasting, and reflective of ANCSA input. BLM should also conduct the required consultations with the affected Alaska Native Corporations and tribal governments; consultation is a critical mechanism for BLM to develop strong working relationships with Alaska Native partners and to demonstrate how Alaska Native input is captured in the Willow MDP.	BLM reached out to ASRC for ANCSA consultation in December 2019. BLM has meet with Kuukpik regarding ANCSA consultation several times. ANCSA consultation is described in Final EIS Section 1.10.4, *Tribal Consultation*.	N
26705	3	President	Acting	Native Village of Nuiqsut Tribal Council	EIS Process and Timeline	BLM should not permit the Willow MOP at this time. For the reasons explained in our comments on the DEIS, 2 NVN asks that BLM not permit the Willow MDP at this time. Development is happening too fast, and the impacts of the many recent projects near our community are not yet understood. Additionally, there is significant uncertainty about the future management of the NPR-A and about ConocoPhillips' ultimate plan for developing Willow. BLM is revising its Integrated Activity Plan (IAP) for the NPR-A, which could significantly change BLM's management of the region. BLM has released a draft environmental impact statement for the IAP, but has not identified a preferred alternative. ConocoPhillips has also signaled that it is uncertain about its plan for developing Willow. The Covid-19 pandemic and recent drop in oil prices may create further uncertainty. BLM's position that it must proceed with this permitting process now is unsupported and is inconsistent with its obligations under the NPRPA, NEPA, and ANILCA to fully consider the impacts of the project and to ensure that any development will not unnecessarily harm our community or resources in the NPR-A. We continue to ask that any permitting for the Willow MDP be delayed for at least five years.	BLM cannot speculate about the intentions of the Project proponent regarding when the Project proponent will choose to apply for authorization or whether the Project is still viable. The EIS is in response to CPAI's request to review its Willow MDP Project. An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. The Draft EIS and the SDEIS consider analysis of a reasonably foreseeable development scenario. BLM is required to respond through a ROD on the Willow MDP Project regardless of potential revisions to the IAP. The Project is subject to lease stipulations from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included in *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1). BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
520	2	Psarianos	Bridget	Trustees for Alaska	EIS Process and Timeline	In the following, we describe a series of deficiencies relating to this SDEIS, while seeking not to repeat our entire discussion of the extensive shortcomings of BLM's draft EIS for the project. In sum, we are deeply concerned about the impacts from the proposed project to the resources and values in the Reserve, the limited opportunity for public input, and the lack of a meaningful impacts analysis due to BLM's deficient draft EIS and the lack of an appropriately timed 404 permit. These issues must be rectified and the draft EIS revised and re-released for a meaningful public comment period.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which issued its Public Notice on March 26, 2020. BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N

4.2.3.9 Environmental Justice

Table B.3.11. Substantive Comments Received on Environmental Justice

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26707	14	Baca	Andrew	US Environmental Protection Agency	Environmental Justice	Environmental Justice As noted in our DEIS comments, we recommend continued attention to Environmental Justice issues as the project moves forward to ensure that disproportionate adverse impacts to environmental justice communities are mitigated to the maximum extent possible. Based upon the analysis presented in the SDEIS, it appears that the new module delivery [O]ption 3 would reduce the highly adverse and disproportionate subsistence, sociocultural systems, and public health impacts identified for module delivery [O]ption 1.	Analysis of Option 3 (Colville River Crossing) is included in the SDEIS and Final EIS, including in Section 3.16 (*Subsistence and Sociocultural Systems*), Section 3.17 (*Environmental Justice*), and Section 3.18 (*Public Health*).	N
26707	15	Baca	Andrew	US Environmental Protection Agency	Environmental Justice	The SDEIS expands the cumulative environmental justice analysis to consider impacts to five additional communities that were not analyzed in the DEIS, due to the overlap of Project effects with potential reasonably foreseeable future actions in the cumulative effects analysis. The cumulative impacts analysis in the SDEIS concludes that the effects 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. . . . We also recommend that the BLM take steps to involve and inform the additional affected communities identified in the SDEIS regarding project decisions and impacts, and that the FEIS consider ways to reduce the contributions of the Willow MDP project to cumulative adverse environmental justice impacts.	The Final EIS also includes the expanded communities. The Project's ROD will identify mitigation measures to be applied to the Project.	N

4.2.3.10 Fish

Table B.3.12. Substantive Comments Received on Fish

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26707	10	Baca	Andrew	US Environmental Protection Agency	Fish	We recommend the FEIS provide additional detail on how data on fish presence at the proposed Colville River crossing site will be collected to address the lack of baseline data on discharge and fish use, as well as discuss the potential for fish eggs to be in the gravel or fish to be in pools within the footprint of the ice bridge. . . . We also recommend that the FEIS provide additional information about fish species that might potentially need to be transported around the ice bridge and how that might be accomplished. If transporting fish would not be feasible (e.g., because of challenges capturing fish under the ice or risk of mortality during transport), we recommend that the FEIS describe the potential environmental consequences.	All concentrations of fish that would have a biological purpose for moving substantially during winter (burbot and Arctic cisco) are documented to occur downstream from Ocean Point (Morris 2003). The number of fish that may move through Ocean Point is expected to be low and would be able to pass in the small channels of flow under the ice bridge. Should the crossing ground out, the preponderance of life-history information on Arctic fishes during winter suggests that only Arctic cisco and burbot would be actively moving in the Colville River. Arctic cisco would be following the saline front, which does not reach the crossing at Ocean Point, and burbot would be feeding, but harvest information suggests that burbot are most common downstream from the Itkillik River nearer the Putu Channel. Even if the crossing blocked fish passage periodically over a 5-week period, impacts to fish would be minimal in terms of the number of fish and because other species in the river (primarily broad whitefish, least cisco, and Arctic grayling) would not be feeding or substantially moving. Therefore, impacts would be limited to small numbers of fish and would occur over isolated brief periods. No spawning is believed to occur at Ocean Point in the main channel of the Colville River, though it is inferred to occur downstream from Ocean Point and, for broad whitefish, also likely within the sloughs around Ocean Point to the east of the main channel. Text was amended in Final EIS Section 3.10.2.8, *Module Delivery Option 3: Colville River Crossing*, to reflect that fish transport and culverts are no longer being considered. Text was also amended to reflect that the ice bridge across the Colville River would be partially grounded and that some small channels of flow would occur; thus, effects to fish are expected to be lesser than the effects described in the SDEIS. After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy. Morris, W. 2003. Seasonal Movements and Habitat Use of Arctic Grayling (Thymallus arcticus), Burbot (Lota lota), and Broad Whitefish (Coregonus nasus) within the Fish Creek Drainage of the National Petroleum Reserve-Alaska, 2001–2002. Technical Report No. 03-02. Fairbanks, AK: Prepared for NSB, Department of Wildlife Management and ADNR, Office of Habitat Management and Permitting.	Y
717	75	Dunn	Connor	ConocoPhillips Alaska	Fish	3.10.1 - Fish - Affected Environment "Ocean Point is also believed to be the approximate upstream extent of saltwater influence from the CRD." This sentence needs a citation and is inconsistent with the next paragraph and Section 3.8.1.2, which states "Ocean Point on the Colville River is upstream of the saltwater intrusion influence, which can reach at least 30 miles upstream from Harrison Bay in the winter (Arnborg, Walker et al. 1962)."	DELETED: "Ocean Point is also believed to be the approximate upstream extent of saltwater influence from the CRD." EDITED: "Saltwater intrusion is at least 30 miles upstream from Harrison Bay in winter, *just upstream from the Itkillik River* (Arnborg, Walker et al. 1962)."	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	77	Dunn	Connor	ConocoPhillips Alaska	Fish	3.10.3 - Fish - Additional Suggested Best Management Practices or Mitigation "Collect baseline data regarding winter fish presence along the Colville River near Ocean Point throughout winters every year until the grounded ice bridge crossing is no longer required for the Project." Documenting winter fish presence for multiple winters isn't necessary and ConocoPhillips requests removal of this proposed BMP/mitigation. BLM's own analysis in Section 3.10.2.2 indicates "fish are not anticipated to be present at Ocean Point during winter because the river ice can be naturally grounded and little flow exists." ConocoPhillips specifically investigated this option due to the possibility that this area grounds out naturally in some winters. In the winters where we propose the heavy haul, this crossing will be grounded and will just mimic natural conditions. The species that use this river are well-documented, and BLM even states in Section 3.10.1 "targeted fish species are not common further upstream to Ocean Point. Studies of seasonal movements of radio-tagged broad whitefish (Morris 2000, 2003) found that fish that moved in the Colville River in fall or winter did not move upstream from Ocean Point and most wintered in a side channel of the Colville River at Ocean Point or downstream in reaches around the confluence with the Itkillik River. It is likely that burbot are not moving through Ocean Point during winter though they are the most likely species to do so when the opportunity is there (i.e. flows are sufficient). Most species aside form burbot are not feeding in the winter and tend to be fairly sedentary once they have reached overwintering locations." BLM again suggests that flow through the winter in this area is not an annual occurrence, and BLM also states that most fish aren't moving or feeding much, plus aren't even likely to be in the area.	Measure was rewritten as follows: "Identify overwintering fish habitat (maximum water depths, particularly free-water depth under ice cover) in the Colville River at and near Ocean Point and other streams in the NPR-A that might intersect the Option 3 ice road. Avoid crossings of potential overwintering habitat." Lack of data regarding fish presence and winter flow at Ocean Point are key topics described in substantive public comments.	N
607	5	Fisher	Kevin	North Slope Borough	Fish	P. 19 3.8.2.1.2 In-Water Structures This section notes that work could super cool [*sic*] the water. . . . Please provide approximate temperatures and address the prevention of supercooling of freshwater fish from freezing. Also, how will monitoring of fish take place during supercooling?	Though supercooling of water has been observed in other areas of the North Slope, temperatures at which this would occur have not been documented. If the river ice surface is used as a work platform, the potential for supercooling would be reduced by removing the smallest area of insulating snow cover as necessary to complete work in a timely fashion. Upon completion, it is likely that snow would quickly drift over the area and further reduce the potential of supercooling open water below.	N
607	6	Fisher	Kevin	North Slope Borough	Fish	P. 28, 3.10.1 Overwintering habitat depicted in this figure was derived from Morris (2003), and likely overestimates overwintering habitat in some areas. 1. How was overestimation determined? 2. Define some areas.	Overwintering habitat derived from Morris (2003) was intended to only include habitats within the Colville River, not bordering aquatic habitats that may be depicted within the figure's overwintering habitat polygons. Thus, overwintering habitat depicted in the figure may appear to be overestimated. All wintering relocations of radio-tagged broad whitefish occurred downstream from the proposed ice road crossing or in the slough to the east of Ocean Point (Morris 2003).	N
607	7	Fisher	Kevin	North Slope Borough	Fish	P. 31 The phrase resistant fish is in bold, and it states that only resistant fish are present from DSP2 to Itkillik River; however, in figure 3.10.1, there is no indication that this area has been examined, otherwise the symbol for resistant fish would be used, as it is in other others on this map. Please clarify and cite sources.	There are six main lakes between the Itkillik River and Kuparuk DS2P, all of which have been previously sampled by CPAI from 1990 to 2014. They range in depth from 3.3 to 11.0 feet deep, and only resistant fish species were detected. Fish sampling points east of the Colville River were added to Figure 3.10.1 in the Final EIS.	N
57	1	Kunakana	Sam	—	Fish	I was totally opposed to any other development until we get a better understanding of what's going on with our fish that we've been getting since 2013, that has been diagnosed with having saprolegnia [*sic*] fungi. I believe that — you know, and that needs to be revisited to check and see if there is a spike in the contaminants that were detected back in 2005 because of ice roads, more ice roads being built in this area for development and for winter exploration.	Discussion of *Saprolegnia parasitica* was added to Final EIS Section 3.10.1.1, *Freshwater*.	Y
26705	14	President	Acting	Native Village of Nuiqsut Tribal Council	Fish	BLM must thoroughly address impacts to fish and hydrology from constructing a freshwater reservoir. The updated project includes construction of a freshwater reservoir under Alternatives B, C, and D. BLM fails to adequately analyze the impact of constructing this reservoir. The SDEIS suggests that the reservoir will not have any effects on fish different from those described in the DEIS because it will not substantially change water levels in Lake M0015 or Willow Creek. As pointed out in our previous comments, the analysis of fish and fishing in the DEIS was already inadequate. Additionally, changing the timing and flow of water in tundra creeks and lakes can have longer-term effects on fish and hydrology. These effects are not well understood, and must be more thoroughly addressed in the SDEIS.	The CFWR would not change the timing or flow in tundra creeks, as described in Final EIS Section 3.8.2.3.6, *Water Withdrawal and Diversion*.	N
520	36	Psarianos	Bridget	Trustees for Alaska	Fish	While the SDEIS states that the location of the crossing is not expected to be used by fish in winter, BLM indicates on maps that the location of this crossing is overwintering fish habitat. Such habitat conditions are incredibly important for Arctic fishes life cycles. It is incorrect to generalize across fish species and the life history of species, however, so BLM should describe which fish may be impacted by changes to this habitat. . . . BLM also acknowledges that this grounded ice crossing may act as a barrier and impede the movement of fish. BLM states that CPAI will consult with ADF&G on how fish would be transported around the grounded ice bridge if they are found at this site. . . . How this would occur must be described in detail as such an undertaking could be logistically challenging or even impossible to effectively execute. The impacts of water withdrawals and their result on dissolved oxygen, among other habitat factors, at or resulting from the crossing design must also be analyzed and described in a revised draft EIS.	As stated in Section 3.10.1.1, *Freshwater*, overwintering habitat depicted in Figure 3.10.1 was derived from Morris (2003) and likely overestimates overwintering habitat in some areas, including at Ocean Point. In addition, after publication of the SDEIS, refinements were made to the description of the Colville River ice bridge; these were added to Appendix D.1 (*Alternatives Development*), Section 4.7.3, *Option 3: Colville River Crossing*. The crossing would not be a bottom-fast ice bridge but would be a partially grounded engineered ice bridge that would be constructed to provide sufficient load-carrying capacity to support the weight of the sealift modules and the SPMTs. The term "grounded ice" is footnoted, and the footnote describes the nature of the engineered ice bridge; it was clarified that there may be one or more low-flow channels present near the riverbed that would allow winter discharge to flow beneath the ice. These small channels are narrower than the length of the SPMT. The engineered ice bridge would be built up to required specifications to support module moves approximately 24 hours before crossing, then allowed to rest before moving a module across, allowing for potential water movement under ice. After a module crosses, the ice crossing would be built up to required specifications approximately 24 hours before the next module crosses the bridge. Text was amended in the Final EIS Section 3.10.2.8, *Module Delivery Option 3: Colville River Crossing*, to reflect that fish transport and culverts are no longer being considered.	Y
520	37	Psarianos	Bridget	Trustees for Alaska	Fish	The bathymetric conditions and flow of the Colville River are dynamic and ever changing depending on seasonal conditions and weather events within this massive watershed. How this crossing site may change and effectively be managed before construction, during construction, during operations, and after operations should all be described in detail.	As stated in Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*, "CPAI will be collecting flow and ice data at Ocean Point for several more years before the start of module transport (ice bridge first needed in 2025)." After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
520	38	Psarianos	Bridget	Trustees for Alaska	Fish	Specifically, a proposed construction, use, and demolition schedule should articulate risks and impacts to this habitat across seasons. Finally, BLM must require CPAI to monitor and publicly report on ice characteristics at the crossing point as noted in Section 3.10.3, prior to considering this option in a meaningful way in a revised EIS.	Construction, use, and maintenance (including season-end maintenance) are described in Section 4.7.3, *Option 3: Colville River Crossing*, of Appendix D.1 (*Alternatives Development*). Effects to fish from Option 3 are described in Section 3.10.2.8, *Module Delivery Option 3: Colville River Crossing*. Proposed BMP H-5 (added to Section 3.10.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices*) would require that data and summary reports derived from North Slope studies be made easily accessible to the public.	N
407	10	Rose	Garett	Natural Resources Defense Council	Fish	The analysis gives no indication of how potential impacts from the new elements exacerbate or otherwise combine with the potential impacts to fish analyzed in the DEIS. It fails to provide information necessary to engage in a meaningful analysis of potentially significant impacts. . . . The SDEIS notes that the freshwater reservoir, boat ramps, and Option 3 all involve activities in or near aquatic habitats important to a number of fish species. The first two components are situated within areas already affected by other Project components or other oil and gas infrastructure. Despite this overlap, the SDEIS treats these new elements as occurring in functional isolation from such infrastructure. For example, the freshwater reservoir will be constructed near BT3 and connected to the Project via gravel roads. But the SDEIS fails to explore whether the potential impacts from the construction and/or operation of the reservoir and other project components are additive to one another or how they otherwise intersect. Option 3 brings potentially significant direct and indirect impacts to new areas, but BLM fails to present any meaningful analyses of such impacts to fish. The SDEIS merely asserts that fish are not anticipated to be present at the Colville River crossing during the winter. But it then undermines this assertion by stating that CPAI will engage in further monitoring to ensure that this is actually the case. And it further undermines it in maps marking the location of the ice bridge as habitat for overwintering fish. Additionally, it provides no analysis about how constructing and using the ice bridge might change conditions in the Colville River in the area around the bridge or the concomitant potential impacts on fish and their habitat. . . . With regard to the reservoir and boat ramps, the SDEIS only states that [t]here are no changes to injury and mortality compared to the Draft EIS for the Project components described in the SDEIS. And with regard to Option 3, while the SDEIS notes the potential injury or mortality from screeding operations, it says such activity would not affect fish at the population level. As with the water resources analysis, BLM's failure to collect and analyze information about fish species and their habitat renders the SDEISs analysis useless for understanding the Projects potentially significant impacts to fish. BLM must remedy this by collecting the information necessary to perform a NEPA-compliant impacts analysis, correcting the errors in its analysis of such impacts, and comprehensively analyzing the potential impacts from the new components of the Proposal.	Effects from all new infrastructure, including the CFWR, are in Section 3.10.2.3.1, *Habitat Loss or Alteration*, and Section 3.10.2.3.2, *Disturbance or Displacement*. Effects from Option 3 (Colville River Crossing) on hydrology and physical conditions in the Colville River are in Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*. Effects from Option 3 on fish are in Section 3.10.2.8, *Module Delivery Option 3: Colville River Crossing*. Impacts to fish would be limited to low numbers of individuals because key life-history phases would be avoided and effects would be primarily limited to short durations and would avoid substantial overwintering areas and spawning areas. Low numbers of individuals would not affect populations within streams and rivers within the Project area, either in individual waterbodies or as a whole, given the highly migratory nature of most fish species in the analysis area and the specific habitats potentially affected. Population-level effects would be a reduction in the number of fish using any given stream or the Project area as a whole. Neither would occur as a result of the Project. After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy.	N
26710	3	Smith	Louise	USFWS	Fish	The Service suggests, to the extent practicable, the proposed ice road route on both sides of the Colville River be designed and routed to avoid river and stream crossings (e.g., the Itkillik River) that may impact access to overwintering fish habitats. In addition, we suggest removing ice-road crossings of fish-bearing streams and rivers prior to spring break-up to allow for seasonal movement of fish.	Avoidance of crossing overwintering habitat was added to Final EIS Section 3.10.2.1.3, *Additional Suggested Avoidance, Minimization, or Mitigation*. Removing ice road crossings prior to breakup is required by BMP C-3.	Y
26710	4	Smith	Louise	USFWS	Fish	The Service supports considering the installation of fish passage culverts within the ice bridge to allow fish passage; however, the culverts should be removed, and the ice bridge slotted before breakup.	The installation of culverts in the ice bridge has been further analyzed by CPAI and determined to be infeasible. Text was removed from the Final EIS.	Y

4.2.3.11 General Economics

Table B.3.13. Substantive Comments Received on General Economics

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
101	2	Campbell	Bruce	—	General Economics	This makes total sense in these harrowing recent times where economies are collapsing right and left due to Covid-19 leading to a huge reduction in demand for transportation fuels around the planet. This advised ADDITIONAL SUPPLEMENTAL DRAFT EIR should especially: 1. ADDRESS THE NEW ECONOMIC REALITY OF CHEAP OIL AND GAS PRICES, and how that may impact the viability of the Willow MDP; 2. ADDRESS THE PLUMMETING DEMAND FOR FUEL AROUND THE GLOBE (and not just during the quarantine phase for Covid-19).	The economic viability of the Project is a consideration for the Project proponent, not BLM under NEPA. Additionally, it would be speculative to assume oil prices will not change (higher or lower) in the coming years.	N
101	4	Campbell	Bruce	—	General Economics	RE-EVALUATE THE FINANCIAL VIABILITY OF VARIOUS PETROCHEMICAL EXTRACTION PROJECTS (both current and planned) THROUGHOUT THE NATIONAL PETROLEUM RESERVE-ALASKA (and beyond) in light of the massive drop in global demand for fuel, including how you see various drilling and pipeline projects linking up. It may be half a decade before we have a decent idea whether the global economy will ever recover to a point where there will be the demand for fuel that there has been in recent years around the globe. So, will the Willow MDP be an anchor to help open up a new set of leases on Alaska's North Slope as the EIS theorizes, or will it not be financially viable in this modern era of covid-19?	The economic viability of the Project is a consideration for the Project proponent, not BLM under NEPA. Additionally, it would be speculative to assume oil prices will not change (higher or lower) in the coming years.	N
20179	3	Freeman	Kyri	Center for Biological Diversity	General Economics	How much revenue would go to local communities, and for how long? Do local people support this plan?	Economics related to the Project are analyzed in Draft and Final EIS Section 3.15, *Economics*. Additionally, the NPR-A Impact Grant Fund is included in the Draft EIS analysis in Section 5.3.1, *State of Alaska National Petroleum Reserve in Alaska Impact Grant Program*. Support for and opposition to the Project vary across community members.	N
14609	1	Gordon	Marc	Center for Biological Diversity	General Economics	It fails to require a large enough profit for taxpayers for the use of this taxpayer owned resource, once all government costs and subsidies are accounted for.	Comment is out of scope for the Willow MDP EIS.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
159	16	Kenning	Erik	ASRC	General Economics	ASRC has communicated to BLM the economic significance of the Willow MDP. The local development of Willow MDP will provides contracting opportunities for Alaska Native Corporations (ANCs) and jobs for our shareholders. . . . Continued responsible resource development across the North Slope provides numerous financial benefits to the local people via the NSB services, Alaska Native Corporation dividends, or through indirect mechanisms like contracting and job opportunities, public services, and more. The vast majority of the NSB operating budget is generated from taxation of oil & gas infrastructure. The NSB then provides funding for essential services to the local communities, these services include: K-12 education, health clinics, sewage, refuse, fire department, wildlife protection, research, police services, search and rescue, emergency response services, and other community necessities. These modern day amenities should not be dismissed. The predicted uplift to North Slope production from Willow will also be critical for the Trans-Alaska Pipeline System (TAPS) operations. The continued operation of TAPS will help to generate additional long-term property taxation opportunities for the NSB so it can continue to provide services which are essential to NSB residents quality of life through social welfare support and continued capital improvements.	The commenter's general support for the Project is noted. Economics related to the Project are analyzed in Draft and Final EIS Section 3.15, *Economics*.	N
159	17	Kenning	Erik	ASRC	General Economics	Further, regional benefits from the NPR-A Impact Fund which can provide funds to the municipal governments of the NPR-A communities should be fully considered in BLM's analysis. The NPR-A Impact Fund has provided benefits to the local communities as a direct result of development within NPR-A. Examples of positive impacts of the NPR-A Impact Fund can be seen in Nuiqsut, through funding of natural gas piping and building conversions, funding of local government operations, renovation of City Hall, as well as funds dedicated to the Youth and Community Center. Funds available for North Slope communities will be greatly increased by the Willow development. As Nuiqsut is the closest community to the development and therefore the most impacted, Nuiqsut should continue to pursue and receive projects funded through the NPR-A Impact Fund to benefit all residents of the community.	The NPR-A Impact Grant Fund is included in the Draft EIS analysis in Section 5.3.1, *State of Alaska National Petroleum Reserve in Alaska Impact Grant Program.*	N
4565	2	Lazarus	Anne	Center for Biological Diversity	General Economics	The commercial fishing industry will be severely and negatively impacted.	The vast majority of Project activities would be onshore, and most offshore activity that occurs would be during winter; the Project is not anticipated to impact any potential commercial fishing activity.	N
5460	1	Ludlum	Carole	Center for Biological Diversity	General Economics	Who will benefit from this development? Yes, there will be some job creation, but it will be temporary. In exchange, an irreplaceable treasure will be destroyed.	Economics related to the Project are analyzed in Draft and Final EIS Section 3.15, *Economics*. Additionally, the NPR-A Impact Grant Fund is included in the Draft EIS analysis in Section 5.3.1, *State of Alaska National Petroleum Reserve in Alaska Impact Grant Program.*	N
24730	1	Talaro	Wendy	Center for Biological Diversity	General Economics	It fails to do an honest, thorough calculation of energy return on energy invested (EROEI).	ERoEI is the ratio of the amount of usable energy delivered from a particular energy source to the amount of energy expended to obtain that energy resource. ERoEI analysis is not a requirement of NEPA analysis, and therefore, it is not included in the EIS.	N

4.2.3.12 Land Ownership and Use

Table B.3.14. Substantive Comments Received on Land Ownership and Use

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	93	Dunn	Connor	ConocoPhillips Alaska	Land Ownership and Use	3.14.2 - Land Ownership and Use - Environmental Consequences The EIS states that the boat ramp at the Ublutuoch (Tiŋmiaqsiuġvik) River would cross the standard disturbance setback of 1 mile around recorded yellow-billed loon nest sites. The boat ramp at the Ublutuoch (Tiŋmiaqsiuġvik) River is located on Kuukpik-owned lands while the nest in question is located on BLM-managed lands. BLM does not administer or enforce loon nest buffers on private lands. This language should be revised to avoid implying that that boat ramp is subject to a loon buffer.	Language was revised throughout the Final EIS.	Y
717	94	Dunn	Connor	ConocoPhillips Alaska	Land Ownership and Use	3.14.2 - Land Ownership and Use - Environmental Consequences Please clarify that the boat ramps are located within and/or adjacent to waterbodies and setback areas for which waivers are already being requested for the Project. The ramp at the TiŋmiaqsiuġvikRiver is located on Kuukpik-owned land and a waiver is not required as BLM does not administer or enforce BMPs on private lands.	An additional waiver is not required. The boat ramp waivers would be included in the wider Project waivers for construction of infrastructure within the setbacks on the three rivers.	N
717	95	Dunn	Connor	ConocoPhillips Alaska	Land Ownership and Use	3.14.2 - Land Ownership and Use - Environmental Consequences Please revise "each boat ramp would add a 3.7-acre gravel footprint to the Project" to: "each boat ramp varies in size and layout and, combined, would add 5.9 acres of gravel footprint."	Modified text in Final EIS Section 3.14.2.3.1, *Action Alternatives*, to read as follows: "Each boat ramp varies in size and layout and would add a maximum 5.9 acres of gravel footprint for all three boat ramps."	Y
717	96	Dunn	Connor	ConocoPhillips Alaska	Land Ownership and Use	3.14.2.1 - Module Delivery Option 3: Colville River Crossing - Last Paragraph on page Add in Mine Site F to the list of existing operational Kuparuk mines. The NSB/Oil Search opened a new area at this location this winter.	Modified text in Final EIS Section 3.14.2.3.2, *Module Deliver Options*, to read as follows: "The gravel for these road improvements would be acquired from existing Kuparuk mines (e.g., Mine Site C, E, or F)."	Y
717	97	Dunn	Connor	ConocoPhillips Alaska	Land Ownership and Use	3.14.2 - Land Ownership - Environmental Consequences - First paragraph in section The first sentence says, "The three components will increase the overall acres to be developed and may potentially change rezoning requirements." The three components in DSEIS are not expected to change the NSB rezoning requirements.	Modified text in Final EIS Section 3.14.2.3, *Action Alternatives and Module Delivery Options*, to read as follows: "The differences among the action alternatives and module delivery options are not expected to change NSB rezoning requirements, but the number of acres rezoned may vary by alternative and option."	Y
717	98	Dunn	Connor	ConocoPhillips Alaska	Land Ownership and Use	3.14.3 - Module Delivery Option 3: Colville River Crossing - First Paragraph on page ConocoPhillips recommends that the proposed mitigation measure to develop a coordination plan with other stakeholders include residents of Nuiqsut not just CWAT.	Modified text in Final EIS Section 3.14.2.1.2, *Additional Suggested Avoidance, Minimization, or Mitigation*, for the additional mitigation measure to read as follows: "Develop a coordination plan with other stakeholders who are permitted to use the CWAT snow road (i.e., Nuiqsut residents) by BLM to prevent access conflicts during sealift module movement across the Colville River."	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	117	Dunn	Connor	ConocoPhillips Alaska	Land Ownership and Use	Appendix A - Land Ownership and Use Native allotments are hard to see in this figure. The Native Allotment at Ocean Point is not visible on figure.	Figure 3.14.1 has been updated and includes the Native allotment at Ocean Point.	Y
407	14	Rose	Garett	Natural Resources Defense Council	Land Ownership and Use	As with its analysis of potentially significant impacts to other resources, the SDEIS repeats the DEISs omissions and errors concerning land ownership and use, thereby obscuring the extent of such impacts. Option 3, in particular, would involve intensified potential impacts to the Colville River Special Areas, which was designated to protect, initially, arctic peregrine falcons and expanded to include all raptors. While the SDEIS notes the fact of ice road construction in the special area, there is no analysis of potentially significant impacts of the Project to the areas values. In this regard, the SDEIS mirrors the DEISs failure to analyze impacts to the Teshekpuk Lake Special Areas (designated to protect migratory birds): the DEIS notes construction within the Teshekpuk Lake Special Area (and Colville River) but provides no analysis of potentially significant impacts to the areas values. Relatedly, the SDEIS does not analyze potential impacts from the new elements to either recreation or wilderness values. BLM has recognized the outstanding wilderness characteristics of Teshekpuk Lake and the Colville River, and has otherwise noted the NPR-A's broader wilderness values. And, paradoxically, BLM noted recreational use of the analysis area before excluding it from analysis in the DEIS. The components evaluated in the SDEIS would intensify and expand the Projects impacts to both recreational and wilderness values. By failing to analyze these impacts, BLM has once again obscured the extent and magnitude of potentially significant impacts from the Project. Given that activity associated with the Project could impair the Special Areas ability to fulfill their purposes and degrade both wilderness and recreational values, it is imperative that BLM specifically analyze potential impacts in this regard.	The land ownership and use of the area is not being changed from wildlife habitat and subsistence use, nor are protections being removed, recreation permits being changed, etc. The area retains its values related to recreation and wilderness. Both the TLSA and the CRSA are areas available to oil and gas leasing. The special areas are administrative boundaries, and Project impacts would not necessarily be greater within them or outside them. Impacts to birds are discussed in Draft and Final EIS Section 3.11, *Birds*, and Appendix E.11, *Birds Technical Appendix*.	N

4.2.3.13 Marine Mammals

Table B.3.15. Substantive Comments Received on Marine Mammals

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	33	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	The Analysis of Marine Mammals Mischaracterizes Polar Bear Habitat and Overstates the Potential for Impacts SDEIS Section 3.13 Marine Mammals contains some new discussion relevant to polar bears that requires revision in the final EIS. The SDEIS mistakenly assesses potential impacts to polar bear foraging habitat. For example, BLM states on page 46 of the SDEIS that 26.2 acres of foraging habitat for polar bears would be lost due to the CFWR and other new features described in the SDEIS, and that polar bear habitat will be altered from vegetation compaction due to ice infrastructure and habitat alteration from water withdrawal in connection with the CFWR. Polar bears primarily forage on sea ice, with their primary diet consisting of ice seals The CFWR is 22 miles at the closest point to the Beaufort Sea coast, the proposed Fish Creek boat ramp location is 14 miles from the coast, Judy Creek boat ramp location is 20 miles from the coast, and the proposed Tiŋmiaqsiuġvik Bridge boat ramp location is 5.5 miles from the coast. It is implausible to expect polar bears to hunt seals this far inland or depend on uncompacted vegetation or freshwater lakes.	Mentions of vegetation compaction impacts to foraging were removed from Section 3.13.2.3.1, *Habitat Loss or Alteration*.	Y
717	34	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	On page 46 of the SDEIS, BLM states, "using the disturbance buffer of one mile commonly used by USFWS for identified polar bear dens, 9,469.8 acres would potentially be disturbed from the CFWR and the boat ramps." This statement incorrectly applies a 1-mile buffer without identifying a known polar bear den or considering what areas consist of proper polar bear denning habitat. Potential denning habitat requires certain topographical features, and the mapped denning habitat within one mile of both the CFWR and the boat ramps reveals there are only 260.4 acres. Moreover, since the boat ramps would be used in the summer when polar bears are not denning, there would be no disturbance of any denning bears because denning occurs in the autumn and early winter.	As described in Section 3.13.2.3.2, *Disturbance or Displacement*, disturbance calculations are based on the USFWS polar bear den disturbance zone, which is 1 mile. This was calculated for all Project activities in winter, not only where a den has been previously located, because there is no other available information on a disturbance threshold for polar bears not in dens.	N
717	35	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	On page 47, in the context of discussing Option 3 for Module Delivery, the SDEIS states: Ice infrastructure would cover 666.66 acres total (333.3 acres each in 2025 and 2027) which could alter polar bear foraging habitat during winter construction. Ice infrastructure would cross mapped potential terrestrial denning habitat for polar bears. Specifically, the crossing of the Colville River at Ocean Point is located in polar bear potential denning habitat. BLM must provide some additional context and analysis here. When the U.S. Fish and Wildlife Service (USFWS) designated polar bear critical denning habitat, it conservatively designated an extremely large area in which almost all polar bear denning occurs, using wide swaths in order to capture any areas that may become important denning habitat as a result of future climatic and environmental changes. That area contains all necessary topographic, macrohabitat, and microhabitat features [for polar bear denning] that are essential for the conservation of polar bears in the United StatesThe Ocean Point ice crossing is nearly 23 miles from the coast and nearly 17 miles away from any designated critical habitat. See SDEIS, Figure 3.13.2. Moreover, there have been no identified polar bear dens within many miles of the Ocean Point crossing. Accordingly, although the Ocean Point crossing is theoretically within an area where polar bears could den, the best available scientific information demonstrates that it is outside of the area where almost all polar bears actually den and the likelihood of any dens or denning females being disturbed in that area is negligible.	Text was added to Section 3.13.2.8, *Module Delivery Option 3: Colville River Crossing*, to clarify the distance to the coast from Option 3, and the density of use by polar bears at the coast and inland. The nearest identified polar bear dens to Option 3 are 2.8 miles to gravel infrastructure and 10.3 miles from ice infrastructure.	Y

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717	84	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Module Delivery Option 3: Colville River Crossing Contrary to the statement in the third paragraph, potential terrestrial denning habitat is mapped for much of the Kuparuk and Oliktok area (Durner et al. 2001; publicly available from: http://pubs.aina.ucalgary.ca/arctic/Arctic54-2-115.pdf). The GIS data is available for public download from this webpage: https://www.usgs.gov/centers/asc/science/polar-bear-maternal-denning?qt-science_center_objects=4#qt-science_center_objects To be consistent with mapping available in the NPR-A, an area can be quantified by assuming an average width of potential terrestrial denning habitat of 6.4 meters (Durner et al. 2001).	Data from this website were used for the SDEIS and Final EIS. Text was clarified in Section 3.13.2.8, *Module Delivery Option 3: Colville River Crossing*, to indicate that part of the Option 3 ice road route east of the Colville River is not mapped for potential terrestrial denning habitat. The Oliktok and Kuparuk areas are mapped.	Y
717	85	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Module Delivery Option 3: Colville River Crossing Please delete the sentence “Multi-season ice pads could take longer to recover depending on the degree of soil saturation as detailed in the Draft EIS Section 3.9, Wetlands and Vegetation.” No multi-season ice pads are proposed as part of Option 3.	Edit made in Section 3.13.2.8, *Module Delivery Option 3: Colville River Crossing*, as suggested.	Y
717	86	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Module Delivery Option 3: Colville River Crossing The estimated distance to 120 dB rms underwater threshold for marine mammals during barge activity is incorrect. Note that the values reported for screeding are 1/10th that of barges and there is no apparent reason for that difference. The footnotes describe a transmission loss of 15 log(R), which is commonly used when no empirical data is available. However, Greene et al. (2008) reported a transmission loss of 26.4 log (R) at Oliktok Point. NMFS, in their Biological Opinion for the Nanushuk Project, estimated that noise from vessel traffic would decline to 120 dB rms at 225 meters (738 ft). Note also, that if a range of source values are estimated, then a range of distances should also be provided	NMFS has consistently stated in several consultations that transmission loss measured at Northstar cannot be considered empirical data for Oliktok Point, so the practical spreading loss of 15 log(R) was used. In recent communication with NMFS representatives, they asked that the backhoe measurement from Greene Jr., Blackwell et al. (2008) of 125 dB at 100 m be used as the source level for screeding instead of the tug/barge scenario for the BA. But for the EIS, we use the worst-case distance of 1.5 miles for vessel disturbance, rather than setting a different analysis area for each activity type.	N
717	87	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Module Delivery Option 3: Colville River Crossing The sound source levels reported for screening should be revisited. The reference provided in the DEIS, Marine Mammal Technical Appendix, was Blackwell and Greene (2003); however, this study did not include screening and was conducted in Cook Inlet. A more appropriate reference, and one that has been used recently by NMFS on projects near Oliktok Point, is Greene et al. (2008). Greene, C.R., S.B. Blackwell, M.W. McLennan, and KGF. 2008. Sounds and vibrations in the frozen Beaufort Sea during gravel island construction. The Journal of the Acoustical Society of America 123:687-695.	NMFS has consistently stated in several consultations that transmission loss measured at Northstar cannot be considered empirical data for Oliktok Point, so the practical spreading loss of 15 log(R) was used. In recent communication with NMFS representatives, they asked that the backhoe measurement from Greene Jr., Blackwell et al. (2008) of 125 dB at 100 m be used as the source level for screeding instead of the tug/barge scenario for the BA. But for the EIS, we use the worst-case distance of 1.5 miles for vessel disturbance, rather than setting a different analysis area for each activity type.	N
717	88	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Module Delivery Option 3: Colville River Crossing - Table 3.13.2 SDEIS, Table 3.13.2: The last row of this table suggests that the barge and support vessel traffic associated with Option 3 may, for all marine mammals, cause temporary disturbance or displacement from underwater noise and human activity or injury or mortality from vessel strikes. However, the draft EIS states, correctly, that impacts to marine mammals as a result of injury or mortality from vessel collision is not expected. See DEIS 3.13.2.3.3. Additionally, the draft EIS at Appendix E.13, Table E.13.6, suggests potential disturbance or displacement from noise and human activity related to barge traffic associated with the Module Delivery Options, but correctly lists no injury or mortality from vessel strikes. The draft EIS also states that seals may be temporarily disturbed by construction activities related to Module Delivery Option 1 and that vessel traffic would otherwise have a limited effect on marine mammals because marine mammals typically avoid vessels in known high-vessel areas, sound levels of vessels are well below the injury thresholds for marine mammals, and, for bowhead and beluga whales, their migration corridor is generally in depths greater than 60 feet and all vessel traffic would occur in shallower water. See id. 3.13.2.6.1. These analyses should equally apply to Option 3, for which barge and support vessel traffic potential effects would be within the scope of the effects considered in the draft EIS. The Final EIS should provide a clear and consistent explanation about the potential effects (or lack thereof) of barge and support vessel traffic on marine mammals across Options 1, 2, and 3.	The Project as proposed in the Draft EIS had significantly less vessel traffic than what is currently proposed. Full analysis of the vessel traffic is included in the Final EIS for all action alternatives and module delivery options.	N
717	89	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Effects to Marine Mammals from Module Delivery Option 3 (Colville River Crossing) BLM suggests impact to polar bears from “habitat alteration from water withdrawal” for ice road infrastructure. See SDEIS, Table 3.13.2. Polar bears are not dependent upon frozen (or thawed) freshwater lakes (See generally 75 Fed. Reg. 76,086; 73 Fed. Reg. 28,212). This statement should therefore be eliminated or, alternatively, supported with a specific explanation based on established available science for how water withdrawal will have an effect on polar bear habitat.	Table 3.13.2 in the SDEIS contained an error, as noted in the comment. This was edited for the Final EIS in Table 3.13.4.	Y
717	90	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Effects to Marine Mammals from Module Delivery Option 3 (Colville River Crossing) BLM suggests that polar bear injury or mortality may occur from vehicle strikes. See SDEIS, Table 3.13.2. ConocoPhillips is unaware of polar bear injury or mortality due to vehicle interactions in the oil fields. The SDEIS must be based on the best available scientific information, not speculation. This suggestion should therefore be removed from the SDEIS.	As stated in Final EIS Section 3.13.2.3.3, *Injury or Mortality*, “data prior to 2001 indicate that no such incidental collisions of polar bears and vehicles have been documented on the North Slope.” Vehicle strike was removed from Table 3.13.4 in the Final EIS.	Y
717	91	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Effects to Marine Mammals from Module Delivery Option 3 (Colville River Crossing) BLM incorrectly applies the USFWS 1 mile buffer in this table. The 1-mile buffer is not a disturbance zone for all polar bears, but rather it’s applied to denning polar bears. So, the calculation of over 53,000 acres of disturbance due to ice roads and the existing gravel roads is grossly inflated and misinterpreted calculation. Rather, only the identified potential terrestrial denning habitat acreage within 1 mile of the associated ice and gravel infrastructure should be used, though arguably den identification surveys will be conducted, plus additional mitigations such as training that will greatly reduce the impact on any denning bear should a bear choose to den within one mile of the Option 3 route, which is highly unlikely given historical den locations and overall polar bear denning density for this area. Plus, the potential impact is only seasonal. There is only 260.4 acres of potential denning habitat within 1 mile of the CRWR and all of the proposed boat ramp. The Kuparuk gravel route and ice road route to Willow only contains 527 acres of potential denning habitat. The 1 mile buffer absolutely cannot be applied to assuming disturbance to non-denning polar bears.	As described in Section 3.13.2.3.2, *Disturbance or Displacement*, disturbance calculations are based on the USFWS polar bear den disturbance zone, which is 1 mile. This was calculated for all Project activities in winter, not only where a den has been previously located. There are no available data on a disturbance distance or threshold for anything other than dens for polar bears. Therefore, in the absence of that information, a conservative distance of 1 mile was used because it is accepted by USFWS and industry for the most-sensitive period.	N

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717	92	Dunn	Connor	ConocoPhillips Alaska	Marine Mammals	3.13.2.2 - Marine Mammals - Effects to Marine Mammals from Module Delivery Option 3 (Colville River Crossing) BLM misapplies the USFWS 1-mile buffer in Table 3.13.3 on page 49. The 1-mile buffer is not a disturbance zone for all polar bears, but rather a management measure that is applied specifically to known, denning polar bears. The calculation of over 53,000 acres of disturbance due to a 1-mile buffer around ice roads and the existing gravel roads is a misapplication of the one-mile buffer mitigation. Only the identified potential terrestrial denning habitat acreage within one mile of the associated ice and gravel infrastructure should be considered, although even that would result in a highly conservative figure. Den identification surveys and additional mitigations such as training to recognize denning habitat and signs of active denning will greatly reduce potential impact on denning polar bears within one mile of the proposed Option 3 route. However, denning is unlikely to occur given history of minimal reported den locations and overall low polar bear denning density for this area. Furthermore, the potential impact is seasonal, as polar bears den only during winter. As stated previously, based on the specific topographical features preferred for denning, there is approximately 260.4 acres of potential denning habitat within one mile of the CFWR and the proposed boat ramps, and the Kuparuk gravel route and ice road route contain approximately 527 acres of potential denning habitat. ConocoPhillips asserts there is no basis for applying a one-mile buffer to assume disturbance to non-denning polar bears.	As described in Section 3.13.2.3.2, *Disturbance or Displacement*, disturbance calculations are based on the USFWS polar bear den disturbance zone, which is 1 mile. This was calculated for all Project activities in winter, not only where a den has been previously located. There are no available data on a disturbance distance or threshold for anything other than dens for polar bears. Therefore, in the absence of that information, a conservative distance of 1 mile was used because it is accepted by USFWS and industry for the most-sensitive period.	N
531	4	Hopson	Lesley	Alaska Eskimo Whaling Commission	Marine Mammals	The AEWC is also concerned that BLM has done little analysis of the potential for impacts to bowhead whales. The DEIS contains very little analysis related to Options 1 and 2, and whether there would be any impacts to bowhead whales during the migration. In fact, when BLM looks at offshore impacts from construction, it uses a standard of 1.5 miles from the construction, which based on the USFWS polar bear den disturbance zone. Further, BLM presents conclusions of limited harm from Options 1 or 2 to bowhead whales based solely on the distance from the migration corridor. However, these conclusions in the DEIS demonstrate a lack of understanding of bowhead whales, and a lack of communication with the AEWC, NWCA, Whaling Captains, and NMFS. DEIS Section 3.13.2.6.1. For Option 2, BLM says the results would be the same. DEIS at Section 3.13.2.6.2. The DSEIS is similarly lacking information on the potential impacts to bowhead whales, and also the sociocultural impacts to whaling. The AEWC asks that the Final EIS reflect the lessons learned from our traditional knowledge regarding bowhead whale behavior and the potential impacts from offshore activities. Our communities have been sharing this information to BOEM and NMFS for many years, and this information should be available to BLM as it is reflected in many other existing planning documents.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." Because vessel traffic was not a new action, it was not described in the SDEIS. Impacts to bowhead whales from vessel traffic are described in Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*, Section 3.13.2.3.3, *Injury or Mortality*, and Section 3.13.2.6.2, *Disturbance or Displacement*. Vessel traffic is also assessed for all marine mammals in Section 3.19.10, *Cumulative Impacts to Biological Resources*. Sociocultural impacts to whaling were added to Section 3.16.2.3.2.5, *Marine Mammals*. Text regarding how traditional knowledge was used in the EIS was added to Final EIS Section 3.1, *Introduction and Analysis Methods*.	Y
520	60	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The SDEIS Underestimates Impacts to Polar Bears and Other Marine Mammals BLM's analysis of impacts to Polar Bears is inadequate Like the draft EIS, the SDEIS understates the impacts of the proposed project to polar bears. Both EISs recognize that polar bears are listed as threatened under the Endangered Species Act but fail to note the perilous conditions facing the Southern Beaufort Sea population specifically. The SDEIS fails to acknowledge the risks to bears from the extensive habitat and noise disturbances associated with the Option 3 module transport effort, especially the inescapable risk of den disturbance and potential mortality should that risk materialize, but also impacts to non-denning bears. The SDEIS also fails to discuss impacts to the barrier island critical habitat near Oliktok Point, and underestimates the impacts to polar bears from barge and vessel traffic and from construction and use of the reservoir and boat ramps. Critically, it entirely fails to take a hard look at the cumulative impacts to polar bears and habitat posed by the Willow project together with existing and reasonably foreseeable actions that taken together would industrialize the majority of Alaska's Arctic coast.	Analysis of vessel traffic and noise are described in the Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*, and Section 3.13.2.3.3, *Injury or Mortality*. As described in Section 3.13.2.8, *Module Delivery Option 3: Colville River Crossing*, ice infrastructure for Option 3 would be 17.2 miles inland from the coast at its closest point. Because the majority (95%) of bear dens observed in this region have occurred within 5 miles of the coast (Durner, Douglas et al. 2009), the temporary habitat loss from Project ice infrastructure would be outside the area most used by polar bears. No habitat loss or alteration would occur in barrier island critical habitat for Option 3. Vessel presence and noise could temporarily disturb individual polar bears resting or foraging on marine mammal carcasses along the coast or on barrier islands. Although it has not been thoroughly documented, persistent disturbance from vessels operating within 1 mile (1.6 km) of barrier islands could prevent use of localized areas of barrier island critical habitat (USFWS 2011a). Screeding at Oliktok Dock (expected to take 1 week) would be 1.2 miles from barrier island critical habitat, the closest Project activity to this habitat. Potential impacts to polar bears would be limited to the short-term disturbance of small numbers of individuals. This text was added to Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*. Text was added to Section 3.19.10, *Cumulative Impacts to Biological Resources*, to assess cumulative effects to polar bears and other marine mammals.	Y
520	61	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	BLM's Affected Environment analysis lacks clarity. The draft and supplemental draft EISs fail to note that the Southern Beaufort Sea (SBS) population of polar bears is at an estimated 900 animals after falling 50% since the late 1990s. It is among the most imperiled, if not the most imperiled, of all polar bear populations worldwide. The bears are experiencing energetic stress, poor cub survival, and poor body condition. SBS bears are increasingly denning on land in Alaska as sea ice diminishes, with terrestrial denning animals now outnumbering those denning on sea ice each season. The U.S. Fish and Wildlife Service (FWS) has calculated a Potential Biological Removal from this population of 14 animals annually; the annual subsistence take alone is far in excess of that. A revised draft EIS should add this important backdrop to the Affected Environment section as it punctuates the need for a very careful assessment of what is proposed in critical polar bear habitat. As FWS and U.S. Geological Survey researchers recently noted, [g]iven that the subsistence take already exceeds PBR, any additional takes related to seismic surveys would not be able to be authorized without impacting the ability of SBS bears to achieve or maintain its optimum sustainable population. The SDEIS, presumably referring to polar bears, states that there are 2,807.8 acres of mapped potential terrestrial denning habitat in the entire analysis area for marine mammals. The draft EIS identified 3,126.6 acres of polar bear denning habitat in the analysis area. So, despite the addition of Option 3, which adds substantially to the total terrestrial denning habitat in the analysis area, the SDEIS finds that there are over 300 fewer acres of denning habitat in that area. BLM needs to clarify the amount of terrestrial denning habitat in the analysis area.	Population details were added to Appendix E.13 (*Marine Mammals Technical Appendix*), Section 1.1.4.2, *Polar Bear*. As stated in Section 3.13.1.1.1, *Polar Bears*, potential terrestrial denning habitat is defined as a topographic feature at least 4.3 feet (1.3 m) in height and having at least an 8-degree slope, which provides conditions for drifting snow. Potential terrestrial denning habitat has been mapped in most of the analysis area, as shown in Figure 3.13.1. Some of the area in the southeast extent of Figure 3.13.1 (east of the Colville River) has not been mapped for potential terrestrial denning habitat. This clarification was added to the Final EIS.	Y

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520	62	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The Module Transport via Colville River Crossing alternative does not accurately reflect risks to polar bears. The SDEIS does not explore the likely impacts to denning or non-denning polar bears from creating this very large disturbance area, either standing alone or in combination with other known and foreseeable disturbance areas. The SDEIS indicates that construction and use of the ice and gravel roads needed for module transport will create polar bear disturbance zones of 53,251.2 acres and 55,613.3 acres, respectively. That totals 83.2 and 86.9 square miles, respectively, or a total disturbance zone of over 170 square miles. Winter ice road travel would entail up to 84 trips per hour essentially continuous travel over 80.2 miles of ice road for two winters. Winter season is from approximately December 15 April 25 (132 days) to account for time to construct ice roads and the usable ice road season (from approximately January 25 - April 25). That indicates that the ice road would be constructed from about December 15 - January 25. Construction is planned to occur from the two end points and converge at the Colville River, so noise disturbance will always impact two areas simultaneously and those impacts must be considered. That timeframe will allow only a tight window for den detection efforts prior to construction. The Integrated Activity Plan requires operators to survey for potential polar bears dens before initiating winter activities near coastal areas. The IAP does not specify any particular survey method, but the industry practice and best known available den detection tool is a Forward Looking Infrared (FLIR) Survey. Recent studies have illuminated that FLIR technology is only able to detect less than 50% of actual dens and is prone to false positives that detect some other heat source. Weather conditions significantly impact the efficacy of FLIR surveys, and the optimal conditions for conducting them rarely exist. One way to increase the effectiveness of FLIR surveys is to perform multiple surveys over a longer time period, but that will not be possible with a December 15 start date for construction. Surveys are confined to December and January because they need to be done after bears den but before they give birth to cubs. Known past polar bear dens exist within 2.8 and 10.3 miles of the gravel and ice roads, respectively, and although polar bears don't necessarily return to the same denning locations, impacts to denning bears are a foreseeable consequence of the project. It is therefore likely that a den in the gravel and ice road disturbance areas will not be detected prior to road construction and use. The project thus runs the risk of disturbing denning bears, or immediate post-denning mother bears and cubs, every day from December 15 - April 25 for two winters. The SDEIS contends that impacts to denning bears will be mitigated via later FWS Letters of Authorization issued pursuant to Incidental Take Regulations (ITR). The ITR currently in effect in the project area and Letters of Authorization (LOAs) issued pursuant thereto do not authorize any lethal take of polar bears. They do not and cannot eliminate the risk, however, that polar bear dens in the project area will go undetected prior to road construction and use. The ITR doesn't require FLIR detection efforts at all, and nor can any LOA. Even if ConocoPhillips were to voluntarily agree to conduct FLIR surveys, their limited effectiveness cannot ensure that dens will be detected, and the proposed action presents a risk of mortality to the precarious SBS population. The Willow draft and supplemental draft EISs don't mention the thorny problem of den detection, or the potential population level impact of den disturbance on the Southern Beaufort Sea polar bear population. Further, as discussed in our draft EIS comments, the project will also impact non denning bears and that is even more true now, with the large road construction project through denning and foraging habitat. A revised EIS must disclose this risk of lethal and non-lethal take of denning polar bears and the impact of that take on the Southern Beaufort Sea population.	As described in Section 3.13.2.8, *Module Delivery Option 3: Colville River Crossing*, ice infrastructure for Option 3 would be 17.2 miles inland from the coast at its closest point. Because the majority (95%) of bear dens observed in this region have occurred within 5 miles of the coast (Durner, Douglas et al. 2009), the temporary disturbance from Project ice infrastructure would be outside the area most used by polar bears. Methods for detecting polar bear dens would be coordinated with USFWS through the Project's ESA and MMPA consultations. CPAI has conducted two aerial surveys using FLIR technology in December and January for the last two winter seasons because of the changes observed in snow depth and timing of bears entering dens and will continue to do so for the Project. There are several assumptions in both Wilson and Durner (2019) and Smith et al. (2020) that are incorrect regarding the efficacy of FLIR surveys: 1) FLIR surveys are effective outside of the weather windows reported in both, as evidenced by several recent industry studies and in results of annual FLIR surveys; 2) dens with ceiling thicknesses greater than 100 cm have been detected in several industry studies; 3) the depth of 100 cm was based on handheld FLIR technology, which does not have the same effective distance as aerial technology; and 4) annual surveys are not just one flight; there is detailed protocol with video review and hot-spot quality assurance/quality control. CPAI also trains personnel to conduct visual surveys for signs of dens in areas, so aerial FLIR survey is not the only method used. Further, on the rare occasion when dens were not detected and a bear emerges near industry, companies work with USFWS to establish stringent measures to not cause abandonment.	N
520	63	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	BLM must consider the impacts to polar bear use of the barrier islands. The offshore analysis area map indicates that the project will impact the barrier islands no disturbance zone for polar bears. Polar bear critical habitat includes a one-mile no disturbance buffer around the barrier islands because of their particular importance for denning, resting, and movement along the coast. Bears may not use the barrier islands if they are disturbed by human activity. The SDEIS does not discuss this fact, and BLM must address the impacts of authorizing an activity within the critical habitat designation for polar bears that could risk displacement of bears from the barrier islands near Oliktok Point. These impacts must be acknowledged and mitigated.	No habitat loss or alteration would occur in barrier island critical habitat for Option 3 (Colville River Crossing). Vessel presence and noise could temporarily disturb individual polar bears resting or foraging on marine mammal carcasses along the coast or on barrier islands. Although it has not been thoroughly documented, persistent disturbance from vessels operating within 1 mile (1.6 km) of barrier islands could prevent use of localized areas of barrier island critical habitat (USFWS 2011b). Screeding at Oliktok Dock (expected to take 1 week) would be 1.2 miles from barrier island critical habitat, the closest Project activity to this habitat. Potential impacts to polar bears would be limited to the short-term disturbance of small numbers of individuals. This text was added to Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*.	Y
520	64	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	BLM fails to address barging impacts. The SDEIS ignores the disturbance zone created by the barge operation because the barge route is only estimated but not specifically known. The approximate nature of the barge route, however, is insufficient reason to wholly discount its effects. The disturbance zone for barging is significant, amounting to over 7000 feet from the source, and there are 600 and 1200 additional miles of barging associated with Option 3 compared to Options 1 and 2, respectively. The impacts from barging the additional miles from Point Lonely or Atigaru Point to Oliktok Point are a necessary piece missing from the analysis. The SDEIS does not evaluate the impacts to polar bears and other marine mammals. Barge operations route should not be difficult to estimate, especially since vessels already travel to Oliktok Point, and must be included and analyzed in a new draft EIS.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." Because vessel traffic was not a new action, it was not described in the SDEIS. Analysis of vessel traffic is described in Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*, and Section 3.13.2.3.3, *Injury or Mortality*.	Y

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520	65	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The SDEIS does not include accurate impacts from reservoir and boat ramps. The SDEIS underestimates the impacts of the proposed water reservoir and boat ramps on both denning and non-denning polar bears. Using the one-mile disturbance buffer often employed by FWS to protect polar bear dens, BLM calculates a disturbance area of 9469.8 acres, or almost 15 square miles, for denning bears. There is a known past polar bear den within 6.1 miles of the reservoir area. While polar bears do not necessarily return to the same den locations, past use indicates it is suitable habitat, demonstrating that the reservoir and ramp construction project may impact denning bears. The SDEIS contends that [b]ecause construction of these facilities would have a short duration and occur over a small area of denning habitat relative to the entire North Slope, polar bears are expected to find alternate similar habitat. But as noted in our draft EIS comments, there are a great number of stressors in polar bear critical denning habitat in addition to the Willow project. The 15 square miles of disturbance from just this one project component are in addition to 170 square miles of disturbance from the road construction and use component, plus the undisclosed square miles of habitat already disturbed or proposed for disturbance. BLM must assess the impacts of the Willow project on denning polar bears together with other existing and reasonably foreseeable impacts on denning bears.	The reservoir and boat ramps would be located more than 12 miles inland from the coast at their closest point. Because the majority (95%) of polar bear dens observed in this region have occurred within 5 miles of the coast (Durner, Douglas et al. 2009), the temporary disturbance from these Project features would be outside the area most used by polar bears. Further, these features would occur in only a small area of potential denning habitat relative to the vast amount of denning habitat in the NPR-A. The effects of the Project are considered in combination with past and present actions and RFFAs in Section 3.19.10, *Cumulative Impacts to Biological Resources*. Text was added to that section regarding polar bears and other marine mammals.	Y
520	66	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	Additionally, the impacts from the reservoir and boat ramp are not limited to the construction phase. The timing and extent of the use of the boat ramps and reservoir to access area rivers is not disclosed, and this activity could also impact polar bears. Non-denning bears, especially females and females with cubs, have demonstrated sensitivity and strong avoidance reactions to the noise produced by snow machines at a distance of over two miles. BLM should estimate the reasonably foreseeable induced public uses of the reservoir and boat ramps, and use a two mile radius around those public uses involving skiffs or other motorized access to delineate the disturbance zone for non-denning bears. While disturbance to non-denning bears is much less likely to be lethal compared to denning bears, it is very likely to increase energetic stress and displace bears from preferred habitat and travel routes. For a population suffering from nutritional stress, poor body condition and reduced cub survival, more energetic stress and disturbance is not a prescription for recovery and could create or exacerbate population-level impacts. Indeed, minimizing the impacts of any human development on polar bears is a clear recovery strategy identified in the FWSs Polar Bear Conservation Management Plan.	The EIS states that habitat loss and alteration, as well as disturbance from gravel infrastructure, would be permanent (Section 3.13.2.3.1, *Habitat Loss or Alteration*, and Section 3.13.2.3.2, *Disturbance or Displacement*). The boat ramps would be used during the open-water season by the community of Nuiqsut, which has a population of 347 people. Because not all residents own a boat, use of the ramps would be by fewer people. While individual bears could use interior, terrestrial habitat during the summer, the majority of SBS bears typically use the sea ice when accessible and coastal areas later in the open-water season. This habitat is north of the boat ramps by 5 miles. The probability of boat traffic occurring when individual bears are in the vicinity that could be affected by visual or auditory stimulus is low. The reservoir would not be used by the public. Disturbance calculations are based on the USFWS polar bear den disturbance zone, which is 1 mile, as stated in Section 3.13.2.3.2, *Disturbance or Displacement*.	N
520	67	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The FWSs comments on the Willow project were notably absent at the draft EIS stage. Their importance is emphasized in the Polar Bear Conservation Management Plan: Review and comment on proposed projects and activities in polar bear habitat within the United States (e.g., oil and gas exploration, . . .) to mitigate potential adverse outcomes. BLM should not move forward with an EIS for the Willow project before receiving and responding to the FWS comments, including those related to polar bear impacts.	BLM did not receive comments from USFWS during the public comment periods on the Draft EIS and the SDEIS. However, all cooperating agencies, including USFWS, had the same opportunity to submit comments on the Draft EIS. As a cooperating agency, USFWS has had frequent conversations with BLM about effects of the Project on resources within USFWS jurisdiction. Comments specific to effects of the Project on polar bears are addressed in the Section 7 consultation between BLM and USFWS.	N
520	68	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	Cumulative Impacts from other environmental stressors must be accurately assessed and mitigated in a revised draft EIS. The SDEIS addresses cumulative impacts to polar bears as follows: As sea ice cover diminishes with warming climate, polar bears may spend more time on land and fast more, which would reduce access to prey and negatively affect energy levels, respectively (Molnr, Derocher et al. 2010). It may also mean a higher likelihood of bears encountering human infrastructure and activities on land. The impacts of onshore development would likely affect polar bears through disturbance in coastal barrier-island and denning habitats, especially during construction, but those would be mitigated through the Incidental Take Regulations and Letters of Authorization issued by USFWS (which stipulate mitigation and minimization measures). Polar bears are already spending more time on land, and the energetic cost of doing so is already a concern, so these are known, present impacts, not future potential ones. Increases in both industrial development and polar bear terrestrial uses will necessarily mean a higher likelihood of encounters and disturbance. These impacts from Willow and other developments on polar bears in the impacted terrestrial, nearshore and offshore areas should be the focus of this section of the SDEIS. Instead, the SDEIS leaves the analysis and mitigation options to the ITR/LOA process under the Marine Mammal Protection Act. This falls short of NEPAs requirement to take a hard look at the impacts of the project.	Text was added to Section 3.19.10, *Cumulative Impacts to Biological Resources*, to assess cumulative effects to polar bears and other marine mammals.	Y
520	69	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The ITR/LOA process itself does not evaluate cumulative impacts, so the analysis foregone now will not be salvaged at some later time. The SDEIS cumulative impacts section assesses only future impacts, noting that past and present impacts are discussed in section 3.1. That section, however, simply mentions the Alpine and GMT developments adjacent to the Willow proposed development. It ignores other developments, such as the Prudhoe Bay complex, from consideration in terms of their cumulative impact on polar bears and critical habitat. Thus, the scope of past and present projects listed is limited to those near the project area, instead of relevant past and present projects that, taken together, cumulatively impact polar bears and their habitat. Worse, there is no assessment or quantification of even the Alpine and GMT developments impacts on polar bears or habitat; instead, there is just a simple mention of their existence.	Cumulative effects are those that occur in combination with past and present actions and RFFAs. The effects of the Willow MDP Project on marine mammals would not extend to Prudhoe Bay and thus would not occur in combination with effects from Prudhoe Bay. Text was added to Section 3.19.10, *Cumulative Impacts to Biological Resources*, regarding polar bears and other marine mammals. As stated in that section, ITRs and LOAs issued by USFWS stipulate mitigation and minimization measures, which would help mitigate cumulative effects.	Y

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520	70	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	The cumulative impacts section discussing reasonably foreseeable future actions (RFFA) continues in the same vein by listing projects but offering no analysis of their cumulative impact on polar bears or their habitat. BLM claims that it considered public and agency input (Appendix B) and used the technical analyses conducted for this SEIS to identify and focus on cumulative effects that are truly meaningful in terms of local, regional, or national significance but in fact it completely overlooks the regional significance of all of the RFFAs in polar bear critical habitat. For example, BLM lists RFFAs including oil and gas development across the entirety of the Arctic National Wildlife Refuge coastal plain, the pending revision of the NPRA IAP, the Nanushuk and Liberty projects, and the ASTAR project, as well as seismic exploration throughout the region. The proposed Arctic Refuge Coastal Plain oil and gas program alone would significantly impact the most important terrestrial denning habitat for Southern Beaufort Sea polar bears. BLM's preferred alternative allows leasing and development, including seismic exploration, across the entire 1.56 million-acre program area despite the presence of high-density denning areas and the fact that 77% of the program area consists of designated critical polar bear habitat. BLM's proposed IAP revision could the area open to oil and gas leasing and development to 81% of the NPRA, and allow new infrastructure to be developed on millions of acres of polar bear critical habitat. The Nanushuk project is comparable in scale to Willow and just across the Colville River from Nuiqsut. It will entail 190-280 miles of seasonal ice roads in the area and over 20 miles of new permanent gravel roads, in addition to a new Central Processing Facility, over 20 miles of infield pipelines, and a 22-mile export pipeline to the Kuparuk CPF, among other infrastructure that will impact polar bears. The Liberty project would connect many of the same types of infrastructure six miles offshore, to an artificial island, where drilling, production, and production support facilities including another seawater treatment plant would be constructed. And while the polar bear discussion in the Willow SDEIS does not mention the ASTAR project, BLM elsewhere notes the proposed 30 to 190 miles of new roads (and 30 to 190 miles of new pipelines), including a community road connecting Nuiqsut and Utqiaġvik that would be routed north of Teshekpuk Lake. All of these actions impact polar bears and critical habitat, and collectively represent the industrialization of a substantial percentage of designated polar bear denning habitat, as well as other critical habitat. Indeed, they collectively represent the transformation of Alaska's Arctic coast from Utqiaġvik to the Canadian border to an industrial development zone. BLM must quantify and assess the impact of these RFFAs on polar bears and their habitat, together with the hundreds of square miles of polar bear critical habitat impacted by the Willow proposal, in its cumulative effects analysis for the Willow project.	Final EIS Section 3.19.3, *Reasonably Foreseeable Future Actions*, includes all the projects described in the comment as RFFAs. The impacts of the Project in combination with those RFFAs are described in Final EIS Section 3.19.10.5, *Marine Mammals*.	N
520	71	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	Finally, BLM briefly mentions that increased access due to these large development projects, including access for subsistence activities, could kill more polar bears, or displace them to other habitats to avoid harvest. As noted above, increased mortality for SBS bears is not consistent with recovery of this depleted and vulnerable population. BLM must estimate the additional induced mortality due to vastly increasing access to polar bear habitat via the Willow project and the RFFAs noted. These significant omissions rise to the level of requiring a revised draft EIS.	Estimated take of polar bears would be a part of the Project's ESA consultation and MMPA LOA.	N
520	72	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	Impacts on other Marine Mammals is similarly lacking. i. BLM neglects to thoroughly analyze marine mammal impacts in the analysis area. Previous comments on the draft EIS have detailed the need for BLM to expand the analysis area for marine mammals. In the SDEIS, BLM has failed to thoroughly examine an increase of vessel traffic, noise, and habitat fragmentation to marine mammals related to barging, lightering and screeding activities at Oliktok Point. Option 3 depends on vessel traffic covering a substantially larger area, as well as support vessel traffic between the coast and the lightering area. BLM must disclose the routes and assess the impacts of the barge and support vessels on all marine mammals potentially affected.	Analysis of vessel traffic and noise are described in Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*, and Section 3.13.2.3.3, *Injury or Mortality*, as well as in Section 3.19.10, *Cumulative Impacts to Biological Resources*.	Y
520	73	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	Both the SDEIS and a subject matter expert in response to a question at the April 17th, 2020 SDEIS online hearing state that option 3 will have comparatively fewer marine impacts: Option 3 would have fewer overall impacts to marine and coastal uses as activities would be additive to existing impacts and no construction of a gravel island. The option would reduce barge and vessel activity through core Nuisqsut [*sic*] seal and eider harvesting areas in Harrison Bay, and would reduce the intensity of marine traffic. In addition, Option 3 would move most infrastructure and activity further into the periphery of Utqiaġvik's use areas. But BLM reaches this conclusion without the benefit of an adequate analysis of the impacts of barge and vessel traffic to marine mammals in the analysis area and along transportation routes. BLM has not provided any additional analysis on noise and other impacts in the marine environment related to making Oliktok Point the destination for project-related marine traffic. BLM must include a detailed analysis of noise in the marine environment, the effects to marine mammals, and effective mitigation measures. This must be done for each of the options BLM has provided.	Analysis of vessel traffic and noise are described in Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*, and Section 3.13.2.3.3, *Injury or Mortality*, as well as in Section 3.19.10, *Cumulative Impacts to Biological Resources*.	Y
520	74	Psarianos	Bridget	Trustees for Alaska	Marine Mammals	Impacts to marine mammals from vessel strikes need to be realistically reflected. BLM has acknowledged that an increase in vessel traffic could increase the likelihood of vessel strikes. BLM has also stated that revisions to the NPR-A IAP could increase vessel traffic. Both of these remarks are understated. An increase in vessel traffic would unquestionably increase the likelihood of vessel collisions with marine mammals. All IAP alternatives, except the no action alternative, support increased development in the NPR-A. BLM must assess the efficacy of mitigation measures to avoid deadly vessel strikes with marine mammals. Likewise, BLM needs to quantify how much vessel traffic is expected to increase for each of the proposed options and assess the reasonably foreseeable increased likelihood of vessel strikes for each option. As noted in our draft EIS comments, this assessment should account for the increasing use of the area by marine mammals, especially whales.	Analysis of vessel strikes are described in Final EIS Section 3.13.2.3.3, *Injury or Mortality*, as well as in Section 3.19.10, *Cumulative Impacts to Biological Resources*.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
407	5	Rose	Garett	Natural Resources Defense Council	Marine Mammals	Failure to Explain Compliance with Other Laws BLM fails to meaningfully explain how the agency will ensure compliance with the Endangered Species Act (ESA) or Marine Mammal Protection Act (MMPA). NEPA requires an agency in an EIS to state how alternatives considered in it and decisions based on it will or will not achieve the requirements of [NEPA] and other environmental laws and policies. Both the ESA and MMPA impose obligations on federal agencies considering actions affecting certain species. The Project could have potentially significant impacts on a number of species that fall under the aegis of one or both statues, including polar bears and bowhead whales. Neither the SDEIS nor DEIS discuss meeting these obligations in any detail. The SDEIS is functionally silent as to compliance with either statute. The DEIS simply asserts that ESA Section 7 consultation will occur with other agencies for species listed under the ESA, without providing any further specification. And it makes only slight reference to the MMPA in Appendix E.14s discussion of noise levels and marine mammals. BLM must rectify these omissions so that the public and decisionmakers fully understand and can comment on how the agency intends to ensure compliance with these critical protective laws.	Text regarding protected species consultations was added to the Final EIS Section 3.13.1.3, *Protected Species Compliance*. BMP J (included in Table 3.12.2) also addresses compliance with the ESA.	Y
407	13	Rose	Garett	Natural Resources Defense Council	Marine Mammals	Marine Mammals. The SDEIS describes activities that will increase potential impacts to a range of species but does nothing to correct the serious analytic flaws repeatedly raised by commentators contained in the DEISs analysis of potentially significant impacts. For example, the SDEIS continues to use an analysis area based on polar bear research for all marine mammals without reasoned explanation.88 Similarly, the SDEIS, despite introducing a new method of infrastructure delivery, does not provide any maps or detailed analysis regarding potential impacts of support vessels or barges along the routes they travel. Additionally, the document cross-references the vague analysis of potential noise impacts to ice seals without providing further analysis, ignoring the best available scientific information. Of particular note, the SDEIS continues to understate potential impacts to polar bears and ignore potentially significant impacts to bowhead and beluga whales. 1) Polar Bears The new elements added to the Project would increase potential impacts to denning and non-denning members of the Southern Beaufort Sea (SBS) population of polar bears, one of the most threatened in the world. The freshwater reservoir and boat ramps are located in areas of potential terrestrial denning habitat. And a number of aspects of Option 3, such as the Colville River crossing, are also located in polar bear habitat. Moreover, winter construction and operation activity which would overlap with denning and post-denning activity is clearly associated with each of the elements: construction of the reservoir and boat ramps could occur during the winter, and Option 3 depends on the construction and utilization of extensive ice infrastructure on both sides of the Colville River. Despite these increased potential impacts, the SDEIS simply reups the inadequate analysis found in the DEIS. Like the DEIS, the SDEIS restates the unsupported assertion that, in response to disturbance from construction of the reservoir and boat ramps, polar bears are expected to find alternate similar habitat. As noted in the conservation comments, there is no support for this conclusion. And, moreover, there is no detailed analysis of how continued use of any of the ramps or reservoir, in combination with the potential impacts of other nearby uses (e.g., aerial and ground traffic) would disturb or displace polar bears. Detailed disclosure of how activities at the reservoir and ramps could place further stress on creatures already operating under potentially high levels of physical and nutritional stress is key for understanding the full magnitude of the Projects potential impacts on the species, yet the SDEIS and DEIS eschew such a discussion in favor of generalizations. Similarly, the SDEIS provides no new injury and mortality analysis, simply cross-referencing the DEISs discussion. While that original discussion acknowledged the possibility of cub abandonment and increased mortality risk from human-bear encounters, it provided no analysis of potential population-level impacts. Further, as noted, the new components analyzed in the SDEIS all take place in known, potential terrestrial denning habitat. Given the precipitous state of the SBS population, these omissions prevent the public from understanding how the Project might push that population closer to extirpation. Compounding these errors, the SDEIS provides no information on how the number of dens in the analysis area were identified. As in the DEIS, the SDEIS appears to simply rely on the number of previously identified dens in the area. Using identified dens likely understates the number of actual dens because of difficulties inherent in detection and the SBS populations increasing trend toward terrestrial denning. By relying solely on previously identified dens, the SDEIS like the DEIS understates the potential impacts to polar bears. Further, the SDEIS provides no disclosure of the well-known difficulties of detecting dens in the field. The DEIS states that all Integrated Activity Plan Lease Stipulations and Best Management Practices would be implemented, including BMP C-1, which prohibits [c]ross-country use of heavy equipment . . . within 1 mile of known or observed polar bear dens or seal birthing lairs. Neither the SDEIS nor the DEIS specify how such dens will be identified. Recent research, however, has shown that standard den detection methods, such as forward-looking infrared radar (FLIR), can be unreliable on the North Slope detecting fewer than half of actual occupied dens. Neither the SDEIS nor the DEIS disclose this unreliability or the consequences of detection failures, further obscuring the Projects potentially significant impacts on polar bears. 2) Whales The SDEIS continues to impermissibly exclude beluga and bowhead whales from detailed analysis of potentially significant impacts. Research shows that both species can occur in the Project area and along any route utilized to deliver infrastructure. But the SDEIS excludes these whale species from analysis, presumably relying on the DEISs unsupported assertion that because migration corridors occur in depths outside of barging range, there will be no potentially significant impacts. Option 3 like the other Options considered in the DEIS, could entail potential impacts to these species, since it involves barging infrastructure to the Oliktok Dock. This option could thus entail potential impacts to whales, such as vessel collision and noise disturbance. The SDEIS and DEIS fail to acknowledge, let alone analyze these risks or other potentially significant impacts.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." Because vessel traffic was not a new action, it was not described in the SDEIS. Analysis of vessel traffic and the effects of noise on seals are described in Final EIS Section 3.13.2.3.2.2, *Coastal and Marine Disturbance or Displacement*, and Section 3.13.2.3.3, *Injury or Mortality*. As described in Section 3.13.2.3.1, *Habitat Loss or Alteration*, though the CFWR and boat ramps would occur in potential terrestrial denning habitat, Project gravel infrastructure would be approximately 8.8 to 27.5 miles inland from the coast. Because the majority (95%) of bear dens observed in this region have occurred within 5 miles of the coast (Durner, Douglas et al. 2009), most of the permanent habitat loss from the Project would be outside the area most used by polar bears. Text has been added to Section 3.13.2.3.1, *Habitat Loss or Alteration.* Visual and infrared surveys are conducted for polar bear dens before the start of each winter season as part of LOAs issued to CPAI. If dens are identified, CPAI would coordinate with USFWS on mitigation measures specific to the den site location and nearest activities. Typical measures include establishment of a 1-mile buffer around the den site to avoid disturbance.	Y

4.2.3.14 National Petroleum Reserve in Alaska Integrated Activity Plan

Table B.3.16. Substantive Comments Received on the National Petroleum Reserve in Alaska Integrated Activity Plan

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
520	7	Psarianos	Bridget	Trustees for Alaska	IAP	Finally, it is also confusing for the public and inappropriate for BLM to be permitting Willow while at the same time the agency is revising the National Petroleum Reserve in Alaska (NPR-A or Reserve) Integrated Activity Plan (IAP). The Willow EIS tiers to the 2013 IAP’s stipulations and best management practices. However, BLM is also reviewing those as part of the IAP revision process. As acknowledged by BLM and others (e.g., in the Greater Moose Tooth One (GMT-1) decision), existing measures in the IAP have failed to adequately address impacts to subsistence and other resources. As part of the IAP revision process, BLM should be considering additional protective measures to address these impacts and meet its statutory obligation to protect sensitive resources and uses. Rushing to permit Willow at this point may foreclose BLM’s consideration of more protective measures to address the serious problems already occurring in the region. BLM should not rush to permit this project. BLM should instead focus on what mitigation measures will more effectively address oil and gas impacts in the Reserve prior to authorizing any more projects.	The Willow MDP Project is subject to lease stipulations from prior IAPs, which do not change when a new IAP is issued. Applicable BMPs/ROPs considered in the revised IAP are included in *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Willow MDP Final EIS (typically, Section 3.X.2.1.1).	N
520	25	Psarianos	Bridget	Trustees for Alaska	IAP	BLM’s failure to do this analysis is particularly troubling in light of BLM’s similar failure to adequately account for Willow in its assessment of impacts in the reasonably foreseeable development scenario (RFDS) in the revised IAP. In the draft EIS for the revised IAP, BLM improperly excluded Willow from its assessment of impacts in the reasonably foreseeable development scenario. Although BLM recognized in the IAP draft EIS that Willow is a planned development and that the permitting process is ongoing, BLM stated that [e]xisting developments and planned developments that have already been permitted as part of the Willow development are not included in the development or production projections below. In other words, BLM excluded the entire Willow Project from its RFDS on the justification that it was already permitted. Obviously, it has not already been permitted. Willow is likely to have massive direct, indirect, and cumulative impacts across a broad area of the Reserve that will be significantly magnified if BLM revises the IAP to open additional areas to oil and gas. BLM needs to engage in an analysis of the cumulative impacts of Willow and the IAP revision in both NEPA analyses, but has failed to do so. BLM needs to revise its analysis to fully account for these cumulative impacts.	The Willow MDP Project was included in the cumulative effects analysis for the Draft IAP/EIS. The cumulative effects analysis for the Final IAP/EIS includes an updated project description for the Willow MDP. The analysis of how the impacts of the Project would interact with the impacts of each alternative considered in the IAP/EIS was based on the best-available information at the time of drafting the Final IAP/EIS. The hypothetical development scenario only includes projects that are not currently in the NEPA process, that have not received funding, or that do not have an existing proposal.	N

4.2.3.15 Noise

Table B.3.17. Substantive Comments Received on Noise

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	57	Dunn	Connor	ConocoPhillips Alaska	Noise	3.6.2.2 - Noise - Module Delivery Option 3: Colville River Crossing “Option 3 would produce similar types and levels of noise as Option 1 (described in the DEIS) except the noise would be farther away from Nuiqsut (Figure 3.6.1) and no impact pile driving, pile removal, or gravel mining would be required.” This statement is inaccurate and requires further detail. Although related noise would not be noticeable in Nuiqsut, the gravel and ice roads that are part of Option 3 would be closer to Nuiqsut, and it should be mentioned that the air and ground traffic would be much less under Option 3 and for fewer years. Furthermore, it is not accurate to state that no gravel mining would be required for Option 3 because gravel from an existing gravel mine outside the NPR-A would be used to upgrade Oliktok Dock and modify Kuparuk Road.	Text was adjusted in Final EIS Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y
717	58	Dunn	Connor	ConocoPhillips Alaska	Noise	3.6.2.1 - Noise - Alternatives B, C, and D Because ambient sound levels are 35 dBA, noise from the nearest boat ramp would not be audible in Nuiqsut (31 dBA is below ambient). Please revise the fourth sentence in this section accordingly.	Text was adjusted in Final EIS Section 3.6.2.4, *Alternative C: Disconnected Infield Roads*, and Section 3.6.2.5, *Alternative D: Disconnected Access.*	Y

4.2.3.16 Permitting

Table B.3.18. Substantive Comments Received on Permitting

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
216	3	Bruno	Jeff	State of Alaska	Permitting	Please note that many of the activities and infrastructure described in the SDEIS and the overall project will require permits/authorizations from ADF&G (separate from this EIS process) as required under State law.	State and local permit requirements are discussed in Section 1.5 (*Cooperating Agencies*) and Section 1.7 (*Permitting Authorities*) of the Final EIS.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
130	4	Karro	Loren J	—	Permitting	I believe that it is inappropriate for BLM to advance this project without a valid Clean Water Act 404 permit application having been filed. Separating the process of the EIS and the 404 permit means a limited opportunity for agencies and the public to review the full scope of the impacts of the proposed Willow Plan. The DEIS did not contain the information and analysis necessary for the Corps to conduct a 404 analysis or make the required findings under the Clean Water Act mandate, and the DEIS did not have any consideration of mitigation measures that might be required. The SDEIS also failed to address this topic. This denies the public an opportunity to comment on mitigation measures that will be required to compensate for the inevitable impacts of the project construction and operation. It is surely extremely rare, if not unprecedented, for the BLM to issue a final decision to permit construction of such a massive wetlands project before there is a valid 404 application. No further steps should be taken to review or authorize this project until a complete 404 permit application is submitted and the comment period on the DEIS is reopened.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which issued its Public Notice on March 26, 2020.	N
130	10	Karro	Loren J	—	Permitting	The SDEIS should be pulled until the insufficiencies noted above are addressed: 1. A valid application for the Corps of Engineers 404 Clean Water Permit is included and analyzed.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which issued its Public Notice on March 26, 2020.	N
843	2	Karro	Loren	—	Permitting	I have found no indication that there is yet a valid clean-water act 404 permit before the BLM and the Corps of Engineers. To move forward with this NEPA process without this application is to separate the EIS and 404 processes, and it limits the agencies and the publics opportunity to review the full scope of the impacts of the proposed plans. Commenting on mitigation measures that might be required are not possible when they have not yet been presented.	A Section 404 permit application is not required in order to undertake the NEPA process. Section 404 requires a permit before dredged or fill material may be discharged into WOUS; the Section 404 program is administered by USACE, which will provide a public comment period on any Section 404 permit application before issuing a permit. USACE issued its Public Notice on March 26, 2020.	N
520	29	Psarianos	Bridget	Trustees for Alaska	Permitting	The Draft EIS is Insufficient to Support the Corp's Obligation Under NEPA and the Clean Water Act. It appears that ConocoPhillips submitted its 404 permit application to the Corps after BLM prepared both its draft and supplemental draft EIS. The Corps is lacking key information necessary to inform its analysis of the Willow project pursuant to its statutory and regulatory mandates. As a result, there is a lack of adequate analysis in the supplemental draft EIS, which provides an insufficient basis to meet the Corps NEPA obligations. We incorporate by reference comments to the Corps on its Public Notice for the Willow MDP, which we will submit to the Corps and BLM on May 11, 2020.	USACE determined that there is sufficient information in the permit application and the Final EIS to make meaningful comparisons among alternatives, to determine the Least Environmentally Damaging Practicable Alternative, to determine whether compensatory mitigation will be required, and to make a permit decision.	N

4.2.3.17 Project Description

Table B.3.19. Substantive Comments Received on Project Description

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
117	15	Campbell	Bruce	—	Project Description	In order to receive additional helpful comments from various agencies, they need a better idea as to specific locations planned for the massive amount of spaghetti-type infrastructure associated with the massive Willow MDP.	The Willow MDP SDEIS and Final EIS include numerous maps identifying the location of Project infrastructure and the environmental resources being analyzed. The EIS provides narrative (text) descriptions and tabular values of impacts and other quantifiable data. This material in total provides for an ample understanding of Project alternatives and impacts.	N
717	6	Dunn	Connor	ConocoPhillips Alaska	Project Description	BLM should correct and clarify the description of the engineered ice crossing of the Colville River under Option 3. Specifically, BLM should explain that there may be one or more narrow, low-flow channels in which water continues to move under the ice, so the ice crossing is not assumed to be bottom-fast.	More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) in the Final EIS to clarify that the proposed ice bridge in Option 3 (Colville River Crossing) would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1).	Y
717	12	Dunn	Connor	ConocoPhillips Alaska	Project Description	The SDEIS analyzes three project components added to the Willow MDP after the draft EIS was published in August 2019. . . . ConocoPhillips listened to concerns about the proposed module transfer island at public meetings, in written public comments, and in ConocoPhillips outreach to Kuukpik Corporation and stakeholders such as whaling captains. . . . After receiving stakeholder feedback opposed to the module transfer island, even before public comment periods were completed, ConocoPhillips worked at length on an option for freezing barges into ice and unloading onto shore during winter, but ultimately could not support that approach from an engineering perspective. ConocoPhillips also evaluated the potential option of using Oliktok dock for sealift offload and transporting modules to the project via crossing the Colville River delta or crossing at or near the Alpine Resupply Ice road crossing of the Colville River. However, that option also proved infeasible due to the logistical, environmental, and safety risks presented by those crossing locations. In response to public comments on the draft EIS, ConocoPhillips investigated additional crossing locations further upstream along the Colville River and ultimately determined that a viable river crossing location at Ocean Point does not present the risks associated with the rejected alternatives in the draft EIS. This option squarely addresses the public comments because it would not require construction of a gravel module transfer island.	The SDEIS and Final EIS for the Willow MDP Project includes a third module delivery option (Option 3: Colville River Crossing) that would not construct an offshore gravel island.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	17	Dunn	Connor	ConocoPhillips Alaska	Project Description	As described in Comment 1 of this letter, ConocoPhillips originally proposed construction of a gravel module transport island at Atigaru Point to support movement of sealift modules for the project. Based on discussions with and feedback from local stakeholders, ConocoPhillips reevaluated onshore transportation options. . . . In the SDEISs analysis of potential impacts to water resources from the Ocean Point ice crossing associated with Module Delivery Option 3 (Section 3.8.2.2), BLM describes the crossing as a bottom-fast ice bridge and presents an assessment that is premised on incomplete information and therefore overestimates potential impacts to river flow. As described below, the engineered ice crossing is not expected to be fully grounded, and it will be monitored and maintained to allow any potential flow to occur under ice. Any overflow will be managed at the surface. The following important clarifications should be incorporated into the final EISs assessment of potential impacts associated with Option 3. The crossing will not be a bottom-fast ice bridge of the type described in Section 3.8.2.2. A more appropriate description is found in Section 2.3.3 (page 6): At the crossing location, an engineered ice bridge would be constructed to provide sufficient load-carrying capacity to support the weight of the sealift modules and the SPMTs. In the same section, the use of the term grounded ice is footnoted and the footnote describes the nature of the engineered ice bridge. This footnote provides a mostly correct description, but should be revised to remove reference to pockets of free water and clarify that there may be one or more low-flow channels present near the bed, carrying the winter discharge beneath the ice. These small channels are narrower than the length of the self-propelled module transporter. The engineered ice bridge will be built up to required specifications to support module moves approximately 24 hours prior to crossing, then allowed to rest prior to moving a module across, allowing for potential water movement under ice. After a module crosses, the ice crossing will be built up to required specifications approximately 24 hours before the next module crosses the bridge.	More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) in the Final EIS to clarify that the proposed ice bridge in Option 3 (Colville River Crossing) would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1). Additional details to clarify effects of a partially grounded ice bridge were added to the *Environmental Consequences* sections for Section 3.8 (*Water Resources*) and Section 3.10 (*Fish*).	Y
717	18	Dunn	Connor	ConocoPhillips Alaska	Project Description	Although the SDEIS correctly notes the Ocean Point ice crossing would be needed for five weeks, transport of module loads will be spaced out over that time, providing time for ice bridge settling and maintenance. Instrumentation will be installed within the Colville River at Ocean Point to monitor water levels near real-time for the entirety of the Willow ice road season. Overflow potential will be mitigated, monitored, and actively managed with pumps and/or surface pipes across the ice bridge if needed.	More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) in the Final EIS to clarify this. Text was also revised in Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y
717	19	Dunn	Connor	ConocoPhillips Alaska	Project Description	On page 21 of the SDEIS, BLM states, if the flows are higher than expected and fully grounding the ice bridge is not practical or it is determined to be a fish passage concern, submerged steel culverts could be installed at a deeper location along the crossing. The use of submerged culverts is not a practicable solution for ice roads as they would freeze and fill with ice and cause potential damage during removal. Accordingly, the statement on page 21 should be eliminated.	Text removed.	Y
717	45	Dunn	Connor	ConocoPhillips Alaska	Project Description	All - The term “Colville River Crossing” will convey a sense of permanence to many readers. ConocoPhillips recommends BLM use the term “Colville River Ice Crossing” or “engineered ice bridge” throughout the document to more accurately reflect the seasonal, non-permanent nature of the crossing.	The “Colville River Crossing” title distinguishes this option sufficiently from the “Module Transfer Island” options. The EIS thoroughly describes this temporary and seasonal crossing as being nonpermanent. No change to the option name.	N
717	48	Dunn	Connor	ConocoPhillips Alaska	Project Description	2.3.5 - Access -Table 2.3.2 Note “C” and “B” in Table 2.3.2 should be switched to match contents of the table (i.e. contents of note C is in regards to summer traffic but is called out on the Winter Traffic columns in the table).	All traffic tables have been updated for the Final EIS.	Y
717	49	Dunn	Connor	ConocoPhillips Alaska	Project Description	2.3.7 - Gravel Requirements - Table 2.3.4 Confirm and clarify that gravel volumes for Oliktok Dock upgrades are included in Table 2.3.4.	Gravel fill for Oliktok Dock is presented under the action alternatives in Appendix D.1, *Alternatives Development* (Final EIS Sections 4.3.6, 4.4.6, and 4.5.6—all titled *Gravel and Other Fill Requirements*), as this action would be applicable to any action alternative (though it would also be required for Option 3: Colville River Crossing).	N
130	6	Karro	Loren J	—	Project Description	The SDEIS proposes boat ramps under alternative B, C and D, but does not state definitively where they will be located under any of the scenarios. They state that the locations will be decided after more community input. It is impossible to fully analyze the possible impacts of the boat ramps, and impossible for the public to knowledgeably comment on the ramps and their impacts, until their actual location on each river is known.	Final EIS Figures 2.4.1, 2.4.2, and 2.4.3 (Appendix A, *Figures*) depict the approximate locations of the boat ramps for each action alternative; Final EIS Figure 2.5.3 provides additional details about each boat ramp location. The exact boat ramp locations would be coordinated with local stakeholders.	N
159	8	Kenning	Erik	ASRC	Project Description	The Colville River crossing as part of Option 3 has been characterized as a grounded ice crossing, although it is noted that there may be small channels of flowing water. We believe that this should be more clearly stated in the final document. CPAI should work to maintain flowing water in the event that the crossing point not be completely frozen to the bottom. It is also important to note that while the engineered ice bridge will be in place for five weeks, it only be used for module transfer for a small portion of that time. When modules are not crossing, the ice bridge would easily allow for more natural water flow - should there be any during the life of the ice bridge.	More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) in the Final EIS to clarify that the proposed ice bridge in Option 3 (Colville River Crossing) would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure 2.4.6 detail A, in Appendix A, *Figures*).	Y
807	4	Major	Mark	—	Project Description	One of the comments in there is transporting fish around the grounded ice bridge. We don’t think the agency, particularly Fish and Game, will allow grounding of the ice anywhere on the Colville River. ConocoPhillips already constructs an ice bridge every year on the main channel of the Colville River to provide access to Alpine and to Nuiqsut. That’s a floating bridge. We would expect that the Fish and Game would take the same stance. You can’t ground it. There was a section in the document that talked about placing steel culverts into the river to provide fish passage, water movement. To my knowledge, that has never been done before on North Slope rivers, and I’m not sure where that input came from.	More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) in the Final EIS to clarify that the proposed ice bridge in Option 3 (Colville River Crossing) would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1).	Y
860	5	Nukapigak	Joe	Kuukpik Corporation	Project Description	Finally, although Kuukpik generally supports constructing the proposed boat ramps at locations designated by the community, their design may require additional refinements. Riprap will likely be needed upstream, for example, to minimize erosion. The parking areas may also not be large enough to allow vehicles with trailers to turn around when other vehicles with trailers are already parked.	CPAI has committed to working with Nuiqsut residents on the final design and location of the boat ramps. As engineering of the boat ramps progresses, design of erosion control measures, layout, and final dimensions will be determined.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
170	2	Osborne	Jeffrey	—	Project Description	Further, the proposed module delivery ice road from Kuparuk drill site 2P to Greater Mooses Tooth 2 drill site, aligns with the North Slope Borough's Community Winter Access Trail (winter access for Utiqiaġvik and villages to the west of Kuparuk). The ice road route and crossing of the Colville River at "Ocean Point" has been utilized by industry and residents with success and effectively no environmental impact.	CPAI would coordinate with NSB on module move timing and would provide provisions for CWAT users to ensure safe passage along the route where the trail and module haul ice road may overlap.	N
520	35	Psarianos	Bridget	Trustees for Alaska	Project Description	We have very serious concerns about the proposed Colville River grounded crossing. This SDEIS lacks significant details about how this crossing would be designed and built and the impacts it would have on ecological processes and values, including fish. There are significant information gaps about the potential impacts of the crossing that make it impossible to make a reasoned choice among alternatives. Such a lack of detailed information calls into question the legitimacy of this SDEIS because the public cannot meaningfully review such unformed development plans. The large sealift modules weighing between 3,000 and 4,000 tons would cross the Colville River approximately one mile south of Ocean Point. This crossing requires grounded ice. According to footnote 3, It is anticipated that the grounded ice crossing for the Colville River would be primarily frozen fast to the riverbed; however, there may be some pockets of free water present beneath the ice that are narrower than the length of the [self-propelled module transporter (SPMT) which is 200 feet long] (Figure 2.3.1). The free-water pockets would be spanned by the overall length of the SPMTs and therefore would bear minimal loading. Additionally, according to BLM: The proposed crossing location was also sited so that it is upstream of the influence of saltwater intrusion and tidal backwatering from the Colville River Delta (CRD) and thus is not expected to be used by fish in winter. CPAI will continue to monitor the proposed Colville River crossing location for fish presence over coming winters prior to construction to gain baseline data. CPAI would work with the ADF&G through the permitting process if fish presence is found during the winter months when module transport would occur; should it be necessary, CPAI will consult with ADF&G on how fish would be transported around the ice bridge. It's clear that it is not known if there will be grounded ice at the time of the SPMTs crossing the Colville River, if there will be free-water pockets, how large those pockets will be, and if there will be fish in the area that winter. These critical data must be collected, analyzed, and shared with the public if successful module crossings of the Colville River are going to be achieved with minimal environmental impacts.	More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) in the Final EIS to clarify that the proposed ice bridge in Option 3 (Colville River Crossing) would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1). Additional details to clarify effects of a partially grounded ice bridge were added to the *Environmental Consequences* sections for Section 3.8 (*Water Resources*) and Section 3.10 (*Fish*). After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not be able to proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy.	Y
813	2	St. John	Jeanine	—	Project Description	We're also supportive of smaller modules and potential scheduled barge deliveries that may also be able to utilize the same route in the wintertime, particularly, if it can improve the timeline for the project and mitigate congestion on both of the ice roads. The history of the route on option 3, particularly as it crosses the Colville, is a known route. As recent as this winter, it was the snow road PistenBully route between North Slope gravel roads and the communities west of the Colville. There are strong operational and mitigation plans that have been implemented for this particular route already.	CPAI would coordinate with NSB on module move timing and would provide provisions for CWAT users to ensure safe passage along the route where the trail and module haul ice road may overlap.	N

4.2.3.18 Public Health

Table B.3.20. Substantive Comments Received on Public Health

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
14	1	Apok	Charlene	—	Public Health	The extractive industry near indigenous communities has been absolutely devastating. There's a direct correlation to our health being negatively impacted, both by missing, murdered indigenous women and girls, but also in examples like Nuiqsut, where there's high cases of res— of respiratory illness because of all of the pollution in the air. Furthermore, these impact statements continue to fail to acknowledge and to adequately address the cultural impacts they — impacts that this will have. Some of these things have already been mentioned in the public testimony, such as language. It also impacts our mental health, our spirituality. The health of our people is directly tied to the health of the land.	Air quality analysis, including modeling results, is included in Draft and Final EIS Section 3.3, *Air Quality*, and Appendix E.3, *Air Quality Technical Appendix*. Public health impacts are analyzed and included in Draft and Final EIS Section 3.18, *Public Health*. Cultural impacts are assessed in Section 3.16, *Subsistence and Sociocultural Systems*.	N
20179	2	Freeman	Kyri	Center for Biological Diversity	Public Health	What would be the human health effects of the waste and gases released, including both climate change and effects related to air quality?	Climate change analysis is included in Draft and Final EIS Section 3.2, *Climate and Climate Change*, and Appendix E.2, *Climate and Climate Change Technical Appendix*. Air quality analysis, including modeling results, is included in Draft and Final EIS Section 3.3, *Air Quality*, and Appendix E.3, *Air Quality Technical Appendix*. Public health impacts are analyzed and included in Draft and Final EIS Section 3.18, *Public Health*.	N
25	3	Girard	Jessica	—	Public Health	The health impact of this project would directly affect the community — community of Nuiqsut where you have asthma rates of 70 percent or higher the health impact, continuing to (unclear) for gravel development, have liquified natural gas burned right around the communities, only intensifies these health impacts, without helping the communities directly impacted by them. And in all these reviews, it is necessary to incorporate all available science.	Air quality analysis, including modeling results, is included in Draft and Final EIS Section 3.3, *Air Quality*, and Appendix E.3, *Air Quality Technical Appendix*. Public health impacts are analyzed and included in Draft and Final EIS Section 3.18, *Public Health*. The EIS uses the best-available scientific materials identified by subject-matter experts, cooperating agencies, and the public via the comment process.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
658	6	Long	Becky	—	Public Health	Lack of Requested Health Impact Assessment means lack of adequate baseline health data. The Supplement has not rectified this situation by doing a health impact assessment. The NVN and others requested that a Health Impact Assessment be done. BLM did not do this so the DEIS and the supplement are inadequate. The current oil and gas development around NVN and the areas subsistence resources has NOT incorporated any protocols to prevent emerging health impacts from the oil and gas fields. No more extractive projects in this area until there is conclusive third party health organization to assess industrial projects toxic releases. The Conoco Phillips air quality monitoring equipment is not adequate for baseline and current data needs. This equipment only tracks 2 to 3 hours daily unlike the lower 48 standards. Supposedly it is technically unfeasible for 24 hour monitoring because of the remoteness. But actually it could be done with real time instrumentation so variability over time could be captured. This needs to be done. The State of Alaska contends they have no money for this. When the 2012 shallow well blowout of a Repsol exploratory well happened 18 miles from NVN, the air monitoring equipment was down due to routine maintenance. There should have been a back-up. Residents say that the incident impacted their health. Without the air monitoring data, an evacuation decision could not be decided. Shallow pressurized gas is a common drilling hazard. The Alaska Oil and Gas Conservation Commission Chair has said in the past that the technology is not perfect. A standard blowout preventer cannot always be used if there is not a pipe casing in the ground to attach it too. But the AOGCC can and should require that wells to be cased at a shallower depth. Oil and gas development in the Nuiqsut area and other BLM lands has proceeded too rapidly without enough care for the health of the people from air quality and subsistence resources impacts. Respiratory illness has increased since 1986. The increased percentage of cases is far more than due to population growth. Yet industry and state agencies blame the residents' lifestyle.	Baseline health data for Nuiqsut are provided in Section 3.18.1, *Affected Environment*. A full HIA conducted by the State of Alaska would not further inform BLM of the differences between the alternatives presented for the Willow MDP Project. Health impacts are analyzed in Final EIS Section 3.18, *Public Health*; BLM determined, in consultation with the State of Alaska, that an HIA was unnecessary. The BLM has no authority over Alaska Oil and Gas Conservation Commission requirements.	N
8	3	Moser	Phillip	—	Public Health	This is environmental degradation. The carbon pollution that the extraction of these resources puts out into the air, is going to most dramatically affect vulnerable people exactly in communities like this.	Air quality analysis, including modeling results, is included in Draft and Final EIS Section 3.3, *Air Quality*, and Appendix E.3, *Air Quality Technical Appendix*. Public health impacts are analyzed and included in Draft and Final EIS Section 3.18, *Public Health*.	N
168	12	O'Reilly-Doyle	Kathleen M	—	Public Health	An article in August 2, 2018, authored by Sabrina Shankman entitled Surrounded by Oil Fields, an Alaska Village Fears for Its Health, When the wind blows in from the vast oil operations, noses run and asthma flares up. Concerns about respiratory illness have risen as North Slope drilling spreads. This article was published in both Inside Climate News and The San Francisco Chronicle. I do not find any analysis in this SDEIS as to how these air quality and health concerns to the residents of the local communities are being addressed. This information should be provided to the public for review and comment before the process is allowed to proceed.	Air quality analysis, including modeling results, is included in Draft and Final EIS Section 3.3, *Air Quality*, and Appendix E.3, *Air Quality Technical Appendix*. Public health impacts are analyzed and included in Draft and Final EIS Section 3.18, *Public Health*.	N
612	3	Strasenburgh	John	—	Public Health	Some who testified at the Nuiqsut hearings (and also at the Nuiqsut hearings on the Draft 2019 IAP/EIS last January) spoke of contamination of land and water and air. What follows land, water, and air pollution is that the fish and wildlife which ingest the contaminants become sick and in turn the people who eat these fish, caribou, and birds have health consequences. Neither the Willow DEIS nor the SEIS study the health effects of Willow development on the people, on either an instant or cumulative basis. BLM should do this. The SEIS also needs to study why the fish are getting sick (sick fish was brought up in the Nuiqsut hearings), how this affects people. BLM explained that the fish weren't studied because they were not considered by BLM to be an important enough a subsistence resource. BLM elaborated on this point, indicating that there might be individual fish mortality, but there was no threat to the fish population a whole. BLM apparently fails to consider that the abundance, health, and diversity of a population can be significantly altered, and instead concludes that is ok because some remnants of the population will still continue to exist.	Fish impacts are analyzed in the Willow MDP EIS in Section 3.10, *Fish*. Public health impacts are analyzed and included in Draft and Final EIS Section 3.18, *Public Health*.	N
3988	1	Sullivan	Joan Paul And Pj	Center for Biological Diversity	Public Health	They use our land and hurt many communities and the people who live in them! CANCER is on the rise whether you want to believe it or not. I believe when these companies come in and prison an area that causes many types of cancer. Of course, for years they never admitted that they caused climate change, so they will deny this too! Why are so many children dying of cancer. [One] in every five and its really worst! I worked with many Org's [*sic*] for children and saw the death of so many. You ask why I bring this up! Because they want to destroy another area, which they cannot control oil spills and it will affect many people. Many have died due to what is happening to our air also. L.A. Have many people not being able to breathe and many died of all ages!	Air quality analysis, including modeling results, is included in Draft and Final EIS Section 3.3, *Air Quality*, and Appendix E.3, *Air Quality Technical Appendix*. Public health impacts are analyzed and included in Draft and Final EIS Section 3.18, *Public Health*.	N
10	1	Thomas	Sara	—	Public Health	In this SEIS, I still saw no mention of suicide, and to be looking at the health impacts of a project and — and to ignore the health impacts on the people, is completely inadequate, especially because we know that, as indigenous communities, our community members are more impacted by extraction nearby our community, and that suicide is directly linked to extraction in indigent communities.	Baseline health data for Nuiqsut are provided in Section 3.18.1, *Affected Environment*. A full HIA conducted by the State of Alaska would not further inform BLM of the differences between the alternatives presented for the Willow MDP Project. Health impacts are analyzed in Final EIS Section 3.18, *Public Health*; BLM determined, in consultation with the State of Alaska, that an HIA was unnecessary. Text was added to Section 3.18.2.4.1.1, *Health Effect Category 1: Social Determinants of Health*, regarding suicide. The *Affected Environment* section of the 2012 and 2020 NPR-A IAP/EIS (BLM 2012, 2020), which the Willow MDP EIS incorporates by reference, also address suicide-related impacts of development.	N

4.2.3.19 *Request for More Detail*

Table B.3.21. Substantive Comments Received on Request for More Detail

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	15	Dunn	Connor	ConocoPhillips Alaska	Request for More Detail	The final EIS should more clearly reflect how the NEPA process has resulted in these project improvements. The final EIS should also more clearly describe, in narrative form, the benefits of Option 3. All essential information is presented in tables in the SDEIS, but the tables do not qualitatively demonstrate the benefits of Option 3. Option 3 reduces gravel use by about 280,000 cubic yards, reduces freshwater withdrawal from lakes by about 50 million gallons, reduces ground traffic approximately 75 percent, reduces fixed-wing flights from 230 to 70, reduces helicopter flights from 450 to 16, and reduces marine traffic by 190 trips. The aggregate result is a significantly improved project.	The purpose of the NEPA process is to disclose effects and compare alternatives (including options). The Final EIS compares the effects of all module delivery options, including Option 3 (Colville River Crossing).	N
717	52	Dunn	Connor	ConocoPhillips Alaska	Request for More Detail	3.1 - Affected Environment and Environmental Consequences - Introduction The SDEIS states that the NPR-A Integrated Activity Plan (IAP) lease stipulations (LSs) or best management practices (BMPs) would apply to all three new Project components. Because the IAP does not apply to the portions of Option 3 located outside of the NPR-A, ConocoPhillips recommends adding clarification that the IAP LSs and BMPs would apply to project changes located within BLM-managed lands of the NPR-A.	Clarification made throughout the Final EIS.	Y
860	3	Nukapigak	Joe	Kuukpik Corporation	Request for More Detail	Eliminating the MTI is step in the right direction, but additional information is needed to determine if the module crossing at Ocean Point can be done safely. . . . Like many other stakeholders, Kuukpik will be interested to learn more about CPAI's new plan to transport the modules overland via a river crossing near Ocean Point. Although Kuukpik believes this may indeed be the best option (and it's certainly preferable to the ill-fated MTI), there still seems to be a lot of questions about how this option would actually work in the field. The Supplemental Draft EIS is far too vague to offer any real guidance in that regard. . . . Two big issues Kuukpik sees are whether the ice bridge will indeed be grounded to the riverbed and what to do if there is more flowing water than CPAI may currently anticipate. . . . The proposed crossing at Ocean Point boasts steep cut banks on both sides of the river and Kuukpik has little information on how CPAI proposed to design the crossing and thus great concerns over the efficacy of the operator to safely cross at that location. Should an incident occur like it did this past winter, it could cause irreparable harm to the resource that is so heavily depended on by Nuiqsut residents. Recovery efforts would be messy, at best. As to the first, a grounded ice bridge across the Colville River may represent a uniquely irreconcilable conflict: CPAI will want to do everything in its power to keep the ice as close to fully grounded as possible, while the community will want to ensure that some water is allowed to pass through relatively unimpeded. The idea of intentionally building a 700+ foot ice darn upstream from Nuiqsut is simply not something residents are likely to accept unless CPAI demonstrates much more concrete plans to deal with the problems that may arise. These problems include blocking the flow of any unfrozen water, leading to back watering and flooding upstream, erosion and scouring underneath and downstream of the bridge, overflow of blocked water on top of the ice, and an increased likelihood of unnatural and/or extreme flooding and release activity in the spring as the bridge slowly breaks apart after CPAI is done with it. And although the Draft curiously tries to argue that fish are not expected to be present in this area during winter, it goes on to note much more frequently the need for further studies to either prove that exact point or to figure out how to deal with the very real likelihood that fish will be encountered when the time build the bridge comes. Fish that might otherwise travel back and forth through this area would probably not survive being trapped on either side of a grounded bridge, especially if the passageways of flowing water are narrow and not consistently connected to other free flowing waters. So far, CPAI's plan for dealing with these issues seems to be some combination of water pumps and steel culverts. Funneling all or nearly all the flowing water in the Colville River into a 3-400 foot wide series of culverts, of course, would be nearly unheard of on the North Slope as far as Kuukpik knows, and might do very little to prevent fish mortality, downstream scouring, unnatural flows and increased turbidity during and after breakup. Pumps and transporting fish might help reduce some of these impacts, but would be extremely labor intensive, complex, and (like culverts) "difficult to manage and maintain" in this environment. . . . The SDEIS doesn't include enough commitments and proposed required operating procedures to give Kuukpik any comfort in that regard. Rather, it notes the problems and concerns identified above (and many others), but basically just says CPAI will figure out how to deal with them when the time comes. This doesn't give Kuukpik much confidence in the SDEIS's conclusion that this effort will not significantly restrict subsistence uses; it simply doesn't appear that enough is known to credibly make that determination. Thus, if this option is selected, Kuukpik expects to see not only robust data collection and analysis every winter between now and the construction of the ice bridge, but also an inclusive and transparent public process prior to construction to allow the community to understand and weigh in on the mitigation measures that will be needed to make sure this project is done in a way that avoids unnecessary impacts to the Kuukpikmiut's name sake river and its subsistence resources.	Additional text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) in the Final EIS to clarify that the proposed ice bridge in Option 3 would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1). Additional details to clarify effects of a partially grounded ice bridge were added to the *Environmental Consequences* sections for Section 3.8 (*Water Resources*) and Section 3.10 (*Fish*). After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy. Measures to avoid, minimize, and mitigate effects of the Project (including those from Option 3: Colville River Crossing) are described in the *Applicable Existing and Proposed Lease Stipulations and Best Management Practices* sections in the Final EIS (typically, Section 3.X.2.1.1). The intent of BMP H-1 (Subsistence Plan) is to prevent unreasonable conflicts with subsistence. The BMP requires that a Subsistence Plan be submitted as early as possible and no later than an application is submitted to BLM. Thus, CPAI would coordinate with the community and Kuukpik about any activity near the Colville River that could affect subsistence.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
860	4	Nukapigak	Joe	Kuukpik Corporation	Request for More Detail	The proposed CFWR reservoir plans to channel water at breakup from Lake M0015 into the CFWR. Lake M0015 is a fish bearing lake and the plan is to have fish screens and a flood control gate at the entrance to the CFWR to control water flow. Kuukpik doesn't necessarily oppose this plan, but the SDEIS doesn't have enough information about the waterbodies or the mechanics of this operation for us to determine whether it can be done with minimal impacts on aquatic resources. For example, the draft states that Lakes M0015 and R0064 are hydraulically connected, but the maps provided don't confirm the extent of that connection. This connection needs to be well-studied and established since Lake R0064 is expected to help recharge the CFWR. The document notes that 55 million gallons of water will be withdrawn in winter but does not address summer water withdrawals. Does CPAI plan to use the lake year round? The Draft also states that "The estimated annual recharge volume of Lake M0015 and Lake R0064 exceeds the estimated volume of the CFWR and change in water flow is not anticipated to impact the Willow Creek 3 baseline flow." However, Kuukpik did not locate any data to support this position. Finally, the Draft erroneously states that the "shallow" side slopes to the CFWR would "reduce the thennal [*sic*] impact of impounded water and stabilize slopes [by providing] a thermal buffer to reduce the lateral thaw extents into the walls of the excavated reservoir." This conclusion is flawed because a 6:1 side slope is hardly "shallow." Kuukpik doesn't know whether a 6:t [*sic*] slope will nevertheless serve the same purpose, but this is just another detail that clearly needs to be studied and presented more completely in the Final EIS in order to allow stakeholders to understand the details of the proposed CFWR.	Additional text was added to Section 3.8.2.3.6, *Water Withdrawal and Diversion*, regarding the filling of the CFWR and recharge of the lakes. Additional detail was added to Section 3.4.2.3.1, *Thawing and Thermokarsting*, to clarify the role and effects of the side slopes and perimeter berm of the CFWR. A reference was provided to demonstrate that 3:1 or shallower side slopes limit or reduce slope movement within cuts made in ice-rich soils. A 6:1 slope is shallower than a 3:1 slope.	Y
168	7	O'Reilly-Doyle	Kathleen M	—	Request for More Detail	Boat Ramps The plan states that Boat ramps are being constructed as voluntary mitigation for the project. It also states that increased subsistence access via boat ramps, and increased river/creek traffic could disturb or displace caribou and may alter their distribution and/or movements. Construction of these boat ramps could further exacerbate the disturbances to caribou and waterfowl. According to Section 2.2.2 of this document, only preliminary locations and designs are available. In addition, detailed plans and specific locations for these proposed launch sites are not available for review during this public comment process, which precludes the opportunity for meaningful public comment on their location and design.	Final EIS Figures 2.4.1, 2.4.2, and 2.4.3 (Appendix A, *Figures*) depict the approximate locations of the boat ramps for each action alternative; Final EIS Figure 2.5.3 provides additional details about each boat ramp location. The exact boat ramp locations would be coordinated with local stakeholders.	N

4.2.3.20 Request for New Alternative

Table B.3.22. Substantive Comments Received on Request for New Alternative

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
589	1	Bennett	Lee Ann	—	Request for New Alternative	The Willow Project is substantially larger than the similar Alpine oil field built between 1998 and 2000. The north-south lay-out of the Willow Project coupled with its perpendicular east-west access roads forms a t-shaped development that threatens to seriously disrupt and deflect caribou herds from their normal migration corridors which could prove disastrous to Nuiqsut's subsistence resources. . . . Clearly, project impacts on subsistence is the most important concern (i.e., to hunters dependent on hunting to feed themselves, their families, and their communities) for the Indigenous villages like Nuiqsut. The BLM's failure to fully analyze a roadless BT4 and/or BT5 alternative, which could dramatically reduce the disruption and deflection of caribou, is a major oversight on their part. It is well-known that caribou do not like crossing gravel roads, they tend to avoid them and their migration behavior can be altered dramatically by them. So, it seems reasonable to me that eliminating the gravel road connections to BT4 and and/or BT5 looks increasingly like one of the better alternatives available, however, neither the Draft EIS nor the Supplement to the Draft EIS analyzes either option despite repeatedly confirming that the proposed 25 mile north-south road system would disrupt and deflect migrating caribou, especially those migrating east from Teshekpuk Lake towards Nuiqsut. . . . I strongly suggest that the BLM to analyze these roadless options as possible alternatives for inclusion in the Final EIS. Comments from the Kuukpik Corporation in Nuiqsut, indicate that it supports giving more weight to alternatives that eliminate one of more of the infield road segments, as well. These segments are unlikely to provide significant subsistence or other value to Nuiqsut residents. Additionally, they are more likely to have significant impacts on migrating caribou. Clearly then, reducing certain road segments would likely reduce negative impacts to migrating caribou without reducing the amount of road available to subsistence hunters. Further, a minor increase in air traffic might be outweighed by the elimination of road segments not very useful for subsistence activities. But of course, the BLM needs to include roadless BT4/BT5 satellites in a new alternative along with a detailed analysis of anticipated flight numbers, marginal differences between alternatives, and a thorough assessment of when and where impacts from such flights would occur.	Alternatives to the Project proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. Roadless portions of oil and gas developments inherently require more air traffic in order to provide necessary access. Though the elimination of a road would aid caribou movements in that area, the increase in air traffic to the roadless development would increase overall disturbance of caribou. In this case, the airstrip would be close to the high-density calving area, with most air traffic landing from the west due to dominant wind directions. This is likely to cause disturbance and/or displacement of calving caribou and have some impacts on caribou movements during other times of the year. Making BT4 and BT5 roadless would mean two additional airstrips (i.e., one at each drill site). The impacts of additional fill (and the multitude of associated impacts of the fill) and additional air traffic (and the additional indirect effects of that traffic) would be greater than the impacts of building an infield road to these sites; therefore, it was not included in detailed analysis. The increase in air traffic for a roadless alternative is substantial. The addition of one more airstrip under Alternative C would add 7,473 more fixed-wing trips and 489 helicopter trips over the life of the Project (62% more fixed-wing traffic and 20% more helicopter traffic than having a road).	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
407	20	Rose	Garett	Natural Resources Defense Council	Request for New Alternative	BLM could have in the SDEIS analyzed a number of viable alternatives that would have reduced potentially significant impacts to the Western Arctic's resources. . . . Among others, these include an alternative disallowing infrastructure in special areas, an alternative allowing winter-only drilling, and an alternative involving meaningful modifications to the Projects configuration. BLM continues to ignore an alternative that would avoid infrastructure in designated Special Areas. . . . The DEIS did not consider such an alternative and neither does the SDEIS, even though all alternatives continue to involve development within the Teshekpuk Lake Special Area, the Colville River Special Area, or both. . . . Similarly, BLM continues to ignore a winter-only drilling alternative. Among other reductions in potential impacts, such an alternative would reduce the need for gravel roads and other infrastructure. And it would reduce disturbance in the spring, summer, and fall, when several different species are engaged in critical activities in the area (e.g., caribou migration and nesting birds). . . . A winter-only drilling alternative and the concomitant reduction in activity outside of winter is more imperative now since activities associated with the permanent infrastructure that BLM considers in the SDEIS would exacerbate potential impacts across all seasons. Additionally, BLM in the SDEIS passed up an opportunity to consider an alternative that would involve different layouts, designs, and sizes for the Project that would reduce overall potential impacts. Most glaringly, under all alternatives, the Projects drill sites have the same size and locations, and the pipelines have the same alignment. In the DEIS, BLM improperly rejected reducing the number or size of the pads, stating that it [w]ould not meet the purpose and need to recover the maximum extent of the targeted hydrocarbon resources. Drill pads have already been optimized to the minimum size needed for the proposed activity. Drill pad locations have already been optimized to provide maximum accessibility to the resources based on existing extended-reach drilling technology and reservoir location and characteristics. As commentators noted, this explanation misstates the purpose and need, which nowhere involves recovering the maximum extent of targeted hydrocarbons. Moreover, dismissing modifications because locations have been optimized to provide maximum accessibility wholly ignores BLM's legal obligations (recognized in the purpose and need statement) under the NPRPA, as amended, which require protection of surface resources. Given that the SDEIS introduces additional infrastructure across all alternatives, it is necessary for BLM to consider reconfigurations that would reduce the Projects potentially significant impacts. BLM must revise its analysis to consider alternatives that meaningfully reduce potentially significant impacts from the Project and reissue the analysis for public comment. Commentators on the DEIS provided a robust list of specific alternatives that would do this. BLM, however, continues to stand by a selection of functionally identical alternatives, in dereliction of its obligations under NEPA.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. Under the NPR-A IAP and Section 404 of the CWA, lessees are required 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). Alternatives to the Project proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. Table D.3.2 in Appendix D.1, *Alternatives Development*, was updated to reflect that the location of drill pads would not allow CPAI to exercise its rights under its leases to extract all the oil and gas possible within the leased areas. (This would apply to the location of pads, the pad size, or the number of pads.) Language about this not meeting the Project's purpose and need was removed.	Y

4.2.3.21 Request for New Analysis

Table B.3.23. Substantive Comments Received on Request for New Analysis

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
117	1	Campbell	Bruce	—	Request for New Analysis	If there is still interest by Conoco-Phillips in pursuing the Willow MDP for the ecologically fragile northeastern corner of the National Petroleum Reserve Alaska, then BLM MUST DO ANOTHER SUPPLEMENT to the (Supplement to) the DRAFT ENVIRONMENTAL IMPACT STATEMENT. This makes total sense in these harrowing recent times where economies are collapsing right and left due to Covid-19 leading to a huge reduction in demand for transportation fuels around the planet. 1. ADDRESS THE NEW ECONOMIC REALITY OF CHEAP OIL AND GAS PRICES, and how that may impact the viability of the Willow MDP; 2. ADDRESS THE PLUMMETING DEMAND FOR FUEL AROUND THE GLOBE (and not just during the quarantine phase for Covid-19).	BLM cannot speculate about the intentions of the Project proponent regarding when the Project proponent will choose to apply for authorization or whether the Project is still viable. The EIS is in response to CPAI's request to review its Willow MDP Project. An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation.	N
117	2	Campbell	Bruce	—	Request for New Analysis	ALLOW MORE INPUT FROM BIOLOGISTS AND HYDROLOGISTS, AS WELL AS FROM OTHER AGENCIES, NOW THAT THE DOCUMENTATION HAS SLOWLY BEEN EMERGING THROUGH THIS EIS PROCESS GIVING A BETTER IDEA OF THE GENERAL AREAS OF WATERSHEDS WHICH WOULD BE IMPACTED BY A MASSIVE ARRAY OF INFRASTRUCTURE AND EXTRACTION UNDER THE WILLOW MDP.	The SDEIS and the Final EIS were prepared by subject-matter experts, including biologists and hydrologists, and were reviewed by cooperating agencies, including USACE, EPA, USFWS, U.S. Department of Transportation, NVN, Inupiat Community of the Arctic Slope, City of Nuiqsut, NSB, and State of Alaska. The Final EIS has been revised in response to comments from the public and from cooperating agencies on the Draft EIS and the SDEIS.	N
117	3	Campbell	Bruce	—	Request for New Analysis	RE-EVALUATE THE FINANCIAL VIABILITY OF VARIOUS PETROCHEMICAL EXTRACTION PROJECTS (both current and planned) THROUGHOUT THE NATIONAL PETROLEUM RESERVE ALASKA (and beyond) in light of the massive drop in global demand for fuel, including how you see various drilling and pipeline projects linking up. It may be half a decade before we have a decent idea whether the global economy will ever recover to a point where there will be the demand for fuel that there has been in recent years around the globe. So, will the Willow MDP be an anchor to help open up a new set of leases on Alaska's North Slope as the EIS theorizes, or will it not be financially viable in this modern era of covid-19?	BLM cannot speculate about whether the Project is still viable. The EIS is in response to CPAI's request to review its Willow MDP Project. An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation. The Draft EIS and the SDEIS consider analysis of a reasonably foreseeable development scenario.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
816	3	Johnson	Alex	—	Request for New Analysis	ConocoPhillips has made significant changes to the project, including changes to infrastructure location, size, facilities, and projected aircraft and vehicle traffic. BLM has not adequately analyzed these changes in its supplemental draft EIS.	As noted in SDEIS Section 1.2 (*Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*), the SDEIS evaluated the three substantive elements added to the Project description since the Draft EIS. BLM decided to issue the SDEIS in a succinct format, in order to provide a more reader-friendly document and avoid duplicative information that could be found in the Draft EIS. The intent was to focus only on the main Project changes that had potential new effects, which had not been previously analyzed in the Draft EIS. This is noted in SDEIS Section 1.2: "The SDEIS limits the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS." Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment and are included and detailed in the Final EIS analyses of potential effects. BLM's decision to focus on the main Project changes and effects that had not been previously analyzed in the Draft EIS is consistent with 43 CFR 46.120(d) and Secretarial Order 3355, which encourages supplementing a Draft EIS to meet the purposes of NEPA as efficiently as possible, while avoiding redundancy in the process.	N
159	12	Kenning	Erik	ASRC	Request for New Analysis	Incorporation of Traditional Knowledge: ASRC expects that BLM consider the history of Traditional Knowledge (TK) throughout the EIS and their review of the Willow project. Traditional Knowledge is based on generations of observations of the environment, ecosystem, and the animals which inhabit our lands. It has sustained Arctic indigenous cultures for daily activities and during times of adversity for millennia. When incorporated into Arctic oil and gas development projects and into the assessment of these projects, it can improve operating practices, safety procedures, and emergency and environmental response systems. In addition to the environmental data that has been collected over the decades supporting this project, traditional knowledge should be a key source of information in assessing impacts and also supporting appropriate mitigation to minimize potential impacts to the environment and animals, especially those terrestrial animals and birds harvested for subsistence. ASRC recommends that BLM continues to work closely with the local Kuukpik Corporation, Native Village of Nuiqsut, City of Nuiqsut, and ASRC and the NPRA Working Group in order to incorporate Traditional Knowledge more fully into their decision-making for the Willow MDP.	Text regarding how traditional knowledge was used in the EIS was added to Final EIS Section 3.1, *Introduction and Analysis Methods*.	Y
95	1	McGinnis	Margaret	—	Request for New Analysis	I am writing to urge that the supplement addresses the following environmental concerns: The BLM had previously identified impacts to subsistence use and access; biological resources, including caribou, polar bears, spectacled and Stellar eiders, yellow billed loons, and fisheries; social and cultural resources; air quality and climate; and aquatic resources associated with this project.	Section 3.16 (*Subsistence and Sociocultural Systems*) of the SDEIS and Final EIS addresses subsistence use and access, as well as cultural resources. Several sections address biological resources (Section 3.9, *Wetlands and Vegetation*; Section 3.10, *Fish*; Section 3.11, *Birds*; Section 3.12, *Terrestrial Mammals*; and Section 3.13, *Marine Mammals*). Air quality impacts are discussed in Section 3.3 (*Air Quality*). Aquatic resources are discussed in Section 3.8 (*Water Resources*).	N
3	2	Merendino	Caleb	—	Request for New Analysis	Supplemental draft environmental impact statement is deeply inadequate on multiple fronts: 1) It fails to sufficiently analyze the project's harm to wildlife already struggling to survive in a warming Arctic, damage to wetlands, air pollution and loss of subsistence values.	BLM prepared the SDEIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the SDEIS includes a full and fair discussion of significant environmental impacts that may result from the three new Project components not previously analyzed in the Draft EIS. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement, and informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. Wildlife impacts are discussed in Section 3.10 (*Fish*), Section 3.11 (*Birds*), Section 3.12 (*Terrestrial Mammals*), and Section 3.13 (*Marine Mammals*). Wetland impacts are discussed in Section 3.9 (*Wetlands and Vegetation*). Air quality impacts are discussed in Section 3.3 (*Air Quality*). Subsistence impacts are discussed in Section 3.16 (*Subsistence and Sociocultural Systems*).	N
839	2	Miller	Pamela	—	Request for New Analysis	I see that [A]lternative B, ConocoPhillips project, this supplemental, basically, slot — appears to slot that in without the full analysis in comparison of the impacts, direct and cumulative, of all the project features and comparing them with the other alternatives. [V]ery confusing in the public — just in your discussion today about what's in engineering versus a design feature. So that was a problem With the [c]oronavirus, with the economic destruction, I think this needs a step back to fully analyze the potential benefits of economics given the [c]oronavirus, as well as how it may affect the local people with the influx of more people for the construction and so on.	The full analysis of all the updated Project design features is included in the Final EIS, including an updated economic analysis in Section 3.15 (*Economics*). As described in Final EIS Section 3.18.2.4.1.5, *Health Effect Category 5: Infectious Disease*, "non-local construction workers would have little contact with Nuiqsut residents, and construction would not affect infectious disease levels in the community."	Y
26705	2	President	Acting	Native Village of Nuiqsut Tribal Council	Request for New Analysis	The SDEIS does not correct or address the many serious deficiencies we identified in our previous comments, nor does it adequately evaluate the impacts from the Colville River Crossing Module Delivery option and other proposed changes to the MDP.	BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
26705	5	President	Acting	Native Village of Nuiqsut Tribal Council	Request for New Analysis	BLM has not addressed the concerns NVN raised in comments on the DEIS. NVN raised serious concerns with the Willow MDP in our comments on the DEIS. As explained in those comments, BLM failed to: (1) adequately consider NVN's input and feedback; (2) give sufficient consideration to environmental justice; (3) adequately disclose and analyze numerous, significant human and environmental impacts from the Willow project; (4) conduct an adequate ANILCA section 810 analysis; and (5) include meaningful mitigation measures. In this SDEIS, BLM has not addressed any of the issues raised in NVN's previous comments, and those comments remain fully applicable to the project. BLM must correct those deficiencies before proceeding with permitting the Willow MDP.	BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to public and cooperating agency comments on the Draft EIS and SDEIS, including comments from NVN. In the Final EIS, environmental justice is addressed in Section 3.17 (*Environmental Justice*) and the ANILCA Section 810 Analysis is included as Appendix G (*Alaska National Interest Lands Conservation Act Section 810 Analysis*). All responses to comments can be found in Appendix B (*Public Engagement and Comment Response*) of the Final EIS.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26705	6	President	Acting	Native Village of Nuiqsut Tribal Council	Request for New Analysis	The SDEIS fails to adequately disclose and analyze the human and environmental consequences of the proposed changes to the Willow MDP. In addition to the issues NVN raised in comments on the DEIS, which have not been resolved in this SDEIS, BLM's analysis of proposed changes to the Willow MDP is deficient. The most prominent change is the consideration of a module delivery "option" that would transport large sealift modules to the project area from the existing Oliktok Dock on gravel and ice roads, including an ice bridge over the Colville River. BLM has failed to adequately consider the impacts of this and other changes to the project. It failed to (a) address significant uncertainty and potentially significant effects to fish and hydrology from the Colville River Crossing ice bridge; (b) adequately consider the impacts of the new module delivery option on subsistence activities; (c) analyze the different air quality impacts from the new module delivery option and other project changes; (d) present the impacts from the module delivery options in comparative form; (e) address the impacts to fish and hydrology from construction of a fresh water reservoir; and (f) disclose and analyze the effects of several other changes to alternatives considered in the DEIS.	The SDEIS addresses all the potential impacts raised by the commenter. Effects on fish are addressed in Section 3.10 (*Fish*); effects on hydrology from the Colville River Crossing ice bridge are addressed in Section 3.8 (*Water Resources*); impacts of the new module delivery option on subsistence activities are addressed in Section 3.16 (*Subsistence and Sociocultural Systems*); air quality impacts from the new module delivery option and other Project changes are addressed in Section 3.3 (*Air Quality*); and impacts from the module delivery options are presented in comparative form in the Final EIS. The other minor Project updates and modifications that were determined not to warrant additional analysis in the SDEIS were listed in the SDEIS for public comment, are detailed in the Final EIS, and are included in the overall analysis of potential effects.	N
26705	13	President	Acting	Native Village of Nuiqsut Tribal Council	Request for New Analysis	BLM must compare the impacts of the Colville River module delivery option to other module delivery options. The SDEIS does not compare the impacts from the Colville River crossing option against the other module delivery options, in violation of NEPA. Among other differences, this option will: require construction of a large ice road in a different location than ice roads under the other options; change total ground traffic; change the location of ground traffic; require additional gravel and in different locations; require different water sources; and include a 100-person camp in a new location. In addition to fully analyzing the impacts from this option, BLM must present the impacts "in comparative form, thus sharply defining the issues and providing a dear basis for choice among options by the decision maker and the public." The SDEIS does not present impacts from the three module delivery options in comparable form. This makes it difficult or impossible to determine from the SDEIS how the impacts from the Colville River crossing option will differ from the other module delivery options. In particular, the SDEIS does not adequately explain how the impacts to subsistence activities under the different module delivery options compare.	The Draft EIS included a comparative analysis of the two module delivery options with an MTI, and the SDEIS provided detailed analysis of the new module deliver option using the Oliktok Dock and Colville River ice road crossing. The Final EIS includes a comparative analysis of all three options. SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." All Project components are described and compared in the Final EIS.	Y
26705	15	President	Acting	Native Village of Nuiqsut Tribal Council	Request for New Analysis	BLM must analyze other changes to the Willow MDP or provide an adequate justification for not doing so. The SDEIS references additional project design updates and modifications provided by the project proponent and which BLM indicates will be detailed in the final EIS. These changes may be significant, including relocating the operations center, processing facility, and air strip; processing GMT2 oil at the Willow processing facility; increased fresh water use utilizing additional source lakes; changes to the quantity of gravel needed for the project and the footprint of the gravel mine sites; and changes to the location and footprint of several other project components. BLM has not provided a sufficient justification why these are not substantial changes relevant to environmental concerns that must be addressed in the SDEIS.	As noted in SDEIS Section 1.2 *(Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*), the SDEIS evaluated the three substantive elements added to the Project description since the Draft EIS. BLM decided to issue the SDEIS in a succinct format, in order to provide a more reader-friendly document and avoid duplicative information that could be found in the Draft EIS. The intent was to focus only on the main Project changes that had potential new effects, which had not been previously analyzed in the Draft EIS. This is noted in SDEIS Section 1.2: "The SDEIS limits the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS." Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment and are included and detailed in the Final EIS analyses of potential effects. BLM's decision to focus on the main project changes and effects that had not been previously analyzed in the Draft EIS is consistent with 43 CFR 46.120(d) and Secretarial Order 3355, which encourages supplementing a Draft EIS to meet the purposes of NEPA as efficiently as possible, while avoiding redundancy in the process.	N
520	8	Psarianos	Bridget	Trustees for Alaska	Request for New Analysis	BLM Must Still Issue a Revised EIS. BLM's draft EIS should be further revised and re-released for public comment. . . . BLM's supplemental draft EIS will need to be revised for at least four reasons: (1) the manner in which it incorporates the draft EIS by reference fails to enable meaningful public review and understanding of the agency's proposal, methodology, and analysis of environmental consequences; (2) it fails to include key information about the project; (3) it fails to analyze a reasonable range of alternatives; and (4) it fails to take a hard look at the direct, indirect, and cumulative impacts of the proposed project. First, BLM's supplemental draft EIS for the Willow project contains vague cross-references to BLM's draft EIS and supporting documents, making it difficult to review and understand the project proposal, alternatives, and impacts. For example, in explaining the alternatives under consideration, the supplemental draft EIS states: In addition to the Project details for Alternatives B, C, and D provided in the Draft EIS Chapter 2.0, Alternatives, and Appendix D, Alternatives Development, a CFWR and up to three subsistence boat ramps would be added to all action alternatives. In order to understand the alternatives that BLM is proposing, the reader must consult both the supplemental draft EIS, the entirety of Chapter 2 of the draft EIS, and Appendix D of the draft EIS. Chapter 2 of the draft EIS continually cross-reference figures which are not in-text, but relegated to Appendix A of the draft EIS. This makes it incredibly challenging to understand the specific alternatives proposed by ConocoPhillips and considered by BLM. An EIS must be organized and written so as to be readily understandable by governmental decisionmakers and by interested non-professional laypersons likely to be affected by actions taken under the EIS. It is inconsistent with NEPAs goal of informed public participation for this supplemental draft EIS to be set up in such a manner.	As noted in SDEIS Section 1.2 (*Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*), the SDEIS evaluated the three substantive elements added to the Project description since the Draft EIS. BLM decided to issue the SDEIS in a succinct format, in order to provide a more reader-friendly document and avoid duplicative information that could be found in the Draft EIS. The intent was to focus only on the main Project changes that had potential new effects, which had not been previously analyzed in the Draft EIS. This is noted in Section 1.2 of the SDEIS: "The SDEIS limits the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS." Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment and are included and detailed in the Final EIS analyses of potential effects. BLM's decision to focus on the main Project changes and effects that had not been previously analyzed in the Draft EIS is consistent with 43 CFR 46.120(d) and Secretarial Order 3355, which encourages supplementing a Draft EIS to meet the purposes of NEPA as efficiently as possible, while avoiding redundancy in the process.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
520	9	Psarianos	Bridget	Trustees for Alaska	Request for New Analysis	Second, the supplemental draft EIS contains significant gaps in information and analysis that seriously frustrate public review and understanding. Certain highly significant issues that affect important resources and uses of the project area, such as air quality, greenhouse gas emissions and climate change, and public health are entirely missing from the supplemental draft EIS impacts analysis. Many issues, such as impacts to hydrology, wildlife, marine mammals, and subsistence are only partially addressed, with key elements of the analysis missing, incomplete, inaccurate, inconsistent with the best available science, or otherwise inadequate. . . . The significant and numerous information and analytical gaps render BLM's supplemental draft EIS so inadequate as to preclude meaningful analysis and review by the public, and therefore necessitate a revised draft EIS. Additionally, what BLM is actually considering and authorizing is very confusing, frustrating public review. To remedy the extensive gaps in information and analysis, a revised draft EIS is necessary that comprehensively considers the entire project in one document.	BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
520	11	Psarianos	Bridget	Trustees for Alaska	Request for New Analysis	Fourth and finally, BLM still fails to take a hard look at the impacts of this massive industrial development. . . . The numerous and significant gaps in information, analysis, and alternatives renders the supplemental draft EIS impacts analysis invalid. As the Ninth Circuit has explained, without establishing the baseline conditions . . . , there is simply no way to determine what effect the proposed [action] will have on the environment and, consequently, no way to comply with NEPA. BLM arbitrarily selected certain resources to analyze in the supplemental draft EIS, while entirely ignoring changes in impacts to other resources, such as air quality and public health. Where BLM did undertake some analysis of differences in resource impacts, such as marine mammals and caribou, elements of the impacts analysis are incomplete, unsupported by the best available science, or otherwise inadequate, as explained below. The deficient impacts analysis renders the supplemental draft EIS so inadequate as to preclude meaningful review. A comprehensive revised draft EIS is required.	As noted in SDEIS Section 1.2 (*Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*), the SDEIS evaluated the three substantive elements added to the Project description since the Draft EIS. BLM decided to issue the SDEIS in a succinct format, in order to provide a more reader-friendly document and avoid duplicative information that could be found in the Draft EIS. The intent was to focus only on the main Project changes that had potential new effects, which had not been previously analyzed in the Draft EIS. This is noted in SDEIS Section 1.2: "The SDEIS limits the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS." Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment and are included and detailed in the Final EIS analyses of potential effects. BLM's decision to focus on the main Project changes and effects that had not been previously analyzed in the Draft EIS is consistent with 43 CFR 46.120(d) and Secretarial Order 3355, which encourages supplementing a Draft EIS to meet the purposes of NEPA as efficiently as possible, while avoiding redundancy in the process.	N
520	12	Psarianos	Bridget	Trustees for Alaska	Request for New Analysis	BLM Arbitrarily Failed to Analyze Impacts Due to Important Changes to the Project. The supplemental draft EIS considers three proposals by ConocoPhillips, while entirely ignoring the direct, indirect, and cumulative impacts from other major project changes proposed by the company. In essence, ConocoPhillips has proposed alterations to nearly every conceivable aspect of the Willow project its size, location, the facilities being used, and levels of activity associated with the project. . . . These are not minor changes to the project proposal, but are the type of changes which should be evaluated in a revised EIS. BLM recognizes this laundry list as substantive elements of the project, and concedes that some the projects effects analyzed in the draft EIS may differ in magnitude, duration, or location due to ConocoPhillips modifications. BLM states that it will evaluate these changes in the final EIS, but offers no explanation as to why or how it determined that constructing three boat ramps and a reservoir warrants analysis in a supplemental EIS, but entirely relocating part of the project and changing the size of its components and level of activities does not. It also leaves the public out of the process by eliminating the opportunity for the public to review the project changes and the agency's analysis and offer public comment for the agency to consider in its review. Here, BLM does not even attempt to provide an explanation for its decision to ignore significant project changes in the supplemental draft EIS. This violates NEPA.	As noted in SDEIS Section 1.2 (*Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*), the SDEIS evaluated the three substantive elements added to the Project description since the Draft EIS. BLM decided to issue the SDEIS in a succinct format, in order to provide a more reader-friendly document and avoid duplicative information that could be found in the Draft EIS. The intent was to focus only on the main Project changes that had potential new effects, which had not been previously analyzed in the Draft EIS. This is noted in SDEIS Section 1.2: "The SDEIS limits the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS." Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment and are included and detailed in the Final EIS analyses of potential effects. BLM's decision to focus on the main Project changes and effects that had not been previously analyzed in the Draft EIS is consistent with 43 CFR 46.120(d) and Secretarial Order 3355, which encourages supplementing a Draft EIS to meet the purposes of NEPA as efficiently as possible, while avoiding redundancy in the process.	N
520	13	Psarianos	Bridget	Trustees for Alaska	Request for New Analysis	Finally, BLM should have considered significant new circumstances that point to a potentially long-term delay in, or possibly a cancellation of all or part of the Willow oil development. This includes the current worldwide decline in crude oil demand due to COVID-19, with an uncertain end date for this decline and the possibility of a near-term recession or depression. Further, there is a current worldwide oversupply of crude oil and resulting tank and tanker storage limitations. This situation has already resulted in production declines including on Alaska's North Slope. It is unlikely that new projects on the North Slope will move forward if existing projects may have to be shut-in. Relatedly, there may be long-term crude oil price projections that are less than the price point needed for ConocoPhillips to pursue the Willow development, or the company may decide to scale back the development. Additionally, ConocoPhillips recently cancelled its exploratory drilling this winter on the North Slope, largely related to the Willow development. As a result of this cancellation, we also question whether ConocoPhillips has sufficient information regarding the project reserves to make informed decisions on locations for gravel well pads. . . . While these uncertainties may take some time to sort out, it is clear that they represent significant new circumstances. If there is a high likelihood that ConocoPhillips will need to delay, cancel, or reduce the size and/or extent of the Willow project, that situation warrants another draft EIS accounting for the foreseeable, significant changes to timing and project design. BLM should not move forward without a better understanding of whether or not this project could proceed in its presently proposed form and on its currently proposed schedule. Further, BLM must consider if it is even feasible that the Willow project can move forward in the current economic climate.	BLM cannot speculate about whether the Project is still viable. The EIS is in response to CPAI's request to review its Willow MDP Project. An oil and gas lease grants certain exploration and development rights, subject to reasonable regulation.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
520	30	Psarianos	Bridget	Trustees for Alaska	Request for New Analysis	IBLM FAILED TO ADEQUATELY CONSIDER IMPACTS TO RESOURCES IN THE PROJECT AREA. The EIS must assess the direct, indirect, and cumulative effects of the proposed project on the human environment, as well as the means to mitigate adverse environmental impacts. The effects and impacts to be analyzed include ecological, aesthetic, historical, cultural, economic, social, and health impacts. The BLM may not rely solely on the one-sided information and conclusions contained in ConocoPhillips application. As the lead agency responsible for developing the EIS, the BLM is obligated to obtain appropriate baseline data for the project area and do a thorough analysis of potential impacts from the proposed project. For most of the resources reviewed in the supplemental draft EIS, the BLM has failed to take a hard look at direct, indirect, and cumulative effects.	BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
520	79	Psarianos	Bridget	Trustees for Alaska	Request for New Analysis	BLM must compare the subsistence impacts of the Colville River module delivery option to other module delivery options. The SDEIS does not compare the subsistence impacts from the Colville River crossing option against the other module delivery options, in violation of NEPA. Among other differences, this option will require construction of a large ice road in a different location than ice roads under the other options; change total ground traffic; change the location of ground traffic; require additional gravel, in different locations; require different water sources; and include a 100-person camp in a new location. In addition to fully analyzing the subsistence impacts from this option, BLM must present the impacts in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public. The SDEIS does not present impacts from the three module delivery options in comparable form. This makes it difficult or impossible to determine from the SDEIS how the subsistence impacts from the Colville River crossing option will differ from the other module delivery options. In sum, BLM's analysis of subsistence impacts in the SDEIS is inadequate. The SDEIS does not resolve the issues previously raised, and it adds additional uncertainty and potentially significant impacts that the agency must addressed in a revised draft EIS before permitting the project.	The Draft EIS included a comparative analysis of the two module delivery options with an MTI, and the SDEIS provided detailed analysis of the new module deliver option using the Oliktok Dock and Colville River ice road crossing (Option 3: Colville River Crossing). The Final EIS includes a comparative analysis of all three options. SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications." All Project components are described and compared in the Final EIS.	Y
407	2	Rose	Garett	Natural Resources Defense Council	Request for New Analysis	These comments are focused on the SDEISs failure to meaningfully analyze the potentially significant impacts of the Project and consider a reasonable range of alternatives. . . . The SDEIS, like the DEIS before it, does neither. As such, the SDEIS and DEIS remain so inadequate as to preclude meaningful analysis, necessitating wholesale revision and recirculation. The SDEIS purports to analyze potential impacts from three components being added to the Willow Project by CPAI. First, a new freshwater reservoir is located near one of the proposed wells. Second, the Project will now include up to three new boat ramps for subsistence use, located along Ublutuoch River, Judy Creek, and/or Fish Creek. Third, BLM purports to consider a new module delivery option for transporting infrastructure to the proposed project site from Oliktok Dock well to the east of the Projects location and across the Colville River via ice bridge (Option 3). Notably, this option, if implemented would complete the encirclement of the Native Village of Nuiqsut by oil and gas infrastructure, fundamentally altering the environs for human users and wildlife alike. The SDEIS fails to meaningfully analyze the Projects potentially significant impacts from these and functionally related components. It excludes a host of Project changes from analysis or discussion. It does not document potential impacts from the new components that it does discuss. It ignores potentially significant cumulative impacts of these components. And it ignores well-documented missteps in the DEISs analysis of connected impacts. Where it considers potential impacts, it regularly dismisses their significance without evidence or required analysis. In short, the SDEIS recapitulates and multiplies omissions, flaws, and errors in the DEIS.	BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement. As noted in Section 1.2 (*Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*) of the SDEIS, ongoing design refinement and engineering is typical during the NEPA process. The SDEIS evaluated three substantive elements added to the Project description since the Draft EIS. The SDEIS limited the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS. Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment and are included and detailed in the Final EIS analyses of potential effects.	N
407	4	Rose	Garett	Natural Resources Defense Council	Request for New Analysis	Unanalyzed Project Changes BLM in the SDEIS fails to provide the required analysis of new Project components and modifications for public comment. NEPA requires that an agency draft a supplemental EIS for comment if [t]he agency makes substantial changes in the proposed action that are relevant to environmental concerns. BLM includes a list of nearly a dozen changes to the Project, including infrastructure relocation, changes to the Projects overall footprint, new facilities, nebulously specified updates, and alterations to the water and gravel required by the Project. BLM has not explained why these seemingly substantial changes will not lead to potentially significant impacts that must be analyzed in the SDEIS, instead simply asserting that they are not expected to substantively change the overall analysis or result in the DEIS.	As noted in SDEIS Section 1.2 (*Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*), ongoing design refinement and engineering is typical during the NEPA process. The SDEIS evaluated three substantive elements added to the Project description since the Draft EIS. The SDEIS limited the scope of analysis to new Project components that would have new potential effects or would have effects in new areas not previously analyzed in the Draft EIS. Potential environmental effects for Project elements that were already evaluated in the Draft EIS were not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect) due to Project modifications. These minor Project updates and modifications were listed in the SDEIS for public comment and are included and detailed in the Final EIS analyses of potential effects.	N
407	6	Rose	Garett	Natural Resources Defense Council	Request for New Analysis	Impacts Analysis Deficiencies The SDEIS fails to meaningfully analyze potentially significant impacts from the Project. The new components discussed in the SDEIS entail greater potential impacts to areas and resources already affected by the Projects original configuration and generate additional impacts in new areas. The deficiencies of the DEISs impacts analysis were raised in detail during the first round of comments. Instead of correcting these deficiencies and comprehensively analyzing the consequences of the new components, the SDEIS piles more atop them. BLM thereby further obscures the magnitude and nature of the Projects potentially significant impacts and further hides from public view information necessary for understanding those impacts.	BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the potential effects of the Project, as well as reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N
407	17	Rose	Garett	Natural Resources Defense Council	Request for New Analysis	The SDEIS thus falls well short of the disclosure and analysis of potentially significant impacts that NEPA requires. BLM continues to hide necessary information and otherwise obscure the magnitude and nature of the Projects potentially significant impacts, thereby preventing the public and decisionmakers from accurately assessing the Projects environmental effects. BLM must revise and recirculate its impacts analysis for the entire Project including the newly added components.	BLM prepared the SDEIS and the Final EIS according to 40 CFR 1502 and BLM's NEPA Handbook (H-1790-1) (BLM 2008); the EIS includes a full and fair discussion of significant environmental impacts that informs decision-makers and the public of the potential effects of the Project, as well as reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. The Final EIS has been revised in response to comments on the Draft EIS, including its supplement.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26709	6	Warren	James	—	Request for New Analysis	The analysis shows that there are very likely direct, indirect, and cumulative impacts of overwhelmingly negative kinds on the ecology, hydrology, vegetation, and wildlife of the affected areas. (This was also the case in the Draft EIS.) And yet the BLM always spreads out the analysis in such a way as to minimize these negative effects. By treating the Teshekpuk Lake Caribou Herd and the gravel infrastructure proposed to be built, BLM claims there will be some adverse impacts and then some maybe positive impacts, such as the great spot for caribou to avoid warble flies and other pests they deal with every summer day. This is not the same as a real analysis of the health of the TLCH and other affected caribou herds across the North Slope. To treat these issues in isolation from one another, Ms. Jones, is deliberately to minimize the impact of BLM decisions.	Effects to the TCH and the CAH from the Project (including effects from gravel infrastructure) are detailed in Section 3.12.2, *Environmental Consequences*. The health of the TCH and the CAH may be impacted by a variety of different factors, including but not limited to effects from the Project. Cumulative effects on these herds are described in Section 3.19.10, *Cumulative Impacts to Biological Resources*. Each action alternative has trade-offs of positive and negative effects. In accordance with CEQ guidelines, the EIS discloses these trade-offs.	N

4.2.3.22 Soils and Permafrost

Table B.3.24. Substantive Comments Received on Soils and Permafrost

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26707	6	Baca	Andrew	US Environmental Protection Agency	Soils and Permafrost	We recommend that the FEIS provide additional detail to support statements in the SDEIS that the design of the CFWR minimizes thermal impacts. Section 3.4.2.1.1 Thawing and Thermokarsting indicates that the proposed 6:1 side slopes within the reservoir would reduce thermal impacts of the unfrozen water in the reservoir on surrounding permafrost. Without a reference or explanation to support this statement, it is unclear whether the proposed angle is the best for reducing thermal impacts and whether there may be additional measures that could further reduce impacts.	The proposed 6:1 slopes of the CFRW sidewalls would aid in slope stability and would reduce the risk of lateral movement as the soils of the sidewalls thaw (either when submerged or exposed to warm surface temperatures). Laying the sidewall slopes back at a shallower angle would help to reduce the lateral thaw extents of the developed talik and would allow the permafrost front to grow farther into the reservoir boundary. This clarification was added to Section 3.4.2.3.1, *Thawing and Thermokarsting*.	Y
717	53	Dunn	Connor	ConocoPhillips Alaska	Soils and Permafrost	3.4.2.1.1 - Soils, Permafrost and Gravel - Thawing and Thermokarsting Paragraph 3 discusses impacts to permafrost based on change in hydrology and snow accumulation from the 7-foot berm around the perimeter of the CWFR but fails to address that the intent and engineered purpose of the berm is to protect the thermal stability at the perimeter of the CWFR. The purpose of the berm should be included in the description.	Installation of soil berms around the perimeter of the CFWR would help maintain the thermal regime of frozen soils adjacent to the excavation. The berms would act as insulation and cause the active layer to rise into the berm, thereby protecting the frozen soils below (near the crest of the CFWR) (Andersland and Ladanyi 2003). This clarification was added to Section 3.4.2.3.1, *Thawing and Thermokarsting*.	Y
717	55	Dunn	Connor	ConocoPhillips Alaska	Soils and Permafrost	3.4.2.1.1 - Soils, Permafrost, and Gravel Resources - Thawing and Thermokarsting This section was copied from the DEIS discussing the gravel mining operations (Section 3.4.2.3.1, Thawing and Thermokarsting): "Excavation activities would reduce the amount of available thawed soil as excavation encroaches on frozen materials (BLM 2018, pg. 250). As the rate of excavation slows or ends, the taliks and water bearing zones would be re-established as the CFWR fills with water." These two sentences are not correct as the construction of the CFWR is stated as being done in the winter when there will be very little unfrozen soil (primarily in the thaw bulb of Lake M0015, which likely only extends into the area of the CFWR Channel Connection immediately adjacent to M0015). The CFWR would be filled the following spring during breakup and a new thaw bulb would begin to develop beneath the CFWR and connection channel, joining with the thaw bulb of Lake M0015. We recommend that this text be corrected.	The discussion in Section 3.4.2.3.1, *Thawing and Thermokarsting*, has been corrected to state that the excavation would be performed in the winter.	Y
407	8	Rose	Garett	Natural Resources Defense Council	Soils and Permafrost	Soils, Permafrost, and Gravel Resources The SDEIS extends the DEISs deficient analysis of potentially significant impacts to soils, permafrost, and gravel resources. In particular, BLM still fails to analyze the Projects impacts in a systematic fashion. Instead, through extensive cross-references to the DEISs analysis and the addition of new errors, the agency continues to obfuscate the scope of such impacts on the literal foundation of the Western Arctic's ecosystem. Where it exists, the SDEISs analysis of the added Project components fails to consider the full extent of their potential impacts. And it fails in this regard despite each of those elements compounding or extending such impacts. The analysis is, at best, limited to the immediate area of the element being discussed: the freshwater reservoir analysis focuses on potential impacts to the area of the reservoir. The subsection on Option 3 notes only that it would affect soils, permafrost, and gravel resources by constructing ice roads (compacting soils and contributing to thaw and thermokarst) and extracting gravel (changing landforms and decreasing gravel resources) with cross-references to the DEIS. Potential impacts from the boat ramps are not analyzed at all, despite having a collective footprint of up to 5.9 acres. Instead of providing substantive analysis, the SDEIS heavily cross-references the DEIS, which does not itself adequately analyze potential impacts. Both discussions fail to disclose how the potential impacts from various parts of the Project the gravel roads and pads, the ice roads, the mine, etc. could compound, creating destructive thermal and hydrological feedback loops resulting in, for example, the formation and collapse of lakes. And, to the extent they discuss impacts at all, both documents focus on the potential impacts from the Projects components in isolation. For example, the new freshwater reservoir would be connected to the Project via gravel road. The SDEIS states that the presence of impounded water [in the reservoir] would disturb frozen soils and change thermal conditions at the site. And the DEIS states that [p]lacement of gravel fill can cause heat transfer to underlying soils beneath pads. Yet neither the SDEIS nor the DEIS discusses how these potential impacts could compound with and exacerbate each other or with the potential impacts of other pieces of the Project. And neither discuss how these impacts could intersect with the changes in permafrost caused by climate change (changes acknowledged in the DEIS). Nor is this error rectified in the Cumulative Impacts section of either document. The SDEIS disclaims any additional discussion of these resources. And the DEIS simply says that the Project would contribute to the cumulative effects of past, present, and reasonably foreseeable future actions [on these resources] but that it would not change the cumulative impacts. BLM thus hides the actual nature and extent of the Projects potentially significant impacts to soils, permafrost, and gravel from the public. And the public is therefore denied a comprehensive look at the potential impacts of the Project on such resources.	SDEIS Section 1.2, *Rationale for Analysis Contained in the Supplement to the Draft Environmental Impact Statement*, states the following: "Potential environmental effects for Project elements that were already evaluated in the Draft EIS are not reiterated in the SDEIS, even though some effects may be slightly different (in magnitude, duration, or location—not in type of effect), due to CPAI's Project modifications. Other Project changes (e.g., minor changes in gravel pad sizes, changes to the location of Project components and minor shifts in gravel road alignments, changes in ground traffic and air traffic numbers) are not expected to substantively change the overall analysis or results described in Chapter 3 of the Draft EIS. These Project updates and modifications will be detailed in the Final EIS." All Project components are detailed in the Final EIS.	N

4.2.3.23 *Spills*

Table B.3.25. Substantive Comments Received on Spills

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	114	Dunn	Connor	ConocoPhillips Alaska	Spills	4.0 - Spill Risk Assessment - Spill Risk Assessment Please revise this section to reflect that spill risk would be reduced under Option 3 as a result of much lower volumes of air, ground, and vessel traffic; fewer miles of ice road; and one less winter construction season.	Spill risk for all module delivery options is discussed in Final EIS Section 4.5.2, *Comparison of Module Delivery Options*.	Y
717	115	Dunn	Connor	ConocoPhillips Alaska	Spills	4.2 - Spill Risk Assessment - Option 3: Colville River Crossing ConocoPhillips recommends including here that the crossing of the Colville would only occur during two winter seasons, thereby further reducing risk.	Spill risk for all module delivery options is discussed in Final EIS Section 4.5.2, *Comparison of Module Delivery Options*.	Y
658	3	Long	Becky	—	Spills	Lack of a current National Contingency Plan (NCP) has convinced me that in the case of an oil spill, cleanup will not be very good. The US Environmental Protection Agency has not updated the NCP mandated by the Clean Water Act since 1994. This unreasonable delay in the rulemaking for an update means that up to date technology and current scientific findings about spill clean-up will NOT be followed. Thus, the current NCP is inadequate for this SEIS and the other parts of the Master Development Plan.	The Project's spill prevention and response measures that would be used during construction, drilling, and operations would be outlined in a Project Oil Discharge Prevention and Contingency Plan and Spill Prevention, Control, and Countermeasures Plan. Project spill prevention and response is described in EIS Appendix D.1, *Alternatives Development*, Section 4.2.8, *Spill Prevention and Response*; EIS Chapter 4.0, *Spill Risk Assessment*, provides a qualitative assessment of potential spills and addresses the types of spills that may occur; and EIS Appendix H, *Spill Summary, Prevention, and Response Planning*, describes preventive measures and response planning activities that CPAI would implement to minimize potential damage to human health and the environment from oil spills or other accidental releases.	N
4006	1	Kadar	Patricia	Center for Biological Diversity	Spills	Any spills, "accidents" or other unanticipated damage cannot be reasonably remedied or removed before permanent damage occurs in this remote area and in such an extreme climate. The EPA is "temporarily" not enforcing existing laws concerning emissions and spills, supposedly due to the COVID-19 pandemic. What if they are never enforced again? What would be the logical outcome of such inaction in the Arctic?	The Project's spill prevention and response measures that would be used during construction, drilling, and operations would be outlined in a Project Oil Discharge Prevention and Contingency Plan and Spill Prevention, Control, and Countermeasures Plan. Project spill prevention and response is described in EIS Appendix D.1, *Alternatives Development*, Section 4.2.8, *Spill Prevention and Response*; EIS Chapter 4.0, *Spill Risk Assessment*, provides a qualitative assessment of potential spills and addresses the types of spills that may occur; and EIS Appendix H, *Spill Summary, Prevention, and Response Planning*, describes preventive measures and response planning activities that CPAI would implement to minimize potential damage to human health and the environment from oil spills or other accidental releases. Regardless of any temporary decisions by EPA related to enforcement actions, BLM and the State of Alaska require reporting and remediation of spills and releases, and it is not reasonable to assume that these entities would not enforce existing laws.	N
26710	2	Smith	Louise	USFWS	Spills	Oil and contaminant spill potential are not adequately addressed in the Willow SDEIS: "Similarly, the three Project components do not change the likelihood or impacts of potential spills, thus spills are not addressed in this chapter of the SDEIS" (SDEIS pg. 12). The Service believes the proposed crossing of the Colville River via an ice bridge substantially increases the risk of oil or other contaminants entering the Colville River. Construction of the ice bridge may necessitate slotting and/or culvert placement to allow for under-ice water flow. Therefore, contaminants entering into the sub-ice water may result in impacts upstream, due to winter storm surges, as well as downstream of the bridge crossing. Spring breakup also will increase the downstream spread of contaminants. The Service suggests analyses of potential spill scenarios and resulting impacts associated with the proposed Colville River Crossing.	Text was added to Final EIS Section 4.2, *Potential Spills during Construction*, regarding the risk and type of spills that could be associated with Option 3 (Colville River Crossing).	Y

4.2.3.24 *Subsistence, Alaska National Interests Lands Conservation Act Section 810*

Table B.3.26. Substantive Comments Received on Subsistence, Alaska National Interests Lands Conservation Act Section 810

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
216	4	Bruno	Jeff	State of Alaska	Subsistence, ANILCA 810	The SEIS indicates that the findings and subsistence hearings will be noticed in the Federal Register. This additional procedural step, which is not required in ANILCA, could cause unnecessary project delays. The notice requirements in ANILCA Section 810(a) clarify the purpose is to obtain input from the State, local subsistence users, and subsistence advisory groups, to better inform the agency of a proposals impact on subsistence use and access; therefore, notices of hearings need only be sent to communities potentially affected by the proposed action. There is no direction in ANILCA to notice the findings more broadly to gain input from the public at large. ANILCA Section 810(b) merely directs the Secretary to provide notice and hearings whenever an EIS is required, and to incorporate the findings from ANILCA Section 810(a) into the EIS; not supplement the 810 Analysis with NEPA-related policy requirements.	Comment noted.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
589	2	Bennett	Lee Ann	—	Subsistence, ANILCA 810	The ANILCA 810 analysis concluded, "the totality of limitations on subsistence access associated with the Project, particularly during the 7-year construction phase but lasting the life of the Project, would constitute a substantial restriction on subsistence access for Nuiqsut residents." Given the importance of caribou availability and access to traditional hunting areas to Nuiqsut hunters, the BLM expects that limitations to subsistence access and the reduced resource availability anticipated to occur over the 30-year Project life . . . would result in an extensive interference with Nuiqsut hunter access. It is concerning and incomprehensible that the BLM still considers Alternative B its preferred alternative, even after their own conclusions. A second major conclusion of the ANILCA 810 analysis is that the Willow Project's overall layout is without a doubt the worst case scenario in terms of disruption and deflection of caribou. . . . Frankly, based on what I've read in the Draft EIS and Supplemental DEIS, Alternative B is the big loser with regard to negative impacts. This alternative is not the right choice for this project, because it is not the right choice for subsistence hunters and the Indigenous communities that will have to live with it for the next 30-years.	At the development stage, the siting of oil and gas facilities is largely dependent on the location of the subsurface resources to be extracted. The target resources (i.e., oil reservoirs) are in fixed locations and remain the same regardless of action alternative; hence, the same drill site locations are identified across all action alternatives. Moving the location of the drill sites would not allow CPAI to exercise its rights under its leases to extract all the oil and gas possible within the leased areas. Alternatives to the Project proponent's proposal are considered and analyzed in detail only if they offer potential environmental benefits to one or more resources or uses. During selection of a preferred alternative, or of any alternative, BLM looks at multiple resources. The purpose of NEPA is to provide decision-makers and other stakeholders with information they need to understand environmental impacts resulting from an action. The process includes the development of alternatives to an action, which allows decision-makers to consider information about the consequences and trade-offs associated with taking any given course action. BLM will select an alternative and provide rationale for the selection of that alternative in the ROD. BLM does not have to choose the preferred alternative in the ROD; it may choose any alternative or a combination of alternatives in the ROD.	N
717	7	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	BLM should revise the subsistence analysis with respect to Option 3 for module delivery to account for seasonality in both ice road use and subsistence activities. Because the ice road will be used only in the winter and subsistence activities in this area are traditionally low, the potential for impacts to subsistence should also be low.	The data show that the ice road area is heavily used by furbearer hunters and by winter caribou hunters. Thus, these particular activities could experience substantial direct impacts during the two winter ice road seasons. Final EIS Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to clarify that caribou harvests in the vicinity of the ice road occur primarily during the summer and fall months and to address the relative impacts to the TCH and CAH.	Y
717	8	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	BLM should revise the subsistence analysis to provide important context and detail associated with relied-upon scientific studies and to ensure the important limitations of those studies are transparently disclosed. BLM should also revise the subsistence analysis to ensure it is consistent with other NEPA documents as well as internally consistent. Related to these revisions, BLM should eliminate unsubstantiated conclusions about potential for roads to impact caribou migration and hunting success.	The subsistence analysis has been reviewed for consistency with the biological sections. For example, while many of the conclusions of the subsistence section regarding caribou availability (Final EIS Section 3.16.2.3.2, *Resource Availability*) are based on the analysis provided in the terrestrial mammals section (Section 3.12, *Terrestrial Mammals*), additional impacts may occur that are not addressed in the biological resources section. Impacts that may seem minimal from a biological perspective, and are therefore not addressed in the biological resources sections, can have greater impacts on resource availability for subsistence users. These impacts have been documented through interviews and data collection with local subsistence harvesters.	N
717	10	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	BLM should reconsider and revise the cumulative impacts analysis for the Alaska National Interest Lands Act (ANILCA) Section 810 analysis. As currently written, the analysis improperly focuses on an alternative presented in the draft NPR-A Integrated Activity Plan (IAP), which is a planning document that is still in process, under BLM's control, and has no direct connection to the Willow MDP.	BLM considered potential cumulative impacts of the Willow MDP Project in the context of the 2020 Final NPR-A IAP/EIS (BLM 2020) alternatives. BLM's 2020 Final NPR-A IAP/EIS addresses the potential impacts of a no action alternative (See Final EIS Section 3.19.3, *Reasonably Foreseeable Future Actions*). BLM evaluated Alternative A and four action alternatives (Alternatives B, C, D, and E) of the 2020 Final NPR-A IAP/EIS, which differ in the areas that would be made available for NPR-A leasing and infrastructure and which would contribute to the cumulative effects of the Project in different ways. BLM found that selection of Alternatives A, B, and C of the 2020 Final NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways; selection of Alternative D or E would likely result in greater cumulative impacts on subsistence. NPR-A IAP/EIS Alternative D or E would increase development infrastructure on the North Slope and would continue to cause alteration and degradation of habitats for key subsistence resources, including caribou, furbearers, fish, and goose. Over time, these changes could affect the health and abundance of different subsistence resources on the North Slope. If development continues westward into the core calving area for the TCH, or if it reduces access to key insect relief habitats, then the herd could experience an overall decline in productivity and abundance. Such a scenario could occur if BLM selects Alternative D or E in the 2020 Final NPR-A IAP/EIS. Alternative D or E would make areas surrounding Teshekpuk Lake available to oil and gas leasing and infrastructure development. Under this scenario, impacts related to the health and abundance of the TCH would likely extend to subsistence users of the herd, including Nuiqsut, Utqiaġvik (Barrow), Anaktuvuk Pass, Atqasuk, and Wainwright. In response to subsistence concerns from the community of Nuiqsut and the public, CPAI has incorporated up to three boat ramps in the Project design that would improve access for subsistence users. Impacts related to an increase in watercraft and hunting (specifically, potential for increased spills and increased mortality of wildlife) would be an indirect result of construction of the boat ramps and would not be within CPAI's control.	N
717	14	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	The third new project component in the SDEIS is the addition of a river access boat ramp or multiple ramps. This is proposed directly in response to concerns about the potential for roads to adversely impact availability of caribou for subsistence hunting and impede hunters access to the caribou. At the public meeting on the draft EIS in Nuiqsut on October 2, 2019, some residents expressed concern about potential effects of roads on access to caribou for subsistence hunting. One person testified: If there was a boat ramp at Tiŋmiaqsiuġvik, I'd sure as heck be out there looking for caribou to harvest, but there is no boat ramp.*3* ConocoPhillips recognized opportunity to facilitate caribou hunting away from roads and other infrastructure by providing river access through boat ramps at appropriate, community-supported locations. The proposed boat ramps are an impact mitigation built into the project design, developed in response to agency analysis, public comment, and community concerns.	The Final EIS includes discussion and analysis of the impacts and benefits of the CPAI boat ramps under each alternative.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	21	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	The Subsistence Analysis of Option 3 Should be Revised to Distinguish Between Seasonal Impacts of Single-Season Ice Roads and Long-Term Gravel Roads The subsistence use analysis for Option 3 inflates the potential impacts to subsistence uses because it generally fails to account for the seasonal aspect of ice roads versus long-term gravel roads. This is an important aspect of the project that needs to be incorporated throughout the subsistence use analysis because many elements of that analysis will have lower impacts from seasonal use of ice roads than from year-round road use. Below, we provide some key examples to highlight why it is important for BLM revise Section 3.16.2.2 to present an assessment of impacts based on short-term seasonal use of ice roads rather than long-term use of gravel roads. On SDEIS page 55, BLM states that "Nuiqsut residents use the area surrounding the ice road crossing for overland and riverine hunting of caribou, overland hunting of wolf and wolverine, hunting of goose (primarily where the ice road crosses the Colville River), riverine moose hunting, and fishing." Similar language is found on SDEIS pages 51, 52, and 57, as well as in other sections of the analysis. These statements and others convey a sense that a significant amount of subsistence activity may overlap with construction and use of ice roads and ice bridges. However, the only traditional winter subsistence activities that occur in this area are wolf and wolverine hunting. Burbot ice fishing is very localized near Nuiqsut, and only a minor amount of caribou hunting occurs in winter.	The Final EIS analysis acknowledges, where appropriate, that summer/fall subsistence activities will likely not be affected by Option 3 (Colville River Crossing). However, the analysis must also consider whether resource availability of subsistence resources, such as fish, could be indirectly affected by ice road construction. Caribou hunting may be relatively low in winter during most years; however, in some years, winter caribou hunting can be an important source of subsistence foods, and the Option 3 ice road would cross through areas heavily used for these particular activities. Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to provide additional context regarding the timing and duration of impacts and their potential for conflicts with subsistence uses.	Y
717	22	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Next, the SDEIS states at page 57 that [t]he Option 3 analysis area accounts for between 6% and 12% of the total caribou harvest during individual study years, compared to between 4% and 11% under Option 1. These percentages and those included in SDEIS Tables 3.16.8 and 3.16.9 seem to be based on an entire year of subsistence use and harvests, which does not properly represent the potential impacts caused by just two years of seasonal ice road use planned in the area for Option 3. In fact, caribou hunting during winter months only amounts to between 0% to 5% (January-April) of the total caribou harvest in Nuiqsut. This indicates that winter activities (such as construction and use of the ice road and engineered ice crossing) have the lowest potential impact on caribou hunting.	Added text to Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, noting that the majority of caribou harvests in the Option 3 area occur during summer and fall, when the ice road would not be present.	Y
717	23	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	BLM also states on page 57 of the SDEIS that "[c]onstruction of the ice road under Option 3 would result in the community of Nuiqsut being completely encircled to the north, west, south, and east by gravel or ice roads." This fails to account for the fact that the ice road would be in place for only a few months at a time, and for only two seasons. It also fails to account for the fact that the North Slope Borough (NSB) hauls fuel on a winter trail in this area, and that the Community Winter Access Trails (CWAT) is in place in this area, and that other industry users sometimes cross the river in this area in the winter. The two seasons during which the Willow project will utilize an ice road in the Ocean Point area where snow trails previously have existed will not introduce a new type of use and will not result in encirclement of Nuiqsut.	The ice road does represent a new type of activity, use, or infrastructure in this particular area, as its primary purpose is for transport of development infrastructure rather than for community travel. Revised text in Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, to ensure that the temporary and additive nature of this impact is acknowledged.	Y
717	24	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Additionally, BLM characterizes impacts to waterfowl hunting (resource availability) from Option 3 as "moderate" based on a presumed likelihood of reduced availability during two spring hunting seasons. See SDEIS Appendix B, Table B.18 (page 47). However, this assessment does not correlate with waterfowl biology as most geese do not arrive on the Arctic Coastal Plain until early to mid-May (that is, after ice road season is ended). In studies from U.S. Geological Survey (USGS) that tracked five greater white-fronted geese (captured at Pt. Lonely) from 2013 to 2017, the earliest arrival dates from the three years of data were May 12 and 13. Ice road season is weather dependent and all activities are typically complete by mid-April to allow time for clean-up and closure of ice sites prior to closure of winter tundra travel, which is typically at the end of April. Accordingly, implementation of Option 3 will result in no impacts to waterfowl hunting and the impact rank should be low.	The bird section of the Final EIS was reviewed to ensure consistency with subsistence conclusions regarding potential impacts of ice roads on waterfowl availability; Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, was revised accordingly. Also revised Table E.16.18 in Appendix E.16, *Subsistence and Sociocultural Systems Technical Appendix*, to change likelihood of impacts to waterfowl resource availability to "low."	Y
717	25	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Finally, the subsistence analysis assumes harvester access on the module haul ice road would be the same as the gravel heavy-haul ice roads (for example, in SDEIS Table B.18) due to high traffic levels. The traffic levels on the module haul ice road would be much lower than the gravel heavy-haul ice roads, and access for Nuiqsut residents would be similar to other Alpine and exploration ice roads. As noted on Page 10, ConocoPhillips would work with the NSB and local residents to ensure access is provided and conflicts are avoided Access would be coordinated in a manner similar to current CPAI practices for the annual Alpine Resupply Ice Road.	Table E.16.18 in Appendix E.16, *Subsistence and Sociocultural Systems Technical Appendix*, has been revised to reflect differences in access impacts between gravel haul and module transport ice roads.	Y
717	26	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	All of the examples above show why the distinction between short-term use of seasonal ice roads and long-term use of gravel roads results in material differences in the magnitude of presumed impacts. The subsistence analysis throughout the SDEIS should be revised to reflect this significant distinction.	The analysis notes where impacts would only occur during the construction phase. Some ice roads would occur seasonally throughout the life of the Project. Revised text in Section 3.16.2.6 (*Module Delivery Option 1: Atigaru Point Module Transfer Island*), Section 3.16.2.7 (*Module Delivery Option 2: Point Lonely Module Transfer Island*), and Section 3.16.2.8 (*Module Delivery Option 3: Colville River Crossing*) to ensure that duration and seasonal nature of module transport and gravel haul ice road impacts are adequately captured throughout.	Y
717	27	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	The Analysis of Potential Impacts to Caribou Draws Unsubstantiated Conclusions. ConocoPhillips restates its request that BLM carefully consider our comments on the subsistence impacts analysis in the draft EIS and make appropriate changes in the final EIS. The subsistence impacts analysis in the SDEIS presents concerns similar to those we raised in comments on the draft EIS, and we incorporate those general concerns here by reference. On the whole, the analysis lacks technical support, fails to acknowledge limits of some scientific studies, and contradicts BLM's analysis of caribou impacts in another section of the SDEIS. Below, and in Attachment A, we provide some examples of where clarifications and improvements are needed to present a more accurate assessment. Page 15 of SDEIS Appendix C, contains the following statement: "[c]aribou responses to roads seem to vary from year to year based on the context in which roads are encountered, thus while project roads may not deflect caribou during all seasons or years, in some years, substantial deflections or delays could take place. Based on available data, it is not possible to predict the exact frequency or intensity at which deflections would take place." BLM provides no technical information to support the assertion that "substantial deflections or delays could take place." Without any such support, this statement is speculative and should be removed.	The conclusion that substantial deflections or delays could take place along Project roads is based on the analysis in EIS Section 3.12, *Terrestrial Mammals*, which indicates that deflections and delays may occur along Project roads, particularly during periods of high vehicle traffic. These statements are supported by scientific studies that are cited in Section 3.12. Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a (*Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs*), to add a reference to Section 3.12, to remove the word "substantial," and to provide additional clarity.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	28	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	BLM should ensure that all scientific papers are presented with appropriate context and accuracy. For example, the SDEIS, in Appendix C, relies upon the Wilson, Parrett et al. 2016 paper, but presents an incomplete assessment that skews the analysis. In that study, only 15 percent of the total sample of collared animals were within 15 kilometers of the road during their collared time period (32 of 216 caribou). Eight of the animals were considered "slow crossers" that may have been affected by the road, although it cannot be said with much certainty what caused them to cross when they did. This slow crossing occurred in just one year of the study. None of these eight animals were from the Teshekpuk Caribou Herd (TCH), which is the herd within the proposed project area. The actions of these eight animals (out of 216 tagged animals) from a different herd in a single year does not support a broad conclusion that migratory patterns or hunting success may be adversely affected by Willow roads.	Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a (*Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs*), to remove reference to this particular study and to caribou behavior along the Delong Mountain Transportation System road. Deflection of caribou from roads has been documented in other studies and is discussed in EIS Section 3.12, *Terrestrial Mammals*.	Y
717	29	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	It is also important that scientific papers are addressed in a manner that is consistent with other NEPA analyses. For example, BLM's discussion of the Wilson, Parrett et al. 2016 paper in the SDEIS is inconsistent with the discussion of the paper in the GMT2 SEIS (Volume 1, page 352). There, BLM explains that 60% of the collared caribou in the study crossed the road without perceptible change. Members of the TCH were unaffected by the road in the study, and the authors of the study postulate that the reason is because the TCH has a greater exposure to industrial development. BLM cautions in the GMT2 SEIS that the application of this study's result is context dependent; however, that cautionary statement is not present in the Willow MDP SDEIS. BLM should provide similar transparency in the Willow MDP EIS, and conclusions should reflect similar caution.	Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a (*Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs*), to remove reference to this particular study and to caribou behavior along the Delong Mountain Transportation System road. Deflection of caribou from roads has been documented in other studies and is discussed in EIS Section 3.12, *Terrestrial Mammals*.	Y
717	31	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Finally, BLM should ensure that its impact assessments are internally consistent. For example, BLM discusses the likelihood of air traffic impacting subsistence hunting in SDEIS Appendix C on page 16 and states that air traffic would likely affect hunting activities. However, this discussion is inconsistent with other statements in the draft EIS, such as BLM's statements on page 105 of that document that (i) "caribou can become habituated to aircraft and as a result exert minimal additional energy in response to aircraft (Webster and Young 1997)" and (ii) magnitude of air traffic would be greatest during calving and Willow is not in medium- or high-density calving areas. Again, recognition of appropriate context and detail shows that certain statements that may seem innocuous such as the statement that aircraft would likely affect hunting activities should be corrected to ensure consistency with the available science, other NEPA analyses, and the draft EIS.	While the subsistence analysis reviews the biological analyses for conclusions and consistency, certain impacts that may seem minimal from a biological perspective may have larger impacts on resource availability for subsistence hunters. In addition, the density of caribou from a biological perspective (i.e., low density of TCH caribou) is irrelevant if the area is highly used by caribou hunters despite the relatively low herd density. In addition to the conclusions cited by the commenter, the biological sections also acknowledge that air traffic results in behavioral responses in caribou; behavioral responses in caribou can affect harvester success, as reported by caribou harvesters in Nuiqsut and elsewhere on the North Slope. The subsistence conclusions are based on the reported experiences of hunters, in addition to the biological analyses.	N
717	32	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	BLM discusses likelihood of air traffic impacting subsistence hunting in SDEIS Appendix C on page 16 and states that air traffic would likely affect hunting activities. However, this discussion does not support BLM's other statements. For example, BLM states in the draft EIS on page 105, that "caribou can become habituated to aircraft and as a result exert minimal additional energy in response to aircraft (Webster and Young 1997)." Additionally, BLM notes that magnitude of air traffic would be greatest during calving (page 105 of the draft EIS), but also notes that Willow is not in medium- or high-density calving areas. Accordingly, BLM's statement that aircraft would likely affect hunting activities should be corrected to align with BLM's other statements on the topic and with the best available information.	While the subsistence analysis reviews the biological analyses for conclusions and consistency, certain impacts that may seem minimal from a biological perspective may have larger impacts on resource availability for subsistence hunters. In addition, the density of caribou from a biological perspective (i.e., low density of TCH caribou) is irrelevant if the area is highly used by caribou hunters despite the relatively low herd density. In addition to the conclusions cited by the commenter, the biological sections also acknowledge that air traffic results in behavioral responses in caribou; behavioral responses in caribou can affect harvester success, as reported by caribou harvesters in Nuiqsut and elsewhere on the North Slope. The subsistence conclusions are based on the reported experiences of hunters, in addition to the biological analyses.	N
717	121	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 2.a Subsistence Resource Availability, second to last paragraph. BLM states that since the caribou responses to roads seem to vary from year to year it is not possible to predict the exact frequency or intensity at which deflections would take place: "However, it is reasonable to conclude that resource availability would be affected as a result of the road and subsistence hunters may experience decreased overall hunting success during certain years as result." If it is not possible to predict, then BLM cannot reasonably conclude roads cause an effect on resource availability for subsistence hunters. ConocoPhillips requests BLM delete the quoted statement.	The text indicates that it is not possible to predict the *exact frequency or intensity;* however, it is possible to conclude that deflections will take place and that such deflections will affect subsistence resource availability, based on biological data on caribou responses to roads and reported experiences of community residents. The conclusion that substantial deflections or delays could take place along Project roads is based on the analysis in EIS Section 3.12, *Terrestrial Mammals*, which indicates that deflections and delays may occur along Project roads, particularly during periods of high vehicle traffic. These statements are supported by scientific studies that are cited in Section 3.12. Revised text in Appendix G (*Alaska National Interests Lands Conservation Act Section 810 Analysis*), Section 2.a, *Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs*, to reference Section 3.12, to remove the word "substantial," and to provide additional clarity.	Y
717	122	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 2.a Subsistence Resource Availability Top paragraph. BLM states that "while road use, in terms of the percentage of active harvesters, has increased somewhat since road construction began." In more specific numbers, road use has increased from 33% in 2015 to 43% in 2017 which only captures 3 months of use of the GMT1 road in that year. Indications are that this number has continued to increase and draft data from 2018 shows 62% of harvesters report using the roads. Also, the use of trucks has increased from 0-2% of the travel method to caribou use areas before the construction of CD5 and the Spur Road to 8-14% after.	The primary increase in truck and road use occurred between the pre-Spur Road and post-Spur Road time periods. Use of roads has increased more gradually since Spur Road construction. Reviewed text and revised Section 2.a, *Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs* (Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*), to address truck use and more recent data showing continued increasing use.	Y
717	123	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 2.a Subsistence Resource Availability Third paragraph. The reference to SRB&A 2017b needs to be reviewed, there is no reference to this report in the reference section.	The reference is included in the Section 810 Analysis (Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*) as follows: SRB&A. 2017b. Social Indicators in Coastal Alaska, Arctic Communities. Final Report. Alaska OCS Technical Report BOEM 2017-035. Anchorage, AK: Prepared for BOEM.	N
717	124	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 2.a Subsistence Resource Availability First paragraph under displacement of other resources. This paragraph is another example of BLM references waterfowl hunting "peaks during months of April and May" and construction including blasting which would displace waterfowl. Geese do not typically arrive on the North Slope until May, well after completion of ice road and blasting. See prior comment in No. 81 about arrival of geese in reference to Appendix B, Table B.18 (page 47).	Reviewed data on timing of waterfowl hunting and revised text in Final EIS Appendix G (*Alaska National Interest Lands Conservation Act Section 810 Analysis*), Section 2.a, *Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs* (*Displacement of Other Resources*), to note that waterfowl hunting peaks in May.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	125	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis -2.a Subsistence Resource Availability Second paragraph under displacement of other resources. BLM added, "While construction activities, noise and infrastructure (e.g., ice roads) may temporarily block or displace fish upstream or downstream." It should be noted that ADF&G closely reviews all ice road crossings of fish bearing streams and requires mitigation to ensure this does not happen.	Reviewed fish section and revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a, *Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs* (*Displacement of Other Resources*), to ensure consistency.	Y
717	126	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 2.a Access to Subsistence Resources Last paragraph on page. BLM states, "The presence of infrastructure and human activity, and associated safety considerations, would reduce the area in which residents can hunt by up to 2.5 miles, depending on the firearm being used (Willow MDP Draft EIS Section 3.16)." This statement is incorrect. As documented in the Nuiqsut Caribou Subsistence Monitoring Project Year 10 (SRBA 2019), in Table 43, as new infrastructure has been constructed, the amount of caribou harvested within 2.5 miles of infrastructure has increased to 106 or 34% in 2017 from 32 (8%) in Year 1, which indicates that access has improved and that caribou are still available within 2.5 miles. BLM lumps gravel haul ice roads with module transport ice roads in regard to resident access and use of ice roads for hunting. Access on the Module Haul would be more comparable to the Alpine Re-Supply Ice Road with only occasional closure for impassable loads.	The text is accurate that the presence of infrastructure could reduce the area in which residents can hunt by *up to* 2.5 miles. This conclusion is based on consideration of firearm safety and the distance at which residents can safely shoot around infrastructure, not based on resource availability. Edited text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a, *Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs* (*Access to Subsistence Resources*), to clarify that 2.5 miles is the maximum distance that would be affected and that residents hunt and harvest resources within 2.5 miles of infrastructure. Revised text in Appendix G, Section 2.a, for clarity regarding traffic and local access to module transport ice roads. Increases in subsistence access for Nuiqsut residents could presumably increase harvest of resources.	Y
717	127	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 2.a Access to Subsistence Resources First paragraph on page. BLM states: "Recently collected data from Nuiqsut households indicate that the percentage of households using roads decreases somewhat with distance from the community, or in areas with high concentrations of drill sites." See comment from our original DEIS letter. "The BLM's analysis, however, fails to account for the fact that to get to farther roads (such as the GMT1 road), Nuiqsut residents much travel on the nearby roads (the Spur Road), so the Spur Road necessarily has the highest use. If harvesters get a caribou off the Spur Road, they have no need to travel further. All this table really indicates is that successful harvests are occurring close to the community via the Spur Road. Having more road available, such as the Willow Road, will only open up more opportunity to more convenient access to caribou, especially caribou that happen to be farther away from Nuiqsut."	While it is true that residents must use the Spur Road to continue on to the CD5 and GMT-1 roads, it remains true that more people simply use the Spur Road to hunt and do not continue on to roads farther away. Data are not available at this time to conclude whether this is because residents are successful along the Spur Road and therefore have no need to go farther. In response to subsistence concerns from the community of Nuiqsut and the public, CPAI has incorporated up to three boat ramps in the Project design that would improve access for subsistence users. Impacts related to an increase in watercraft and hunting (specifically, potential for increased spills and increased mortality of wildlife) would be an indirect result of construction of the boat ramps and would not be within CPAI's control. Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a, *Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs* (*Access to Subsistence Resources*), to clarify that the data are preliminary and that the data are not available to conclude why road use declines with distance from the community.	Y
717	128	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 7.a Module Deliver Option 3 Last paragraph on page. BLM notes that for Nuiqsut the ice road in Option 3, would "result in the community of Nuiqsut being completely encircled to the north, west, south and east by gravel or ice roads for 2 seasons." It should also be noted that this route chosen for Option 3 is essentially the same seasonal route already commonly used every winter by NSB for CWAT and fuel hauls and/or industry Rolligon routes for exploration, therefore, the impacts would occur in an area with already existing activity.	Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 7.a, *Evaluation and Finding for Module Delivery Option 3 (Colville River Crossing)*, to ensure that the temporary and additive nature of this impact is acknowledged.	Y
717	129	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix C - ANILCA 810 Analysis - 7.a Module Deliver Option 3 First paragraph on page. BLM makes reference to geese hunting in April. This is another example of BLM reference to waterfowl impacts during times of the year when waterfowl typically are not present. Geese do not typically arrive on the North Slope until May. See prior comment in No. 81 about arrival of geese in reference to Appendix B, Table B.18 (page 47).	Reviewed bird section and data on timing of waterfowl hunting to ensure consistency with subsistence conclusions regarding potential impacts of ice roads on waterfowl availability. Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 7.a, *Evaluation and Finding for Module Delivery Option 3 (Colville River Crossing)*, to clarify that waterfowl hunting in April is limited and that impacts are relatively unlikely.	Y
717	99	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	3.16.1.1.1 - Overview of Subsistence Resources - Nuiqsut - Last Paragraph (page 51) and first paragraph on page 52. In describing the subsistence uses in Nuiqsut, BLM states, "In addition, seal and eider hunting occur offshore near the module delivery options. Residents of Nuiqsut commonly harvest fish (particularly broad whitefish) downstream from the Project in Fish (Uvlutuuq) Creek; in addition, residents conduct much of their fishing for broad whitefish, Arctic cisco, Arctic greyling, and burbot downstream from the direct effects area where it crosses the Colville River. Resident commonly hunt for moose along the Colville River, including at Ocean Point." This paragraph should clearly state the that module transfer ice road is seasonal, which minimizes impact to most subsistence activities, with the exception of wolf/wolverine and burbot fishing which only occur in the winter and this route/crossing is historically impacted most winter seasons, most recently with NSB CWAT activity and fuel hauling.	The overview of subsistence resources provides a baseline description of subsistence uses within the entire area of potential effect. Discussion of impacts specific to each alternative, including seasonal differences in impacts by area, are provided under direct and indirect impacts discussions. The subsistence analysis clearly states that impacts related to module delivery Option 3 are most likely to occur for winter activities, such as furbearer hunting and winter caribou hunting. Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to provide additional context regarding the timing of subsistence activities within the analysis area.	Y
717	100	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	3.16.1.1.2 - Overview of Subsistence Resources - Utqiaġvik - Second Paragraph on Page Similar to comment above regarding Nuiqsut, the BLM states that "Moose are hunted by some Utqiaġvik residents where the direct effects area crosses the Colville River near Ocean Point." BLM does recognize some of the seasonality of subsistence hunting in this paragraph but does not address the winter ice road activity minimizes impacts to most subsistence hunting activities.	The overview of subsistence resources provides a baseline description of subsistence uses within the entire area of potential effect. Discussion of impacts specific to each alternative, including seasonal differences in impacts by area, are provided under direct and indirect impacts discussions. Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has be revised to provide additional context regarding the timing of subsistence activities within the analysis area.	Y
717	101	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	3.16.2.1.3 - Harvester Access - Last Paragraph on page The paragraph discusses boat access along the Colville River where module transport road is proposed. There will be no boat in river when ice road is constructed or used.	The sentence has been clarified to note that boats are not used in winter.	Y
717	102	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	3.16.2.2 - Other Subsistence and Sociocultural Impacts - module delivery option 3 - Colville River Crossing The description of subsistence activities in this paragraph also fails to break down seasonal use in Ocean Point area vs. winter ice road season.	Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to provide additional context regarding the timing of subsistence activities within the Option 3 analysis area.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	103	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	3.16.2.2 - Subsistence In the first paragraph, BLM states: "The Option 3 analysis area accounts for between 6% and 12% of the total caribou harvest during individual study years, compared to between 4% and 11% under Option 1." This analysis is specifically referring to the heavy haul module ice road, but it is unclear if the 6 -12% harvest is the value for only the months of January through April, because those are the months of the active ice road season. BLM is not specific in this instance, and should clarify when the 6-12% harvest occurs in this area. If, in fact, it doesn't occur during the months that the ice road would be present, then ConocoPhillips believes this is an inaccurate statement.	Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, text has been revised to clarify the timing of subsistence harvests within this area.	Y
717	104	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	3.16.2.2 - Subsistence and Sociocultural Systems - Module Delivery Option 3: Colville River Crossing BLM makes the statement, "Construction of the ice road under Option 3 would result in the community of Nuiqsut being complete encircled to the north, west, south, and east by gravel or ice roads." As described in preceding sections (see Section 3.14.2.1), the proposed ice road route is already a route used seasonally by the NSB CWAT and fuel haul projects as well as other industry. This is seasonal only and is making use of an already used ice road corridor. ConocoPhillips recommends deleting this statement because this activity around Nuiqsut is historically common each winter.	Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, text has been revised to acknowledge the presence of the CWAT south of the community of Nuiqsut and to ensure that the additive and temporary nature of the Option 3 ice road impacts is clear.	Y
717	118	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix B - Subsistence - 1.2 .1 Subsistence Overview - Nuiqsut (Last paragraph in section) The last paragraph in this section should also reference that due to Alpine Development, Nuiqsut has seasonal access to the Dalton Highway in order to travel to Anchorage and Fairbanks for supplies, including subsistence resources like boats, snow machines, four-wheelers, trucks, ammunition, etc. This is unique on the North Slope and provides a significant cost reduction for all supplies and materials.	Reviewed and revised text in Section 1.2.1, *Nuiqsut*, of Appendix E.16, *Subsistence and Sociocultural Systems Technical Appendix*.	Y
717	119	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix B - Subsistence - Comparison of Impacts to Subsistence Uses for Nuiqsut In the third row of the table, (Resource Availability), for Option 3: Colville River Crossing, impacts to waterfowl are considered "moderate" with likelihood of reduced availability during two spring hunting seasons. Ice road season is weather dependent and all activities are typically complete by mid-April so that clean-up and closure can occur prior to closure of winter tundra travel which is usually towards the end of April. While the Table B.7 on page 19 of Appendix B shows low use for waterfowl in April this does not correlate with the waterfowl biology as most geese do not arrive on the Arctic Coastal Plain until early to mid-May (AFTER ICE ROAD SEASON). Based upon the raw data from USGS that tracked five greater white-fronted from 2013-2017 that were captured at Pt Lonely, the earliest arrival dates from the three years of data were May 12 and 13. Additionally, biologists studying greater-white fronted goose productivity for ConocoPhillips pre- and post-construction of the CD5 noted in 2017 that the mean incubation start date for geese was June 7. Therefore, it's highly unlikely that any goose-related subsistence activity is occurring in the Ocean Point area in April, and therefore BLM should revise statements referring to this accordingly. Additionally, the ice road will not be traveled, maintained or otherwise used come May when subsistence activities for goose hunting and egging may be occurring, therefore there is no impact from the ice road expected to this subsistence activity.	The bird section of the Final EIS was reviewed to ensure consistency with subsistence conclusions regarding potential impacts of ice roads on waterfowl availability; Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, was revised accordingly. Also revised Table E.16.18 in Appendix E.16, *Subsistence and Sociocultural Systems Technical Appendix*, to change likelihood of impacts to waterfowl resource availability to "low."	Y
717	120	Dunn	Connor	ConocoPhillips Alaska	Subsistence, ANILCA 810	Appendix B - Subsistence - Comparison of Impacts to Subsistence Uses for Nuiqsut In row 4 (Harvester Access) under Alternative B, BLM states: "High likelihood of impacts during construction phase due to lack of ice road access on gravel haul and module transport ice roads . . . due to high traffic levels." And in Option 3 in same row: "Moderate likelihood of impacts during construction phase due to lack of ice road access on module transport ice roads." The module ice road will not have the same level of traffic as the gravel haul ice roads and on page 10 of the DSEIS it notes: "ConocoPhillips would work with the NSB and local residents to ensure access is provided and conflicts are avoided. . . . Access would be coordinated in a manner similar to the current CPA practices for the annual Alpine Resupply Ice Road." This is also stipulated on page 51. Because traffic will be low and access will be provided, the impacts should be low.	Table E.16.18 (Appendix E.16, *Subsistence and Sociocultural Systems Technical Appendix*) has been revised to reflect differences in access impacts between gravel haul and module transport ice roads.	Y
607	2	Fisher	Kevin	North Slope Borough	Subsistence, ANILCA 810	The Borough continues to support Alternative B because having roads between all the Willow drill sites and connecting Willow to the Greater Mooses Tooth unit will reduce air traffic, improve emergency response, safety and community access. Air traffic is one of the primary concerns, if not the primary concern, from our residents and subsistence hunters concerning oil and gas development because of its impacts on caribou movements and subsistence harvests. Therefore, minimizing flights must be prioritized over limiting ground infrastructure. Alternative B will also allow residents access to additional roads for subsistence and recreation purposes. These roads may also assist in the annual construction of the Community Winter Access Trail between Nuiqsut and Barrow. We encourage BLM and CPAI to allow local residents access to the Willow projects roads. CPAI should allow residents to utilize the Willow projects roads for subsistence purposes and produce concise policies regarding the use of its roads for subsistence purposes. We also encourage BLM and CPAI to work closely together on designing and implementing vehicle pullout pads and subsistence ramps that allow free passage and subsistence access. These pullouts and ramps will help mitigate the impacts of Willow on subsistence.	BLM will select an alternative and provide rationale for the selection of that alternative in the ROD. BLM does not have to choose the preferred alternative in the ROD; it may choose any alternative or a combination of alternatives in the ROD. The existing NPR-A BMP E-1 requires that Project roads must protect subsistence use and access to subsistence hunting and fishing areas; proposed revisions to this BMP in the updated NPR-A IAP would go further and require permittees to allow subsistence use of permanent gravel and appropriate ice roads and shall construct subsistence pullouts and boat ramps at all crossings of heavily used subsistence rivers. Mitigation measures adopted for the Project will be noted in BLM's ROD. Subsistence tundra access ramp design has been updated by CPAI based on lessons learned from GMT-1, GMT-2, and community feedback.	Y
607	4	Fisher	Kevin	North Slope Borough	Subsistence, ANILCA 810	Subsistence Boat Ramps. We appreciate CPAIs willingness to construct up to three boat ramps for local residents to use as mitigation for project related impacts. Please work with local residents and entities to identify the best locations and the best designs for these boat ramps. The construction of boat ramps and other subsistence infrastructure should also be coordinated with Oil Search LLC., who may be constructing a subsistence boat ramp for its Nanushuk Project.	The commenter's support for the subsistence boat ramps is noted. Final boat ramp design has not been completed and will only occur after additional input from the community is received. To BLM's knowledge, the boat ramp to be constructed by Oil Search LLC as part of the Nanushuk Project would be on the east side of the Colville River, outside the NPR-A and BLM's management authority; coordination between CPAI and Oil Search should not be necessary but could be facilitated by NSB, NVN, Kuukpik, or the community of Nuiqsut.	N
20179	4	Freeman	Kyri	Center for Biological Diversity	Subsistence, ANILCA 810	How would subsistence hunting and any recreational activity be affected in the region? I'm concerned that your agency's supplemental draft environmental impact statement does not answer any of these questions.	Impacts to subsistence hunting are addressed in Section 3.16, *Subsistence and Sociocultural Systems*, and in the ANILCA Section 810 Analysis included as Appendix G (*Alaska National Interest Lands Conservation Act Section 810 Analysis*).	N

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53	1	Hetrick	Willow	—	Subsistence, ANILCA 810	Some of the main problems that we have with this project are the impediment of the caribou. As you know, caribou move in a north/south direction, and this Willow project, so far, has an east/west kind of orientation on the landscape, and there are a lot of concerns from the community about the availability of subsistence harvest, particularly for caribou, should this project continue. And we would — we would encourage the BLM to issue mitigation measures to help the caribou movement and to address the concerns of the community about subsistence harvest. We also would like the BLM to consider restrictions both vehicles and aircraft during critical times of caribou movement and bird nesting periods, and that is slightly addressed in the EIS and then again in the supplemental EIS.	Relevant lease stipulations and BMPs and additional suggested measures to reduce impacts to resources are provided in Section 3.12.2.1, *Avoidance, Minimization, and Mitigation*. These include measures to restrict air and ground traffic during key nesting, calving, and migratory periods. The comment has been reviewed by BLM for consideration as an additional suggested mitigation measure. Mitigation measures adopted for the Project would be noted in BLM's ROD.	N
531	2	Hopson	Lesley	Alaska Eskimo Whaling Commission	Subsistence, ANILCA 810	In particular, the AEWC has several concerns about the construction of an MTI in Harrison Bay. As is well documented, through our hunters observations and western science research, bowhead whales are very sensitive to disturbance from anthropogenic activities. Harrison Bay is used by westward-migrating bowhead whales as a resting and feeding area. In addition, island construction in this region has the potential to change the migratory behavior of fall whales as they travel toward Utqiaġvik, and therefore the potential to interfere with the important fall whale harvest there. A very serious concern with industrial or other anthropogenic activity in the mid-Beaufort Sea is the potential for deflection of the fall migration north, away from near-shore waters, as they approach Utqiaġvik. In this situation, our whaling captains could be subjected to grave dangers if they were forced to travel beyond safe distances from shore to access their subsistence resources.	The potential impacts of the MTI on subsistence resources, including bowhead whales, are addressed in Final EIS Section 3.13.2.6.2, *Disturbance or Displacement*. The marine mammal section concludes that vessel traffic associated with the MTIs would occur in shallower waters outside the migratory path of bowhead whales.	N
531	7	Hopson	Lesley	Alaska Eskimo Whaling Commission	Subsistence, ANILCA 810	The AEWC would also encourage the BLM to consult with NMFS in regard to any impacts to bowheads as it develops the Final EIS and Record of Decision. Further, BLM should encourage that ConocoPhillips continue to participate in the CAA process well in advance of any operations taking place out in the water. . . . We want the agreement to be voluntary and the process to be supported strongly by the federal government.	The potential impacts of the MTI on subsistence resources, including bowhead whales, are addressed in the Final EIS (Section 3.13, *Marine Mammals*). The marine mammal section concludes that vessel traffic associated with the MTIs would occur in shallower waters outside the migratory path of bowhead whales. The comment has been reviewed by BLM for consideration as an additional suggested mitigation measure. Mitigation measures adopted for the Project would be noted in BLM's ROD. BMP H-1 and Proposed BMP H-4 would require the development of a Subsistence Plan and coordination with the Alaska Eskimo Whaling Commission.	N
130	5	Karro	Loren J	—	Subsistence, ANILCA 810	I was concerned that the Preliminary 810 Analysis states that the project may SIGNIFICANTLY restrict subsistence uses for Nuiqsut people and those of the other North Slope villages, because of possible changes to the caribou migration and the caribou and marine mammals distribution patterns. The SDEIS repeats these concerns, stating that "Thus, the direct and indirect impacts on caribou availability within the area west of Nuiqsut could have substantial impacts to subsistence users" [SDEIS section 3.16.2.3.2.1]. It further states that fish availability could be affected. Loss of subsistence uses could affect not only the food availability for the whole village, but also a loss to the culture, the mental and physical health, and the traditions of the North Slope villages. These are not minor effects that can be stated and then ignored.	The ANILCA Section 810 Analyses are prepared to disclose whether the BLM believes that an action may significantly restrict subsistence uses. In the case of the Willow MDP Project, BLM did conclude positive findings, meaning that there is the potential for significant restriction on subsistence uses for the community of Nuiqsut and, in the cumulative case, for other North Slope communities (Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*). Avoidance, minimization, and mitigation measures to offset impacts to subsistence and subsistence-related resources are considered in the EIS. Details are included in the individual resource sections of Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I (*Avoidance, Minimization, and Mitigation Technical Appendix*).	N
159	10	Kenning	Erik	ASRC	Subsistence, ANILCA 810	ASRC supports the desire of Nuiqsut residents to have access to the Willow project infrastructure for subsistence purposes. Existing subsistence ramps and truck pullouts were designed and then refined with significant local input. The three new boat lunches proposed under Alternative B should be designed with a high level of local input to assure that they provide the desired results for the community. As with the existing subsistence enhancements, CPAI should remain flexible to adapting and refining any of the boat launches to provide the maximum benefit to the local residents. Providing these enhancements to the project infrastructure creates new options for the community to practice their subsistence activities - something that ASRC passionately supports.	CPAI has committed to consulting with Nuiqsut about boat ramp design and locations. Mitigation measures for subsistence activities, including existing and proposed BMPs and CPAI design measures, can be found in Final EIS Section 3.16.2.1, *Avoidance, Minimization, and Mitigation*, and Final EIS Appendix I, *Avoidance, Minimization, and Mitigation Technical Appendix*. Mitigation measures adopted for the Project would be noted in BLM's ROD.	Y
50	1	Kunakana	Sam	—	Subsistence, ANILCA 810	. . . [W]e do eat a lot of fish during the summer. . . . We go fishing for broad whitefish. That needs to be considered in the EIS, as cumulative effects in ANILCA 810. I have seen the changes since development got started in our area. I'd like to stress out that when you talk about expert subsistence hunters, I am one of them, as opposed to your contractors that come over here and say they're expert subsistence hunt — subsistence hunters. They're not. They just come over here twice a year. They don't live here 24/7, 365 days a year, seeing what goes on around our area (unclear) exploration, ice road building, everything about development in this area. I would like to stress out that BLM really needs to look into these contaminants associated with industry that is mandated from — that was mandated to DOI to look into getting baseline studies, because one year of studies is not good enough to show the cumulative — impacts associated with industry.	The ANILCA Section 810 Analysis (Appendix G, *Alaska National Interest Lands Conservation Act 810 Analysis*) includes an analysis of potential impacts to fish, including the potential for contamination of fish resources resulting from spills. Appendix G, Section 8.a (*Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Use and Needs* [for the cumulative case]), and Section 3.19.12 (*Cumulative Impacts to Subsistence and Sociocultural Systems*) have been revised to provide additional discussion of potential cumulative impacts of contaminants on fish and other subsistence resources. NEPA does not require data collection, and BLM cannot require data collection unless it can be tied to a specific impact. Contamination is not expected as an impact from the Project. Monitoring for contaminants could be accomplished through a grant from the NPR-A Impact Grant Program. BMP A-11 would require implementation of a monitoring study of contaminants in locally used subsistence foods.	Y
57	3	Kunakana	Sam	—	Subsistence, ANILCA 810	Fish Creek and Nigliq Channel, the Colville River Channel, all are connected together. They're even connected to the Teshekpuk Lake area, when it comes to the migration of the Teshekpuk herd. . . . EISs need to be included under one umbrella through ConocoPhillips, because when we talk about reports that are being turned back and forth, from the contractor to the people that are con— that contract these contracts, decide to do the studies, that serve as experts in this area. . . . More often, we've been catching a lot of sick caribou in this area since development started, and I think that needs to be reconsidered into the EIS to check and see if further mitigation measures need to be done with these contaminants that our fish and our caribou are eating, which, in turn, comes to us, because we are the people that subsist this area. So, caribou, fish (speaks Iñupiaq), even the whale. The comments need to be prioritized on this EIS from the village of Nuiqsut first before any other entity, when it comes to the commenting to this master plan. And I would consider BLM looking into having the Native Village of Nuiqsut doing some studies on their own — quality of service — quality of service from BLM State of Alaska, (unclear) has been lost because of these studies that are being done, inconsistently.	Cumulative impacts are discussed in Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*. The section has been revised to include additional discussion of potential contamination and avoidance of subsistence foods and resulting effects on subsistence and sociocultural systems. ROP H-5 would make data and summary reports derived from North Slope studies easily accessible to the public. BLM does not have authority to require NVN to conduct studies as mitigation for the Willow MDP Project.	Y

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
805	6	Lowenthal; Haaland; Huffman; Grijalva; Gallego	Alan; Deb; Jared; Raul M.; Ruben	United States Congress	Subsistence, ANILCA 810	Rural communities on the North Slope rely upon subsistence resources like the Teshekpuk Caribou Herd, and threats to the health of these resources are threats to the traditional lifestyle of these communities. The proximity of the project to the community of Nuiqsut and its potential adverse impacts on subsistence resources and cultural activities are gravely concerning.	Comment noted. Project impacts to caribou are discussed in EIS Section 3.12, *Terrestrial Mammals*, and Appendix E.12, *Terrestrial Mammals Technical Appendix*. Project impacts to subsistence are discussed in EIS Section 3.16, *Subsistence and Sociocultural Systems*; Appendix E.16, *Subsistence and Sociocultural Systems Technical Appendix*; and Appendix G, *Alaska National Interest Lands Conservation Act 810 Analysis*.	N
34	2	Maupin	Sinqiniq	—	Subsistence, ANILCA 810	Food insecurity has shown to have a negative impact on the health and psychological well-being of those who suffer from it. Brinkman and Cullen have also conducted research that shows food insecurity leads to increased incidences of violence and civil conflict in developing nations. However, very little research has been conducted to examine the potential link between food insecurity and violence in developed nations.	Added language to Section 3.16.2.3.4, *Other Subsistence and Sociocultural Impacts*, and Section 3.18.2.4.1.4, *Health Effect Category 4: Food, Nutrition, and Subsistence Activities*, to address the potential for impacts to food security.	Y
8	2	Moser	Phillip	—	Subsistence, ANILCA 810	. . . the damages to subsistence, on top of the damages to these communities, and as we've heard, the communities are where the most vulnerable people, the elders that have the most language fluency in the area, are going to be put at most risk by this project.	Comment noted.	N
56	2	Opie	Rene	—	Subsistence, ANILCA 810	And I'm also opposed because no effort has gone into including any health and social issues, as well as the subsistence issue of our fish harvest in the EISs.	Potential social impacts of the Project, including impacts related to changes in subsistence resource availability, harvester access, increased interactions with nonlocal workers, changes in income and employment levels, disruption in social ties and roles, and decreased food security, are discussed in Section 3.16.2.3.4, *Other Subsistence and Sociocultural Impacts*. Impacts to health are discussed in Section 3.18, *Public Health*.	N
844	2	O'Reilly-Doyle	Kathleen	—	Subsistence, ANILCA 810	ANILCA 810 analysis: The preliminary 810 analysis concludes that the project impacts may significantly restrict uses for the community of Nuiqsut. And cumulative impacts may significantly restrict subsistence uses and needs to Nuiqsut and five other North Slope Communities. These communities rely on subsistence harvest to meet their cultural needs and food requirements. The findings of the 810 analysis should weigh heavily on any future consideration of the approval of this proposal, as these needs cannot be met in other ways.	ANILCA Section 810 requires that BLM disclose, in the form of what are called findings, whether an action may significantly restrict subsistence user access. BLM considers all analysis contained in the EIS and appendices, including the ANILCA Section 810 Analysis (Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*). However, findings are not a decision. Findings do not preclude BLM from including additional mitigations in the future, and they do not restrict BLM to choose any particular alternative.	N
807	1	Major	Mark	—	Subsistence, ANILCA 810	Kuukpik has not taken a formal position on this project, at this time, but we do have some significant concerns. As we've mentioned in previous sessions, the drill sites run north to south, but the caribou move east to west. We are concerned that the project may block the caribou or divert them from being able to get to areas where they can be harvested by the Nuiqsut residents.	The potential impacts of north-south roads on the fall caribou migration, in addition to the relative impacts of these roads by alternative, are addressed in the subsistence sections: Section 3.16.2.3 (*Alternative B: Proponent's Project*), Section 3.16.2.4 (*Alternative C: Disconnected Infield Roads*), and Section 3.16.2.5 (*Alternative D: Disconnected Access*).	N
860	2	Nukapigak	Joe	Kuukpik Corporation	Subsistence, ANILCA 810	Kuukpik's conversations with BLM and others during the ongoing NPR-A IAP/EIS process cause us to believe that even more of the Teshekpuk Caribou Herd's critical habitat will is under threat than Kuukpik initially believed because BLM is seriously considering adopting Alternative D-the alternative that Kuukpik always hoped was being included just because it was so extreme in favor of development that it made other less radical alternatives look more reasonable by comparison. . . . But now we know BLM is actually considering adopting some version of Alternative D (and that the Willow proponent, CPAI, is actively urging BLM to do so*4*). If that happens, the caribou herd that is most critical to Nuiqsut's subsistence lifestyle and food security will face a threat unlike any they have seen before, including the prospect of drilling pads, pipelines and roads throughout the critical calving and post-calving coastal areas near Teshekpuk Lake. Moreover, development in the migration corridors on either side of the Lake may prevent caribou from even wanting to enter the area to the north at all. . . . the SDEIS specifically concludes that "Reductions in the abundance of caribou . . . for the cumulative case and selection of the 2019 Draft NPR-A IAP/EIS Alternative D may significantly restrict subsistence uses for the communities of Nuiqsut, Utqiaġvik, Atqasuk, Wainwright. and Anaktuvuk Pass." . . . Similarly, Alternative D would facilitate development all around the Lake itself, deflecting and displacing the same herd from areas farther north. . . . BLM has concluded that Willow has a "high potential" of deflecting caribou that should move west to east close to Nuiqsut. . . . The point here is that Willow isn't being proposed in a vacuum. Rather, it is just one of the threats Nuiqsut faces, and one that has to be considered in conjunction with other major challenges, like the prospect of development around Teshekpuk Lake. BLM acknowledges this in the SDEIS, but the Final EIS should connect the dots in more detail to show why the combined effects of the Willow Project and development around Teshekpuk Lake would, together, have such potentially devastating impacts on the long-term health and viability of the TCH. . . . One area in desperate need of attention is further efforts to reduce vehicle traffic associated with the Willow Project. Option 3 for the module transport, for example, is expected to require "approximately 2,000 vehicles per day (84 vehicles per hour) during winter for 2 years (2025 and 2027) (Table 2.3.2)." . . . What are CPAI's plans to minimize the effect of that level of traffic on subsistence resources and winter subsistence users, such as trappers who frequent the Willow and upper Colville areas?	Because the SDEIS only included information and analysis associated with the subsistence boat ramps, Option 3 (Colville River Crossing), and freshwater reservoir, responses to many of the Draft EIS comments are not reflected in the SDEIS. The Final EIS incorporates responses to the Draft EIS comments, and responses to substantive comments can be found in Appendix B, *Public Engagement and Comment Response*. Additional text was added to the discussion of potential impacts to caribou and subsistence resulting from the Project in combination with RFFAs; these are discussed in Section 3.19.10.4, *Terrestrial Mammals*, and Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*. BLM considered potential cumulative impacts of the Willow MDP Project in the context of the 2020 Final NPR-A IAP/EIS (BLM 2020) alternatives. BLM's 2020 Final NPR-A IAP/EIS addresses the potential impacts of a no action alternative (see Willow MDP Final EIS Section 3.19.3, *Reasonably Foreseeable Future Actions*). BLM evaluated Alternative A and four action alternatives (Alternatives B, C, D, and E) of the 2020 Final NPR-A IAP/EIS, which differ in the areas that would be made available for NPR-A oil and gas leasing and infrastructure and which would contribute to the cumulative effects of the Project in different ways. BLM found that selection of Alternatives A, B, and C of the 2020 Final NPR-A IAP/EIS would contribute to the cumulative effects of the Project in similar ways; selection of Alternative D or E would likely result in greater cumulative impacts on subsistence. NPR-A IAP/EIS Alternative D or E would increase development infrastructure on the North Slope and would continue to cause alteration and degradation of habitats for key subsistence resources, including caribou, furbearers, fish, and goose. Over time, these changes could affect the health and abundance of different subsistence resources on the North Slope. If development continues westward into the core calving area for the TCH, or if it reduces access to key insect relief habitats, then the herd could experience an overall decline in productivity and abundance. Such a scenario could occur if BLM selects Alternative D or E in the 2020 Final NPR-A IAP/EIS. Alternative D or E would make areas surrounding Teshekpuk Lake available to oil and gas leasing and infrastructure development. Under this scenario, impacts related to the health and abundance of the TCH would likely extend to subsistence users of the herd, including Nuiqsut, Utqiaġvik (Barrow), Anaktuvuk Pass, Atqasuk, and Wainwright.	Y
26705	8	President	Acting	Native Village of Nuiqsut Tribal Council	Subsistence, ANILCA 810	BLM has not adequately considered the impacts of the Colville River Crossing module delivery option on subsistence activities. The ice road proposed for the Colville River module delivery option would pass through an area more heavily used by the Nuiqsut community for winter subsistence activities than the other module transport options, with greater potential direct impacts. In our comments on the DEIS, we noted that our community is effectively surrounded by oil and gas development and that BLM has taken no action to meaningfully protect subsistence resources and our remaining subsistence use areas from the impacts of oil development. Under Option 3, the encircling of our community will be complete. During module transport years, hunters and other members of our community traveling on snow machines would have to cross this and other roads in order to access many subsistence resources in the winter. Despite the very significant consequences of this road, BLM includes almost no discussion of the effects it may have on subsistence users and makes no attempt to quantify these effects. Conclusory assertions that one option may have fewer impacts than other options do not fulfill BLM's obligation to thoroughly analyze the environmental effects of each alternative NVN has significant concerns that Option 3, like the other options, will further compromise subsistence practices within the community, by affecting subsistence resources such as caribou and furbearers and by making access to resources more difficult.	While the analysis of module delivery Option 3 (Colville River Crossing) acknowledges potential impacts to furbearer hunters and winter caribou hunters, it concludes that Option 3 would have fewer overall impacts than Option 1 (Atigaru Point Transfer Island) and Option 2 (Point Lonely Module Transfer Island) because of the lack of an MTI, lower traffic levels, reduced biological impacts, location of the ice road in an area where an another annual road is already located (NSB's CWAT), and shorter duration of impacts. While Option 3 would further encircle the community, it would do so for two winter seasons, and would be additive to existing infrastructure and traffic in the area from the CWAT, and therefore, those specific impacts would be temporary. Section 3.16.2.8 (*Module Delivery Option 3: Colville River Crossing*) has been revised to provide additional discussion of the impact to furbearer hunting, in addition to clarification regarding the level of winter use for caribou hunting. The cumulative effects subsistence section (Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*) has also been revised to further address the potential for the community to be entirely encircled by development.	Y

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26705	9	President	Acting	Native Village of Nuiqsut Tribal Council	Subsistence, ANILCA 810	The SDEIS fails to include an adequate analysis of how Option 3 will effect caribou and how those effects will differ from the other module delivery options. This is particularly problematic because the Colville River crossing option will affect the Central Arctic Herd in addition to the Teshekpuk Caribou Herd. Members of our community harvest animals from both of these herds. BLM must analyze how the ice road for the Colville River crossing option will deflect and otherwise affect caribou from both the Teshekpuk Lake Herd and Central Arctic Herd and compare those effects to the effects from the other module delivery options. Conclusory statements that there will be fewer effects because there will be less vehicle traffic mask actual differences in the options and ignore site-specific and season-specific effects.	The analysis acknowledges the higher percentage of harvesters potentially affected by module delivery Option 3 (Colville River Crossing) and the greater potential for impacts to harvester access due to the location of the ice road. However, because of the substantially lower levels of traffic, the shorter duration (two winter seasons), the lack of an MTI, and the decrease in impacts to biological resources (based on review of the biological resources sections), the EIS concludes that the overall impacts to the community are lower than Option 1 (Atigaru Point Module Transfer Island) and Option 2 (Point Lonely Module Transfer Island). Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to provide additional discussion and clarity regarding the impacts of Option 3 compared to Options 1 and 2 and the relative impacts to the TCH and CAH.	Y
26705	10	President	Acting	Native Village of Nuiqsut Tribal Council	Subsistence, ANILCA 810	The SDEIS also entirely fails to analyze impacts to furbearers and furbearer harvesting. The single specific mention of furbearer impacts from the ice road under Option 3 makes it clear that it may have significant effects: The ice road route under Option 3 would cross through areas somewhat more heavily used by the community of Nuiqsut than those under Options 1 and 2. In particular, the ice road would cross through areas heavily used in the winter for hunting of furbearers (96% of wolf and wolverine harvesters) and caribou (91% of harvesters) along the Itkillik River, Colville River near Ocean Point, and to the south and west of the community.*28* Despite acknowledging that the ice road will go through areas heavily used for furbearer hunting, the SDEIS contains no analysis whatsoever of the impacts to furbearers or furbearer harvesters in Nuiqsut. Impacts to furbearers and harvesting of furbearers were not analyzed appropriately in the DEIS either, so there is no such analysis for any of the alternatives or options. Furbearer hunting and trapping is very important to our community, and the impacts must be analyzed.	Potential impacts to the resource availability of furbearers are provided in Section 3.16.2.3.2.2, *Furbearers*. Subsequent alternative discussions build on the analysis provided under Alternative B. Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to provide additional discussion of the impact to furbearer hunting, in addition to clarification regarding the level of winter use for caribou hunting.	Y
520	58	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	Another place text needs to be updated is in Appendix C. The ANILCA 810 analysis states that displacement of caribou between 2-4 km from roads is common. Recent research on the Central Arctic Herd, however, indicated a displacement distance of 5 km from infrastructure is necessary. This study is cited in Chapter 3, but not in Appendix C. The Appendix C information should be updated to include reference to this study and to reflect the higher upper bounds of caribou calving displacement.	Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a (*Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs*), to reflect revisions to displacement zones in Section 3.12, T*errestrial Mammals*, based on the higher upper bounds of displacement zone.	Y
520	59	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	Finally, Appendix C states that [e]ffects on caribou movement are most likely to occur where linear structures are placed parallel to the herds primary movement, citing Wilson et al. (2016). This reference seems to be in error as the cited study does not discuss the effects of parallel versus perpendicular roads. Furthermore, it was based on analyzing a road that was generally perpendicular to the path of caribou migration. Here the road alignment is not perpendicular, therefore a different citation should be provided for the above statement or it should be removed.	Revised text in Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*, Section 2.a (*Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs*), to clarify statement and revise reference.	Y
520	75	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	BLM's Subsistence Analysis is Inadequate 1. BLM has not addressed the subsistence concerns raised in comments on the draft EIS. The SDEIS does not cure any of the many significant defects in the draft EISs subsistence analysis, including its failure to: (1) integrate community feedback; (2) give sufficient consideration to environmental justice; (3) disclose and analyze adequately numerous, significant human and environmental impacts from the Willow project; and (4) include meaningful mitigation measures. BLM cannot move forward without correcting the significant problems in the draft EISs analysis of impacts to subsistence resources and users, in addition to the new defects introduced in the SDEIS.	The ANILCA Section 810 Analyses are prepared to disclose whether the BLM believes that an action may significantly restrict subsistence uses. In the case of the Willow MDP Project, the BLM did conclude positive findings, meaning that there is the potential for significant restriction on subsistence uses for the community of Nuiqsut and, in the cumulative case, for other North Slope communities (Appendix G, *Alaska National Interest Lands Conservation Act Section 810 Analysis*). Avoidance, minimization, and mitigation measures to offset impacts to subsistence and subsistence-related resources are considered in the EIS. Details are included in the individual resource sections of Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I (*Avoidance, Minimization, and Mitigation Technical Appendix*). The SDEIS only included a discussion of impacts related to the subsistence boat ramps, CFWR, and module delivery Option 3 (Colville River Crossing) and, therefore, did not incorporate many of the comments on the Draft EIS. The Final EIS incorporates and addresses comments made on the Draft EIS; responses to comments on the Draft EIS and SDEIS can be found in Final EIS Appendix B, *Public Engagement and Comment Response*.	N
520	76	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	The SDEIS fails to adequately disclose and analyze the significant effects to subsistence from the new module delivery option and other project changes. . . . BLM has not adequately addressed the significant uncertainty and missing information regarding the impacts of the Colville River Crossing ice bridge on subsistence activities. As explained in detail in this comment letter, the SDEIS acknowledges significant uncertainty about the how the Colville River Crossing ice bridge will work and what its effects will be on streamflow and fish populations. BLM plans to unlawfully delay gathering the necessary information until after it has chosen among the alternatives and options. The Colville River is extremely important to subsistence users. Without basic information about this option, BLM cannot assess properly the effects of this option on subsistence users.	Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, provides an analysis of the potential impacts of Option 3 and provides discussion of the relative impacts of this option compared to Options 1 and 2. In summary, Option 3 would occur in an area of slightly higher subsistence use for wolf, wolverine, and caribou but would have a shorter duration and substantially lower levels of air and ground traffic. Section 3.16.2.8 has been revised to include additional discussion of potential impacts of the ice road and ice bridge on subsistence uses. Additional information about the effects of Option 3 was also added to Final EIS Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*, and Section 3.10.2.8, *Module Delivery Option 3: Colville River Crossing*. After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy.	Y

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520	77	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	BLM has not adequately considered the impacts of the Colville River Crossing module delivery option ice road on subsistence activities. The ice road proposed for the Colville River module delivery option would pass through an area more heavily used by the Nuiqsut community for subsistence activities, with greater potential direct impacts. Under this option, Nuiqsut will be completely encircled by oil and gas activities. Construction of the heavy-haul ice road will require hunters and other members of the community traveling on snow-machines to cross this and other industrial roads in order to access many subsistence resources in the winter. Despite the very significant consequences of constructing this road, BLM includes almost no discussion of the effects it may have on subsistence users and makes no attempt to quantify these effects. . . . Option 3, like the others, will further compromise subsistence practices, by affecting subsistence resources such as caribou and furbearers and by making hunter access to resources more difficult. The SDEIS fails to include adequate analysis of how this option will affect caribou and how those effects will differ from the other module delivery options. This is particularly problematic because the Colville River crossing option will affect the Central Arctic Herd in addition to the Teshekpuk Caribou Herd. Both herds are important for subsistence harvest. BLM must analyze how the ice road for the Colville River crossing option will deflect and otherwise affect caribou from both the Teshekpuk Lake Herd and Central Arctic Herd and compare those effects to the effects from the other module delivery options. Conclusory statements that there will be fewer effects because there will be less vehicle traffic mask actual differences in the options and ignore site-specific and season-specific effects.	The analysis in the Final EIS acknowledges the higher percentage of harvesters potentially affected and the greater potential for impacts to harvester access due to the location of the ice road. However, because of the substantially lower levels of traffic, the shorter duration (two winter seasons), the lack of an MTI, and the decrease in impacts to biological resources (based on review of the EIS biological resources sections), the Final EIS concludes that the overall impacts to the community are lower than Options 1 and 2. Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to provide additional discussion and clarity regarding the impacts of Option 3 compared to Options 1 and 2 and the relative impacts to TCH and CAH caribou.	Y
520	78	Psarianos	Bridget	Trustees for Alaska	Subsistence, ANILCA 810	The SDEIS also entirely fails to analyze impacts to furbearers and furbearer harvesting. The single specific mention of furbearer impacts from the ice road under Option 3 makes it clear that it may have significant effects for Nuiqsut: The ice road route under Option 3 would cross through areas somewhat more heavily used by the community of Nuiqsut than those under Options 1 and 2. . . . Despite acknowledging that the ice road will go through areas heavily used for furbearer hunting, the SDEIS contains no analysis whatsoever of the impacts to furbearers or furbearer harvesters in Nuiqsut. Impacts to furbearers and harvesting of furbearers were not analyzed appropriately in the draft EIS either, so there is no such analysis for any of the alternatives or options. Furbearer hunting and trapping is culturally important, and the impacts must be analyzed.	Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*, has been revised to provide additional discussion of impact to furbearer hunting, in addition to clarification regarding the level of winter use for caribou hunting.	Y
407	15	Rose	Garett	Natural Resources Defense Council	Subsistence, ANILCA 810	The SDEIS further obscures the magnitude and nature of the Projects potentially significant impacts on subsistence activities. BLM neglects to gather information necessary to meaningfully analyze Option 3's potentially significant impacts to the Colville River, a critical area for subsistence. The agency's statements about the potential impacts of Option 3's ice road west of the Colville River crossing at Ocean Point provide no analysis or detail about effects to caribou, despite the importance of areas due south of Nuiqsut to subsistence hunters. And the discussion completely fails to analyze potential impacts of the freshwater reservoir to subsistence, potential impacts to furbearers in the context of subsistence, and how any of the three new components might have population-level effects on subsistence species. . . . The original document concluded, without meaningful analysis, that there would be no population-level impacts to subsistence species. And it failed to meaningfully analyze a host of potential sub-population impacts, such how the Project could affect the health of individual members of a species beyond direct injury (e.g., the nutritional stress that the Project may place on caribou) and the Projects overall potential impact on fecundity. It failed to meaningfully analyze potentially significant impact to fish from constructing a massive new gravel mine near Nuiqsut and abutting Ublutuoch River. And despite plainly acknowledging that [r]elative to other resources, the availability of furbearers would be most impacted directly around Project activities and infrastructure, it failed to provide any detailed analysis quantified or otherwise of such impacts. The SDEIS, like the DEIS, thus fails to afford the public or decisionmakers meaningful analysis of the Projects potentially significant impacts on subsistence. Such an analysis is imperative because the Project would continue or even, under Option 3, complete Nuiqsut's full encirclement by components of oil and gas development. As Nuiqsut's comments on the DEIS stated, such encirclement will further reduce their subsistence use areas and change permanently where and how they hunt. BLM must ensure that the potential consequences of such encirclement on subsistence are fully known and presented to public scrutiny before continuing with the NEPA process.	The potential impacts of the Option 3 ice road over the Colville River are discussed in Section 3.16.2.8, *Module Delivery Option 3: Colville River Crossing*. The primary winter uses of the Option 3 ice road are for furbearer hunting and winter caribou hunting, although a relatively low number of caribou harvests have been reported in the area during the winter. The analysis addresses potential impacts of the ice road to subsistence uses of caribou and furbearers, in addition to potential impacts on fish and waterfowl. Quantitative analysis of Option 3 is provided regarding percentage of harvesters using the area for different subsistence resources, as well as the percentage of caribou harvests occurring within the area. The comment does not specify what other type of quantitative analysis is missing. Section 3.16.2.8 has been revised to provide additional discussion of impact to furbearer hunting, in addition to clarification regarding the level of winter use for caribou hunting. Section 3.16.2.3, *Alternative B: Proponent's Project*, has been revised to address potential impacts of the CFWR on subsistence. While Option 3 would encircle the community, it would do so for two winter seasons, and would be additive to existing infrastructure and traffic in the area from the CWAT, and therefore, those specific impacts would be temporary. Section 3.16.2.8 has been revised for clarity. The cumulative subsistence section (Section 3.19.12, *Cumulative Impacts to Subsistence and Sociocultural Systems*) has been revised to further address the potential for the community to be entirely encircled by development. Conclusions regarding the potential impacts of the Project on resource abundance are based on the conclusions of the biological sections, which indicate that the individual alternatives would not have population-level effects on resources. The cumulative analysis addresses the potential for population-level effects in the cumulative case. Impacts to caribou resulting from Option 3 are discussed in Section 3.12.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y
612	2	Strasenburgh	John	—	Subsistence, ANILCA 810	I am also troubled by the fact that the presenter of the overview (at 19:15:36 of the April 29, 2020 evening hearing) made the point that BLM is under no obligation to consider the ANILCA section 810 conclusions in its decisions. From the presentation transcript of the evening of April 29, 2020: They [i.e., the section 810 findings] don't restrict the BLM to choose any particular alternative. They are just findings that disclose whether we believe there's potential for significant restrictions on subsistence use and needs. The section 810 findings associated with the Willow project show the potential for significant adverse effect on the access to and availability of caribou, marine mammals, and subsistence resources: "reduction in abundance of caribou caused by alteration of their distribution and degradation of habitat"; and "reduction in availability of marine mammals caused by alteration of their distribution"; among other dire conclusions (page 21 of project overview in introduction to the hearings). . . . By any line of rational thinking, BLM must consider the section 810 conclusions and modify, mitigate, deny or take any action necessary to remove these dire consequences of the project as proposed.	ANILCA Section 810 requires that BLM disclose, in the form of what are called findings, whether an action may significantly restrict subsistence user access. BLM considers all analysis contained in the EIS and appendices, including the ANILCA Section 810 Analysis. However, findings are not a decision. Findings do not preclude BLM from including additional mitigations in the future, and they do not restrict BLM to choose any particular alternative.	N

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7	1	Wier	Carly	—	Subsistence, ANILCA 810	. . . [T]his is a completely inadequate and — and really unfair process that you've rolled out here the 810 analysis, directly says that this project is going to trade food security and culture and community for this project. We are very concerned about our future of — of — of food security here in Alaska, and I think it's a very, very real concern, particularly for communities that rely on subsistence food sources, like caribou.	The ANILCA Section 810 analyses are prepared to disclose whether BLM believes that an action may significantly restrict subsistence uses. In the case of the Willow MDP Project, BLM did conclude positive findings, meaning that there is the potential for significant restriction on subsistence uses for the community of Nuiqsut and, in the cumulative case, for other North Slope communities (Appendix G, *Alaska National Interest Lands Conservation Act 810 Analysis*). Avoidance, minimization, and mitigation measures to offset impacts to subsistence and subsistence-related resources are considered in the EIS. Details are included in the individual resource sections of Chapter 3.0 (*Affected Environment and Environmental Consequences*), in Chapter 5.0 (*Mitigation*), and in Appendix I (*Avoidance, Minimization, and Mitigation Technical Appendix*).	N

4.2.3.25 Terrestrial Wildlife

Table B.3.27. Substantive Comments Received on Terrestrial Wildlife

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
23965	2	Bentley	Judith	Center for Biological Diversity	Terrestrial Wildlife	The project is unacceptable, and your agency's supplemental draft environmental impact statement is deeply inadequate on multiple fronts: 1) It fails to sufficiently analyze the project's harm to wildlife already struggling to survive in a warming Arctic.	Effects to wildlife from the Project in combination with effects from climate change are detailed in Section 3.19.10, *Cumulative Impacts to Biological Resources*.	N
216	2	Bruno	Jeff	State of Alaska	Terrestrial Wildlife	With respect to resources within the purview of ADF&G we have one comment regarding moose habitat use described in Table 3.12.2. Occasionally moose are observed near or on the coastal plain during the summer but is generally not considered moose habitat. Moose have been documented on the lower Colville near Ocean Point annually during spring surveys in April (Daggett 2019). We request that this is included as a general comment in the written text or that the habitat is designated as insect relief (IR) in the table.	Information on the northern extent of moose habitat on the Colville River was added to Section 1.1.3, *Moose*, of Appendix E.12 (*Terrestrial Mammals Technical Appendix*), and Moist-Sedge Shrub Meadow was removed as moose habitat in tables within that appendix.	Y
25775	1	Dieterich	Michele	Center for Biological Diversity	Terrestrial Wildlife	The DEIS does not analyze the harm to wildlife and wetland ecosystems.	Effects to caribou from the Project are detailed in Section 3.12.2, *Environmental Consequences*. Effects to wetlands from the Project are detailed in Section 3.9.2, *Environmental Consequences*.	N
717	30	Dunn	Connor	ConocoPhillips Alaska	Terrestrial Wildlife	BLM cites the Johnson et al. (2019) study in Section 3.19 of the SDEIS to support the statement that "CAH [Central Arctic Herd] caribou density was lower in 12%, 15%, and 17% of important habitat during the calving, post-calving, and mosquito season respectively as a result of partial avoidance of areas near infrastructure." However, this study included Prudhoe Bay, which lacks facility design and science-based engineering that allow free caribou passage. At Prudhoe Bay, pipelines were built low to the ground and roads and pipelines are not separated, which can restrict caribou movement. The Johnson et al. (2019) study should not be used to determine potential future impacts on caribou at Willow because proven mitigation measures, namely, pipeline heights and road and pad separation, will be used to facilitate caribou movement with little or no impediment.	It is correct that Johnson, Golden et al. (2019) includes areas without modern mitigation measures for caribou. Because Section 3.19 (*Cumulative Effects*) is the cumulative effects analysis, areas of past development are included and the total effect of existing infrastructure is relevant. Section 3.19.10, *Cumulative Impacts to Biological Resources*, was updated to acknowledge that the percentages discussed are for development that does not all have modern mitigation measures.	Y
717	81	Dunn	Connor	ConocoPhillips Alaska	Terrestrial Wildlife	3.12.1 - Terrestrial Mammals - 2nd paragraph - Affected Environment BLM incorrectly describes the area east of the Colville as "The area east of the Colville River to Oliktok Point contains the Kuparuk oilfield as well as the Mustang, Nuna, and Oooguruk developments." In 2019, ConocoPhillips purchased the Nuna 1 pad from Caelus Energy. The Nuna pad is now referred to as DS-2T and is simply another drill site in the Kuparuk River Unit. There are no plans to further develop the other drill sites or similar within this area as previously proposed by Caelus. Therefore, describing this area as including the "Nuna Development" is misleading.	Edits were made to Section 3.12.1, *Affected Environment*, as suggested.	Y
717	82	Dunn	Connor	ConocoPhillips Alaska	Terrestrial Wildlife	3.12.2.1.1 - Terrestrial Mammals - Habitat Loss and Alteration ConocoPhillips recommends either resolving the discrepancies or clarifying why there are discrepancies between the total values shown in Tables 3.12.3 and 3.12.4 (and in text) and those shown in the Bird section, Tables 3.11.2 and 3.11.3, and Wetlands section, Tables 3.9.3 and 3.9.4. Most notably, the acreage of habitat affected by dust shadow from the CFWR is reported as considerably higher (84.7 acres) than is reported for wetlands (33.6 acres).	Numbers may vary among resource sections because not all areas affected by the Project are used by birds or caribou. Table notes were added to impact tables in Section 3.9 (*Wetlands and Vegetation*), Section 3.11 (*Birds*), and Section 3.12 (*Terrestrial Wildlife*).	Y
717	83	Dunn	Connor	ConocoPhillips Alaska	Terrestrial Wildlife	3.12.2.1.2 - Terrestrial Mammals - Disturbance and Displacement The value of 10,052.6 acres of disturbance from new infrastructure does not appear to take into account that much of the area 2.5 miles from the new infrastructure was already accounted for in the disturbance area presented in the DEIS for adjacent roads and pads. The CFWR and boat ramps are proposed immediately adjacent to previously proposed infrastructure, so most disturbance impacts from these features would be negligible compared to those from the roads and pads. In addition, only the construction of the CFWR could disturb caribou; following construction, the CFWR would act like a lake with human activity only at the access road and pad. ConocoPhillips recommends further clarification and discussion of these topics within this section.	The Final EIS presents the area of disturbance for each alternative and does not separate out the CFWR.	N
20179	1	Freeman	Kyri	Center for Biological Diversity	Terrestrial Wildlife	How will the project impact native wildlife, include migratory birds?	Effects to caribou from the Project are detailed in Section 3.12.2, *Environmental Consequences*. Effects to birds from the Project are detailed in Section 3.11.2, *Environmental Consequences*.	N
26702	4	Gannon	Glenna	—	Terrestrial Wildlife	Additionally, this complex is a huge infrastructure proposal and impacts to the regions from infrastructure development like bridges could significantly affect wildlife and fish, spawning grounds. Umm, that's any one bridge. And as far as I can tell, there's only permitting for one, let alone seven.	Effects to caribou from the Project are detailed in Section 3.12.2, *Environmental Consequences*. Effects to fish from the Project are detailed in Section 3.10.2, *Environmental Consequences*.	N

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805	5	Lowenthal; Haaland; Huffman; Grijalva; Gallego	Alan; Deb; Jared; Raul M.; Ruben	United States Congress	Terrestrial Wildlife	Furthermore, the SDEIS fails to consider any alternatives that are protective of sensitive resources in the region. BLM should be maintaining the strongest possible protections for Special Areas within the Reserve. Instead, the proposed Willow Plan development encroaches into the Colville River and Teshekpuk Lake Special Areas. The proposed gravel mines would be adjacent to the Colville River Special Area, with a proposed gravel road and pipeline routing through the Special Area. The proposed oil and gas infrastructure and industrial activities will also extend into Teshekpuk Lake Special Area, an area that has been protected for decades because of its ecological value as the largest Arctic lake. Permanent infrastructure from this development will impact critical nesting areas for endangered bird species as well as high density, year-round range for the Teshekpuk Caribou Herd, causing lasting impacts to wildlife.	Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA. The Tiŋmiaqsiuġvik Mine Site is 3.8 miles away from the CRSA at its closest point.	N
45	1	Major	Mark	—	Terrestrial Wildlife	Obviously, this project is of major concern to Kuukpik, Nuiqsut, because it has severe potential for impacts on caribou. One of the big concerns is that the project runs north to south, but the caribou migrate east to west. The supplement didn't really address that kind of detail and what might be done to help out with that situation. But the problem that we still see is there haven't been any measures put in place or required upon the applicant, by the BLM, to help mitigate impacts to caribou. In that presentation in Nuiqsut, Kuukpik mentioned two specific items that could be done. One is to have flight restrictions in place during that key caribou calving period, and have vehicle restrictions in place to limit the number of the vehicles and limit the number of flights that would come in and possibly disturb the caribou. Can the BLM do that? I think they have the authority to do that kind of stuff, but nothing has been put forward in the supplemental EIS. We'd ask the BLM to take a close look at that and see what they can do.	BMP K-5 restricts air traffic within the Teshekpuk Lake Caribou Habitat Area: aircraft use (including fixed-wing and helicopter) is restricted from May 20 through August 20. Aircraft must maintain a minimum height of 2,000 feet above ground level over the Teshekpuk Lake Caribou Habitat Area from May 20 through August 20. Proposed revisions to the NPR-A IAP BMPs would also address the effects of air traffic on wildlife; these were added to the Final EIS in Section 3.12.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices.* BMPs F-2 through F-4 would include limiting the number of takeoffs and landings to the maximum extent practicable. Larger landing strips and storage areas are considered in order to allow the use of larger aircraft, which would reduce the overall number of flights. (This has been incorporated into the Willow MDP Project design to reduce the total air traffic.) Restricting the number of vehicles allowed during construction would extend the construction period considerably and thus extend the duration of the greatest Project impacts.	Y
49	1	Major	Mark	—	Terrestrial Wildlife	Kuukpik's concerns with this project are the fact that the drill sites run north to south, and the caribou migrate east to west. If they don't migrate east to west correctly, the Nuiqsut community may get cut off. We think that the BLM can put in measures to help that, to address that. I mentioned them at the earlier meeting. Those are flight restrictions and vehicle restrictions during critical times, caribou calving time, and bird nesting time. And the BLM does not address that so far, and we think the BLM has the authority to do that.	BMP K-5 restricts air traffic within the Teshekpuk Lake Caribou Habitat Area: aircraft use (including fixed wing and helicopter) is restricted from May 20 through August 20. Aircraft must maintain a minimum height of 2,000 feet above ground level over the Teshekpuk Lake Caribou Habitat Area from May 20 through August 20. Proposed revisions to the NPR-A IAP BMPs would also address the effects of air traffic on wildlife; these were added to the Final EIS in Section 3.12.2.1.1, *Applicable Existing and Proposed Lease Stipulations and Best Management Practices.* BMPs F-2 through F-4 would include limiting the number of takeoffs and landings to the maximum extent practicable. Larger landing strips and storage areas are considered in order to allow the use of larger aircraft. (This has been incorporated into the Willow MDP Project design to reduce the total air traffic.) Restricting the number of vehicles allowed during construction would extend the construction period considerably and thus extend the duration of the greatest Project impacts.	Y
520	54	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	The SDEIS addressed some of the areas in which impacts from the newly proposed additions to the Willow project may affect caribou, but many areas require clarification or adjustments. 1. Module delivery options must analyze impacts on caribou disturbance, displacement, and forage. We note that the addition of Option 3 would likely change the extent of impacts on caribou in comparison to the other action alternatives, as it keeps development and activity in both winter and summer farther from the sensitive areas around Teshekpuk Lake, which are used year-round by the Teshekpuk Caribou Herd (TCH), including for critical calving, post-calving and insect relief habitat. One area where impacts are difficult to determine, however, was the impacts of the proposed heavy-haul ice road on overwintering caribou. The TCH is the only North Slope caribou herd in which the majority of individuals regularly overwinter on the coastal plain. This keeps caribou in potential contact with proposed oil and gas development and activity. Based on Figure 3.12.4, the heavy-haul ice road proposed in Option 3 would pass through areas of medium and high density for overwintering caribou. The SDEIS estimates that ground traffic during the winter period would average 84 trips per hour, or 1.4 trips per minute. This is a large amount of potential disturbance to move through caribou overwintering habitat, especially given that such traffic levels are over 5 times higher than those the SDEIS acknowledges as inhibiting crossing success. The SDEIS mentions potential for disturbance or displacement associated with these activities, but does little to provide analysis of the expected consequences. Winter is a critical time for caribou. Foraging opportunities are limited during the winter and caribou rely on body stores of energy for survival and gestation. Studies in other ungulate species of displacement and altered habitat use due to energy development have noted that fitness costs are likely greater during winter, when individuals already exhibit a negative energy balance. Further energetic costs at such a time may lead to loss of body mass and depletion of vital energy reserves. There has been little study of winter responses by caribou to industrial development and activity in Alaska. Nonetheless, studies from Canada reveal that disturbances, such as loud noises, can lead to flight responses in caribou, causing them to expend additional energy, and that caribou may avoid human infrastructure and disturbance in the winter. Such factors can have greater effects in years of high snow depth, when energetic costs of movement increase and foraging opportunities are reduced. Any extra expenditure of energy that caribou undertake as a result of interaction with oil and gas activity or developments is of concern as reproductive success in caribou is strongly correlated with nutritional stress. Late winter body mass of female caribou has been strongly linked to calf production and survival, potentially influencing population growth rates. While caribou exhibit the lowest annual movement rates during the winter, this does not imply a lack of awareness or response to their environment. Studies of European reindeer have found vigilance is highest in winter, compared to other seasons. Furthermore, a study in Canada found that caribou avoided human settlements more strongly, and showed greater cumulative habitat loss due to development, in the winter than in summer. Previous development to the east of the NPR-A has taken place in an area that is mostly abandoned by caribou in the winter, making it especially important that winter impacts be fully considered in the NPR-A context and that extra precautions be taken to avoid negative impacts to overwintering caribou. The SDEIS does not adequately assess or mitigate overwintering impacts.	Information on caribou likely avoiding and having difficulty crossing roads with a very high level of traffic was added to Final EIS Section 3.12.2.6.2, *Disturbance or Displacement*. The main effect of this is likely to be altered distribution and lowered access to some areas of winter habitat. The impact of this would be limited by the large size of the winter range during most years. Travel conditions are generally good in the ACP during winter, so energetic implications from locomotion are unlikely to be high.	Y

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520	55	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	2. Caribou calving density must be consistent, detailed, and accurate to understand the impacts from Willow. Content in the SDEIS regarding caribou calving density in the project area was unclear and at times appears contradictory. Figure 3.12.4 and Figure 3.12.6 both show TCH calving density, broken into high-, medium- and low-density calving areas. Both figures contain identical notes indicating the source of data and methods of showing calving densities, with the same citation given for each (Prichard et al. 2019). However, the two figures show different extents of the various calving density areas. Figure 3.12.4 shows high density calving extending to the northern edge of the proposed development pads and gravel roads and medium density calving area covering nearly the entire remainder of newly proposed pads and roads. Figure 3.12.6, however, shows no overlap of high density calving and proposed project roads, a different distribution of high density calving areas north of the lake, and medium density calving areas that only reach to BT4, the northernmost proposed Willow pad. Most of the proposed Willow roads and pads lie in low density calving areas or outside of any of the calving areas according to this latter figure, in contrast to the depiction in Figure 3.12.4. If these figures are based on the same data, as the note and citation indicate, it is unclear why they show different depictions of calving. This needs to be clarified so that readers can accurately interpret the relevant data and confirm the dataset in the SDEIS are accurate. Clarifying this discrepancy in the depictions of caribou calving density also has implications for conclusions drawn in the SDEIS. The discussion of the affected environment and environmental consequences for terrestrial mammals states that, The disturbance zone for the boat ramps and CFWR would be located in areas where the average caribou density during the calving season is at the low end of the range (less than 0.19 to 0.34 total caribou per square km respectively) from 2002 through 2019 based on aerial surveys. This statement implies a low expected level of impact on calving caribou; however, it does not appear consistent with the data presented in the SDEIS. The statement above references Figures 3.12.4 through 3.12.7. As noted above, however, Figures 3.12.4 and 3.12.6 differ in their depiction of calving areas. No figure is presented that overlays the proposed boat ramps and CFWR with caribou calving data, but comparing the locations of this infrastructure from Figure 2.2.2 with Figures 3.12.4 suggests that the proposed infrastructure would mostly lie within the medium calving density area, contradicting the statement in the SDEIS. The calving distribution shown in Figure 3.12.6 aligns more closely with the statement that the proposed boat ramps and the CFWR would mostly overlap areas of low calving density. The density ranges in the quote above also do not appear to accurately align with the information presented in the SDEIS. Figure 3.12.7 shows the mean caribou density by season from 20012018. Inferring locations for boat ramps and the CFWR from Figure 2.2.2 suggests that these primarily lie within calving densities of 0.3 [to] 0.6 caribou per square km, with boat ramp 1 occurring in a lower area of somewhere between 0-0.2 caribou per square km. It is unclear from this figure why the SDEIS concludes that the disturbance zone would mostly span from 0.19-0.34 caribou per square km, when 0.3 forms the bottom end of the range for three out of four of the referenced infrastructure locations. This also needs clarification.	Figure 3.12.4 shows the kernel distribution of all collared female caribou of the TCH during calving. Figure 3.12.6 shows the kernel distribution of all collared female caribou of the TCH *that were known to have calved*. The distribution for Figure 3.12.6 is more closely associated with Teshekpuk Lake, because noncalving females often remain outside the main calving areas during the calving period (Person, Prichard et al. 2007; Wilson, Prichard et al. 2012). This difference was clarified on the maps. Figure 3.12.7 shows the average density from aerial surveys conducted during different seasons. This differs from the kernel maps in that these are direct estimates of density from aerial surveys (not smoothed by kernel density estimation) and include all caribou (all females, males, calves).	Y (Figure)
520	56	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	Correcting the above statements/figures so that they align with the actual caribou data is relevant to more than just preserving technical accuracy. It also has implications for the findings of the ANILCA 810 analysis. This analysis states twice that the alternatives analysis area lies within low density calving areas for the TCH. It concludes that because the alternatives analysis area is located in low density calving areas for the TCH, displacement would likely not have population-level effects. This leads BLM to conclude that the abundance of caribou available for subsistence use would not be impacted under Alternative B. If the conclusions about the calving density within the alternatives analysis are not accurate, or are not supported by the available data (e.g., if Figure 3.12.4 is accurate), this calls into question BLM’s finding. It is critical that BLM check all data sources and accurately reflect the available data in its figures and statements in both Chapter 3 and Appendix C of the SDEIS. An accurate and complete dataset should be used in a new draft EIS that accurately describes the project.	Figure 3.12.4 shows the kernel distribution of all collared female caribou of the TCH during calving; this includes females that did not calve. Because many noncalving females remain outside the main calving areas during the calving period (Person, Prichard et al. 2007; Wilson, Prichard et al. 2012), this increases the area of high density relative to calving females only. Figure 3.12.7 shows the most direct evidence of the density of caribou in specific areas during the calving season.	Y (Figure)
520	57	Psarianos	Bridget	Trustees for Alaska	Terrestrial Wildlife	Caribou discussion should accurately reflect the best available scientific literature While scientific literature regarding caribou is included in the draft EIS and SDEIS, there are several places where content should be updated to clearly reflect accurate scientific information. For example, when discussing effects on terrestrial mammals of Module Delivery Option 3, the SDEIS cites Murphy and Curatolo (1987) as stating that road traffic levels greater than 15 vehicles per hour reduce caribou road crossing success. The study did find this, however, it also indicated that caribou avoidance of roads may occur at lower levels of traffic. As the text currently stands, it seems that avoidance would only occur at greater than 15 vehicles per hour, which is misleading and inconsistent with the scientific record. This has been pointed out to BLM previously for other NEPA processes, yet this was not reflected in the SDEIS. The statement should be updated to indicate that caribou avoidance of roads is also expected at lower traffic volumes.	Text was modified in Section 3.12.2.8, *Module Delivery Option 3: Colville River Crossing*, to clarify that deflections and delays could occur at lower traffic volumes, although less likely.	Y

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407	12	Rose	Garett	Natural Resources Defense Council	Terrestrial Wildlife	The SDEISs analysis of potential impacts to caribou remains cursory. For instance, the SDEIS, like the DEIS, uses an analysis area of 3.7 miles. As the conservation comments noted, research shows that this area is likely far too small to reflect the full array of annual impacts on a highly mobile species, such as impacts to forage abundance and seasonal variation in the range of potential impacts. Similarly, the SDEIS takes no steps to address previously raised concerns about the effectiveness of aircraft restrictions for protecting caribou from potential impacts, despite the fact that Option 3 involves additional fixed-wing and helicopter flights. And the analysis fails to provide any specification of how the intense flow of ice road traffic 84 trips an hour could potentially affect overwintering caribou, aside from stating it could disturb and displace caribou and cross-referencing the DEIS, which has a similarly cursory discussion of potential impacts from ice road traffic. The SDEIS also has no meaningful discussion of Option 3s impacts on members of the Central Arctic Herd (CAH), despite being within the range of that herd. The SDEIS notes, without providing detail, merely that additional summer traffic on roads involved in Option 3 could potentially result in additional delays or deflections of the CAH. Compounding this, the SDEIS appears to functionally disclaim any impact on CAH members. It fails to analyze the potential impacts of ice roads on CAH members (e.g., how ice road placement could affect forage opportunities during the spring, summer, and fall). It concludes, without analysis, that because few members of the CAH are present during winter, construction activities at that time would have minimal impacts on that herd. Then it states once again without analysis that because summer construction activities would occur on or near existing roads and pads in an area that is already industrial, there would be minimal disturbance to CAH caribou. The SDEISs terrestrial mammals analysis also ignores potentially significant impacts to non-caribou terrestrial mammals that utilize the area being analyzed, most notably wolves and wolverines. All three new components occupy areas used by Nuiqsut and Utqiaġvik for the subsistence hunting of wolves and wolverines. The SDEIS acknowledges the importance of the Project area for such hunting, and the DEIS noted the cultural importance of hunting furbearers. And the DEIS also noted that wolves and wolverines were relatively uncommon in the area being analyzed, suggesting that potential impacts to the local population could have far-reaching consequences. Despite all this, the SDEIS is silent with regard to potential impacts on these species from the new components. In proceeding without a broader, improved analysis of potentially significant impacts to terrestrial mammals, the SDEIS simply compounds the analytic contradictions contained within the DEIS. Despite failing to meaningfully consider potentially significant impacts on furbearers, for instance, BLM nevertheless purported to draw conclusions about how the Project would impact furbearer harvesters. And the DEIS claims without analysis that the Project will have no population-level impacts on any subsistence resources, including furbearers and other terrestrial mammals. In the absence of a meaningful analysis of potentially significant impacts to these species, it is unclear how BLM arrived at these conclusions.	Different studies have reported somewhat different distances of lower-density use by maternal caribou of the CAH during calving, but these distances have been consistently between 1 and 5 km. Lawhead (1988) reported that “few caribou were present within 3-5 km of the Oliktok Point and Milne Point Roads during and after peak calving in that year. This localized avoidance was especially marked for cows with calves.” More recently, Johnson, Golden et al. (2019) estimated that CAH caribou were at lower-than-expected density within 5 km of infrastructure. These distances may vary for different roads and by factors such as calving density or traffic levels (Lawhead, Prichard et al. 2004). Based on all the research conducted on the CAH, a 4-km displacement for maternal caribou during the 2- to 3-week calving period is a reasonable estimate of displacement for conditions similar to the Kuparuk oil fields. The addition of hunting along roads in the TCH range adds additional uncertainty. In addition, some impacts such as potential overgrazing could occur in areas 4 to 6 km from roads. For these reasons, the use of a 6-km analysis area, assuming some displacement occurs to 4 km, is justified. Additional references were added to Final EIS Section 3.12, *Terrestrial Mammals*, to demonstrate the rationale for the analysis area. Final EIS Appendix E.12, *Terrestrial Mammals Technical Appendix*, describes effects to species other than caribou. Effects from ice road traffic are provided in Section 3.12.2.3.2, *Disturbance or Displacement*. High ice road traffic is likely to result in avoidance and difficulty crossing but only represents a very small part of the winter range; travel conditions in winter are generally good, and large energetic expenditures are not likely as a result. Ice roads would cause a temporary degradation of forage along the footprint of the ice road, which represents a very small portion of CAH summer range. As stated in Section 3.12.2.3.2, additional traffic along existing roads may increase delays or deflections for CAH; this is put in context of the fact that 1) traffic would stop for crossings of large numbers of caribou and that 2) CAH caribou move through Kuparuk oil fields multiple times during the summer (Prichard, Lawhead et al. 2019), 3) are highly motivated during insect harassment, 4) use roads and pads for fly relief, and 5) can use alternate routes. The NPR-A IAP considered the effectiveness of BMPs (including aircraft restrictions) and is the reason that specific BMPs were selected in the ROD and are now required. Various BMPs require lessees to monitor specific resources; if monitoring indicates that BMPs are not effective, then BLM adaptively manages to reduce impacts.	Y
612	4	Strasenburgh	John	—	Terrestrial Wildlife	A couple of additional points: All lakes provide important wildlife habitat. Accordingly, all lakes should have buffers, not just deep water lakes. The Teshekpuk Lake Special area is important habitat for birds, including the highest density of shorebirds in the circumpolar Arctic, and many other species among them, spectacled eiders, king eiders, red throated loons, dunlins, and molting geese. And the TLSA provides important caribou calving habitat. And yet, significant development in this special area is called for in the project plan. Teshekpuk Lake Special Area is critical and unique habitat, and development should not be allowed there.	Parts of the infield road system, as well as BT2 and BT4, would be within the TLSA in an area that is available to oil and gas leasing. Like most or all previous NPR-A projects, much of the Project area overlaps previously undisturbed area. All else being equal, the TLSA is only an administrative boundary, and Project impacts would not necessarily be greater within the TLSA than they would outside the TLSA.	N
570	4	P Warren	James	—	Terrestrial Wildlife	By treating the Teshekpuk Lake Caribou Herd and the gravel infrastructure proposed to be built, BLM claims there will be some adverse impacts and then some maybe positive impacts, such as the great spot for caribou to avoid warble flies and other pests they deal with every summer day. This is not the same as a real analysis of the health of the TLCH and other affected caribou herds across the North Slope. To treat these issues in isolation from one another, Ms. Jones, is deliberately to minimize the impact of BLM decisions.	Effects to the TCH and the CAH from the Project (including effects from gravel infrastructure) are detailed in Section 3.12.2, *Environmental Consequences*. The health of the TCH and the CAH may be impacted by a variety of different factors, including but not limited to effects from the Project. Cumulative effects on these herds are described in Section 3.19.10, *Cumulative Impacts to Biological Resources*. Each action alternative has trade-offs of positive and negative effects. In accordance with CEQ guidelines, the EIS discloses these trade-offs.	N
4	5	P Warren; Warren	James; Jim	—	Terrestrial Wildlife	The analysis shows that there are very likely direct, indirect, and cumulative impacts of overwhelmingly negative kinds on the ecology, hydrology, vegetation, and wildlife of the affected areas. (This was also the case in the Draft EIS.) And yet the BLM always spreads out the analysis in such a way as to minimize these negative effects. By treating the Teshekpuk Lake Caribou Herd and the gravel infrastructure proposed to be built, BLM claims there will be some adverse impacts and then some maybe positive impacts, such as the great spot for caribou to avoid warble flies and other pests they deal with every summer day. This is not the same as a real analysis of the health of the TLCH and other affected caribou herds across the North Slope. To treat these issues in isolation from one another, Ms. Jones, is deliberately to minimize the impact of BLM decisions.	Effects to the TCH and the CAH from the Project (including effects from gravel infrastructure) are detailed in Section 3.12.2, *Environmental Consequences*. The health of the TCH and the CAH may be impacted by a variety of different factors, including but not limited to effects from the Project. Cumulative effects on these herds are described in Section 3.19.10, *Cumulative Impacts to Biological Resources*. Each action alternative has trade-offs of positive and negative effects. In accordance with CEQ guidelines, the EIS discloses these trade-offs.	N

4.2.3.26 Visual Resources

Table B.3.28. Substantive Comments Received on Visual Resources

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	59	Dunn	Connor	ConocoPhillips Alaska	Visual Resources	3.7.2.1 - Visual Resources - Alternatives B, C, and D Please clarify the statement "though the boat ramp(s) would be visible by river users in the immediately adjacent areas." Based on discussion in later sections, specifically Section 3.16.2.1.3, Harvester Access, existing use of the affected portions of Fish and Judy Creeks is extremely limited ("The boat ramps on Judy (Iqalliqpik) Creek, and Fish (Uvlutuuq) Creek are located in areas that are not commonly accessed by boat, according to available subsistence use area data (SRB&A 2010b, 2019)"). Following boat ramp installation, river users are more likely to use those portions of Fish and Judy Creeks as a direct result of the boat ramps.	Existing and future use of Judy (Iqalliqpik) Creek and Fish (Uvlutuuq) Creek may be limited, but river users would see the boat ramps and human development in an area of otherwise limited development.	N

4.2.3.27 Water Resources

Table B.3.29. Substantive Comments Received on Water Resources

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26707	5	Baca	Andrew	US Environmental Protection Agency	Water Resources	Surface Water Impacts Constructed Freshwater Reservoir. We recommend that the FEIS analyze whether and to what extent the annual diversion of flow to the constructed freshwater reservoir would alter the hydrograph of Willow Creek 3. Section 2.2.1 describes the CFWR and indicates that the reservoir would be filled by diverting a percentage of the flow that contributes to Willow Creek 3. The SDEIS concludes that the diversion of flow to the reservoir is not anticipated to impact the Willow Creek 3 baseline flow as the estimated annual recharge volume of Lake M0015 and Lake R0064 exceeds the estimated volume of the CFWR. We further recommend that the FEIS clarify what is meant by the baseline flow of Willow Creek 3 and explain how this baseline flow is related to the annual recharge volume of the two referenced lakes.	Additional spring breakup data for Willow Creek 3 and effects from the CFWR were clarified in Section 3.8.2.3.6, *Water Withdrawal and Diversion*, and in Section 1.2.2.2.4, *Willow Creek 3*, of Appendix E.8A (*Water Resources Technical Appendix*). The diversion of flow to the CFWR would likely reduce the spring breakup hydrograph of Willow Creek 3, which was measured at 5 cfs on May 30, 2019, and 16 cfs on June 2. Baseline summer flows in Willow Creek are likely very low. However, no long-term records exist to establish the specific "baseline" flow conditions of Willow Creek 3, so the term was removed. Because the flow-control gate at the CFWR could be closed so that water is not diverted into the CFWR during periods of low flow, minimal impacts to the summer flow regime of Willow Creek 3 are anticipated.	Y
26707	7	Baca	Andrew	US Environmental Protection Agency	Water Resources	Colville River Crossing. We recommend that a synthetic monthly mean discharge dataset be generated for Ocean Point, in order to support analysis of impacts of the proposed ice bridge crossing of the Colville River. As noted in the SDEIS, there is no flow data available for the Colville River at Ocean Point, and discharge measured at the Umiat gaging station is used in the impacts analysis as the most representative data available. The SDEIS suggests that flow at Ocean Point is likely approximately 1.5 times higher than flow at Umiat, based on the assumption that the magnitude of flow is likely to increase roughly proportional to the drainage area increase. We recommend using such a conversion to generate a representative synthetic dataset for Ocean Point, rather than basing the impacts analysis on flows measured at Umiat.	As suggested, discharge at Ocean Point was estimated using the drainage-area ratio method and was described in Final EIS Appendix E.8A (*Water Resources Technical Appendix*). The technical memo in which the estimate was developed is provided as Appendix E.8B (*Ocean Point Technical Memorandum*).	Y
26707	8	Baca	Andrew	US Environmental Protection Agency	Water Resources	In addition, we recommend using the average of only the last 10 years of the Umiat discharge data rather than the entire period of record. Based on data presented in Table 3.8.2, mean monthly discharges for winter months have increased over the 17 years of available data. Using mean discharges derived from the entire period of record will likely underestimate the discharge at Ocean Point during construction and use of the ice bridge.	Data for both the last 10 years and the period of record (17 years) for Umiat are presented in Final EIS Appendix E.8A (*Water Resources Technical Appendix*), as is the average monthly mean discharge for both time periods. The estimate for discharge at Ocean Point was developed using the last 10 years of data, as presented in Final EIS Appendix E.8B (*Ocean Point Technical Memorandum*).	Y
26707	9	Baca	Andrew	US Environmental Protection Agency	Water Resources	We recommend the FEIS estimate the likelihood that provisions for water management or fish passage will be necessary during construction and use of the proposed ice bridge. We further recommend that the FEIS discuss whether the use of steel culverts or pumping would be practicable and how they might be implemented. If these measures are determined to not be practicable, we recommend that the FEIS address how their absence would affect the environmental consequences of constructing the proposed ice bridge. Section 3.8.2.2 discusses the possible environmental consequences of the proposed Colville River ice bridge crossing, including the potential for the bottom-fast ice bridge to block the river flow and lead to out-of-bank flooding. Flow between the bed and the ice that would erode the riverbed or unground the bridge is presented as another possibility. The SDEIS explains that CPAI will collect flow and ice data at Ocean Point for the next several years and will develop a plan for water management and fish passage prior to bridge construction. The document indicates that alternatives include a battery of steel culverts hundreds of feet long or pumping of flows around the ice bridge, but states that both alternatives would be difficult to manage and maintain.	Description of the ice bridge was clarified in the Project description and in Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*. The bridge would not be entirely grounded and would allow some flow to pass underneath, thus reducing the likelihood that out-of-bank flooding would occur or that additional water management would be needed.	Y
26707	13	Baca	Andrew	US Environmental Protection Agency	Water Resources	The SDEIS identifies numerous potential surface water impacts related to construction of boat ramps within the floodplain of the Ublutuoch (Tiŋmiaqsiuġvik) River, Judy (Iqalliqpik) Creek, and Fish (Uvlutuuq) Creek, which were not previously considered in the DEIS, and we recommend that the FEIS consider measures to address these impacts as well.	Surface water impacts from the boat ramps are included in the Final EIS.	N
101	3	Campbell	Bruce	—	Water Resources	ALLOW MORE INPUT FROM BIOLOGISTS AND HYDROLOGISTS, AS WELL AS FROM OTHER AGENCIES, NOW THAT THE DOCUMENTATION HAS SLOWLY BEEN EMERGING THROUGH THIS EIS PROCESS GIVING A BETTER IDEA OF THE GENERAL AREAS OF WATERSHEDS WHICH WOULD BE IMPACTED BY A MASSIVE ARRAY OF INFRASTRUCTURE AND EXTRACTION UNDER THE WILLOW MDP.	The SDEIS and the Final EIS were reviewed by subject-matter experts and by cooperating agencies.	N

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117	16	Campbell	Bruce	—	Water Resources	For instance, I note that a freshwater reservoir (plus perhaps a couple boat ramps) is proposed now instead of that island alternative. WHAT WATERCOURSES WILL HAVE THEIR NATURAL COURSE ALTERED SO AS TO FORM THE RECENTLY PROPOSED FRESHWATER RESERVOIR AS PART OF THE WILLOW MDP? WHAT WATERCOURSES (INCLUDING TRIBUTARIES AND WATERBODIES WHICH A WATERCOURSE MAY EMPTY INTO) AND WHAT PORTIONS OF SPECIES LIFE CYCLES WILL BE IMPACTED BY THE NEWLY-PROPOSED FRESHWATER RESERVOIR? Will a lot of the water in this reservoir be tapped for testing pipeline equipment?	The CFWR would be constructed under all action alternatives to provide a source of freshwater to support the Project. The CFWR would not replace module delivery Options 1 and 2, which still propose construction of an MTI. Effects from the CFWR on water resources are provided in Final EIS Section 3.8.2.3.6, *Water Withdrawal and Diversion*. Effects from the CFWR on fish are provided in the Final EIS Section 3.10.2.3.1, *Habitat Loss or Alteration*.	N
717	20	Dunn	Connor	ConocoPhillips Alaska	Water Resources	Finally, the SDEIS states, in Section 3.8.2.2, that [i]t is unknown to what extent the construction of ice bridges is currently exacerbating ice jam flooding conditions. Ice jams and flooding occur naturally in the Colville River delta, and annual break-up monitoring for over 20 years shows that slotting the annual Alpine Resupply Colville River Ice Bridge has negligible effects regarding ice jams and flooding downstream within the Colville River delta. The final EIS should reflect this known information.	The severity of an ice jam is a function of the preceding rate of rise of water level and velocity, the amount of ice traveling with the breakup front, and the nature of the obstacle that initiates the jam (Ashton 1986). It is not unreasonable to assume that upstream actions on an ice bridge may affect the formation and severity of an ice jam. However, as noted, ice jams and flooding do occur naturally in the CRD. A search of the USACE Ice Jam Database (2020) shows seven ice jams recorded from 1988 to 2016. The locations varied from Umiat (1988, 1993) to the CRD (2004, 2007, 2011, 2013). Absence of evidence of ice jam exacerbation does not provide evidence of downstream negligible effects; it confirms the unknown. Changed "exacerbating" to "influencing" in Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y
717	56	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.1.1 - Water Resources - Gravel infrastructure The impacts to water resources from gravel infrastructure, including the boat ramps, presented in the DEIS and the SDEIS are generally described as: 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 2 through 6 are possible as compared to undeveloped conditions but they are dependent on the depth and duration of water impoundment (Effect 1). For example, an increase in duration (and depth) of water impoundment against a roadway or on the upstream side of a culvert for a month following the spring runoff event would be much more likely to result in thermokarsting, erosion, or channel changes than an impoundment occurring over a few days each year (or even every other year). ConocoPhillips recommends that the FEIS clearly describe the likelihood of effects 2 through 6.	There is not sufficient design information available yet to determine what the depth, duration, direction, velocity, and frequency of impounded water would be. Therefore, the range of potential effects are described in the EIS.	N
717	60	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.1.1 - Water Resources - Rivers The spring breakup monitoring record is currently 28 consecutive seasons of stage and discharge data near Nuiqsut/Monument 1 per the 2019 MBI breakup report. Median spring peak discharge value refers to Umiat. Water quality record now includes additional sampling at Ocean Point in February 2020 (MBI)This table lacks a row for Winter Monitoring Record, i.e. collected at Ocean Point in December 2019 and February 2020 (MBI).	Amended Table 3.8.1 in Section 3.8.1.1.1, *Rivers*, with updated number of seasons of data for Colville River Spring Breakup Monitoring Record row, and added a new row for Winter Monitoring Record. Table 3.8.2 in Section 3.8.1.1.3, *Freshwater Water Quality*, was amended with a new row for Colville River winter water quality.	Y
717	61	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.1.1 - Water Resources - Rivers December 31, 2019 - average floating ice thickness is 2.7 ft; average water under ice is 1.5 ft (max is 2.3 ft); average velocity is 0.15 ft/s (max is 0.25 ft/s).	The range of these values was provided in the SDEIS and is in Table E.8.4 (in Appendix E.8A, *Water Resources Technical Appendix*) of the Final EIS. Additional data from December 31, 2019, were put into a new table (Table E.8.5) in Section 1.2.1, *Colville River*, of Appendix E.8A, and references in Final EIS Section 3.8.1.1.1, *Rivers*.	Y
717	62	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.1.1 - Water Resources - Rivers This table lacks a row for data collected February 25, 2020 (MBI).	These data were added to Table E.8.4 in Appendix E.8A, *Water Resources Technical Appendix*, of the Final EIS.	Y
717	63	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.1.1 - Water Resources - Rivers Units for salinity is ppt, and that should be stated.	Units of measurement were added to Table 3.8.3 in Final EIS Section 3.8, *Water Resources*.	Y
717	64	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.1.1 - Water Resources - Gravel Infrastructure The SDEIS states that the CFWR would require 10.9 acres of gravel infrastructure. ConocoPhillips estimates 7.4 acres of gravel fill associated with the CFWR, which includes a 3.9-acre perimeter berm and 3.5 acres for the gravel access road and pad.	Gravel fill and excavation are described separately for the Final EIS.	N
717	65	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.1.2 - Water Resources - In-Water Structures (Water Intakes, Boat Ramps) The DEIS reported that the Ublutuoch River has a discharge near zero for November through April (DEIS Appendix E.8, Table E.8.9). Based on that information, it would be unlikely for removal of the insulating snow cover to supercool the water immediately around the construction site, leading to the formation of slush throughout the entire water column due to lack of discharge and moving water. Supercooling and slush formation cannot occur without open surface conditions and flowing water with sub-freezing air temperatures.	The Draft EIS (and Final EIS) also report that the area at the boat ramp is overwintering fish habitat. Supercooling of water could occur if the area is deep enough for overwintering habitat. No edits to text were made.	N
717	66	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.1.3 - Water Resources - Water Withdrawal BLM should include a value or range for the "estimated annual recharge volume of the basin" for comparison to the volume of the CFWR.	Additional text was added to Section 3.8.2.3.6, *Water Withdrawal and Diversion*, regarding filling of the CFWR and recharge of the lakes.	Y
717	67	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.2 - Water Resources - Module Delivery Option 3: Colville River Crossing Paragraph 4 - "The lowest range of winter flows recorded at Umiat are 1.8 to 2.7 cfs (Table 3.8.2)" It is unclear where values originate; Table 3.8.2 provides flows lower than the range described.	Text was corrected (Section 1.2.1, *Colville River*, of Appendix E.8A, *Water Resources Technical Appendix*). The mean monthly April flow at Umiat is 3.1 cfs. This was also corrected in Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y
717	68	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.2 - Water Resources - Module Delivery Option 3: Colville River Crossing Paragraph 4 - "Between January and March, the next lowest flow months, the mean monthly flow at Umiat varied from 24.0 to 3.1 cfs." Should be 24.0 and 3.9 cfs according to table.	Text was corrected (Section 1.2.1, *Colville River*, of Appendix E.8A, *Water Resources Technical Appendix*). The mean monthly March flow at Umiat is 3.9 cfs. This was also corrected in Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y
717	69	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.1.5 - Water Resources - Watercraft in Rivers In this section and throughout the document, the analysis correctly discloses potential indirect impacts related to construction of up to three boat ramps in the Project Area. However, it would be appropriate to clarify for the reader that impacts related to an increase in watercraft and hunting (specifically potential for increased spills and increased mortality of wildlife) are an indirect result of ConocoPhillips' proposal and that ConocoPhillips does not have direct control, ownership, or management of these activities and impacts.	BLM has disclosed the direct, indirect, and cumulative impacts associated with the construction of up to three boat ramps; while the fact that CPAI does not have direct control, ownership, or management of these activities is true, it is not relevant for making an informed decision in accordance with NEPA.	N

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717	70	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.2 - Water Resources - Module Delivery Option 3: Colville River Crossing Paragraph 3 - Update to include winter flow data collected 2109-2020 in Colville River at Ocean Point (MBI 2020).	Data were added to Final EIS Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*, and Section 1.2.1, *Colville River*, of Appendix E.8A, *Water Resources Technical Appendix*.	Y
717	71	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.2 - Water Resources - Module Delivery Option 3: Colville River Crossing The information in these sentences is not physically correct: "Additionally, building an ice road across the portion of the channel that is dry could cause the riverbed to freeze deeper than it would have. A deeper freeze could cause water that is flowing in the riverbed to be forced to the surface at locations outside the channel(s) that would have confined the surface water flow had the ice road not been constructed." Building the ice road across the portion of the channel that is dry (in Figure 2.3.1 this is the 1300-foot gravel bar and banks where the ramps would be constructed) would actually provide some insulation, which would in turn reduce the freeze down into the bed and help maintain flow within the bed. As ice covers thicken (either naturally or through creation of an ice crossing), the rate of freeze into the riverbed decreases as the distance for heat from the underlying water or riverbed to travel to the atmosphere increases. So as the ice road is thickened, the heat transfer from the water to the atmosphere is slowed, also slowing any freeze down into the riverbed. As a result, water that is flowing in the riverbed would be less likely to be forced to the surface.	Agreed. This text was deleted from Section 3.8.2.8, *Module Delivery Option 3: Colville River Crossing*.	Y
717	72	Dunn	Connor	ConocoPhillips Alaska	Water Resources	3.8.2.2 - Water Resources - Module Delivery Option 3: Colville River Crossing ConocoPhillips recommends deleting or clarifying the statement: "Even if the ice road and bridge is slotted, the added ice may cause ice jam flooding within the CRD or other locations along the river to be worse than it would have been." As is noted elsewhere in the document, the ice roads and ice bridges in the Ocean Point area are part of the existing affected environment. It is unclear whether this statement references a change in conditions relative to existing conditions, which include regular use of ice roads in this area, or a hypothetical scenario with no ice roads in the area.	It would be a change from the existing condition to build a partially grounded ice bridge large enough to transport sealift modules. The existing CWAT route is a snow road, not an ice road. No changes to text were made.	N
531	3	Hopson	Lesley	Alaska Eskimo Whaling Commission	Water Resources	In addition, several of the NWCA captains have expressed concerns about other impacts from the construction of the MTI, including sedimentation. The construction would change the environment in Harrison Bay. It is unclear what would happen to these islands after they are no longer necessary for the Willow Project.	As described in Section 3.8.2.6, *Module Delivery Option 1: Atigaru Point Module Transfer Island*, "the island is expected to be reshaped by waves and ice within 10 to 20 years, similar to Resolution and Goose islands, two Beaufort Sea exploratory islands constructed at water depths similar to the Proponent's MTI."	N
159	9	Kenning	Erik	ASRC	Water Resources	ASRC feels strongly that CPAI should use existing break-up monitoring data from the Colville River Delta and experience gained from the annual Alpine re-supply ice bridge/ice road. This should be used in conjunction with local knowledge, to assure that the slotting of the ice bridge during abandonment is done in the most effective manner and reducing possible impacts.	BLM concurs with the commenter's recommendation.	N
45	2	Major	Mark	—	Water Resources	Regarding the lakes M0015, and then I think it's R0064, and that had to do with the hydraulic connectivity. There was a basic statement made that these two lakes are hydraulically connected, but the only place we could find a map that even identified the R-lake was in the ANILCA 810 Section. And that map, maybe it's coarse grain, but it didn't show a stream between the two, so if the BLM could answer that question, that would be helpful too.	Labels for Lake M0015 and Lake R0064 were added to all applicable figures for Section 3.8, *Water Resources*; Chapter 2.0, *Alternatives*; and Appendix D.1, *Alternatives Development*.	Y
26705	7	President	Acting	Native Village of Nuiqsut Tribal Council	Water Resources	BLM must address the significant uncertainty and missing information regarding the impacts of the Colville River Crossing ice bridge. . . . The SDEIS states that the bridge will be constructed on grounded ice. But the SDEIS acknowledges that there is likely to be winter flow at the bridge location. BLM lacks comprehensive winter stream flow data for the Colville at Ocean Point because there is no gauging station at that location. The limited data that BLM has for Ocean Point shows that ice was not grounded in December 2007 and only partly grounded in December 2019. Data from upstream at Umiat shows there is usually flow in the river in every month of the year. As BLM acknowledges, flows at Ocean Point, nearly 70 miles downstream, are likely higher than flow at Umiat. BLM acknowledges that fish use the river at the bridge location, but some of the fish information included in the SDEIS is decades old and may be outdated. The SDEIS explains that flow in the river during construction and operation of the ice bridge would create significant engineering problems and risks of serious harm to the river and fish. . . . BLM proposes to resolve the uncertainties about water management and fish passage later, by allowing ConocoPhillips to collect flow and ice data at Ocean Point for several years before construction. But NEPA requires BLM to obtain and consider this data to properly assess the impacts of the ice bridge on hydrology and fish before approving the project. "If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant," the information must be included in the EIS. BLM has not demonstrated that this information is unavailable or exorbitant to obtain. In fact, the SDEIS acknowledges that the data is necessary before construction and that ConocoPhillips is already planning on gathering it. BLM must gather and consider winter streamflow and fish population data in order to properly evaluate the Colville River crossing module delivery option and compare it against the other options in the SDEIS.	More text was added to Section 4.7.3.2, *Module Delivery and Colville River Crossing*, of Appendix D.1 (*Alternatives Development*) to clarify that the proposed ice bridge in Option 3 (Colville River Crossing) would be partially grounded; however, there would be some pockets of deep, free water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels, with their load being supported by the grounded ice sections (Figure D.4.6, detail A, in Appendix D.1). Text was also added to the *Environmental Consequences* sections of Section 3.8 (*Water Resources*) and Section 3.10 (*Fish*) to clarify effects. Because the bridge would be partially grounded, some water would be able to pass under the bridge; therefore, the description of effects was adjusted to reflect that. Also, effects from the Option 3 Colville River ice bridge are disclosed for two scenarios: 1) where flow can easily pass under the partially grounded ice bridge and 2) where flows are larger than anticipated. After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy. ADF&G would also require data as part of the fish habitat permit for the Project.	Y

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407	9	Rose	Garett	Natural Resources Defense Council	Water Resources	The SDEIS evaluates potentially significant impacts to water resources without the necessary information to complete such an analysis. . . . the water analysis relied on nearly 20-year-old hydraulic data without adequate justification. Beyond simply being stale data, its unreliability is heightened by the dynamic nature of the watercourses in the Western Arctic and the advance of climate change over the last two decades. Nor is this reliance inconsequential: the Western Arctic has a complicated, protean hydrology,45 so accurate, up-to-date information is essential to understand how a large, multi-decade extraction project such as Willow could potentially affect those systems. Like the DEIS, the SDEIS draws conclusions without the necessary data. BLM's analysis of the potential impacts from Option 3s crossing of the Colville River draws some conclusions about potential impacts only to then reveal that the relevant data has yet to be collected. . . . Similarly, in its analysis of potential impacts to fish, BLM admits that it does not have the data to determine whether there will be grounded ice at Ocean Point. And, in each case, it is wholly unclear why BLM could not collect this information prior to analyzing potential impacts from the project. The lack of data undermines the utility of BLM's analysis for the public and BLM itself. Beyond failing to collect information necessary for the analysis, the SDEIS also obscures the extent of potentially significant impacts to water resources. Paralleling much of the DEISs analysis, the SDEIS does not quantify the potential impacts to water resources from the infrastructure associated with the three new elements. For instance, the analysis of Option 3 notes the potential for backwatering and out of bank flooding but does not quantify the extent of these potential impacts. Relatedly, the SDEIS treats hydrological systems as occurring in isolation from other aspects of the natural environment. While BLM has acknowledged the potential for landscape alteration from water impoundment, for instance, there is no detailed discussion of how impoundment impacts could compound with potential thermal effects to degrade the permafrost and tundra. . . . To rectify this, BLM must revise its analysis of the Projects potential impacts to water resources to reflect accurate, up-to-date information and the actual scope of such impacts.	River discharge is generally considered the most important parameter influencing river ecosystems; large rivers integrate the behavior of all upstream catchments. Long-term records of continuous discharge at Umiat and discrete measurements during breakup downstream are available; discharge and gaging efforts are continuing. In addition to assessing the data for Umiat, discharge at Ocean Point was estimated using the drainage-area ratio method, as described in Final EIS Appendix E.8A (*Water Resources Technical Appendix*). The technical memo in which the estimate was developed is provided as Appendix E.8B (*Ocean Point Technical Memorandum*). After the NEPA process, BLM can require additional data from CPAI in order to approve the ROW permit. CPAI would not proceed with the crossing until it can demonstrate that the level of effects would be within those analyzed in the EIS. If CPAI had to change its design to demonstrate this, that would require either additional NEPA analysis or a Determination of NEPA Adequacy. Quantification of bank flooding would not be accurate without more detailed design and flow data. More detail was added to Appendix E.8A to project potential flow at Ocean Point, and Appendix E.8B was added to the Final EIS. Discussion of how impoundments could affect the thermal regime and degrade the permafrost is provided in Section 3.4.2.3.1, *Thawing and Thermokarsting*.	Y
26710	6	Smith	Louise	USFWS	Water Resources	The CFWR, excavated within wetlands adjacent to Lake M0015 and the Bear Tooth Drill Site 3 road, will access water from Lake M0015 within the Willow Creek 3 Basin (WC 3 Basin) . . . As unknown impacts to the watershed may occur, water levels in fish bearing lakes within the WC 3 Basin may fluctuate widely from year to year. The Service recommends monitoring the CFWR and using adaptive management to ensure adequate water flow and free passage of fish within the WC 3 Basin.	As stated in Final EIS Section 3.8.2.3.6, *Water Withdrawal and Diversion*, minimal effects are anticipated either to Lakes M0015 or R0064 or to Willow Creek 3 as a result of the CFWR. Therefore, additional monitoring is unwarranted.	N

4.2.3.28 Wetlands and Vegetation

Table B.3.30. Substantive Comments Received on Wetlands and Vegetation

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
26707	2	Baca	Andrew	US Environmental Protection Agency	Wetlands and Vegetation	We continue to be concerned with the use of the impervious cover model to predict watershed degradation due to wetland losses within vast HUC 10 watersheds, as this tool is designed to predict water quality impacts, primarily to streams, at much smaller scales. Watershed health is a distinct concept from impact analysis. If a watershed remains healthy because impacts are below a certain threshold, that does not mean there are no impacts. While we do not dispute that wetland condition in the mostly undisturbed project area is currently good, we disagree that project impacts can be assessed by relying upon impervious cover thresholds. We continue to recommend that the EIS include analysis of the impacts to aquatic resource functions and values at the site-specific scale, which will help to inform decisions regarding appropriate mitigation. Wetlands perform specific functions and we recommend that the loss of these functions be identified in the FEIS.	The implementing regulations do not require that a functional assessment be used to evaluate a Section 404 permit application, nor to determine compensatory mitigation requirements. USACE determined that there is sufficient information in the permit application and the Final EIS to make meaningful comparisons among alternatives, to determine the Least Environmentally Damaging Practicable Alternative, to determine whether compensatory mitigation will be required, and to make a permit decision.	N
717	54	Dunn	Connor	ConocoPhillips Alaska	Wetlands and Vegetation	10. 3.9.2.2.2 - Wetlands and Vegetation - Module Delivery Option 3: Colville River Crossing Here and throughout the document, the analysis describes "Approximately 666.6 acres of vegetation damage could occur from ice infrastructure for Option 3." This statement is misleading. ConocoPhillips proposes approximately 333.3 acres of impact due to ice roads and pads. That impact would occur in two separate years, but likely within the same footprint (i.e., the same 333.3 acres would be impacted). This should be clarified. Also, as is noted in Section 3.13.2.2, "The altered habitat from the construction of single season ice roads and pads would recover almost immediately after the winter season is complete and the ice melts." Similar text should be clarified in Table 3.9.6, Table 3.10.1, Table 3.11.6, Section 3.12.2.2, Table 3.12.6, Table 3.13.2, and Table 3.13.3.	The data provided by CPAI to BLM for analysis of the Project plans (i.e., action alternatives and module delivery options) do not provide year attributes for the GIS maps, only centerlines for planned ice road routes. Ice infrastructure footprint values (i.e., acres) were provided in tabular form by year. While BLM understands that CPAI may construct ice roads and ice pads within the footprint of the previously constructed ice infrastructure, there may also be practical, logistical, or permitting-agency reasons to not do so (e.g., allowing tundra to recover). Additionally, this would be inconsistent with how the action alternatives and other module delivery options are evaluated. The data provided by CPAI do not allow for the requested level of granular analysis to independently verify the commenter's proposal, or for the ability to apply it consistently across all action alternatives or module delivery options.	N
717	73	Dunn	Connor	ConocoPhillips Alaska	Wetlands and Vegetation	29. 3.9.1 - Wetlands and Vegetation - Affected Environment Please clarify that designation of BLM sensitive species is not relevant to non-BLM lands (i.e. State of Alaska-owned lands in Kuparuk, etc.).	Footnote 5 for "sensitive species" in the SDEIS (Section 3.9.1, *Affected Environment*) states the following: "BLM designates native wildlife, fish, or plant species occurring on BLM lands…" The footnote has been updated for the Final EIS (Section 3.9.1, *Affected Environment*) to include a statement that the sensitive species designation only applies to BLM-managed lands.	Y
717	74	Dunn	Connor	ConocoPhillips Alaska	Wetlands and Vegetation	30. 3.9.2.2.2 - Wetlands and Vegetation - Direct Vegetation Damage Section 3.9.2.2.2 and Table 3.9.6 state that 666.6 acres of vegetation would be damaged due to constructing ice roads and pads to facilitate Option 3. The actual acres of ice that will be constructed is 333.3 acres that would be constructed 2 times. BLM should revise this section and table to indicate the actual acreage is 333.3, but constructed twice. It is incorrect and misleading to count this as 666.6 acres.	The data provided by CPAI to BLM for analysis of the Project plans (i.e., action alternatives and module delivery options) do not provide year attributes for the GIS maps, only centerlines for planned ice road routes. Ice infrastructure footprint values (i.e., acres) were provided in tabular form by year. While BLM understands that CPAI may construct ice roads and ice pads within the footprint of the previously constructed ice infrastructure, there may also be practical, logistical, or permitting-agency reasons to not do so (e.g., allowing tundra to recover). Additionally, this would be inconsistent with how the action alternatives and other module delivery options are evaluated. The data provided by CPAI do not allow for the requested level of granular analysis to independently verify the commenter's proposal, or for the ability to apply it consistently across all action alternatives or module delivery options.	N

Letter No.	Comment No.	Sender Last Name	Sender First Name	Org.	Primary Comment Code	Comment Text	Response	Text Change (Y/N)
717	76	Dunn	Connor	ConocoPhillips Alaska	Wetlands and Vegetation	32. 3.9.3. - Vegetation - Additional Suggested Best Management Practices or Mitigation “Provide wash stations to clean and inspect vehicles before allowed west of the Colville River; clean tires and wheel wells so they are free from soils, seeds, and plant parts.” ConocoPhillips already has an approved invasive species plan for the NPRA that will be followed for Willow, and complies with the existing 2013 NPRA IAP BMP M-2. Hence this additional BMP is redundant and unnecessary.	The suggested BMP has been removed from the text due to its redundancy with BMP M-2.	Y
520	42	Psarianos	Bridget	Trustees for Alaska	Wetlands and Vegetation	Wetlands mitigation is also inadequate and incomplete for this project as described in the SDEIS. Under the Clean Water Act Section 404, loss of wetlands must be avoided and mitigated, and, if avoidance and mitigation do not eliminate wetlands loss, wetlands loss must be compensated for. Compensation may take the form of creation, restoration, or preservation of wetlands, with ratios of lost wetlands to mitigated wetlands variable depending on the mechanism. The acres of different habitat types lost or altered captured in Table 3.11.2 and Table 3.11.3 would be a useful tally of wetlands lost for compensatory mitigation purposes. But the Willow projects 404 permit inexplicably does not include measures to compensate for wetlands loss. Birds use wetlands for foraging, nesting, raising chicks, and staging for migration. The wetlands in Alaska offer an opportunity to properly conduct wetlands mitigation, including compensatory mitigation. Here, the SDEIS documents the loss and alteration of a number of wetland habitats that birds are using, yet none of these acres will be compensated for. This is unacceptable and should be remedied in a revised draft EIS and wetlands plan.	Tables E.9.2 through E.9.8 quantify effects to wetlands by alternative. Except as required by law, BLM policy precludes imposition of compensatory mitigation on public land users (IM 2019-018, Compensatory Mitigation, DOI 2019). A compensatory mitigation plan is not required for NEPA or for the Section 404 permit application; only a compensatory mitigation statement is required. USACE determines compensatory mitigation requirements associated with Section 404 permits and provides a public comment opportunity upon issuance of the Public Notice for permit applications under Section 404.	N
26710	5	Smith	Louise	USFWS	Wetlands and Vegetation	In order to minimize the spread of invasive species, the Service recommends installation and use of strategically placed wash and inspection stations prior to use of vehicles within the project area.	Suggestion is included in Section 3.9.2.1.4, *Additional Suggested Avoidance, Minimization, or Mitigation*.	N

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Willow Master Development Plan

Appendix C
Regulatory Authorities and Framework

August 2020

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TABLE OF CONTENTS

List of Tables

List of Acronyms

ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ASRC	Arctic Slope Regional Corporation
BLM	Bureau of Land Management
EIS	Environmental Impact Statement
ESA	Endangered Species Act
Kuukpik	Kuukpik Corporation
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NVN	Native Village of Nuiqsut
Project	Willow Master Development Plan Project
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USCG	U.S. Coast Guard

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1.0 COOPERATING AGENCIES

The Bureau of Land Management (BLM) is the lead agency for the Environmental Impact Statement (EIS). Eight federal, tribal state, and local government entities are participating as cooperating agencies (Table C.1.1).

Table C.1.1. Cooperating Agencies and Their Authorities and Expertise

Agency	Authority/Expertise
U.S. Army Corps of Engineers	Permit authority for Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act
U.S. Environmental Protection Agency	Responsibilities under the Clean Air Act, the Clean Water Act, and the Oil Pollution Act
U.S. Fish and Wildlife Service	Responsibilities under the Endangered Species Act, expertise in fish and wildlife
State of Alaska (Departments of Fish and Game; Environmental Conservation; Natural Resources; Health and Social Services; and Commerce, Community, and Economic Development)	Responsible for adjudicating requests or applications for permits, easements, and leases on state land (including state submerged land within 3 miles of the coast); authority for air, water use, and wastewater permits; and expertise in sociocultural, human health, wildlife, subsistence, economic resources, off-road travel, and ice road construction
North Slope Borough	Responsible for land use planning and regulation; permit authority for rezone; and expertise in sociocultural, wildlife, subsistence, and economic resources
Native Village of Nuiqsut	Expertise in sociocultural, wildlife, subsistence, and economic resources
City of Nuiqsut	Expertise in sociocultural and economic resources
Iñupiat Community of the Arctic Slope	Expertise in sociocultural, subsistence, and economic resources

Note: The U.S. Coast Guard and U.S. Department of Transportation, Pipeline and Hazardous Materials Administration were initially invited as cooperating agencies for the Environmental Impact Statement (EIS), but they ultimately decided not to accept this role. Their decision to decline the invitation was made after publication of the Draft EIS.

2.0 OTHER AGENCIES

The Federal Aviation Administration, Bureau of Ocean Energy Management, and National Marine Fisheries Service (NMFS) were invited to be cooperating agencies but declined to participate.

3.0 PERMITTING AUTHORITIES

In proposing to undertake an action (e.g., issue an authorization), federal agencies are required under the National Environmental Policy Act (NEPA) to analyze the reasonably foreseeable environmental impacts. If more than one authorizing federal agency is involved in a related action, a single NEPA document may be developed to meet the requirements of all federal agencies. All action alternatives and module delivery options in the EIS would require authorization by BLM, the U.S. Army Corps of Engineers (USACE), and the U.S. Coast Guard (USCG).

The State of Alaska, North Slope Borough, Kuukpik Corporation (Kuukpik), Native Village of Nuiqsut (NVN), and Arctic Slope Regional Corporation (ASRC) are responsible for land management decisions, easements, leases, authorizations, and permits on their respective lands. The State of Alaska also has authority for state waters within 3 miles of the shore.

4.0 SUMMARY OF PERMITS, APPROVALS, AND CONSULTATIONS REQUIRED

Oil and gas development on Alaska’s North Slope requires dozens of permits, approvals, and other reviews and consultations. Table C.4.1 provides a full list of anticipated permits, approvals, and consultations, as well as a list of applicable federal laws and executive orders.

Table C.4.1. Federal, State, and Local Applicable Laws, Executive Orders, Permits, Approvals, and Consultations

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
Federal laws and executive orders common to multiple federal agencies	National Environmental Policy Act (NEPA) of 1969 (42 USC 4321)	NEPA requires all federal agencies to prepare a detailed statement of the environmental effects of proposed major federal actions with potential to significantly affect the quality of the human environment.	Environmental Impact Statement (EIS)
Federal laws and executive orders common to multiple federal agencies	National Historic Preservation Act (NHPA) of 1966 (16 USC 470)	Before issuing a federal authorization, federal agencies must consider the effect of the undertaking on historic properties (resources listed in or determined eligible for the National Register of Historic Places [NRHP]) and must consult with State Historic Preservation Office (SHPO), Indian tribes,[a] and other parties. Federal agencies must provide the Advisory Council on Historic Preservation (ACHP) with a reasonable opportunity to comment on the Willow Master Development Plan (Project).	NHPA Section 106 consultation
Federal laws and executive orders common to multiple federal agencies	Alaska Native Claims Settlement Act (ANCSA) of 1971 (43 USC 1601 et seq.)	ANCSA required the conveyance of lands to Alaska Native regional and village corporations providing surface and subsurface rights. The Arctic Slope Regional Corporation and Kuukpik Corporation own subsurface and surface lands, respectively, in the Project area.	Coordination with ANCSA landowners
Federal laws and executive orders common to multiple federal agencies	American Indian Religious Freedom Act of 1978 (42 USC 1996)	Federal agencies must consider Native American religious concerns when a federal management decision has the potential to restrict access or ceremonial use of, or affect the physical integrity of, sacred sites (on both federal and nonfederal lands affected by the federal action).	Consideration of impacts to activities protected under this act
Federal laws and executive orders common to multiple federal agencies	Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 USC 3001 et seq.)	NAGPRA establishes procedures for the inadvertent discovery or planned excavation of Native American cultural items on federal or tribal lands and establishes ownership of cultural items excavated or discovered.	Evaluation of potential impacts to resources protected under NAGPRA
Federal laws and executive orders common to multiple federal agencies	Freedom of Information Act (FOIA) of 1966 (5 USC 552)	FOIA allows for the full or partial disclosure of previously unreleased information and documents controlled by the U.S. government.	Public disclosure of project records
Federal laws and executive orders common to multiple federal agencies	Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 USC 668)	The BGEPA prohibits the “taking” of bald or golden eagles (including their parts, nests, or eggs) without a permit issued by the Secretary of the Interior.	Eagle take permit if eagles would be “disturbed,” as defined by the act
Federal laws and executive orders common to multiple federal agencies	EO 11514 (1970) – Protection and Enhancement of Environmental Quality	EO 11514 directs the U.S. government to provide leadership in protecting and enhancing the quality of the environment. Federal agencies are to initiate measures to direct their policies, plans, and programs to meet national environmental goals.	Review and evaluation of the Draft and Final EIS by the U.S. Environmental Protection Agency (EPA) for compliance with Council on Environmental Quality (CEQ) guidelines
Federal laws and executive orders common to multiple federal agencies	EO 11988 (1977) – Floodplain Management	EO 11988 requires federal agencies to reduce the risk of flood loss; 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 agency responsibilities.	Establishment of procedures ensuring that the potential effects of flood hazards and floodplain management are considered for actions undertaken in a floodplain

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
Federal laws and executive orders common to multiple federal agencies	EO 11990 (1977) – Protection of Wetlands	EO 11990 requires federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to take action to preserve and enhance wetlands in carrying out their responsibilities.	Avoidance of short- and long-term adverse impacts to wetlands whenever a practicable alternative exists
Federal laws and executive orders common to multiple federal agencies	EO 12898 (1994) – Environmental Justice	EO 12898 requires that federal agencies identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations to the greatest extent practicable and permitted by law.	Assessment of environmental justice in the EIS
Federal laws and executive orders common to multiple federal agencies	Executive Memorandum – Government-to-Government Relationship with Native American Tribal Governments (1994)	Federal agencies must consult with tribal governments before taking actions that would affect federally recognized tribal governments or tribal trust resources. Federal agencies must act in a knowledgeable and sensitive manner respectful of tribal sovereignty.	Government-to-government relations with Native American tribal governments
Federal laws and executive orders common to multiple federal agencies	EO 12962 (1995) – Recreational Fisheries	EO 12962 requires that federal agencies improve the quantity, function, sustainable productivity, and distribution of aquatic resources for increased recreational fishing opportunities.	Evaluation of potential effects to aquatic systems and recreational fisheries
Federal laws and executive orders common to multiple federal agencies	EO 13045 (1997) – Protection of Children from Environmental Health and Safety Risks	EO 13045 requires federal agencies to assess environmental health and safety risks that may disproportionately affect children and to ensure their policies, programs, activities, and standards address the disproportionate risks to children.	Evaluation of the potential impacts to human health, including children
Federal laws and executive orders common to multiple federal agencies	EO 13112 (1999) – Invasive Species	EO 13112 aims to prevent the introduction of invasive species; to control invasive species already introduced; and to minimize the economic, ecological, and human health impacts of invasive species.	Prevention of the introduction of invasive species, control of introduced species, and restoration of native species
Federal laws and executive orders common to multiple federal agencies	EO 13175 (2000) – Consultation and Coordination with Indian Tribal Government[b]	EO 13175 requires federal departments and agencies to consult with Indian tribal governments when considering polices that would substantially impact tribal communities.	Consultation and coordination with Indian tribal governments
Federal laws and executive orders common to multiple federal agencies	EO 13186 (2001) – Responsibilities of Federal Agencies to Protect Migratory Birds	EO 13186 helps federal agencies to comply with the Migratory Bird Treaty Act (MBTA) and to reduce their liability for the unintentional take of migratory birds.	Avoidance or minimization of the impacts to migratory birds and protection of birds and their habitats
Federal laws and executive orders common to multiple federal agencies	EO 13783 (2017) – Promoting Energy Independence and Economic Growth	EO 13783 requires federal agencies to review existing regulations that potentially burden the development or use of domestically produced energy resources and appropriately suspend, revise, or rescind those that unduly burden the development of domestic energy resources beyond the degree necessary to protect the public interest or otherwise comply with the law.	EO 13783 revokes EO 13653 – Preparing the United States for the Impacts of Climate Change – and withdraws the CEQ's "Memorandum: Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews" (81 FR 51866)

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
Federal laws and executive orders common to multiple federal agencies	Naval Petroleum Reserves Production Act (NPRPA) of 1976, as amended (42 USC 6501 et seq.)	The NPRPA excludes the National Petroleum Reserve in Alaska (NPR-A) from the application of Section 202 of the Federal Land Policy and Management Act (FLPMA) (43 USC 1701), as amended, which is the basis for BLM's resource management plans. BLM conducts planning within the NPR-A with an Integrated Activity Plan (IAP).	BLM conducts planning within the NPR-A with an IAP and complies with all applicable laws in the preparation of the IAP, including the NEPA, the Endangered Species Act (ESA) of 1973, the Marine Mammal Protection Act (MMPA) of 1972, and the NHPA
Department of Interior (DOI)	FLPMA of 1976, as amended (43 USC 1701 et seq.)	The FLPMA was enacted to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development, and enhancement of the public lands; and for other purposes.	Under the FLPMA, the Secretary of the Interior has broad authority to regulate the use, occupancy, and development of public lands and to take whatever action is required to prevent unnecessary or undue degradation of public lands (43 USC 1732)
U.S. Army Corps of Engineers (USACE)	Clean Water Act (CWA) of 1972, amended 1977 (33 USC 1344)	The CWA regulates the discharge of dredged or fill material into Waters of the United States (WOUS), including wetlands.	Department of Army (DA)/CWA Section 404 permit
USACE	Rivers and Harbors Act (RHA) of 1899 (33 USC 403)	The RHA regulates work and structures in, over, or under navigable WOUS, as well as work and structures that affect the course, location, condition, or capacity of WOUS.	DA/RHA Section 10 permit
EPA	CWA of 1972, amended 1977 (33 USC 1251 et seq.) (40 CFR 110 and 112)	EPA has the following authority under the CWA: Section 311: EPA requires owners and operators to prepare and implement Spill Prevention, Control, and Countermeasures (SPCC) Plans for facilities storing more than 1,320 gallons in aggregate in aboveground tanks with a capacity of 55 gallons or more. Section 402: EPA oversees draft Alaska Pollutant Discharge Elimination System (APDES) permits and can object to proposed permit decisions. Section 404: EPA reviews and comments on permit applications for compliance with Section 404(b)(1) guidelines and other statutes and authorities within their jurisdiction.	Oversight of SPCC Rule requirements Review of APDES permits Review of DA (Section 404) permits
EPA	Clean Air Act (CAA) of 1967, amended 1990 (42 USC 7401 et seq.)	Under Section 309 of the CAA, EPA reviews and evaluates environmental effects and the adequacy of Draft and Final EIS documents. EPA has program oversight responsibilities of the Alaska Department of Environmental Conservation's (ADEC's) implementation of the CAA program in Alaska, which gives ADEC authority to issue air quality control permits.	Section 309 evaluation
EPA	Oil Pollution Act (OPA) of 1990 (40 CFR 112.20)	Section 4202 of the OPA amended CWA Section 311(j) by requiring owners and operators of tank vessels, offshore facilities, and certain onshore facilities to prepare and submit Facility Response Plans (FRPs).	Review of FRPs

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
EPA	Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901 et seq.)	The RCRA establishes criteria governing the management of hazardous waste. Any hazardous waste generated at a facility is subject to the hazardous waste regulations administered by EPA.	Permits for the transportation and storage of hazardous waste material
EPA	Toxic Substances Control Act (TSCA) of 1976 (15 USC 2601 et seq.)	Under the TSCA, the EPA is authorized to require reporting, recordkeeping, testing requirements, and restrictions related to chemical substances and mixtures.	Reporting requirements
EPA	Underground Injection Control (UIC) Program (40 CFR 144)	The UIC Program regulates construction of Class I UIC wells for nonhazardous liquids and municipal wastewater.	Class I UIC permit
EPA	Standards of Performance for New Stationary Sources (40 CFR 60) National Emission Standards for Hazardous Air Pollutants for Source Categories (40 CFR 63)	The Standards of Performance establish federal standards of performance for new, modified, and reconstructed stationary sources within certain source categories. The National Emission Standards set technology-based standards to regulate hazardous air pollutants from certain sources within specific source categories.	Compliance with certain equipment specifications and emission limits Requirements for monitoring, recordkeeping, reporting, operation, and maintenance
EPA	Noise Control Act of 1972(42 USC 4901)	This act requires federal agencies to comply with all federal, state, and local noise control laws and regulations. In 1991, the federal government transferred primary responsibility for noise issues to state and local governments. There are no local noise thresholds at the state or local level for the Project area.	Investigate and study noise and its effects Disseminate information to the public regarding noise pollution and its adverse health effects
U.S. Coast Guard (USCG)	Navigation and Navigable Waters (33 CFR 114 and 115) RHA of 1899 and General Bridge Act of 1946 (33 USC 401, 491, 525)	USCG approves bridge permits to ensure navigability.	Bridge permits
USCG	Navigation and Navigable Waters, Subchapter P, Ports and Waterways Safety (33 CFR 160–169)	As authorized by Subchapter P, USCG approves bridge design in navigable waters, and USCG and the Department of Homeland Security approve safety features in ports and waterways.	Application for cargo transfer operations Port Operations Handbook approval FRPs Private aids to navigation authorization Tug and barge vessel inspections Notice to mariners
U.S. Department of Transportation (USDOT), Pipeline and Hazardous Materials Safety Administration (PHMSA)	Pipeline Safety (49 CFR 190–199) Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006 (Public Law 109-468) Pipeline Safety Statute (49 USC 60101–60301)	Pipeline transportation and pipeline facilities must meet the minimum standards for safety, inspection, protection, and enforcement as regulated by the USDOT and PHMSA. A special permit is required for any exceptions to the PHMSA regulations.	PHMSA approvals Review of FRPs
USDOT, PHMSA	Hazardous Materials Transportation Act of 1975 (49 USC 5101–5127)	Hazardous materials must be transported according to USDOT regulations. PHMSA has regulatory and civil enforcement authority over the transportation of explosive materials in commerce.	Hazardous materials transportation requirements and registration License to transport explosives

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
U.S. Fish and Wildlife Service (USFWS)	BGEPA of 1940 (16 USC 668 et seq.)	USFWS issues permits for the relocation of bald and golden eagle nests that interfere with resource development or recovery operations.	Permits to take, haze, relocate, or destroy birds or their nests for public safety purposes
USFWS and National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS)	MMPA of 1972 (16 USC 1361 et seq.)	The MMPA prohibits the harassment, hunting, capture, or killing of marine mammals, or the attempt to harass, hunt, capture, or kill marine mammals, and requires Incidental Take Authorizations (ITAs) for any exemptions. The USFWS and NMFS have joint regulatory authority to implement the MMPA.	ITAs (as necessary): Letters of authorization or incidental harassment authorizations
USFWS	MBTA of 1918 (16 USC 703–709)	The MBTA prohibits the pursuit, hunt, take, capture, kill, or sale of migratory birds. USFWS is authorized to implement provisions of the MBTA and may issue waivers or permits.	USFWS consultation
USFWS and NMFS	ESA of 1973 (16 USC 1531)	USFWS and NMFS have joint regulatory authority to manage species protected under the ESA. USFWS and NMFS consult on the effects to threatened or endangered species and their designated critical habitat, as well as issue ITAs. Species include terrestrial mammals, plants, birds, and marine mammals.	ESA consultation USACE issuance of Biological Assessments USFWS/NMFS issuance of concurrence or Biological Opinion
USFWS	Fish and Wildlife Coordination Act (FWCA) of 1980 (16 USC 661 et seq.)	The FWCA authorizes USFWS to assess the potential impacts of water resource development projects on fish and wildlife resources.	Consultation and development of mitigation to offset impacts
NMFS	Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976 (16 USC 1361 et seq.)	NMFS provides consultation on the effects to essential fish habitat (EFH), as authorized by the MSA. EFH includes habitats necessary to a species for spawning, breeding, feeding, or growth to maturity.	EFH consultation
U.S. Department of Justice – Bureau of Alcohol, Tobacco, Firearms, and Explosives	Importation, Manufacture, Distribution, and Storage of Explosive Materials (18 USC 1102, Chapter 40) Commerce in Explosives (27 CFR 555)	Bureau of Alcohol, Tobacco, Firearms, and Explosives requires that applicants obtain a permit before they purchase, store, and use explosives for blasting activities.	Permit and license for use of explosives
Federal Communications Commission (FCC)	Communications Act of 1934 (47 USC 151 et seq.)	FCC regulates interstate and international communications by radio, television, wire, satellite, and cable, including radio licensing.	Radio license
ADEC	CAA of 1967, amended 1990 (42 USC 7401 et seq.) Air Quality Control (18 AAC 50 et seq.)	ADEC's primary responsibility is to control and mitigate air pollution in Alaska, as well as to issue air quality control permits for construction and operations of stationary sources.	Air quality control minor permit
ADEC	CWA of 1972, amended 1977 (33 USC 1251 et seq.)	Section 401 requires (for the USACE 404 permit) ADEC to certify that discharges into WOUS will comply with the CWA, the Alaska Water Quality Standards, and other applicable state laws.	Section 401 Water Quality Certification

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
ADEC	CWA of 1972, amended 1977 (33 USC 1251 et seq.) Wastewater Disposal (18 AAC 72) APDES (18 AAC 83) Water Quality Standards (18 AAC 70) Drinking Water Standards (18 AAC 80)	ADEC has the following authority under the CWA: Provides approval for domestic wastewater collection, treatment, and disposal plans for domestic wastewater. Requires a permit for the disposal of domestic and nondomestic wastewater. Fully administers EPA's National Pollutant Discharge Elimination System program through the APDES. Provides approval for treatment and disposal plans for industrial wastewater. Establishes and enforces water quality standards and limits for surface waterbodies. Establishes standards for design, construction, and operation of public water systems, including contaminant monitoring requirements.	APDES permits (e.g., North Slope Oil and Gas General Permit) Review of Stormwater Pollution Prevention Plans Reviews of treatment systems for drinking water and wastewater Domestic wastewater disposal permit Nondomestic wastewater disposal permit
ADEC	Solid Waste Management (18 AAC 60; AS 46.03.100)	ADEC reviews and approves Solid Waste Processing and Temporary Storage Facilities Plans for handling and temporary storage of solid waste and landfills.	Integrated waste management permit/plan approval
ADEC	Food Permit and Registration Requirements (18 AAC 31.020)	ADEC issues permits to operate a food establishment.	Food establishment permit
ADEC	Drinking Water System Classification and Plan Approval (18 AAC 80)	ADEC may issue approval of public drinking water plans.	Potable water-well logs Approval to construct and operate a public water supply system Public water system identification number
ADEC	Safe Drinking Water Act (Part C) Wastewater Treatment and Disposal (18 AAC 72)	Grind and inject facilities require approval. EPA regulates UIC wells.	Approval for grind and inject facilities wastewater disposal permit
ADEC	Oil and Hazardous Substances Pollution Control Regulations (18 AAC 75; AS 46.04.040, 050)	ADEC requires an Oil Discharge Prevention and Contingency Plan and Proof of Financial Responsibility for the following: Vessels and petroleum product barges that operate on state waters Oil and gas exploration or development projects Oil terminal/storage facility capable of storing 5,000 barrels or more of crude oil or 10,000 barrels or more of refined petroleum products Aboveground or belowground storage capacity greater than 10,000 barrels (420,000 gallons) of refined petroleum products	Oil Discharge Prevention and Contingency Plan
Alaska Department of Fish and Game (ADF&G)	FWCA of 1980 (16 USC 2901; 16 USC 661 et seq.)	ADF&G provides comments and recommendations to federal agencies, pursuant to the FWCA. ADF&G also consults with USFWS to conserve and improve wildlife resources.	Wildlife consultation Fish habitat permits

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
ADF&G	Anadromous Fish Act (AS 16.05.871)	ADF&G provides authorization for activities that could use, divert, obstruct, pollute, or change the natural flow or bed of rivers, lakes, and streams used by anadromous fish.	Fish habitat permits
ADF&G	Fishway Act (AS 16.05.841)	ADF&G provides authorization for activities within or across a stream used by fish, if such activities have been determined to be possible impediments to the efficient passage of resident anadromous fish.	Determination of sufficient fish passage
ADF&G	License, Permit, and Tag Fees; Surcharge; Miscellaneous Permits to Take Fish and Game (AS 16.05.340)	ADF&G may issue a permit to collect fish and game, subject to limitations and provisions as appropriate, for a scientific, propagative, or educational purpose.	Permit to collect fish and game
ADF&G	Permit for Scientific, Educational, Propagative, or Public Safety Purposes (5 AAC 92.033)	ADF&G may issue a permit for the taking, possessing, importing, or exporting of game for scientific, propagative, or public safety purposes.	Fish collection permits Hazing of terrestrial mammals Lethal take (e.g., foxes and other carnivores)
Alaska Department of Natural Resources (ADNR)	Alaska Historic Preservation Act (AS 41.35.010–240) NHPA of 1966 (54 USC 300101 et seq.; 36 CFR 800.106–110) Archaeological Resources Protection Act of 1979 (16 USC 470)	Section 106 of the NHPA requires consultation with SHPO and, when there are adverse effects to cultural resources listed in or eligible for the NRHP, with ACHP. ADNR's Office of History and Archaeology issues a field archaeology permit for archaeological fieldwork on state lands; USACE would consult with the Office of History and Archaeology. SHPO issues a Cultural Resources Concurrence for projects that may affect historic or archaeological sites.	Section 106 Memorandum of Agreement or Programmatic Agreement Archaeology collection permit Field archaeology permit
ADNR	Oil and Gas Leasing, Unit Plan of Development (11 AAC 83.343) Oil and Gas Leasing, Unit Plan of Operations (11 AAC 83.346)	Unit Plans of Development and Plans of Operations are required for approval of activities on state oil and gas leases.	Unit Plan of Development Unit Plan of Operations
ADNR	Sale of Timber and Materials (AS 38.05.110) Permits (AS 38.05.850) Mining Sites Reclamation Plan (AS 27.19)	ADNR issues Material Sales Contracts for mining on and purchasing gravel from state lands, as well as issues right-of-way (ROW) and land use permits for the use of state land or waters and for ice road construction on state land. ADNR also approves Mining Reclamation Plans on state, federal, municipal, and private land and water.	Material Sales Contract Mining license Approval of Reclamation Plan Land use permits and leases Approval of bonding and financial assurance
ADNR	Grant of ROW Lease (AS 38.35.020)	ADNR issues pipeline ROW leases for new pipeline and pipeline-related construction and operation across state lands.	Issuance of pipeline ROW
ADNR	Water Use Act (AS 46.15)	ADNR issues a Temporary Water Use Permit for water use during construction and operation, as well as water rights permits for appropriating significant amounts of water beyond temporary uses.	Issuance of Temporary Water Use Permit Water permit/certificate to appropriate water
ADNR	Uses Requiring a Permit (11 AAC 96.010)	Permits are required for temporary use of state lands for ice infrastructure, temporary winter off-road travel, and temporary summer off-road travel.	Temporary land use permits
Alaska Oil and Gas Conservation Commission (AOGCC)	Permit to Drill (20 AAC 25.005)	AOGCC oversees permitting approval for each well to be drilled or redrilled.	Permit to drill

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
AOGCC	Enhanced Recovery Operations (20 AAC 25.402)	AOGCC oversees approvals to inject fluid into a well for the purpose of enhanced oil recovery.	Class I UIC enhanced oil recovery well area injection order
AOGCC	Bonding (20 AAC 25.025)	AOGCC oversees bonding requirements (bond remains active until wells are plugged and abandoned and well sites are restored).	Establishment of a single-well bond or a statewide bond with AOGCC for each operating company (as regulated under 20 ACC 25.025) to drill, produce, and maintain oil, gas, and geothermal wells
Alaska Department of Public Safety, Division of Fire and Life Safety	General Function of the Department of Public Safety with Respect to Fire Protection (AS 18.70.010) Alaska Fire and Life Safety Regulations (13 AAC 50–55)	The Alaska Division of Fire and Life Safety has statewide jurisdiction for fire code enforcement and plan review authority, except in communities that have received deferrals (the Municipality of Anchorage, Fairbanks, etc.).	Fire and Life Safety Plan checks Plan review certificate of approval for each building Fire marshal permits
Alaska Department of Public Safety, Division of Fire and Life Safety	2009 International Fire Code (IFC)	All fuel systems being developed to support port and airport operations during pipeline construction must be reviewed and found to conform to the 2009 IFC requirements. If explosive blasting is used, the storage magazine, type, and location and any barricades must meet IFC requirements.	2009 IFC requirements
Alaska Department of Transportation and Public Facilities (ADOT&PF)	Permits for Oversize or Overweight Vehicles (17 AAC 25.320)	ADOT&PF issues permits for oversize or overweight vehicles.	Oversize or overweight vehicle permits
ADOT&PF	Transportation of Hazardous Materials, Hazardous Substances, or Hazardous Waste (17 AAC 25.200)	ADOT&PF regulates the transportation of hazardous materials, hazardous substances, or hazardous waste by vehicles.	Compliance with the transportation of hazardous materials, hazardous substances, or hazardous waste regulations
Alaska Department of Labor and Workforce Development, Alaska Division of Labor Standards and Safety	Safety (AS 18.60; 8 AAC 61)	The Alaska Division of Labor Standards and Safety ensures that project-related activities meet standards and regulations for occupational health and safety.	Certificates of inspection for fired and unfired pressure vessels Occupational safety and health (inspections and certificates) Employer identification number
Alaska Department of Health and Social Services (ADHSS)	Alaska Best Management Practices Alaska Health Impact Assessment Program	ADHSS uses existing public health surveillance data, medical literature reviews, and field studies to evaluate the potential human health effects of new policies, programs, or development projects in Alaska.	Participation in Human Health Baseline for project
Alaska Department of Military and Veterans' Affairs	Emergency Planning Districts and Committees (AS 26.23.073) Plan Review (AS 26.23.077)	The Alaska Department of Military and Veterans' Affairs oversees planning and reporting requirements for facilities that handle, store, and manufacture hazardous materials.	Hazardous chemical inventories
Alaska Department of Military and Veterans' Affairs	Hazardous chemical inventories	The State Emergency Response Commission enforces reporting and planning requirements for facilities handling, storing, and manufacturing hazardous materials.	Reporting of hazardous chemicals, materials, and wastes handled
North Slope Borough (NSB)	Rezoning (NSB Code 19.60.060)	Code 19.60.060 regulates the process to zone specific areas for resource development and to conduct activities described in the Master Plan within the NSB.	Zoning Map Amendment

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
NSB	Administrator Approvals (NSB Code 19.50.010)	Code 19.50.010 regulates the approval process for development projects in the NSB.	Industrial development and use permit
NSB	Administrator Approval Criteria (NSB Codes 19.50.030) Planning and Zoning Commission Approval Criteria (NSB Code 19.60.040)	Administrator and Planning and Zoning Commission approvals require confirmation that project areas do not have identified Traditional Land Use Inventory (TLUI) sites or buffer zones for identified TLUI sites.	Certificate of Iñupiat history, language, and culture/TLUI clearance (Form 500)

[a] Indian tribes, as defined by the NHPA and EO 13175, are "an Indian tribe, band, nation, or other organized group or community, including a Native village, regional corporation or village corporation, as those terms are defined in Section 3 of the Alaska Native Claims Settlement Act (43 USC 1602), which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians" (16 USC 470w).
[b] The relationship between federally recognized tribal entities and the U.S. government. This relationship is similar to those employed with other sovereign nations and mandates that consultations with tribes be conducted at an executive or agency-executive level (in accordance with EO 13175).

5.0 CONSULTATION AND COORDINATION

5.1 Endangered Species Act Consultation

Consultation under Section 7 of the Endangered Species Act (ESA) is occurring or has occurred between federal authorizing agencies and the U.S. Fish and Wildlife Service (USFWS) and NMFS, as appropriate, for species listed under the ESA. Consultation with USFWS is paralleling the NEPA process and will be completed before the issuance of any Record of Decision.

A letter of concurrence from NMFS was received July 15, 2020 concurring 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 stock gray whale, Western North Pacific distinct population segment (DPS) or Mexico DPS humpback whale, sperm whale), Arctic subspecies ringed seal, Beringia DPS bearded seal, the Western DPS Steller sea lion, North Pacific right whale critical habitat, or Steller sea lion critical habitat.

5.2 Magnuson-Stevens Fishery Conservation and Management Act Coordination

Coordination under the Magnuson-Stevens Fishery Conservation and Management Act regarding essential fish habitat is occurring between federal authorizing agencies and NMFS, as appropriate, parallel to the NEPA process.

5.3 National Historic Preservation Act Section 106 Consultation

Consultation under Section 106 of the National Historic Preservation Act was initiated on November 23, 2018, and BLM attempted continued formal and informal Section 106 consultation through the March 2019 NPR-A working group meeting. To date, no North Slope Tribal, municipal, corporation representative, North Slope community members, or non-governmental organizations have elected to consult with BLM regarding places of historic or cultural importance or traditional use. BLM's consultation efforts did not result in any responses indicating specific concerns for documented or undocumented places of historic or cultural importance or traditional use. BLM is seeking concurrence with the Alaska State Historic Preservation Officer on a Section 106 finding of No Adverse Effect to Historic Properties.

5.4 Native Consultation

BLM initiated government-to-government consultation and Alaska Native Claims Settlement Act (ANCSA) corporation consultation with the following tribes and ANCSA corporations whose members could be substantially affected by the Willow Master Development Plan Project (Project):

- NVN
- Naqsragmiut Tribal Council
- Iñupiat Community of the Arctic Slope
- Kuukpik
- ASRC

Government-to-government consultation meetings have been held regularly with NVN. NVN also often participates in regularly scheduled Working Group meetings for the National Petroleum Reserve in Alaska. Kuukpik and ASRC have engaged in regular consultation with BLM during the NEPA process to date.

6.0 COMPLIANCE WITH SECTION 810 OF THE ALASKA NATIONAL INTEREST LANDS CONSERVATION ACT

BLM's evaluation of the effects of the Project on subsistence uses and needs, as required under Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), is in Appendix G (*Alaska National Interest Conservation Act 810 Analysis*). BLM provided notice in the *Federal Register* regarding its positive findings, pursuant to ANILCA Section 810, that Alternatives B, C, and D and the cumulative case presented in the Draft EIS and the Supplement to the Draft EIS met the "may significantly restrict" threshold. Therefore, public hearings were held in the potentially affected communities of Anaktuvuk Pass, Atqasuk, Nuiqsut, Point Lay, Wainwright, and Utqiaġvik (Barrow) following the publication of the Draft EIS in order to solicit public comments from the potentially affected community and subsistence users. Additional virtual public meetings and hearings were held after publication of the Supplement to the Draft EIS.

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Willow Master Development Plan

Appendix D.1
Alternatives Development

August 2020

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Willow Master Development Plan

Appendix D.1
Alternatives Development

August 2020

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Table of Contents

List of Figures

List of Tables

List of Acronyms

2:1	2 horizontal to 1 vertical ratio
3:1	3 horizontal to 1 vertical ratio
6:1	6 horizontal to 1 vertical ratio
ACF	Alpine central processing facility
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
Alpine	Alpine Development
AOGCC	Alaska Oil and Gas Conservation Commission
APDES	Alaska Pollutant Discharge Elimination System
API	American Petroleum Institute
ASDP	Alpine Satellite Development Plan
BLM	Bureau of Land Management
BMP	best management practice
BT	Bear Tooth
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
CD1	Colville Delta drill site 1
CD4N	Colville Delta drill site 4N
CD5	Colville Delta drill site 5
CEQ	Council on Environmental Quality
CFWR	constructed freshwater reservoir
CPAI	ConocoPhillips Alaska, Inc.
CPF2	Central Processing Facility 2
CRSA	Colville River Special Area
cy	cubic yards
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FECP	Facility Erosion Control Plan
GMT	Greater Mooses Tooth
GMT-1	Greater Mooses Tooth 1
GMT-2	Greater Mooses Tooth 2
GW1	Greater Willow 1
GW2	Greater Willow 2
HDD	horizontal directional drilling
HSM	horizontal support member
IAP	Integrated Activity Plan
Kuparuk	Kuparuk River Unit
LS	lease stipulation
MDP	Master Development Plan
MG	million gallons
MLLW	mean lower low water
MTI	module transfer island
NEPA	National Environmental Policy Act
NPR-A	National Petroleum Reserve-Alaska
NPRPA	Naval Petroleum Reserves Production Act
NSB	North Slope Borough
ODPCP	Oil Discharge Prevention and Contingency Plan
OHW	ordinary high water
Project	Willow Master Development Plan Project
Q1	first quarter
Q2	second quarter

Q3	third quarter
Q4	fourth quarter
ROD	Record of Decision
ROP	required operating procedure
SPCC	Spill Prevention Control and Countermeasures
SPMT	self-propelled module transporter
SWPPP	Stormwater Pollution Prevention Plan
TLSA	Teshekpuk Lake Special Area
UIC	underground injection control
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
VSM	vertical support member
WOC	Willow Operations Center
WOUS	Waters of the U.S.
WPF	Willow Processing Facility

Glossary Terms

Culvert Battery – A group of two or more culverts.

Extended Reach Drilling – A directional drilling technique used to develop long, horizontal wells allowing a larger area to be reached from one surface location (pad) and providing greater access to a reservoir.

Gas Lift – A method of artificial lift (i.e., process used to increase reservoir pressure and encourage oil to the surface) that uses an external source of high-pressure gas for supplementing formation gas to lift the well fluids.

Hydraulic Fracturing – A well stimulation technique that uses a specially blended fluid that is pumped into a well under extreme pressure causing cracks in the underground reservoir formation. These cracks in the rock allow oil and natural gas to flow, increasing resource production and recovery. Water and sand typically make up 98% to 99.5% of the fluid used in this technique.

Pile Supported – Structures (e.g., buildings, bridges) constructed on columns (i.e., piles) driven into the ground to carry the vertical load.

Screeding – A process which recontours sediment on the marine floor but does not remove sediment from the water. The activity often entails dragging a metal plate such as a screed bar across the sediment, thereby smoothing the high spots and filling the relatively lower areas. The amount of material moved is generally small and localized, and the result is a flat seafloor within the work area. Screeding is necessary to temporarily ground the sealift barges during module offloading; a flat seafloor provides stability and prevents damage to the barge hulls during grounding.

Subsistence – A traditional way of life in which wild, renewable resources are obtained, processed, and distributed for household and community consumption according to prescribed social and cultural systems and values.

Waters of the U.S. – Waterbodies and wetlands under jurisdiction of U.S. Army Corps of Engineers, as defined by 33 CFR 328.3.

1.0 INTRODUCTION

The Bureau of Land Management (BLM) is the federal manager of the National Petroleum Reserve in Alaska (NPR-A) and is responsible for land use authorizations on federal land within the NPR-A. The BLM is the lead federal agency for National Environmental Policy Act (NEPA) review of the Willow Master Development Plan (MDP) Project (Project), as proposed by ConocoPhillips Alaska, Inc. (CPAI); Figure D.1.1 provides an overview of the Project area with all action alternatives. Additionally, the U.S. Army Corps of Engineers (USACE) is a cooperating agency that has jurisdiction over the Project through its authority to issue or deny permits for the placement of dredge or fill material in **Waters of the U.S.** (WOUS), including wetlands. Both the NEPA evaluation and USACE's permit review require consideration of project alternatives. This appendix provides a detailed overview of the alternatives development process used by the BLM and cooperating agencies, alternative concepts considered and initially evaluated but eliminated from detailed analysis, and the three action alternatives discussed in the Environmental Impact Statement (EIS).

2.0 REGULATORY SETTING FOR ALTERNATIVES ANALYSIS

NEPA directs federal agencies to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources" (42 USC 4332). In determining the alternatives to be considered in satisfying the Project's purpose and need, the emphasis is on what is reasonable rather than whether the Project proponent likes or is itself capable of implementing an alternative (40 CFR 1502.14). "Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 1981).

Guidelines developed under Section 404(b)(1) of the Clean Water Act direct the USACE to use the overall project purpose (based on the Project proponent's stated purpose and need) to define alternatives and determine whether the Project proponent's proposed project is the least environmentally damaging practicable alternative prior to making a permit decision. The USACE determines whether an alternative is practicable based on whether it is available and capable of being implemented after taking into consideration cost, existing technology, and logistics, in light of the overall project purpose (40 CFR Section 230.3(q)). Throughout the process, other cooperating agencies also provide input into alternatives development.

2.1 Lease Stipulations and Best Management Practices in the National Petroleum Reserve in Alaska

Activity in the NPR-A is subject to a variety of existing lease stipulations (LSs) and best management practices (BMPs) intended to reduce effects from development activity; these stipulations and BMPs are detailed in the 2013 NPR-A Integrated Activity Plan (IAP) Record of Decision (ROD) (BLM 2013). In addition to the 2013 LSs and BMPs, BLM is revising the NPR-A IAP (BLM 2020), including potential changes to required BMPs (described as required operating procedures [ROPs] in BLM 2020). Updated ROPs adopted in the new NPR-A IAP will replace existing BMPs (BLM 2013) as applied to the Project. The Willow MDP ROD will detail which of the measures described below will be implemented for the Project. Many of the previously identified LSs and BMPs are readily incorporable into the Project, although some LSs and BMPs may require exceptions or deviations due to technical constraints and would be evaluated by the BLM on a case-by-case basis. Deviations and exceptions from LSs and BMPs are discussed further in the relevant sections for each action alternative.

Table D.2.1 lists LS and BMP categories from the 2013 NPR-A IAP ROD and the proposed revisions from BLM 2019.

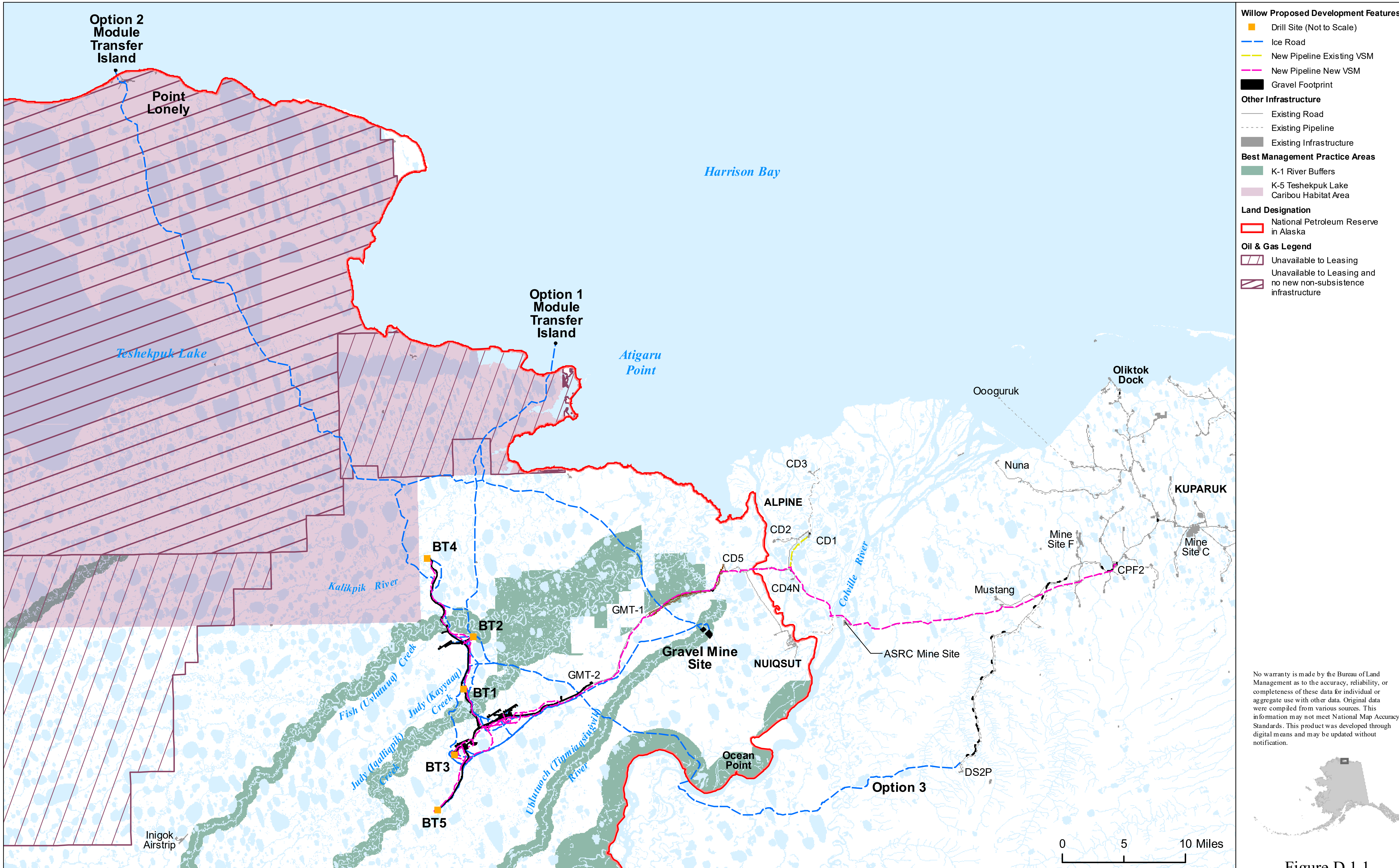

Willow Proposed Development Features
Drill Site (Not to Scale)
Ice Road
New Pipeline Existing VSM
New Pipeline New VSM
Gravel Footprint
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
Best Management Practice Areas
K-1 River Buffers
K-5 Teshekpuk Lake Caribou Habitat Area
Land Designation
National Petroleum Reserve in Alaska
Oil & Gas Legend
Unavailable to Leasing
Unavailable to Leasing and no new non-subsistence infrastructure
Option 2 Module Transfer Island
Point Lonely
Harrison Bay
Teshekpuk Lake
Option 1 Module Transfer Island
Atigaru Point
Oooguruk
Oliktok Dock
Nuna
KUPARUK
CD3
ALPINE
CD2
CD1
CD5
CD4N
Colville River
Mine Site F
Mine Site C
CPF2
Mustang
ASRC Mine Site
BT4
Kalikpik River
BT2
GMT-1
Gravel Mine Site
NUIQSUT
BT1
GMT-2
Fish (Uvlutuuq) Creek
Judy (Kayyaaq) Creek
Judy (Iqalliqpik) Creek
Ublutuoch (Tinmiaqsiugvik) River
BT3
BT5
Ocean Point
Option 3
DS2P
Inigok Airstrip
0
5
10 Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure D.1.1

Table D.2.1. Applicable Lease Stipulations and Best Management Practices

Category	Lease Stipulations and Best Management Practices	2020 IAP Proposed Revisions to BMPs
Waste handling and disposal	A-1, A-2, A-7	A-1, A-2; BMP *A-7 withdrawn*
Fuels and hazardous materials handling and storage; spill prevention and spill response	A-3, A-4, A-5	A-3, A-4, A-5
Health and safety	A-8, A-11, A-12	A-8, A-13; *BMPs A-11 and A-12 have no similar requirement*
Air quality	A-9, A-10	A-10, A-14; *BMP A-9 withdrawn*
Water use	B-1, B-2	B-1, B-2
Winter overland moves	C-1, C-2, C-3, C-4	C-1, C-2, C-3, C-4
Facility design and construction	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-17, E-18, E-19	E-1, E-2, E-3, E-5, E-6, E-7, E-8, E-10, E-11, E-12, E-13, E-17, E-18, E-19, E-21; *BMP E-4 withdrawn*; *BMPs E-9 and E-14 combined or incorporated into other ROPs*
Aircraft use	F-1	F-1, F-2, F-3, F-4
Oilfield abandonment	G-1	G-1
Subsistence	H-1, H-3	H-1, H-3, H-4, H-5, K-15, K-16
Worker orientation	I-1	I-1
Biologically sensitive areas	K-1, K-2, K-6, K-7	E-23, K-1, K-2, K-5 (formerly K-6), K-6 (formerly K-4), K-7 (formerly K-4), K-9 (formerly K-5), K-10 (formerly K-9), K-11 (formerly K-10), K-12 (formerly K-7)
Summer vehicle tundra access	L-1	L-1
General wildlife and habitat protection	M-1, M-2, M-3, M-4	M-1, M-2, M-3, M-4, M-5

Source: BLM 2013, 2020
Note: BMP (best management practice); IAP (Integrated Activity Plan); LN (Lease Notice).

Likely deviations to existing LSs and BMPs include LS E-2 and BMPs E-7, E-11, K-1, and K-2. Each identified deviation would be reviewed as the Project design engineering advances for opportunities to conform to LSs and BMPs to the extent practicable. (See Section 4.2.12, *Compliance with Bureau of Land Management Lease Stipulations, Best Management Practices, and Supplemental Practices*, for additional details on the objective, requirements, and standards for each BMP and the reason for any deviation.) Deviations to the proposed revision to BMP C-1 would also be needed for module delivery options 1 and 2, if the BMP revisions are selected by BLM in the IAP ROD.

3.0 ALTERNATIVES DEVELOPMENT

3.1 Overview of the Alternatives Development Process

Regulations governing NEPA state that the alternatives section "is the heart of the environmental impact statement" (40 CFR 1502.14). The regulations require federal agencies to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." The Council on Environmental Quality (CEQ) guidance in *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* (CEQ 1981) states the following:

> *In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.*

The process used to develop a reasonable range of alternatives for analysis in the EIS included five steps:

1. Develop an initial range of potential alternatives
2. Develop screening criteria
3. Evaluate potential alternatives against the screening criteria
4. Document the rationale for alternatives considered but eliminated from further analysis in the EIS
5. Carry remaining alternatives forward as a reasonable range of alternatives for full analysis in the EIS

Key components necessary to meet the Project's purpose and need include drill sites, processing facilities, pipelines, Project area access, gravel source(s), and other support infrastructure.

Following Project scoping, the BLM convened a series of alternatives development meetings with EIS cooperating agencies. These meetings identified a range of options for various Project components to address issues identified during scoping. These initial options included various configurations for Project components and access. Options identified during the cooperating agency alternatives development meetings included the elimination of some roads, use of different airstrips, alternatives to the module transfer island (MTI), different pad locations, and use of other central processing facilities.

3.1.1 Alternatives Screening Criteria

The BLM and EIS cooperating agencies developed alternatives screening criteria and used them in evaluating potential alternatives and developing the range of reasonable alternatives. The four basic criteria were as follows:

1. Purpose and need: Alternatives that did not meet the overall Project's purpose were eliminated from further analysis in the EIS.
2. Feasible and practicable: Alternatives that clearly were not feasible or were impractical from a technological or economic standpoint were eliminated from further analysis in the EIS.
3. Substantive issues: Alternatives advanced for analysis in the EIS specifically addressed substantive issues identified during public and agency scoping.
4. Relative environmental effects: Feasible alternatives that would not reduce adverse environmental effects or address resource conflict when compared with the proponent's Project were eliminated from further analysis in the EIS.

Additional considerations for screening alternatives consisted of the following:

- Sufficiently unique: The alternative should be sufficiently unique from other alternatives being evaluated to address resource issues or conflicts that are not already being addressed.
- Future development: The alternative should have the potential to support reasonably foreseeable future development.

3.1.1.1 Purpose and Need

The purpose of the Proposed Action is to construct the infrastructure necessary to allow the safe production and transportation to market of federal oil and gas resources under leaseholds in the northeast area of the NPR-A, consistent with the proponent's federal oil and gas lease and unit obligations. The need for federal action (i.e., the issuance of authorizations) is established by BLM's responsibilities under various federal statutes, including the Naval Petroleum Reserves Production Act (NPRPA), as amended, and the Federal Land Policy and Management Act, as well as various federal responsibilities of cooperating agencies under other statutes, including the Clean Water Act. Under the NPRPA, BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a).

3.1.1.2 Feasible and Practicable

The CEQ (1981) guidance expands on 40 CFR 1502.14 (Alternatives Including the Proposed Action) and states that "reasonable alternatives" are "those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 1981). The Project's EIS will also be used by the USACE for its NEPA evaluation. The USACE will issue a ROD for the Project, and the USACE's requirements to select the least environmentally damaging practicable alternative require consideration of practicability during alternatives development. USACE 404(b)(1) guidelines use the term "practicable" and define it as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CFR 230). Although the "practicable" threshold under the USACE 404(b)(1) guidelines may be considered a more specific and finer filter than the broader "reasonable" threshold from the CEQ guidance, the intent was to not separate or exclude reasonable options under either definition. Therefore, considering the broader CEQ guidance (CEQ 1981), as well as the more specific 404(b)(1) guidance (40 CFR 230), the screening criteria were developed to consider feasibility in terms of cost, logistics, and technology as well as common sense. These are further defined as follows:

- Cost feasibility: Alternatives should not involve components with potential costs that would render the project infeasible. (Clean Water Act regulations cite cost as one of the considerations to be factored into determining whether an alternative is practicable.)
- Logistical feasibility: Alternatives should consider whether there are any constraints to development in terms of location, infrastructure, laws, regulations, ability to be permitted, ordinances, or topography.
- Technological feasibility: Alternatives should not involve components that use uncertain or unavailable technology or introduce an increased risk of operational failure or accidents. Certain aspects of an alternative component may have technical constraints affecting the ability to practicably implement those components.

3.1.1.3 Substantive Issues

The BLM identified substantive issues to be addressed in the Project EIS through public and agency scoping and consultation with Alaska Native tribes and Alaska Native Claims Settlement Act corporations. Substantive issues identified during scoping included those that would have significant effects; those that are necessary to make a reasoned choice among alternatives; or those that are needed to address points of disagreement, debate, or dispute regarding an anticipated outcome from a Project action. Table 1.5.1 in Chapter 1.0, *Introduction and Purpose and Need*, summarizes the substantive issues within the scope of the EIS that were identified through scoping and are addressed in the EIS.

3.1.1.4 Relative Environmental Effects

The EIS evaluates alternatives for their impacts on the physical, biological, and social environments. Feasible alternatives resulting in less adverse environmental effects or addressing resource conflicts when compared to the proponent's proposed project were advanced for further analysis in the EIS. Considerations for relative environmental effects were based on substantive issues raised during scoping. These included potential effects on terrestrial wildlife (including caribou [*Rangifer tarandus*]), **subsistence**, public safety, human health, socioeconomics (general and Nuiqsut specific), air quality, the Teshekpuk Lake Special Area (TLSA), and climate change. Therefore, the development of reasonable alternatives considered the potential for each alternative to do the following:

- Reduce the overall Project footprint (i.e., direct impacts from facilities)
- Reduce potential human health impacts (especially those relating to air quality and subsistence)
- Reduce impacts to wildlife, subsistence resources (especially caribou), and subsistence use areas
- Reduce risks related to spills or other accidental releases
- Reduce impacts to water resources and floodplains, including marine habitat

The four screening criteria guided the alternatives development process and provided a basis for eliminating unreasonable or impracticable options through an independent and structured process.

3.1.2 Alternative Components Considered during Alternatives Screening Process

This section provides an overview of the alternative components considered during alternatives development. Alternative components are organized by the Project component being addressed: access, airstrip, module delivery, gravel mine site, gravel pads, processing facility, and the Project schedule. Table D.3.1 summarizes the 33 options considered during alternatives development (not including the No Action Alternative [Alternative A] and Alternative B [Proponent's Project]). Additional alternative components evaluated and dismissed by CPAI were reviewed by the BLM during the alternatives development process and dismissed due to screening criteria; these are described in CPAI's *Environmental Evaluation Document* (CPAI 2018) and include use of the Alpine development (Alpine) processing facility (ACF), **pile-supported facilities**, roadless drill sites, not constructing an airstrip, and more.

3.1.2.1 Access Options

Several options were considered to reduce the Project's impacts related to access road development. Reducing new road infrastructure would lessen the direct and indirect impacts from road construction and gravel mining requirements. A reduced road footprint would reduce direct impacts to WOUS, including wetlands, hydrological resources and connections, and potential impacts to wildlife, especially caribou.

Access options include making certain segments of the Project "roadless" (i.e., no gravel road but connections with ice roads), constructing a bridge across the Colville River, and relocating road segments, including bridges. An alternative infield road alignment that would minimize deviations to LSs and BMPs was also considered.

Each of the access options is described in Table D.3.1.

3.1.2.2 Airstrip Options

Options were considered to use existing airstrips in the area (three total) and to integrate the airstrip with a Project gravel road. These four options were aimed at reducing impacts from air traffic and construction of a new Project area airstrip (e.g., fill of WOUS, impacts to subsistence and wildlife).

Each of the airstrip options is described in Table D.3.1.

3.1.2.3 Module Delivery Options

The Project would require a sealift (ocean-going barge) to deliver large prefabricated modules to the North Slope, and CPAI has proposed the construction of a gravel island in Harrison Bay (near Atigaru Point) to receive the module shipments before transferring them to the Project area via ice road. The alternatives analysis also identified Point Lonely as an alternative location for island construction.

Multiple options to eliminate or modify the proposed MTI were considered during alternatives development to reduce impacts to the marine environment and the infrastructure in subsistence use areas.

Each of the module delivery options is described in Table D.3.1.

3.1.2.4 Mine Site Options

The Project would require approximately 5.0 to 6.4 million cubic yards (cy) of gravel to complete construction of proposed infrastructure (volume varies by alternative and module delivery option). One alternative to CPAI's proposal was considered during alternatives development, and the BLM later requested that CPAI examine a second alternative related to the methods for gravel mining production that would eliminate or reduce the need to use traditional blasting (i.e., explosive) methods. These alternatives were considered to reduce impacts to habitat (e.g., creation of a new mine site) and the community of Nuiqsut (e.g., noise).

Each of the mine site options is described in Table D.3.1.

3.1.2.5 Gravel Pads Options

A total of four options for gravel pads was considered during alternatives development. Suggested options for pads ranged from reducing pad size and altering pad locations to reducing the overall number of pads. These options were aimed at reducing direct and indirect impacts to wetlands and vegetation.

Each of the gravel pads options is described in Table D.3.1.

3.1.2.6 Processing Facility Options

Two options were suggested as an alternative to constructing a Project-specific processing facility to reduce potential impacts to air quality and impacts to wetlands and vegetation from the construction of additional Project infrastructure.

Each of these processing facility options is described in Table D.3.1.

3.1.2.7 Schedule Options

Two options were suggested as alternatives related to the timing or schedule of how the Project would be executed. These alternatives were aimed at reducing impacts to subsistence users.

Each of these schedule options is described in Table D.3.1.

Table D.3.1. Alternative Components Considered during Alternatives Development

Component Category	Component Number	Alternative Component Considered	Description	Why Considered
All	1	No Action Alternative	No action; carried forward as Alternative A in the EIS.	NEPA requirement to serve as a baseline of comparison for impact analysis
All	2	Proponent's proposed project	Project as proposed by CPAI; carried forward as Alternative B in the EIS.	CPAI's proposed action
Access	3	No gravel road connections to drill sites BT2 and BT4	This alternative component would not include a gravel road connection to drill sites BT2 and BT4 (i.e., the gravel road connection would stop at drill site BT1); instead, access to these drill sites would be via aircraft and seasonal ice road.	Reduce footprint/fill Reduce number of stream crossings Reduce impacts to caribou movement
Access	4	Construct a permanent bridge over the Colville River	This alternative component would construct a permanent bridge over the Colville River to provide a year-round gravel road connection between the Project area and the Alaska National Highway System; use smaller sealift modules and deliver them to the Project area from Oliktok Dock via gravel or ice roads.	Eliminate the need for the MTI Reduce annual water consumption required for ice road construction Reduce air traffic to Alpine and the Project area
Access	5	Construct a boat ramp on the Colville River	This alternative component would construct a boat ramp/launch on the Colville River and would provide a connection to year-round road access (e.g., Dalton Highway).	Subsistence access
Access	6	Make drill site BT4 roadless	This alternative component would make drill site BT4 disconnected (i.e., no gravel road connection) from the rest of the Project and allow connection by ice road during the winter and by aircraft during the remainder of the year.	Reduce impacts to caribou movement Reduce footprint/fill Reduce number of stream crossings
Access	7	Relocate the Judy (Iqalliqpik) Creek Bridge crossing (as designed by CPAI in its proposed Alternative 2) (CPAI 2018)	This alternative component would relocate the Judy (Iqalliqpik) Creek Bridge crossing location (proposed by CPAI in Alternative 2) to an area that would allow a shorter crossing of the creek (1,850 feet long as proposed).	Reduce impacts to Judy (Iqalliqpik) Creek (e.g., fish, subsistence, hydrology) Reduce impacts to yellow-billed loons (*Gavia adamsii*)
Access	8	Roadless access to the WPF and make drill site BT4 roadless	This alternative would use only a seasonal road (e.g., ice road) connection for Project access and to access drill site BT4.	Reduce impacts to caribou movement Reduce footprint/fill Reduce number of stream crossings
Access	9	Relocate Judy (Iqalliqpik) Creek Bridge crossing and reroute the road (as designed by CPAI in its proposed Alternative 2) (CPAI 2018)	This alternative would relocate the Judy (Iqalliqpik) Creek Bridge crossing location and reroute the gravel road; departing from the WPF, the road would cross Judy (Iqalliqpik) Creek to the west before heading to drill sites BT2 and BT4, with a spur road to drill site BT1.	Reduce impacts to Judy (Iqalliqpik) Creek (e.g., fish, subsistence, hydrology) Reduce impacts to yellow-billed loons
Access	10	Different infield road alignment	This alternative would use a different infield road alignment (as presented in CPAI's Environmental Evaluation Document, Alternative 2 [CPAI 2018]) that would maximize conformance to NPR-A LSs and BMPs.	Avoid all but one yellow-billed loon nesting lake shoreline setback (BMP E-11) Avoid the 3-mile Fish (Uvluttuq) Creek setback (BMP K-1)

Component Category	Component Number	Alternative Component Considered	Description	Why Considered
Airstrip	11	Use the existing Alpine airstrip	This alternative component would use the existing Alpine airstrip and would not construct a new airstrip in the Project area.	Centralize air traffic in an area with existing air traffic Reduce footprint/fill Maximize the use of existing infrastructure
Airstrip	12	Use the existing Nuiqsut airstrip	This alternative component would use the existing Nuiqsut airstrip and would not construct a new airstrip in the Project area. This would require the construction of a new gravel road to the Project area (or GMT-2) or an access agreement to use the privately owned (Kuukpik Corporation) Nuiqsut Spur Road.	Centralize air traffic in an area with existing air traffic outside of the Colville River Delta Reduce footprint/fill Offer socioeconomic benefit to Nuiqsut Maximize the use of existing infrastructure
Airstrip	13	Use the existing Inigok airstrip	This alternative component would use the existing Inigok airstrip and would not construct a new airstrip in the Project area. This would require the construction of a new gravel road to the Project area extending approximately 20 miles to the northwest.	Move air traffic further away from Nuiqsut Reduce footprint/fill Maximize the use of existing infrastructure
Airstrip	14	Integrate the proposed airstrip and roadway	This alternative component would integrate a portion of the parallel gravel road into the proposed airstrip, resulting in a dual-use facility.	Reduce footprint/fill
MTI	15	Use small-sized sealift modules (550 tons or less) for the WPF	This alternative component would use small-sized sealift modules (550 tons or less; module transporters would be 100 tons) to construct the WPF so modules could be delivered to Oliktok Dock and transported to the Project area over terrestrial ice roads and cross the Colville River seasonal ice bridge (maximum load capacity is 650 tons).	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users) Reduce water consumption
MTI	16	Use medium-sized sealift modules (1,400 tons or less) for the WPF	This alternative component would use medium-sized sealift modules (1,500 tons or less) to construct the WPF so modules could be delivered to Oliktok Dock and transported to the Project area over a combination of sea ice and terrestrial-based ice roads.	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users)
MTI	17	Freeze sealift barges in place in Harrison Bay	This alternative component would ground sealift barges in Harrison Bay (in the same location as the proposed MTI) during the open-water season and allow them to freeze in place during winter.	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users)
MTI	18	Reduce the lifespan of the MTI	The MTI is proposed to be used for two distinct periods (2 consecutive years to support the WPF and drill site module delivery and 1 additional year to support drill site modules); this option would eliminate the second period of module delivery to the MTI (and instead use smaller modules delivered to Oliktok Dock), which would allow for decommissioning of this Project facility sooner.	Reduce the lifespan of the MTI to reduce the length of time for impacts to occur to the marine environment and subsistence users

Component Category	Component Number	Alternative Component Considered	Description	Why Considered
MTI	19	Make the MTI semipermanent	The MTI would be constructed with the intent of being maintained for an extended time beyond the length identified as needed for the Project. This would allow future development (by CPAI or others) in the area to use the facility and not require construction of a similar feature.	Increasing the lifespan of the MTI could potentially reduce the cumulative impacts associated with future development May provide usable infrastructure to local subsistence users
MTI	20	Land sealift barges at the shore near Atigaru Point	This alternative component would ground sealift barges near the shoreline in Harrison Bay during the open-water season and allow them to freeze in place during winter.	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users)
MTI	21	Construct a dock at Atigaru Point	This alternative component would construct a new industrial dock facility at Atigaru Point (located in Harrison Bay) for the delivery of sealift modules during the open-water season.	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users) Reduce potential cumulative impacts from future development May provide usable infrastructure to local subsistence users
MTI	22	Construct a dock at Point Lonely	This alternative component would construct a dock at Point Lonely and use the existing infrastructure from this decommissioned U.S. Department of Defense site for the off-loading and staging of sealift modules.	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users) Maximize the use of existing infrastructure
MTI	23	Construct an MTI at Point Lonely	This alternative component would construct a gravel island at Point Lonely to receive the sealift modules during the open-water season. The existing infrastructure at Point Lonely would be used to stage equipment (e.g., ice-road–making equipment, personnel camp).	Eliminate the MTI at Atigaru Point (i.e., reduce impacts to Nuiqsut subsistence users) Maximize the use of existing infrastructure
MTI	24	Deliver sealift modules to the Project area via a grounded-ice bridge over the Colville River near Umiat	This alternative component would deliver medium-sized or large-sized sealift modules to Oliktok Dock and transfer them to the Project area via ice roads, with a crossing of the Colville River on a grounded-ice bridge, south of the Project area near Umiat.	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users) Maximize the use of existing infrastructure
MTI	25	Construct a dock at the abandoned Kogru River pad	This alternative component would construct a dock at an abandoned pad site along the Kogru River.	Eliminate the need for the MTI (i.e., reduce impacts to the marine environment and subsistence users) Maximize the use of existing infrastructure
Mine site	26	Use the existing Arctic Slope Regional Corporation mine site	This alternative component would use the existing commercial Arctic Slope Regional Corporation mine site near Nuiqsut to supply gravel for the Project instead of constructing a new project-specific gravel mine site.	Consolidate gravel mining operations to a single, existing mine site (i.e., maximize use of existing infrastructure)

Component Category	Component Number	Alternative Component Considered	Description	Why Considered
Mine site	27	Alternatives to traditional blasting to support gravel mining operations	This alternative component would examine alternative methods for gravel mining (e.g., mechanical extraction) that would eliminate or reduce the use of blasting with conventional explosives.	Reduce noise impacts to wildlife, Nuiqsut residents, and subsistence activities
Pads	28	Reduce the number and/or size of drill pads	This alternative component would reduce the overall number of Project drill pads or reduce the size of individual pads.	Reduce footprint/fill
Pads	29	Reduce the size of pads by using pile-supported facilities	It would use pile-supported structures where practicable (e.g., camps, cold storage) instead of placing structures at grade on gravel pads.	Reduce footprint/fill
Pads	30	Relocate drill site BT4 from its proposed location to an area outside of the K-5 Teshekpuk Lake Caribou Habitat Area	This alternative component would relocate drill site BT4 out of its proposed location within the K-5 Teshekpuk Lake Caribou Habitat Area.	Reduce impacts to caribou Reduce the number of stream crossings
Pads	31	Move drill site BT2 westward and away from Fish (Uvlutuuq) Creek	This alternative component would relocate drill site BT2 westward and away from Fish (Uvlutuuq) Creek.	Avoid Fish (Uvlutuuq) Creek setback (BMP K-1) Reduce impacts to fish Reduce impacts to subsistence use
Processing facility	32	Use the Alpine central processing facility instead of constructing a Project-specific processing facility	This alternative component would use the existing Alpine central processing facility instead of constructing a project-specific processing facility in the Project area.	Centralize processing activity at an existing facility Maximize the use of existing infrastructure Reduce footprint/fill
Processing facility	33	Relocate the Project processing facility closer to the GMT Unit boundary	This alternative component would relocate the proposed WPF farther to the northeast, closer to the GMT Unit boundary.	Reduce impacts to caribou
Schedule	34	Phase development of the Project so construction does not begin until the GMT-2 development is constructed and is in its drilling/operations phase	This alternative component would institute phasing to begin Project construction after GMT-2 has been constructed and has advanced to the drilling/operations phase so impacts from GMT-2 can be better identified and addressed in the Project.	Provide additional insight into the potential effects to environmental resources that may be addressable in the Project Reduce cumulative impacts in area
Schedule	35	Delay the Project EIS until after GMT-2 is in the drilling/operations phase	This alternative component would delay the development of the Project EIS until after GMT-2 development is in its drilling/operations phase so the impacts from the GMT-2 project would be known and could be further addressed in the design and plans for the Project.	Provide additional insight into the potential effects to environmental resources that may be addressable in the Project Reduce cumulative impacts in area

Note: BMP (best management practice); BT1 (Bear Tooth drill site 1); BT2 (Bear Tooth drill site 2); BT4 (Bear Tooth drill site 4); CPAI (ConocoPhillips Alaska, Inc.); EIS (Environmental Impact Statement); GMT (Greater Mooses Tooth); GMT-2 (Greater Mooses Tooth 2); LSs (lease stipulations); MTI (module transfer island); NEPA (National Environmental Policy Act); NPR-A (National Petroleum Reserve in Alaska); WPF (Willow Processing Facility).

3.1.3 Alternative Components Considered but Eliminated from Further Analysis

As previously described, the BLM and the cooperating agencies considered a range of alternative components for various Project components (access, airstrip, MTI, mine site, pads, and processing facility). A total of 33 alternative components (excluding the No Action Alternative and Alternative B [Proponent's Project]) were evaluated to determine whether they were reasonable in light of the Project's purpose. Of these, 26 alternative components were eliminated from further analysis because they did not meet the overall Project purpose; were not considered economically or technically feasible or practicable (as defined by CEQ [1981] guidelines); did not address substantive issues raised during scoping; did not provide benefits over an alternative already being considered; or were determined to be more appropriate as potential mitigation or minimization measures. After the alternative components were evaluated against the screening criteria, they were either 1) eliminated or 2) incorporated into an action alternative to be carried forward for analysis in the EIS. Alternatives components considered but eliminated from further analysis are summarized in Table D.3.2, along with the rationale for elimination.

Table D.3.2. Alternative Components Considered but Eliminated from Further Analysis and the Rationale for Elimination[1]

Component Number	Alternative Component Considered	Rationale for Elimination
3	Access – No gravel road connections to drill sites BT2 and BT4	Would result in 26 to 30 acres of additional surface disturbance (i.e., wetland fill) for additional airstrip, camp, and equipment and supply storage at each drill site. Would result in substantial additional water use over the life of the Project to annually construct resupply ice roads from drill site BT1 to drill sites BT2 and BT4. Would result in additional air traffic during the 9-month roadless period each year (would increase air traffic by approximately 7,000 flights during construction and 1,100 flights during drilling and operations). Would result in an airstrip (at drill site BT4) closer to high-density caribou calving grounds. Due to prevailing winds, most air traffic would land from west to east, which would result in higher levels of air traffic and associated noise west of drill site BT4. The heaviest air traffic would occur in summer (when there would be no ice road), which would spatially and temporally overlap with calving caribou. This potential disturbance could result in caribou displacement that is similar to or greater than having an all-season gravel road connection to drill site BT4. Would increase health and environmental risk in the event of an emergency (i.e., inability to evacuate personnel or respond to oil spill incidents when weather prevents flights in and out of the airstrips, which is common on the North Slope).
4	Access – Construct a permanent bridge over the Colville River	Would not reduce environmental impacts (would likely increase impacts to caribou, subsistence, and wetlands/WOUS). Substantial technical and economic feasibility constraints make this alternative not practicable under the U.S. Army Corps of Engineers Section 404 regulations. Construction of a permanent bridge over the Colville River is not part of the Project's purpose and need.
5	Access – Construct a boat ramp on the Colville River	Would not provide increased access to the Project area for CPAI.
6	Access – Make drill site BT4 roadless	Would result in increased surface disturbance (need for additional airstrip, storage, and camps). Would increase health and environmental risk in the event of an emergency (i.e., inability to evacuate personnel or respond to oil spill incidents when weather prevents flights in and out of the airstrips, which is common on the North Slope). Would increase air traffic near the K-5 Teshekpuk Lake Caribou Habitat Area during the 9 months annually when ice roads would not be available (air traffic would increase by approximately 3,500 flights during construction and 550 flights during drilling and operations).

[1] Any impact comparisons provided in Table D.3.2 are made in reference to CPAI's proposed project (Alternative B [Proponent's Project]) unless otherwise indicated.

Component Number	Alternative Component Considered	Rationale for Elimination
8	Access – Roadless access to the WPF and make drill site BT4 roadless	Would not appreciably reduce impacts beyond the advanced alternatives: Alternative C (Disconnected Infield Roads) or Alternative D (Disconnected Access). Would increase air traffic at drill site BT4 near the K-5 Teshekpuk Lake Caribou Habitat Area during the 8 months annually when ice roads would not be available (air traffic at this drill site would increase by approximately 3,500 flights annually during construction and 550 flights during drilling and operations).
10	Access – Different infield road alignment	Would not reduce overall impacts: would have 7 additional miles of gravel road, 3 additional stream crossings, and a longer bridge at Judy (Iqalliqpik) Creek
11	Airstrip – Use the existing Alpine airstrip	Would substantially increase air traffic at the Alpine airstrip, which is sited in the Colville River Delta, an area that both resource agencies and Nuiqsut community members have noted is a more environmentally sensitive area (e.g., wildlife, subsistence use) than the Project area. Cooperating agencies emphasized that increased impacts in the Colville River Delta should be avoided. Use of the Alpine airstrip would increase air traffic at Alpine by approximately 700 flights per year during construction and would increase vehicle traffic through the GMT and Alpine developments. Would require upgrades to the Alpine airstrip and construction of an additional bypass road, as the integrated road and airstrip at Alpine would no longer be logistically feasible with the amount of air and vehicle traffic from both the Willow and Alpine developments operating concurrently. This would result in additional impacts to wetlands and other environmental resources in the Colville River Delta. Increased vehicle trips and travel times pose a risk to Project employees through increased personnel exposure to potential accidents during transport between Alpine to Willow (an approximately 2-hour drive each way). The additional travel time also increases the risk to personnel in the event an evacuation is required (e.g., medical emergency). For reference, CPAI documented 510 medical evacuations in the Kuparuk and Alpine oil fields in 2015 and 2016. The Alpine airstrip is located in an area more prone to weather-related flight safety issues (e.g., fog) than the Project area, which poses a number of logistical problems, including safety challenges related to weather limitations. Increasing the number of flights at this airstrip would only exacerbate current weather-related delays. This option would not support reasonably foreseeable future development within the Project area.
12	Airstrip – Use the existing Nuiqsut airstrip	Would require improvements and expansion of the existing Nuiqsut airstrip to accommodate traffic, including fill in adjacent wetlands and streams. Would require a gravel road connection to the Project area from Nuiqsut, which would result in additional fill in wetlands. Use of the existing gravel road connection to Alpine from Nuiqsut (Spur Road) would require approval from the Kuukpik Corporation for CPAI to use and improve the road (to Project standards). BLM discussed this with the Kuukpik Corporation for the GMT-2 development, and the Kuukpik Corporation denied the request. Would require construction of a new all-season gravel road to connect the Project area with Nuiqsut. Would add additional road traffic in Nuiqsut (or require a new gravel road connection between Nuiqsut and the Project area), which would generate increased, traffic, noise, and dust in the community. There is currently no consensus from the community or Native Village of Nuiqsut about whether they would be in favor of Nuiqsut being an operations hub for oil and gas development.
13	Airstrip – Use the existing Inigok airstrip	This option would not reduce environmental impacts: The Inigok airstrip is located more than 20 miles from the Project area (drill site BT5) and would require upgrades and an additional gravel access road to use it, creating additional impacts to wetlands and other environmental resources (e.g., caribou). The new gravel road to Inigok would be in an area used more heavily by caribou than the proposed road connection from GMT-2 to the Project area, and the road to Inigok would be much longer.
14	Airstrip – Integrate the proposed airstrip and roadway	Use of an integrated airstrip for both landing aircraft and vehicle traffic creates safety concerns due to the number of anticipated flights and volume of vehicle traffic. Integrating the proposed airstrip with the road would only reduce impacts to wetlands by 5.5 acres.

Component Number	Alternative Component Considered	Rationale for Elimination
15	MTI – Use small-sized sealift modules (550 tons or less) for the WPF	While the smaller module size would eliminate the need for the MTI because modules could be offloaded at Oliktok Dock and transported across the annual Colville River ice bridge (650-ton maximum weight limit, including module transporters [approximately 100 tons]), this option is not technically feasible due to the some of the individual module components exceeding the maximum load capacity of the Colville River ice bridge. This alternative component would also increase the overall Project footprint because of the need to construct on-site fabrication facilities to complete module installation and because of safety requirements for individual module separation distance minimums. This alternative component would increase the overall amount of vehicle traffic near Nuiqsut during the already busy ice road season when the annual Alpine Resupply Ice Road is in operation. Use of small-sized sealift modules would require significantly increased labor hours on the North Slope (versus the module fabrication facility located outside of Alaska), which would increase the overall safety exposure of Project personnel on the North Slope where weather conditions are extreme and full medical support is limited to distance locations (e.g., Fairbanks, Anchorage).
16	MTI – Use medium-sized sealift modules (1,400 tons or less) for the WPF	While medium-sized modules would eliminate the need for the MTI because modules could be offloaded at Oliktok Dock and use a sea- and tundra-based ice road route to deliver the modules to the WPF pad, additional environmental impacts and Project execution risks would occur. Existing and planned gravel infrastructure size would increase 19 acres and use 73,500 cubic yards of fill material. This would include the curve straightening of existing roads to accommodate the overall length of the module transporters, the construction of the gravel pad near Fish (Uvlutuuq) Creek in the Colville River Delta, and an increase in the WPF pad size to address safety requirements (resulting from an increase from four modules to 15). The required length and thickness of the ice road routes to be completed in a single season is at the upper limits of what has been historically constructed in a single winter season on the North Slope. The North Slope does not have enough equipment or personnel capacity to support construction of this route and support other projects by CPAI and other North Slope operators. Due to the design requirements for the sea-ice route and the limited window to transport the 15 sealift modules, the sealift module move would occur over two seasons, effectively doubling impacts (e.g., potential marine mammal disturbance, water consumption) and requiring the construction of the staging pad near Fish (Uvlutuuq) Creek in the Colville River Delta. In order to transport the modules (1,800-ton total load with transport vehicles), the sea ice would need to be grounded. In the Colville River Delta, due to year-round flows, the sea ice cannot be grounded and the floating ice would need to be approximately 25 feet thick to support the move. Should a module break through the ice, Project personnel would be in danger, the module could be lost, and the environmental impacts could be significant. (It is estimated that salvage of a module would take between 1 and 3 years.) The increased transport time would delay Project construction by 1.5 years and first oil by 2 years, making the Project economically unfeasible for CPAI. CPAI has notified the BLM that due to the risk to Project personnel, assets (e.g., sealift modules, support equipment), and the environment from the long sea-ice route, this option is unfeasible and could not be implemented if selected as the preferred alternative in the Willow Master Development Plan EIS.

Component Number	Alternative Component Considered	Rationale for Elimination
17	MTI – Freeze sealift barges in place in Harrison Bay	The freeze-in barge concept was evaluated by a team of engineers, including specialists in ice engineering, cold-region engineering, Arctic marine naval architecture, geothermal engineering, and offshore geotechnical engineering to determine risks and potential mitigation measures to reduce risks. The analysis determined that the concept of freezing the sealift modules in place was not practical or feasible from a technological standpoint and presented significant risks to the environment, personnel safety, and modules (CPAI 2019a). Identified ice loading on the barge structure could readily lead to a loss of barge structural integrity. Mitigation measures to counter structural loading included using supplemental refrigeration to freeze ballast water in the barge holds; structural reinforcement of existing barges and custom-built ice class barges; and construction of ice- or gravel-berm protective barriers. Each of these mitigation measures still presented operational risks and uncertainty of varying degrees, including risk to human safety and asset protection. Barge anchoring (i.e., preventing ice loads from moving the barges after they have been grounded to the seafloor) presented additional challenges that engineering design could not mitigate. Mitigation measures included tying/connecting the five barges together as a single unit; installing pipe piles to further anchor the barges to the grounded location; and dredging the grounding site to reach more resistant (to sliding) soils. In the event of a barge structural event, significant ice formation on the modules (i.e., spray accumulation on the module creating uneven loading) or ice pileups against the loaded barges could result in a module or barge (or both) sinking in Harrison Bay. Such an event would create a significant risk to Project personnel and would result in a significant salvage operation with a potential for serious environmental impacts.
18	MTI – Reduce the lifespan of the MTI	The MTIs (module delivery options 1 and 2) have been designed to accommodate two distinct sealifts: the first would deliver the WPF modules and three drill site modules (BT1, BT2, and BT3); the second sealift would deliver two drill site modules (BT4 and BT5). Drill site module design and detailed engineering is not anticipated to be completed until at least 2020. If the drill site module design can produce sealift modules weighing less than 650 tons (with module transporters), CPAI could deliver the sealift modules to Oliktok Point and transport them to the Project area via a combination of ice and gravel roads. (This route would require crossing the Colville River ice bridge, which has a maximum weight rating of 650 tons.) At the current time, this alternative component has been eliminated from consideration in the EIS, as its implementation is speculative; however, should CPAI determine that this is technically and logistically feasible, Project plans could be updated with the BLM and the MTI could be decommissioned earlier than proposed.
19	MTI – Make the MTI semipermanent	CPAI has not identified any reasonably foreseeable future projects that would require sealift module delivery in the NPR-A and has no need for an MTI following Project construction. The MTI would be located in State of Alaska waters (under module delivery options 1 and 2), and the State of Alaska has expressed no interest in taking ownership of the MTI following Project construction. Since the MTI will require annual inspection and maintenance as needed (e.g., gravel bag armor replacement) and there is no other identified entity to take possession and responsibility for the MTI, this alternative option has been eliminated as not being logistically feasible.
20	MTI – Land sealift barges at shore near Atigaru Point	Landing sealift module barges at the shore would require dredging approximately 2.5 miles of seafloor (approximately 100 acres) to a depth of approximately 11.5 feet to 14.5 feet, creating greater impacts to the marine environment than the construction of the MTI at Atigaru Point. Significant dredging activity has been identified by local stakeholders (e.g., Nuiqsut subsistence users) as being overly disruptive to subsistence activity.

Component Number	Alternative Component Considered	Rationale for Elimination
21	MTI – Construct a dock at Atigaru Point	Construction of a dock at Atigaru Point would have greater impacts to the marine environment and wetlands and WOUS: For marine vessels to reach shore, dredging would be required for approximately 2.5 miles of seafloor (approximately 100 acres) to a depth of approximately 11.5 feet to 14.5 feet, creating greater impacts to the marine environment than the construction of the MTI at Atigaru Point. Significant dredging activity has been identified by local stakeholders (e.g., Nuiqsut subsistence users) as being overly disruptive to subsistence activity. Dock facilities would require additional fill to construct gravel pads and the dock in wetlands and WOUS.
22	MTI – Construct a dock at Point Lonely	Construction of a dock at Point Lonely is not technically feasible due to accelerated rates of shoreline erosion occurring at the site. Annual shoreline erosion at Point Lonely in recent years has accelerated in excess of 80 feet per year. Such shoreline erosion rates, where the causeway would connect to the shoreline, cannot be adequately addressed through Project planning and engineering design.
24	MTI – Deliver modules to the Project area via grounded-ice bridge over the Colville River near Umiat	Umiat is the only location upstream of Nuiqsut with Colville River flow data for a substantial period of record. U.S. Geological Survey data shows that the Colville River at Umiat frequently has flowing water year-round. The lowest flow periods are only one month long (April). As such, the Colville River at Umiat or downstream would not have the required grounded ice conditions.[2] There are multiple feeder rivers and streams that would need to be crossed on the approach to Umiat, and they may also not have fully grounded ice. The ice road route would be approximately 115 miles to south Umiat and an additional 50 miles north to reach the Project area. Ice road transit would require a minimum of one multi-season ice pad or gravel pad due to the length of the route (i.e., module delivery would likely take 2 years to complete). Crossing the Colville River at Umiat would have greater environmental impacts than crossing the river near Ocean Point due to the increased distance from the Project area (e.g., additional ice roads, additional transport year) and is not sufficiently unique from Option 3 (Colville River Crossing) analyzed in the Final EIS.
25	MTI – Construct a dock at the abandoned Kogru River pad	Construction of a dock at the abandoned Kogru River pad would have greater impacts to the marine environment and wetlands/WOUS: For marine vessels to reach shore, dredging would be required for approximately 9 miles of seafloor (approximately 370 acres) to a depth ranging from 11.5 feet to 14.5 feet, creating greater impacts to the marine environment than the Proposed Action. Significant dredging activity has been identified by local stakeholders (e.g., Nuiqsut subsistence users) as being overly disruptive to subsistence activity. Dock facilities would require the placement of additional fill to construct gravel pads in wetlands and WOUS
26	Mine site – Use the existing ASRC mine site	Use of this mine site would have greater impacts in Nuiqsut than the proposed mine site as the ASRC mine site is approximately half the distance to Nuiqsut: Blasting activity would have greater impacts. Gravel hauling would also occur through or near the community, creating additional noise and air quality impacts in Nuiqsut. The ASRC mine site is farther from the Project area and would increase the round-trip gravel hauling operation by approximately 20 miles per load.

[2] BLM and cooperating agencies dismissal of the Colville River crossing location at Umiat was based on the year-round river flow in the area and the understanding that grounding an ice bridge at this location or downstream would not be feasible. Based on stakeholder feedback, CPAI continued to look for a feasible crossing location and with additional data collection and was able to identify a crossing location where an ice bridge could be partially grounded near Ocean Point. This crossing location would allow for a partially grounded ice bridge (where some water flow would still occur in small channels) and was included as Option 3 (Colville River Crossing) in the Supplement to the Draft EIS and in the Final EIS.

Component Number	Alternative Component Considered	Rationale for Elimination
27	Mine site – Alternatives to blasting to support gravel mining operations	CPAI reviewed multiple gravel mining methods as alternatives to blasting at the request of the BLM, including mechanical methods (e.g., crushers, mining saws, terrain levelers, road headers, continuous miners), steam or thermal thawing, and alternative blasting products (e.g., Autostem products). Of the equipment types requested by the BLM for CPAI to investigate, the majority were not capable of producing mining rates required for the short gravel mining season in the Project area. Previous North Slope operations working on smaller scale projects (e.g., pad work, road work) have employed some of the mechanical methods noted by the BLM with success. However, the equipment has had a history of hydraulic failures at temperatures approach -15 degrees Fahrenheit; winter temperatures on the North Slope are regularly colder than this limit. Additionally, due to the slower rate of mining production, the mine site would need to be operated year-round, which is not feasible for the Project because the mine site would not be connected by gravel road (mining operations would only occur during winter with ice road access).
28	Pads – Reduce the number and/or size of drill site pads	Would not allow CPAI to exercise their rights under their leases to extract all the oil and gas possible within the leased areas. Leases provide the lessee the right to extract all of the oil and gas resources within the lease, subject to regulation. Drill pads have already been optimized to the minimum size needed for the proposed activity (e.g., 20-foot wellhead spacing). Drill pad locations have already been optimized to provide maximum accessibility to the resources based on existing extended-reach drilling technology and reservoir location and characteristics.
29	Pads – Reduce the size of pads by using pile-supported facilities	Would create safety risks related to emergency egress and access for emergency responders (e.g., firefighters), who would only have access to one or two sides of the structure for a portion of the year. Would limit maintenance access and opportunities outside of the winter season. Pile-supported modules overhanging tundra that require resupply by truck (e.g., chemical tanks, fuel tanks) would pose an increased risk to the environment in the event of an overfill or spill. Most support facilities (e.g., central processing facility modules, fleet and equipment repair shop, fabrication shop) are designed to have access to all sides of the structures for functionality and to provide space to move material and equipment around safely and efficiently. Would not appreciably reduce impacts to wetlands in comparison with the Proposed Action due to shading effects beneath buildings.
32	Processing – Use the Alpine central processing facility instead of constructing a Project-specific processing facility	The Alpine central processing facility does not have capacity to process Project production (peak estimate of 200,000 barrels of oil per day, 175,000 barrels of water per day, and 300 million standard cubic feet of gas per day). The Alpine central processing facility is currently at gas handling capacity and the expected production from GMT-1 and GMT-2 will keep the facility at or near capacity for gas and water handling into the 2030s. The Project reservoir pressures are substantially less than those found at the Alpine development, presenting additional challenges to co-processing fluids at the existing facility. Upgrades to increase capacity of the Alpine central processing facility would increase overall Project impacts in the Project area and the Colville River Delta, an environmentally sensitive area: Partial processing facilities in the Project area would be required (i.e., although a full central processing facility would not be required, a partial processing facility would still be required). Transport of multiphase fluids to the Alpine central processing facility would require additional pumping and heating equipment in the Project area, expanding the gravel footprint within the Project area.

Component Number	Alternative Component Considered	Rationale for Elimination
34	Schedule – Phase development of the Project so construction does not begin until GMT-2 development is constructed and is in the drilling/operations phase	This is already accomplished under the action alternatives, including the proponent's Proposed Action through planned sequential construction of drill sites (versus simultaneous development) over 9 to 10 years (varies by alternative). Additionally, future potential development of the Greater Willow 1 and Greater Willow 2 areas are considered in the EIS as reasonably foreseeable future development for cumulative effects analysis; development of these sites requires additional subsurface data and these sites would be subject to future National Environmental Policy Act reviews.
35	Schedule – Delay the Project EIS until after GMT-2 is in the drilling/operations phase	The BLM is unable to postpone Project permitting based on regulatory requirements applicable to the NPR-A found in 42 USC 6506(a). Deferral of a project authorization would be inconsistent with the directives of the Naval Petroleum Reserves Production Act to expeditiously carry out an oil and gas leasing program. Delayed permitting would be inconsistent with the rights of CPAI acquired with the subject leases to reasonably develop the oil and gas within those lease tracts (generally limited to a 10-year lease term) and with CPAI's obligations in the Bear Tooth Unit Agreement to promptly pursue development.

Note: ASRC (Arctic Slope Regional Corporation); 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); CPAI (ConocoPhillips Alaska, Inc.); EIS (Environmental Impact Statement); GMT (Greater Mooses Tooth); GMT-2 (Greater Mooses Tooth 2); MTI (module transfer island); NEPA (National Environmental Policy Act); NPR-A (National Petroleum Reserve in Alaska); WOUS (Waters of the U.S.).

3.1.4 Alternative Components Carried Forward

In developing the alternatives to be considered in the Project EIS, several alternative components suggested were incorporated into Alternatives C and D analyzed in the EIS. Additionally, some alternative components were able to be incorporated into all action alternatives (e.g., as a BMP) or are being analyzed in the EIS until a determination on their feasibility is determined.

Table D.3.3 summarizes those alternative components carried forward as either alternatives or standalone components for analysis in the EIS.

Table D.3.3. Alternative Components Considered and How They Are Carried Forward in the Environmental Impact Statement

Component Number	Alternative Component Considered	Description of How an Alternative Component is Carried Forward in the Environmental Impact Statement
1	No action alternative	No action; carried forward as Alternative A in the EIS.
2	Proponent's proposed project	Project as proposed by CPAI; carried forward as Alternative B (Proponent's Project) in the EIS.
7	Access – Relocate the Judy (Iqalliqpik) Creek Bridge crossing (as designed by CPAI in its proposed Alternative 2) (CPAI 2018)	All action alternatives with a crossing of Judy (Iqalliqpik) Creek use the same road and bridge alignment. The proposed bridge length has been reduced from 1,850 feet to 420 (Draft EIS) to 380 feet (Final EIS).
9	Access – Relocate the Judy (Iqalliqpik) Creek Bridge crossing and reroute the road (as designed by CPAI in its proposed Alternative 2) (CPAI 2018)	All action alternatives with a crossing of Judy (Iqalliqpik) Creek use the same road and bridge alignment; the road alignment has been further refined between the Draft and Final EIS. The proposed bridge length has been reduced from 1,850 feet to 420 (Draft EIS) to 380 feet (Final EIS).
23	MTI – Construct an MTI at Point Lonely	This alternative concept has been carried forward in the EIS as Option 2: Point Lonely Module Transfer Island.
30	Pads – Move drill site BT4 out of the K-5 Teshekpuk Lake Caribou Habitat Area	Drill site BT4 has been relocated outside of the K-5 Teshekpuk Lake Caribou Habitat a\Area and east of the Kalikpik River for all action alternatives. CPAI has agreed to apply all K-5 BMPs to the drill site due to its proximity to the K-5 area.
31	Pads – Move drill site BT2 west, away from Fish (Uvlutuuq) Creek	This has been included as an adaptive management BMP that would apply to all action alternatives: delay construction of drill site BT2 as long as possible to see if advances in extended reach drilling allow CPAI to reach target resources from a drill site located farther away from Fish (Uvlutuuq) Creek.
33	Processing facility – Relocate the Project processing facility closer to the GMT Unit boundary	This alternative component has been incorporated into Alternative C (Disconnected Infield Roads) in the Draft EIS. The Willow Processing Facility was relocated approximately 4 miles to the west (i.e., closer to the GMT Unit boundary) for Alternative B (Proponent's Project) in the Final EIS.

Note: BMP (best management practice); BT2 (Bear Tooth drill site 2); BT4 (Bear Tooth drill site 4); CPAI (ConocoPhillips Alaska, Inc.); EIS (Environmental Impact Statement); GMT (Greater Mooses Tooth); MTI (module transfer island).

3.1.5 Additional Alternatives Concepts Evaluated by ConocoPhillips Alaska, Inc.

CPAI conducted internal examinations of additional concepts to Project elements that were not further evaluated by the BLM or cooperating agencies as they had been sufficiently described and dismissed based on CPAI's initial evaluation.

3.1.5.1 Use of the Clover Mine Site

The 19-acre Clover Mine Site was previously evaluated by BLM in the Alpine Satellite Development Plan (ASDP) Final EIS (BLM 2004) and the Greater Mooses Tooth 1 (GMT-1) Draft Supplemental EIS (BLM 2014) as a potential source of gravel that could supply approximately 626,000 cy of gravel, which is insufficient for the Project (which would require approximately 5.0 to 6.4 million cy of gravel depending on the alternative).

CPAI further evaluated the Clover Mine Site as a potential Project mine site. Use of the Clover Mine Site was found to be disadvantageous over the proposed Project mine site located in the Tiŋmiaqsiuġvik area. Issues with using the Clover Mine Site include the following:

- Proximity to Nuiqsut. The Clover Mine Site is approximately 1 mile closer to Nuiqsut and could result in increased impacts from blasting and other mine site operations.
- Material quality. The gravel identified at the Clover Mine Site has a higher level of interbedded silt and other fine sediment than the material found in the Tiŋmiaqsiuġvik area. The poorer quality material would result in a larger footprint, relative to the proposed location for the same amount of gravel. This lower quality material would also result in increased maintenance of gravel infrastructure and increased potential impacts to adjacent waters or tundra due to the increased likelihood of material sloughing.
- Impacts to hydrology. The previously evaluated mine site contains an ephemeral drainage, and the larger site that would need to be developed to support the Project would impact several streams and drainages.
- Longer gravel hauling trips. The Clover Mine Site is farther from the Project and would result in longer round trips for haul trucks.

3.1.5.2 Ice Road or Tundra Access Only

Development of the Project with access to the Project area other than by gravel road or air was considered as a means of potentially reducing environmental effects from gravel extraction, establishment of gravel roads or airstrips on top of tundra, and disturbance of wildlife through noise and movement. This alternative concept would not include construction of gravel roads, a gravel airstrip, or a gravel helipad; instead, access would be limited to use of low-ground-pressure vehicles and ice roads.

This alternative concept was evaluated in the ASDP Final EIS (BLM 2004). Both the federal and state governments limit tundra travel, other than in emergencies, during large portions of the summer to prevent undue damage to the environment when the ground is soft. Regular routine maintenance and inspection trips to drill sites during summer by low-ground-pressure vehicles would result in sustained and substantial damage to vegetation, soils, and water resources, including important wetland habitat. Vehicle crossings of rivers and streams would result in unacceptable damage to riparian resources and fish habitats and are prohibited in anadromous waterbodies, with few exceptions. Crossing Project area streams with low-ground-pressure vehicles would not be feasible during some periods throughout the year because of breakup, freeze-up, or high-flow conditions. As a result, reliable access would be limited to winter, when ice roads could be constructed and made available for transport to and from the Project area.

Limited access would create unacceptable hazards for safety and emergency response and limit the number of wells that could be drilled per season. Heavy equipment necessary for fire, rescue, and spill response, as well as critical medical equipment such as an ambulance, would not be capable of traveling cross-tundra or across wet environments. Although tundra-travel vehicles (e.g., low-ground-pressure vehicles, tracked vehicles) may be permitted to travel cross-tundra during an emergency, they have serious limitations, including a lack of integrated medical life support equipment, slow travel speeds, and limited weight and volume capacities. The ASDP Final EIS (BLM 2004) found that a project alternative that relies solely on low-ground-pressure vehicles and ice roads for all but emergency access was not a reasonable alternative because it fails to provide adequate continuous access to achieve project purpose and need.

Because development with access other than gravel road or air would not provide continuous access to the Project area, it would not satisfy the Project purpose and need to support production and transportation of petroleum resources from the Project area while protecting important surface resources. Consequently, alternatives other than air or gravel access were not considered feasible and were not considered for further evaluation.

3.1.6 Updates to Alternatives since the Draft Environmental Impact Statement

CPAI provided BLM with Project updates and refinements based on continued engineering and Project evaluation. Project updates were applied to all action alternatives and include one new module delivery option (Option 3: Colville River Crossing). This section summarizes the Project updates; detailed descriptions are included in Section 4.2, *Project Components Common to All Action Alternatives*, through Section 4.7.3, *Option 3: Colville River Crossing*.

3.1.6.1 Greater Mooses Tooth 2 Processing at Willow

The Greater Mooses Tooth 2 (GMT-2) drill site, located within the NPR-A and northeast of the Project (Figure D.1.1), is currently permitted and under construction. This CPAI project was evaluated previously by BLM with a Final Supplemental EIS (2018) to the ASDP and is anticipated to be operational in 2021 with infield pipelines connecting the drill site to the Alpine central processing facility (ACF). The ACF will process produced fluids and provide other operational support to the GMT-2 project.

CPAI is evaluating a possible connection from GMT-2 to the Willow Processing Facility (WPF) beginning in 2026 to optimize future production efficiency. Connecting GMT-2 to the WPF would route production and injection fluids to Willow instead of Alpine. CPAI has not yet made a final determination on whether this configuration will be implemented; this decision will not affect the drilling schedule at GMT-2. The final decision to execute this GMT-2 project optimization would be influenced by long-term operational performance at the ACF and the drilling results for GMT-2. Incorporation of this GMT-2 configuration has been included in all Willow action alternatives.

If this development concept is implemented, new infield pipelines would be constructed between GMT-2 and the WPF during Project construction. Additionally, a 34.5 kilovolt power and fiber-optic communications cable would be suspended beneath the pipelines from the WPF to GMT-2. These new pipelines, power line, and communications cable would be installed with the Project pipelines on pipeline racks between the WPF and GMT-2, which have sufficient extra space to support the additional GMT-2 pipelines. The WPF footprint and emissions inventory did not require design changes to accommodate this additional input as the facility was originally designed with additional capacity.

Drilling and operational activity in support of the GMT-2 project was previously analyzed (BLM 2018), and no additional wells, freshwater use, or ground or air traffic is considered in the Willow MDP EIS analysis.

3.1.6.2 Freshwater Source Updates

Ongoing Project engineering and planning have indicated that additional freshwater sources to support drilling and operations would be required. To meet these freshwater needs, CPAI proposes to include a constructed freshwater reservoir (CFWR) in the Lake M0015 and Lake R0064 drainage basin for all action alternatives. The CFWR would include a connection channel with a weir and fish exclusion screen to Lake M0015.

CPAI also proposes to construct gravel access to one or two additional lakes, depending on the alternative. Alternative B would provide a gravel access road connection to Lake L9911 (also called Lake R0061) near GMT-2. Alternative C would include the gravel access road to Lake L9911 and an additional access road to Lake M0235 near the north Willow Operations Center (WOC). Alternative D would include gravel access to Lake M0235.

Section 4.2.5, *Water Sources and Use*, provides additional details on the CFWR and supplemental water sources.

3.1.6.3 Module Delivery Option 3: Colville River Crossing

Based on discussions with stakeholders, CPAI developed a third module delivery option that would use the existing Oliktok Dock to offload sealift modules and then use existing gravel roads and Project-specific ice roads to deliver the large sealift modules to the Project area. This option would include an ice road crossing of the Colville River near Ocean Point, where a partially grounded ice crossing is feasible.

Use of Oliktok Dock for sealift module delivery was previously considered during alternatives development (Section 3.1.3, *Alternative Components Considered but Eliminated from Further Analysis*), but the variants used either a sea-ice road, the annual Alpine Resupply Ice Road, or a crossing of the Colville River near Umiat to deliver the modules to the Project area. These concepts were eliminated from further analysis based on technical or logistical constraints.

3.1.6.4 Other Refinements to the Action Alternatives

All action alternatives were further refined following additional engineering. Project-wide refinements address facility locations, adjustments to gravel pad sizes, gravel road alignments, the mine site footprint, ice road design, projected water use volumes, estimated traffic values, and Project facilities on existing gravel pads.

3.1.6.4.1 Alternative B Support Facility Locations Updates

The locations of the WOC, WPF, and airstrip have been shifted approximately 3 to 4 miles to the northeast to address concerns related to caribou movement. The WPF would be located on its own gravel pad (it was previously colocated with Bear Tooth drill site 3 [BT3]); the location of BT3 has not changed.

3.1.6.4.2 Gravel Footprint Updates

CPAI has updated the footprints to the gravel pads, airstrips, and aircraft aprons. The changes in gravel footprints vary by alternative (Section 4.3, *Alternative B* [*Proponent's Project*]; Section 4.4, *Alternative C* [*Disconnected Infield Roads*]; and Section 4.5, *Alternative D* [*Disconnected Access*]). Generally, drill site pads have increased by several acres to accommodate **hydraulic fracturing** equipment and material storage. The largest increases are at Bear Tooth drill sites 1, 2, and 4 (BT1, BT2, and BT4) for Alternative C. The WOC (North WOC and South WOC for Alternative C) pad size was increased to accommodate additional laydown space and storage, and the WPF gravel pad size has also increased slightly. The airstrip was lengthened to 6,200 feet to accommodate Bombardier Q400 aircraft, and the apron footprint was increased to provide additional fuel and materials storage. The two roads included in the Draft EIS to access airstrip approach lighting were removed from all action alternatives to reduce the overall Project gravel footprint.

To avoid potential interference with the airstrip, a separate communications tower pad has been added to all action alternatives. Under Alternative D, a gravel staging pad was added east of GMT-2 to store ice road equipment needed for the annual ice road that would be required to support Project resupply for this alternative.

For all action alternatives, the widths of several infield gravel roads (connecting Project drill sites and support facilities) were narrowed from 32 feet wide to 24 feet wide. This includes the road between BT2 and BT4 and the infield roads to BT3 (except under Alternative D, where BT3 and the WPF would be colocated) and Bear Tooth drill site 5 (BT5). The airstrip access road was similarly narrowed from 32 feet wide to 24 feet wide for all action alternatives. CPAI would limit vehicle speeds to 25 miles per hour (versus 35 miles per hour) as a voluntary BMP along these 24-foot-wide road segments. The BMP is intended to address health, safety, and environmental purposes, including potential impacts from dust and to wildlife.

3.1.6.4.3 Tiŋmiaqsiuġvik Gravel Mine Site Updates

Since publication of the Draft EIS, CPAI has completed further evaluations of the Tiŋmiaqsiuġvik Gravel Mine Site, and the mine site footprint was reduced. The mine site footprint still includes two individual mine cells, but the individual cell footprints have been reduced from 115.0 acres each to 109.3 acres and 40.4 acres (149.7 total acres).

3.1.6.4.4 Traffic and Freshwater Use Estimate Updates

Estimated traffic and freshwater use volumes were updated. These changes are a result of refinements in engineering design, the inclusion of an additional year of construction, and other Project updates described in this section (3.1.6, *Updates to Alternatives since the Draft Environmental Impact Statement*).

3.1.6.4.5 Ice Road Widths and Water Use Updates

CPAI refined ice design assumptions for ice road widths and water use for all action alternatives and module delivery options; ice road water use estimates are now consistent with the values used for the evaluation of the GMT-1 and GMT-2 projects. Table D.3.4 summarizes ice road widths and water volumes required for construction by ice road type.

Table D.3.4. Ice Road Design Widths and Freshwater Requirements Update Summary

Ice Road Type/Use	Draft EIS Width (feet)	Draft EIS Water Volume Requirement (MG per mile)	Final EIS Width (feet)	Final EIS Water Volume Requirement (MG per mile)
Gravel haul	70	3.0	50	1.4
Pipeline construction	35	1.5	70	2.0
Sealift module haul (over tundra)	105	4.5	60	2.5[a]
General access[b]	35	1.5	35	1.0

Note: EIS (Environmental Impact Statement); MG (million gallons).
[a] Module haul ice roads would require additional strengthening to support module weight.
[b] General access ice roads include the annual resupply ice roads and would apply to Alternatives C and D.

3.1.6.4.6 New Facilities on Existing Gravel Pads

The Project would include the installation of support modules and equipment on the existing Kuparuk River Unit (Kuparuk) CPF2 and the ACF gravel pads. The Kuparuk CPF2 pad would be expanded to accommodate additional facilities under all action alternatives; the ACF pad would only require expansion under Alternative D.

3.1.6.5 Boat Ramps

CPAI would construct up to three boat ramps (number varies by alternative) to serve as voluntary mitigation for Project impacts on subsistence activities. Under all action alternatives, a boat ramp would be constructed along the Ublutuoch (Tiŋmiaqsiuġvik) River, with access from the existing gravel road between Alpine Colville Delta drill site 5 (CD5) and GMT-1. Under Alternative B, up to two additional boat ramps could be constructed at Judy (Iqalliqpik) and Fish (Uvlutuuq) creeks.

3.1.6.6 Schedule Update

An additional year has been added to the construction phase for all action alternatives, which would delay first oil and the start of the operations phase by 1 year. Gravel mining and gravel infrastructure construction would still begin in 2021; however, construction of gravel pads and related facility installation (e.g., WPF, drill sites) and drilling activity would begin 1 year later. The drilling schedule has been revised to reflect two drilling rigs operating simultaneously over a short period of time (now 6 years).

4.0 REASONABLE RANGE OF ALTERNATIVES

The following four alternatives are analyzed in detail in the EIS:

- Alternative A: No Action
- Alternative B: Proponent's Project (Figure D.4.1)
- Alternative C: Disconnected Infield Roads (Figure D.4.2)
- Alternative D: Disconnected Access (Figure D.4.3)

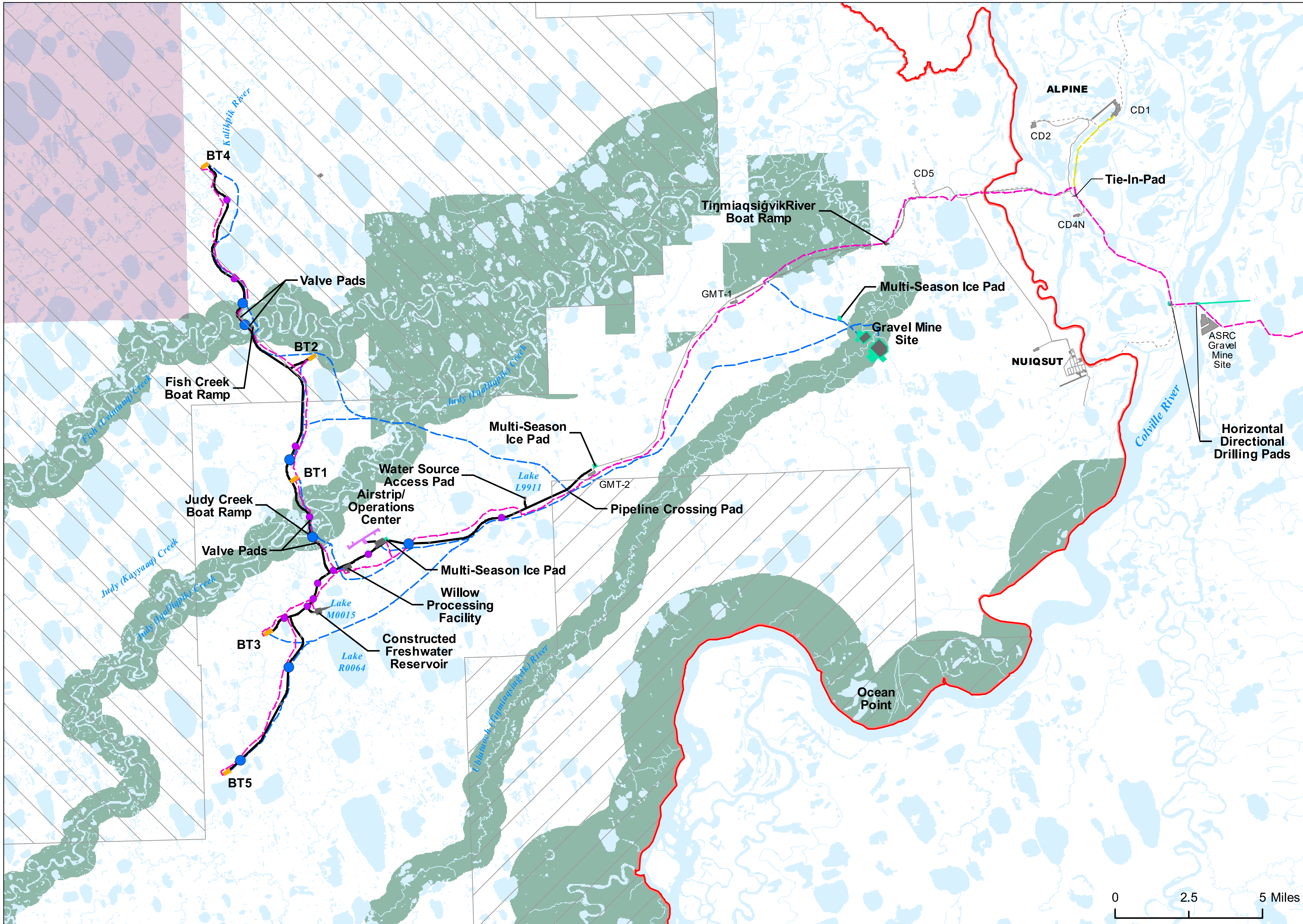
Action alternatives (B, C, and D) presented in the EIS include variations on specific Project components (e.g., Project access). The range of alternatives was developed to address the resource impact issues and conflicts identified during internal scoping with the BLM Interdisciplinary Team and external scoping with the public and cooperating agencies. Additionally, the following three options are presented for how sealift modules (required for all action alternatives) would be delivered to the Project; any option could be paired with any action alternative:

- Option 1: Atigaru Point Module Transfer Island (Figure D.4.4)
- Option 2: Point Lonely Module Transfer Island (Figure D.4.5)
- Option 3: Colville River Crossing (Figure D.4.6)

Sealift module delivery options are discussed in Section 4.7, *Sealift Module Delivery Options*.

4.1 Alternative A: No Action

Under the No Action Alternative, the Project would not be constructed; however, oil and gas exploration in the area would continue. Under the NPRPA, the BLM is required to conduct oil and gas leasing and development in the NPR-A (42 USC 6506a). On previously leased lands, the U.S. Court of Appeals has determined BLM has made an irrevocable commitment to allow some surface disturbances to support drilling and operations (BLM 2018). The No Action Alternative would not meet the Project's purpose and need and is included in the analysis for baseline comparison, but BLM does not have the authority to select this alternative because CPAI's leases are valid and provide the right to develop the oil and gas resources therein.



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

Other Infrastructure
- Existing Road
- Existing Pipeline
- Existing Infrastructure

Land Designation
- National Petroleum Reserve in Alaska

Best Management Practice Areas
- K-1 River Buffers
- K-5 Teshekpuk Lake Caribou Habitat Area
- Colville River Special Area
- Teshekpuk Lake Special Area

Data Sources:
ADFG 2020
NSSI 2018

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Figure D.4.1

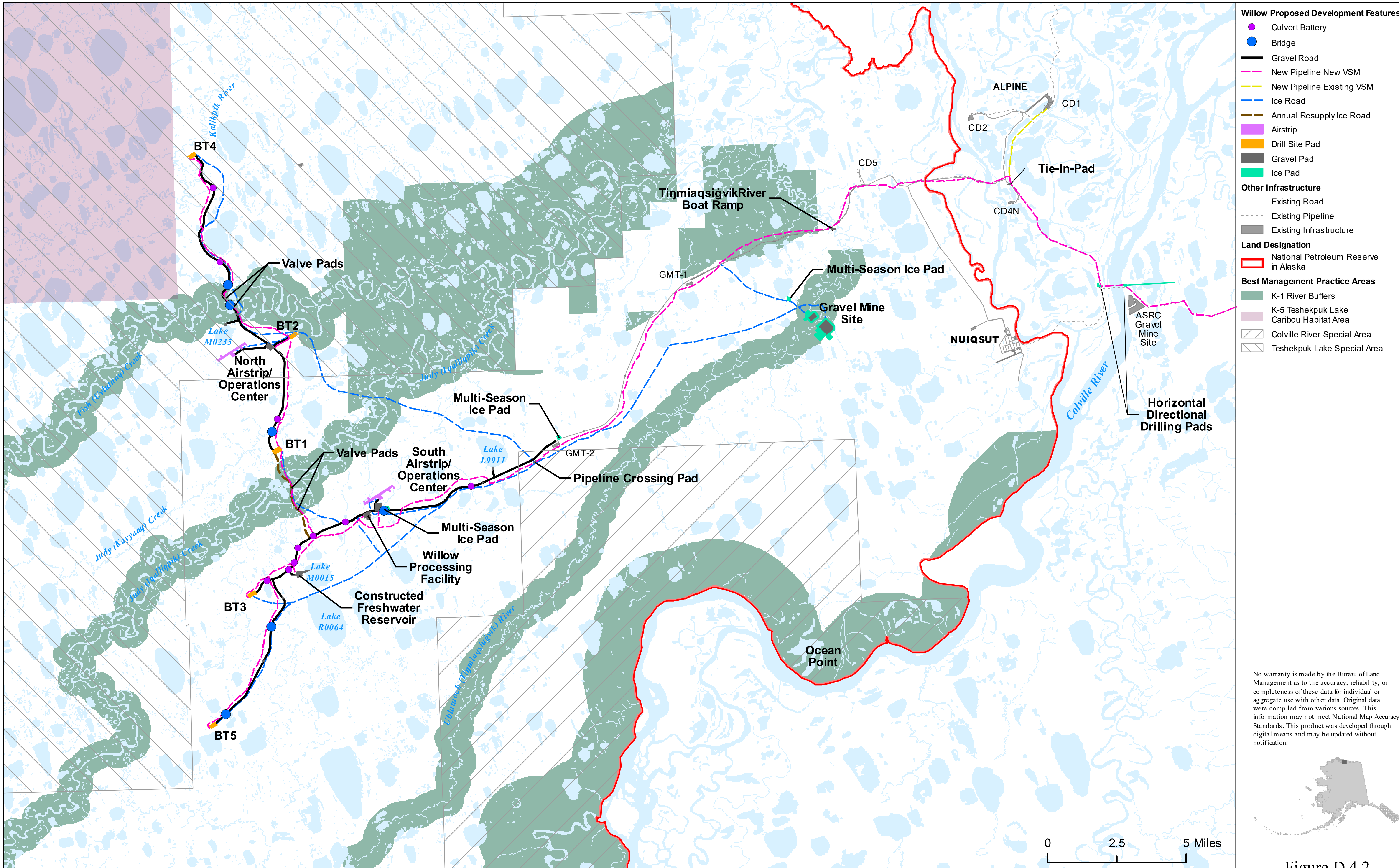
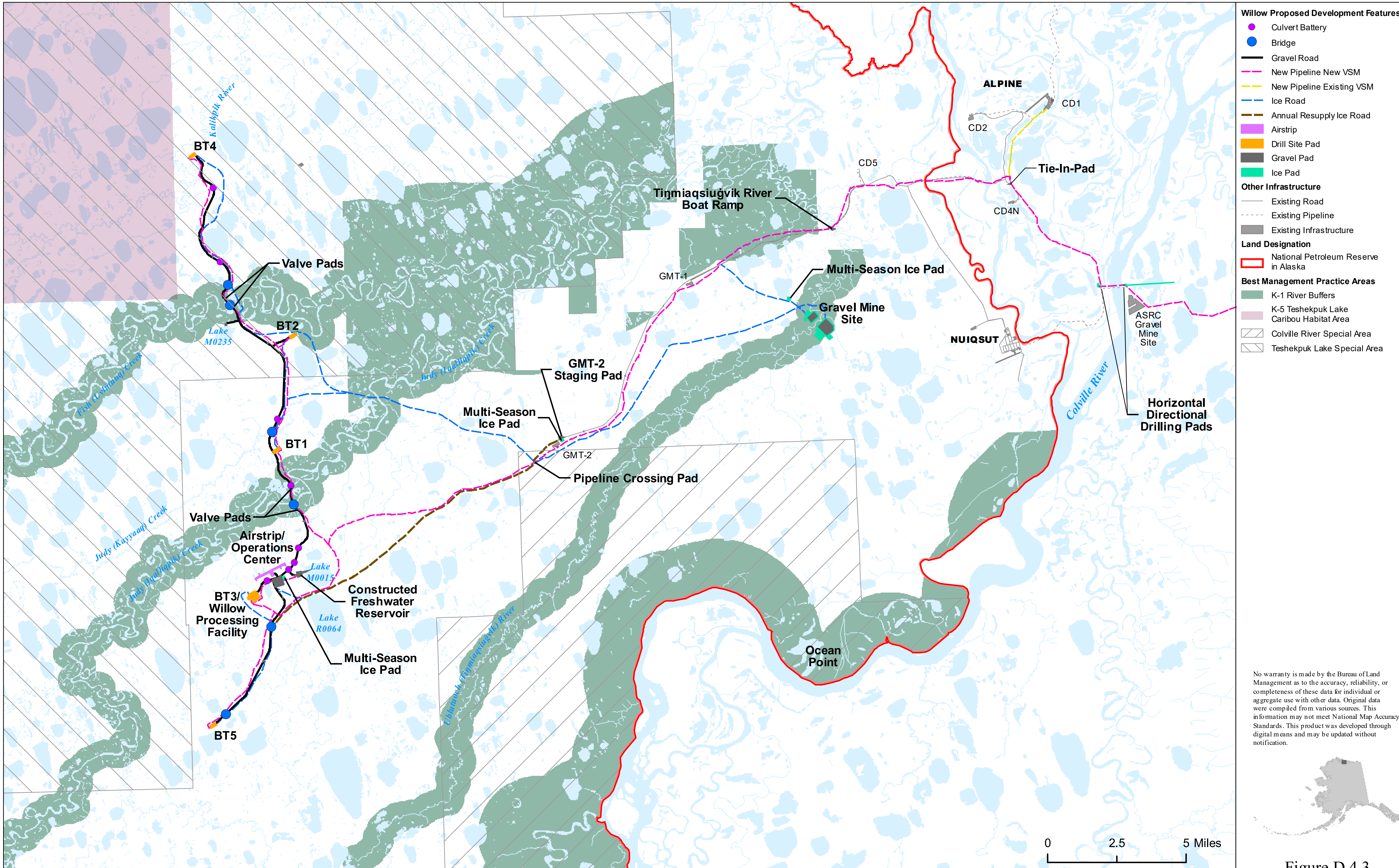

Willow Proposed Development Features
Culvert Battery
Bridge
Gravel Road
New Pipeline New VSM
New Pipeline Existing VSM
Ice Road
Annual Resupply Ice Road
Airstrip
Drill Site Pad
Gravel Pad
Ice Pad
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
Land Designation
National Petroleum Reserve in Alaska
Best Management Practice Areas
K-1 River Buffers
K-5 Teshekpuk Lake Caribou Habitat Area
Colville River Special Area
Teshekpuk Lake Special Area
BT4
BT2
BT1
BT3
BT5
Valve Pads
North Airstrip/ Operations Center
South Airstrip/ Operations Center
Multi-Season Ice Pad
Willow Processing Facility
Constructed Freshwater Reservoir
Pipeline Crossing Pad
GMT-1
GMT-2
Tinmiaqsiġvik River Boat Ramp
Gravel Mine Site
ALPINE
CD1
CD2
CD5
CD4N
Tie-In-Pad
NUIQSUT
ASRC Gravel Mine Site
Horizontal Directional Drilling Pads
Ocean Point
Colville River
Kalikpik River
Fish (Iqalliqpik) Creek
Judy (Iqalliqpik) Creek
Judy (Kayyaaq) Creek
Ublutuoch (Tinmiaqsiġvik) River
Lake M0235
Lake L9911
Lake M0015
Lake R0064
0
2.5
5 Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure D.4.2



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure D.4.3

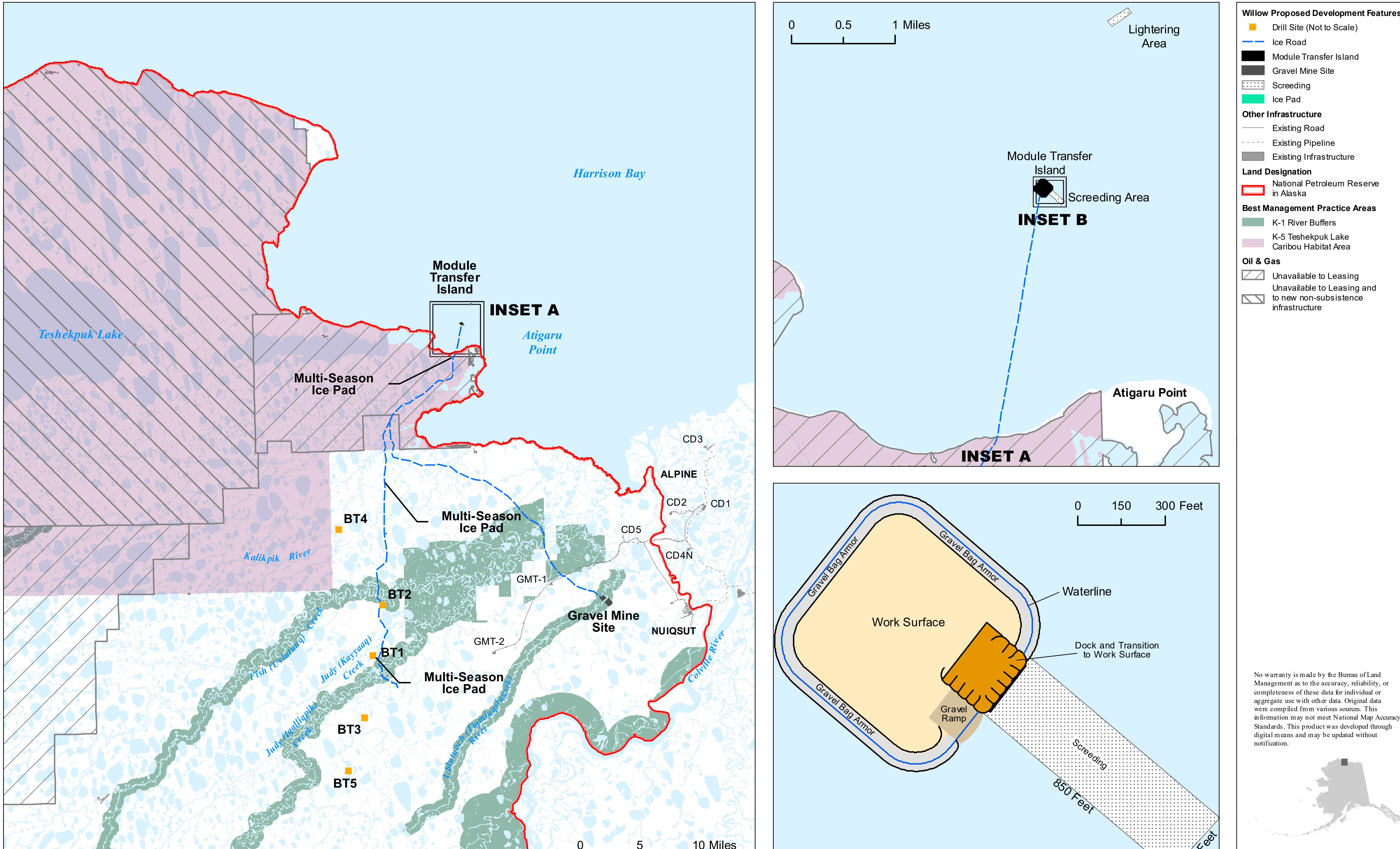
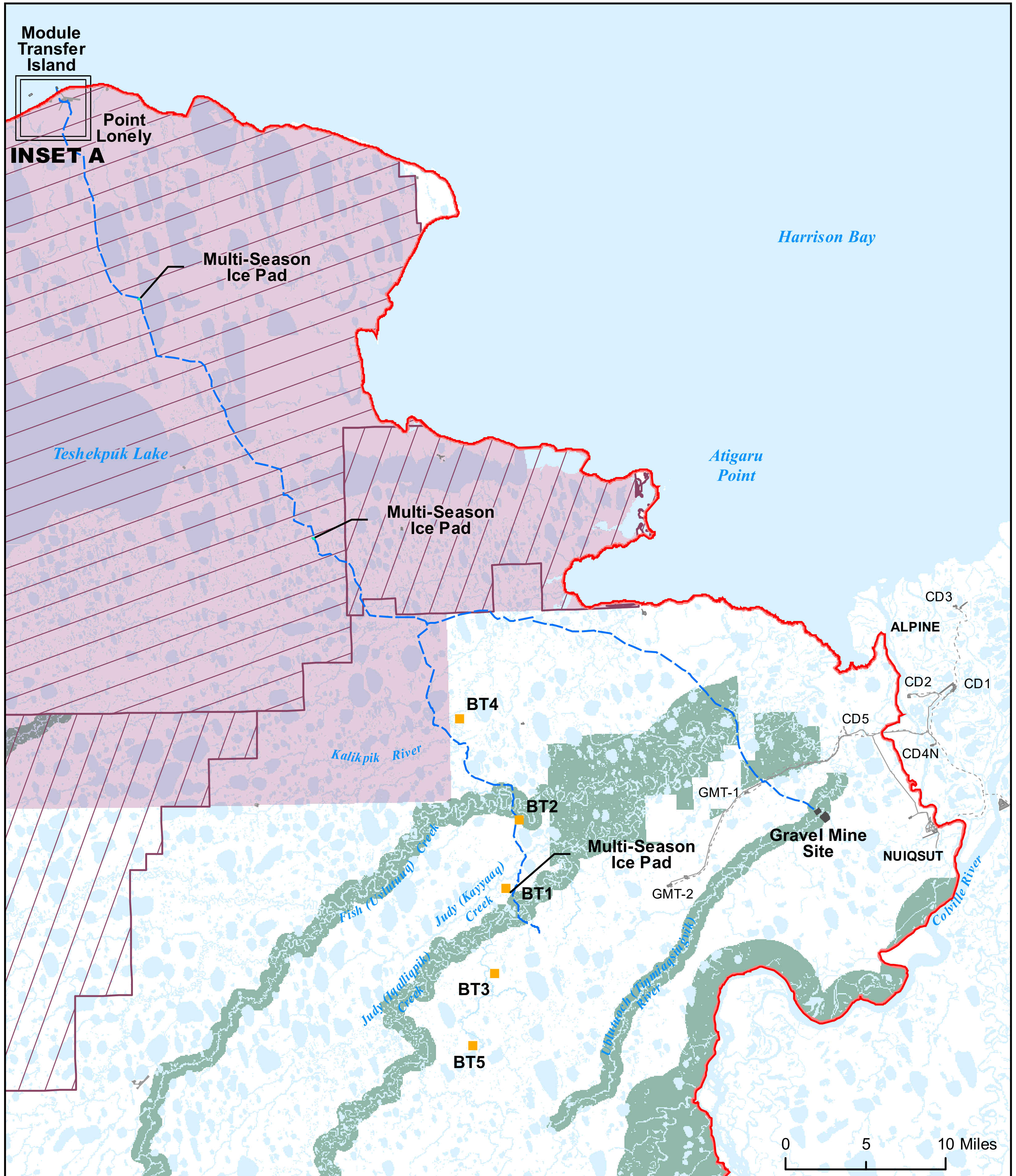
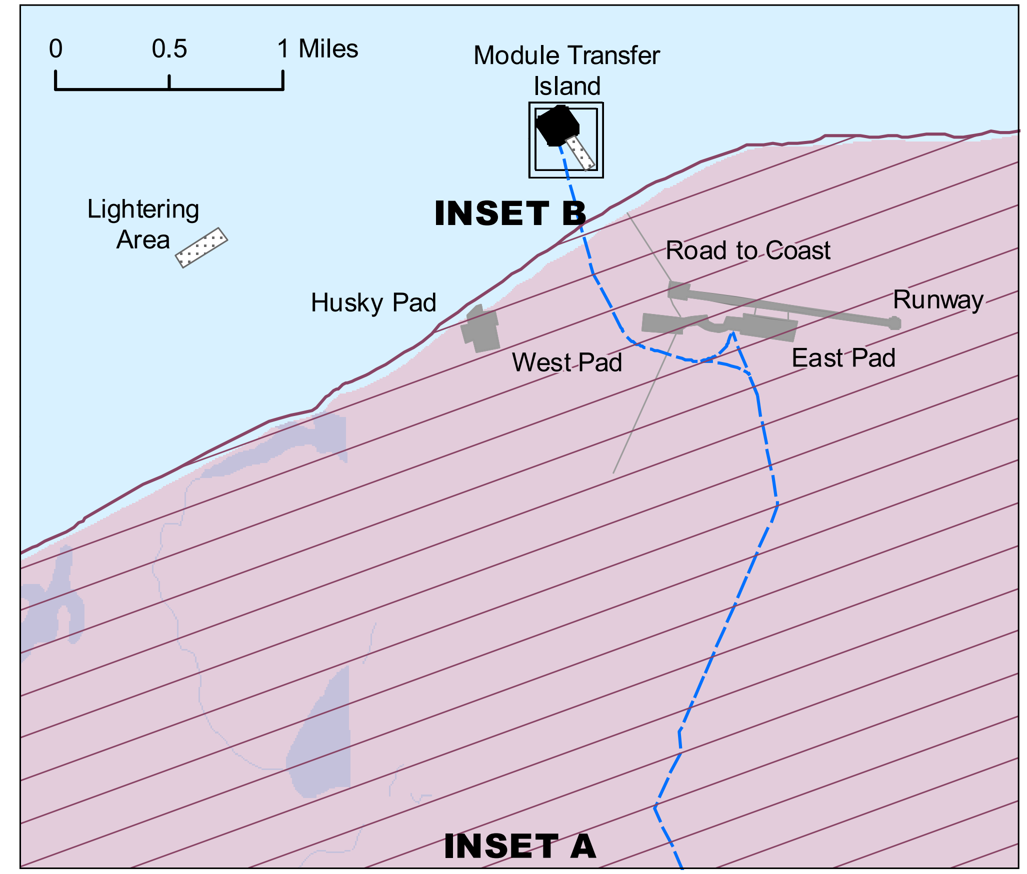
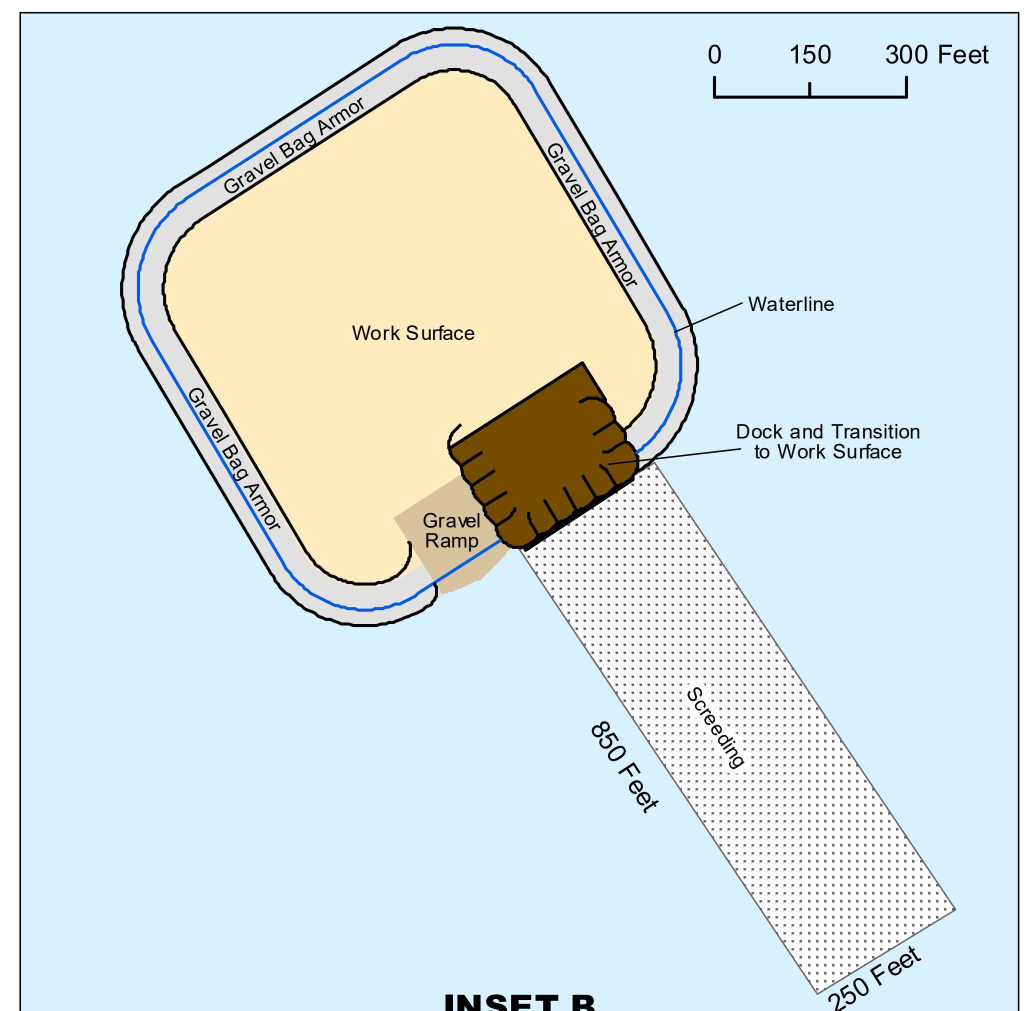

Harrison Bay
Teshekpuk Lake
Module Transfer Island
INSET A
Atigaru Point
Multi-Season Ice Pad
CD3
ALPINE
CD2
CD1
CD5
CD4N
BT4
Kalikpik River
GMT-1
BT2
Gravel Mine Site
NUIQSUT
GMT-2
BT1
Fish (Uvlutuuq) Creek
Judy (Kayyaaq) Creek
Judy (Iqalliqpik) Creek
BT3
BT5
Colville River
0 5 10 Miles
0 0.5 1 Miles
Lightering Area
Module Transfer Island
Screeding Area
INSET B
Atigaru Point
INSET A
0 150 300 Feet
Gravel Bag Armor
Waterline
Work Surface
Dock and Transition to Work Surface
Gravel Ramp
Screeding
850 Feet
250 Feet
INSET B
Willow Proposed Development Features
Drill Site (Not to Scale)
Ice Road
Module Transfer Island
Gravel Mine Site
Screeding
Ice Pad
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
Land Designation
National Petroleum Reserve in Alaska
Best Management Practice Areas
K-1 River Buffers
K-5 Teshekpuk Lake Caribou Habitat Area
Oil & Gas
Unavailable to Leasing
Unavailable to Leasing and to new non-subsistence infrastructure
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure D.4.4







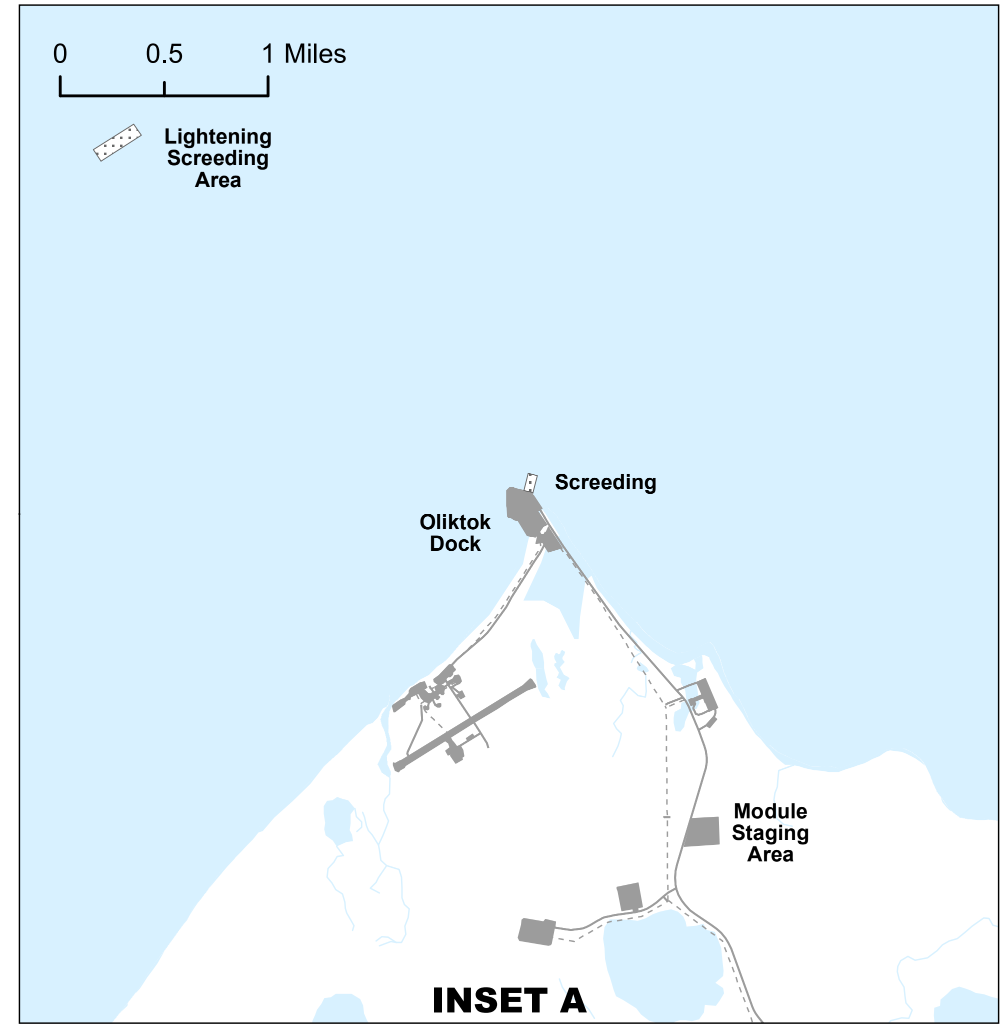
Willow Proposed Development Features
- Drill Site (Not to Scale)
- Ice Road
- Module Transfer Island
- Gravel Mine Site
- Screeding
- Ice Pad

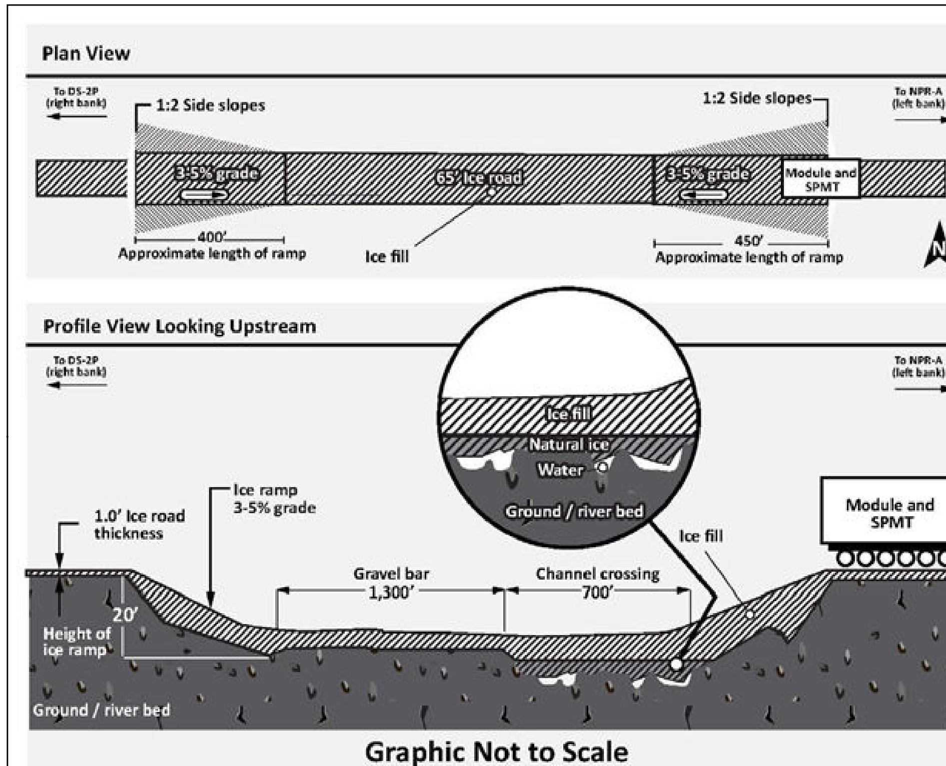
Other Infrastructure
- Existing Road
- Existing Pipeline
- Existing Infrastructure

Land Designation
- National Petroleum Reserve in Alaska
- K-5 Teshekpuk Lake Caribou Habitat Area

Oil & Gas
- Unavailable to Leasing
- Unavailable to Leasing and no new non-subsistence infrastructure

Figure D.4.5





DETAIL A - Colville River Ice Bridge

Willow Proposed Development Features
- Drill Site (Not to Scale)
- Screeding

Other Infrastructure
- Existing Road
- Existing Pipeline
- Existing Infrastructure

Land Designation
- National Petroleum Reserve in Alaska

Best Management Practice Areas
- K-1 River Buffers
- K-5 Teshekpuk Lake Caribou Habitat Area

Oil & Gas
- Unavailable to Leasing
- Unavailable no Leasing and no new non-subsistence infrastructure

Figure D.4.6

4.2 Project Components Common to All Action Alternatives

The Project would include construction of five drill sites, a processing facility (i.e., WPF), an operations center (i.e., WOC), pipelines, gravel roads, and an airstrip, and development of a gravel mine site. Components common to more than one action alternative are described below. Individual action alternatives are detailed in Sections 4.3 through 4.5; module delivery options are described in Section 4.7, *Sealift Module Delivery Options*.

4.2.1 Project Facilities and Gravel Pads

The Project would include multiple gravel pads to support Project infrastructure, as described in the following sections. Pads would be a minimum of 5 feet thick (with an average thickness greater than 7 feet) to maintain a stable thermal regime and protect underlying permafrost. Pad thickness and the gravel fill volume needed for each pad would vary due site-specific topography and design criteria (e.g., flat gravel surface). Embankment side slopes would be 2 horizontal to 1 vertical ratio (2:1). Erosion potential would be evaluated on a pad-specific basis and embankment erosion protection measures would be designed and employed as necessary.

4.2.1.1 Willow Processing Facility

The WPF would include the main plant facilities needed to separate and process multiphase production fluids and deliver sales-quality crude oil. Produced water would be processed at the WPF and reinjected to the subsurface as part of reservoir pressure maintenance/water flood for secondary recovery. Produced natural gas would be used to fuel plant and facility equipment, be reinjected into a producing reservoir formation to maintain reservoir pressure and increase recovery, and used for **gas lift**.

Under plant startups, shutdowns, and upset conditions, natural gas may be flared to maintain safe operations. Project flaring activity can be categorized as follows:

- Initial cleanout – Initial cleanup/flowback from production and injection wells in order to remove fluids from the wellbore. The associated gas would be flared prior to WPF startup; following WPF commissioning, gas would be returned to the production system and would not be flared except under upset conditions. Flaring would only be associated with wells drilled prior to WPF startup (BT1 and some BT2 wells). The anticipated duration would be 1 to 2 days.
- Stimulation cleanout – Cleanup/flowback after well stimulation activities are complete to remove proppant and stimulation fluids from the wellbore. The associated gas would be flared prior to WPF startup; following WPF commissioning, gas would be returned to the production system and would not be flared except under upset conditions. Flaring would only be associated with wells drilled prior to WPF startup (BT1 and some BT2 wells). The anticipated duration would be 4 to 7 days.
- Well testing – Flowback of wells to tanks prior to facility startup in order to determine fluid rates and water cut. Associated gas would be flared prior to WPF startup; following WPF commissioning, gas would be returned to the production system and would not be flared except under upset conditions. Flaring would only be associated with wells drilled prior to WPF startup (BT1 and some BT2 wells). The anticipated duration would be 4 to 7 days.
- Facility upset – Flaring of excess gas, in accordance with regulated flaring limits, to stabilize WPF conditions during startup or facility upset. The goal would be to flare small volumes of gas in order to avoid a facility shutdown. Flaring at the WPF would be regulated, and the WPF would have a limited number of permitted flaring events allowed in the permit. The anticipated duration would be hours.
- Facility emergency blowdown – Flaring all gas within the boundaries of the WPF in order to shut down and depressurize the facility in the event of an emergency. The anticipated duration would be minutes to hours.

The WPF would house processing equipment and support facilities and would include the following:

- Emergency shutdown equipment
- Natural-gas-fired turbine generators
- Compressors
- Gas strippers
- Gas treatment facilities
- Heat exchangers
- Separators
- Stabilizer unit
- Flare system

- Utility systems (e.g., heating glycol, nitrogen)
- Oil-producing vessels
- Pumps
- Pigging facilities
- Metering facilities
- Electrical equipment
- Fuel supply storage tank(s) and associated fueling station
- A tank farm, which could include methanol, sales oil or off-specification crude oil, crude oil flowback fluids, scale inhibitor, emulsion breaker, biocide,[3] corrosion inhibitor, and minor volumes of other chemicals as required to support Project operations
- Warm storage facilities for equipment

Additional facilities would be required to accommodate production from GMT-2 (Section 3.1.6.1, *Greater Mooses Tooth 2 Processing at Willow*); all equipment would be housed within the proposed infrastructure on the WPF pad. The additional equipment includes the following:

- Electrically driven booster compressor to increase gas pressures for injection into the deeper GMT-2 reservoir
- Electrically driven booster pump to increase water pressure for injection into the deeper GMT-2 reservoir
- Additional metering equipment required for the independent measurement of injection fluids being shipped to GMT-2 from the WPF (due to the crossing of the Bear Tooth-Greater Mooses Tooth Unit Boundary

The previously proposed electrical generation equipment would provide sufficient power to support the additional equipment needed to process the GMT-2 resources; there would be no additional emission sources or changes to fueled equipment sizes associated with processing GMT-2 production at the WPF.

In addition to the equipment and facilities listed above, each action alternative may require additional equipment or facilities to meet logistical needs specific to each action alternative. At various times throughout the Project's producing lifetime, temporary modules, maintenance buildings, pipelines, and other structures may be used at the WPF to address short-term needs. Processing facility buildings would be designed to industry and building codes appropriate for each purpose. The designs would consider factors such as temperature, wind, precipitation, seismicity, building contents, purpose, personnel health and safety, and other environmental factors.

4.2.1.2 Drill Sites

The Project would construct five drill sites; drill site locations do not vary by action alternative as the target resources are in fixed locations and drill site locations were optimized to allow for maximum resource recovery from the least amount of drill site pads. Each drill pad has been designed and sized to accommodate all drilling and operations facilities, wellhead shelters, drill rig movement, material storage, and well work equipment. Each drill site would be sized to accommodate 40 to 70 wells at a typical 20-foot wellhead spacing; the Project would have a total of 251 wells. Additional facilities typical for drill sites would include the following:

- Emergency shutdown equipment
- Fuel gas treatment equipment
- Well test and associated measurement facilities
- Electrical and instrumentation control equipment
- Pig launchers and receivers
- Chemical injection facilities (including tanks, containment, small pumps, and exterior tank fill connections)
- Production heater and associated equipment
- Spill response equipment containers
- Communications infrastructure (including tower(s) up to 200 feet tall)
- High-mast lights
- Temporary tanks to support drilling and well work operations
- Production operations storage tanks
- Production operations stand-by tank (normally empty)
- Transformer platforms (oil-insulated)

[3] Biocide would be used in the seawater system to kill micro-organisms which cause internal pipeline corrosion.

- Pipe racks or manifold piping/valves (or both)

The Project would use hydraulic fracturing and **extended reach drilling** to access the targeted hydrocarbon deposits and develop wells (Section 4.2.10.2.1, *Hydraulic Fracturing*). Hydraulic fracturing is a well stimulation technique used to increase the flow of oil and natural gas. Extended reach drilling is a directional drilling technique used to develop long, horizontal wells and allow a larger area to be reached from a single surface location (i.e., drill pad), providing greater access to a reservoir.

Wells would be categorized as either production or injection. The production wells would generate the Project's oil and gas production while the injector wells would be used to inject water (i.e., treated seawater and/or WPF-processed produced water) and/or gas into the producing formation(s) to maintain reservoir pressure. Wells would be equipped with appropriate safety valve systems in accordance with 20 AAC 25.265. Manifold or pipe rack piping (or both) would combine individual wellhead piping into a common gathering line through which all produced fluids would be transported to the WPF.

4.2.1.3 Willow Operations Center

The base of operations for the Project would be the WOC (South WOC under Alternative C), which would be located near the WPF (but separated by approximately 1 mile for safety reasons). The WOC location would minimize the risk to Project personnel by placing permanently occupied buildings (e.g., living quarters) away from potential blast hazards associated with the WPF, which is consistent with current best safety practices and standards, including the American Petroleum Institute (API) Recommended Practice 752. The WOC would be adjacent to the Project airstrip.

The WOC would contain accommodations and utility buildings and maintenance and storage facilities to support Project operations, including the following:

- Permanent Willow Operations Camp facilities, including living quarters, offices, meeting rooms, dining facilities, a central control building, a lab, a medical clinic, and wellness facilities
- Wastewater and water treatment plants, water tanks, and chemical storage
- Freshwater storage tanks
- At least two Class I underground injection control (UIC) disposal wells
- Emergency response center, including spill response shop, fire department, and ambulance bay
- Essential and black start generators
- Craft maintenance shop and tool room
- Hazardous waste accumulation and storage
- Fleet maintenance shop
- Fabrication and weld shop
- Warehouse
- Storage tents
- Diesel and jet fuel tanks and pump skids
- Drilling shop and mud plant
- Municipal solid waste incinerator
- Staging areas
- Drilling and cuttings storage
- Operations and maintenance storage
- Laydown space
- Rolling stock parking

In addition to the facilities listed above, each alternative may require additional equipment or facilities to meet logistical needs specific to each alternative. Temporary surface structures such as camps, offices, shops, envirovacs (bathroom), connexes, fuel and chemical storage areas, and warehouses may be used at the WOC to support Project activities.

Alternative C would include a second WOC (North WOC) which is further described in Section 4.4, *Alternative C: Disconnected Infield Roads*.

4.2.1.4 Valve Pads

Isolation valves would be installed on each side of pipeline crossings at Fish (Uvlutuuq) Creek and Judy (Iqalliqpik) Creek, allowing the isolation of produced fluids pipelines on either side of the bridges to minimize potential spill impacts in the event of a leak or break. To support valve infrastructure, gravel pads would be constructed on each side of the identified crossings (two valve pads per crossing; four valve pads total). Valve pads would be located adjacent to gravel roads and approximately 400 to 2,000 feet from the bridge crossings. Under Alternative C, the valve pads at Judy (Iqalliqpik) Creek would not be located adjacent to a gravel road and would only be accessible via helicopter; therefore, these valve pads would be larger to allow helicopter access.

4.2.1.5 Pipeline Pads

Four pipeline pads would be constructed to support pipeline construction and operations:

- One pipeline crossing pad would be located along the import/export pipelines near GMT-2 to allow north to south ice road crossings. Pipelines would be placed in casings through the gravel pad embankment.
- Two new horizontal directional drilling (HDD) pipeline pads would be constructed near the existing Alpine Sales Pipeline HDD Colville River crossing. These pads would be where the proposed diesel and seawater pipelines (Section 4.2.2.3, *Other Pipelines*) transition from aboveground to belowground on each side of the Colville River. These gravel pads would include a rectifier (west bank) to support the cathodic protection system (i.e., corrosion prevention equipment) and thermosyphons (east and west banks). The west bank may also include a module housing power and instrumentation to support the cathodic protection and pipeline monitoring systems.
- The Willow Pipeline (Section 4.2.2.2, *Willow Pipeline*) would tie into existing pipeline infrastructure at a new tie-in pad located along the Alpine Pipeline near Alpine Colville Delta drill site 4N (CD4N). One or more truckable modules would be installed on this pad to support pigging, provide overpressure protection, and meter fluids as well as infrastructure to facilitate warm-up or de-inventory of the Willow Pipeline and seawater pipeline.

4.2.1.6 Water Source Access Pads

Freshwater access would vary by action alternative. All action alternatives would include construction of a water source access pad to provide access to the CFWR near Lake M0015. The water source access pad at the CFWR would be connected to other infrastructure via a 0.3-mile-long access road from the road east of BT3. Alternatives B and C would also include a water source access pad at Lake L9911. Access would be provided via a short gravel spur road from the road between GMT-2 and the Project. Alternatives C and D would include a water source access pad at Lake M0235, northwest of BT2. Access would be provided via a gravel spur road connected to the gravel road segment between BT2 and BT4. All pads would be sized to minimize the gravel footprint while maintaining adequate space for vehicles to access the water sources and safely maneuver. The CFWR access pad would also include space for a pump house.

Note: The water source access pads located on the south side of Lake M0015 and the north side of Lake R0064 evaluated in the Willow MDP Draft EIS (BLM 2019) are no longer included as part of any action alternative.

4.2.1.7 Communications Tower Pad

To avoid potential interference with the airstrip and comply with Federal Aviation Administration (FAA) requirements, the communications tower associated with the WOC (South WOC under Alternative C) would be constructed on a separate pad for all action alternatives. For Alternatives B and C, the gravel pad would be located adjacent to the WOC and South WOC, respectively. For Alternative D, the gravel pad would be located approximately 1,250 feet south of the WOC along the gravel road to BT5. The communications tower pad would house communications infrastructure, including a communications tower up to 200 feet tall.

4.2.1.8 New Project Facilities on Existing Gravel Pads

The Project would include installation of additional modules and equipment on existing gravel pads at Kuparuk CPF2 and the ACF (located at Alpine Colville Delta drill site 1 [CD1]). The Kuparuk CPF2 pad would be expanded 1.0 acre to accommodate these new facilities. The ACF pad would only require expansion (1.3 acres) under Alternative D.

Modules and equipment would be installed on the existing Kuparuk CPF2 pad for the following purposes:

- Diesel transfer tanks, pumps, and pigging facilities for delivery to the ACF and WPF

- Seawater transfer pumps and pigging facilities for delivery to the WPF
- Infrastructure to facilitate warm-up or de-inventory of the Willow pipeline and seawater pipeline

Modules, equipment, and storage tanks would be installed on the existing ACF gravel pad for the following purposes:

- Drag reducing agent tanks and equipment for injection into the sales-oil pipeline system
- Crude oil surge drum and associated equipment to assist with pressure management of the sales-oil pipeline system
- Diesel tanks and pigging facilities to receive product from Kuparuk CPF2
- Infrastructure to facilitate warm-up or de-inventory of the Willow Pipeline and seawater pipeline

In addition to the above facilities, space for a new heavy-duty fleet shop, additional warehouse, and maintenance shop would be needed at the ACF under Alternative D.

4.2.2 Pipelines

The Project would include infield and import/export pipelines. Infield pipelines would carry a variety of products, including produced fluids, produced water, seawater, miscible injectant, and gas, between the WPF and each drill site.

Import/export pipelines would include the Willow Pipeline, a seawater pipeline, and a diesel pipeline. The Willow Pipeline, a U.S. Department of Transportation (USDOT) regulated sales-oil transport pipeline, would carry sales-quality crude oil processed at the WPF to a tie-in with the existing Alpine Sales Pipeline near Alpine CD4N. The seawater pipeline would import seawater (using the existing seawater treatment plant in Kuparuk) from Kuparuk CPF2 to the WPF. The diesel pipeline (a USDOT-regulated pipeline) would transport miscellaneous refined hydrocarbon products from Kuparuk CPF2 to the ACF at Alpine CD1 for Alternative B and to the WOC for Alternatives C and D. A freshwater pipeline would transport freshwater from the CFWR near Lake M0015 to the WOC. Treated water and fuel gas pipelines would connect the WPF to the WOC.

Pipeline design would conform to the American Society of Mechanical Engineers codes B31.4 and B31.8, as appropriate, applicable federal and state standards, and CPAI's internal specifications and criteria. All pipelines would be hydrostatically tested prior to startup, as required by the appropriate design code (e.g., B31.4 and B31.8). Typical pipeline construction would consist of carbon steel pipe, as dictated by service, pipeline size, and code; pipelines would be externally coated with fusion-bonded epoxy to prevent external corrosion and then covered with rigid polyurethane insulation and metal jacketing that would be nonreflective or buffed in the field. Pipelines would rest on common horizontal support members (HSMs) atop vertical support members (VSMs) placed approximately 55 feet apart, with an estimated 80% of VSMs being singular and 20% being installed as pairs. VSMs would have a typical diameter of 12 to 24 inches (approximately 75% and 25% of VSMs, respectively) and a disturbance footprint of 18 to 32 inches (up to 5.6 square feet). VSMs would be driven to a minimum of 17 feet below the active permafrost layer to prevent subsidence or frost jacking. CPAI would maintain VSMs through its asset integrity inspection and maintenance program for monitoring and repairs.

At Fish (Uvlutuuq) Creek and Judy (Iqalliqpik) Creek (except under Alternative C), pipelines would be placed on structural steel supports attached to the bridge girders, below the bridge deck. At smaller stream crossings, pipelines would be installed approximately perpendicular to the channel with VSMs on each side of the crossing to avoid VSM placement in streams to the extent practicable. VSMs placed below ordinary high water (OHW; applicable only to Alternative C) would typically be 48 inches in diameter.

Fiber-optic and power cables would be suspended via messenger cable attached to the HSMs, except at pipeline-road crossings, where fiber optic and power cables would be installed in a trench beneath the road. Trenches would be excavated in winter, and soils would be temporarily sidecast onto plywood, plastic sheeting, or an adjacent ice pad. Excavated materials would be backfilled into the trench. Trenching may also be used to bury power and communications cables at the HDD pads.

Pipelines (including suspended cables) on new VSMs would be a minimum of 7 feet above the surrounding ground surface, including in areas where new VSMs would be placed adjacent to existing Alpine or Kuparuk pipelines, which may be less than 7 feet above the ground surface. New pipelines that share existing VSMs and HSMs would match the existing HSM heights. Where Project pipelines would parallel existing pipelines, the new VSMs would be aligned with the existing VSMs (to the extent practicable) to avoid a picket fence effect. Except for locations where there is no gravel road connecting Project facilities, all pipelines would parallel new and existing gravel roads, typically between 500 and 1,000 feet from roadways. This separation distance provides daily opportunities to observe pipelines for leaks or other damage while maintaining enough distance to prevent collisions between pipelines and vehicles and reduces impacts (e.g., disturbance) for caribou crossing roads and pipelines.

4.2.2.1 Infield Pipelines

Infield pipelines would include the following pipelines connecting the WPF to each Project drill site and to GMT-2:

- Produced fluids pipeline – Produced crude oil, gas, and water transported from each drill site to the WPF for processing.
- Injection water pipeline – Seawater or produced water transported from the WPF for injection to support enhanced oil recovery.
- Gas pipeline – Lean gas transported from the WPF for artificial lift, pressure support, and fuel gas.
- Miscible-injectant pipeline – Miscible injectant transported from the WPF for injection to support enhanced oil recovery.

The infield pipeline supports would include space to accommodate future pipelines to support potential future development in the Project area (e.g., Greater Willow 1 [GW1] and Greater Willow 2 [GW2]; Figure D.1.1). Infield pipelines between GMT-2 and the WPF would be carried on Project import/export pipeline supports (i.e., Project pipeline VSMs and HSMs).

All infield pipelines would be designed to allow pipeline inspection and maintenance (e.g., pigging) between each drill site and the WPF. Permanent pigging facilities would be installed for the produced fluid and injection water pipelines. Pipeline valves that can be closed in the event of an emergency would be installed on produced fluids pipelines at each side of the Judy (Iqalliqpik) Creek and Fish (Uvlutuuq) Creek crossings, isolating the section of pipeline between the valves to minimize potential spill impacts in the event of a pipeline leak or break.

Pipelines would be designed to minimize redundant parallel pipelines to the extent practicable. For example, infield pipelines from BT4 would tie in to BT2 infield pipelines at BT2, and BT2 pipelines would tie in to BT1 pipelines at BT1 to reach the WPF under each action alternative. An additional set of infield pipelines would connect BT5 to the WPF, GMT-2 to the WPF, and under Alternatives B and C, an additional set of infield pipelines would connect BT3 to the WPF (note: under Alternative D, the WPF is colocated with BT3). Infield pipelines would use single VSMs, except where anchor supports are used in expansion loops (i.e., “Z” bends), where two VSMs per pipeline support would be used.

4.2.2.2 Willow Pipeline

The Willow Pipeline, a USDOT-regulated sales-oil transport pipeline, would carry sales-quality crude oil processed at the WPF to a tie-in with the existing Alpine Sales Pipeline at the tie-in pad near Alpine CD4N. From Alpine CD4N, sales-quality oil would be transported via the existing Alpine Sales Pipeline to the Kuparuk Pipeline and onward to the Trans-Alaska Pipeline System near Deadhorse, Alaska, for shipment to market. The Willow Pipeline would be placed on new VSMs between the WPF and the tie-in pad near Alpine CD4N. Between the WPF and the tie-in pad near CD4N, vertical lops or isolation valves would be installed on each side of the Ublutuoch (Tiŋmiaqsiuġvik) River and on each side of the segments crossing the Niġliagvik Channel, Niġliq Channel, and Lakes L9341 and L9323.

The Willow Pipeline would comply with USDOT Spill Response Plan requirements.

4.2.2.3 Other Pipelines

Other Project pipelines would include a seawater import pipeline, a diesel import pipeline, a freshwater pipeline, a treated water pipeline, and a fuel gas pipeline. The new seawater pipeline would import seawater from Kuparuk CPF2 to the WPF for injection in the target reservoirs. The USDOT-regulated diesel pipeline would transport diesel fuel and other refined hydrocarbon products to power drilling support equipment, well work operations, and vehicles and equipment, as well as provide freeze protection of wells.

Under Alternative B, the diesel pipeline would extend from Kuparuk CPF2 to the ACF at Alpine CD1; from the ACF, diesel fuel would be trucked to the WPF and other locations in the Project area, as needed. Under Alternatives C and D, the diesel pipeline would transport fuel from Kuparuk CPF2 to the WOC and WPF. Alternative C would also include a diesel pipeline connecting the WPF to the North WOC. The seawater pipeline would be placed on new VSMs from Kuparuk CPF2 to the WPF. The diesel pipeline would share new VSMs with the seawater pipeline, except for the pipeline segment between Alpine CD4N and the ACF at CD1, where it would be placed on existing VSMs. New VSMs would also be shared with the Willow Pipeline, where available. Between Kuparuk CPF2 and Alpine CD4N, vertical loops would be installed on the diesel pipeline on each side of the Miluveach River, the Kachemach River, and the Colville River.

The seawater and diesel pipelines would cross beneath the Colville River and would be installed using HDD. The Colville River crossing would be near the existing Alpine Pipeline HDD crossing, approximately 400 feet downstream (north). The pipeline crossing would be similar in design and size to the existing Alpine pipeline crossing. Each pipeline would be installed approximately 60 feet apart in its own casing. Pipelines would be insulated and placed within the outer pipeline casing, which would serve to inhibit heat transfer to permafrost, contain fluids in the event of a leak or spill, and provide structural integrity. A third casing would be installed between the seawater and diesel pipelines to convey an anode as part of the pipelines' cathodic protection system.

The HDD process would involve drilling a borehole under the Colville River that is large enough to accommodate the pipeline casing. The HDD entry and exit locations would be set back more than 300 feet from the riverbanks and the total length of the borehole would be approximately 4,500 feet. The depth below the river channel bottom at the center of the HDD crossing would be approximately 70 feet. Throughout the process of drilling and enlarging the borehole, a slurry made of naturally occurring nontoxic materials (typically bentonite clay and water) would be circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and hold the borehole open. Pipeline sections would be staged and welded together to form segments long enough to span the entire crossing. Once the borehole is ready, the completed pipeline segments would be pulled through the drilled borehole.

Two new gravel pads would be constructed for the HDD crossing where the pipelines transition from aboveground to belowground, with one on each side of the river near the existing Alpine Pipeline HDD gravel pads. The HDD crossing would be constructed during winter. Two HDD ice pads and an HDD laydown pad (approximately 42 total acres) would be constructed with one HDD ice pad on each side of the Colville River to support the HDD crossing construction.

The raw water pipeline would transport freshwater from the intake infrastructure at the CFWR to the WPF and the WOC. The raw water pipeline would be placed on VSMs parallel to the water source access road before connecting to VSMs shared with other infield pipelines to the WPF and the WOC (South WOC under Alternative C). All alternatives also include treated water pipelines between the WOC and the WPF. Alternative C would also construct a second treated water pipeline between the WPF and the North WOC (Section 4.2.4.5, *Potable Water*). A fuel gas pipeline would also connect the WPF and WOC (South WOC for Alternative C) under all action alternatives.

4.2.3 Access to the Project Area

Access to the Project area from Alpine, Kuparuk, or Deadhorse would occur via ground transportation over gravel and ice roads as well as by fixed-wing aircraft and helicopters. Construction material (e.g., pipeline, VSMs) may be delivered to the North Slope and Project area by ground transportation and barge. Small modules and bulk materials would be delivered by barge to Oliktok Dock and transported to the Project area via the annual Alpine Resupply Ice Road (Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*). The larger sealift modules comprising the processing facilities at the WPF and the drill sites would also be delivered to the North Slope by sealift barge; however, these modules would be too large to cross the Colville River ice bridge used by the Alpine Resupply Ice Road. As a result, three different options for the WPF and drill site sealift module deliveries are described in Section 4.7.

Anticipated ground, air, and marine traffic is detailed by alternative (Sections 4.3 through 4.5).

4.2.3.1 Ice Roads

Ice roads would be used primarily during construction to support gravel infrastructure and pipeline construction, for lake access, and to access the gravel mine site. Due to heavy equipment size and the frequency of construction traffic, safety considerations dictate the use of separate ice roads for pipeline construction, gravel placement, and general traffic.

Ice road construction is dependent upon ground temperature and precipitation (i.e., sufficient snow for prepacking routes) and typically begins in November or December. Vehicle access via ice road depends on the ice road season opening and closing dates and the distance from existing infrastructure. The usable ice road season for travel to the Project area is anticipated to be shorter than that of Kuparuk and Alpine operations due to the logistical challenges of constructing and completing a remote ice road. Based on CPAI's experience at GMT-1 and other exploration projects conducted in the NPR-A, the annual ice road use season for the Project is expected to be 90 days, from approximately January 25 through April 25. A typical ice road would be at least 6 inches thick with a 35- or 70-foot-wide surface, depending on its use. A typical ice road used for gravel hauling would have a 50-foot-wide surface. All ice road routes in the EIS are estimated, and final alignments would be determined through design optimization and impact minimization analysis prior to Project construction.

Ice road design begins with a desktop analysis to identify preliminary routes that have been field verified the prior summer and adjusted to address design constraints and field conditions. Routes would be field staked in October and November, and ice road construction would begin when suitable conditions allow. Ice road construction would begin by prepacking the route with tundra-approved vehicles, after which general construction would commence. Typical equipment used in ice road construction includes Tucker Sno-Cats (tracked crew vehicles), Rolligons, water buffalos (portable water tanks), Terra Gators (water spreaders), front-end loaders, Maxi Hauls (tractor and dump trailer), water trucks, trimmers (for creating ice chips), and graders. Following the construction of ice roads, water trucks, graders, and snow blowers are used for ice road maintenance. Ice and snow ramps, thicker ice sections at select water crossings, and use of supplemental materials such as rig mats, may be used to increase ice road strength.

Following the end of the ice road season, all ice road stream crossings would be breached or slotted, and the ice built up artificially at crossings (e.g., ice or snow ramps) would be removed to match the static water elevation. Following spring breakup, work crews would conduct "stick picking" to remove any anthropogenic materials.

BMPs typically used in conjunction with ice roads include:
- Placement of delineators to mark ice road edges
- Frequent maintenance of routes
- Use of portable spill containment (i.e., duck ponds) under vehicles and equipment
- Coordination with the Kuukpik Subsistence Oversight Panel and the ice road monitors to patrol routes for spill cleanup needs
- Summer cleanup activities (i.e., stick picking)

Large modules comprising the processing facilities would be delivered to the North Slope by sealift barge (Section 4.7) during the open-water season. During the following winter construction season, the sealift modules would be transported via ice road (combination of sea ice and over tundra) to the Project area. A typical tundra-based ice road used for sealift module mobilization would be 60 feet wide.

During drilling and operations, seasonal ground access from Deadhorse and Kuparuk to the Project area would be provided by the annually constructed Alpine Resupply Ice Road and then via existing Alpine and GMT gravel roads; under Alternative D, an annual ice road would be constructed from GMT-2 to the Project area. Alternative C would require the construction of an annual ice road between the WPF and BT1 to provide annual resupply for drill sites BT1, BT2, and BT4. For annual (i.e., resupply) ice roads, the same general area would be used year after year, with the previous year's location being mapped so subsequent years can follow the same route, as is reasonably practicable and appropriate. This method of ice road layout has the fewest impacts from an overall footprint perspective. CPAI would remove any anthropogenic debris (i.e., stick pick) from the route annually and perform annual inspections, as required by respective landowners and land managers.

Estimated ice road mileage by alternative is summarized in Table D.4.1. Additional ice roads to support sealift module delivery are described in Section 4.7.

Table D.4.1. Estimated Total Ice Road Mileage by Alternative and Year

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
2021	32.7	32.2	41.0
2022	43.9	44.6	92.0
2023	99.3	155.2	151.6
2024	137.6	109.0	150.9
2025	44.0	77.7	62.1
2026	56.2	14.7	27.9
2027	50.2	59.6	17.4
2028	21.0	65.8	68.6
2029	10.3	15.7	69.1
2030	0.0	3.6	19.3
2031+	0.0	3.6	12.5
2031 – Life of Project[a]	0.0	72.0[b]	262.5[c]
Total	**495.2**	**650.1**	**962.4**

Note: + (indicates annual use from 2031 to end of the life of the Project in 2050 for Alternatives B and C and 2052 for Alternative D).
[a] Life of the Project would be 30 years (2021 through 2050) for Alternatives B and C and 31 years (2021 through 2051) for Alternative D.
[b] Assumes 3.6-mile-long annual ice road to reach Bear Tooth drill site 1 (BT1) for the life of the Project.
[c] Assumes 12.5-mile-long annual ice road between Greater Mooses Tooth Unit and the Project area for the life of the Project.

4.2.3.2 Gravel Roads

All-season gravel roads would connect the Project drill sites to the WPF and to the existing Greater Mooses Tooth (GMT) Unit (with some exceptions under Alternatives C and D) and Alpine gravel infrastructure. Gravel roads would be designed to maintain the existing thermal regime and would be a minimum of 5 feet thick (average of 7 feet thick due to topography) and have 2:1 side slopes. The roads to BT3 (except under Alternative D), BT4, BT5, the airstrip(s), and the water source access road(s) would be 24 feet wide at the surface with an average toe-to-toe width of approximately 53 feet. All other Project roads would be 32 feet wide (crown width) with an average 61-foot toe-to-toe width. CPAI would limit 24-foot-wide Project roads to 25 miles per hour (32-foot-wide roads would have 35 mile per hour speed limits). Roads would include subsistence tundra access ramps at road pullouts; locations and designs would be based on lessons learned from GMT-1 and GMT-2, on community input, and in consultation with Nuiqsut but would generally be every 2.5 to 3 miles. These pullouts and tundra access ramps would allow local residents to cross gravel roads or gain access to subsistence use areas.

Where possible, roads would be constructed at least 500 feet from pipelines to minimize caribou disturbance, prevent excessive snow accumulation from snowdrifts, and allow for snow removal. However, pipelines would typically be constructed within 1,000 feet of roads to allow visual inspection from the road. Where practicable, roads would be designed to conform to BLM requirements and BMPs. Anticipated deviations from these BMPs are detailed by alternative (Sections 4.3 through 4.5).

4.2.3.2.1 Bridges

All action alternatives would include bridges. All bridges would be designed 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. Bridges crossing Judy (Iqalliqpik) and Fish (Uvlutuuq) creeks would be designed to maintain a bottom chord clearance of at least 13 feet above the 2-year design flood elevation (open water) to provide vessel clearance. Water surface elevations would be analyzed considering snow and ice impacts as well as open water conditions. Design analysis would be based on observations and measurements and modeled conditions (e.g., ice and snow effects), and would vary from crossing to crossing based on site-specific conditions.

Shorter, single-span bridges would be designed, where practical, to avoid the placement of piers in main channels. Each bridge deck would have a removable guardrail and would be designed to support drill rig movement. At the Fish (Uvlutuuq) Creek and (excluding Alternative C) Judy (Iqalliqpik) Creek crossings, pipelines would be placed on structural steel supports attached to the bridge girders below the bridge deck. At smaller streams, pipelines would span the streams on VSMs.

The multi-span Judy (Iqalliqpik) Creek, Judy (Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 2, and Willow Creek 4 bridges would be constructed on steel-pile pier groups, made up of sets of four pilings positioned approximately 40 to 70 feet apart with sheet-pile abutments located above OHW at each end of the bridge.. Crossings over Willow Creek 4A and Willow Creek 8 would be constructed using single-span bridges (sets of four pilings positioned approximately 50 to 60 feet apart with sheet-pile abutments at each end of the bridge). Bridged crossings would range from 40 to 420 feet in length. Specific bridge crossings are detailed in Sections 4.3 through 4.5.

4.2.3.2.2 Culverts

Culverts would be designed, constructed, and maintained to ensure fish passage and stream flow. Culverts would be placed in the road to maintain natural surface drainage patterns; culverts at swale crossings would be placed perpendicular to the road, where feasible. The size, layout, and quantity of culverts crossing swales would be based on site-specific conditions to pass the 50-year flood event with a headwater elevation not exceeding the top of the culvert (headwater/diameter ratio of 1 or less). Typical culverts would be steel pipe pile, would extend approximately 2 feet past the toe of the slope, and would have a minimum of 3 feet of gravel cover (dependent on pipe material, wall size, and design loads). Neighboring culverts would be spaced a minimum of 3 feet between the outer walls of each culvert to provide for proper gravel compaction and load distribution.

Where fish passage is required (as designated by the Alaska Department of Fish and Game [ADF&G]), culverts would be designed with at least one of the culverts in the **culvert battery** having the invert embedded 20% below grade, situated in the deepest part of the stream channel. Fish passage culverts would be backfilled to match existing grade (20% of the culvert diameter) to provide conditions similar to a streambed within the culvert. Fish passage culverts would be corrugated steel plate or steel pipe pile. Baffles may be added on a site-specific basis and in consultation with permitting agencies.

Preliminary cross-drainage culvert locations would be selected based on aerial photography. CPAI (or its representative) would walk the road alignment prior to construction to optimize final culvert locations, noting low areas where culverts are needed, and review the data with regulatory agencies for concurrence. Thus, the final design for the size, number, and location of the cross-drainage culverts would be determined following the field survey. The estimated spacing of the cross-drainage culverts is one every 1,000 feet; however, some culverts may be spaced closer or farther than the 1,000-foot estimate, as is common for roads associated with North Slope oil and gas development. The culverts would be installed per the final design prior to breakup of the first construction season, but additional culverts may be placed after breakup as site-specific conditions are further assessed with regulatory agencies. Culverts would be regularly inspected as part of CPAI's roads and pads maintenance program.

4.2.3.3 Airstrip and Associated Facilities

Year-round access to the Project area from Alpine, Kuparuk, Deadhorse, or other locations would be provided by aircraft. Air access would be supported by a 6,200-foot-long gravel airstrip with aprons located near the WOC under Alternatives B and D and near the South WOC under Alternative C; Alternative C would include a second, same size airstrip near the North WOC (Section 4.2.3, *Access to the Project Area*). The airstrip(s) would be capable of supporting and could include regular use by Hercules C-130, DC-6, Otter, CASA, and Bombardier Q400 aircraft, or similar. Additional airstrip facilities would include a traffic advisory center and approach lighting with airstrip module lighting pads. Trenching may be required to bury power and communications cables between the WOC and airstrip, and along the airstrip between modules and lighting components. Trenching would be conducted in the same manner as described for power and communications cables at pipeline road crossings (Section 4.2.2, *Pipelines*).

Helicopters would be used to support Project construction, ongoing environmental studies, ice road permit compliance, and to a lesser extent, drilling and operations. Helicopter support for future exploration, including exploration wellhead inspections and debris cleanup (i.e., stick picking) from winter exploration activities, is not part of the Project.

Airstrip location(s) is constrained by a number of factors to ensure the safety of aircraft taking off and landing at the airstrip(s). These factors include the height of the drill rig(s) at BT3 (Alternative D), the WPF and WOC structure heights, and the setback distances required by the FAA for aircraft approaches and takeoffs. The airstrip(s) would be oriented in a southwest-northeast direction due to the prevailing winds. Airstrip locations and access roads vary by alternative.

Aircraft would support the transportation of work crews, materials, equipment, and waste to and from the Project area and Fairbanks, Anchorage, Kuparuk, and Deadhorse. Air transportation to the Project area would occur year-round. During the useable winter ice road season (approximately February through April), material resupply and waste transportation to Kuparuk and the North Slope gravel road system would also occur via the annual Alpine Resupply Ice Road. Aircraft would maintain altitudes consistent with BMP F-1 (BLM 2013), except during takeoffs and landings and unless doing so would endanger human life or violate safe flying practices. Aircraft flight paths would be routed north of Nuiqsut to the extent practicable.

Fueling and chemical deicing of aircraft would occur on the airstrip apron(s); chemical deicing of the runway(s) is not anticipated.

4.2.3.4 Sealift Barge Delivery to Oliktok Dock

Sealift barges would be used to deliver the processing and drill site modules, as well as other bulk materials, to the North Slope. Barge transit routes would follow existing, regularly used marine transportation routes. Under all action alternatives, bulk materials and smaller, prefabricated modules that can be transported on the annual Alpine Resupply Ice Road would be delivered to Oliktok Dock; large processing and drill site modules that are too heavy to be transported on the Alpine Resupply Ice Road are addressed in Section 4.7, *Sealift Module Delivery Options*.

Sealift barges would make deliveries to Oliktok Dock during four open-water (summer) seasons. no regular use of barges is proposed during the Project's drilling and operations phases. Under Alternatives B and C, sealift barges would deliver modules and/or bulk construction materials (e.g., pipeline pipe, VSMs, HSMs) in the summers of 2022 through 2024 and 2026. Under Alternative D, sealift barges would deliver modules and/or bulk construction materials in the summers of 2023 through 2025 and 2027.

After delivery to Oliktok Dock, bulk materials and smaller modules would be stored at an existing 12-acre pad located approximately 2 miles south of Oliktok Dock (Figure D.4.6). The following winter, the materials would be transported to the Project area via existing gravel roads and the annual Alpine Resupply Ice Road. No improvements to the existing gravel roads or additional ice road construction would be necessary to complete this material delivery. Additionally, no improvements would be required at the 12-acre staging pad. (Vehicle trips associated with this material movement from Oliktok Dock to the Project area are included in the construction traffic numbers for Alternatives B, C, and D.)

Oliktok Dock was originally constructed in the early 1980s, and to accommodate the 25-foot-high side-shell sealift barges expected to be used for the Project, CPAI would raise the existing dock surface approximately 6 feet by adding structural components and a gravel ramp, which would require 5,200 cy of gravel sourced from an existing Kuparuk mine site (e.g., Mine Site C, Mine Site E, or Mine Site F). All modifications to the dock would be within the dock's existing development footprint.

To facilitate module delivery, CPAI would use a 9.6-acre offshore barge lightering area approximately 2.3 nautical miles (2.6 miles) from Oliktok Dock, where the water is approximately 10 feet deep. Lightering is the process of transferring cargo between vessels to reduce a vessel's draft, which allows it to enter a dock or port with shallower waters. The water depth at Oliktok Dock is too shallow (approximately 8 feet deep) to accommodate the draft depth of a fully loaded sealift barge. As a result, a portion of the load on each barge would be lightered onto an empty barge to allow transport to the dock.

During the lightering process, barges would be grounded on the seabed, which would require **screeding**, which is the redistribution or recontouring of the existing seafloor to provide a level surface for the barges to be grounded on during load transfers.[4] The relatively flat seafloor prevents pressure point damage to the barge hulls and allows the barges to be safely grounded. Grounding barges would require intaking seawater as ballast and then discharging the seawater to refloat the barges. Ballast water intake and discharge would occur at the lightering area and at the dock face; ballast water to ground barges would not be transported. Barge ballast tanks would be stripped of water and dried before departing the fabrication site for the North Slope.

Following sealift barge grounding and cargo transfer, each barge with a lightened load would be grounded in front of Oliktok Dock and offloaded. To prevent pressure points on the barge hull during the grounded offload at the dock, approximately 2.5 acres of marine area in front of the dock would also be screeded immediately before the first barge delivery each year. Screeding would occur in summer shortly before barges arrive and would take

[4] Screeding operations are typically accomplished by dragging a metal plate attached to a screeding barge across the bottom of the seafloor to move sediments in a leveling operation. The amount of material moved is typically small and localized; no sediments would be removed from the water and no new fill material would be added. A backhoe or excavator may be used to assist where required; however, the bucket would not be raised above the water surface during operation.

approximately 1 week to complete, with bathymetry measured afterward to confirm the seafloor surface is acceptable to the barge operator.

Screeding would occur once during each open-water season with barge deliveries at the barge lightering area and in front of Oliktok Dock.

4.2.3.4.1 Protected Species Observers

Each sealift barge delivery would consist of a combination of barges and tugboats; barges would be unpowered and un-crewed. Tugboats would pull and maneuver the barges along the transit route to the barge lightering area and to Oliktok Dock. Each sealift would include at least one Protected Species Observer (PSO) from Dutch Harbor to Oliktok Dock. The PSO would be located on the lead vessel and would be the central point of contact for any observations of sensitive species. All tugboat captains would be required to complete a wildlife awareness training program prior to the sealift and report any sensitive wildlife sightings to the PSO. In order to maintain 24-hour observation coverage, two to three PSO personnel would be aboard the lead vessel to allow for shift rotations.

4.2.4 Other Infrastructure and Utilities

4.2.4.1 Ice Pads

Single-season and multi-season ice pads would be used to support construction. Single-season ice pads are built and used for a single winter construction season, and they would be used during all years of construction to house construction camps, stage construction equipment, and support construction activities. Single-season ice pads would be used during construction at the gravel mine site during gravel mining activities (Section 4.2.6, *Gravel Mine Site*), on either side of bridge crossings during gravel road and pipeline construction, at the Colville River HDD pipeline crossing, and at other locations as needed near proposed infrastructure within the Project area. Single-season ice pad acreage estimates include 10.0 acres of ice pad for every 15.0 miles of ice road that would be constructed; this estimate is based on CPAI's North Slope operating experience.

In addition to single-season ice pads, multi-season ice pads would be used on a limited basis to stage construction materials between winter construction seasons, which would avoid the placement of gravel fill to support temporary activities. Multi-season ice pads would be constructed similarly to single-season ice pads with compacted snow over a base layer of ice. However, multi-season ice pads would also include a vapor barrier over the ice to prevent melting from rain and evaporation as well as structural insulated panels to insulate the pads and white tarps to reflect sunlight and heat. The multi-season ice pads would then be covered by rig mats made of wood, steel, or composite materials (USACE 2012, Appendix G). Once a multi-season ice pad is no longer needed, the rig mats, tarp, insulation, and vapor barrier would be removed, any spills or releases would be cleaned, and the ice base would be excavated to within 12 inches of the tundra surface before being allowed to melt over the course of the summer.

Multi-season ice pads would be built in one winter and used over the following summer and winter before being allowed to melt; each multi-season ice pad would last no longer than approximately 18 months. In areas where the multi-season ice pads are required for a longer period of time, each consecutive ice pad would be constructed in a slightly different location so the footprints do not overlap. (Note: figures showing the locations of multi-season ice pads should be viewed as portraying approximate locations rather than exact locations.)

Ten-acre multi-season ice pads would be used at three locations during Project construction under all action alternatives. These include multi-season ice pads near GMT-2, near the WOC (South WOC under Alternative C), and at the Tiŋmiaqsiuġvik Gravel Mine Site. Construction and use of these three pads would allow ice road, gravel mining, and other construction equipment to be stored in the field over the summer to support earlier construction starting during the following winter construction season while minimizing the need for additional gravel infrastructure.

4.2.4.2 Camps

Camps required to support Project construction include temporary construction camps within the Project area at the WOC (for Alternatives B and D; at the North and South WOCs under Alternative C) as well as other existing camp space at Alpine (Alpine Operations Camp), the Kuukpik Pad (near the intersection of the Nuiqsut Spur Road and Alpine CD5), and the Sharktooth Camp in Kuparuk. The housing of construction workers at the Kuukpik Hotel in Nuiqsut would also be possible. Camps to support drilling would be located at each drill site.

The Willow Camp would support operations and would be housed on the WOC pad (for Alternatives B and D; at the North and South WOCs under Alternative C). Details of camp sizes and locations by alternative are provided in Sections 4.3 through 4.5 and Section 4.7.

4.2.4.3 Power Generation and Distribution

Electrical power for the Project would be generated by a 98-megawatt power plant at the WPF, equipped with natural-gas-fired turbines. Power would be delivered to each drill site and the WOC(s) via power cables suspended from pipeline VSMs using messenger cables attached to the HSMs. Following facility startup, the power plant at the WPF would also be used to power drill rigs, except during periods when power from the WPF is unreliable.

During construction and drilling, prior to completion of the permanent power supply, portable generators would provide temporary power at the various locations. The portable generators would be fueled by ultra-low sulfur diesel. Once fuel gas is available, on startup of the WPF, diesel-fired emergency backup generators would be installed at the WPF and at the Willow Camp (located on the WOC pad). Portable diesel-fired emergency backup generators would be available to provide emergency power at drill sites. Permanent electric power generator sets would be totally enclosed or acoustically packaged to reduce noise emissions.

4.2.4.4 Communications

Communications infrastructure throughout the Project area would include fiber-optic cables suspended from pipeline VSMs via messenger cables attached to HSMs. Permanent communications towers would be located on the communications tower pad near the WOC and at each drill site (six towers total). The communications towers would be up to 200 feet tall. Permanent towers would be triangular, self-supporting lattice towers and would not use guy wires. Temporary towers would be pile supported and may require guywire supports. Guywires would include devices to mitigate bird strikes (e.g., bird diverters). All towers would have warning lights, as required by the FAA for aircraft safety. Bird nesting diversion equipment may be installed on towers consistent with BLM NPR-A BMP E-9 (BLM 2013), as is practicable given the equipment layout and potential for snow and ice loading and associated concerns.

4.2.4.5 Potable Water

The CFWR adjacent to Lake M0015 (also called R0056) would be the primary source of freshwater for domestic use under all action alternatives. Additional freshwater sources include Lake L911 (Alternatives B and C) and Lake M0235 (Alternatives C and D). The freshwater intake infrastructure at the CFWR and Lakes L9911 and M0235 would be accessed by water source access roads and pads.

The water from the CFWR and Lakes L9911 and M0235 would be treated in accordance with State of Alaska Drinking Water Regulations (18 AAC 80), as required for any potable drinking water system. Prior to operation of the freshwater intake system, potable water for construction and drilling camp use would be withdrawn using temporary equipment and trucked to the water plant at the temporary construction camp. Additional freshwater withdrawals from other local permitted lakes would be needed during the construction phase (e.g., ice road and pad construction, hydrostatic pipeline testing, HDD), the drilling phase (e.g., drilling support), and the operations phase (e.g., dust control); these are described in Section 4.2.5, *Water Sources and Use*.

4.2.4.6 Domestic Wastewater

Domestic wastewater treatment infrastructure would be located at the WOC (North and South WOCs under Alternative C). Sanitary waste generated from camps would be hauled to the wastewater treatment facility. The treated wastewater would be disposed of in the Class I UIC disposal well located at the WOC(s), hauled to and disposed of at another approved disposal site (e.g., Alpine), or in an emergency, discharged under the Alaska Pollutant Discharge Elimination System (APDES) General Permit (AKG 33-2000).

Prior to the establishment of the UIC well at the WOC, domestic wastewater would be treated and either hauled to Alpine or Kuparuk (winter only) for injection in an existing UIC disposal well or, in instances where weather or conditions at Alpine prevent disposal, discharged to tundra per APDES permit conditions.

4.2.4.7 Solid Waste

Domestic waste (e.g., food, paper, wood, plastics) would either be incinerated (to prevent attracting animals) on-site or at Alpine or, if non-burnable, would be recycled or transported to a landfill facility in Deadhorse (North

Slope Borough [NSB] landfill), Fairbanks, or Anchorage. Incinerator ash would be stored on-site until it could be transported to a landfill for disposal. Other hazardous and solid waste from the Project would be managed under Alaska Department of Environmental Conservation (ADEC) and U.S. Environmental Protection Agency (EPA) regulations, as well as BLM BMPs.

4.2.4.8 Drilling Waste

Drilling waste (e.g., drilling mud, cuttings) would be disposed of on-site through annular disposal (i.e., pumped down the well through the space between the two well casing strings) and/or transported to an approved disposal well (e.g., Class I UIC disposal well at the WOC). Reserve pits would not be required or used by the Project. A temporary storage cell (typically a lined, wooden structure) may be constructed for staging drilling muds and cuttings prior to disposal. Produced water would be processed at the WPF and reinjected to the subsurface through injection wells as part of reservoir pressure maintenance and waterflood for secondary recovery. Well work waste materials would be managed according to the *Alaska Waste Disposal and Reuse Guide* (CPAI and BP n.d.). In addition to regulations governing waste handling and disposal, the Project would also be managed under BLM BMPs.

4.2.4.9 Fuel and Chemical Storage

Fuel and other chemicals would primarily be stored at the WPF, with additional storage at drill sites. Diesel fuel would be stored in temporary tanks on-site during construction under all action alternatives. During the drilling and operations phases, the WPF would include a fuel supply storage tank(s) and an associated fueling station as well as a tank farm to store methanol, crude oil flowback, corrosion inhibitor, biocide, scale inhibitor, emulsion breaker, and other chemicals, as required. Jet fuel would be stored on the airstrip apron for helicopter use; jet fuel would be delivered to airplanes by fuel trucks supplied by storage tanks located at the WPF.

Drill sites would have temporary tanks to support drilling operations, including brine tanks, cuttings and mud tank, and a drill rig diesel fuel tank (built into the drill rig structure). Production operations storage tanks at drill sites would include chemical storage tanks that may contain any of the following (depending on operational needs): corrosion inhibitor, methanol, scale inhibitor, emulsion breaker, anti-foaming agent, and ultra-low sulfur diesel fuel. Portable oil storage tanks to support well and pad operational activities and maintenance (i.e., well work, well testing) may be present on an as-needed basis.

Fuel and oil storage would comply with local, state, and federal oil pollution prevention requirements, according to the Oil Discharge Prevention and Contingency Plan (ODPCP) and Spill Prevention Control and Countermeasures (SPCC) Plan. Secondary containment for fuel and oil storage tanks would be sized as appropriate to the container type and according to governing regulatory requirements (18 AAC 75 and 40 CFR 112). Fuel and chemical storage for the Project would be managed under BLM BMPs (BLM 2013).

4.2.5 Water Sources and Use

4.2.5.1 Constructed Freshwater Reservoir

CPAI would construct a CFWR (Figure D.4.7) to ensure a reliable source of freshwater for the Project while minimizing the need for water withdrawal from Project-area lakes. The CFWR would be sized for an estimated winter withdrawal volume of 55 million gallons (MG), with an overall volume of 80 MG. This value assumes the presence of ice approximately 6 feet thick and would maintain 5 feet of water at the CFWR bottom for settling.

The CFWR has been designed similar to the existing freshwater reservoir adjacent to Kuparuk CPF2. The CFWR would consist of an 800-foot-long by 700-foot-wide by 50-foot-deep pit with 6 horizontal to 1 vertical ratio (6:1) side slopes. An approximately 1,325-foot-long, 6- to 10-foot-deep connection channel would connect the CFWR to Lake M0015 to support initial reservoir flooding and facilitate annual recharge. The connection channel dimensions are approximate and include a 15-foot flat bottom and 6:1 side slopes to ensure slope stability; the final design is pending following the completion of additional geotechnical studies. The excavation footprint for the CFWR would be 16.3 acres. The channel connection would include a sheet-pile weir with a screen to limit fish access to the CFWR and a flow control gate to allow CPAI to restrict flow into the CFWR based on the monitoring of Lake M0015 water levels and the lake's outlet to Willow Creek 3. At times of low flow in Willow Creek 3, the flow control gate could be closed so that water is not diverted into the CFWR.

The initial filling of the CFWR from Lake M0015 would occur during the first year's breakup (i.e., during high flow) following reservoir construction. The volume of water required to fill the CFWR (55 MG) would be less than 4% of the water volume storage within the Willow Creek 3 basin (which contains both Lake M0015 and Lake R0064, which are hydraulically connected). The estimated recharge volume of the basin exceeds that of the volume of the CFWR. The CFWR would be refilled annually during spring breakup; refill would not occur during low-flow periods.

The CFWR would be bordered by a 7-foot-high permanent berm (3.9-acre footprint), which would provide foot access around the CFWR and help maintain the thermal stability of the permafrost adjacent to the CFWR. The berm would be comprised of approximately 25,000 cy of native material excavated from the CFWR pit and capped with approximately 6,000 cy of gravel to accommodate equipment access for maintenance of the CFWR, including the connection channel.

The CFWR would be accessed by a 0.3-mile-long gravel access road from the gravel road connection to BT3. Water would be withdrawn using a submerged pump (screened per ADF&G design standards) and would likely be accessed via a catwalk extending into the CFWR. From the CFWR, raw water would be transported via pipeline to the WPF for firewater use and to the WOC (South WOC under Alternative C) for treatment and transport elsewhere in the Project area as needed.

4.2.5.2 Other Water Sources

CPAI would also construct gravel access roads to connect to Lake L9911 (Alternatives B and C) and/or Lake M0235 (Alternatives C and D) to supply water for the Project's drilling and operations phases. Lake L9911 has an estimated total lake volume of 1,586 MG and Lake M0235 has an estimated total lake volume of 327 MG. Water intake infrastructure at these lakes would consist of a triplex pump (housed within secondary containment) sitting on the water source access pad. The pump would have a hose connection for filling water trucks. No permanent infrastructure would be constructed on these water source access pads.

Water for construction and the maintenance of ice roads and ice pads would be withdrawn from lakes near the construction activities as allowed by State of Alaska temporary water use authorizations and fish habitat permits (where necessary).

Seawater for hydraulic fracturing and well injection would be sourced from the existing Kuparuk Seawater Treatment Plant at Oliktok Point. Seawater would be transported to the Project area from Kuparuk CPF2 via a new seawater pipeline (Section 4.2.2.3).

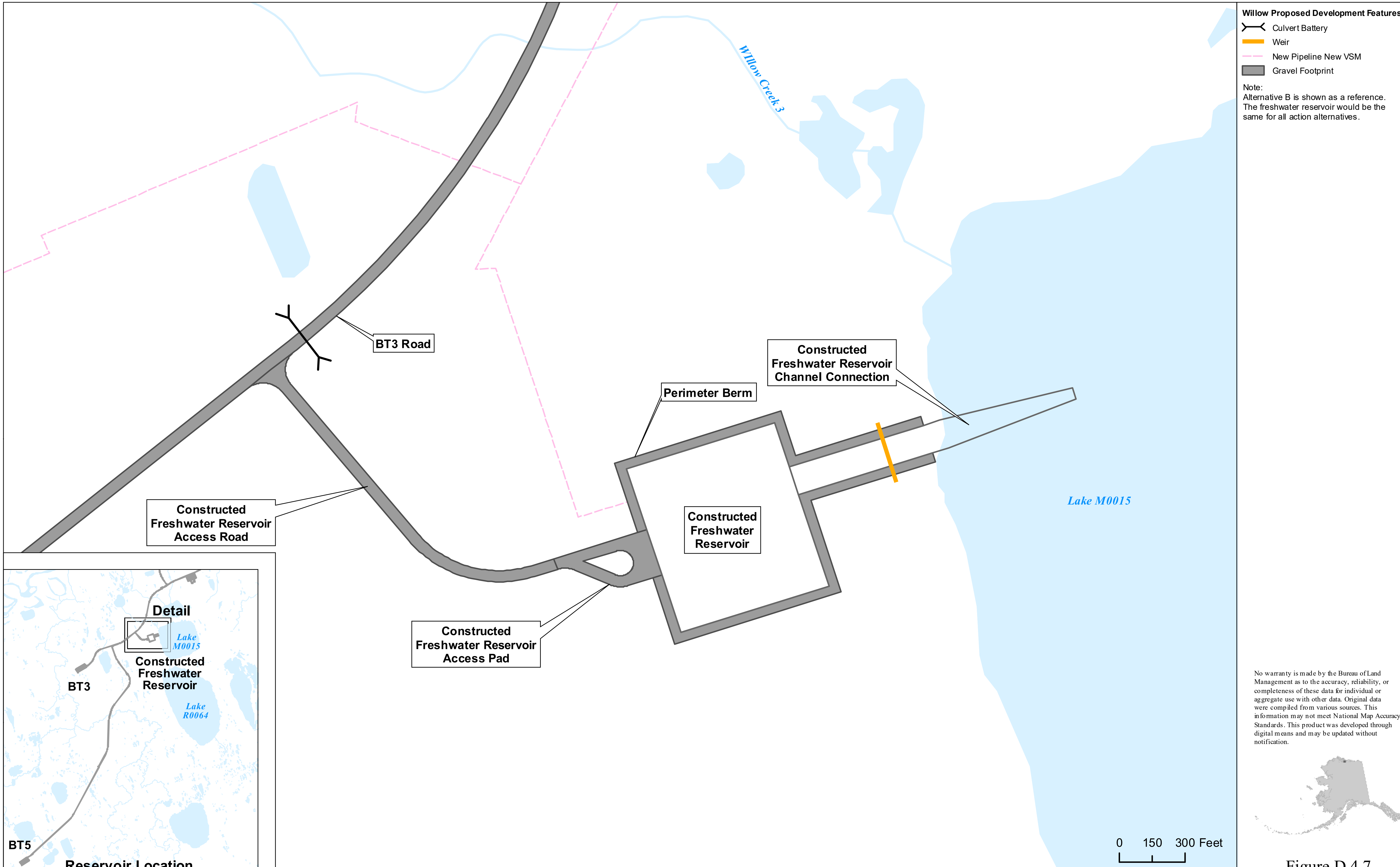


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Figure D.4.7

4.2.5.3 Water Use

Freshwater would be required for domestic use at remote construction camps and for construction and maintenance of ice roads and ice pads. Potable water requirements are based on a demand of 100 gallons per day per person. Freshwater would also be used for hydrostatic testing; the specific water volume required would be based on pipeline diameter and length.

Depending on the use, ice road widths would be 35 feet, 50 feet, or 70 feet; the volume of freshwater required to construct these ice roads would be approximately 1.0 MG, 1.4 MG, and 2.0 MG, respectively. Multi-season ice pads require approximately 0.25 MG of water per acre, per foot of thickness; Project multi-season ice pads would typically be between 5 to 7 feet thick (including insulation and rig mats), depending on site-specific topography. Multi-season ice pads are individually engineered based on geographic and seasonal variables, and 0.25 MG of water per acre, per foot of thickness of multi-season ice pad is used as high-level estimate for multi-season ice pad construction. Water use for module delivery is described in Section 4.7.

Freshwater would be required for domestic use at the drilling camp and during drilling activities (100 gallons per day per person for potable water). Prior to WPF startup, freshwater would be used for drilling water and hydraulic fracturing. Drilling water requirements are estimated to be 1.4 MG per rig per month and hydraulic fracturing would require approximately 1.0 MG of water per well. Following WPF startup, freshwater needs for drilling water would drop to approximately 0.4 MG per well; the remaining drilling and all of the hydraulic fracturing water would then be seawater.

Freshwater for drilling may be withdrawn from lakes near the Project using temporary triplex pump and truck connections, as allowed by temporary water use authorizations and fish habitat permits. Anticipated freshwater use is detailed by Project phase and action alternative in Table D.4.2; detailed freshwater use by alternative can be found in Section 4.3.5, *Water Sources and Use*; Section 4.4.5, *Water Sources and Use*; and Section 4.5.5, *Water Sources and Use*.

Table D.4.2. Estimated Total Freshwater Use (million gallons) by Alternative and Project Phase

Project Phase	Alternative B: Proponent’s Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Construction[a]	1,207.5	1,368.6	1,523.6
Drilling[b]	228.0	228.0	228.0
Operations[c]	226.9	317.7	534.7
Total	1,662.4	1,914.3	2,286.3

[a] The construction phase would include ice road construction (1.0 million gallons [MG] per mile for a 35-foot-wide road, 1.4 MG per mile for a 50-foot-wide road, and 2.0 MG per mile for a 70-foot-wide road), ice pad construction (0.25 MG per acre), dust suppression, hydrostatic testing, and camp supply (100 gallons per person per day).
[b] The drilling phase would include drilling water (1.4 MG per month per drilling rig prior to processing facility startup and 0.4 MG per rig per month after facility startup), hydraulic fracturing (1.0 MG per well prior to processing facility startup), and camp supply (100 gallons per person per day).
[c] The operations phase would include dust suppression, camp supply (100 gallons per person per day), and the annual resupply ice road (1.0 MG per mile for a 35-foot-wide road; Alternatives C and D).

During construction, seawater would be used for ballast water by sealift barges making deliveries to Oliktok Dock. Following WPF startup, seawater would be used for the hydraulic fracturing of production and injection wells, drilling, and for reservoir injection to support enhanced oil recovery. Hydraulic fracturing is expected to require approximately 1.0 MG of seawater per well. Drilling is expected to require approximately 1.0 MG of seawater per drilling rig per month. Enhanced oil recovery would require approximately 2.1 to 3.8 MG of seawater per day beginning in 2025 (Alternatives B and C) or 2026 (Alternative D).

4.2.6 Gravel Mine Site

The amount of gravel required for the Project varies by alternative and module delivery option (approximately 5.0 to 6.4 million cy depending on the alternative and module delivery option). Gravel would be obtained from a new gravel source in the Tiŋmiaqsiuġvik area, approximately 4 to 5 miles southeast of GMT-1 (Figures D.4.1, D.4.2, and D.4.3). The mine site footprint would overlap the Ublutuoch (Tiŋmiaqsiuġvik) River 0.5-mile setback (137.8 acres; Figure D.4.8); however, mine development is allowed in the setback area (BMP K-1 in BLM 2013).

4.2.6.1 Mine Site Description

CPAI proposes to develop two mine site cells (Area 1 and Area 2) located on BLM-managed lands in the Tiŋmiaqsiuġvik area (approximately 20 miles from the WOC; Figure D.4.8) These mine site areas were evaluated by CPAI for their potential to supply some or all of the gravel required to construct the Project, and further geotechnical investigation has reduced the anticipated mine site footprint from 230.0 acres (total), as described in the Willow MDP Draft EIS (BLM 2019). At this time, CPAI believes development of both mine areas would be required to provide a sufficient quantity of gravel for the Project. Mine Site Area 1 would have a 109.3-acre excavation footprint and Mine Site Area 2 would have a 40.4-acre footprint (149.7 total acres).

The gravel mine site would be accessed seasonally via ice road; no permanent gravel road to the mine site is proposed as part of the Project. There would be no activity at the mine site outside of the winter construction season. Gravel mining operations would occur over six to seven winter construction seasons (varies by alternative) to support construction of Project drill sites, WPF and WOC pads, airstrip(s), and all-season roads. Mine Site Area 2 would likely be developed first, followed by Mine Site Area 1 as Mine Site Area 2 is depleted of suitable gravel resources.

The layout of the mine site areas would be designed to maximize access to the most suitable construction materials while minimizing overall surface disturbance at the site. Overburden removal and gravel mining would proceed as material is needed. Mine site excavation would begin with the removal of overburden followed by removal of suitable gravel material over six to seven winter construction seasons over a nine- or ten-year construction phase (varies by alternative). To support gravel mining, a 10.0-acre multi-season ice pad and approximately 188.0 total acres of single-season ice pads would be used for the following:

- Storing gravel mining equipment over the summer
- Housing construction equipment
- Stockpiling overburden
- Creating an ice pad around the mine site perimeter

Mining disturbance would generally occur incrementally over the construction phase; for example, only those areas necessary to extract gravel for the first and second winter construction seasons would be disturbed during initial mining activities. Overburden would be stockpiled on ice pads for approximately 2 years of mine site development. Following the second winter season of mining activities, the overburden material would be removed from the ice pad and placed in the excavated area to begin initial rehabilitation on previously mined areas using the overburden removed from newly mined areas to minimize the overall disturbance footprint. In the mine site cells, the excavation area side slopes would be graded to a 3 horizontal to 1 vertical ration (3:1). Pumping would be necessary to maintain a lowered water level throughout mining operations. Pumped water would be discharged through a diffuser onto tundra close to the Ublutuoch (Tiŋmiaqsiuġvik) River, just upstream from the confluence with Bill’s Creek, and/or tundra close to Bill’s Creek, just upstream from its confluence with the Ublutuoch (Tiŋmiaqsiuġvik) River.

Inorganic overburden material would be used to create water diversion berms (approximately 5 feet tall and 15 feet wide at the top) as needed around the perimeter of Mine Site Areas 1 and 2. These berms would be placed directly on the surrounding tundra to prevent surface water flow into the mine site, help maintain thermal stability of permafrost adjacent to the mine footprint, safeguard the stability of the mine walls during mine operation, and provide a protective physical barrier around the mine site for local residents. Mine Site Area 1 and Area 2 would have its own perimeter berms. The berms would be incrementally expanded towards the mine site pit once reclamation activities began.

The maximum final mine site disturbance area following the last winter construction season would be 149.7 total acres.

4.2.6.2 Mine Site Reclamation

Mine site reclamation would begin once excavation has progressed enough to provide room within the excavated area to safely perform both mining and reclamation activities concurrently. Reclamation materials would include overburden removed during mining and soils generated during Project construction (e.g., CFWR excavation). The material stockpiled on the adjacent ice pads would be placed back into the excavated area. It is anticipated the overburden generated in Mine Area 2 would remain stockpiled through one summer before being used for mine site reclamation. Following the removal of the overburden stockpiles, monitoring and treatment of the underlying tundra would be completed as needed. All subsequent overburden removed during mining operations would then remain in the excavated mine site. Performing reclamation during the same season as mining would minimize the overall disturbance footprint by eliminating the ongoing need to stockpile overburden outside of the mine site excavation.

When the mine site is no longer needed as a gravel source and reclamation efforts are complete, the mine site walls would have 3:1 slopes. The mine site area cells would be allowed to naturally fill with water (e.g., precipitation, meltwater) to potentially provide waterfowl and shorebird habitats similar to existing habitats in the surrounding area. The reclaimed mine sites would include deepwater areas, with a maximum depth of approximately 70 feet in Mine Area 1 and 50 feet in Mine Area 2. It is anticipated it will take a decade or longer to fill the excavation sites with water.

The Willow Mine Site Mining and Reclamation Plan is included as Appendix D.2, *Willow Mine Site Mining and Reclamation Plan*.

4.2.7 Erosion and Dust Control

The Project would follow a Facility Erosion Control Plan (FECP), which would outline procedures for the operation, monitoring, and maintenance of various erosion control methods. A Stormwater Pollution Prevention Plan (SWPPP) would describe management of surface water drainage for Project gravel pads. Both plans would be based on the existing Alpine FECP and Alpine SWPPP.

The FECP would describe snow removal and dust control measures. Snow removal plans would include the use of snow-blowing equipment to minimize significant snow build-up along the shoulders of roads and gravel dispersion to the tundra as well as the placement of cleared snow in designated areas. Rotary snow blowers and road graders would be used to clear snow from roads; use of this equipment would spread snow across a wide surface area and prevent thick berms from forming along the road shoulder, which would decrease the incidence of snowdrift accumulations during high-wind events. The FECP would discuss snow removal and gravel deposition removal for CPAI operations staff. CPAI would select snow push (i.e., storage) areas annually based on avoiding areas of thermokarst and proximity to waterbodies, and evaluating how the area looks based on previous years' activities.

CPAI would implement a Project Dust Control Plan to minimize the incidence of fugitive dust. The Dust Control Plan would identify Project sources for fugitive dust, dust control methods and measures to be used for each source, and monitoring and record keeping parameters. Dust control would include watering gravel roads to minimize dust impacts to the tundra and to maintain gravel road integrity. The Willow Dust Control Plan can be found in Appendix I.3, *Dust Control Plan*.

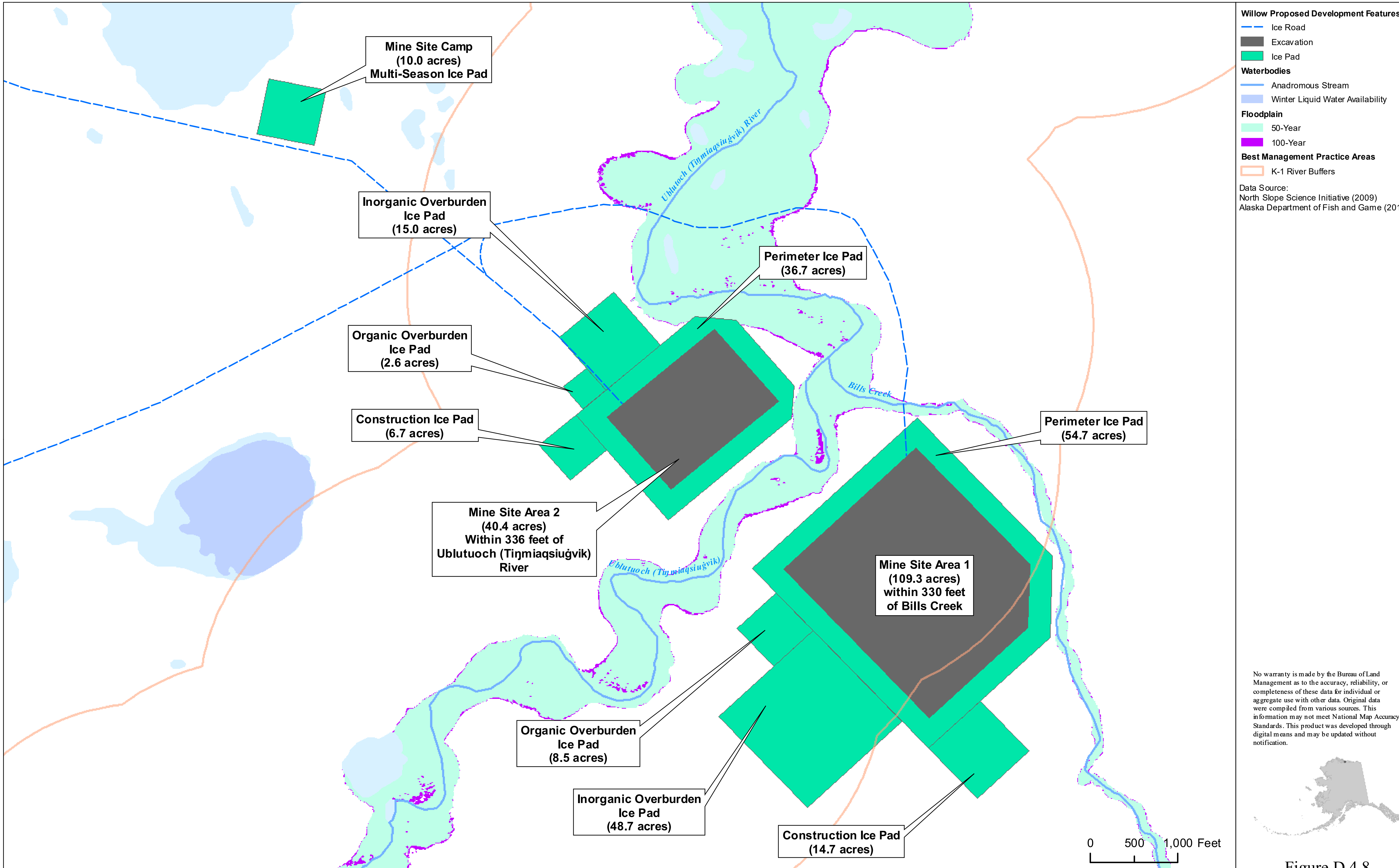
Mine Site Camp
(10.0 acres)
Multi-Season Ice Pad
Inorganic Overburden Ice Pad (15.0 acres)
Organic Overburden Ice Pad (2.6 acres)
Construction Ice Pad (6.7 acres)
Perimeter Ice Pad (36.7 acres)
Mine Site Area 2 (40.4 acres) Within 336 feet of Ublutuoch (Tiŋmiaqsiuġvik) River
Ublutuoch (Tiŋmiaqsiuġvik) River
Bills Creek
Perimeter Ice Pad (54.7 acres)
Mine Site Area 1 (109.3 acres) within 330 feet of Bills Creek
Organic Overburden Ice Pad (8.5 acres)
Inorganic Overburden Ice Pad (48.7 acres)
Construction Ice Pad (14.7 acres)
0 500 1,000 Feet
Willow Proposed Development Features
Ice Road
Excavation
Ice Pad
Waterbodies
Anadromous Stream
Winter Liquid Water Availability
Floodplain
50-Year
100-Year
Best Management Practice Areas
K-1 River Buffers
Data Source:
North Slope Science Initiative (2009)
Alaska Department of Fish and Game (2018)
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Figure D.4.8

4.2.8 Spill Prevention and Response

Facilities would be designed to mitigate spills with spill prevention measures and spill response capabilities. CPAI would implement a pipeline maintenance and inspection program and an employee spill prevention training program to further reduce the likelihood of spills occurring. CPAI's design of production facilities would include provisions for secondary containment of hydrocarbon-based and hazardous materials, as required by state and federal regulations. If a spill occurs on a pad, the fluid would remain on the pad unless the spill is near a pad edge or exceeds the pad's retention capacity. Fuel transfers near pad edges would be limited to the extent practicable to mitigate this risk. In addition to regulations governing spill prevention and response, the Project would be managed under the BLM BMPs described for solid waste and fuel and chemical storage (BLM 2013). Additional details on spill prevention and response are in Appendix H, *Spill Summary, Prevention, and Response Planning*.

4.2.8.1 Spill Prevention

Spill prevention and response measures that would be used during construction, drilling, and operations would be outlined in a Project ODPCP and SPCC Plan.

CPAI would design and construct pipelines to comply with state, federal, and local regulations. Pipelines would be constructed of high-strength steel and pipeline welds would be validated using nondestructive examination during pipeline construction to ensure their integrity and pipelines would be hydrostatically tested prior to operation. The production fluids, water injection, seawater, and export pipelines would be fully capable of accommodating pigs for cleaning and corrosion inspection.

4.2.8.2 Spill Response

CPAI would implement the Project's ODPCP and SPCC Plan to minimize accidental oil spills and associated impacts. Through the ODCP, CPAI would demonstrate that readily accessible inventories of fit-for-purpose oil spill response equipment and personnel would be available for use at Project facilities. In addition, a state-registered primary response action contractor would serve as CPAI's primary response action contractor and would provide trained personnel to manage all stages of a spill response, including containment, recovery, and cleanup.

Spill response equipment would be pre-staged at strategic locations across the Project area as outlined in the ODPCP for an initial response.

4.2.8.3 Spill Training and Inspections

CPAI provides regular training for its employees and contractors on the importance of preventing oil or hazardous material spills, including new employee orientation, annual environmental training seminars, and appropriate certification classes for specific issues covering spill prevention. The CPAI Incident Management Team participates in regularly scheduled training programs and conducts spill response drills in coordination with federal, state, and local agencies. Employees are encouraged to participate in the North Slope Spill Response Team where members receive regularly scheduled spill response training.

CPAI is required to conduct visual examinations of pipelines and facility during operations at a minimum interval not exceeding 3 weeks. CPAI would provide aerial overflights as necessary to allow inspection both visually and with the aid of infrared technology, when required. Infrared technology allows for spill identification based on the temperature "signature" resulting when warm fluids leak. CPAI would also conduct regular visual inspections of facilities and pipelines from gravel roads, where available, and from ice roads and aircraft for sections of pipelines not paralleled by gravel roads (Alternatives C and D).

4.2.9 Abandonment and Reclamation

The abandonment and reclamation of Project facilities would be determined at or before the time of abandonment. The plan for abandonment and reclamation is subject to input from federal, state, and local authorities and private landowners. Other stakeholders would also provide comments on the Abandonment and Reclamation Plan. Controlling factors for the Abandonment and Reclamation Plan may include the following:

- BLM leases, applications for permits to drill, and rights-of-way
- USACE Section 404 permit conditions
- State of Alaska easement(s)
- Alaska Oil and Gas Conservation Commission requirements for plugging and abandoning wells
- NSB Title 19 requirements

- Private agreements addressing private lands

The abandonment and reclamation of Project facilities may involve removing gravel pads and roads, or alternatively leaving them in place for future use by a different entity. Revegetation of abandoned gravel facilities may be accomplished by seeding with native vegetation or by allowing natural colonization. Depending on the types of abandonment and reclamation activities that occur, summer road and air traffic levels would be similar to those experienced during construction activities but at potentially lower intensity levels and shorter durations.

If the gravel infrastructure is removed as part of the reclamation process, it could be used for other development projects. To assist with abandonment and reclamation, BLM holds bonds from any company conducting development activities within the NPR-A to cover the cost of reclamation. CPAI also sets aside money to cover asset retirement obligations. Reclamation standards are determined by the BLM authorized officer at the time of reclamation.

4.2.10 Schedule and Logistics

Project timing is based on several factors, including permitting and other regulatory approvals, project sanctioning, and purchase and fabrication of long lead time components. CPAI would construct the Project over approximately 9 to 10 years (depending on the alternative) beginning in the first quarter (Q1) of 2021. The WPF is anticipated to come online in the fourth quarter (Q4) of 2025 (first oil) for Alternatives B and C and in Q4 of 2026 for Alternative D. Operations would run to the end of the Project's field life, which is estimated to be 2050 (Alternatives B and C) or 2051 (Alternative D). Table D.4.3 provides a project schedule overview. Detailed schedules for each action alternative are provided for Alternative B in Section 4.3.8, *Schedule and Logistics*; Alternative C in Section 4.4.8, *Schedule and Logistics*; and Alternative D in Section 4.5.8, *Schedule and Logistics*.

Table D.4.3. Project Schedule Overview by Alternative and Project Milestone

Project Milestone	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Life of Project	30 years (2021 through 2050)	30 years (2021 through 2050)	31 years (2021 through 2051)
Construction	9 years (2021 through 2029)	9 years (2021 through 2029)	10 years (2021 through 2030)
Drilling[a]	6 years (2024 through 2029)	6 years (2024 through 2029)	6 years (2025 through 2030)
Operations	25 years (2026 through 2050)	25 years (2026 through 2050)	25 years (2027 through 2051)
First oil	2025 (fourth quarter)	2025 (fourth quarter)	2026 (fourth quarter)

[a] Drilling would consist of Bear Tooth drill site 1 (BT1) pre-drilling activity (2 years) before the Willow Processing Facility (WPF) is operational; development drilling (4 years) would commence after the WPF is operational. During pre-drilling, drilling rigs would operate on diesel generators and during development drilling, drill rigs would operate on electrical power provided by the WPF.

4.2.10.1 Construction Phase

Gravel mining and placement would be conducted almost exclusively during winter. Prepacking snow and ice road construction to access the gravel mine site and gravel road and pad locations would occur in December and January, with ice roads assumed available for use by February 1, pending tundra travel authorization approvals from regulatory agencies.

Gravel for the gravel infrastructure associated with initial construction (access road [Alternatives B and C], BT1, BT2, BT3, connecting roads, WPF, WOC, and airstrips) would be mined and placed during winter (January through April) of the first 4 to 5 years of construction (varies by alternative). Two additional winter seasons of gravel mining and placement would occur to construct BT4, BT5, and associated roads.

Gravel roads and pads would be built by constructing an ice road followed by gravel placement. Gravel conditioning (turning the upper layers once or twice during the summer to expose, thaw, and dewater the deeper layers) and recompaction would occur later that same year (likely in August and September). Culvert locations would be identified (as described in Section 4.2.3.2.2, *Culverts*) and culverts would be installed per the final design during the first construction season prior to spring breakup. Additional culverts may be placed after spring breakup as site-specific needs are further assessed. Bridges would be constructed during winter from ice roads and pads.

Once gravel pads are constructed, on-pad facility construction and installation would commence. Modules for the WPF, BT1, BT2, and BT3 would be delivered by sealift barge during the summer open-water season (Section 4.7). Modules would be staged until the following winter construction season, when they would be transported to their installation location via ice road (ice road routes would vary by module delivery option). Modules for BT4 and BT5 would be delivered via a second sealift 2 years after the first delivery and moved to the Project area in the same manner as modules for BT1, BT2, and BT3.

The CFWR would be constructed during Q1 and the second quarter (Q2) of 2023 (under all action alternatives). Excavated material within the reservoir and channel connection would be removed and used to construct the perimeter berm or hauled to the mine site for disposal within the mine site excavation pit. The freshwater pipelines would also be constructed in 2023. CPAI anticipates that the reservoir would flood during the breakup seasons of 2023 and 2024 (at the end of Q2). The degree to which the CFWR would fill in 2023 would be dependent on the water volume available from Lake M0015 during breakup and the adaptive management efforts by CPAI to avoid impacts to Lake M0015 and Willow Creek 3. CPAI assumes the CFWR would be available for use in the third quarter (Q3) of 2024.

Pipelines would be installed during winter from ice roads. First, VSM locations would be surveyed and drilled. In most locations, a VSM and an HSM would be assembled and installed using a sand slurry for backfill around the VSM. Alternatively, VSMs may be driven into an undersized borehole using a vibratory hammer. Engineering design would determine which method would be used for any given set of VSMs. The pipelines would be strung, welded, tested, and installed on pipe saddles atop the HSMs. The HDD Colville River pipeline crossing would be completed during the winter construction season of 2024 (Section 4.2.2.3). Pipeline installation would take from 1 to 4 years per pipeline, depending on pipeline length and location.

Gravel haul and placement to modify Oliktok Dock would occur during the 2022 summer season (Alternatives B and C) or 2023 (Alternative D). During each summer open-water season before sealift arrival, screeding at the barge lightering area and the area in front of Oliktok Dock would occur around mid-July, once the risk of ice encroachment has passed.

4.2.10.2 Drilling Phase

Drilling is planned to begin in 2024 (Alternatives B and C) or 2025 (Alternative D) at BT1. Two drilling rigs would be mobilized to the Project area and drilling would begin prior to completion of the WPF and drill site facilities. This pre-drilling period would last approximately 24 months and would allow the WPF to be commissioned immediately following construction by timing the completion of a sufficient number of wells to provide the minimum fluid rates to commission the pipelines and the WPF. Pre-drilling would eliminate a 1- to 2-year delay between construction and production of first oil. It is assumed the wells would be drilled consecutively, from BT1 to BT5; however, CPAI would determine the final timing and order of drilling based on economics and drill rig availability.

Drilling is anticipated to take 6 years and would be conducted year-round with an anticipated progress rate of approximately 15 to 30 days per well.

4.2.10.2.1 Hydraulic Fracturing

Project drilling would include the use of hydraulic fracturing techniques, which is a process used to increase the flow of fluids from a reservoir into the wellbore and to establish a connection between oil-bearing formation layers. Each production well would receive a multistage hydraulic fracturing operation similar to those employed at other North Slope developments. The process would involve isolating a portion of the reservoir to be fractured and then pumping gelled seawater or brine mixed with a proppant (small beads of sand or human-made ceramic material) at high pressure into the formation. The high-pressure fluid would create fractures in the formation, and the proppants would prevent the fracture from closing, allowing oil and gas within the formation to flow into the wellbore and, ultimately, the surface.

It is anticipated that each well would be hydraulically fractured one time with approximately 12 to 20 individual fracturing locations within the well. Hydraulic fracturing operations would last approximately 6 days per well with six wells per pad per year being fracture stimulated. Two hydraulic fracturing operations could occur concurrently, although not on the same pad; however, fracturing operations may occur simultaneously, with well drilling on the same pad. Total water use for hydraulic fracturing would be approximately 14,000 to 24,000 barrels (0.6 to 1.0 MG) of seawater (following WPF startup). Hydraulic fracturing would only be used during the initial stage of drilling to stimulate flows at the production wells; it would not be needed for continued production over the life of the Project.

The Alaska Oil and Gas Conservation Commission (AOGCC) maintains jurisdiction over the subsurface fracturing process (20 AAC 25.283), and all hydraulic fracturing activities would comply with AOGCC regulations. AOGCC regulations specifically require the disclosure of chemicals used in the hydraulic fracturing process, including the anticipated volume of fluids to be used in the operation. Other agencies (e.g., EPA, ADEC, Alaska Department of Natural Resources) maintain some regulatory oversight, although this is primarily limited to surface activities associated with the equipment and materials used in the hydraulic fracturing process.

4.2.10.3 Operations Phase

Following initial well drilling and WPF start-up, typical operations would consist of well operations and production and transportation of produced hydrocarbons. Well maintenance operations would occur intermittently throughout the life of the Project. CPAI's standard operations and maintenance practices would be implemented for this Project phase.

Table D.4.4 summarizes the anticipated daily production profile for each action alternative; these production values include fluids produced at GMT-2 and processed at the WPF.

Table D.4.4. Estimated Daily Oil Production Profiles by Alternative, Including Contributions from the Greater Mooses Tooth 2 Development (thousands of barrels of oil per day)

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
2026	194	194	NA
2027	194	194	194
2028	193	193	194
2029	161	161	193
2030	133	133	161
2031	120	120	133
2032	112	112	120
2033	99	99	112
2034	85	85	99
2035	73	73	85
2036	66	66	73
2037	58	58	66
2038	54	54	58
2039	49	49	54
2040	45	45	49
2041	41	41	45
2042	38	38	41
2043	35	35	38
2044	32	32	35
2045	29	29	32
2046	28	28	29
2047	26	26	28
2048	24	24	26
2049	23	23	24
2050	21	21	23
2051	NA	NA	21

Note: NA (not applicable)

4.2.11 Project Infrastructure in Special Areas

All action alternatives would include Project infrastructure located in BLM-identified Special Areas.

Alternatives B and C would construct approximately 1 mile of road and pipeline and Alternative D would construct approximately 1 mile of pipeline in the 1977 designated Colville River Special Area (CRSA) (BLM 2008a). In making this designation, the Secretary of the Interior stated that

> *the central Colville River and some of its tributaries provide critical nesting habitat for the arctic peregrine falcon, an endangered species. The bluffs and cliffs along the Colville River provide nesting sites with the adjacent areas being utilized as food hunting areas* (42 FR 28515, June 3, 1977).

The CRSA is approximately 2.4 million acres and includes lands around the Colville River. The Project infrastructure would avoid setbacks established along the Colville River to protect Arctic peregrine falcon (*Falco peregrinus tundrisus*) nesting habitat in the CRSA (Protection 1 in BLM [2008] and BMP K-1 in BLM [2013]). Consistent with BLM BMP K-7 (BLM 2013), in designing the Project, CPAI made reasonable and practicable efforts to locate permanent facilities as far from raptor nests as feasible and to minimize loss of potential raptor foraging habitat, with consideration for other potential impacts.

All action alternatives would include drill sites BT2 and BT4 and associated roads and pipelines within the TLSA; under Alternative C, the North WOC and airstrip would also be within the TLSA. Under Alternatives C and D, the water source access road and pad to Lake M0235 would also be within the TLSA. The TLSA was established in 1977 (BLM 2013) with the purpose of protecting caribou calving and insect-relief areas and waterbird and shorebird breeding, molting, staging, and migration habitats. As described in BLM (2013),

> *designation of lands as a Special Area carries with it no specific restrictions on activities. It does require, however, that activities be conducted in a manner which will assure the maximum protection of surface values [as identified by the Secretary for the Special Area] to the extent consistent with the requirements of the [Naval Petroleum Reserves Production Act] NPRPA for exploration and production activities.*

4.2.12 Compliance with Bureau of Land Management Stipulations, Best Management Practices, and Supplemental Practices

Due to technical constraints, some Project facilities would require deviations from NPR-A lease stipulations and BMPs (Section 2.1., *Lease Stipulations and Best Management Practices in the National Petroleum Reserve in Alaska*). The likely deviations are described in Table D.4.5. Each identified deviation would be reviewed as the Project design engineering advances for opportunities to conform to the lease stipulations and BMPs to the extent practicable. When deviations are granted, they typically are specific to stated Project actions or locations and are not granted for all Project actions. The specific number and locations of these deviations for each action alternative is described in Sections 4.3 through 4.5.

Table D.4.5. Anticipated Deviations from National Petroleum Reserve in Alaska Lease Stipulations and Best Management Practices

Lease Stipulation or Best Management Practice[a]	Best Management Practice Description and Reason for Deviation	Applicable Alternative or Option[b]
BMP 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 less than equal to 4-feet deep may be authorized from rivers on a site-specific basis. *Reason for deviation*: 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.	Option 3
LS 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 waterways. *Reason for deviation*: LS 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 LS 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.	All

Lease Stipulation or Best Management Practice[a]	Best Management Practice Description and Reason for Deviation	Applicable Alternative or Option[b]
BMP 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. Design standards include: Pipelines shall be elevated a minimum of 7 feet above the surrounding ground surface; crossing ramps for pipelines may be required; and a minimum distance of 500 feet between pipelines and roads shall be maintained. *Reason for deviation*: While BMP E-7 requires a minimum distance of 500 feet between pipelines and roads, it is acknowledged this may not be feasible in all areas. In these cases, alternative designs would be considered by the BLM authorized officer. Initial pipeline engineering has identified that the minimum distances would not be feasible in all areas for all action alternatives 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.	All
BMP E-11	*Objective*: Minimize the take of species, particularly those listed under the Endangered Species Act and BLM Special Status Species, from direct or indirect interaction with oil and gas facilities. *Requirement/Standard*: Specific requirements for surveys, facility siting, and facility design vary based on species (which includes spectacled and Steller's eiders [*Somateria fischeri* and *Polysticta stelleri*] and yellow-billed loons). *Reason for deviation*: All action alternatives would cross the default standard mitigation disturbance setback of 1 mile around recorded nest sites for yellow-billed loons and a 500-meter (1,625-foot) setback of the shoreline of nest lakes.	All
LS/BMP K-1	*Objective*: Minimize the disruption of natural flow patterns and changes to water quality; minimize the disruption of natural functions resulting from the loss or change to vegetative and physical characteristics of floodplain and riparian areas; minimize the loss of spawning, rearing, or overwintering fish habitat; minimize the loss of cultural and paleontological resources; minimize the loss of raptor habitat; minimize the disruption of subsistence activities; and minimize impacts to scenic and other resources. *Requirement/Standard*: Permanent oil and gas facilities, including gravel pads, roads, airstrips, and 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 (Uvlutuuq) Creek (3-mile setback), Judy (Iqalliqpik) Creek (0.5-mile setback), and the Ublutuoch (Tiŋmiaqsiuġvik) River (0.5-mile setback). *Reason for deviation*: Alternatives B and D would include essential road and pipeline crossings of Judy (Iqalliqpik) and Fish (Uvlutuuq) creeks; Alternative C would include an essential road and pipeline crossing of Fish (Uvlutuuq) Creek and an essential pipeline crossing of Judy (Iqalliqpik) Creek. Pipeline valve pads would also be located within the prescribed setbacks under all action alternatives. All action alternatives would locate the Tiŋmiaqsiuġvik Gravel Mine Site within the prescribed setback.	All
LS/BMP K-2	*Objective*: Minimize the disruption of natural flow patterns and changes to water quality; minimize the disruption of natural functions resulting from the loss or change of vegetative and physical characteristics of deepwater lakes; minimize the loss of spawning, rearing, or overwintering fish habitat; minimize the loss of cultural and paleontological resources; minimize impacts to subsistence cabins and campsites; and minimize the disruption of subsistence activities. *Requirement/Standard*: Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are generally prohibited on the lake or lakebed within 0.25 mile of the ordinary high-water mark of any deep lake (i.e., depth greater than 13 feet). *Reason for deviation*: All action alternatives include a constructed freshwater reservoir at Lake M0015, a previously identified deepwater lake.	All

Lease Stipulation or Best Management Practice[a]	Best Management Practice Description and Reason for Deviation	Applicable Alternative or Option[b]
LS/BMP K-6b	*Objective*: Protect coastal waters and their value 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 walrus and seals; prevent the loss of important bird habitat and alteration or disturbance of shoreline marshes; and prevent impacts to subsistence resources and activities. *Requirement/Standard*: Marine vessels used as part of a BLM-authorized activity 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 deviation*: All action alternatives include sealift barge delivery of bulk construction materials, which would require grounding of barges to facilitate offloading. Barge grounding would require ballast water transfers.	All

Note: BLM (Bureau of Land Management); BMP (best management practice); LS (lease stipulation).
[a] LSs and BMPs are identified in BLM (2013).
[b] Excludes essential road and pipeline crossings.

The Point Lonely MTI (Section 4.7.2, *Option 2: Point Lonely Module Transfer Island*) would require the use of existing gravel infrastructure located in a portion of the K-5 Teshekpuk Lake Caribou Habitat Area, which prohibits construction of new nonsubsistence infrastructure. The NPR-A IAP/EIS ROD (2013) states that "construction, renovation, or replacement of facilities on the existing gravel pads at Camp Lonely and Point Lonely may be permitted if the facilities will promote safety or environmental protection." Because use of existing gravel facilities would minimize environmental impacts, it would promote environmental protection. Consequently, use of the existing infrastructure at Point Lonely (Section 4.7.2) conforms to the IAP and no deviation to existing BMPs is necessary.

Should BLM select revisions to BMP C-1 in the revised NPR-A IAP ROD, module delivery options 1 (Atigaru Point MTI; Section 4.7.1, *Option 1: Atigaru Point Module Transfer Island*) and 2 (Point Lonely MTI; Section 4.7.2) would require a deviation to support sea ice road construction, which would be wider than 12 feet.

4.2.13 Boat Ramps for Subsistence Users

CPAI proposes to construct up to three boat ramps (number varies by action alternatives) for subsistence use as part of its effort to mitigate Project effects on the community of Nuiqsut (Figure D.4.9). CPAI proposes to construct one boat ramp (all action alternatives) to access the Ublutuoch (Tiŋmiaqsiuġvik) River along the existing gravel road between Alpine CD5 and GMT-1. Two additional boat ramps could be constructed along Judy (Iqalliqpik) Creek and/or Fish (Uvlutuuq) Creek under Alternative B, pending further community input; these boat ramps would be accessed via short gravel roads connected to Project roads near Project bridges. Due to roadless sections contained in Alternatives C and D, these two additional boat ramps would not apply to these alternatives as there would be no gravel road connection to these locations from Nuiqsut.

Preliminary locations and boat ramp design have been determined, but CPAI is seeking community feedback on the preferred location(s) that would best serve the needs of the community. The boat ramps would include a gravel pad with space for vehicles to turn around and provide parking space for approximately 10 vehicles with trailers. The total acreage below OHW for all three boat ramps would be approximately 0.2 acres. The gravel access road would likely have a surface width of 24 feet. Boat ramp footprints are summarized in Table D.4.6. CPAI estimates approximately 20,000 cy of gravel fill would be required to construct each of the three boat ramps. Gravel for the boat ramps would come from the Tiŋmiaqsiuġvik Gravel Mine Site (Section 4.2.6).

Table D.4.6. Boat Ramp Footprint Summary

Boat Ramp Location[a]	Applicable Alternative	Total Footprint (acres)[a]	Gravel Fill Volume (cubic yards)[a]
Ublutuoch (Tiŋmiaqsiuġvik) River	B, C, D	1.8	20,000
Judy (Iqalliqpik) Creek	B	2.0	20,000
Fish (Uvlutuuq) Creek	B	2.1	21,000
Total	**NA**	**5.9**	**61,000**

Note: NA (not applicable).
[a] Includes gravel boat ramp access road, gravel (parking) pad, and boat ramp above and below ordinary high water.

The Ublutuoch (Tiŋmiaqsiuġvik) River boat ramp would be constructed during the first year of Project construction, and under Alternative B, the boat ramps at Judy (Iqalliqpik) Creek and Fish (Uvlutuuq) Creek would be constructed within 2 years of constructing the BT1 and BT4 access roads, respectively, after site visits and input from local stakeholders. Gravel placement would occur during winter months with gravel seasoning and compaction occurring the following summer. Boat ramp construction would not require pile driving. The need for erosion control would be evaluated during the final design phase, after locations have been finalized based on community input.

The boat ramp would be designed and constructed to avoid impacts on fish and fish habitat and would be coordinated with BLM and ADF&G.

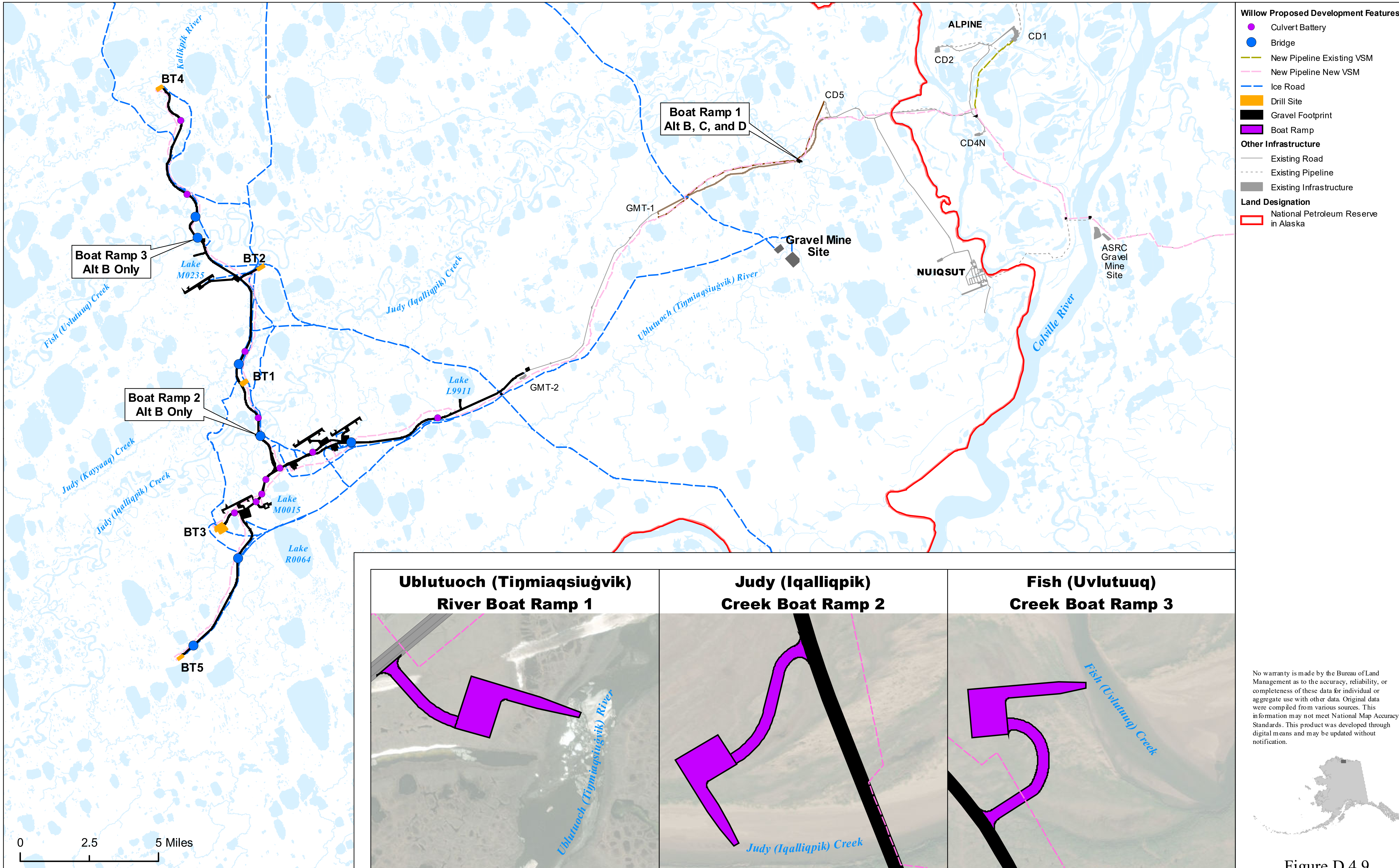

Willow Proposed Development Features
Culvert Battery
Bridge
New Pipeline Existing VSM
New Pipeline New VSM
Ice Road
Drill Site
Gravel Footprint
Boat Ramp
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
Land Designation
National Petroleum Reserve in Alaska
ALPINE
CD1
CD2
CD4N
CD5
Boat Ramp 1 Alt B, C, and D
Boat Ramp 3 Alt B Only
Boat Ramp 2 Alt B Only
BT1
BT2
BT3
BT4
BT5
GMT-1
GMT-2
Gravel Mine Site
NUIQSUT
ASRC Gravel Mine Site
Colville River
Kalikpik River
Fish (Uvlutuuq) Creek
Judy (Iqalliqpik) Creek
Judy (Kayyaaq) Creek
Ublutuoch (Tiŋmiaqsiuġvik) River
Lake M0235
Lake L9911
Lake M0015
Lake R0064
0 2.5 5 Miles
Ublutuoch (Tiŋmiaqsiuġvik) River Boat Ramp 1
Judy (Iqalliqpik) Creek Boat Ramp 2
Fish (Uvlutuuq) Creek Boat Ramp 3
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure D.4.9

4.3 Alternative B: Proponent's Project

Alternative B would extend an all-season gravel road from the GMT-2 development southwest, toward the Project area (Figure D.4.1). Gravel roads would connect to all Project facilities, including the WPF, WOC, airstrip, and all five drill sites. Additional Project support facilities would include the CFWR, four valve pads, four pipeline pads, two water source access pads (at the CFWR and Lake L9911), eight road turnouts (with subsistence access ramps), HDD pipeline pads at the Colville River, and three boat ramps.

Alternative B would construct seven bridges (one on the road extending from GMT-2 and six on the roads to Project pads). Infield (multiphase) pipelines would connect individual drill sites to the WPF and export/import pipelines would connect the WPF to existing infrastructure on the North Slope. Diesel fuel would be piped from Kuparuk CPF2 to the ACF and then trucked 37.5 miles to the Project area. Alternative B would also include pipeline tie-in pad near Alpine CD4N and an expansion of the existing pad at Kuparuk CPF2.

Sealift module delivery to the Project area would be required (Section 4.7, *Sealift Module Delivery Options*).

The Alternative B road alignment would provide direct gravel road access from the existing gravel road network in the GMT and Alpine developments to the Project facilities. The full, all-season gravel road access connection to Alpine would allow for additional operational safety and risk reduction by providing redundancies and additional contingencies for each project and would provide support for reasonably foreseeable future actions described in Table E.19.1 in Appendix E.19, *Cumulative Effects Technical Appendix*. Table D.4.7 provides a summary of Project components and their associated footprint for Alternative B.

Alternative B is BLM's preferred alternative. The identification of a preferred alternative does not constitute a commitment or decision; if warranted, BLM may select a different alternative than the preferred alternative in its ROD.

Table D.4.7. Summary of Components for Alternative B: Proponent's Project

Project Component	Description
Drill site gravel pads	Five (79.8 acres total): BT1, BT2, and BT3 (17.0 acres each) and BT4 and BT5 (14.4 acres each)
WPF gravel pad	22.8-acre pad
WOC gravel pad	31.3-acre pad
Water source access gravel pads	Two water source access pads (2.6 acres total) at the CFWR (1.3 acres) and Lake L9911 (1.3 acres)
CFWR	16.3-acre excavation (reservoir and connecting channel) and 3.9-acre perimeter berm
Other gravel pads	Four valve pads (1.3 acres total); two pads at Judy (Iqalliqpik) Creek pipeline crossing (0.7 acres) and two pads at Fish (Uvlutuuq) Creek pipeline crossing (0.6 acres) HDD pipeline pads (two total) at Colville River crossing (1.5 acres total) Tie-in pad near Alpine CD4N (0.7 acre) Pipeline crossing pad near GMT-2 (0.5 acre) Kuparuk CPF2 pad expansion (1.0 acre) Communications tower pad (0.5 acre)
Single-season ice pads	Used during construction at the gravel mine site, bridge crossings, the Colville River HDD crossing, and other locations as needed in the Project area (936.6 total acres)
Multi-season ice pads	10.0-acre multi-season ice pad near GMT-2 (Q1 2021 to Q2 2022, Q1 2022 to Q2 2023, Q1 2023 to Q2 2024, and Q1 2024 to Q2 2025) 10.0-acre multi-season ice pad near WOC (Q1 2021 to Q2 2022) 10.0-acre multi-season ice pad at the Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2022 and Q1 2022 to Q2 2023)
Infield pipelines	43.4 total miles: BT1 to WPF (4.3 miles); BT2 to BT1 (4.7 miles); BT3 to WPF (4.2 miles); BT4 to BT2 (10.2 miles); BT5 to WPF (9.8 miles); GMT-2 to WPF (10.2 miles)
Willow export pipeline	33.3 total miles (WPF to tie-in pad near Alpine CD4N)
Other pipelines	64.3-mile seawater pipeline (Kuparuk CPF2 to WPF); includes Colville River HDD crossing 34.4-mile diesel pipeline (Kuparuk CPF2 to Alpine CD1); includes Colville River HDD crossing 2.8-mile fuel gas pipeline (WOC to WPF) 4.9-mile freshwater pipeline (CFWR to WPF to WOC) 2.8-mile treated water pipeline (WOC to WPF)
Gravel roads	37.0 miles (260.2 acres, including vehicle turnouts) total connecting drill sites to the WPF, WOC, airstrip access road, water source access roads, and GMT-2 Eight turnouts with subsistence tundra access ramps (3.0 acres total)

Project Component	Description
Bridges	Seven total at Judy (Iqalliqpik) Creek, Judy (Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4A, and Willow Creek 8
Airstrip	6,200 × 200–foot airstrip and apron (42.1 acres total); would also require airstrip access road
Boat ramps	1.8 acres at Ublutuoch (Tiŋmiaqsiuġvik)River 2.0 acres at Judy (Iqalliqpik) Creek 2.1 acres at Fish (Uvlutuuq) Creek 5.9 acres total
Oliktok Dock modifications	Modifications to the existing dock include adding structural components and a gravel ramp within the existing developed footprint 2.5 acres of screeding at Oliktok Dock 9.6 acres of screeding at the barge lightering area
Ice roads	Approximately 495.2 total miles (3,590.7 total acres) over nine construction seasons
Total footprint and gravel fill volume[a]	454.1-acre gravel footprint using 4.9 million cy of gravel fill and 25,000 cy of native fill 149.7-acre gravel mine site excavation 16.3-acre excavation at the CFWR 12.1-acre screeding area
Gravel source	Two mine site cells (149.7 total acres) in Tiŋmiaqsiuġvik area (Mine Site Area 1 would be 109.3 acres and Mine Site Area 2 would be 40.4 acres)
Total freshwater use	1,662.4 million gallons over the life of the Project (30 years)
Ground traffic (number of trips)[b,c]	3,188,910
Fixed-wing air traffic (number of trips)[b, d]	12,101 total flights Willow: 11,809 Alpine: 292
Helicopter air traffic (number of trips)[b]	2,421 total flights Willow: 2,321 Alpine: 100
Marine traffic (number of trips)[b,e]	319 total trips Sealift barges: 24 Tugboats: 37 Support vessels: 258
Infrastructure in special areas	Colville River Special Area: 1.0 mile (8.1 acres) of gravel road; 1.4 miles of pipeline Teshekpuk Lake Special Area: 10.8 miles of gravel road and gravel pads (106.3 total acres); 11.4 miles of pipeline
Fish-bearing waterbody setback overlap (LS E-2)	56.0 acres of gravel footprint, 5.5 miles of gravel road, and 5.5 miles of pipelines 23.1 acres of gravel mine site excavation
Less than 500-foot pipeline-road separation (BMP E-7)	15.7 miles of pipelines and road with less than 500 feet of separation
Yellow-billed loon setback overlap (BMP E-11)	60.0 acres of gravel infrastructure and 7.7 miles of pipelines within 1 mile of a nest 25.8 acres of gravel infrastructure and 3.3 miles of pipelines within 1,625 feet of lakes with nests
River setback overlap (BMP K-1)	Colville River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines Fish (Uvlutuuq) Creek: 12.3 acres of gravel infrastructure and 5.5 miles of pipelines Judy (Iqalliqpik) Creek: 18.7 acres of gravel infrastructure and 2.3 miles of pipelines Ublutuoch (Tiŋmiaqsiuġvik) River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines; 137.8 acres of gravel mine site excavation
Deepwater lake setback overlap (BMP K-2)	3.2 acres of gravel infrastructure and 0.0 mile of pipelines; 14.5 acres of the constructed freshwater reservoir would be within the setback and 1.4 acres of the reservoir connection would be within the lake

Note: BMP (best management practice); 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); CFWR (constructed freshwater reservoir); cy (cubic yards); GMT-2 (Greater Mooses Tooth 2); HDD (horizontal directional drilling); LS (lease stipulation); Q1 (first quarter); Q2 (second quarter); VSM (vertical support member); WPF (Willow Processing Facility); WOC (Willow Operations Center).

[a] Values may not sum to totals due to rounding.

[b] Total traffic for 30-year life of the Project (not including reclamation activity). Ground traffic trips are one-way; a single flight is defined as a landing and subsequent takeoff; and a vessel trip is defined as a docking and subsequent departure.

[c] Number of trips includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Construction ground traffic also includes gravel hauling (e.g., B-70/Maxi Haul dump trucks).

[d] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse); includes Q400, C-130, Twin Otter/CASA, Cessna, and DC-6 or similar aircraft.
[e] Includes crew boats, tugboats supporting sealift barges, screeding barges, and other support vessels.

4.3.1 Project Facilities and Gravel Pads

Project facilities proposed for the WPF, drill sites, and the WOC for Alternative B are described in Section 4.2.1, *Project Facilities and Gravel Pads*. Under Alternative B, the WPF would be located approximately 3.5 miles northeast of BT3 and the WPF would be located approximately 9.3 miles by road from GMT-2. Two Class I UIC disposal wells (one for drilling and operations wastes and one for domestic wastewater) would be installed at the WOC; an existing UIC well at Alpine would provide backup, as needed.

4.3.2 Pipelines

Alternative B pipelines (Figure D.4.10) would include infield pipelines connecting each drill site (and GMT-2) to the WPF and the Willow Pipeline (oil export) connecting the WPF to existing facilities at Alpine. Additional pipelines would include a seawater import pipeline from Kuparuk CPF2 to the WPF, a diesel import pipeline from Kuparuk CPF2 to the ACF (located at Alpine CD1; diesel fuel would be trucked from Alpine to the Project area), and a freshwater pipeline from the CFWR access pad to the WPF and the WOC (Figure D.4.10). VSMs would be installed using the drill-set-slurry method. Alternative B would require approximately 13,000 total VSMs with an estimated 0.8-acre total disturbance footprint. Pipeline design would be as described in Section 4.2.2.

All pipelines would parallel gravel roads to facilitate routine visual observation and investigation of pipelines. Conducting visual observation and investigation of pipelines from a gravel road would reduce the number and frequency of aircraft flights required to visually inspect pipelines.

The Willow Pipeline (oil export) and seawater pipeline would be constructed on new VSMs from the WPF to the tie-in pad near Alpine CD4N (Willow Pipeline) and Kuparuk CPF2 (seawater pipeline), as described in Section 4.2.2. The diesel pipeline would be placed on new VSMs (shared with the seawater pipeline) between Kuparuk CPF2 and Alpine CD4N and on existing VSMs from Alpine CD4N to the ACF located at Alpine CD1. From Alpine CD1, diesel fuel would be trucked to the WOC, WPF, and other facilities. In total, 314.2 miles of pipelines would be constructed with 311.1 miles of pipelines on new VSMs (approximately 99%) and 3.1 miles of pipelines on existing VSMs (approximately 1%) using 97.5 miles of new and existing pipeline corridors. Infield pipelines would connect each drill site to the WPF. Where practicable, infield pipelines would tie into other infield pipelines (Section 4.2.2.1, *Infield Pipelines*) to minimize redundant parallel pipelines. Water pipelines would connect the CFWR to the WOC and WPF, and a fuel gas pipeline would connect the WPF to the WOC.

Table D.4.8 summarizes pipeline infrastructure under Alternative B by pipeline segment.

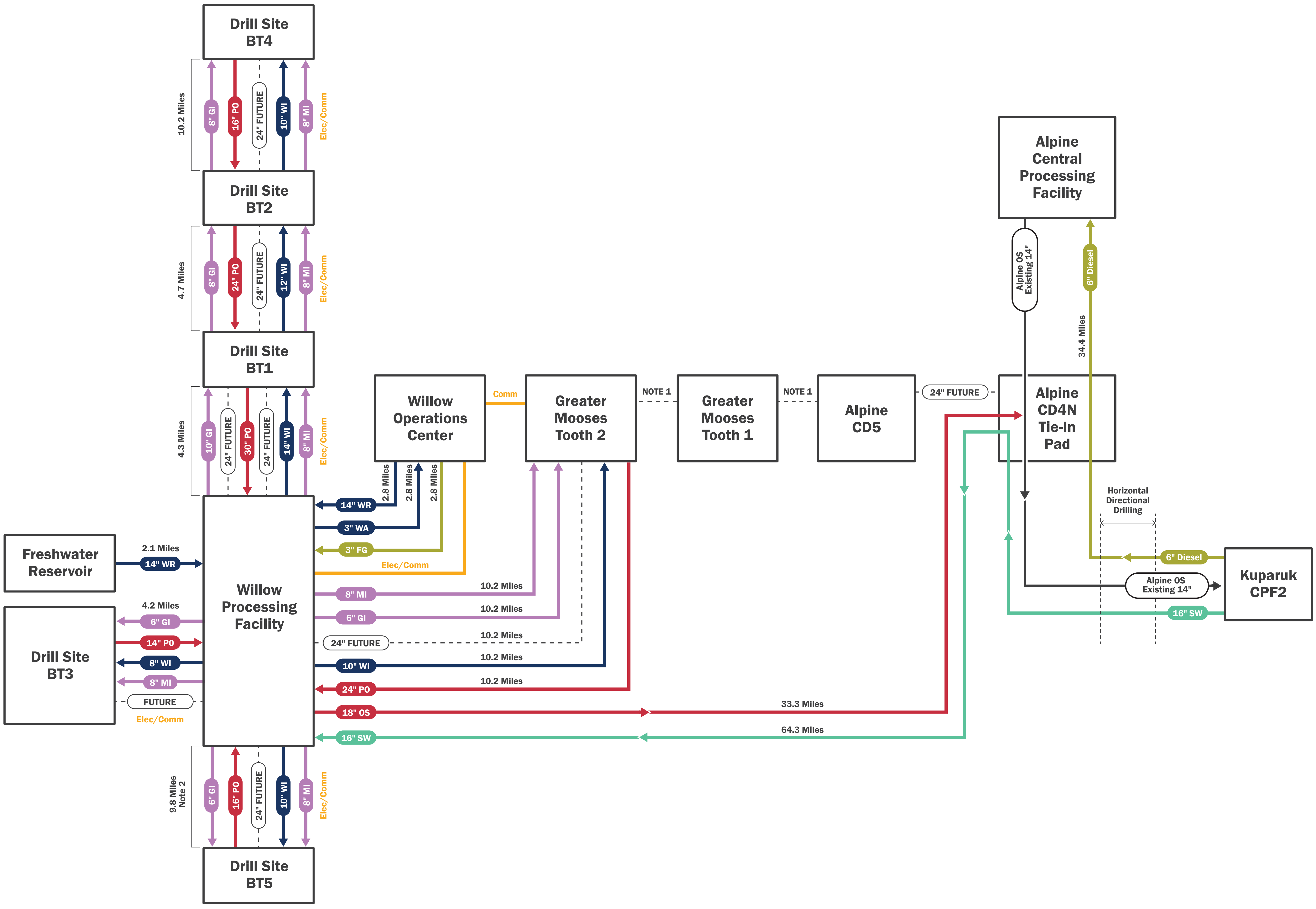
Table D.4.8. Alternative B Pipeline Segments Summary

Pipeline	Pipeline Segment	Segment Length (miles)	Notes
BT4 infield[a]	BT4 to BT2	10.2	Pipelines on new set of VSMs
BT2 infield[a]	BT2 to BT1	4.7	Pipelines on new set of VSMs; would also transport BT4 materials
BT1 infield[a]	BT1 to WPF	4.3	Pipelines on new set of VSMs; would also transport BT4 and BT2 materials
BT3 infield[a]	BT3 to WPF	4.2	Pipelines on new set of VSMs
BT5 infield[a]	BT5 to WPF	9.8	Pipelines on new VSMs; would share VSMs with BT3 infield pipeline from BT5 junction to WPF (2.8 miles)
GMT-2 infield[a]	GMT-2 to WPF	10.2	Would share new VSMs with Willow export and seawater import pipelines from GMT-2 to WPF (10.2 miles)
Freshwater	CFWR to WPF to WOC	4.9	Would share new VSMs with BT3 infield pipelines from the CFWR junction to WPF (1.7 miles) and treated water and fuel gas pipelines from WPF to WOC (2.8 miles)
Treated water	WOC to WPF	2.8	Would share new VSMs with freshwater and fuel gas pipelines from WPF to WOC (2.8 miles)
Fuel gas	WOC to WPF	2.8	Would share new VSMs with freshwater and treated water pipelines from WOC to WPF (2.8 miles)
Willow export	WPF to CD4N tie-in pad	33.3	Would share new VSMs with seawater pipeline from WPF to CD4N (33.0 miles)

Pipeline	Pipeline Segment	Segment Length (miles)	Notes
Seawater	CPF2 to WPF	64.3	Would share new VSMs with Willow Pipeline from WPF to CD4N (33.0 miles) and diesel pipeline from CD4N to CPF2 (31.3 miles); includes new HDD crossing of the Colville River near existing HDD crossing
Diesel	CPF2 to CD1	34.4	Would share new VSMs with seawater pipeline from CPF2 to CD4N (31.3 miles) and existing VSMs from CD4N to CD1 (3.1 miles); includes new HDD crossing of the Colville River near existing HDD crossing

Note: 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); CD1 (Alpine CD1); CD4N (Alpine CD4N); CFWR (constructed freshwater reservoir); CPF2 (Kuparuk CPF2); GMT-2 (Greater Mooses Tooth 2); HDD (horizontal directional drilling); VSM (vertical support member); WOC (Willow Operations Center); WPF (Willow Processing Facility).

[a] Infield pipelines include produced fluids, injection water, gas, and miscible-injectant pipelines.



Legend

- Elec/Comm — 34.5kV Power and Communications Cables
- Diesel — Diesel
- FG — Fuel Gas
- GI — Gas Injection
- MI — Miscible Injection
- PO — Production Oil
- OS — Sales Oil
- SW — Seawater
- WA — Water Fresh
- WF — Fire Protection Water
- WI — Injection Water
- WP — Potable Water
- WR — Raw Water

Notes

1. Alignment contains one empty pipeline slot on pipe supports.
2. Pipeline size, service, and length is assumed at this time.

Figure D.4.10

4.3.3 Access to the Project Area

Alternative B would include seasonal ice road access to support construction; access to the WPF from the GMT and Alpine developments via an all-season gravel road; access from the WPF to individual drill sites via all-season gravel roads; helicopter and fixed-wing aircraft to the Project and Alpine airstrips; and barge delivery of small modules and bulk construction materials to Oliktok Dock. Table D.4.9 provides a summary of total traffic volumes anticipated for the Project under Alternative B by transportation type and year; Table D.4.10 provides a detailed traffic breakdown by season.

Table D.4.9. Alternative B Total Project Traffic Volumes Summary for the Life of the Project (number of trips)

Year	Ground[a]	Fixed-Wing Trips Alpine[b,c]	Fixed-Wing Trips Willow[b,c]	Helicopter Trips Alpine[d]	Helicopter Trips Willow[d]	Barges to Oliktok Dock[e]	Tugboats to Oliktok Dock[f]	Support Vessels to Oliktok Dock[g]
2020	0	0	0	25	0	0	0	0
2021	55,300	60	0	50	0	0	0	0
2022	137,270	122	31	25	25	6	9	66
2023	274,030	75	168	0	82	8	12	88
2024	363,620	35	751	0	82	5	8	52
2025	387,490	0	707	0	82	0	0	0
2026	282,570	0	738	0	82	5	8	52
2027	242,900	0	738	0	82	0	0	0
2028	185,090	0	724	0	82	0	0	0
2029	113,200	0	560	0	82	0	0	0
2030	54,640	0	352	0	82	0	0	0
2031 to 2050	1,092,800	0	7,040	0	1,640	0	0	0
Total	**3,188,910**	**292**	**11,809**	**100**	**2,321**	**24**	**37**	**258**

Note: Ground trips are defined as one-way; a single fixed-wing or helicopter flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.
[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks).
[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse).
[c] Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.
[d] Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used. Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.
[e] Includes sealift barges for bulk materials and small modules.
[f] Includes tugboats accompanying sealift barges.
[g] Includes crew boats, screeding barge, and other support vessels.

Alternative B would have a total of 12,101 fixed-wing flights (including landings and departures at the Project airstrip and Alpine), 2,421 helicopter flights (including landings and departures at the Project airstrip and Alpine), and 61 total barge and tugboat trips from Dutch Harbor to Oliktok Dock.

During construction, ice roads would be constructed to support Project pipeline, gravel pad and gravel road construction, and gravel source (Tiŋmiaqsiuġvik Gravel Mine Site) access over nine winter construction seasons. (The Project would receive annual resupply via the Alpine ice road, which is constructed annually between Kuparuk and Alpine to support Alpine operations. This ice road mileage is not included in the Project's analyses as it would be constructed regardless in support of Alpine.) Ice road design and mileage is described in Section 4.2.3.1, *Ice Roads*.

Table D.4.10. Alternative B Detailed Project Ground and Aircraft Traffic Volumes by Season for the Life of the Project (number of trips)

Season and Year	Ground[a]	Fixed-Wing Trips Alpine[b]	Fixed-Wing Trips Willow[b]	Helicopter Trips Alpine[c]	Helicopter Trips Willow[c]
Summer 2020	0	0	0	25	0
Winter 2021	33,180	36	0	0	0
Spring 2021	11,060	12	0	12	0
Summer 2021	11,060	12	0	38	0
Fall 2021	0	0	0	0	0
Winter 2022	92,127	81	21	0	0
Spring 2022	31,554	28	7	25	0
Summer 2022	11,055	10	3	0	25
Fall 2022	1,690	2	0	0	0
Winter 2023	184,754	52	114	0	0
Spring 2023	62,991	17	39	0	25
Summer 2023	22,068	6	13	0	57
Fall 2023	3,376	0	2	0	0
Winter 2024	234,083	21	457	0	0
Spring 2024	82,013	7	169	0	25
Summer 2024	35,572	3	72	0	57
Fall 2024	9,096	0	18	0	0
Winter 2025	237,297	0	435	0	0
Spring 2025	86,366	0	158	0	25
Summer 2025	42,027	0	77	0	57
Fall 2025	17,566	0	32	0	0
Winter 2026	167,540	0	430	0	0
Spring 2026	60,752	0	158	0	25
Summer 2026	39,566	0	103	0	57
Fall 2026	15,666	0	40	0	0
Winter 2027	147,474	0	443	0	0
Spring 2027	52,813	0	160	0	25
Summer 2027	31,653	0	96	0	57
Fall 2027	12,530	0	38	0	0
Winter 2028	106,234	0	409	0	0
Spring 2028	39,470	0	154	0	25
Summer 2028	27,238	0	106	0	57
Fall 2028	12,274	0	48	0	0
Winter 2029	57,077	0	276	0	0
Spring 2029	22,640	0	112	0	25
Summer 2029	22,640	0	112	0	57
Fall 2029	11,320	0	56	0	0
Winter 2030	30,248	0	187	0	0
Spring 2030	10,928	0	71	0	25
Summer 2030	10,928	0	72	0	57
Fall 2030	5,464	0	36	0	0
Winter 2031–2050	549,132	0	3,538	0	0
Spring 2031–2050	218,560	0	1,408	0	500
Summer 2031–2050	218,560	0	1,408	0	1,140
Fall 2031–2050	109,280	0	704	0	0
Total[d]	**3,188,922**	**287**	**11,806**	**100**	**2,321**

Note: Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff.

[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks).

[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

[c] Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.

[d] Values may not match other summary traffic values presented in the Final EIS due to rounding.

Gravel roads would provide year-round access between the GMT and Alpine developments and the Project area and from the WPF to individual drill sites. Alternative B gravel roads would require construction of seven bridges (Table D.4.11) following the design described in Section 4.2.3.2.1, *Bridges*. Five of the seven bridges would require the placement of 36 total piles (ranging from 36 to 48 inches in diameter) below OHW (Table D.4.11). Alternative B would also require 11 additional culverts or culvert batteries at swale crossings (Figure D.4.1) and 202 cross-drainage culverts.

Table D.4.11. Alternative B Bridges Summary

Waterbody Crossing	Bridge Length (± feet)[a]	Piles below Ordinary High Water (number)[b]	Latitude (°North)	Longitude (°West)
Judy (Iqalliqpik) Creek	380	16	70.1462	152.0914
Judy (Kayyaaq) Creek	75	4	70.1848	152.1211
Fish (Uvlutuuq) Creek	420	16	70.2526	152.1787
Willow Creek 2	80	0	70.1413	151.9557
Willow Creek 4	130	0	70.0816	152.1302
Willow Creek 4a	50	0	70.0360	152.2015
Willow Creek 8	40	0	70.2635	152.1806

[a] Bridge lengths are approximations based on the interpretation of available aerial imagery and are subject to change.
[b] In-stream pile diameters are assumed to be 48 inches; diameter excludes any potential surface casing required for installation.

The airstrip (Section 4.2.3.3, *Airstrip and Associated Facilities*) would be located near the WOC and construction would begin during the winter construction season of 2021 and be completed in summer 2022. Prior to airstrip availability, the Alpine airstrip (located at Alpine CD1) would be used to support the Project. Helicopters would be used to support ice road construction, environmental monitoring, and surveying. Following construction of gravel roads, and during the drilling and operations phases, Project helicopter use would primarily be limited to ongoing environmental monitoring and spill response support.

Sealift barges would be used to deliver bulk construction materials and small modules to Oliktok Dock to support Project construction (Section 4.2.3.4). Additionally, sealift barges would be used to deliver large processing and drill site modules to the North Slope (Section 4.7). No additional or regular use of barges is proposed over the life of the Project following construction.

4.3.4 Other Infrastructure and Utilities

4.3.4.1 Ice Pads

Single- and multi-season ice pads would be used to support Project construction. Single- and multi-season ice pads are described in Section 4.2.4.1, *Ice Pads*.

Alternative B would require 936.6 acres of single-season ice pads over the Project's construction phase (9 years). Additionally, Alternative B would include the use of three multi-season ice pads to store equipment through the summer to support ice road construction and other temporary construction activities. The following 10.0-acre multi-season ice pads would be constructed under Alternative B:

- Near GMT-2 (Q1 2021 to Q2 2025)
- Near the WOC (Q1 2021 to Q2 2022)
- At the Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)

4.3.4.2 Camps

Table D.4.12 details camp requirements to support construction, drilling, and operations.

Table D.4.12. Alternative B Camps Summary

Project Phase	Camp	Location	Capacity	Use Schedule
Construction	Temporary camp	Ice pad near the WOC	250	Q1 2021 to Q4 2021
Construction	Kuukpik Pad Camp[a]	Kuukpik Pad[b]	450	Q1 2021 to Q4 2025
Construction	Alpine Operations Camp[a]	Alpine central processing facility (at Alpine CD1)[b]	250 to 300	Q1 2021 to Q2 2024
Construction	Temporary camp[c]	WOC pad	250	Q1 2022 to Q2 2024
Construction	Sharktooth Camp[a]	Kuparuk[b]	220	Q1 2022 to Q2 2024

Project Phase	Camp	Location	Capacity	Use Schedule
Drilling	Drill rig camp(s)	Drill site(s) or WOC pad	150	Q1 2024 to Q4 2029
Construction, operations	Willow Camp[c]	WOC pad	500	Q2 2024 to Q4 2027
Operations	Willow Camp[c]	WOC pad	200	Q1 2028 to Q4 2050

Note: Q1 (first quarter); Q2 (second quarter); Q4 (fourth quarter); WOC (Willow Operations Center).
[a] Existing camp.
[b] Existing gravel pad.
[c] During construction, up to 60 bed spaces may be used at the existing Kuukpik Hotel in Nuiqsut in lieu of bed spaces identified at or near the WOC.

4.3.4.3 Utilities, Waste Handling, and Fuel and Chemical Storage

Power generation and distribution, communications, potable water systems and use, domestic wastewater, solid waste, and drilling waste handling, as well as fuel and chemical storage, would be as described under Section 4.2.4, *Other Infrastructure and Utilities*.

4.3.5 Water Sources and Use

As described for all action alternatives in Section 4.2.5, freshwater would be needed during construction for domestic use at construction camps, construction and maintenance of ice roads and ice pads, and hydrostatic testing of pipelines. During drilling, freshwater would be required for domestic use at the drill rig camps and to support drilling activities. Water for construction and drilling would be withdrawn from lakes in the Project area. Freshwater for domestic use during operations would be sourced from the CFWR and Lake L9911 using the freshwater intake infrastructure (Section 4.2.4.5*, Potable Water*). Anticipated freshwater use for Alternative B is detailed by year and Project phase in Table D.4.13.

Seawater would also be required, as described in Section 4.2.5, and would be sourced from the existing Kuparuk seawater treatment plant and transported via seawater pipeline to the Project area (Section 4.2.2.3, *Other Pipelines*).

Table D.4.13. Alternative B Estimated Freshwater Use by Project Phase and Year (million gallons)

Year (season)	Construction[a]	Drilling[b]	Operations[c]	Total
2020–2021 (winter)	72.4	0.0	0.0	**72.4**
2021 (summer)	1.1	0.0	0.0	**1.1**
2021–2022 (winter)	129.7	0.0	0.0	**129.7**
2022 (summer)	3.2	0.0	0.0	**3.2**
2022–2023 (winter)	241.0	0.0	0.0	**241.0**
2023 (summer)	9.5	0.0	0.0	**9.5**
2023–2024 (winter)	315.1	21.5	0.0	**336.6**
2024 (summer)	12.8	43.0	0.0	**55.8**
2024–2025 (winter)	104.5	43.9	0.0	**148.4**
2025 (summer)	19.7	44.8	0.9	**65.4**
2025–2026 (winter)	111.3	8.8	1.8	**121.9**
2026 (summer)	2.3	8.8	4.3	**15.4**
2026–2027 (winter)	103.8	8.8	3.2	**115.8**
2027 (summer)	2.6	8.8	5.1	**16.5**
2027–2028 (winter)	48.5	8.8	4.1	**61.4**
2028 (summer)	4.2	8.8	5.1	**18.1**
2028–2029 (winter)	23.5	8.8	4.1	**36.4**
2029 (summer)	2.1	8.8	5.1	**16.0**
2029–2030 (winter)	0.2	4.4	4.1	**8.7**
2030 (summer)	0.0	0.0	5.1	**5.1**
2030–2031 (winter)	0.0	0.0	4.1	**4.1**
2031 (summer)	0.0	0.0	5.1	**5.1**
2031–2032+ (19 winters)[d]	0.0	0.0	77.9	**77.9**
2032+ (19 summers)[e]	0.0	0.0	96.9	**96.9**
Total	**1,207.5**	**228.0**	**226.9**	**1,662.4**

Note: "+" indicates annual use to the end of Project operations (2050).

[a] The construction phase would include ice road construction (1.0 million gallons [MG] per mile for 35-foot-wide road, 1.4 MG per mile for a 50-foot-wide-road; and 2.0 MG per mile for 70-foot-wide road), ice pad construction (0.25 MG per acre), dust suppression, hydrostatic testing, and camp supply (100 gallons per person per day).
[b] The drilling phase would include drilling water (1.4 MG per month per drilling rig prior to Willow Processing Facility startup and 0.4 MG per drill rig per month after facility startup), hydraulic fracturing (1.0 MG per well prior to Willow Processing Facility startup), and camp supply (100 gallons per person per day).
[c] The operations phase would include dust suppression and camp supply (100 gallons per person per day).
[d] Annual winter water use for operations would be 4.1 MG.
[e] Annual summer water use for operations would be 5.1 MG.

4.3.6 Gravel and Other Fill Requirements

Project roads and pads would be constructed with gravel obtained from the Tiŋmiaqsiuġvik Gravel Mine Site and the perimeter berm surrounding the CFWR would be constructed from material excavated from the reservoir and capped in gravel. Table D.4.14 lists the estimated quantity of fill materials anticipated for each Project component.

Table D.4.14. Alternative B Estimated Fill Material Requirements by Project Component

Component	Footprint (acres)[a]	Fill Quantity (cubic yards)[a]	Fill Type	Notes and Assumptions
Drill pads (five total)	79.8	1,108,000	Gravel	Based on five drill sites with an average pad thickness of 9 feet and 2:1 side slopes
Willow Processing Facility pad	22.8	346,000	Gravel	Based on an average pad thickness of 10 feet with 2:1 side slopes
Willow Operations Center pad	31.3	487,000	Gravel	Based on an average pad thickness of 10 feet with 2:1 side slopes
Valve pads (4 total) and pipeline pads (4 total)	4.0	48,000	Gravel	Based on four valve and four pipeline pads with an average pad thickness of 7 feet and 8 feet (respectively) with 2:1 side slopes
Water source access pads (2 total)	2.6	24,000	Gravel	Based on two pads with an average pad thickness of 7 feet with 2:1 side slopes
Communications tower pad	0.5	5,000	Gravel	Based on an average pad thickness of 7 feet with 2:1 side slopes
CPF2 pad expansion	1.0	13,000	Gravel	Based on an average pad thickness of 8-feet and 2:1 side slopes
Airstrip (includes airstrip and apron)	42.1	588,000	Gravel	Based on an average pad thickness of 9.5 feet with 2:1 side slopes
Gravel roads	257.2	2,173,000	Gravel	Based on an average road surface width of 24 to 32 feet and an average thickness of 7 feet with 2:1 side slopes; includes water source and airstrip access roads
Vehicle turnouts (8 total)	3.0	32,000	Gravel	Eight subsistence tundra access road pullouts (one located every 2.5 to 3.0 miles) with an average thickness of 7 feet
CFWR perimeter berm	3.9	25,000	Overburden	Constructed from overburden material excavated during construction of the freshwater reservoir; based on an average thickness of 7 feet with 2:1 side slopes
CFWR perimeter berm	0.0	6,000	Gravel	Capping material for the overburden perimeter berm
Oliktok Dock upgrades	0.0	5,200	Gravel	All gravel would be placed within the existing developed footprint
Boat ramps	5.9	61,000	Gravel	Based on three boat ramps
Total[b]	**454.1**	**4,921,200**	**NA**	**NA**

Note: 2:1 (2 horizontal to 1 vertical ratio); CFWR (constructed freshwater reservoir); CPF2 (Kuparuk CPF2); NA (not applicable).
[a] Values are approximate and are subject to change.
[b] Values may not total due to rounding; 4,896,200 cubic yards of gravel fill and 25,000 acres of overburden fill.

4.3.7 Spill Prevention and Response

Spill prevention and response would be consistent with prevention measures and response procedures described in Section 4.2.8, *Spill Prevention and Response*. The WOC would provide a centralized facility to support Project drill sites in a variety of ways, including equipment, personnel, and other support materials, to respond to potential emergencies. Under Alternative B, CPAI would conduct regular ground-based visual inspections of facilities and pipelines, including the Willow Pipeline (oil export) and seawater pipeline from the WPF to GMT-2 from proposed gravel roads. The gravel road connection to the GMT development would also facilitate faster emergency response times to GMT-2 and GMT-1, as emergency response equipment at the Alternative B WOC would be closer to GMT-2 than the existing ACF.

4.3.8 Schedule and Logistics

Detailed schedule and logistics information is provided in Section 4.2.10, *Schedule and Logistics*. Figure D.4.11 provides a general schedule for key construction, drilling, and operations milestones. Production from BT1, BT2, and BT3 would begin in Q4 of 2025, Q2 of 2026, and Q4 of 2026, respectively. Production from BT4 could begin as early as Q1 of 2029 and from BT5 as early as Q1 of 2030. The schedule presented in Figure D.4.11 is based on the current best available information, and the schedule may be modified as detailed design progresses or as circumstances require.

4.3.9 Project Infrastructure in Special Areas

As described in Section 4.2.11, *Project Infrastructure in Special Areas*, Alternative B would include 1.0 mile of road (8.1 acres) and 1.4 miles of pipelines within the CRSA just southwest of GMT-2. Approximately 106.3 acres of the Project, including BT2 and BT4 and their associated roads (10.8 miles), and 11.4 miles of pipeline would be located within the TLSA. These special area designations allow for oil and gas development in these areas, and the Project would comply with BMPs associated with these two management areas (BLM 2008a, 2013).

4.3.10 Compliance with Best Management Practices

As described in Section 4.2.12, Alternative B would require deviations to existing LSs and BMPs, including LS E-2 and BMPs E-7, E-11, K-1, and K-2. These include the location of the proposed road alignment within 1 mile of an observed yellow-billed loon nest and/or within 1,625 feet of a loon-nesting lake shoreline at six lakes (BMP E-11). Alternative B would include a total of 15.7 miles of pipeline located within 500 feet of gravel roads (BMP E-7). This mileage is spread over several short road-pipeline stretches where separating roads from pipelines may not be feasible (e.g., within narrow land corridors between lakes, where roads converge on a drill pad). CPAI would continue to seek opportunities to avoid pipeline placement within 500 feet of gravel roads as Project engineering progresses. When deviations are granted, they typically are specified to stated Project actions or locations and are not granted for all Project actions. These deviations from NPR-A BMPs are described in more detail in Table D.4.5 (Section 4.2.12).

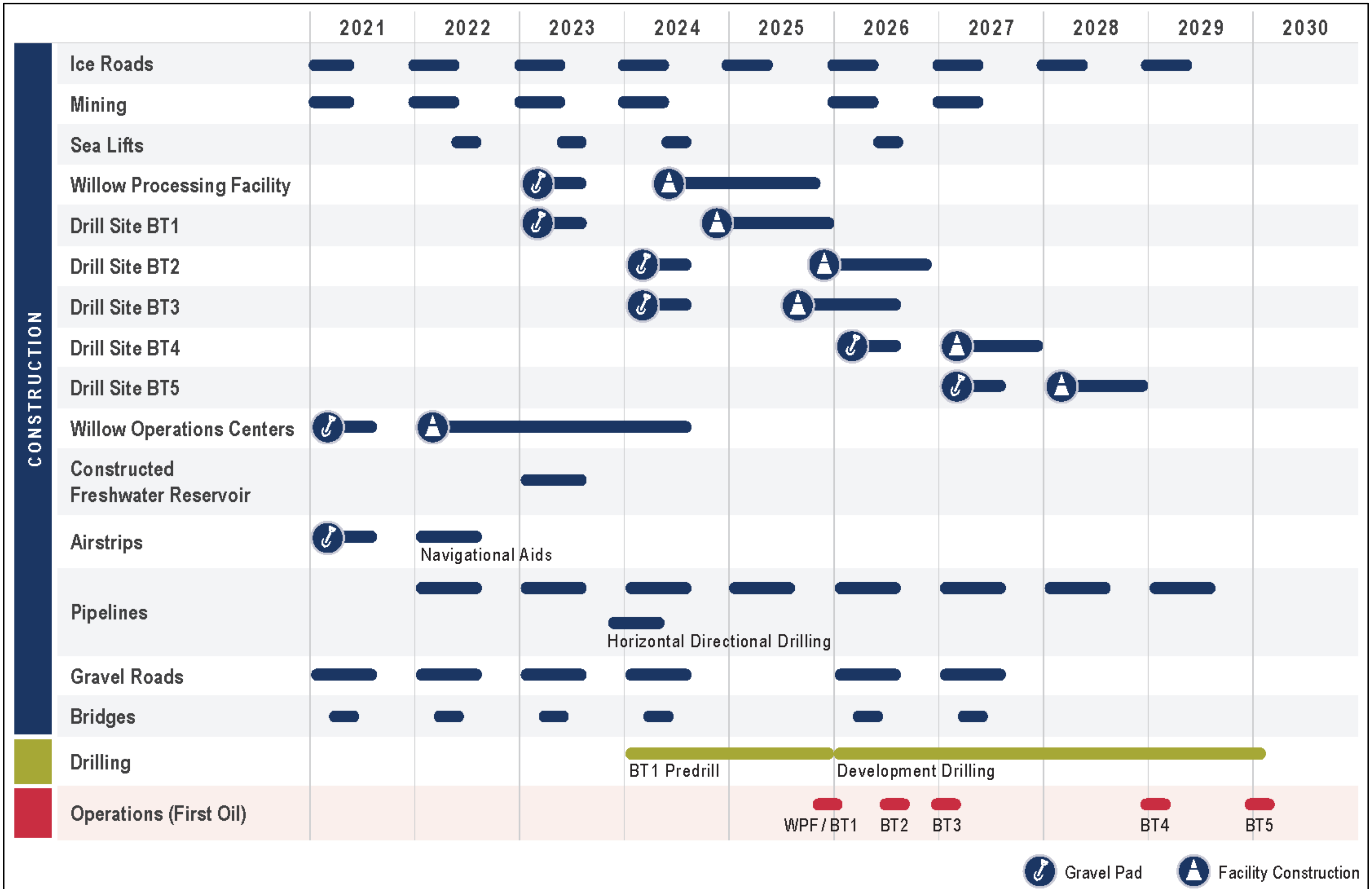
4.3.11 Boat Ramps for Subsistence Users

CPAI would construct up to three boat ramps (Figures D.4.1 and D.4.9) for subsistence use as part of its effort to mitigate Project effects on the community of Nuiqsut (Section 4.2.13, *Boat Ramps for Subsistence Users*) under Alternative B. The three boat ramps would be constructed at the following locations:

- Ublutuoch (Tiŋmiaqsiuġvik) River, along the existing gravel road between Alpine CD5 and GMT-1
- Judy (Iqalliqpik) Creek, near the proposed bridge crossing
- Fish (Uvlutuuq) Creek, near the proposed bridge crossing

The three boat ramps would have a total gravel footprint of 5.9 acres using 61,000 cy of gravel fill. The Ublutuoch (Tiŋmiaqsiuġvik) River boat ramp would be constructed during the first year of Project construction, and the boat ramps at Judy (Iqalliqpik) Creek and Fish (Uvlutuuq) Creek would be constructed within 2 years of constructing the BT1 and BT4 access roads, respectively, after site visits and input from local stakeholders.

Figure D.4.11. Alternative B Schedule



Notes: BT1/2/3/4/5 (Bear Tooth drill sites 1/2/3/4/5); WPF (Willow Processing Facility)

4.4 Alternative C: Disconnected Infield Roads

Alternative C would have the same gravel access road between GMT-2 and the Project area as Alternative B, but it would disconnect gravel road access between the WPF to BT1 (Figure D.4.2). Thus, there would be no gravel road between the two facilities or a bridge across Judy (Iqalliqpik) Creek; however, a gravel road would connect BT1 with BT2, BT4, and additional support infrastructure. A second airstrip, storage and staging facilities, and a WOC would be located west of BT2 to accommodate the movement of personnel and materials between the South WOC and the North WOC and BT1/BT2/BT4. A 3.6-mile-long annual ice road would be constructed along the Alternative B gravel road alignment for the life of the Project to allow for the movement of large equipment and consumable materials to BT1/BT2/BT4.

Additional Project infrastructure and facilities would include six bridges, four valve pads (two would be sized to be helicopter accessible at Judy [Iqalliqpik] Creek), four pipeline pads, CFWR, three water source access pads (at the CFWR and Lakes L9911 and M0235, eight road turnouts (with subsistence access ramps), HDD pipeline pads at the Colville River, and one boat ramp. Infield pipelines would connect all drill sites to the WPF. Import and export pipelines would connect BT1, BT2, and BT4 to the WPF and would connect the WPF to existing infrastructure on the North Slope. Diesel and seawater pipelines would extend from Kuparuk CPF2 to the Project area.

Under Alternative C, the WPF, South WOC, and primary Project airstrip would be located similarly to their locations in Alternative B, near the GMT and BT Unit boundaries. Alternative C (unlike Alternative B) would require a diesel pipeline connection from Kuparuk CPF2 to Alpine to the Project area due to the need to regularly supply fuel to the three disconnected drill sites; piped diesel fuel would be made available to support the Project at the WPF and South and North WOCs.

Sealift module delivery to the Project area would be required under Alternative C (Section 4.7, *Sealift Module Delivery Options*).

The intent of this alternative is to reduce effects to caribou movement and decrease the number of stream crossings required; this is also intended to further reduce impacts to subsistence users of these resources. This alternative would remove a portion of the road (versus Alternative B) that crosses Judy (Iqalliqpik) Creek, which could impede caribou movement across linear features (i.e., this alternative would avoid the junction of two roads, which could be a pinch point that deflects caribou movement). This alternative would also reduce linear infrastructure in the Project area, which would reduce some impacts to hydrology (e.g., sheet flow) and wetlands (e.g., direct fill, fugitive dust). The alternative would reduce summer ground traffic but would increase air traffic (versus Alternative B).

Table D.4.15 provides a summary of Project components and their associated impacts for Alternative C.

Table D.4.15. Summary of Components for Alternative C: Disconnected Infield Roads

Project Component	Description
Drill site gravel pads	Five (88.3 acres total): BT1 (23.3 acres), BT2 (18.1 acres), BT3 (17.0 acres), BT4 (15.5 acres), and BT5 (14.4 acres)
WPF gravel pad	22.8-acre pad located near the South Airstrip
WOC gravel pads	Two WOC pads (50.2 acres total): South WOC (33.4 acres) North WOC (16.8 acres)
Water source access gravel pads	Three water source access pads (3.9 acres total) at the CFWR (1.3 acres), Lake L9911 (1.3 acres), and Lake M0235 (1.3 acres)
CFWR	16.3-acre excavation (reservoir and connecting channel) and 3.9-acre perimeter berm
Other gravel pads	Four valve pads (1.7 acres total); two helicopter-accessible pads at Judy (Iqalliqpik) Creek pipeline crossing (1.1 acres) and two pads at Fish (Uvlutuuq) Creek pipeline crossing (0.6 acre) HDD Pipeline pads (two total) at Colville River crossing (1.5 acres total) Tie-in pad near Alpine CD4N (0.7 acre total) Pipeline crossing pad near GMT-2 (0.5 acre total) Kuparuk CPF2 pad expansion (1.0 acre) Communications tower pad (0.5 acre)
Single season ice pads	Used during construction at the gravel mine site, bridge crossings, the Colville River HDD crossing, and other locations as needed in the Project area (1,166.4 total acres)

Project Component	Description
Multi-season ice pads	10.0-acre multi-season ice pad near GMT-2 (Q1 2021 to Q2 2022, Q1 2022 to Q2 2023, Q1 2023 to Q2 2024, and Q1 2024 to Q2 2025) 10.0-acre multi-season ice pad near the South WOC (Q1 2021 to Q2 2022) 10.0-acre multi-season ice pad at the Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)
Infield pipelines	47.0 total miles (on new VSMs): BT1 to WPF (6.0 miles); BT2 to BT1 (4.5 miles); BT3 to WPF (5.9 miles); BT4 to BT2 (9.9 miles); BT5 to WPF (11.5 miles); and GMT-2 to WPF (9.2 miles)
Willow export pipeline	32.2 total miles (WPF to tie-in pad near Alpine CD4N)
Other pipelines	63.3-mile seawater pipeline from Kuparuk CPF2 to WPF; includes Colville River HDD crossing 82.0-mile diesel pipeline from Kuparuk CPF2 to South WOC to WPF to North WOC; includes Colville River HDD crossing 1.7-mile fuel gas pipeline (WPF to South WOC) 5.6-mile freshwater pipeline (CFWR to WPF to South WOC) 12.9-mile treated water pipeline (South WOC to WPF to North WOC)
Gravel roads	35.3 miles (243.2 acres, including vehicle turnouts) total connecting: BT5, BT3, CFWR, South Airstrip access road, South WOC to WPF; and WPF to GMT-2 BT1, BT2, and BT4, water source access road, North Airstrip access road, and the North WOC Eight vehicle turnouts with subsistence tundra access ramps (3.0 acres total)
Bridges	Six total: at Judy (Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4A, Willow Creek 8
Airstrips	Two airstrips (87.6 acres total) North Airstrip: 6,200 × 200–foot airstrip and apron (43.8 acres); would also require airstrip access road South Airstrip: 6,200 × 200–foot airstrip and apron (43.8 acres); would also require airstrip access road
Boat ramp	1.8 acres at Ublutuoch (Tiŋmiaqsiuġvik) River
Oliktok Dock modifications	Modifications to the existing dock include adding structural components and a gravel ramp within the existing developed footprint 2.5 acres of screeding at Oliktok Dock 9.6 acres of screeding at the barge lightering area
Ice roads	Approximately 650.1 total miles (4,411.6 total acres): 574.5 miles (4,090.3 acres) over nine construction seasons (2021 to 2029) 3.6 miles (15.3 acres) of an annual resupply ice road (2030 to 2050; 75.6 total miles; 321.3 total acres)
Total footprint and gravel fill volume[a]	507.6-acre gravel footprint using 5.8 million cy of gravel fill and 25,000 cy of native fill 149.7-acre gravel mine site excavation 16.3-acre excavation at the CFWR 12.1-acre screeding area
Gravel source	Two mine site cells (149.7 total acres) in Tiŋmiaqsiuġvik area (Mine Site Area 1 would be 109.3 acres and Mine Site Area 2 would be 40.4 acres)
Total freshwater use	1,914.3 million gallons over the life of the Project (30 years)
Ground traffic (number of trips)[b,c]	4,212,510
Fixed-wing air traffic[b,d]	19,574 total flights South Willow: 13,201 North Willow: 6,081 Alpine: 292
Helicopter air traffic[b]	2,910 total flights South Willow: 2,421 North Willow: 357 Alpine: 132
Marine traffic (number of trips)[b,e]	319 total trips Sealift barges: 24 Tugboats: 37 Support vessels: 258
Infrastructure in special areas	Colville River Special Area: 1.0 mile (8.1 acres) of gravel road; 1.4 mile of pipeline Teshekpuk Lake Special Area: 179.7 acres of gravel road and gravel pads; 12.3 miles of pipeline
Fish-bearing waterbody setback overlap (LS E-2)	50.1 acres of gravel footprint, 4.0 miles of gravel road, and 4.0 miles of pipelines 23.1 acres of gravel mine site excavation

Project Component	Description
Less than 500-foot pipeline-road separation (BMP E-7)	17.1 miles of pipelines with less than 500 feet of separation
Yellow-billed loon setback overlap (BMP E-11)	41.2 acres of gravel infrastructure and 7.7 miles of pipelines within 1 miles of a nest 13.5 acres of gravel infrastructure and 3.3 miles of pipelines within 1,625 feet of lakes with nests
River setback overlap (BMP K-1)	Colville River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines Fish (Uvlutuuq) Creek: 12.9 acres of gravel infrastructure and 5.4 miles of pipelines Judy (Iqalliqpik) Creek: 1.1 acres of gravel infrastructure and 2.3 miles of pipelines Ublutuoch (Tiŋmiaqsiuġvik) River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines; 137.8 acres of gravel mine site excavation
Deepwater lake setback overlap (BMP K-2)	3.2 acres of gravel infrastructure and 0.0 mile of pipelines; 14.5 acres of the constructed freshwater reservoir would be within the setback and 1.4 acres of the reservoir connection would be within the lake

Note: BMP (best management practice); 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); CFWR (constructed freshwater reservoir); cy (cubic yards); GMT-2 (Greater Mooses Tooth 2); HDD (horizontal directional drilling); LS (lease stipulation); Q1 (first quarter); Q2 (second quarter); VSM (vertical support member); WPF (Willow Processing Facility); WOC (Willow Operations Center).
[a] Values may not sum to totals due to rounding.
[b] Total traffic for the 30-year life of the Project (not including reclamation activity). Ground traffic trips are one-way; a single flight is defined as a landing and subsequent takeoff; and a vessel trip is defined as a docking and subsequent departure.
[c] Number of trips includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Construction ground traffic also includes gravel hauling (e.g., B-70/Maxi Haul dump trucks).
[d] Flights outlined are additional flights required beyond projected travel to/from non-Project airstrips (e.g., Anchorage, Fairbanks, Deadhorse); includes Q400, C-130, Twin Otter/CASA, Cessna, and DC-6 or similar aircraft.
[e] Includes crew bats, tugboats supporting sealift barges, screeding barges, and other support vessels.

4.4.1 Project Facilities and Gravel Pads

Project facilities proposed for the WPF, drill sites, and South WOC for Alternative C are described in Section 4.2.1. Under Alternative C, the WPF and South WOC would be located near the east end of the Project area along the BT Unit and GMT Unit boundary, approximately 5 miles northeast of BT3 and 8 miles from GMT-2.

Due to the disconnected drill sites (BT1, BT2, and BT4) under this alternative (i.e., no gravel road connection to the remaining Project area or Alpine), additional equipment and facilities would be required, including a second WOC (North WOC) to accommodate equipment storage, shop space, and a camp serving BT1, BT2, and BT4 (Figure D.4.2). The North WOC would include facilities and associated infrastructure similar to the South WOC (Section 4.2.1.3, *Willow Operations Center*). Additional facilities required due to the disconnected gravel infield road would include the following:

- Three Class I UIC disposal wells at the North WOC, in addition to two Class I UIC disposal wells at the South WOC; disposal wells would accommodate drilling, wastewater, and grind and inject materials from the northern drill sites.
- The North WOC would include a grind and inject facility, a mud plant, and additional maintenance shops.
- BT1 and BT2 would be larger under Alternative C to accommodate additional storage, equipment laydown, and a wire coil maintenance shop.
- The pipeline valve pads at Judy (Iqalliqpik) Creek would be helicopter accessible due to there being no road connection at this location, making them larger at 1.1 total acres (versus the Alternatives B and C 0.7-acre valve pads at this creek crossing).

The South WOC would not include a mud plant to avoid construction of two mud plants for the Project; instead, muds for the southern drill sites would be trucked to and from Alpine. Additional storage space would be required at the WPF for cuttings prior to being hauled to Alpine for disposal.

In addition to the CFWR, Alternative C would construct water source access gravel roads and pads to Lake L9911 (near GMT-2) and Lake M0235 (near the North WOC) (Figure D.4.2)

4.4.2 Pipelines

Alternative C pipelines (Figure D.4.12) would include infield pipelines connecting each drill site to the WPF and the Willow Pipeline (oil export) connecting the WPF to existing facilities at Alpine. Additional pipelines would include seawater import pipelines from Kuparuk CPF2 to the WPF and a diesel import pipeline from Kuparuk CPF2 to the South WOC and WPF. Alternative C would also extend a diesel pipeline from the WPF to the North

WOC. A freshwater pipeline would connect the CFWR to the South WOC and WPF, and a treated freshwater pipeline would connect the WPF to the North WOC. A fuel gas pipeline would connect the WPF with the South WOC.

All pipelines would parallel gravel roads to facilitate routine visual observation and investigation of pipelines, except the infield pipelines along the roadless segment (approximately 4 miles) between the WPF and BT1, including the Judy (Iqalliqpik) Creek crossing. The absence of a parallel gravel road would result in the following changes from Alternative B:

- The infield pipelines crossing Judy (Iqalliqpik) Creek would not be attached to a bridge but would instead require the placement of 10 VSMs below OHW.
- Pipeline valve pads at Judy (Iqalliqpik) Creek would be helicopter accessible (1.1 total acres).
- The infield pipeline segment would not allow for daily visual inspection, although routine observation and investigation of pipelines would occur as part of CPAI's operational practices, as well as be in compliance with regulatory requirements for pipeline inspection.
- Increased air traffic (number and frequency) due to the need to visually inspect pipelines.

Alternative C would require approximately 13,000 total VSMs with an estimated 0.8-acre total disturbance footprint. All VSMs would be installed using the drill-set-slurry method. Pipeline design would be as described in Section 4.2.2.

From the WPF, the Willow Pipeline (oil export), seawater pipeline, and diesel pipeline would be located on a single set of new VSMs to Alpine CD4N; from Alpine CD4N to Kuparuk CPF2, the seawater and diesel pipelines would be placed on new VSMs, as described in Section 4.2.2. The diesel pipeline would be placed on existing VSMs from Alpine CD4N to the ACF, located at Alpine CD1. In total, 383.7 miles of pipeline would be constructed with 377.5 miles of pipelines on new VSMs (approximately 98.4%) and 6.2 miles of pipelines on existing VSMs (approximately 1.6%) using 98.5 miles of new and existing pipeline corridors. Infield pipelines would connect each drill site to the WPF. Where practicable, infield pipelines would tie into other infield pipelines (Section 4.2.2.1) to minimize redundant parallel pipelines.

Table D.4.16 summarizes pipeline infrastructure under Alternative C by pipeline segment.

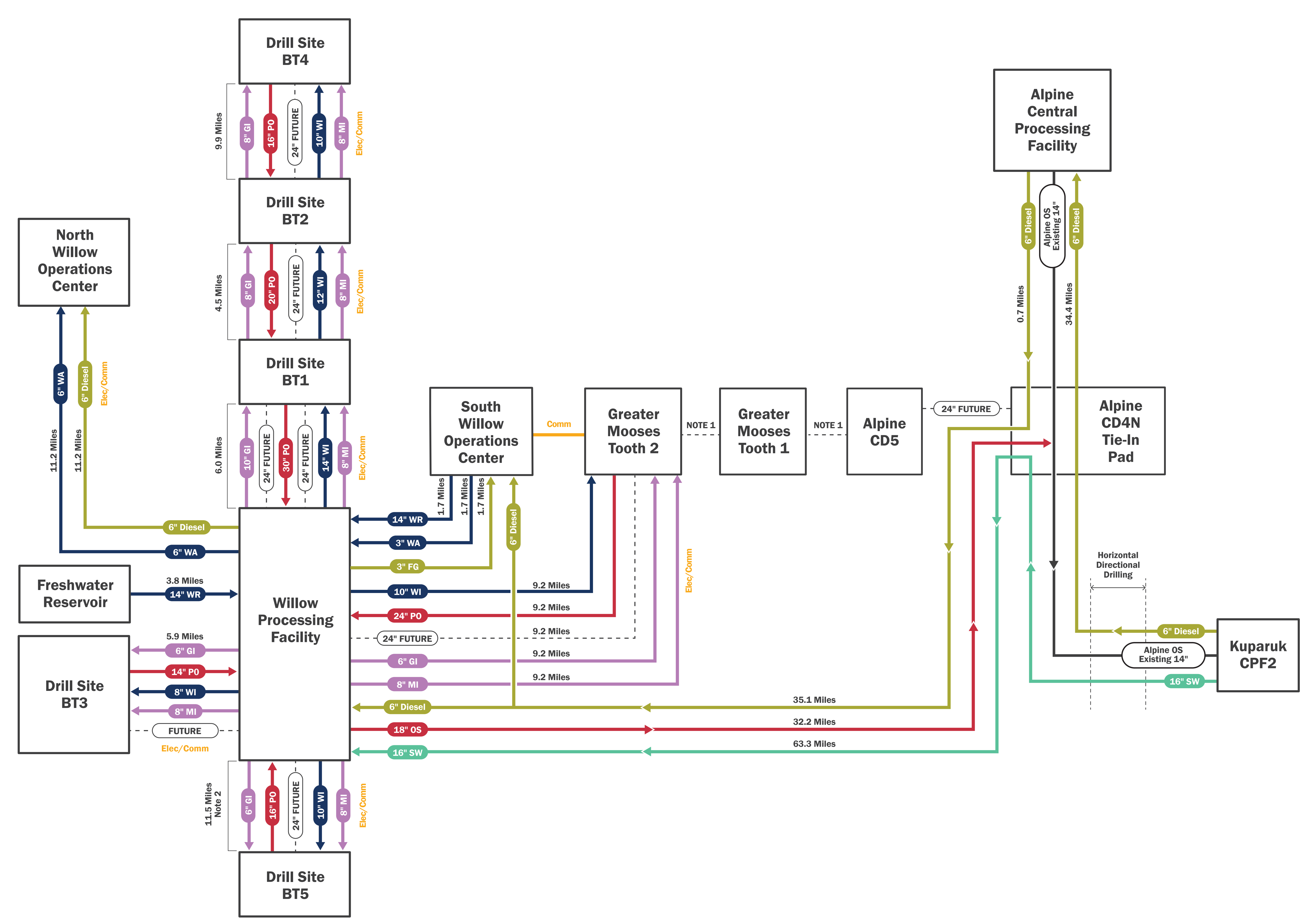
Table D.4.16. Alternative C Pipeline Segments Summary

Pipeline	Pipeline Segment	Segment Length (miles)	Notes
BT4 infield[a]	BT4 to BT2	9.9	Pipelines on new set of VSMs
BT2 infield[a]	BT2 to BT1	4.5	Pipelines on new set of VSMs; would also transport BT4 materials
BT1 infield[a]	BT1 to WPF	6.0	Pipelines on new set of VSMs; would also transport BT4 and BT2 materials; would require 10 VSMs below ordinary high water at Judy (Iqalliqpik) Creek crossing
BT3 infield[a]	BT3 to WPF	5.9	Pipelines on new set of VSMs
BT5 infield[a]	BT5 to WPF	11.5	Pipelines on new set of VSMs; would share VSMs with BT3 infield pipeline from the BT5 junction to the WPF (4.6 miles)
GMT-2 infield[a]	GMT-2 to WPF	9.2	Would share new VSMs with Willow export, diesel, and seawater pipelines from GMT-2 to the WPF (9.1 miles)
Freshwater	CFWR to WPF to South WOC	5.6	Would share new VSMs with BT3 infield pipelines from the CFWR pipeline junction to the WPF (3.4 miles) and treated water, fuel gas, and diesel pipelines from the WPF to the South WOC (1.7 miles)
Treated water	South WOC to WPF to North WOC	12.9	Would share new VSMs with freshwater, fuel gas, and diesel pipelines from the South WOC to the WPF (1.7 miles) and the BT1 and BT2 infield pipelines from the WPF to the BT2 pipeline junction (10.4 miles)
Fuel gas	WPF to South WOC	1.7	Would share new VSMs with freshwater and treated water pipelines from the WPF to the WOC (1.7 miles)
Willow export	WPF to CD4N tie-in pad	32.2	Would share new VSMs with seawater and diesel pipelines from the WPF to the CD4N tie-in pad (31.9 miles)
Seawater	CPF2 to WPF	63.3	Would share new VSMs with the Willow export and diesel pipelines from the WPF to the Alpine CD4N tie-in pad and CPF2 (63.3 miles); includes a new HDD crossing of the Colville River

Pipeline	Pipeline Segment	Segment Length (miles)	Notes
Diesel	CPF2 to CD1 to South WOC to WPF to North WOC	82.0	Would share new VSMs with the seawater pipeline from CPF2 to the South WOC pipeline junction; would share new VSMs with the freshwater, fuel gas, and treated water pipeline from the South WOC pipeline junction to the WPF (2.4 miles); would share new VSMs with BT1 and BT2 infield and treated water pipelines from the WPF to the BT2 pipeline junction (10.4 miles); would use existing VSMs from CD4N to CD1 (6.2 miles); would include a new HDD crossing of the Colville River

Note: 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); CD1 (Alpine CD1); CD4N (Alpine CD4N); CFWR (constructed freshwater reservoir); CPF2 (Kuparuk CPF2); GMT-2 (Greater Mooses Tooth 2); HDD (horizontal directional drilling); VSM (vertical support member); WOC (Willow Operations Center); WPF (Willow Processing Facility).

[a] Infield pipelines include produced fluids, injection water, gas, and miscible-injectant pipelines.



Legend

Elec/Comm	34.5kV Power and Communications Cables
Diesel	Diesel
FG	Fuel Gas
GI	Gas Injection
MI	Miscible Injection
PO	Production Oil
OS	Sales Oil
SW	Seawater
WA	Water Fresh
WF	Fire Protection Water
WI	Injection Water
WP	Potable Water
WR	Raw Water

Notes

1. Alignment contains one empty pipeline slot on pipe supports.
2. Pipeline size, service, and length is assumed at this time.

Figure D.4.12

4.4.3 Access to the Project Area

Alternative C would include barge delivery of small modules and bulk construction materials to Oliktok Dock and seasonal ice road access to support construction; access to BT1, BT3, the WPF, and the South WOC via all-season gravel road from the GMT and Alpine developments; seasonal access (ice road) to BT1, BT2, BT4, and the North WOC; and helicopter and fixed-wing aircraft to the Project (North and South Airstrips) and Alpine airstrip.

Table D.4.17 provides a summary of total traffic volumes anticipated for the Project under Alternative C by transportation type and year; Table D.4.18 provides a detailed traffic breakdown by season.

Alternative C would have a total of 19,574 fixed-wing flights (including landings and departures at Alpine and the North and South Airstrips), 2,910 helicopter flights (including landings and departures at Alpine and the North and South Airstrips), and 61 total barge and tugboat trips from Dutch Harbor to Oliktok Dock.

During construction, approximately 574.5 miles of ice roads would be constructed to support Project pipeline, gravel pad and gravel road construction, and gravel source (Tiŋmiaqsiuġvik Gravel Mine Site) access over nine winter construction seasons (Table D.4.1). During drilling and operations, planned ice road use would be limited to drill rig mobilization and an annual resupply 3.6-mile road connection to BT1, BT2, and BT4 for the life of the Project. Approximately 75.6 total miles of annual ice road would be constructed through 2050, for a total of 650.1 miles of ice road over the life of the Project (2021 through 2050). (The Project would also use the annual resupply ice road between Alpine and Kuparuk. This ice road mileage is not included in the Project's analyses as it would be constructed regardless in support of Alpine.) Ice road design and mileage is described in Section 4.2.3.1.

Gravel roads would provide year-round access between the GMT and Alpine developments and the southern Project area (e.g., WPF, South WOC, BT3, BT5, and CFWR). An additional gravel road would connect BT1, BT2, BT4, the North WOC, and the North Airstrip with each other, but not the rest of the Project area. Alternative C gravel roads would require the construction of six bridges (Table D.4.19) following the design described in Section 4.2.3.2.1. Two of the six bridges would require the placement of 20 total piles (48 inches in diameter) below OHW. Alternative C would also require 10 additional culverts or culvert batteries at swale crossings (Figure D.4.2) and 186 cross-drainage culverts.

Under Alternative C, two airstrips would be constructed: the South Airstrip would serve as the primary Project airstrip and would be located near the WPF and the South WOC (near the boundary between the BT and GMT Units); and the North Airstrip, which would be located near the North WOC and would provide year-round access to BT1, BT2, BT4, and the North WOC (Figure D.4.2). Both airstrips would be larger than the airstrip under Alternative B (43.8 acres versus 42.1 acres) to provide more apron space to accommodate additional fuel storage, parking space for multiple aircraft, and space for solid waste storage prior to air transport for disposal off-site.

The South Airstrip would be started in the winter construction season of 2021 and completed in 2022; the North Airstrip would be started in the winter construction season of 2023 and completed in 2024. Prior to Project airstrip availability, the Alpine airstrip (located at Alpine CD1) would be used to support the Project.

Helicopters would be used during the Project's construction phase to support ice road construction, environmental monitoring, and surveying. Following the construction of gravel roads and during the drilling and operations phases, helicopter use to support the Project would primarily be limited to ongoing environmental monitoring and spill response support.

Table D.4.17. Alternative C Total Project Traffic Volumes Summary for the Life of the Project (number of trips)

Year	Ground[a]	Fixed-Wing Trips Alpine[b]	Fixed-Wing Trips South Willow[b]	Fixed-Wing Trips North Willow[b]	Helicopter Trips Alpine[c]	Helicopter Trips South Willow[c]	Helicopter Trips North Willow[c]	Barges to Oliktok Dock[e]	Tugboats to Oliktok Dock[f]	Support Vessels to Oliktok Dock[g]
2020	0	0	0	0	25	0	0	0	0	0
2021	55,300	60	0	0	50	0	0	0	0	0
2022	138,650	122	31	0	57	57	0	6	9	66
2023	309,730	75	196	0	0	145	0	8	12	88
2024	402,250	35	558	440	0	145	0	5	8	52
2025	490,860	0	1,121	1,230	0	87	58	0	0	0
2026	204,740	0	1,017	1,009	0	94	40	5	8	52
2027	308,390	0	1,124	675	0	116	29	0	0	0
2028	311,140	0	693	672	0	116	29	0	0	0
2029	250,760	0	691	186	0	107	12	0	0	0
2030	82,890	0	370	89	0	74	9	0	0	0
2031–2050	1,657,800	0	7,400	1,780	0	1,480	180	0	0	0
Total	**4,212,510**	**292**	**13,201**	**6,081**	**132**	**2,421**	**357**	**24**	**37**	**258**

Note: Ground trips are defined as one-way; a single fixed-wing or helicopter flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.

[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks).

[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse).

[c] Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

[d] Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used. Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.

[e] Includes sealift barges for bulk materials and small modules.

[f] Includes tugboats accompanying sealift barges.

[g] Includes crew boats, screeding barge, and other support vessels.

Table D.4.18. Alternative C Detailed Project Ground and Aircraft Traffic Volumes by Season for the Life of the Project (number of trips)

Season and Year	Ground[a]	Fixed Wing to Alpine[b]	Fixed Wing to South Willow[b]	Fixed Wing to North Willow[b]	Alpine Helicopter[c]	Willow South Helicopter[c]	Willow North Helicopter[c]
Summer 2020 (total)	0	0	0	0	25	0	0
Winter 2021 (total)	33,180	36	0	0	0	0	0
Spring 2021 (total)	11,060	12	0	0	12	0	0
Summer 2021 (total)	11,060	12	0	0	38	0	0
Fall 2021 (total)	0	0	0	0	0	0	0
Winter 2022 (total)	92,781	81	0	0	0	0	0
Spring 2022 (total)	31,829	28	0	0	57	0	0
Summer 2022 (total)	11,327	10	8	0	0	57	0
Fall 2022 (total)	1,680	2	16	0	0	0	0
Winter 2023 (total)	209,754	52	139	0	0	0	0
Spring 2023 (total)	71,461	17	45	0	0	45	0
Summer 2023 (total)	23,872	6	16	0	0	100	0
Fall 2023 (total)	3,646	0	2	0	0	0	0
Winter 2024 (total)	245,327	21	340	0	0	0	0
Spring 2024 (total)	89,211	8	124	46	0	45	0
Summer 2024 (total)	45,389	4	63	256	0	100	0
Fall 2024 (total)	16,086	2	22	92	0	0	0
Winter 2025 (total)	311,229	1	704	805	0	0	0
Spring 2025 (total)	110,604	0	253	277	0	27	14
Summer 2025 (total)	46,748	0	111	118	0	60	44
Fall 2025 (total)	19,084	0	44	50	0	0	0
Winter 2026 (total)	118,360	0	562	561	0	0	0
Spring 2026 (total)	43,395	0	216	214	0	31	10
Summer 2026 (total)	31,146	0	155	154	0	63	30
Fall 2026 (total)	14,244	0	71	70	0	0	0
Winter 2027 (total)	198,885	0	734	455	0	0	0
Spring 2027 (total)	69,479	0	253	152	0	39	7
Summer 2027 (total)	30,482	0	111	67	0	77	22
Fall 2027 (total)	11,115	0	41	24	0	0	0
Winter 2028 (total)	197,444	0	448	427	0	0	0
Spring 2028 (total)	70,082	0	156	151	0	39	7
Summer 2028 (total)	31,059	0	69	67	0	77	22
Fall 2028 (total)	12,240	0	27	26	0	0	0
Winter 2029 (total)	135,644	0	370	108	0	0	0
Spring 2029 (total)	52,597	0	145	39	0	35	0
Summer 2029 (total)	40,349	0	111	30	0	72	12
Fall 2029 (total)	18,845	0	52	14	0	0	0
Winter 2030 (total)	46,723	0	193	47	0	0	0

Season and Year	Ground[a]	Fixed Wing to Alpine[b]	Fixed Wing to South Willow[b]	Fixed Wing to North Willow[b]	Alpine Helicopter[c]	Willow South Helicopter[c]	Willow North Helicopter[c]
Spring 2030 (total)	16,578	0	74	18	0	22	0
Summer 2030 (total)	16,578	0	74	18	0	52	9
Fall 2030 (total)	8,289	0	37	9	0	0	0
Winter 2031–2050 (total)	833,045	0	3,719	896	0	0	0
Spring 2031–2050 (total)	331,560	0	1,480	356	0	480	0
Summer 2031–2050 (total)	331,560	0	1,480	356	0	1,000	180
Fall 2031–2050 (total)	165,780	0	740	178	0	0	0
Total[d]	**4,210,808**	**292**	**13,202**	**6,081**	**132**	**2,421**	**357**

Note: Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff.
[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks).
[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.
[c] Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.
[d] Values may not match other summary traffic values presented in the Final EIS due to rounding.

Table D.4.19. Alternative C Bridges Summary

Waterbody Crossing	Bridge Length (± feet)[a]	Piles below Ordinary High Water (number)[b]	Latitude (North)	Longitude (West)
Judy (Kayyaaq) Creek	75	4	70.1848	152.1211
Fish (Uvlutuuq) Creek	420	16	70.2526	152.1787
Willow Creek 2	80	0	70.1413	151.9557
Willow Creek 4	130	0	70.0816	152.1302
Willow Creek 4A	50	0	70.0360	152.2015
Willow Creek 8	40	0	70.2635	152.1806

[a] Bridge lengths are approximations based on the interpretation of available aerial imagery and are subject to change.
[b] In-stream pile diameters are assumed to be 48 inches; diameter excludes any potential surface casing required for installation.

Sealift barges would be used to deliver bulk construction materials and small modules to Oliktok Dock to support Project construction (Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*). Additionally, sealift barges would be used to deliver large processing and drill site modules to the North Slope (Section 4.7). No additional or regular use of barges is proposed over the life of the Project following construction.

4.4.4 Other Infrastructure and Utilities

4.4.4.1 Ice Pads

Single- and multi-season ice pads would be used to support Project construction. Single- and multi-season ice pads are described in Section 4.2.4.1.

Alternative C would require 1,166.4 acres of single-season ice pads over the life of the Project (30 years). Additionally, Alternative C would include the use of three multi-season ice pads to support temporary camps and stage equipment and materials, as needed. The following 10.0-acre multi-season ice pads would be constructed under Alternative C:

- Near GMT-2 (Q1 2021 to Q2 2022, Q1 2022 to Q2 2023, Q1 2023 to Q2 2024, and Q1 2024 to Q2 2025)
- Near the South WOC (Q1 2021 to Q2 2022)
- At the Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)

4.4.4.2 Camps

Table D.4.20 details camp requirements for Alternative C to support construction, drilling, and operations.

Table D.4.20. Alternative C Camps Summary

Project Phase	Camp	Location	Capacity	Use Schedule
Construction	Temporary camp	Ice pad near the South WOC	250	Q1 2021 to Q4 2021
Construction	Kuukpik Pad Camp[a]	Kuukpik Pad[b]	450	Q1 2022 to Q2 2025
Construction	Alpine Operations Camp[a]	Alpine central processing facility (at Alpine CD1)[b]	250 to 300	Q1 2021 to Q2 2024
Construction	Temporary camp[c]	North WOC	250	Q1 2022 to Q2 2024
Construction	Sharktooth Camp[a]	Kuparuk[b]	220	Q1 2022 to Q4 2024
Drilling	Drill rig camp(s)	Drill site(s) or WOC (South and/or North)	150	Q1 2024 to Q4 2029
Construction, operations	South Willow Camp[c]	South WOC	500	Q2 2024 to Q4 2027
Operations	South Willow Camp[c]	South WOC	200	Q1 2028 to Q4 2050
Construction, operations	North Willow Camp	North WOC	200	Q3 2024 to Q4 2028
Operations	North Willow Camp	North WOC	200	Q1 2029 to Q4 2050

Note: Q1 (first quarter); Q2 (second quarter); Q3 (third quarter); Q4 (fourth quarter); WOC (Willow Operations Center).
[a] Existing camp.
[b] Existing gravel pad.
[c] During construction, up to 60 bed spaces may be used at the existing Kuukpik Hotel in Nuiqsut in lieu of bed spaces identified at or near the South WOC.

4.4.4.3 Utilities, Waste Handling, and Fuel and Chemical Storage

Power generation and distribution, communications, potable water systems and use, domestic wastewater, solid waste, and drilling waste handling, as well as fuel and chemical storage, would be as described in Section 4.2.4.

4.4.5 Water Sources and Use

As described for all action alternatives in Section 4.2.5, freshwater would be needed during construction for domestic use at construction camps, construction and maintenance of ice roads and ice pads, and hydrostatic testing of pipelines. During drilling, freshwater would be required for domestic use at the drill rig camps and to support drilling activities. Water for construction and drilling would be withdrawn from lakes in the Project area. Freshwater for domestic use during operations would be sourced from the CFWR and Lakes L9911 and M0235 using the freshwater intake infrastructure (Section 4.2.4.5, *Potable Water*). Alternative C would also require construction of an annual 3.6-mile-long ice road connecting the north and south portions of the Project area. Anticipated freshwater use for Alternative C is detailed by year and Project phase in Table D.4.21.

Seawater would also be required, as described in Section 4.2.5, and would be sourced from the existing Kuparuk seawater treatment plant and transported via seawater pipeline to the Project area (Section 4.2.2.3, *Other Pipelines*).

Table D.4.21. Alternative C Estimated Freshwater Use by Project Phase and Year (million gallons)

Year (season)	Construction[a]	Drilling[b]	Operations[c]	Total
2020–2021 (winter)	71.9	0.0	0.0	**71.9**
2021 (summer)	1.1	0.0	0.0	**1.1**
2021–2022 (winter)	130.5	0.0	0.0	**130.5**
2022 (summer)	3.2	0.0	0.0	**3.2**
2022–2023 (winter)	339.3	0.0	0.0	**339.3**
2023 (summer)	10.0	0.0	0.0	**10.0**
2023–2024 (winter)	269.7	21.5	0.0	**291.2**
2024 (summer)	12.8	43.0	0.0	**55.8**
2024–2025 (winter)	188.2	43.9	0.0	**232.1**
2025 (summer)	20.0	44.8	0.9	**65.7**
2025–2026 (winter)	32.5	8.8	1.8	**43.1**
2026 (summer)	2.4	8.8	4.3	**15.5**
2026–2027 (winter)	116.5	8.8	3.2	**128.5**
2027 (summer)	2.6	8.8	5.1	**16.5**
2027–2028 (winter)	132.3	8.8	4.1	**145.2**
2028 (summer)	4.1	8.8	5.1	**18.0**
2028–2029 (winter)	29.0	8.8	6.7	**44.5**
2029 (summer)	2.3	8.8	5.1	**16.2**
2029–2030 (winter)	0.2	4.4	8.3	**12.9**
2030 (summer)	0.0	0.0	5.1	**5.1**
2030–2031 (winter)	0.0	0.0	8.3	**8.3**
2031 (summer)	0.0	0.0	5.1	**5.1**
2031–2032+ (19 winters)[d]	0.0	0.0	157.7	**157.7**
2032+ (19 summers)[e]	0.0	0.0	96.9	**96.9**
Total	**1,368.6**	**228.0**	**317.7**	**1,914.3**

Note: "+" indicates annual use to the end of Project operations (2050).

[a] The construction phase would include ice road construction (1.0 million gallons [MG] per mile for a 35-foot-wide road, 1.4 MG per mile for a 50-foot-wide road, and 2.0 MG per mile for a 70-foot-wide road), ice pad construction (0.25 MG per acre), dust suppression, hydrostatic testing, and camp supply (100 gallons per person per day).

[b] The drilling phase would include drilling water (1.4 MG per month per drilling rig prior to Willow Processing Facility startup and 0.4 MG per drill rig per month after facility startup), hydraulic fracturing (1.0 MG per well prior to Willow Processing Facility startup), and camp supply (100 gallons per person per day).

[c] The operations phase would include dust suppression, camp supply (100 gallons per person per day), and an annual ice road (1.0 MG per mile for a 35-foot-wide road).

[d] Annual winter water use for operations would 8.3 MG.

[e] Annual summer water use for operations would be 5.1 MG.

4.4.6 Gravel and Other Fill Requirements

Project roads and pads would be constructed with gravel obtained from the Tiŋmiaqsiuġvik Gravel Mine Site and the perimeter berm surrounding the CFWR would be constructed from material excavated from the reservoir and would be capped in gravel. Table D.4.22 lists the estimated quantity of fill material anticipated for each Project component under Alternative C.

Table D.4.22. Alternative C Estimated Fill Material Requirements by Project Component

Component	Footprint (acres)[a]	Fill Quantity (cubic yards)[a]	Fill Type	Notes and Assumptions
Drill pads (five total)	88.3	1,263,000	Gravel	Based on five drill sites with an average pad thickness of 9 feet and 2:1 side slopes
Willow Processing Facility pad	22.8	346,000	Gravel	Based on an average pad thickness of 10 feet with 2:1 side slopes
Willow Operations Center pads (two total)	50.2	780,000	Gravel	Two Willow Operations Centers (North and South) with an average pad thickness of 10 feet with 2:1 side slopes
Valve pads (four total) and pipeline pads (four total)	4.4	52,000	Gravel	Based on four valve pads and four pipeline pads with an average pad thickness of 7 feet and 8 feet (respectively) and 2:1 side slopes; Judy (Iqalliqpik) Creek valve pads would be sized to accommodate helicopter access
Water source access pads (three total)	3.9	36,000	Gravel	Based on three pads with an average pad thickness of 7 feet with 2:1 side slopes
Communications tower pad	0.5	5,000	Gravel	Based on an average pad thickness of 7 feet with 2:1 side slopes
CPF2 pad expansion	1.0	13,000	Gravel	Based on an average pad thickness of 8 feet with 2:1 side slopes
Airstrips (two total; includes aprons and airstrips)	87.5	1,224,000	Gravel	Based on two airstrips with an average thickness of 9.5 feet with 2:1 side slopes
Gravel roads	240.2	2,015,000	Gravel	Based on an average road surface width of 24 to 32 feet and thickness of 7 feet with 2:1 side slopes; includes water source access and airstrip access roads
Vehicle turnouts (eight total)	3.0	32,000	Gravel	Eight subsistence tundra access road pullouts every 2.5 to 3 miles with an average thickness of 7 feet
CFWR perimeter berm	3.9	25,000	Overburden	Constructed from overburden material excavated during construction of the freshwater reservoir; based on an average thickness of 7 feet with 2:1 side slopes
CFWR perimeter berm	0.0	6,000	Gravel	Capping material for the overburden perimeter berm
Oliktok Dock upgrades	0.0	5,200	Gravel	Upgrades would be within the existing footprint
Boat ramps	1.8	20,000	Gravel	Based on one boat ramp
Total[b]	**507.6**	**5,822,200**	**NA**	**NA**

Note: 2:1 (2 horizontal to 1 vertical ratio); CFWR (constructed freshwater reservoir); CPF2 (Kuparuk CPF2); NA (not applicable).
[a] Values are approximate and are subject to change.
[b] Values may not total due to rounding; 5,797,200 cubic yards of gravel fill and 25,000 cubic yards of overburden fill.

4.4.7 Spill Prevention and Response

Spill prevention and response would be consistent with prevention measures and response procedures described in Section 4.2.8. The WPF would provide a centralized facility to support Project area drill sites in a variety of ways, including equipment, personnel, and other emergency response support. Without a gravel access road connecting all drill sites to the South WOC, emergency response equipment would be duplicated at the North and South WOCs; this would require additional gravel pad space (versus Alternative B) to accommodate duplicated equipment. Outside of ice road season, additional response personnel and materials could be transferred to the north Project area as needed by helicopter, fixed-wing aircraft, and/or low-ground-pressure vehicles (e.g., Rolligons), although these modes limit cargo and passenger capacity. Under Alternative C, response to a significant spill at BT1, BT2, or BT4 could result in the following challenges specific to Alternative C:

- The need to make multiple trips to transport personnel and/or equipment would further inhibit response time
- Helicopter use could be limited by weather restrictions
- The use of all-terrain vehicles (in the event other transportation methods are unavailable) has the potential to create additional tundra damage

Under Alternative C, CPAI would conduct regular ground-based visual inspections of facilities and pipelines, including the seawater, diesel, and Willow export pipelines from the WPF to GMT-2 from proposed gravel roads. For the cross-country portion of the pipelines without a parallel gravel road between the Project access road and

BT1, routine pipeline inspections and emergency response when the annual resupply ice road is not in place would be conducted using aircraft. Infield and import pipelines from BT1 to BT4 would be regularly inspected from the parallel gravel roadway.

The lack of a gravel road parallel to approximately 3.6 miles of infield, diesel, and seawater pipelines would not allow for routine daily observation of these pipelines to detect leaks or other problems that could result in a spill incident. Routine observation and investigation of pipelines would occur as part of CPAI's operational best practices as well as be in compliance with regulatory requirements to conduct pipeline inspections.

Substantial truck traffic by ice road over the life of the Project would pose additional health, safety, and environmental hazards, as vehicles unintentionally leaving the roadway are more likely to occur on ice roads than gravel roads. This poses additional risk to Project personnel and increases the risk of minor spills associated with vehicle accidents.

The gravel road connection to the GMT development may also facilitate faster emergency response times to GMT-2 and GMT-1 as emergency response equipment at the Alternative C South WOC would be available in addition to the equipment staged at the existing ACF. Under Alternative C, equipment staged at Willow would also be available to provide mutual aid in the event of a fire, medical, or spill response at Alpine or in Nuiqsut.

4.4.8 Schedule and Logistics

Detailed schedule and logistics information is provided in Section 4.2.10. Figure D.4.13 provides a general schedule for key construction, drilling, and operations milestones. Alternative C would require an additional year of gravel mining relative to Alternative B. Production from BT1, BT2, and BT3 would begin in Q4 of 2025, Q2 of 2026, and Q4 of 2026, respectively. BT4 production would begin in Q1 of 2029 and BT5 production would begin in 2030. The schedule presented in Figure D.4.13 is based on the current best available information, and the schedule may be modified as detailed design progresses or as circumstances require.

4.4.9 Project Infrastructure in Special Areas

As described in Section 4.2.11, Alternative C would include 1.0 mile of road (8.1 acres) and 1.4 miles of pipelines within the CRSA just southwest of GMT-2. Approximately 179.7 acres of the Project under Alternative C, including BT2 and BT4 and their associated roads (1.0 mile), the North WOC and North Airstrip, the Lake M0235 access road and pad, and 12.2 miles of pipeline, would be located within the TLSA. These designations allow for oil and gas development in these areas, and the Project would comply with BMPs associated with these two management areas (BLM 2008a, 2013).

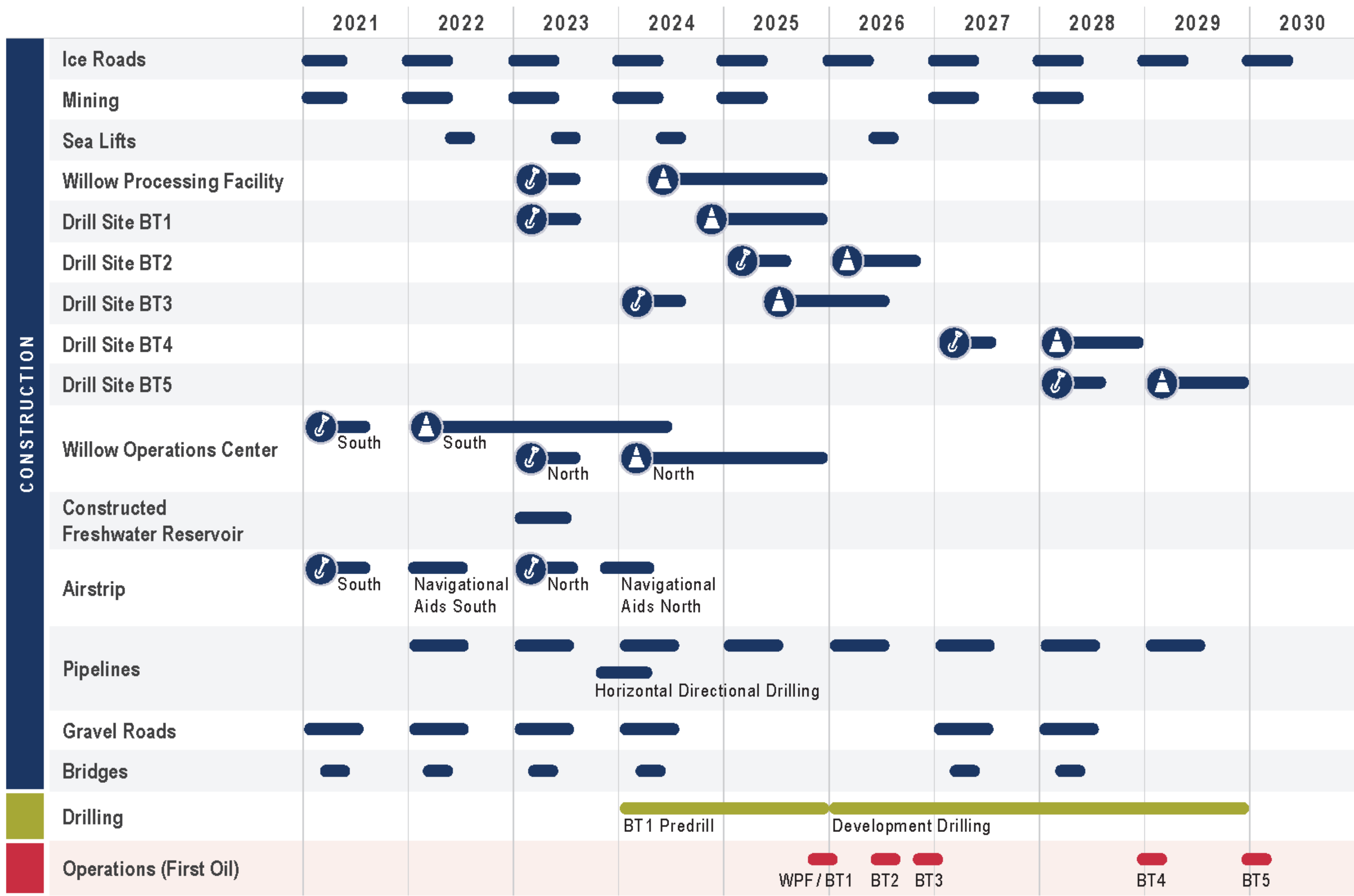
4.4.10 Compliance with Best Management Practices

As described in Section 4.2.12, Alternative C would require deviations to existing LSs and BMPs, including LS E-2 and BMPs E-7, E-11, K-1, and K-2. These include the locations of the proposed road alignment within 1 mile of an observed yellow-billed loon nest and/or within 1,625 feet of a loon-nesting lake shoreline at six lakes (BMP E-11). Alternative C would include 17.1 miles of pipeline located within 500 feet of gravel roads (BMP E-7). This mileage is spread over several short road-pipeline sections where separating roads from pipelines may not be feasible (e.g., within narrow land corridors between lakes, where pipelines and roads converge on a drill pad). CPAI will continue to seek opportunities to avoid the placement of pipelines within 500 feet of roads as Project engineering progresses. When deviations are granted, they typically are specified to stated Project actions or locations and are not granted for all Project actions. Deviations anticipated for Alternative C are described in Table D.4.5 (Section 4.2.12)

4.4.11 Boat Ramps for Subsistence Users

CPAI would construct one boat ramp for subsistence use as part of its effort to mitigate Project effects on the community of Nuiqsut (Section 4.2.13) under Alternative C (Figures D.4.2 and D.4.9). The boat ramp would be constructed on the Ublutuoch (Tiŋmiaqsiuġvik) River along the existing gravel road between Alpine CD5 and GMT-1. The boat ramp would have a gravel footprint of 1.8 acres and require 20,000 cy of gravel fill. The boat ramp would be constructed during the first year of Project construction.

Figure D.4.13. Alternative C Schedule



Notes: BT1/2/3/4/5 (Bear Tooth drill sites 1/2/3/4/5); WPF (Willow Processing Facility)

4.5 Alternative D: Disconnected Access

Alternative D would colocate the WPF with BT3, construct four additional drill sites, the WOC, pipeline and valve pads, CFWR, two water source access road and pads at the CFWR and Lake M0235, gravel roads connecting Project facilities, an airstrip, a staging pad near GMT-2, one boat ramp, and an expansion of the existing gravel pads at Alpine CD1 and Kuparuk CPF2. However, Alternative D would not be connected by an all-season gravel access road to the GMT and Alpine developments (Figure D.4.3); but it would employ the other gravel roads as proposed under Alternative B connecting drill sites and other Project infrastructure. Annual resupply access to the Project area would be provided by ice road connection between GMT-2 and the WPF (12.5 miles).

The lack of a gravel access road connection to Alpine would reduce the degree to which the Project could leverage existing Alpine infrastructure. As a result, additional facilities would be required in the Project area, duplicating some facilities currently at Alpine, including warehouse space; valve and fleet shops; emergency response equipment; biocide, methanol, and corrosion inhibitor storage tanks; and an incinerator. The addition of these facilities in the Project area would require additional gravel pad space at the WOC and WPF. Additionally, Alternative D would require a diesel pipeline connection from Kuparuk CPF2 to the WOC (similar to Alternative C) as fuel could not be trucked to the Project area throughout the year.

Alternative D would require sealift module delivery to the Project area (Section 4.7, *Sealift Module Delivery Options*).

The intent of Alternative D is to reduce the number of bridges, minimize the length of linear infrastructure on the landscape, and provide another strategy to decrease effects to caribou movement and subsistence. Additionally, this alternative would have the smallest overall gravel footprint, which would reduce impacts to hydrology (e.g., sheet flow) and wetlands (e.g., direct fill, indirect impacts from dust).

Table D.4.23 provides a summary of Project components and their associated impacts for Alternative D.

Table D.4.23. Summary of Components for Alternative D: Disconnected Access

Project Component	Description
Drill site gravel pads	Five (62.8 acres total): BT1 and BT2 (17.0 acres each), BT4 and BT5 (14.4 acres each), and BT3 (colocated with the WPF; acreage accounted for under WPF pad)
WPF gravel pad	WPF colocated with BT3; 64.7-acre pad
WOC gravel pad	62.2-acre pad
Water source access gravel pads	Two water source access pads (2.6 acres total) at the CFWR (1.3 acres) and at Lake M0235 (1.3 acres)
CFWR	16.3-acre excavation (reservoir and connecting channel) and 3.9-acre perimeter berm
Other gravel pads	Four valve pads (1.3 acres total): two pads at Judy (Iqalliqpik) Creek pipeline crossing and two pads at Fish (Uvlutuuq) Creek pipeline crossing HDD pipeline pads (two total) at Colville River crossing (1.5 acres total) Tie-in pad near Alpine CD4N (0.7 acre total) Pipeline crossing pad near GMT-2 (0.5 acre total) Kuparuk CPF2 pad expansion (1.0 acre) Communications tower pad (0.5 acre) Staging pad near GMT-2 (5.9 acres) Alpine CD1 pad expansion (1.3 acres)
Single-season ice pads	Used during construction at the gravel mine site, bridge crossings, the Colville River HDD crossing, and other locations as needed in the Project area (1,241.4 total acres)
Multi-season ice pads	10.0-acre multi-season ice pad near GMT-2 (Q1 2021 to Q2 2022, Q1 2022 to Q2 2023, Q1 2023 to Q2 2024, and Q1 2024 to Q2 2025) 10.0-acre multi-season ice pad near the WOC (Q1 2021 to Q2 2022) 10.0-acre multi-season ice pad at Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)
Infield pipelines	46.5 total miles: BT1 to WPF (10.0 miles); BT2 to BT1 (4.7 miles); BT4 to BT2 (10.2 miles); BT5 to WPF (6.5 miles); GMT-2 to WPF (15.1 miles)
Willow export pipeline	38.2 total miles (WPF to tie-in pad near Alpine CD4N)

Project Component	Description
Other pipelines	69.2-mile seawater pipeline from Kuparuk CPF2 to WPF; includes Colville River HDD crossing 77.0-mile diesel pipeline from Kuparuk CPF2 to Alpine CD1 to WOC; includes Colville River HDD crossing 1.5-mile fuel gas pipeline (WPF to WOC) 2.2-mile freshwater pipeline (CFWR to WOC to WPF) 1.5-mile treated water pipeline (WOC to WPF)
Gravel roads	27.1 miles (188.9 acres including turnouts) total connecting drill sites to BT3/WPF, the WOC, the airstrip access road, and water source access roads; there would be no gravel road connection to GMT-2 Six turnouts with subsistence tundra access ramps (2.2 acres total)
Bridges	Six total: at Judy (Iqalliqpik) Creek, Judy (Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 4, Willow Creek 4A, and Willow Creek 8
Airstrip	6,200 × 200–foot airstrip and apron (44.7 acres total); would also require airstrip access road
Boat ramp	1.8 acres at Ublutuoch (Tiŋmiaqsiuġvik) River
Oliktok Dock modifications	Modifications to the existing dock include adding structural components and a gravel ramp within the existing developed footprint 2.5 acres of screeding at Oliktok Dock 9.6 acres of screeding at the barge lightering area
Ice roads	Approximately 962.4 total miles (5,893.4 total acres): 699.9 miles (4,780.4 acres) over 10 construction seasons (2021 to 2030) 12.5 miles (55.7 acres) of annual resupply ice road (2031 to 2051; 262.5 total miles; 1,113.0 total acres)
Total footprint and gravel fill volume[a]	444.3-acre gravel footprint using 5.9 million cy of gravel fill and 25,000 cy of native fill 149.7-acre gravel mine site excavation 16.3-acre excavation at the CFWR 12.1-acre screeding area
Gravel source	Two mine site cells (149.7 total acres) in Tiŋmiaqsiuġvik area (Mine Site Area 1 would be 109.3 acres and Mine Site Area 2 would be 40.4 acres)
Total freshwater use	2,286.3 million gallons over the life of the Project (31 years)
Ground traffic (number of trips)[b,c]	4,376,890
Fixed-wing air traffic (number of trips)[b,d]	19,038 total flights Willow: 15,387 Alpine: 3,651
Helicopter air traffic (number of trips)[b]	2,503 total flights Willow: 2,403 Alpine: 100
Marine traffic (number of trips)[b,e]	319 total trips Sealift barges: 24 Tugboats: 37 Support vessels: 258
Infrastructure in special areas	Colville River Special Area: 0.5 acre of gravel infrastructure; 1.4 miles of pipeline Teshekpuk Lake Special Area: 108.4 acres of gravel road and gravel pads; 11.5 miles of pipeline
Fish-bearing waterbody setback overlap (LS E-2)	37.2 acres of gravel footprint, 4.2 miles of gravel road, and 4.2 miles of pipelines 23.1 acres of gravel mine site excavation
Less than 500-foot pipeline separation (BMP E-7)	17.9 miles of pipelines and road with less than 500 feet of separation
Yellow-billed loon setback overlap (BMP E-11)	58.0 acres of gravel infrastructure and 7.7 miles of pipelines within 1 mile of a nest 15.3 acres of gravel infrastructure and 3.3 miles of pipelines within 1,625 feet of lakes with nests
River setback overlap (BMP K-1)	Colville River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines Fish (Uvlutuuq) Creek: 12.6 acres of gravel infrastructure and 5.4 miles of pipelines Judy (Iqalliqpik) Creek: 16.7 acres of gravel infrastructure and 2.3 miles of pipelines Ublutuoch (Tiŋmiaqsiuġvik) River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines; 137.8 acres of gravel mine site
Deepwater lake setback overlap (BMP K-2)	3.2 miles of gravel infrastructure and 1.5 mile of pipelines; 14.5 acres of the constructed freshwater reservoir would be within the setback and 1.4 acres of the reservoir connection would be within the lake

Note: BMP (best management practice); 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); CFWR (constructed freshwater reservoir); cy (cubic yards); GMT-2 (Greater Mooses Tooth 2); HDD (horizontal directional drilling); LS (lease stipulation); Q1 (first quarter); Q2 (second quarter); VSM (vertical support member); WOC (Willow Operations Center); WPF (Willow Processing Facility).
[a] Values may not sum to totals due to rounding.
[b] Total traffic for the 30-year life of the Project (not including reclamation activity). Ground-traffic trips are one-way; a single flight is defined as a landing and subsequent takeoff.
[c] Number of trips includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Construction ground traffic also includes gravel hauling (e.g., B-70/Maxi Haul dump trucks).
[d] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse); includes Q400, C-130, Twin Otter/CASA, Cessna, and DC-6 or similar aircraft.
[e] Includes crew boats, tugboats supporting sealift barges, screeding barges, and other support vessels.

4.5.1 Project Facilities and Gravel Pads

Project facilities proposed for the WPF, drill sites, and the WOC for Alternative D are described in Section 4.2.1. Under Alternative D, the WPF and BT3 would be colocated and in the same location as provided under Alternatives B and C for BT3. Freshwater access would be developed for the CFWR (Lake M0015) and Lake M0235.

Unlike Alternatives B and C, the Project area would not be connected to the GMT Unit by an all-season gravel road. Rather, air access (fixed-wing aircraft and helicopter) and tundra travel would provide the only year-round access to the Project area. Alternative D would include annual construction of a seasonal ice road connection from GMT-2 to the Project area to transport materials and supplies to the Project area and waste and other materials out of the Project area.

The lack of a year-round access road to Alpine would place additional constraints on Alternative D that are not present under Alternatives B and C, including the ability to leverage resources and existing infrastructure at Alpine. As a result, Alternative D would require additional facilities in the Project area not needed under Alternatives B and C. These additional facilities include a grind and inject facility; additional warehouse space; a wireline/coil maintenance shop; a light-duty fleet shop; storage space and equipment; laydown space; and biocide, methanol, and corrosion inhibitor tanks at the WOC. Alternative D would also require two additional Class I injection wells at the WOC (four total) for use as backup injection wells. The addition of these two wells would require additional gravel pad space at both the WPF and WOC.

Additional construction logistics, including the need to store equipment in the Project area over the summer, store substantially more diesel fuel on-site, and manage supplies and waste prior to WOC construction, would require additional gravel pad space during construction. As the Project and Alpine would not be able to share facilities, Alternative D would also require additional pad space at Alpine CD1 for a new heavy-duty fleet shop and additional warehouse and maintenance shop space at the ACF. Additionally, Alternative D would include a gravel pad near GMT-2 to store ice road construction equipment over the summer to facilitate construction of the annual resupply ice road.

4.5.2 Pipelines

Alternative D pipelines (Figure D.4.14) would include infield pipelines connecting each drill site to the WPF and the Willow Pipeline (oil export) connecting the WPF to existing facilities at Alpine. Additional new import pipelines would include a seawater import pipeline from Kuparuk CPF2 to the WPF and a diesel import pipeline from Kuparuk CPF2 to the WPF and WOC. Additional infield pipelines would include a freshwater pipeline from the CFWR to the WOC to the WPF, a treated water pipeline from the WOC to the WPF, and a fuel gas pipeline from the WPF to the WOC. Infield pipelines would connect each drill site to the WPF paralleling Project roads, minimizing redundant parallel pipelines to the extent practicable (Section 4.2.2.1).

From the WPF to the tie-in pad near Alpine CD4N, the Willow Pipeline (oil export) would share a new set of VSMs with the seawater and diesel pipelines. From Kuparuk CPF2 to the WPF, the seawater pipeline would share new VSMs with the Willow export and diesel pipelines and would include a new HDD crossing of the Colville River. From the WOC to the tie-in pad at Alpine CD4N, the diesel pipeline would share new VSMs with the Willow export and seawater pipelines; from Alpine CD4N to Alpine CD1, the diesel pipeline would be placed on existing VSMs; and from Alpine CD4N to Kuparuk CPF2, the diesel pipeline would be on new VSMs shared with the seawater pipeline. The diesel pipeline would also include an HDD crossing of the Colville River

Approximately 10 miles of pipelines (Willow export, seawater, and diesel) would not parallel gravel roads due to the lack of a gravel road connection to GMT-2. The absence of a parallel gravel road would not allow daily visual inspection of these pipelines, although routine observations and investigations would occur as part of CPAI's operational practices as well as be in compliance with regulatory pipeline inspection requirements. The absence of a parallel gravel road would increase the number and frequency of aircraft flights needed to visually inspect pipelines.

In total, 373.9 miles of pipelines would be constructed with 367.7 miles of pipelines on new VSMs (approximately 98.3%) and 6.2 miles of pipelines on existing VSMs (approximately 1.7%) using 98.1 miles of new and existing pipeline corridors. Alternative D would require approximately 13,700 total VSMs with an estimated 0.9-acre total disturbance footprint.

Pipeline design would be as described in Section 4.2.2.

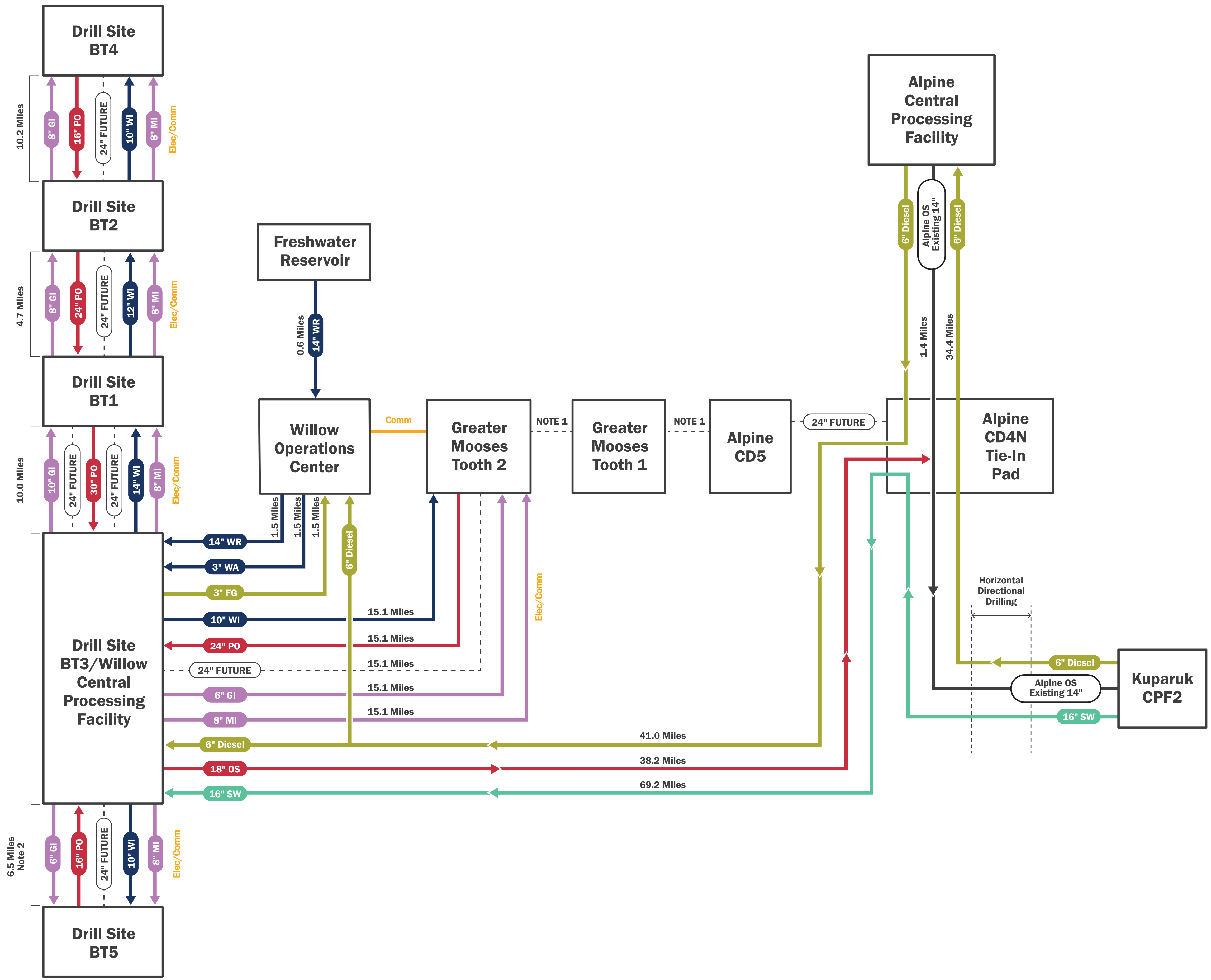
Table D.4.24 summarizes pipeline infrastructure under Alternative D by pipeline segment.

Table D.4.24. Alternative D Pipeline Segments Summary

Pipeline	Pipeline Segment	Segment Length (miles)	Notes
BT4 infield[a]	BT4 to BT2	10.2	Pipelines on new set of VSMs
BT2 infield[a]	BT2 to BT1	4.7	Pipelines on new set of VSMs; would also transport BT4 materials
BT1 infield[a]	BT1 to WPF	10.0	Pipelines on new set of VSMs; would also transport BT2 and BT4 materials
BT5 infield[a]	BT5 to WPF	6.5	Pipelines on new set of VSMs; would share VSMs with BT1 infield pipelines from BT5 junction to WPF
GMT-2 infield[a]	GMT-2 to WPF	15.1	Would share new VSMs with Willow export, diesel, and seawater pipelines from GMT-2 to WPF
Freshwater	CFWR to WOC to WPF	2.2	Would share new VSMs with treated water, fuel gas, and diesel pipelines from WOC to WPF (1.5 miles)
Treated water	WOC to WPF	1.5	Would share new VSMs with freshwater, fuel gas, and diesel pipelines from WOC to WPF
Fuel gas	WPF to WOC	1.5	Would share new VSMs with freshwater, treated water, and diesel pipelines from WPF to WOC
Willow export	WPF to CD4N tie-in pad	38.2	Would share new VSMs with seawater and diesel pipelines from WPF to Alpine CD4N (37.9 miles)
Seawater	CPF2 to WPF	69.2	Would share new VSMs with Willow export and diesel pipelines; includes new HDD crossing of the Colville River
Diesel	CPF2 to CD1 to WOC	77.0	Would share new VSMs with seawater pipeline from CPF2 to WPF (69.2 miles); would share new VSMs with freshwater, fuel gas, and treated water pipelines from WPF to WOC (1.5 miles); would use existing VSMs from CD4N to CD1 (6.2 miles); includes new HDD crossing of Colville River

Note: BT1 (Bear Tooth drill site 1); BT2 (Bear Tooth drill site 2); BT4 (Bear Tooth drill site 4); BT5 (Bear Tooth drill site 5); CD1 (Alpine CD1); CD4N (Alpine CD4N); CFWR (constructed freshwater reservoir); CPF2 (Kuparuk CPF2); HDD (horizontal directional drilling); VSM (vertical support member); WOC (Willow Operations Center); WPF (Willow Processing Facility).

[a] Infield pipelines include produced fluids, injection water, gas, and miscible-injectant pipelines.



Legend

Elec/Comm	34.5kV Power and Communications Cables
Diesel	Diesel
FG	Fuel Gas
GI	Gas Injection
MI	Miscible Injection
PO	Production Oil
OS	Sales Oil
SW	Seawater
WA	Water Fresh
WF	Fire Protection Water
WI	Injection Water
WP	Potable Water
WR	Raw Water

Notes

1. Alignment contains one empty pipeline slot on pipe supports.
2. Pipeline size, service, and length is assumed at this time.

Figure D.4.14

4.5.3 Access to the Project Area

Alternative D would include seasonal ice road access between the Project area and GMT-2 to support construction and annual Project resupply; access from BT3/WPF to individual drill sites via all-season gravel roads; helicopter and fixed-wing aircraft to Project and Alpine airstrips; and barge delivery of small modules and bulk materials via Oliktok Dock. Table D.4.25 provides a summary of total anticipated traffic volumes for the Project under Alternative D by transportation type and year; Table D.4.26 provides a detailed traffic breakdown by season.

Table D.4.25. Alternative D Total Project Traffic Volumes Summary for the Life of the Project (number of trips)

Year	Ground[a]	Fixed-Wing Trips Alpine[b,c]	Fixed-Wing Trips Willow[b,c]	Helicopter Trips Alpine[d]	Helicopter Trips Willow[d]	Barges to Oliktok Dock[e]	Tugboats to Oliktok Dock[f]	Support Vessels to Oliktok Dock[g]
2020	0	0	0	25	0	0	0	0
2021	52,500	70	0	50	0	0	0	0
2022	182,750	87	0	25	25	0	0	0
2023	308,550	258	336	0	82	6	9	66
2024	280,750	283	396	0	82	8	12	88
2025	307,460	259	995	0	82	5	8	52
2026	279,370	208	900	0	82	0	0	0
2027	273,750	272	1,084	0	82	5	8	52
2028	281,680	210	922	0	82	0	0	0
2029	308,500	272	958	0	82	0	0	0
2030	213,680	220	892	0	82	0	0	0
2031–2050	1,887,900	1,512	8,904	0	1,722	0	0	0
Total	**4,376,890**	**3,651**	**15,387**	**100**	**2,403**	**24**	**37**	**258**

Note: Trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.

[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks).

[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse).

[c] Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

[d] Typical helicopters include A-Star and 206 Long Ranger models, although similar types of helicopters may be used. Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.

[e] Includes sealift barges for bulk materials and small modules.

[f] Includes tugboats accompanying sealift barges.

[g] Includes crew boats, screeding barge, and other support vessels.

Alternative D would have a total of 19,038 fixed-wing flights (including landings and departures at the Project airstrip and Alpine), 2,503 helicopter flights (including landings and departures at the Project and Alpine), and 61 total barge and tugboat trips to Oliktok Dock.

Table D.4.26. Alternative D Detailed Project Ground and Aircraft Traffic Volumes by Season for the Life of the Project (number of trips)

Season and Year	Ground[a]	Fixed Wing to Alpine[b]	Fixed Wing to Willow[b]	Alpine Helicopter	Willow Helicopter[c]
Summer 2020	0	0	0	25	0
Winter 2021	36,855	33	0	0	0
Spring 2021	12,285	17	0	12	0
Summer 2021	3,360	20	0	38	0
Fall 2021	0	0	0	0	0
Winter 2022	124,596	52	0	0	0
Spring 2022	42,434	26	0	25	0
Summer 2022	13,007	0	0	0	25
Fall 2022	1,803	0	0	0	0
Winter 2023	210,521	164	228	0	0
Spring 2023	71,226	77	78	0	32
Summer 2023	23,637	0	26	0	50

Season and Year	Ground[a]	Fixed Wing to Alpine[b]	Fixed Wing to Willow[b]	Alpine Helicopter	Willow Helicopter[c]
Fall 2023	2,705	0	3	0	0
Winter 2024	197,444	196	278	0	0
Spring 2024	66,266	85	94	0	32
Summer 2024	15,666	0	22	0	50
Fall 2024	1,803	0	3	0	0
Winter 2025	186,909	184	603	0	0
Spring 2025	68,569	78	222	0	32
Summer 2025	33,169	0	107	0	50
Fall 2025	13,134	0	43	0	0
Winter 2026	164,450	151	530	0	0
Spring 2026	60,636	62	195	0	32
Summer 2026	36,811	0	119	0	50
Fall 2026	16,016	0	52	0	0
Winter 2027	169,301	184	665	0	0
Spring 2027	60,767	82	241	0	32
Summer 2027	30,669	0	121	0	50
Fall 2027	14,005	0	56	0	0
Winter 2028	177,272	153	585	0	0
Spring 2028	62,352	63	204	0	32
Summer 2028	32,254	0	106	0	50
Fall 2028	11,191	0	37	0	0
Winter 2029	196,173	184	610	0	0
Spring 2029	69,500	82	216	0	32
Summer 2029	30,477	0	95	0	50
Fall 2029	11,949	0	37	0	0
Winter 2030	128,319	159	529	0	0
Spring 2030	46,835	66	196	0	32
Summer 2030	26,333	0	110	0	50
Fall 2030	12,106	0	51	0	0
Winter 2031–2051	971,053	1,080	4,580	0	0
Spring 2031–2051	381,600	454	1,802	0	671
Summer 2031-–051	359,600	0	1,700	0	1,051
Fall 2031–2051	179,800	0	848	0	0
Total[d]	**4,374,858**	**3,651**	**15,387**	**100**	**2,403**

Note: Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff.

[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks).

[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

[c] Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.

[d] Values may not match other summary traffic values presented in the Final EIS due to rounding.

During construction, approximately 699.9 miles of ice roads would be constructed to support Project pipeline, gravel pad and gravel road construction, and gravel source (Tiŋmiaqsiuġvik Gravel Mine Site) access over 10 winter construction seasons. During drilling and operations, a 12.5-mile-long annual resupply ice road would be constructed between GMT-2 and the Project's gravel infrastructure (following the same general alignment as the gravel road under Alternative B). Additional limited ice roads would be constructed as needed to accommodate drill rig mobilization. Ice road design and mileage is described in Section 4.2.3.1.

Alternative D gravel roads connecting Project facilities would require the construction of six bridges (Table D.4.27) following the design described in Section 4.2.3.2.1. Three of the six bridges would require the placement of 36 total piles (48 inches in diameter) below OHW. Alternative D would also require eight additional culverts or culvert batteries at stream or swale crossings (Figure D.4.3) and 143 cross-drainage culverts.

Table D.4.27. Alternative D Bridges Summary

Waterbody Crossing	Bridge Length (± feet)[a]	Piles below Ordinary High Water (number)	Latitude (North)	Longitude (West)
Judy (Iqalliqpik) Creek	380	16	70.1462	152.0914
Judy (Kayyaaq) Creek	75	4	70.1848	152.1211
Fish (Uvlutuuq) Creek	420	16	70.2526	152.1787
Willow Creek 4	130	0	70.0816	152.1302
Willow Creek 4A	50	0	70.0360	152.2015
Willow Creek 8	40	0	70.2635	152.1806

[a] Bridge lengths are approximations based on the interpretation of available aerial imagery and are subject to change.

Airstrip (Section 4.2.3.3) construction would begin during the winter construction season of 2021 and be completed during summer 2022. The airstrip would be located near the WOC and would require a larger apron space than those planned for Alternatives B and C to accommodate additional fuel storage, parking space for aircraft, and storage space for solid waste before it can be transported out of the Project area by aircraft. Prior to airstrip availability, the Alpine airstrip (located at Alpine CD1) may be used to support the Project.

Helicopters would be used during Project construction to support ice road construction, environmental monitoring, and surveying. Following the construction of gravel roads and during the drilling and operations phases, helicopters used to support the Project would primarily be limited to ongoing environmental monitoring and spill response support.

Sealift barges would be used to deliver bulk construction materials and small modules to Oliktok Dock to support Project construction (Section 4.2.3.4). Additionally, sealift barges would be used to deliver large processing and drill site modules to the North Slope (Section 4.7). No additional or regular use of barges is proposed over the life of the Project following construction.

4.5.4 Other Infrastructure and Utilities

4.5.4.1 Ice Pads

Single- and multi-season ice pads would be used to support Project construction. Single- and multi-season ice pads are described in Section 4.2.4.1.

Alternative D would require 1,241.4 acres of single-season ice pads over the life of the Project (30 years). Additionally, Alternative D would include the use of three multi-season ice pads to support temporary camps and stage equipment and materials, as needed. The following 10.0-acre multi-season ice pads would be constructed under Alternative D:

- Near GMT-2 (Q1 2021 to Q2, Q1 2022 to Q2 2023, Q1 2023 to Q2 2024, and Q1 2024 to Q2 2025)
- Near the WOC (Q1 2021 to Q2 2022)
- At the Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)

4.5.4.2 Camps

Table D.4.28 details camp requirements for Alternative D to support Project construction, drilling, and operations.

Table D.4.28. Alternative D Camps Summary

Project Phase	Camp	Location	Capacity	Use Schedule
Construction	Temporary camp	Ice pad near WOC	250	Q1 2021 to Q2 2022
Construction	Kuukpik Pad Camp[a]	Kuukpik Pad[b]	150	Q1 2021 to Q4 2030
Construction	Alpine Operations Camp[a]	Alpine central processing facility (at Alpine CD1)[b]	250	Q1 2021 to Q4 2025
Construction	Temporary camp[c]	WOC	100	Q1 2022 to Q4 2026
Construction	Sharktooth Camp[a]	Kuparuk[b]	220	Q1 2022 to Q4 2024
Drilling	Drill rig camp(s)	Drill site(s) or WOC	150	Q1 2024 to Q4 2030
Construction, operations	Willow Camp[c]	WOC	500	Q2 2024 to Q4 2030
Operations	Willow Camp[c]	WOC	200	Q1 2031 to Q4 2051

Note: Q1 (first quarter); Q2 (second quarter); Q4 (fourth quarter); WOC (Willow Operations Center).
[a] Existing camp.
[b] Existing gravel pad.
[c] During construction, up to 60 bed spaces may be used at the existing Kuukpik Hotel in Nuiqsut in lieu of bed spaces identified at or near the WOC.

4.5.4.3 *Utilities, Waste Handling, and Fuel and Chemical Storage*

Power generation and distribution, communications, potable water systems and use, domestic wastewater, solid waste, and drilling waste handling, as well as fuel and chemical storage, would be as described in Section 4.2.4.

4.5.5 Water Sources and Use

As described in Section 4.2.5, freshwater would be needed during construction for domestic use at construction camps, construction and maintenance of ice roads and ice pads, and hydrostatic testing of pipelines. During drilling, freshwater would be required for domestic use at drill rig camps and to support drilling activities. Water for construction and drilling would be withdrawn from lakes in the Project area. Freshwater for domestic use during operations would be sourced from the CFWR and Lake M0235 using the freshwater intake infrastructure (Section 4.2.4.5, *Potable Water*). Alternative D would also require construction of an annual 12.5-mile-long ice road from GMT-2 to the Project for the life of the Project. Anticipated water use for Alternative D is detailed by year and Project phase in Table D.4.29.

Seawater would also be required, as described in Section 4.2.5, and would be sourced from the existing Kuparuk seawater treatment plant and transported via seawater pipeline (Section 4.2.2.3, *Other Pipelines*).

Table D.4.29. Alternative D Estimated Freshwater Use by Project Phase and Year (million gallons)

Year (season)	Construction[a]	Drilling[b]	Operations[c]	Total
2020–2021 (winter)	84.1	0.0	0.0	**84.1**
2021 (summer)	1.1	0.0	0.0	**1.1**
2021–2022 (winter)	225.8	0.0	0.0	**225.8**
2022 (summer)	3.2	0.0	0.0	**3.2**
2022–2023 (winter)	326.8	0.0	0.0	**326.8**
2023 (summer)	9.5	0.0	0.0	**9.5**
2023–2024 (winter)	330.2	0.0	0.0	**330.2**
2024 (summer)	9.0	0.0	0.0	**9.0**
2024–2025 (winter)	128.5	21.5	0.0	**150.0**
2025 (summer)	14.4	43.0	0.0	**57.4**
2025–2026 (winter)	52.6	43.9	0.0	**96.5**
2026 (summer)	10.0	44.8	0.9	**55.7**
2026–2027 (winter)	27.8	8.8	1.8	**38.4**
2027 (summer)	2.4	8.8	4.3	**15.5**
2027–2028 (winter)	125.8	8.8	3.2	**137.8**
2028 (summer)	4.5	8.8	5.1	**18.4**
2028–2029 (winter)	133.6	8.8	4.1	**146.5**
2029 (summer)	3.3	8.8	5.1	**17.2**
2029–2030 (winter)	28.7	8.8	7.4	**44.9**
2030 (summer)	2.1	8.8	5.1	**16.0**
2030–2031 (winter)	0.2	4.4	18.6	**23.2**
2031 (summer)	0.0	0.0	5.1	**5.1**
2031/2032+ (20 winters)	0.0	0.0	372.0	**372.0**
2032+ (20 summers)	0.0	0.0	102.0	**102.0**
Total	**1,523.6**	**228.0**	**534.7**	**2,286.3**

Note: "+" indicates annual use for the life of the Project (2051) for operations.
[a] The construction phase would include ice road construction (1.0 million gallons [MG] per mile for a 35-foot-wide road, 1.4 MG per mile for a 50-foot-wide road, and 2.0 MG per mile for a 70-foot-wide road), ice pad construction (0.25 MG per acre), dust suppression, hydrostatic testing, and camp supply (100 gallons per person per day).
[b] The drilling phase would include drilling water (1.4 MG per month prior to Willow Processing Facility startup and 0.4 MG per drill rig per month after startup), hydraulic fracturing (1.0 MG per well prior to Willow Processing Facility startup), and camp supply (100 gallons per person per day).
[c] The operations phase would include dust suppression, camp supply (100 gallons per person per day), and an annual ice road (1.0 MG per mile for a 35-foot-wide road).
[d] Annual winter water use for operations would 18.6 MG.
[e] Annual summer water use for operations would be 5.1 MG.

4.5.6 Gravel and Other Fill Requirements

Project roads and pads would be constructed with gravel obtained from the Tiŋmiaqsiuġvik Gravel Mine Site and the perimeter berm surrounding the CFWR would be constructed from material excavated from the reservoir and capped in gravel. Table D.4.30 lists the estimated quantity of fill material anticipated for each Project component under Alternative D.

Table D.4.30. Alternative D Estimated Fill Material Requirements by Project Component

Component	Footprint (acres)[a]	Fill Quantity (cubic yards)[a]	Fil Type	Notes and Assumptions
Drill sites pads (four total)	62.8	872,000	Gravel	Based on four drill sites with an average pad thickness of 9 feet and 2:1 side slopes
BT3/WPF pad	64.7	1,401,000	Gravel	Based on an average pad thickness of 13.5 feet with 2:1 side slopes
Willow Operations Center pad	62.2	1,168,000	Gravel	Based on an average pad thickness of 12 feet with 2:1 side slopes
Valve pads (four total) and pipeline pads (four total)	4.0	48,000	Gravel	Based on four valve pads and four pipeline pads with an average pad thickness of 7 feet and 8 feet (respectively) with 2:1 side slopes
Water source access pads (two total)	2.6	24,000	Gravel	Based on two pads with an average pad thickness of 7 feet with 2:1 side slopes
Communications tower pad	0.5	5,000	Gravel	Based on an average pad thickness of 7 feet with 2:1 side slopes
CPF2 pad expansion	1.0	13,000	Gravel	Based on an average pad thickness of 8 feet with 2:1 side slopes
CD1 pad expansion	1.3	19,000	Gravel	Based on an average pad thickness of 10 feet with 2:1 side slopes
GMT-2 staging pad	5.9	79,000	Gravel	Based on an average pad thickness of 9 feet with 2:1 side slopes
Airstrip (includes airstrip and apron)	44.7	627,000	Gravel	Based on an average thickness of 9.5 feet with 2:1 side slopes
Gravel roads	186.7	1,572,000	Gravel	Based on average road surface width of 24 to 32 feet and thickness of 7 feet with 2:1 side slopes; includes water source access and airstrip access roads
Vehicle turnouts (six total)	2.2	24,000	Gravel	Six subsistence tundra access road pullouts every 2.5 to 3 miles with an average thickness of 7 feet
CFWR perimeter berm	3.9	6,000	Gravel	Constructed from overburden material excavated during construction of the freshwater reservoir; based on an average thickness of 7 feet with 2:1 side slopes
CFWR perimeter berm	0.0	25,000	Overburden	Capping material for the overburden perimeter berm
Oliktok Dock upgrades	0.0	5,200	Gravel	Upgrades would be within the existing footprint
Boat ramp	1.8	20,000	Gravel	Based on one boat ramp
Total[b]	**444.3**	**5,908,200**	**NA**	**NA**

Note: 2:1 (2 horizontal to 1 vertical ratio); BT3/WPF (Bear Tooth drill site 3/Willow Processing Facility); CD1 (Alpine CD1); CFWR (constructed freshwater reservoir); CPF 2 (Kuparuk CPF2); GMT-2 (Greater Mooses Tooth 2); NA (not applicable).
[a] Values are approximate and are subject to change.
[b] Values may not total due to rounding; 5,883,200 cubic yards of gravel fill and 25,000 cubic yards of overburden fill.

4.5.7 Spill Prevention and Response

Spill prevention and response would be consistent with prevention measures and response procedures described in Section 4.2.8. The WOC would provide a centralized facility to support Project drill sites, including equipment, personnel, and other support to respond to potential emergencies. The lack of an all-season gravel road connection to the GMT and Alpine developments would pose additional challenges for spill response during the non-ice road season.

The lack of a gravel road parallel to approximately 12.5 miles of Willow export, diesel, and seawater pipelines would not allow for routine daily observation of these pipelines to detect leaks or other problems that could result in a spill incident. Routine observation and investigation of pipelines would occur as part of CPAI's operational best practices as well as be in compliance with regulatory requirements to conduct pipeline inspections.

Without an all-season gravel access road connection to GMT-2, existing emergency response equipment at Alpine would need to be duplicated at Willow, requiring additional gravel pad space. Construction of the Project would also provide no additional benefits for emergency response to any incidents that could occur at GMT-2 and other facilities within Alpine, and equipment at Willow would not be available to provide mutual aid in the event of a fire, medical, or spill response at Alpine or in Nuiqsut.

With the exception of the ice road season, spill response mobilization would be limited to helicopters and low-ground-pressure vehicles (e.g., Rolligons), both of which have limited cargo and/or passenger capacity. Response to a spill of any significant size would likely require multiple trips, further delaying response times. Additionally, helicopter response could be further limited by weather conditions. Summer travel by all-terrain vehicles during a response, in the event other transportation modes are not available, may also result in additional tundra damage during transport when compared to a spill located near a road.

Substantial truck traffic by ice road over the life of the Project would pose additional health, safety, and environmental hazards, as vehicles unintentionally leaving the roadway are more likely to occur on ice roads than gravel roads. This poses additional risk to Project personnel and increases the risk of minor spills associated with vehicle accidents.

4.5.8 Schedule and Logistics

Detailed schedule and logistics information is provided in Section 4.2.10.

The lack of a gravel access road connection under Alternative D would result in less flexibility to leverage existing infrastructure. which would result in less efficient construction in comparison to Alternatives B and C. The lack of flexibility would result in additional constraints on development construction and logistics that would extend the construction phase compared to Alternatives B and C by 1 year (10 years total) and delay first oil by approximately 1 year to Q4 of 2026). Production from BT5 would begin in Q4 of 2030.

To help mitigate these logistical issues, initial construction activities would prioritize construction of the WOC, delaying installation of drill site facilities. Until construction of the diesel pipeline from Kuparuk CPF2 to the Project area is completed, the transport of diesel fuel would also be a limiting factor in construction logistics. This would specifically limit the opportunity to conduct early well pre-drilling.

Figure D.4.15 provides a general schedule for key construction, drilling, and operations milestones. The schedule presented in Figure D.4.15 is based on the current best available information; the schedule may be modified as detailed design progresses and as circumstances require.

4.5.9 Project Infrastructure in Special Areas

As described in Section 4.2.11, Alternative D would include 0.5 acres of gravel infrastructure and 1.4 miles of pipelines within the CRSA just southwest of GMT-2. Alternative D also would have approximately 108.4 acres of the Project, including BT2 and BT4 and their associated roads (11.1 miles), and 11.4 miles of pipeline located within the TLSA. These designations do allow oil and gas development in these areas, and the Project would comply with BMPs associated with these two management areas (BLM 2008a, 2013).

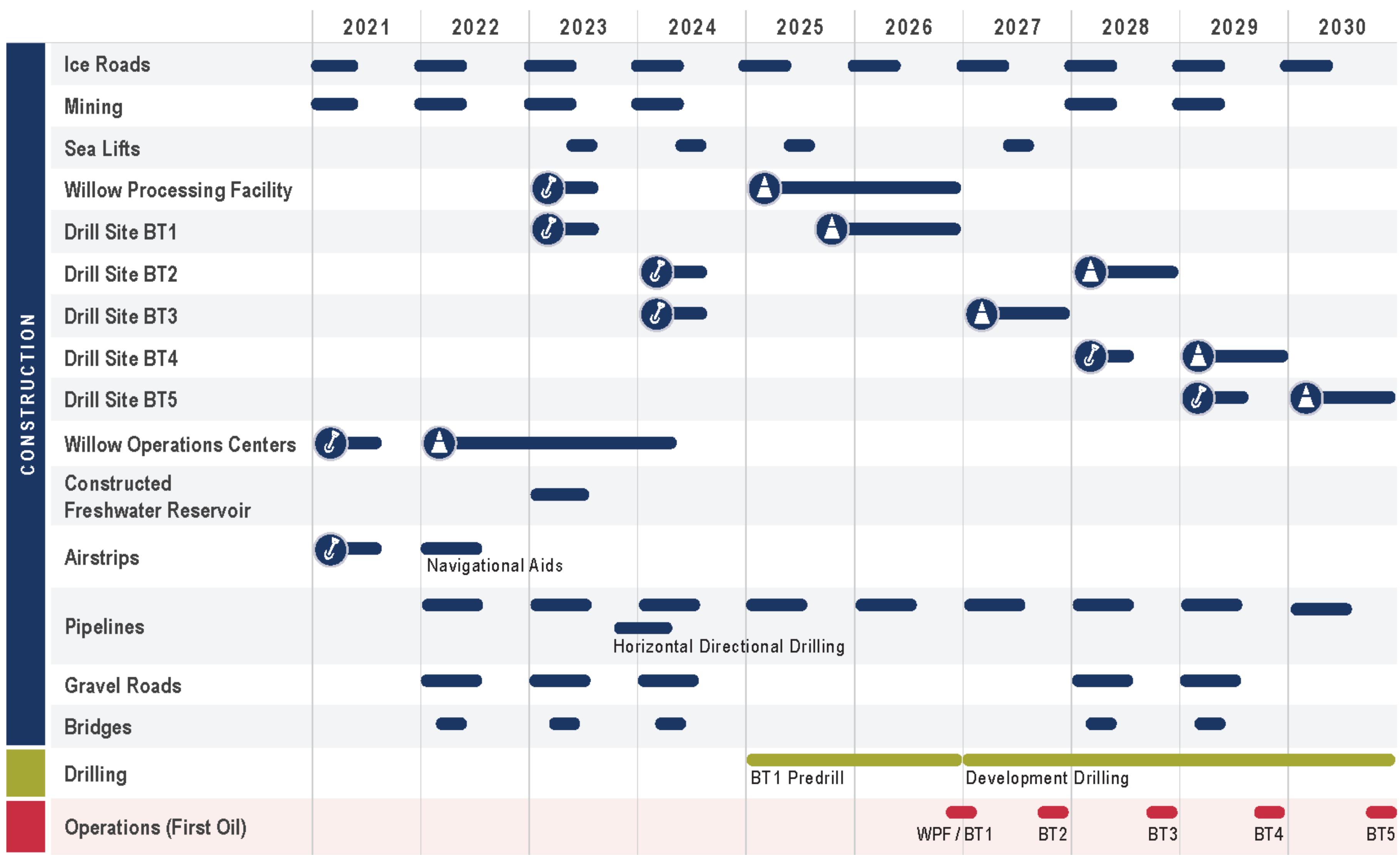
4.5.10 Compliance with Best Management Practices

As described in Section 4.2.12, Alternative D would require deviations to existing LSs and BMPs, including LS E-2 and BMPs E-7, E-11, K-1, and K-2. These include the location of the proposed road alignment within 1 mile of an observed yellow-billed loon nest and/or within 1,625 feet of a loon-nesting lake shoreline at four lakes (BMP E-11). Alternative D would include 17.9 miles of pipeline located within 500 feet of gravel roads (BMP E-7). This mileage is spread over several short road-pipeline stretches where separating roads from pipelines may not be feasible (e.g., within narrow land corridors between lakes, where pipelines and roads converge on a drill pad). CPAI will continue to seek opportunities to avoid the placement of pipelines within 500 feet of roads as Project engineering progresses. When deviations are granted, they typically are specified to stated Project actions or locations and are not granted for all Project actions. Other deviations for Alternative D are described in Table D.4.5 (Section 4.2.12).

4.5.11 Boat Ramps for Subsistence Users

CPAI would construct one boat ramp during the first year of Project construction for subsistence use as part of its effort to mitigate Project effects on the community of Nuiqsut (Section 4.2.13) under Alternative D (Figures D.4.3 and D.4.9). The boat ramp would be constructed on the Ublutuoch (Tiŋmiaqsiuġvik) River along the existing gravel road between Alpine CD5 and GMT-1. The boat ramp would have a gravel footprint of 1.8 acres and require 20,000 cy of gravel fill.

Figure D.4.15. Alternative D Schedule



Notes: BT1/2/3/4/5 (Bear Tooth drill sites 1/2/3/4/5); WPF (Willow Processing Facility)

4.6 Comparison of Action Alternatives

Table D.4.31 provides a summary comparison of impacts by action alternative. Figure D.4.16 provides a comparison of the action alternatives.

Table D.4.31. Summary Comparison of Impacts by Action Alternatives

Project Component	Alternative B – Proponent's Project	Alternative C – Disconnected Infield Roads	Alternative D – Disconnected Access
Drill site gravel pads	Five pads (79.8 acres total) Three 17.0-acre pads (51.0 acres total): BT1, BT2, and BT3 Two 14.4-acre pads (28.8 acres total): BT4 and BT5	Five pads (88.3 acres total): BT1 (23.3 acres), BT2 (18.1 acres), BT3 (17.0 acres), BT4 (15.5 acres), and BT5 (14.4 acres)	Five pads (62.8 acres total): Two 17.0-acre pads (34.0 acres total): BT1 and BT2 Two 14.4-acre pads (28.8 acres total): BT4 and BT5 BT3 (colocated with WPF; acreage accounted for under WPF pad)
WPF gravel pad	22.8-acre pad	22.8-acre pad	64.7-acre pad (colocated with BT3)
WOC gravel pad	31.3-acre pad	Two WOC pads (50.2 acres total): South WOC (33.4 acres) North WOC (16.8 acres)	62.2-acre pad
Constructed freshwater reservoir	16.3-acre excavation (reservoir and connecting channel) and 3.9-acre perimeter berm	16.3-acre excavation (reservoir and connecting channel) and 3.9-acre perimeter berm	16.3-acre excavation (reservoir and connecting channel) and 3.9-acre perimeter berm
Water source access gravel pads	Two water source access pads (2.6 acres total) at the CFWR (1.3 acres) and Lake L9911 (1.3 acres)	Three water source access pads (3.9 acres total) at the CFWR (1.3 acres) and Lakes L9911 (1.3 acres) and M0235 (1.3 acres)	Two water source access pads (2.6 acres total) at the CFWR (1.3 acres) and Lake M0235 (1.3 acres)
Other gravel pads	Four valve pads (1.3 acres total); two pads at Judy (Iqalliqpik) Creek pipeline crossing and two pads at Fish (Uvlutuuq) Creek pipeline crossing Two HDD pipeline pads at Colville River crossing (1.5 acres total) Tie-in pad near Alpine CD4N (0.7 acre) Pipeline crossing pad near GMT-2 (0.5 acre) Communications tower pad (0.5 acre) Kuparuk CPF2 pad expansion (1.0 acre)	Four valve pads (1.7 acres total); two helicopter accessible pads at Judy (Iqalliqpik) Creek pipeline crossing and two pads at Fish (Uvlutuuq) Creek pipeline crossing Two HDD pipeline pads at Colville River crossing (1.5 acres total) Tie-in pad near Alpine CD4N (0.7 acre) Pipeline crossing pad near GMT-2 (0.5 acre) Communications tower pad (0.5 acre) Kuparuk CPF2 pad expansion (1.0 acre)	Four valve pads (1.3 acres total): two pads at Judy (Iqalliqpik) Creek pipeline crossing and two pads at Fish (Uvlutuuq) Creek pipeline crossing Two HDD pipeline pads at Colville River crossing (1.5 acres total) Tie-in pad near Alpine CD4N (0.7 acre) Pipeline crossing pad near GMT-2 (0.5 acre) Communications tower pad (0.5 acre) GMT-2 staging pad (5.9 acres) Kuparuk CPF2 pad expansion (1.0 acre) Alpine CD1 pad expansion (1.3 acres)
Single-season ice pads	Used during construction at the gravel mine site, bridge crossings, the Colville River HDD crossing, and other locations as needed in the Project area (936.6 total acres)	Used during construction at the gravel mine site, bridge crossings, the Colville River HDD crossing, and other locations as needed in the Project area (1,166.4 total acres)	Used during construction at the gravel mine site, bridge crossings, the Colville River HDD crossing, and other locations as needed in the Project area (1,241.4 total acres)

Project Component	Alternative B – Proponent's Project	Alternative C – Disconnected Infield Roads	Alternative D – Disconnected Access
Multi-season ice pads	Three 10.0-acre pads (30.0 acres total): 10.0-acre multi-season ice pad near GMT-2 (Q1 2021 to Q2 2025) 10.0-acre multi-season ice pad near WOC (Q1 2021 to Q2 2022) 10.0-acre multi-season ice pad at the Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)	Three 10.0-acre pads (30.0 acres total): 10.0-acre multi-season ice pad near GMT-2 (Q1 2021 to Q2 2025) 10.0-acre multi-season ice pad near the South WOC (Q1 2021 to Q2 2022) 10.0-acre multi-season ice pad at the Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)	Three 10.0-acre pads (30.0 acres total): 10.0-acre multi-season ice pad at GMT-2 (Q1 2021 to Q2 2025) 10.0-acre multi-season ice pad at the WOC (Q1 2021 to Q2 2022) 10.0-acre multi-season ice pad at Tiŋmiaqsiuġvik Gravel Mine Site (Q1 2021 to Q2 2023)
Infield pipelines	43.4 total segment miles: BT1 to WPF (4.3 miles) BT2 to BT1 (4.7 miles) BT3 to WPF (4.2 miles) BT4 to BT2 (10.2 miles) BT5 to WPF (9.8 miles) GMT-2 to WPF (10.2)	47.0 total segment miles: BT1 to WPF (6.0 miles) BT2 to BT1 (4.5 miles) BT3 to WPF (5.9 miles) BT4 to BT2 (9.9 miles) BT5 to WPF (11.5 miles) GMT-2 to WPF (9.2 miles)	46.5 total segment miles: BT1 to WPF (10.0 miles) BT2 to BT1 (4.7 miles) BT4 to BT2 (10.2 miles) BT5 to WPF (6.5 miles) GMT-2 to WPF (15.1 miles)
Willow export pipeline	33.3 total miles (WPF to tie-in pad near Alpine CD4N)	32.2 total miles (WPF to tie-in pad near Alpine CD4N)	38.2 total miles (WPF to tie-in pad near Alpine CD4N)
Other pipelines	64.3-mile seawater pipeline (Kuparuk CPF2 to WPF); includes Colville River HDD crossing 34.4-mile diesel pipeline (Kuparuk CPF2 to Alpine CD1); includes Colville River HDD crossing; diesel would be trucked 37.5 miles from Alpine CD1 to the WOC 2.8-mile fuel gas pipeline (WOC to WPF) 4.9-mile freshwater pipeline (CFWR to WPF to WOC) 2.8-mile treated water pipeline (WOC to WPF)	63.3-mile seawater pipeline from Kuparuk CPF2 to WPF; includes Colville River HDD crossing 82.0-mile diesel pipeline from Kuparuk CPF2 to South WOC to WPF to North WOC 1.7-mile fuel gas pipeline (WPF to South WOC) 5.6-mile freshwater pipeline (CFWR to WPF to South WOC) 12.9-mile treated water pipeline (South WOC to WPF to North WOC)	69.2-mile seawater pipeline from Kuparuk CPF2 to WPF; includes Colville River HDD crossing 77.0-mile diesel pipeline from Kuparuk CPF2 to Alpine CD1 to WOC; includes Colville River HDD crossing 1.5-mile fuel gas pipeline (WPF to WOC) 2.2-mile freshwater pipeline (CFWR to WOC to WPF) 1.5-mile treated water pipeline (WOC to WPF)
Total miles of pipeline alignment without a parallel road (i.e., greater than 1,000 feet of separation)	40.7	45.5	47.9
VSMs	Approximately 13,000 total VSMs with a 0.8-acre disturbance footprint	Approximately 13,000 total VSMs with a 0.8-acre disturbance footprint	Approximately 13,700 total VSMs with a 0.9-acre disturbance footprint
Pipeline VSMs below ordinary high water (number)	0	10 at Judy (Iqalliqpik) Creek	0

Project Component	Alternative B – Proponent's Project	Alternative C – Disconnected Infield Roads	Alternative D – Disconnected Access
Gravel roads	37.0 miles (260.2 total acres, including vehicle turnouts) total connecting drill sites to the WPF, WOC, airstrip access road, water source access roads, and GMT-2 Eight vehicle turnouts with subsistence/tundra access ramps (3.0 acres total)	35.3 miles (243.2 total acres, including vehicle turnouts) total connecting: BT5, BT3, CFWR, South Airstrip access road, and South WOC to the WPF; and WPF to GMT-2 BT1, BT2, and BT4, water source access road, North Airstrip access road, and the North WOC Eight vehicle turnouts with subsistence/tundra access ramps (3.0 acres total)	27.1 miles (188.9 total acres, including vehicle turnouts) total connecting four drill sites to BT3/WPF, WOC, airstrip access road, and water source access roads; there would be no gravel road connection to GMT-2 Six vehicle turnouts with subsistence/tundra access ramps (2.2 acres total)
Bridges	Seven total bridges: Judy (Iqalliqpik) Creek, Judy (Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4A, and Willow Creek 8	Six total bridges: Judy (Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4A, Willow Creek 8	Six total bridges: Judy (Iqalliqpik) Creek, Judy (Kayyaaq) Creek, Fish (Uvlutuuq) Creek, Willow Creek 4, Willow Creek 4A, and Willow Creek 8
Bridge piles below ordinary high water (number)	36 total: 16 at Judy (Iqalliqpik) Creek 4 at Judy (Kayyaaq) Creek 16 at Fish (Uvlutuuq) Creek	20 total: 4 at Judy (Kayyaaq) Creek 16 at Fish (Uvlutuuq) Creek	36 total: 16 at Judy (Iqalliqpik) Creek 4 at Judy (Kayyaaq) Creek 16 at Fish (Uvlutuuq) Creek
Culverts or culvert batteries (number)	11	10	8
Cross-drainage culverts (number)	195	186	143
Airstrip	6,200 × 200–foot airstrip and apron (42.1 acres total); would require airstrip access road	Two airstrips (87.6 acres total): North Airstrip: 6,200 × 200–foot airstrip and apron (43.8 acres total); would also require an airstrip access road South Airstrip: 6,200 × 200–foot airstrip and apron (43.8 acres total); would require an airstrip access road	6,200 × 200–foot airstrip and apron (44.7 acres total); would require an airstrip access road
Boat ramps	Three boat ramps (5.9 acres total): 1.8 acres at Ublutuoch (Tiŋmiaqsiuġvik) River 2.0 acres at Judy (Iqalliqpik) Creek 2.1 acres at Fish (Uvlutuuq) Creek	1.8 acres at Ublutuoch (Tiŋmiaqsiuġvik) River	1.8 acres at Ublutuoch (Tiŋmiaqsiuġvik) River
Oliktok Dock modifications	Modifications to the existing dock include adding structural components and a gravel ramp within the existing developed footprint 2.5 acres of screeding at Oliktok Dock 9.6 acres of screeding at the barge lightering area	Modifications to the existing dock include adding structural components and a gravel ramp within the existing developed footprint 2.5 acres of screeding at Oliktok Dock 9.6 acres of screeding at the barge lightering area	Modifications to the existing dock include adding structural components and a gravel ramp within the existing developed footprint 2.5 acres of screeding at Oliktok Dock 9.6 acres of screeding at the barge lightering area

Project Component	Alternative B – Proponent's Project	Alternative C – Disconnected Infield Roads	Alternative D – Disconnected Access
Ice roads	Approximately 495.2 total miles (3,590.7 total acres) over nine construction seasons (2021 through 2029)	Approximately 650.1 total miles (4,411.6 total acres) 574.5 miles (4,090.3 acres) over nine construction seasons (2021 through 2029) 3.6 miles (15.3 acres) of annual resupply ice road (2030 to 2050; 75.6 total miles; 321.3 total acres)	Approximately 962.4 total miles (5,893.4 total acres) 699.9 miles (4,780.4 acres) over 10 construction seasons (2021 to 2030) 12.5 miles (55.7 acres) of annual resupply ice road (2030 to 2051; 262.5 total miles; 1,113.0 total acres)
Total footprint and gravel fill volume[a]	454.1-acre gravel footprint using 4.9 million cy of gravel fill and 25,000 cy of native fill 149.7-acre gravel mine site excavation 16.3-acre excavation at the CFWR 12.1-acre screeding area	507.6-acre gravel footprint using 5.8 million cy of gravel fill and 25,000 cy of native fill 149.7-acre gravel mine site excavation 16.3-acre excavation at the CFWR 12.1-acre screeding area	444.3-acre gravel footprint using 5.9 million cy of gravel fill and 25,000 cy of native fill 149.7-acre gravel mine site excavation 16.3-acre excavation at the CFWR 12.1-acre screeding area
Gravel source	Two mine site cells (149.7 total acres) in Tiŋmiaqsiuġvik area (Mine Site Area 1 would be 109.3 acres and Mine Site Area 2 would be 40.4 acres)	Two mine site cells (149.7 total acres) in Tiŋmiaqsiuġvik area (Mine Site Area 1 would be 109.3 acres and Mine Site Area 2 would be 40.4 acres)	Two mine site cells (149.7 total acres) in Tiŋmiaqsiuġvik area (Mine Site Area 1 would be 109.3 acres and Mine Site Area 2 would be 40.4 acres)
Total freshwater use	1,662.4 million gallons over the life of the Project (30 years)	1,914.3 million gallons over the life of the Project (30 years)	2,286.3 million gallons over the life of the Project (31 years)
Ground traffic (number of trips)[b,c]	3,188,910	4,212,510	4,376,890
Fixed-wing air traffic[b,d]	12,101 total flights Willow: 11,809 Alpine: 292	19,574 total flights South Willow: 13,201 North Willow: 6,051 Alpine: 292	19,038 total flights Willow: 15,387 Alpine: 3,651
Helicopter air traffic[b,e]	2,421 total flights Willow: 2,321 Alpine: 100	2,910 total flights South Willow: 2,421 North Willow: 357 Alpine: 132	2,503 total flights Willow: 2,403 Alpine: 100
Marine traffic (number of trips)[b,f]	319 total trips Sealift barges: 24 Tugboats: 37 Support vessels: 258	319 total trips Sealift barges: 24 Tugboats: 37 Support vessels: 258	319 total trips Sealift barges: 24 Tugboats: 37 Support vessels: 258
Project duration	30 years (9 years of construction)	30 years (9 years of construction)	31 years (10 years of construction)
Infrastructure in special areas	Colville River Special Area: 1.0 mile (8.1 acres) of gravel road; 1.4 miles of pipeline Teshekpuk Lake Special Area: 10.8 miles of gravel road and gravel pads (106.3 acres total); 11.4 miles of pipeline	Colville River Special Area: 1.0 mile (8.1 acres) of gravel road; 1.4 miles of pipeline Teshekpuk Lake Special Area: 12.5 miles of gravel road and gravel pads (179.7 acres total); 12.2 miles of pipeline	Colville River Special Area: 0.5 acre of gravel infrastructure; 1.4 miles of pipeline Teshekpuk Lake Special Area: 11.1 miles of gravel road and gravel pads (108.4 acres total); 11.4 miles of pipeline
Fish-bearing waterbody setback overlap (LS E-2)	0.0 acres of gravel footprint, 0.0 mile of gravel road, and 0.0 miles of pipelines	Less than 0.1 acre of gravel footprint, 0.0 mile of gravel road, and 0.0 miles of pipelines	Less than 0.1 acre of gravel footprint, 0.0 mile of gravel road, and 0.0 miles of pipelines

Project Component	Alternative B – Proponent's Project	Alternative C – Disconnected Infield Roads	Alternative D – Disconnected Access
Less than 500-foot pipeline-road separation (BMP E-7)	15.7 miles of pipelines and road with less than 500 feet of separation	17.1 miles of pipelines and road with less than 500 feet of separation	17.9 miles of pipelines and roads with less than 500 feet of separation
Yellow-billed loon setback overlap (BMP E-11)	60.0 acres of gravel infrastructure and 7.7 miles of pipelines within 1 mile of a nest 25.8 acres of gravel infrastructure and 3.3 miles of pipelines within 1,625 feet of lakes with nests	41.2 acres of gravel infrastructure and 7.7 miles of pipelines within 1 mile of a nest 13.5 acres of gravel infrastructure and 3.3 miles of pipelines within 1,625 feet of lakes with nests	58.0 acres of gravel infrastructure and 7.7 miles of pipelines within 1 mile of a nest 15.3 acres of gravel infrastructure and 3.3 miles of pipelines within 1,625 feet of lakes with nests
River setback overlap (BMP K-1)	Colville River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines Fish (Uvlutuuq) Creek: 12.3 acres of gravel infrastructure and 5.5 miles of pipelines Judy (Iqalliqpik) Creek: 18.7 acres of gravel infrastructure and 2.3 miles of pipelines Ublutuoch (Tiŋmiaqsiuġvik) River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines; 137.8 acres of gravel mine site	Colville River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines Fish (Uvlutuuq) Creek: 12.9 acres of gravel infrastructure and 5.4 miles of pipelines Judy (Iqalliqpik) Creek: 1.1 acres of gravel infrastructure and 2.3 miles of pipelines Ublutuoch (Tiŋmiaqsiuġvik) River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines; 137.8 acres of gravel mine site	Colville River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines Fish (Uvlutuuq) Creek: 12.6 acres of gravel infrastructure and 5.4 miles of pipelines Judy (Iqalliqpik) Creek: 16.7 acres of gravel infrastructure and 2.3 miles of pipelines Ublutuoch (Tiŋmiaqsiuġvik) River: 0.0 acres of gravel infrastructure and 0.0 miles of pipelines; 137.8 acres of gravel mine site
Deepwater lake setback overlap (BMP K-2)	3.2 acres of gravel infrastructure and 0.0 mile of pipelines; 14.5 acres of the constructed freshwater reservoir would be within the setback and 1.4 acres of the reservoir connection would be within the lake	3.2 acres of gravel infrastructure and 0.0 mile of pipelines; 14.5 acres of the constructed freshwater reservoir would be within the setback and 1.4 acres of the reservoir connection would be within the lake	3.2 acres of gravel infrastructure and 1.5 mile of pipelines; 14.5 acres of the constructed freshwater reservoir would be within the setback and 1.4 acres of the reservoir connection would be within the lake

Note: BMP (best management practice); 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); CD1 (Alpine CD1); CD4N (Alpine CD4N); CFWR (constructed freshwater reservoir); GMT-2 (Greater Mooses Tooth 2); HDD (horizontal directional drilling); LS (lease stipulation); MTI (module transfer island); Q1 (first quarter); Q2 (second quarter); VSM (vertical support member); WPF (Willow Processing Facility); WOC (Willow Operations Center). Ground trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.

[a] Values may not sum to totals due to rounding.

[b] Total traffic is for the life of the Project (Alternative B and C, 30 years; Alternative D, 31 years) and does not include any reclamation activity.

[c] Number of trips includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Construction ground traffic also includes gravel hauling (e.g., B-70/Maxi Haul dump trucks).

[d] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse); includes Q400, C-130, Twin Otter/CASA, Cessna, and DC-6 or similar aircraft.

[e] Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used. Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project

[f] Includes crew bats, tugboats supporting sealift barges, screeding barges, and other support vessels.

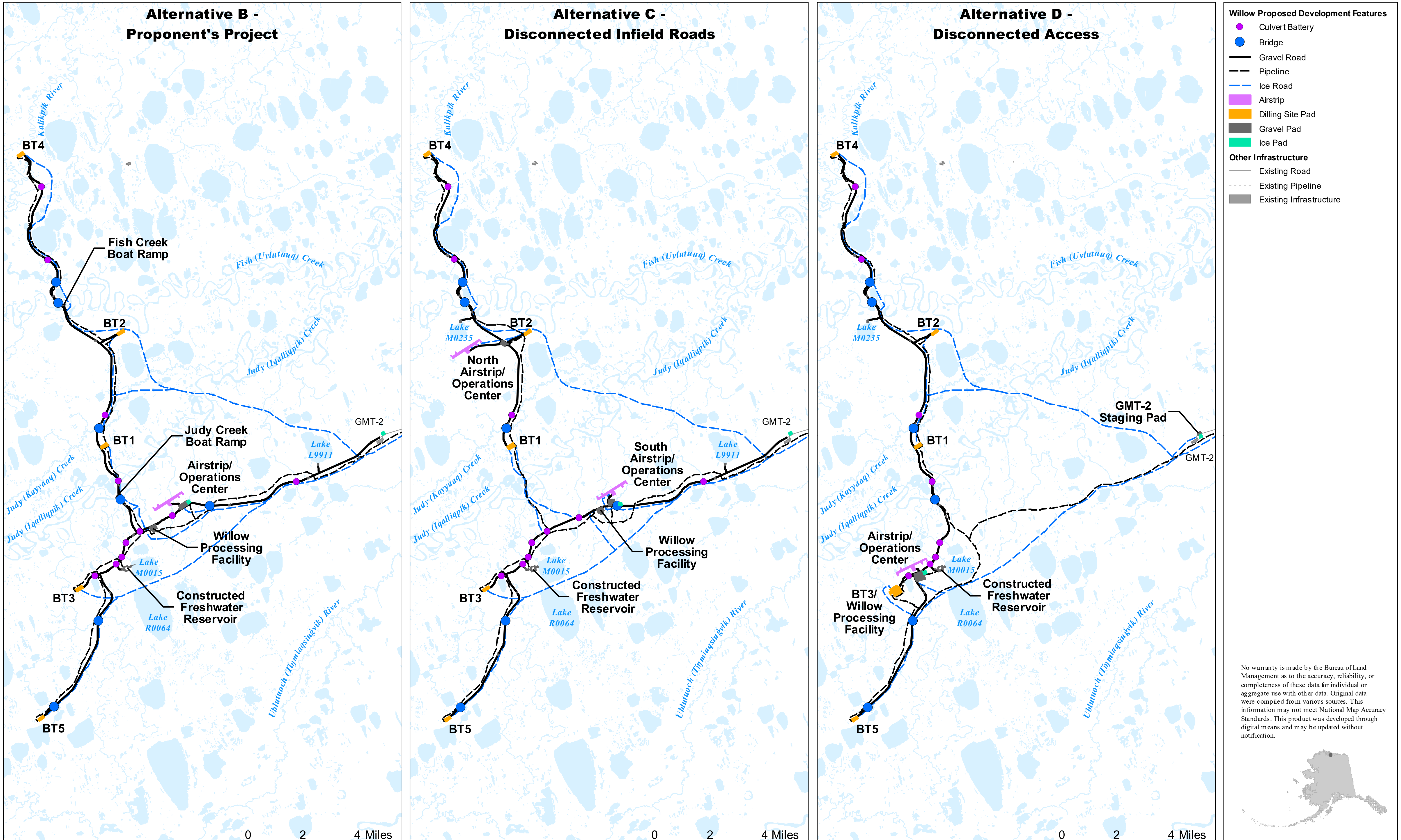

Alternative B - Proponent's Project
Kalikpik River
BT4
Fish Creek Boat Ramp
Fish (Uvlutuuq) Creek
BT2
Judy (Iqalliqpik) Creek
BT1
Judy Creek Boat Ramp
GMT-2
Lake L9911
Airstrip/ Operations Center
Judy (Kayyaaq) Creek
Judy (Iqalliqpik) Creek
Willow Processing Facility
Lake M0015
BT3
Constructed Freshwater Reservoir
Lake R0064
Ublutuoch (Tiŋmiaqsiuġvik) River
BT5
0 2 4 Miles
Alternative C - Disconnected Infield Roads
Kalikpik River
BT4
Fish (Uvlutuuq) Creek
Lake M0235
BT2
North Airstrip/ Operations Center
Judy (Iqalliqpik) Creek
BT1
South Airstrip/ Operations Center
GMT-2
Lake L9911
Judy (Kayyaaq) Creek
Judy (Iqalliqpik) Creek
Willow Processing Facility
Lake M0015
BT3
Constructed Freshwater Reservoir
Lake R0064
Ublutuoch (Tiŋmiaqsiuġvik) River
BT5
0 2 4 Miles
Alternative D - Disconnected Access
Kalikpik River
BT4
Fish (Uvlutuuq) Creek
Lake M0235
BT2
Judy (Iqalliqpik) Creek
GMT-2 Staging Pad
GMT-2
BT1
Judy (Kayyaaq) Creek
Judy (Iqalliqpik) Creek
Airstrip/ Operations Center
Lake M0015
BT3/ Willow Processing Facility
Constructed Freshwater Reservoir
Lake R0064
Ublutuoch (Tiŋmiaqsiuġvik) River
BT5
0 2 4 Miles
Willow Proposed Development Features
Culvert Battery
Bridge
Gravel Road
Pipeline
Ice Road
Airstrip
Dilling Site Pad
Gravel Pad
Ice Pad
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure D.4.16

4.7 Sealift Module Delivery Options

CPAI proposes to use large prefabricated modules for Project components like the WPF and drill site facilities. These large modules would be fabricated at an off-site location and transported to the North Slope via sealift barge. Modules for the WPF and drill sites are anticipated to weigh between 3,000 and 4,000 tons and up to 1,000 tons, respectively. As a result, the large modules are too heavy to be transported across the Colville River on the annual resupply ice road and other options to transport the modules to the Project area are evaluated in this EIS. To facilitate off-loading and mobilization to the Project area, the following three module delivery options are presented for detailed analysis:

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

The first two options for module transport would deliver the large modules to an MTI west of the Colville River (eliminating this required crossing) and then use ice roads to transport the modules to their gravel pads. Based on discussions with stakeholders, CPAI developed a third option to deliver the large modules to the Project area that would use the existing Oliktok Dock. Option 3 would use existing Kuparuk gravel roads and ice roads to move the large modules to the Project area, with a new Colville River crossing location near Ocean Point.

Sealift delivery of the large WPF and drill site modules would occur during two open-water seasons. Under Alternatives B and C, the modules would be delivered during the summers of 2024 and 2026; under Alternative D, the modules would be delivered during the summers of 2025 and 2027. The three module delivery options are detailed below. The large WPF and drill site module delivery barges would be in addition to the vessel traffic required to delivery small modules and bulk materials to Oliktok Dock, as described in Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*.

The origins of the modules and sealift barges are not currently known, but transit routes would follow existing, regularly used marine transportation routes. Any of the module delivery options could be combined with any of the action alternatives.

4.7.1 Option 1: Atigaru Point Module Transfer Island

4.7.1.1 Module Transfer Island Construction

Option 1 would include construction of an MTI with a design life of 5 to 10 years in State of Alaska–owned waters in Harrison Bay, approximately 2 miles north of Atigaru Point, to support sealift module delivery for the Project (Figure D.4.4). Modules for the WPF, BT1, BT2, and BT3 would be delivered by sealift barges to the MTI during the summer of 2024 (Alternatives B and C) or 2025 (Alternative D). A second sealift would deliver modules for BT4 and BT5 in 2026 (Alternatives B and C) or 2027 (Alternative D). Modules would be stored on the MTI and mobilized from the MTI to their gravel pads via ice road the following winter ice road season.

The MTI would be built through the placement of gravel fill from the Tiŋmiaqsiuġvik Gravel Mine Site in approximately 8 to 10 feet of water to a height of approximately 13 feet above mean lower low water (MLLW). The MTI would include a 600-foot-square (8.3-acre) gravel work surface surrounded by 3:1 side slopes with gravel bag armor slope protection and a 200-foot-long sheet-pile dock with a top surface at 16 feet above MLLW to facilitate barge offloading (Figure D.4.4). The resulting island footprint would be approximately 12.8 acres (based on an assumed 8.5-foot depth) on the seafloor.

Gravel haul and placement to construct the MTI would occur via an ice road during the 2022–2023 winter construction season under Alternatives B and C and the 2023–2024 winter season under Alternative D as soon as the ice roads have been constructed. Winter MTI construction would occur from a grounded sea ice pad surrounding the MTI. Sea ice within the MTI footprint, surrounding the MTI footprint, and the associated sea ice road would be bottom-fast (frozen to the seafloor) before construction of the MTI would begin. Sea ice within the MTI footprint would be cut and removed and gravel would be placed into the opening until the design volume and approximate shape of the MTI is attained. Installation of the sheet-pile offload dock would occur in winter once the initial gravel placement is sufficient to support pile-driving activities and the staging of materials and equipment. Sheet pile would be installed over approximately 25 to 30 days, with approximately 3 to 6 hours of actual pile driving occurring per day, using vibratory driving equipment. After completion of the sheet-pile bulkhead, a 24-inch-diameter pipe pile would be installed to support the dock face and provide barge mooring using both vibratory and impact pile-driving equipment. Pipe pile installation would take approximately 2 days with approximately 2 hours of pile driving per day (estimated at 1.5 hours of vibratory driving and 0.5 hour of impact driving per day). Winter pile driving for dock construction would cease prior to sea ice breakup. Because the MTI footprint and sea ice immediately surrounding the MTI would be bottom-fast during construction, turbid water would be contained within the grounded-ice footprint.

On-site equipment and facilities to support winter construction would include an office, a break room, an envirovac (bathroom), an emergency camp, mobile light plants, a helipad, navigational aids, and a tripwire perimeter alarm and surveillance camera. An approximately 195-foot-tall communications tower would be erected on a multi-season ice pad near Atigaru Point at the start of MTI construction and would remain in place until after the first module delivery season is complete; the tower would be reinstalled for the second module delivery season and remain in place until MTI decommissioning. One additional tower (i.e., repeater) would be erected on a multi-season ice pad to relay communications signals to the Project area. On-site facilities would also include a fuel storage area to hold and store multiple fuel tanks filled via ice road to support MTI construction. Workers to support winter construction would be housed at a 100-person construction camp located on a multi-season ice pad near Atigaru Point (Figure D.4.4). Except for equipment needed for summer construction activities, equipment would be removed from the MTI at the end of the winter construction season and transported via ice road to designated onshore staging areas.

During the following summer's open-water season (2023 for Alternatives B and C and 2024 for Alternative D), construction equipment would be transported to the MTI by barge, likely from Oliktok Point. Workers to support summer construction would be housed at a 100-person camp located on a barge moored at or near the MTI. Work on the MTI would recommence around early to mid-July once the risk of ice encroachment has passed. The gravel surface would be reworked and compacted to eliminate interstitial ice and then graded to the final design. Large prefabricated filter fabric panels would be installed on the side slopes by crane, and slope protection, in the form of 4-cubic-yard gravel-filled bags, would be installed on the fabric-covered side slopes from the seafloor to the work surface. Concrete footings would then be installed on the compacted work surface to support module storage. All construction equipment not needed for subsequent activities on the MTI would be demobilized as soon as summer construction activities are completed.

4.7.1.2 Module Delivery

To facilitate module delivery, barge lightering would be used to reduce the required vessel draft at the MTI dock face. Prior to sealift barge arrival, the barge lightering area and the area in front of the MTI dock face would require screeding (14.5 total acres; Figure D.4.4). (Screeding is described in Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*. Preparation of the barge lightering area and lightering process would be the same, except the screeding area adjacent to the MTI [4.9 acres] would be larger than that required for Oliktok Dock [2.5 acres].)

Modules would be offloaded from eight sealift barges onto the MTI in summer 2024 (Alternatives B and C) or 2025 (Alternative D). Modules, riding on self-propelled module transporters (SPMTs), would be stored on the concrete footings installed during the previous summer construction season. The SPMTs would be skirted to prevent snow and wildlife from moving underneath the staged modules. During the winter season of 2024–2025 (Alternatives B and C) or 2025–2026 (Alternative D), heavy-haul ice roads would be constructed onshore and offshore to support module transport (Figure D.4.4). All modules would be transported using SPMTs via sea ice road from the MTI to a staging area located on an onshore ice pad located near the shoreline (location to be determined). From the staging area, all modules would be transported over a land-based ice road to the WPF for installation. Modules for BT4 and BT5 would be delivered via a second sealift in summer 2026 (Alternatives B and C) or 2027 (Alternative D) and moved to the Project area in the same manner as the modules for the WPF, BT1, BT2, and BT3 the following winter.

4.7.1.3 Module Transfer Island Maintenance and Decommissioning

The MTI would be inspected on an annual basis shortly after breakup to identify and repair any consequential damage for its service life (5 years). Following module mobilization from the MTI to the WPF, all work-surface facilities would be removed from the MTI.

At the end of the MTI service life, all gravel slope protection materials and other anthropogenic materials would be removed from the MTI, including removal of all sheet and pipe piles.

It is expected that after the island is abandoned, it would be naturally reshaped by waves and ice. Based on observations from two exploratory islands (Resolution and Goose islands) at similar water depths in the Beaufort Sea that have been decommissioned using similar methods, the MTI would be expected to be reshaped to a crescent reminiscent of a natural barrier island within 10 to 20 years. (Resolution Island is located in the Sagavanirktok River Delta, and Goose Island is located in Foggy Island Bay.) The top of the MTI would likely drop to or below the water surface within the 10- to 20-year period following island abandonment. Based on previous North Slope experience, navigational aids would not be installed on the abandoned and decommissioned island due to the potential of the navigational aids being rendered inoperable due to damage (i.e., wave or ice impacts, erosion of the unarmored gravel material). In keeping with precedent for islands previously abandoned on the North Slope, the location, shape, and maximum island elevation would be documented by one or more post-abandonment surveys and reported to the U.S. Coast Guard for publication in Notices to Mariners and inclusion in pertinent navigational charts. This practice would ensure that mariners are made aware of the shoal and would minimize the possibility mariners would depend on a navigational aid that may be inoperable.

4.7.1.4 Ice Roads

Ice roads would be used for gravel hauling operations required to construct the MTI and for sealift module delivery from the MTI to the Project area. Ice road widths would vary based on their intended use, with gravel hauling ice roads being 50 feet wide and module hauling routes ranging from 60 to 120 feet wide, for tundra-based and sea ice–based roads, respectively. Gravel haul ice roads would connect the MTI to the Tiŋmiaqsiuġvik Gravel Mine Site for MTI construction and the heavy haul ice roads would connect the MTI to the Project area to support module transport to the Project area. A deviation would be needed for ROP C-1 as the sea ice roads would be greater than 12 feet wide to support gravel hauling and module transfer.

Ice road needs for the Atigaru Point MTI are described and summarized in Table D.4.32.

Table D.4.32. Option 1: Atigaru Point Module Transfer Island Ice Road Route Summary

Ice Road Type	Total Length (miles)[a]	Width (feet)	Total Area (acres)[a]	Description
Tundra heavy haul and support	68.4[b]	60	497.4[b]	Onshore module delivery (SPMTs) and support vehicle traffic
Sea ice heavy haul	4.8	120	69.8	Offshore module delivery
Tundra gravel haul	35.2	50	213.3	Gravel haul route to construct the MTI
Sea ice gravel haul	2.4	50	14.5	Gravel haul route to construct the MTI
Total	**110.8**	**NA**	**795.0**	**NA**

Note: MTI (module transfer island); NA (not applicable); SPMT (self-propelled module transporter).
[a] Total value includes all years of ice road segment construction (i.e., some routes would be constructed more than once).
[b] Alternative D would require an additional 5.4 total miles of 60-foot-wide heavy-haul ice road (39.3 acres) to reach the Willow Processing Facility gravel pad.

The Proponent's MTI would require a total of approximately 110.8 miles of ice roads (103.6 miles onshore, 7.2 miles offshore) resulting in a total ice road area of 795.0 acres (710.7 acres onshore, 84.3 acres offshore). No seawater would be used to construct onshore ice roads; a combination of seawater and freshwater would be used to construct offshore ice roads. Ice road mileage and footprint is summarized by year in Table D.4.33.

Table D.4.33. Option 1: Atigaru Point Module Transfer Island Estimated Total Ice Road Mileage and Footprint by Year (tundra based and sea ice based)

Year	Ice Road Length (miles)	Ice Road Footprint (acres)
2021	0.0	0.0
2022	0.0	0.0
2023	37.6	227.8
2024	0.0	0.0
2025	36.6	283.6
2026	0.0	0.0
2027	36.6	283.6
Total[a]	**110.8**	**795.0**

[a] Alternative D would require an additional 5.4 total miles of 60-foot-wide heavy-haul ice road (39.3 acres) to reach the Willow Processing Facility gravel pad.

4.7.1.5 Ice Pads

Single-season and multi-season ice pads would be used to support the construction of the MTI and the delivery of the sealift modules to the Project area. Single- and multi-season ice pads are described in Section 4.2.4.1.

Option 1 would require 118.9 acres of single-season ice pads to support MTI construction, ice road construction, and module delivery. Additionally, three 10.0-acre multi-season ice pads would be required to construct the gravel haul ice roads and module heavy-haul ice roads for both sealift delivery events. They would be located at BT1, near Atigaru Point, and midway between BT1 and Atigaru Point. The ice pads would be used to stage equipment at strategic locations along ice road routes.

4.7.1.6 Water Use

Freshwater would be required to support construction of the MTI, ice roads, and ice pads and provide domestic water supply for camps. Seawater would be needed for construction of the gravel haul and module haul sea ice road and for use as barge ballast. Option 1 water use is summarized by year and season in Table D.4.34. Total freshwater requirements for the Atigaru Point MTI would be 307.9 MG and seawater requirements would be 376.0 MG.

Table D.4.34. Option 1: Atigaru Point Module Transfer Island Freshwater and Seawater Use by Year (million gallons)

Year (season)	Freshwater – Ice Pads[a]	Freshwater – Ice Roads[b]	Freshwater – Camp Supply[c]	Freshwater Total	Seawater Total[d]
2021–2022 (winter)	5.0	0.0	0.5	**5.5**	**0.0**
2022 (summer)	0.0	0.0	0.0	**0.0**	**0.0**
2022–2023 (winter)	11.3	53.7	2.3	**67.3**	**74.0**
2023 (summer)	0.0	0.0	1.4	**1.4**	**0.0**
2023–2024 (winter)	7.5	0.0	0.5	**8.0**	**0.0**
2024 (summer)	0.0	0.0	0.9	**0.9**	**4.0**
2024–2025 (winter)	11.7	93.5[e]	3.2	**108.4**	**147.0**
2025 (summer)	0.0	0.0	0.0	**0.0**	**0.0**
2025–2026 (winter)	7.5	0.0	0.5	**8.0**	**0.0**
2026 (summer)	0.0	0.0	0.9	**0.9**	**4.0**
2026–2027 (winter)	11.7	93.5[e]	2.3	**107.5**	**147.0**
2027 (summer)	0.0	0.0	0.0	**0.0**	**0.0**
Total	**54.7**	**240.7[e]**	**12.5**	**307.9**	**376.0**

[a] Ice pad construction uses 0.25 million gallons (MG) of water per acre.
[b] Ice road construction uses 1.5 MG of water per mile for a 35-foot-wide road and 3 MG of water per mile for a 70-foot-wide road.
[c] Camp supply assumes 100 gallons of water per person per day.
[d] Includes ballast water and sea ice road construction.
[e] Alternative D would require an additional 6.7 MG of freshwater for each module mobilization (13.4 MG total).to support ice road construction.

4.7.1.7 Traffic

Construction of the MTI and delivery of the sealift modules to the Project area would require ground, air, and marine traffic. Rolligons would be used to deliver ice pad construction equipment to strategic points along the ice road route where the equipment would be staged on multi-season ice pads. Additional ground traffic would include light-duty trucks, passenger trucks, gravel hauling trucks, and miscellaneous support vehicles. Fixed-wing aircraft would be used for security and MTI and module monitoring. Helicopters would be used for security and to transport personnel or equipment to Atigaru Point or the MTI. Tugboats and sealift barges would bring the modules from points outside of Alaska and support vessel traffic would be between Atigaru Point and Oliktok Dock.

Traffic volumes to support construction of the Atigaru Point MTI and delivery of the sealift modules is summarized by year in Table D.4.35; Table D.4.36 provides a summary of traffic volumes to Atigaru Point by year and season.

Table D.4.35. Option 1: Atigaru Point Module Transfer Island Traffic Volumes Summary (number of trips)

Year	Ground[a]	Fixed-Wing Trips Alpine[b]	Fixed-Wing Trips Willow[b]	Fixed-Wing Trips Atigaru[b]	Helicopter Alpine[c]	Helicopter Willow[c]	Sealift Barges at Atigaru[d]	Support Vessels[e]	Tugboats at Atigaru[d]
2022	43,680	25	0	0	15	0	0	0	0
2023	140,670	0	35	36	0	210	0	140	0
2024	43,790	0	85	12	0	65	8	88	12
2025	1,082,620	0	30	18	0	55	0	0	0
2026	43,770	0	35	12	0	60	1	21	4
2027	951,580	0	20	18	0	45	0	10	0
Total	**2,306,110**	**25**	**205**	**96**	**15**	**435**	**9**	**259**	**16**

Note: Ground trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.

[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks) and module delivery (i.e., self-propelled module transporter).

[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

[c] Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.

[d] Table indicates the arrival month at Atigaru Point and assumes the vessels departed Dutch Harbor approximately 4 weeks prior.

[e] Includes crew boats, tugboats supporting sealift barges, and other support vessels.

Option 1 would include 326 total fixed-wing aircraft flights, 450 total helicopter flights, 25 tugboat and barge trips, and 259 support vessel trips.

Table D.4.36. Option 1: Atigaru Point Module Transfer Island Traffic Volume Summary by Season (number of trips)

Season and Year	Ground[a]	Fixed Wing to Alpine[b]	Fixed Wing to Willow[b]	Fixed Wing to Atigaru[b]	Alpine Helicopter[c]	Willow Helicopter[c]	Sealift Barges at Atigaru[d]	Support Vessels[e]	Tugboats at Atigaru[d]
Winter 2022	32,760	15	0	0	0	0	0	0	0
Spring 2022	10,920	10	0	0	0	0	0	0	0
Summer 2022	0	0	0	0	15	0	0	0	0
Winter 2023	105,504	0	7	18	0	78	0	0	0
Spring 2023	35,168	0	3	6	0	42	0	0	0
Summer 2023	0	0	0	12	0	90	0	140	0
Fall 2023	0	0	16	0	0	0	0	0	0
Winter 2024	32,844	0	37	0	0	0	0	0	0
Spring 2024	10,948	0	17	0	0	0	0	0	0
Summer 2024	0	0	16	12	0	40	8	88	12
Fall 2024	0	0	16	0	0	20	0	0	0
Winter 2025	811,965	0	26	13	0	50	0	0	0
Spring 2025	270,655	0	12	5	0	10	0	0	0
Winter 2026	32,829	0	7	0	0	24	0	0	0
Spring 2026	10,943	0	3	0	0	12	0	0	0
Summer 2026	0	0	0	12	0	16	1	21	4
Fall 2026	0	0	16	0	0	8	0	0	0
Winter 2027	713,685	0	24	13	0	34	0	0	0
Spring 2027	237,895	0	5	5	0	11	0	0	0
Summer 2027	0	0	0	0	0	0	0	10	0
Total	**2,306,116**	**25**	**205**	**96**	**15**	**435**	**9**	**259**	**16**

Note: Trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.
[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks) and module delivery (i.e., self-propelled module transporters).
[b] Flights outlined are additional flights required beyond projected travel to/from existing airstrips. Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.
[c] Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used. Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.
[d] Table indicates the arrival month at Atigaru Point and assumes the vessels departed Dutch Harbor approximately 4 weeks prior.
[e] Includes crew boats, tugboats supporting sealift barges, and other support vessels.

4.7.1.8 *Schedule*

Figure D.4.17 provides a schedule for Option 1: Atigaru Point Module Transfer Island.

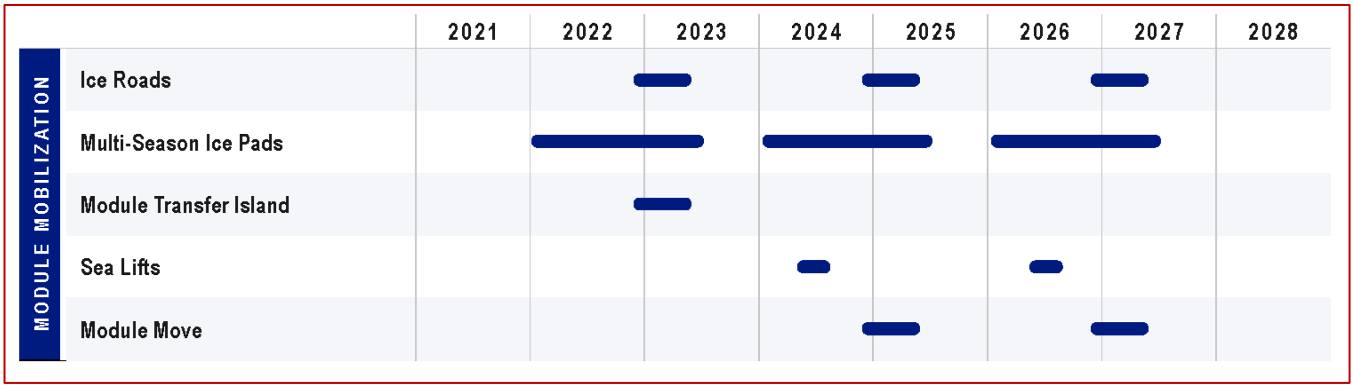


Figure D.4.17. Schedule of Activity for Option 1: Atigaru Point Module Transfer Island

Note: Sea Lift 1 would include the Willow Process Facility and Bear Tooth drill sites 1, 2, and 3 facilities; Sea Lift 2 would include Bear Tooth drill sites 4 and 5 facilities. Schedule shown is for Alternative B.

4.7.1.9 *Option 1: Atigaru Point Module Transfer Island Design Summary*

Table D.4.37 summarizes the design characteristics of the Proponent's MTI.

Table D.4.37. Option 1: Atigaru Point Module Transfer Island Design Characteristics Summary

Element	Description
Location	Southwestern Harrison Bay, approximately 2.2 nautical miles offshore near Atigaru Point
Water depth	Approximately 8 feet, MLLW
Work surface	600 feet by 600 feet (8.3 acres) at +13 feet, MLLW
Design life	5 to 10 years
Dock	200-foot-long dock face at +16 feet, MLLW
Gravel fill volume	397,000 cy from Tiŋmiaqsiuġvik Gravel Mine Site
Seafloor footprint	12.8 acres
Screeding area	4.9 acres adjacent to dock face; 9.6 acres at the barge lightering area (14.5 acres total)
Side slopes	3 horizontal to 1 vertical ratio (3:1)
Side slope armor	6,000 total 4-cy gravel filled bags
Ice ramp	7 horizontal to 1 vertical ratio (7:1) slope; 120 feet wide
Gravel haul ice roads	Tundra based: 35.2 total miles of 50-foot-wide ice road (213.3 acres) Sea ice based: 2.4 total miles of 50-foot-wid ice road (14.5 acres)
Module haul ice roads[a]	Tundra based: 68.4 total miles of 60-foot-wide ice road (497.4 acres)[a] Sea ice based: 4.8 total miles of 120-foot-wid ice road (69.8 acres)
Single-season ice pads	Ice pads (110.8 total acres) constructed at MTI site (approximately 2.4 miles offshore) and to support ice road construction
Multi-season ice pads	Three 10.0-acre multi-season ice pads (30.0 acres total) to support module mobilization and gravel hauling at BT1, near Atigaru Point, and midway between BT1 and Atigaru Point
Camps	100-person camp for winter ice road construction each season 100-person camp for module offload and transport for each sealift 100-person vessel-based camp for summer construction at MTI
Freshwater use[a]	307.9 million gallons for camps, ice roads, and ice pads[a]
Total seawater use	376.0 million gallons for ice roads and ballast water

Note: BT1 (Bear Tooth drill site 1); cy (cubic yards); MLLW (mean lower low water); MTI (module transfer island).

[a] Alternative D would require an additional 2.7 miles of 60-foot-wide heavy-haul ice road to reach the Willow Processing Facility gravel pad for each year of module mobilization. This additional ice road would require an additional 6.7 million gallons of freshwater in each year of module mobilization (13.4 million gallons of freshwater).

4.7.2 Option 2: Point Lonely Module Transfer Island

Option 2 would include construction of an MTI at Point Lonely (Figure D.4.5). Point Lonely is a former U.S. Department of Defense site approximately 15 miles east of Smith Bay that is no longer in operation and has been decommissioned from its historical use. The site is located approximately 40 air miles northwest of the Option 1 Atigaru Point MTI location, north of Teshekpuk Lake along the coast of the Beaufort Sea. The site still contains gravel infrastructure, including roads, pads, and an airstrip, although most structures have been removed or are otherwise abandoned. The site is now under the management of the BLM.

4.7.2.1 Module Transfer Island Construction

A new MTI, with a design life of 5 to 10 years, would be constructed at Point Lonely (approximately 0.6 miles offshore in State of Alaska–owned waters) to support sealift module delivery for the Project (Figure D.4.5). Modules for the WPF, BT1, BT2, and BT3 would be delivered by sealift barges to the MTI during the summer of 2024 (Alternatives B and C) or 2025 (Alternative D). A second sealift would deliver modules for BT4 and BT5 in 2026 (Alternatives B and C) or 2027 (Alternative D). Modules would be stored on the MTI and mobilized from the MTI to the WPF via ice road the following winter ice road season.

The MTI would be built through placement of gravel fill from the Tiŋmiaqsiuġvik Gravel Mine Site in approximately 9.8 to 11.2 feet of water (an average of 10.5 feet) to a height of approximately 13 feet above MLLW. The MTI would consist of a 600-foot-square (8.3-acre) gravel work surface surrounded by 3:1 side slopes with gravel bags and a 200-foot-long sheet-pile dock with a top surface 16 feet above MLLW to facilitate barge offloading (Figure D.4.5). The resulting island footprint would be approximately 13.0 acres (based on the average 10.5-foot depth) on the seafloor.

Gravel haul and placement to construct the MTI would occur via ice road during the 2022–2023 winter construction season under Alternatives B and C and the 2023–2024 winter season under Alternative D as soon as the ice roads have been constructed. Winter MTI construction would occur from a grounded sea ice pad surrounding the MTI. Sea ice within the MTI footprint, surrounding the MTI footprint, and the associated off-shore ice road would be bottom-fast (frozen to the seafloor) before construction of the MTI would begin. Sea ice within the MTI footprint would be cut and removed and gravel would be placed into the opening until the design volume and approximate shape of the MTI is attained. Installation of the sheet-pile offload dock would occur in winter once the initial gravel placement is sufficient to support pile-driving activities and staging of materials and equipment. Sheet pile would be installed over a period of approximately 25 to 30 days, with approximately 3 to 6 hours of pile driving occurring per day, using vibratory driving equipment. After completion of the sheet-pile bulkhead, a 24-inch-diameter pipe pile would be installed to support the dock face and provide barge mooring, using both vibratory and impact pile-driving equipment. Pipe pile installation would take approximately 2 days with approximately 2 hours of pile driving per day (estimated at 1.5 hours of vibratory driving and 0.5 hour of impact driving per day). Winter pile driving for dock construction would cease prior to sea ice breakup. Because the MTI footprint and sea ice immediately surrounding the MTI would be bottom-fast during construction, turbid water would be contained within the grounded ice footprint.

On-site equipment and facilities to support winter construction would include an office, a break room, an envirovac (bathroom), an emergency camp, mobile light plants, a helipad, navigational aids, and a tripwire perimeter alarm and surveillance camera. An approximately 195-foot-tall communications tower would be erected at the start of MTI construction and would remain in place until after the first module delivery season is complete; the tower would be reinstalled for the second module delivery season and remain in place until MTI decommissioning. Two additional towers (i.e., repeaters) would be erected on a multi-season ice pads to relay communications signals to the Project area. On-site facilities would also include a fuel storage area to hold multiple fuel tanks filled via ice road to support MTI construction. Workers to support winter construction would be housed at a 100-person construction camp located on the existing gravel pad at the Point Lonely site (Figure D.4.5). Except for equipment needed for summer construction activities, equipment would be removed from the MTI at the end of the winter construction season and transported via ice road to designated onshore staging areas.

During the following summer's open-water season (2023 for Alternatives B and C and 2024 for Alternative D), construction equipment would be transported to the MTI by barge, likely from Oliktok Point. Work on the MTI would recommence around early to mid-July once the risk of ice encroachment has passed. The gravel surface would be reworked and compacted to eliminate interstitial ice and then graded to the final design configuration. Large prefabricated filter fabric panels would be installed on the side slopes by crane, and slope protection, in the form of 4-cy gravel-filled bags, would be installed on the fabric-covered side slopes from the seafloor to the work surface. Concrete footings would then be installed on the compacted work surface to support module storage. All construction equipment not needed for subsequent activities on the MTI would be demobilized as soon as summer construction activities are completed.

4.7.2.2 Module Delivery

To facilitate module delivery, barge lightering would be used to reduce the required vessel draft at the MTI dock face. Prior to sealift barge arrival, the barge lightering area and the area in front of the MTI dock face would require screeding (14.5 total acres; Figure D.4.5). (Screeding is described in Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*. Preparation of the barge lightering area and lightering process would be the same, except the screeding area adjacent to the MTI [4.9 acres] would be larger than that required for Oliktok Dock [2.5 acres].)

Modules, riding on SPMTs, would be offloaded from eight sealift barges onto the MTI in summer 2024 (Alternatives B and C) or 2025 (Alternative D). Modules would be stored on the concrete footings installed during the previous summer construction season. The SPMTs would be skirted to prevent snow and wildlife from moving underneath the staged modules. During the winter season of 2024–2025 (Alternatives B and C) or 2025–2026 (Alternative D), heavy-haul ice roads would be constructed onshore and offshore to support module delivery (Figure D.4.5). All modules would be transported using SPMTs via sea ice road from the MTI to a staging area located on the existing gravel Point Lonely East Pad. From this gravel staging pad, all modules would be transported over land-based ice road to the WPF for installation. Modules for drill sites BT4 and BT5 would be delivered via a second sealift in summer 2026 (Alternatives B and C) or 2027 (Alternative D) and moved to the Project area in the same manner as the modules for the WPF, BT1, BT2, and BT3 the following winter.

4.7.2.3 Module Transfer Island Maintenance and Decommissioning

The MTI would be inspected on an annual basis shortly after breakup to identify and repair any observed damage for its service life (5 years). Following module mobilization from the MTI to the WPF, all on-pad facilities would be removed from the MTI.

At the end of the MTI service life, all gravel slope protection materials and other anthropogenic materials would be removed from the MTI, including the removal of all sheet and pipe piles.

It is expected that after the island is abandoned, it would be naturally reshaped by waves and ice. Based on observations from two exploratory islands (Resolution and Goose islands) at similar water depths in the Beaufort Sea that have been decommissioned using similar methods, the MTI would be expected to be reshaped to a crescent reminiscent of a natural barrier island within 10 to 20 years. (Resolution Island is located in the Sagavanirktok River Delta, and Goose Island is located in Foggy Island Bay.) The top of the MTI would likely drop to or below the water surface within the 10- to 20-year period following island abandonment. Based on previous North Slope experience, navigational aids would not be installed on the abandoned and decommissioned island due to the potential of the navigational aids being rendered inoperable due to damage (i.e., wave or ice impacts, erosion of the unarmored gravel material). In keeping with precedent for islands previously abandoned on the North Slope, the location, shape, and maximum island elevation would be documented by one or more post-abandonment surveys and reported to the U.S. Coast Guard for publication in Notices to Mariners and inclusion in pertinent navigational charts. This practice would ensure that mariners are made aware of the shoal and would minimize the possibility that mariners would depend on a navigational aid that may be inoperable.

4.7.2.4 Ice Roads

Ice roads would be used for gravel hauling operations required to construct the MTI and for sealift module delivery from the MTI to the Project area. Ice road widths would vary based on their intended use, with gravel hauling ice roads being 50 feet wide and module hauling routes ranging from 60 to 120 feet wide, for tundra-based and sea ice–based roads, respectively. Gravel haul ice roads would connect the MTI to the Tiŋmiaqsiuġvik Gravel Mine Site for MTI construction and heavy-haul ice roads would connect the MTI to the Project area to support module transport to the Project area. A deviation would be needed for ROP C-1 as the sea ice roads would be greater than 12 feet wide to support gravel hauling and module transfer.

Ice road needs for the Point Lonely MTI are described in Table D.4.38.

Table D.4.38. Option 2: Point Lonely Module Transfer Island Ice Road Route Summary

Ice Road Type	Total Length (miles)[a]	Width (feet)	Total Area (acres)[a]	Description
Tundra heavy haul and support	146.0[b]	60	1,061.8[b]	Onshore module delivery (SPMTs) and support vehicle traffic
Sea ice heavy haul	1.2	120	17.4	Offshore module delivery
Tundra gravel haul	77.4	50	469.1	Gravel haul route to construct MTI
Sea ice gravel haul	0.6	50	3.6	Gravel haul route to construct MTI
Total	**225.2**	**NA**	**1,551.9**	**NA**

Note: MTI (module transfer island); NA (not applicable); SPMT (self-propelled module transporter).
[a] Total ice road area includes all years of ice road segment construction (i.e., some routes would be constructed more than once).
[b] Alternative D would require an additional 5.4 total miles of 60-foot-wide heavy-haul ice road (39.3 acres) to reach the Willow Processing Facility gravel pad.

The Point Lonely MTI would require a total of approximately 225.2 miles of ice roads (223.4 miles onshore, 1.8 miles offshore) resulting in a total ice road area of 1,551.9 acres (1,530.9 acres onshore, 21.0 acres offshore). No seawater would be used to construct onshore ice roads; a combination of seawater and freshwater would be used to construct offshore ice roads. Ice road mileage by year is summarized in Table D.4.39.

Table D.4.39. Option 2: Point Lonely Module Transfer Island Estimated Total Ice Road Mileage and Footprint by Year (tundra based and sea ice based)

Year	Ice Road Length (miles)	Ice Road Footprint (acres)
2021	0.0	0.0
2022	0.0	0.0
2023	78.0	472.7
2024	0.0	0.0
2025	73.6	539.6
2026	0.0	0.0
2027	73.6	539.6
Total[a]	**225.2**	**1,551.9**

[a] Alternative D would require an additional 5.4 total miles of 60-foot-wide heavy-haul ice road (39.3 acres) to reach the Willow Processing Facility gravel pad.

4.7.2.5 Ice Pads

Single-season and multi-season ice pads would be used to support the construction of the MTI and the delivery of the sealift modules to the Project area. Single- and multi-season ice pads are described in Section 4.2.4.1.

Option 2 would require 195.2 acres of single-season ice pads to support MTI construction, ice road construction, and module delivery. Additionally, three 10.0-acre multi-season ice pads would be required to construct the gravel haul ice roads and module heavy-haul ice roads for both sealift delivery events. One would be located at BT1 and two would be located between BT1 and Point Lonely. The ice pads would be used to stage equipment at strategic locations along the ice road routes.

4.7.2.6 Water Use

Freshwater would be required to support construction of the MTI, ice roads, and ice pads and provide domestic water supply for camps. Seawater would be needed for construction of the gravel haul and module haul sea ice roads, and for use as barge ballast. Option 2 water use is summarized by year and season in Table D.4.40. Total freshwater requirements for the Point Lonely MTI would be 572.0 MG and seawater requirements would be 185.0 MG.

Table D.4.40. Option 2: Point Lonely Module Transfer Island Freshwater Use by Year (million gallons)

Year (season)	Freshwater – Ice Pads[a]	Freshwater – Ice Roads[b]	Freshwater – Camp Supply[c]	Freshwater Total	Seawater Total[d]
2021–2022 (winter)	7.5	0.0	0.5	**8.0**	0.0
2022 (summer)	0.0	0.0	0.0	**0.0**	0.0
2022–2023 (winter)	18.6	111.5	3.2	**133.3**	59.0
2023 (summer)	0.0	0.0	1.4	**1.4**	0.0
2023–2024 (winter)	7.5	0.0	0.5	**8.0**	0.0
2024 (summer)	0.0	0.0	0.9	**0.9**	4.0

Year (season)	Freshwater – Ice Pads[a]	Freshwater – Ice Roads[b]	Freshwater – Camp Supply[c]	Freshwater Total	Seawater Total[d]
2024–2025 (winter)	17.9	184.2	4.1	**206.2**	59.0
2025 (summer)	0.0	0.0	0.0	**0.0**	0.0
2025–2026 (winter)	7.5	0.0	0.5	**8.0**	0.0
2026 (summer)	0.0	0.0	0.9	**0.9**	4.0
2026–2027 (winter)	17.9	184.2	3.2	**205.3**	59.0
2027 (summer)	0.0	0.0	0.0	**0.0**	**0.0**
Total	**76.9**	**479.9**	**15.2**	**572.0**	**185.0**

[a] Ice pad construction uses 0.25 million gallons (MG) of water per acre.
[b] Ice road construction uses 1.5 MG of water per mile for a 35-foot-wide road and 3 MG of water per mile for a 70-foot-wide road.
[c] Camp supply assumes 100 gallons of water per person per day.
[d] Includes ballast water and sea ice road construction.
[e] Alternative D would require an additional 6.7 MG of freshwater for each module mobilization (13.4 MG total).to support ice road construction.

4.7.2.7 Traffic

Construction of the Point Lonely MTI and delivery of the sealift modules to the Project area would require ground, air, and marine traffic. Rolligons would be used to deliver ice pad construction equipment to strategic points along the ice road route where the equipment would be staged on multi-season ice pads. Additional ground traffic would include light-duty trucks, passenger trucks, gravel hauling trucks, and miscellaneous support vehicles. Fixed-wing aircraft would be used for security and MTI and module monitoring. Helicopters would be used for security and to transport personnel or equipment between Point Lonely and the MTI and the Project area and Alpine. Tugboats and sealift barges would bring the modules from points outside of Alaska and support vessel traffic would be between Point Lonely and Oliktok Dock.

Traffic volumes to support construction of the Point Lonely MTI and delivery of the sealift modules is summarized by year in Table D.4.41; Table D.4.42 provides a summary of traffic volumes to Atigaru Point by year and season.

Table D.4.41. Option 2: Point Lonely Module Transfer Island Traffic Volumes Summary (number of trips)

Year	Ground[a]	Fixed-Wing Trips Alpine[b]	Fixed-Wing Trips Willow[b]	Fixed-Wing Trips Point Lonely[b]	Helicopter Trips Alpine[c]	Helicopter Trips Willow[c]	Sealift Barges to Point Lonely[d]	Support Vessels[e]	Tugboats to Point Lonely[d]
2022	43,680	25	0	0	15	0	0	0	**0**
2023	288,450	0	35	36	0	210	0	140	**0**
2024	43,790	0	85	12	0	65	8	88	**12**
2025	1,475,740	0	30	18	0	55	0	0	**0**
2026	43,770	0	35	12	0	60	1	21	**4**
2027	1,301,020	0	20	18	0	45	0	10	**0**
Total	**3,196,450**	**25**	**205**	**96**	**15**	**435**	**9**	**259**	**16**

Note: Ground trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.
[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks) and module delivery (i.e., self-propelled module transporters).
[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.
[c] Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.
[d] Table indicates the arrival month at Point Lonely and assumes the vessels departed Dutch Harbor approximately 4 weeks prior.
[e] Includes crew boats, tugboats supporting sealift barges, and other support vessels.

Option 1 would include 326 total fixed-wing aircraft flights, 450 total helicopter flights, 25 tugboat and barge trips, and 259 support vessels.

Table D.4.42. Option 2: Point Lonely Module Transfer Island Traffic Volumes by Season (number of trips)

Season and Year	Ground[a]	Fixed Wing to Alpine[b]	Fixed Wing to Willow[b]	Fixed Wing to Point Lonely[b]	Alpine Helicopter[c]	Willow Helicopter[c]	Sealift Barges to Point Lonely[d]	Support Vessels[e]	Tugboats to Point Lonely[d]
Winter 2022	32,760	15	0	0	0	0	0	0	0
Spring 2022	10,920	10	0	0	0	0	0	0	0
Summer 2022	0	0	0	0	15	0	0	0	0
Winter 2023	216,339	0	7	18	0	78	0	0	0
Spring 2023	72,113	0	3	6	0	42	0	0	0
Summer 2023	0	0	0	12	0	90	0	140	0
Fall 2023	0	0	16	0	0	0	0	0	0
Winter 2024	32,844	0	37	0	0	0	0	0	0
Spring 2024	10,948	0	17	0	0	0	0	0	0
Summer 2024	0	0	16	12	0	40	8	88	12
Fall 2024	0	0	16	0	0	20	0	0	0
Winter 2025	1,106,805	0	26	13	0	50	0	0	0
Spring 2025	368,935	0	12	5	0	10	0	0	0
Winter 2026	32,829	0	7	0	0	24	0	0	0
Spring 2026	10,943	0	3	0	0	12	0	0	0
Summer 2026	0	0	0	12	0	16	1	21	4
Fall 2026	0	0	16	0	0	8	0	0	0
Winter 2027	975,765	0	24	13	0	34	0	0	0
Spring 2027	325,255	0	5	5	0	11	0	0	0
Summer 2027	0	0	0	0	0	0	0	10	0
Total	**3,196,456**	**25**	**205**	**96**	**15**	**435**	**9**	**259**	**16**

Note: Trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.
[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks) and module delivery (i.e., self-propelled module transporters).
[b] Flights outlined are additional flights required beyond projected travel to/from existing airstrips. Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.
[c] Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used. Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.
[d] Table indicates the arrival month at Point Lonely and assumes the vessels departed Dutch Harbor approximately 4 weeks prior.
[e] Includes crew boats, tugboats supporting sealift barges, and other support vessels.

4.7.2.8 Schedule

Figure D.4.18 provides a schedule for Option 2: Point Lonely Module Transfer Island.

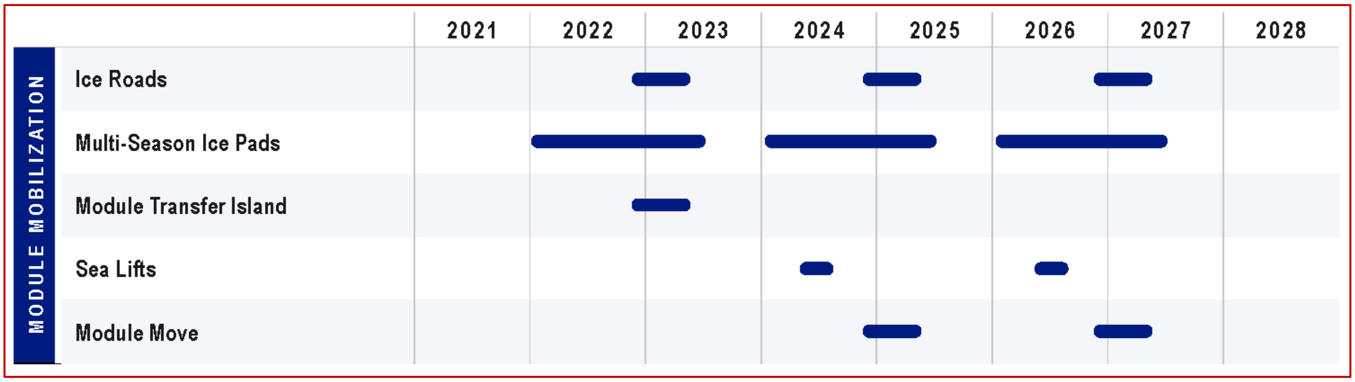


Figure D.4.18. Schedule of Activity for Option 2: Point Lonely Module Transfer Island

Note: Sea Lift 1 includes the Willow Processing Facility and Bear Tooth drill sites 1, 2, and 3 facilities; Sea Lift 2 includes Bear Tooth drill sites 4 and 5 facilities. Schedule shown is for Alternative B.

4.7.2.9 Option 2: Point Lonely Module Transfer Island Design Summary

Table D.4.43 summarizes the design characteristics of the Point Lonely MTI.

Table D.4.43. Option 2: Point Lonely Module Transfer Island Design Characteristics Summary

Element	Description
Location	Approximately 3,500 feet (0.6 mile) northwest of the Point Lonely former Distant Early Warning Line site
Water depth	Approximately 10.5 feet, MLLW
Work surface	600 feet by 600 feet (8.3 acres) at +13 feet, MLLW
Design life	5 to 10 years
Dock	200-foot-long dock face at +16 feet, MLLW
Gravel fill volume	446,000 cy from Tiŋmiaqsiuġvik Gravel Mine Site
Seafloor footprint	13.0 acres
Screeding area	4.9 acres at the dock face; 9.6 acres at the barge lightering area (14.5 acres total)
Side slopes	3 horizontal to 1 vertical (3:1)
Side slope armor	6,900 total 4-cy gravel filled bags
Ice ramp	7 horizontal to 1 vertical (7:1) slope; 120 feet wide
Gravel haul ice roads	Tundra based: 77.4 total miles of 50-foot-wide ice road (469.1 acres) Sea ice based: 0.6 total miles of 50-foot-wid ice road (3.6 acres)
Module haul ice roads[a]	Tundra based: 146.0 total miles of 60-foot-wide ice road (1,061.8 acres) Sea ice based: 1.2 total miles of 120-foot-wid ice road (17.4 acres)
Single-season ice pads	Ice pads (195.2 total acres) constructed at MTI site (approximately 0.6 miles offshore) and to support ice road construction
Multi-season ice pads	Three 10.0-acre multi-season ice pads (30.0 acres total) to support module mobilization and gravel hauling: one at BT1 and two between BT1 and Point Lonely
Camps	100-person camp for winter ice road construction each season 100-person camp for module offload and transport for each sealift 100-person vessel-based camp for summer construction at MTI
Freshwater use[a]	572.0 million gallons for camps, ice roads, and ice pads
Seawater use	185.0 million gallons for ice roads and ballast water

Note: BT1 (Bear Tooth drill site 1); cy (cubic yards); MLLW (mean lower low water); MTI (module transfer island).

[a] Alternative D would require an additional 2.7 miles of 60-foot-wide heavy-haul ice road to reach the Willow Processing Facility gravel pad for each year of module mobilization. This additional ice road would require an additional 6.7 million gallons of freshwater in each year of module mobilization (13.4 million gallons of freshwater).

4.7.3 Option 3: Colville River Crossing

Module delivery Option 3 would use the existing Oliktok Dock to receive the sealift barges containing the WPF and large drill site modules. From Oliktok Dock, the modules would be transported over existing gravel roads using SPMTs from Oliktok Dock to Kuparuk DS2P. From Kuparuk DS2P, the modules would then be moved by heavy-haul ice roads to GMT-2, crossing the Colville River on a partially grounded ice crossing near Ocean Point (Figure D.4.6). From GMT-2, the modules would be transported to the Project area over Project gravel roads (Alternatives B and C) or ice roads (Alternative D) to reach the WPF and drill site gravel pads.

Option 3 is BLM's preferred module delivery option. The identification of a preferred module delivery option does not constitute a commitment or decision; if warranted, BLM may select a different module delivery option than the preferred module delivery option in its Record of Decision.

4.7.3.1 Oliktok Dock, Barge Lightering Area, and Summer Staging Area

Option 3 would make use of the existing Oliktok Dock for module delivery and offload. The lightering process and screeding activity would be the same as described for the smaller modules and bulk construction materials in Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*. The screeding for both the offshore lightering area and at the face of Oliktok Dock would be completed once for each sealift season.

After delivery to Oliktok Dock, modules would be moved to and stored at the existing 12.0-acre gravel pad located approximately 2 miles south of the dock. The staging area pad would be the same pad as used under all action alternatives (Section 4.2.3.4) to receive bulk materials and smaller modules. The staging pad is approximately 3 to 4 feet thick and the area where the modules would be stored would be improved with new gravel to increase its thickness up to 5 feet. Rig mats would then be installed on the surface to provide additional structural support for sealift module storage. There would be no expansion of the gravel pad footprint; all gravel work would be completed within the existing footprint. The sealift modules would be skirted to prevent drifting snow from accumulating under the modules.

4.7.3.2 Module Delivery and Colville River Crossing

In the January following each sealift arrival, the modules would be transported via existing gravel roads from the gravel staging pad to an ice pad located near Kuparuk DS2P while the Colville River ice crossing is constructed. The 60-foot-wide, 40.1-mile-long heavy-haul ice road for module transport would be constructed from both the east and west ends, at Kuparuk DS2P and GMT-2, respectively (Figure D.4.6.). The two segments would meet at the Colville River crossing near Ocean Point. Engineering factors considered when selecting the ice road route for module transport included the following:

- The maximum allowable ice road grades for SPMT operation
- Assumed SPMT dimensions of 27 feet wide by 200 feet long
- Suitable Colville River crossing location (as described below)

At Ocean Point on the Colville River, an engineered ice crossing would be constructed to provide sufficient load-carrying capacity to support the sealift modules and SPMTs. The partially **grounded ice** crossing would be approximately 1 river mile downstream of Ocean Point, as defined by the U.S. Geological Survey (1955 Harrison Bay, A3 quad topographic map). The specific crossing location was selected based on favorable hydrological, topographical, and bathymetric conditions. The crossing was also sited so that it would be far enough upstream from the Colville River Delta to minimize potential impacts to fish passage. For the purposes of this description of Option 3, partially grounded ice refers to ice crossing the river channel that is primarily frozen fast to the riverbed. However, there would be some pockets of deep, free flowing water present that would be narrower than the length of the SPMTs, which would bridge the liquid water channels with their load being supported by the grounded ice sections (Figure D.4.6., detail A). Overflow is expected and would be managed both passively with snow berms or other diversion structures, or in combination with high-volume pumps and/or rapid response heavy equipment to clear new pathways for water to flow away from the ice structure (Appendix D.3, *Ice Bridge Plan*).

The proposed crossing location was also sited so that it is upstream of the influence of saltwater intrusion and tidal backwatering from the Colville River Delta and thus is not expected to be used by fish in winter. CPAI will continue to monitor the proposed Colville River crossing location for fish presence over the coming winters prior to construction to gain additional baseline data. CPAI would work with ADF&G through the permitting process if fish presence is found during the winter months when module transport would occur; should it be necessary, CPAI will consult with ADF&G on how fish would be transported around the ice bridge.

The Colville River ice crossing would be approximately 2,800 feet long from the top of the bank to the top of the bank (approximately 700 feet long from the edge of the water to the edge of the water) and 65 feet wide at the surface. Ramps entering and exiting the river channel may be wider depending on the amount of ice fill required. The total ice thickness of the ramp and crossing would range up to 7.1 feet from the riverbed (natural ice thickness in this area varied from 0.5 to 6.2 feet thick in April 2019 [CPAI 2019]; additional details on the existing conditions of the crossing location are described in Section 3.8.1.1, *Rivers*, and in Appendix E.8, *Water Resources Technical Appendix*).

4.7.3.3 Access and Traffic

Module transport from Oliktok Dock to the Project area would occur by existing gravel road between the dock and Kuparuk DS2P, by ice road (including the Colville River crossing) from near Kuparuk DS2P to GMT-2, and by the Project's gravel access road (Alternatives B and C) from GMT-2 to the Project area. Alternative D would require an additional 13.1 miles of 60-foot-wide heavy-haul ice road between GMT-2 and the Project area for module mobilization (2026 and 2028).

The 2-mile-long existing gravel road between Oliktok Dock and the summer staging area pad is approximately 3-feet thick on average and would need to be improved to a depth of 5 feet to support summer transport of the sealift modules. This improvement would require approximately 40,300 cy of gravel and would increase the existing footprint by less than 0.1 acre. An estimated 12 culverts (about 5 culverts per mile) would be extended within this road segment to accommodate the thicker roadway section.

Existing gravel roads between the summer staging pad and Kuparuk DS2P would be used during winter conditions, and the roads would not require additional gravel to increase thickness. However, CPAI anticipates that several curves along the route would require widening to accommodate the turning radius of the 200-foot-long SPMTs (Figure D.4.19). Approximately 5.0 acres of additional gravel fill would be placed to widen the identified curves along the existing Kuparuk gravel road network (Section 4.7.3.6, *Gravel Requirements*). Culverts would be extended as needed. Improvements to gravel roads and pads associated with Option 3 would be completed in summer.

Ground, air, and marine traffic associated with construction of the ice road and bridge, modifications to existing gravel roads and pads, and transport of the sealift modules to the Project area is summarized in Table D.4.44.

Table D.4.44. Option 3: Colville River Crossing Traffic Volumes Summary (number of trips)

Year	Ground[a]	Fixed Wing Trips Kuparuk[b]	Fixed Wing Trips Alpine[b]	Helicopter Trips Alpine[c]	Sealift Barges to Oliktok[d]	Support Vessels[e]	Tugboats to Oliktok[d]
2022	0	0	0	0	0	0	0
2023	4,590	6	0	0	0	0	0
2024	300	4	0	0	8	54	12
2025	264,990	14	14	8	0	0	0
2026	300	4	0	0	1	6	4
2027	264,980	14	14	8	0	0	0
Total	**535,160**	**42**	**28**	**16**	**9**	**60**	**16**

Note: Ground trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.

[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks) and module delivery (i.e., self-propelled module transporters).

[b] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

[c] Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.

[d] Table indicates the arrival month at Atigaru Point and assumes the vessels departed Dutch Harbor approximately 4 weeks prior.

[e] Includes crew boats, tugboats supporting sealift barges, and other support vessels.

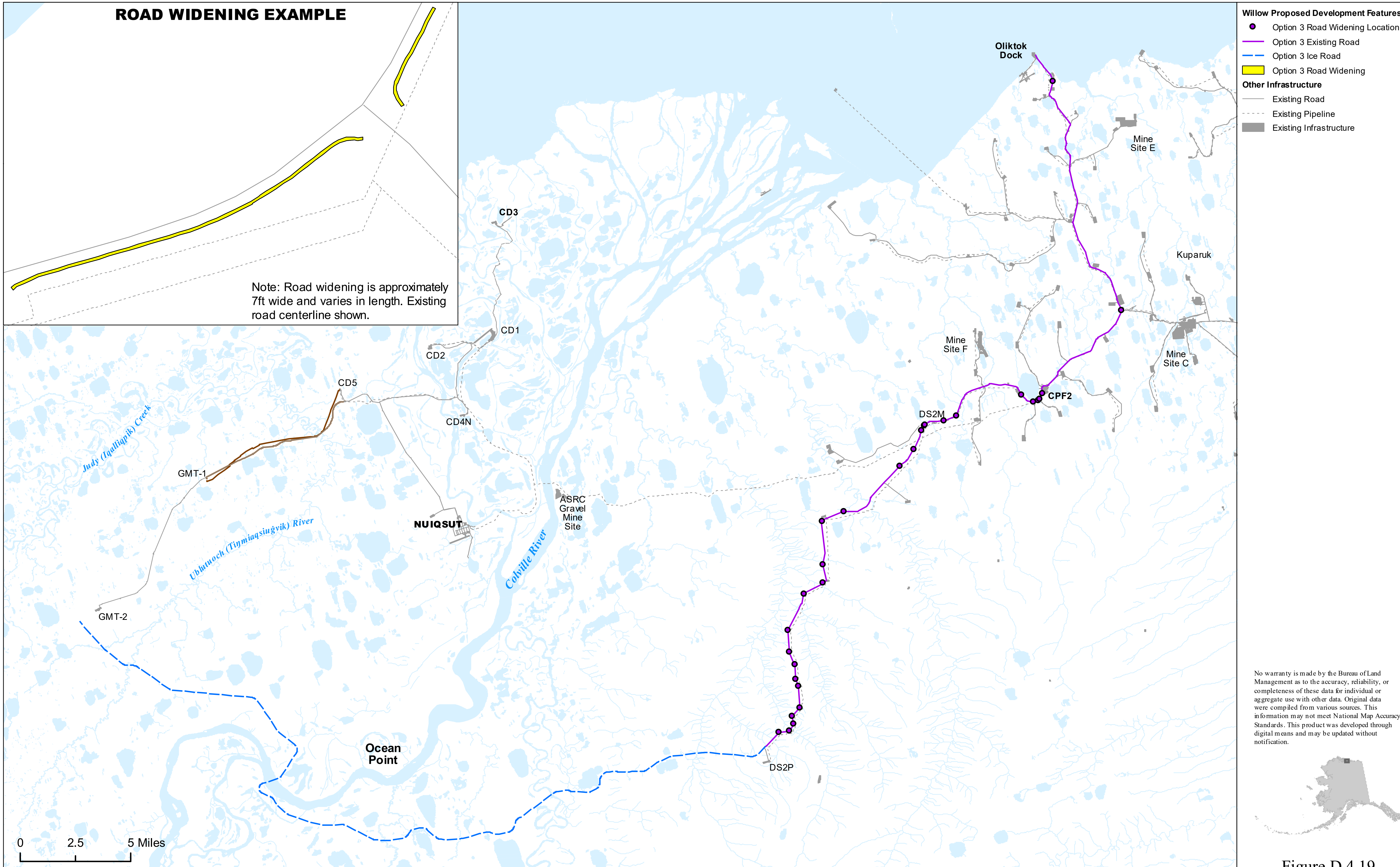


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Figure D.4.19

Table D.4.45. Option 3: Colville River Crossing Traffic Volume Summary by Season (number of trips)

Season and Year	Ground[a]	Fixed Wing to Kuparuk[b]	Fixed Wing to Alpine[b]	Fixed Wing to Willow[b]	Alpine Helicopter[c]	Willow Helicopter[c]	Sealift Barges to Oliktok[e]	Support Vessels[d]	Tugboats to Oliktok[e]
Summer 2023	4,590	6	0	0	0	0	0	0	0
Summer 2024	300	4	0	0	0	0	8	54	12
Winter 2025	198,736	9	9	0	0	0	0	0	0
Spring 2025	66,252	5	5	0	0	0	0	0	0
Summer 2025	0	0	0	0	8	0	0	0	0
Summer 2026	300	4	0	0	0	0	1	6	4
Winter 2027	198,734	9	9	0	0	0	0	0	0
Spring 2027	66,248	5	5	0	0	0	0	0	0
Summer 2027	0	0	0	0	8	0	0	0	0
Total	**535,160**	**42**	**28**	**0**	**16**	**0**	**9**	**60**	**16**

Note: Trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.
[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B70/maxi dump trucks) and module delivery (i.e., self-propelled module transporters).
[b] Flights outlined are additional flights required beyond projected travel to/from existing airstrips. Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.
[c] Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used. Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project.
[d] Table indicates the arrival month at Atigaru Point and assumes the vessels departed Dutch Harbor approximately 4 weeks prior.
[e] Includes crew boats, tugboats supporting sealift barges, and other support vessels.

4.7.3.4 Other Infrastructure

Module delivery under Option 3 would require 40.1 miles of 60-foot-wide ice roads (291.6 acres) to be constructed twice to support large module delivery in 2025 and 2027 (for Alternatives B and C; 2026 and 2028 for Alternative D). This would result in a total of 80.2 miles (583.2 acres) of ice roads.

Single-season ice pads would be used to support ice road construction and camp placement. Single-season ice pads are described in Section 4.2.4.1. Option 3 would require 41.7 acres of single-season ice pads in 2025 and 2027 (83.4 total acres) under Alternatives B and C (2026 and 2028 for Alternative D).

Option 3 would require a 100-person camp located on the 15.0-acre ice pad near Kuparuk DS2P to support sealift module transport. Ice road crews for the eastern ice road segment would be based out of the camp near Kuparuk DS2P; ice road crews for the western portion in the NPR-A would be based out of one of the construction camps already proposed for Project action alternatives (i.e., Kuukpik Pad). The previously proposed camp is included as a component of Alternatives B, C, and D in the alternatives analysis and is therefore not included as a component specific to the Option 3 analysis.

4.7.3.5 Water Use

Freshwater would be needed to construct the Colville River ice crossing, ice roads, and ice pads, as well as for domestic use at construction camps (100 gallons per person per day). The water would be supplied from nearby lakes that would be permitted for such use. For ice built between the Colville River banks, some of the water for the ice crossing may come from the Colville River. Option 3 anticipated water use is summarized in Table D.4.46 by year and season and Project component.

Table D.4.46. Option 3: Colville River Crossing Freshwater Use by Year (million gallons)

Year (season)	Ice Pads[a]	Ice Roads[b]	Camp Supply[c]	Total
2020–2021 (winter)	0.0	0.0	0.0	**0.0**
2021 (summer)	0.0	0.0	0.0	**0.0**
2021–2022 (winter)	0.0	0.0	0.0	**0.0**
2022 (summer)	0.0	0.0	0.0	**0.0**
2022–2023 (winter)	0.0	0.0	0.0	**0.0**
2023 (summer)	0.0	0.0	1.0	**1.0**
2023–2024 (winter)	0.0	0.0	0.0	**0.0**
2024 (summer)	0.0	0.0	0.5	**0.5**
2024–2025 (winter)	10.4	115.0	1.4	**126.8**
2025 (summer)	0.0	0.0	0.9	**0.9**
2025–2026 (winter)	0.0	0.0	0.0	**0.0**
2026 (summer)	0.0	0.0	0.3	**0.3**
2026–2027 (winter)	10.4	115.0	1.4	**126.8**
2027 (summer)	0.0	0.0	0.9	**0.9**
Total	**20.8**	**230.0**	**6.4**	**257.2**

[a] Ice pad construction uses 0.25 million gallons (MG) of water per acre.
[b] Ice road construction uses 1.5 MG of water per mile for a 35-foot-wide road and 3 MG of water per mile for a 70-foot-wide road.
[c] Camp supply assumes 100 gallons of water per person per day.

Seawater (4.0 MG) would be used as ballast water by marine vessels for each sealift delivering the sealift modules (2024 and 2026).

4.7.3.6 Gravel Requirements

Gravel would be used to raise the heights of the existing Oliktok Dock, improve the existing summer staging pad south of Oliktok Dock, and modify portions of existing gravel roads to accommodate module transport. Gravel would be sourced from an existing gravel source in Kuparuk (e.g., Mine Site C, Mine Site E, Mine Site F). Table D.4.47 summarizes new gravel footprint and volumes for Option 3.

Table D.4.47. Option 3: Colville River Crossing New Gravel Footprint and Volumes

Project Component	New Footprint (acres)	Gravel Volume (cubic yards)
Upgrades to existing gravel road from Oliktok Dock to summer staging area pad	0.1	40,300
Upgrades to summer staging area pad	0.0	43,700
Upgrades to existing gravel road from the summer staging area pad to Kuparuk DS2P	4.9	34,700
Total	**5.0**	**118,700**

Note: DS2P (Kuparuk drill site 2P).

4.7.3.7 Schedule

Gravel haul and placement to modify the existing gravel roads and pads would occur during the 2023 summer season under Alternatives B and C (summer 2024 under Alternative D). During the summer open-water season before sealift arrival (2024 and 2026 for Alternatives B and C; 2025 and 2027 for Alternative D), screeding of the barge lightering area and the area in front of the dock face would occur about mid-July, once the risk of ice encroachment has passed.

Modules for the WPF, BT1, BT2, and BT3 would be delivered by sealift barges to Oliktok Dock during the summer of 2024 (Alternatives B and C) or 2025 (Alternative D). A second sealift barge delivery for BT4 and BT5 modules would occur in summer 2026 (Alternatives B and C) or 2027 (Alternative D). Modules would be stored on the summer staging pad south of Oliktok Dock and mobilized to the Project area the following the winter construction season.

Figure D.4.20 provides an overview of the Option 3 activity schedule.

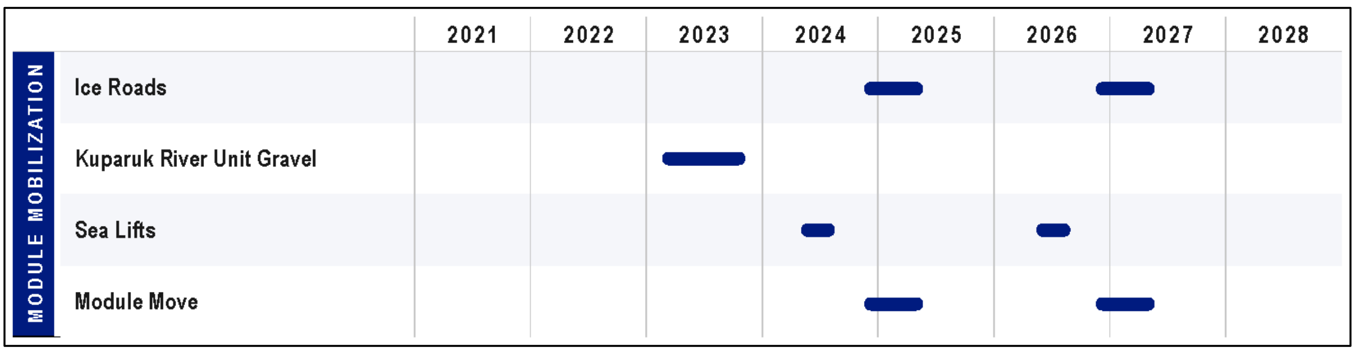

Figure D.4.20. Schedule of Activity for Option 3: Colville River Crossing

Note: Sea Lift 1 would include the Willow Process Facility and Bear Tooth drill sites 1, 2, and 3 facilities; Sea Lift 2 would include Bear Tooth drill sites 4 and 5 facilities. Schedule shown is for Alternative B.

4.7.3.8 Option 3: Colville River Crossing Design Summary

Table D.4.48 summarizes the module delivery Option 3 components.

Table D.4.48. Summary of Components for Option 3: Colville River Crossing

Element	Description
Screeding	No additional screeding needed beyond activity described in Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*
Summer staging area	Existing 12.0-acre gravel pad approximately 2 miles south of Oliktok Dock; would require the addition of 43,700 cy of gravel within the pad's existing footprint
Single-season ice pads	Ice pads (83.4 total acres) constructed near Kuparuk DS2P and to support ice road construction
Multi-season ice pads	No multi-season ice pads
Gravel roads	Use approximately 46 miles of existing Kuparuk gravel roads between Oliktok Dock and Kuparuk DS2P; would require curve widening at select locations to address the self-propelled module transporter turning radius. Curve widening would include: Less than 0.1 acre (43,000 cy of gravel) between Oliktok Dock and the 12.0-acre staging area 4.9 acres (34,700 cy of gravel) between the 12.0-acre summer staging area to Kuparuk DS2P Use Project gravel access road (Alternatives B and C) or Project annual ice road (Alternative D) between GMT-2 and the Project area
Module transport ice road	40.1-mile-long, 60-foot-wide heavy-haul ice road would be constructed twice to support module moves in 2025 and 2027 (80.2 total miles and 583.2 total acres) in two segments: Kuparuk DS2P to the east side of the Colville River near Ocean Point West side of the Colville River near Ocean Point to GMT-2
Colville River crossing	Heavy-haul partially grounded ice crossing near Ocean Point
Camps	100-person camp for winter ice road construction at a single-season ice pad near Kuparuk DS2P
Total new gravel footprint and gravel volume	5.0 acres; 118,700 cy
Gravel source	Existing gravel mine in Kuparuk (Mine Site C, Mine Site E, or Mine Site F)
Freshwater use	257.2 MG for camps, ice pads, and ice roads[a]
Seawater use	8.0 MG for ballast water

Note: cy (cubic yards); DS2P (drill site 2P); GMT-2 (Greater Mooses Tooth 2); MG (million gallons).
[a] Alternative D would require an additional 13.1-mile-long, 60-foot-wide heavy-haul ice road for module transport between the Project area and Greater Mooses Tooth 2. This ice road would require an additional 32.7 MG of freshwater for each year of module mobilization (65.4 MG of total additional freshwater).

4.8 Comparison of Module Delivery Options

Table D.4.49 provides a summary comparison of impacts by module delivery option.

Table D.4.49. Summary Comparison of Impacts by Sealift Module Delivery Option

Component	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Gravel footprint (acres)	12.8	13.0	5.0
Gravel fill volume (cubic yards)	397,000	446,000	118,700
Screeding footprint	14.5 total acres 4.9 acres adjacent to dock face 9.6 acres at the barge lightering area	14.5 total acres 4.9 acres adjacent to dock face 9.6 acres at the barge lightering area	No additional screeding needed beyond activity for action alternatives described in Section 4.2.3.4, *Sealift Barge Delivery to Oliktok Dock*
Ice roads	110.8 total miles (795.0 total acres) Gravel haul: 35.2 miles on tundra; 2.4 miles on sea ice Module delivery: 68.4 total miles on tundra; 4.8 miles on sea ice over two module delivery seasons[a]	225.2 total miles (1,551.9 total acres) Gravel haul: 77.4 miles on tundra; 0.6 miles on sea ice Module delivery: 146.0 total miles on tundra; 1.2 miles on sea ice over two module delivery seasons[a]	80.2 total miles (583.2 total acres)[b]
Single-season ice pads	118.9 total acres	195.2 total acres	83.4 total acres
Multi-season ice pads	Three 10.0-acre multi-season ice: One at BT1 One near Atigaru Point One midway between Atigaru Point and BT1	Three 10.0-acre multi-season ice pads: One at BT1 Two along ice road between BT1 and Point Lonely	NA
Sealift delivery schedule (years)	Alternative B: 2024 and 2026 Alternative C: 2024 and 2026 Alternative D: 2025 and 2027	Alternative B: 2024 and 2026 Alternative C: 2024 and 2026 Alternative D: 2025 and 2027	Alternative B: 2024 and 2026 Alternative C: 2024 and 2026 Alternative D: 2025 and 2027
Module mobilization (years)	Alternative B: 2025 and 2027 Alternative C: 2025 and 2027 Alternative D: 2026 and 2028	Alternative B: 2025 and 2027 Alternative C: 2025 and 2027 Alternative D: 2026 and 2028	Alternative B: 2025 and 2027 Alternative C: 2025 and 2027 Alternative D: 2026 and 2028
Total freshwater usage (MG)	307.9[a]	572.0[a]	257.2[b]
Total seawater usage (MG)	376.0	185.0	8.0
Ground traffic (number of trips)[c]	2,306,110	3,196,450	535,160
Fixed-wing traffic (number of trips)[d]	326 total flights Willow: 205 Alpine: 25 Atigaru: 96	326 total flights Willow: 205 Alpine: 25 Point Lonely: 96	70 total flights Alpine: 28 Kuparuk: 42
Helicopter traffic (number of trips)[e]	450 total flights Willow: 435 Alpine: 15	450 total flights Willow: 435 Alpine: 15	16 total flights to/from Alpine
Marine traffic (number of trips)[f]	284 total trips Sealift barges: 9 Tugboats: 16 Support vessels: 259	284 total trips Sealift barges: 9 Tugboats: 16 Support vessels: 259	85 total trips Sealift barges: 9 Tugboats: 16 Support vessels: 60

Component	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Construction camps (100-person capacity)	Camp for winter ice road construction (each ice road year) on a multi-season ice pad Camp for module offload and transport on a multi-season ice pad at Atigaru Point Camp for summer construction and module receipt would be located on a barge (i.e., Floatel) at the module transfer island	Camp for winter ice road construction (each ice road year) on the existing gravel pad Camp for module offload and transport at Point Lonely on the existing gravel pad Camp for summer construction and module receipt at Point Lonely on the existing gravel pad	Camp for winter ice road construction (each ice road year) on a single-season ice pad

Note: BT1 (Bear Tooth drill site 1); MG (million gallons); NA (not applicable). Traffic trips are defined as one-way; a single flight is defined as a landing and subsequent takeoff; and a single vessel trip is defined as a docking and subsequent departure.

[a] Alternative D would require an additional 2.7 miles of 60-foot-wide heavy-haul ice road to reach the Willow Processing Facility gravel pad for each year of module mobilization. This additional ice road would require an additional 6.7 MG of freshwater for each year of module mobilization (13.4 MG of freshwater).

[b] Alternative D would require an additional 13.1-mile-long, 60-foot-wide heavy-haul ice road for module transport between the Project area and Greater Mooses Tooth 2. This ice road would require an additional 32.7 MG of freshwater for each year of module mobilization (65.4 MG of total additional freshwater).

[c] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks) and module delivery (i.e., self-propelled module transporters).

[d] Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse) and include flights to the Alpine and Willow airstrips. Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

[e] Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.

[f] Includes crew boats, tugboats supporting sealift barges, and other support vessels.

5.0 SUMMARY COMPARISON TABLES FOR ANALYSIS

This section provides a comparison of action alternatives and module delivery options for select Project components (Tables D.5.1 through D.5.18); some tables provide a comparison of both alternatives and module delivery options together. These tables are intended to assist reviewers in the identification of overall Project impacts using select quantifiable data (e.g., footprint, water use, traffic).

5.1 Ice Road and Ice Pad Comparisons

Table D.5.1. Summary of Ice Road Length (miles) by Year for Each Action Alternative and Module Delivery Option

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island[a]	Option 2: Point Lonely Module Transfer Island[a]	Option 3: Colville River Crossing
2021	32.7	32.2	41.0	0.0	0.0	0.0
2022	43.9	44.6	92.0	0.0	0.0	0.0
2023	99.3	155.2	151.6	37.6	78.0	0.0
2024	137.6	109.0	150.9	0.0	0.0	0.0
2025	44.0	77.7	62.1	36.6	73.6	40.1
2026	56.2	14.7	27.9	0.0	0.0	0.0
2027	50.2	59.6	17.4	36.6	73.6	40.1
2028	21.0	65.8	68.6	0.0	0.0	0.0
2029	10.3	15.7	69.1	0.0	0.0	0.0
2030	0.0	3.6	19.3	0.0	0.0	0.0
2031+	0.0	3.6	12.5	0.0	0.0	0.0
2031 – Life of Project[b]	0.0	72.0[c]	262.5[d]	0.0	0.0	0.0
Total	**495.2**	**650.1**	**962.4**	**110.8**	**225.2**	**80.2**

Note: "+" indicates annual use from 2031 to end of the Project life in 2050 (Alternatives B and C) or 2051 (Alternative D).
[a] Includes sea ice and tundra-based ice roads.
[b] Life of the Project for Alternatives B and C is 2050; life of the Project for Alternative D is 2051.
[c] Assumes 3.6-mile-long annual ice road between Bear Tooth (BT) drill sites 1 (BT1) and 2 (BT2) for the life of the Project.
[d] Assumes 12.5-mile-long annual ice road between existing gravel road at Greater Mooses Tooth 2 and the Project area for the life of the Project.

Table D.5.2. Summary of Ice Road Area (acres) by Year for Each Action Alternative and Module Delivery Option

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island[a]	Option 2: Point Lonely Module Transfer Island[a]	Option 3: Colville River Crossing
2021	181.8	180.0	224.7	0.0	0.0	0.0
2022	347.0	350.0	719.9	0.0	0.0	0.0
2023	753.7	1,130.6	1,076.6	227.8	472.7	0.0
2024	1,004.2	832.2	1,061.0	0.0	0.0	0.0
2025	373.4	570.7	476.9	283.6	539.6	291.6
2026	346.6	108.6	183.7	0.0	0.0	0.0
2027	318.4	365.6	94.6	283.6	539.6	291.6
2028	178.2	434.6	405.1	0.0	0.0	0.0
2029	87.4	118.0	427.2	0.0	0.0	0.0

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island[a]	Option 2: Point Lonely Module Transfer Island[a]	Option 3: Colville River Crossing
2030	0.0	15.3	110.7	0.0	0.0	0.0
2031+	0.0	15.3	55.7	0.0	0.0	0.0
2031 – Life of Project[b]	0.0	306.0	1,113.0	0.0	0.0	0.0
Total	**3,590.7**	**4,411.6**	**5,893.4**	**795.0**	**1,551.9**	**583.2**

Note: "+" indicates annual use from 2031 to end of the Project life in 2050 (Alternatives B and C) or 2051 (Alternative D).
[a] Includes sea ice and tundra-based ice roads.
[b] Life of the Project for Alternatives B and C is 2050; life of the Project for Alternative D is 2051.
[c] Assumes 3.6-mile-long annual ice road between Bear Tooth (BT) drill sites 1 (BT1) and 2 (BT2) for the life of the Project.
[d] Assumes 12.5-mile-long annual ice road between existing gravel road at Greater Mooses Tooth 2 and the Project area for the life of the Project.

Table D.5.3. Summary of Single-Season Ice Pad Area (acres) by Year for Each Action Alternative and Module Delivery Option

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
2021	82.8	82.5	88.0	0.0	0.0	0.0
2022	153.5	153.9	185.2	0.0	0.0	0.0
2023	192.7	230.0	227.5	40.1	67.0	0.0
2024	259.8	240.8	269.1	0.0	0.0	0.0
2025	29.3	178.3	41.0	39.4	64.1	41.7
2026	100.8	9.8	19.0	0.0	0.0	0.0
2027	96.8	103.0	12.0	39.4	64.1	41.7
2028	14.0	107.2	109.3	0.0	0.0	0.0
2029	6.9	10.5	109.3	0.0	0.0	0.0
2030	0.0	2.4	13.0	0.0	0.0	0.0
2031+	0.0	2.4	8.0	0.0	0.0	0.0
2031 – Life of Project[a]	0.0	48.0	168.0	0.0	0.0	0.0
Total	**936.6**	**1,166.4**	**1,241.4**	**118.9**	**195.2**	**83.4**

Note: "+" indicates annual use from 2031 to end of the Project life in 2050 (Alternatives B and C) or 2051 (Alternative D).
[a] Life of the Project for Alternatives B and C is 2050; life of the Project for Alternative D is 2051.

5.2 Freshwater Use Comparison

Table D.5.4. Summary of Freshwater Use (million gallons) by Year for Each Action Alternative and Module Delivery Option

Year (Season)	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
2020/2021 (Winter)	72.4	71.9	84.1	0.0	0.0	0.0
2021 (Summer)	1.1	1.1	1.1	0.0	0.0	0.0
2021/2022 (Winter)	129.7	130.5	225.8	5.5	8.0	0.0
2022 (Summer)	3.2	3.2	3.2	0.0	0.0	0.0
2022/2023 (Winter)	241.0	339.3	326.8	67.3	133.3	0.0
2023 (Summer)	9.5	10.0	9.5	1.4	1.4	1.0
2023/2024 (Winter)	336.6	291.2	330.2	8.0	8.0	0.0
2024 (Summer)	55.8	55.8	9.0	0.9	0.9	0.5
2024/2025 (Winter)	148.4	232.1	150.0	108.4	206.2	126.8
2025 (Summer)	65.4	65.7	57.4	0.0	0.0	0.9
2025/2026 (Winter)	121.9	43.1	96.5	8.0	8.0	0.0
2026 (Summer)	15.4	15.5	55.7	0.9	0.9	0.3
2026/2027 (Winter)	115.8	128.5	38.4	107.5	205.3	126.8
2027 (Summer)	16.5	16.5	15.5	0.0	0.0	0.9
2027/2028 (Winter)	61.4	145.2	137.8	0.0	0.0	0.0
2028 (Summer)	18.1	18.0	18.4	0.0	0.0	0.0
2028/2029 (Winter)	36.4	44.5	146.5	0.0	0.0	0.0
2029 (Summer)	16.0	16.2	17.2	0.0	0.0	0.0
2029/2030 (Winter)	8.7	12.9	44.9	0.0	0.0	0.0
2030 (Summer)	5.1	5.1	16.0	0.0	0.0	0.0
2030/2031 (Winter)	4.1	8.3	23.2	0.0	0.0	0.0
2031 (Summer)	5.1	5.1	5.1	0.0	0.0	0.0
2031/2032+ (Winter)	77.9	157.7	372.0	0.0	0.0	0.0
2032+ (Summer)	96.9	96.9	102.0	0.0	0.0	0.0
Total	**1,662.4**	**1,914.3**	**2,286.3**	**307.9**	**572.0**	**257.2**

Note: "+" indicates annual use from 2031 to end of the Project life in 2050 (Alternatives B and C) or 2051 (Alternative D); Options 1, 2, and 3 are only to support construction and would end in 2027.

5.3 Ground Traffic Comparisons

Table D.5.5. Summary of Ground Traffic (number of trips) by Year for Each Action Alternative and Module Delivery Option

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
2021	55,300	55,300	52,500	0	0	0
2022	137,270	138,650	182,750	43,680	43,680	0
2023	274,030	309,730	308,550	140,670	288,450	4,590
2024	363,620	402,250	280,750	43,790	43,790	300
2025	387,490	490,860	307,460	1,082,620	1,475,740	264,990
2026	282,570	204,740	279,370	43,770	43,770	300
2027	242,900	308,390	273,750	951,580	1,301,020	264,980
2028	185,090	311,140	281,680	0	0	0
2029	113,200	250,760	308,500	0	0	0
2030	54,640	82,890	213,680	0	0	0
2031 – Life of Project[a]	1,092,800	1,657,800	1,887,900	0	0	0
Total	**3,188,910**	**4,212,510**	**4,376,890**	**2,306,110**	**3,196,450**	**535,160**

Note: "+" indicates annual use from 2031 to the end of the Project life in 2050 (Alternatives B and C) or 2051 (Alternative D). Ground trips are defined as one-way. Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks).
[a] Life of the Project for Alternatives B and C is 2050; life of the Project for Alternative D is 2051.

Table D.5.6. Comparison of Alternatives Total and Daily Ground Traffic (number of trips) by Season and Year

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Summer 2020 (total)	0	0	0
Summer 2020 (daily)	0.0	0.0	0.0
Winter 2021 (total)	33,180	33,180	36,855
Winter 2021 (daily)	274.2	274.2	304.6
Spring 2021 (total)	11,060	11,060	12,285
Spring 2021 (daily)	181.3	181.3	201.4
Summer 2021 (total)	11,060	11,060	3,360
Summer 2021 (daily)	90.7	90.7	27.5
Fall 2021 (total)	0	0	0
Fall 2021 (daily)	0.0	0.0	0.0
Winter 2022 (total)	92,127	92,781	124,596
Winter 2022 (daily)	761.4	766.8	1,029.7
Spring 2022 (total)	31,554	31,829	42,434
Spring 2022 (daily)	517.3	521.8	695.6
Summer 2022 (total)	11,055	11,327	13,007
Summer 2022 (daily)	90.6	92.8	106.6
Fall 2022 (total)	1,690	1,680	1,803
Fall 2022 (daily)	27.7	27.5	29.6
Winter 2023 (total)	184,754	209,754	210,521
Winter 2023 (daily)	1,526.9	1,733.5	1,739.8
Spring 2023 (total)	62,991	71,461	71,226
Spring 2023 (daily)	1,032.6	1,171.5	1,167.6
Summer 2023 (total)	22,068	23,872	23,637
Summer 2023 (daily)	180.9	195.7	193.7
Fall 2023 (total)	3,376	3,646	2,705
Fall 2023 (daily)	55.3	59.8	44.3
Winter 2024 (total)	234,083	245,327	197,444
Winter 2024 (daily)	1,934.6	2,027.5	1,618.4
Spring 2024 (total)	82,013	89,211	66,266
Spring 2024 (daily)	1,344.5	1,462.5	1,086.3
Summer 2024 (total)	35,572	45,389	15,666
Summer 2024 (daily)	291.6	372.0	128.4
Fall 2024 (total)	9,096	16,086	1,803
Fall 2024 (daily)	149.1	263.7	29.6
Winter 2025 (total)	237,297	311,229	186,909
Winter 2025 (daily)	1,961.1	2,572.1	1,544.7
Spring 2025 (total)	86,366	110,604	68,569
Spring 2025 (daily)	1,415.8	1,813.2	1,124.1
Summer 2025 (total)	42,027	46,748	33,169
Summer 2025 (daily)	344.5	383.2	271.9
Fall 2025 (total)	17,566	19,084	13,134
Fall 2025 (daily)	288.0	312.8	215.3
Winter 2026 (total)	167,540	118,360	164,450
Winter 2026 (daily)	1,384.6	978.2	1,359.1
Spring 2026 (total)	60,752	43,395	60,636
Spring 2026 (daily)	995.9	711.4	994.0
Summer 2026 (total)	39,566	31,146	36,811
Summer 2026 (daily)	324.3	255.3	301.7
Fall 2026 (total)	15,666	14,244	16,016
Fall 2026 (daily)	256.8	233.5	262.6
Winter 2027 (total)	147,474	198,885	169,301
Winter 2027 (daily)	1,218.8	1,643.7	1,399.2

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Spring 2027 (total)	52,813	69,479	60,767
Spring 2027 (daily)	865.8	1,139.0	996.2
Summer 2027 (total)	31,653	30,482	30,669
Summer 2027 (daily)	259.5	249.9	251.4
Fall 2027 (total)	12,530	11,115	14,005
Fall 2027 (daily)	205.4	182.2	229.6
Winter 2028 (total)	106,234	197,444	177,272
Winter 2028 (daily)	878.0	1,631.8	1,465.1
Spring 2028 (total)	39,470	70,082	62,352
Spring 2028 (daily)	647.0	1,148.9	1,022.2
Summer 2028 (total)	27,238	31,059	32,254
Summer 2028 (daily)	223.3	254.6	264.4
Fall 2028 (total)	12,274	12,240	11,191
Fall 2028 (daily)	201.2	200.7	183.5
Winter 2029 (total)	57,077	135,644	196,173
Winter 2029 (daily)	471.7	1,121.0	1,621.3
Spring 2029 (total)	22,640	52,597	69,500
Spring 2029 (daily)	371.1	862.3	1,139.3
Summer 2029 (total)	22,640	40,349	30,477
Summer 2029 (daily)	185.6	330.7	249.8
Fall 2029 (total)	11,320	18,845	11,949
Fall 2029 (daily)	185.6	308.9	195.9
Winter 2030 (total)	30,248	46,723	128,319
Winter 2030 (daily)	250.0	386.1	1,060.5
Spring 2030 (total)	10,928	16,578	46,835
Spring 2030 (daily)	179.1	271.8	767.8
Summer 2030 (total)	10,928	16,578	26,333
Summer 2030 (daily)	89.6	135.9	215.8
Fall 2030 (total)	5,464	8,289	12,106
Fall 2030 (daily)	89.6	135.9	198.5
Winter 2031–2050 (total)	549,132	833,045	971,053
Winter 2031–2050 (daily)	226.9	344.2	382.2
Spring 2031–2050 (total)	218,560	331,560	381,600
Spring 2031–2050 (daily)	179.1	271.8	297.9
Summer 2031–2050 (total)	218,560	331,560	359,600
Summer 2031–2050 (daily)	89.6	135.9	140.4
Fall 2031–2050[a] (total)	109,280	165,780	179,800
Fall 2031–2050[a] (daily)	89.6	135.9	70.2
Season Total	**3,188,922**	**4,210,808**	**4,374,858**

Note: Ground trips are defined as one-way. Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks). Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May).
[a] Under Alternative D, this period would be 2031 through 2051.

Table D.5.7. Comparison of Alternatives Ground Traffic That Exceeds 15.0 Vehicles per Hour and the Number of Days of Exceedance by Season and Year

Season and Year	Alternative B Trips per hour	Alternative B No. of Days	Alternative C Trips per hour	Alternative C No. of Days	Alternative D Trips per hour	Alternative D No. of Days
Winter 2022	31.7	121	31.9	121	43	121
Spring 2022	21.6	122	21.7	61	29	61
Winter 2023	63.6	121	72.2	121	72	121
Spring 2023	43.0	61	48.8	61	49	61
Winter 2024	80.6	121	84.5	151	67	121
Spring 2024	56.0	61	60.9	61	45	61

Season and Year	Alternative B Trips per hour	Alternative B No. of Days	Alternative C Trips per hour	Alternative C No. of Days	Alternative D Trips per hour	Alternative D No. of Days
Summer 2024	NA	NA	15.5	122	NA	NA
Winter 2025	81.7	121	107.2	121	64	121
Spring 2025	59.0	61	75.5	61	47	61
Summer 2025	NA	NA	16.0	122	NA	NA
Winter 2026	57.7	121	40.8	121	57	121
Spring 2026	41.5	61	29.6	61	41	61
Winter 2027	50.8	121	68.5	121	58	121
Spring 2027	36.1	61	47.5	61	42	61
Winter 2028	36.6	121	68.0	121	61	121
Spring 2028	27.0	61	47.9	61	43	61
Winter 2029	19.7	121	46.7	121	68	121
Spring 2029	15.5	61	35.9	61	47	61
Winter 2030	NA	NA	1.5	121	44	121
Spring 2030	NA	NA	NA	NA	32	61
Winter 2031–2051	NA	NA	NA	NA	16	2,541
Total	**NA**	**1,517**	**NA**	**1,851**	**NA**	**4,179**

Note: NA (not applicable). Ground trips are defined as one-way. Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks). Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May).

Table D.5.8. Comparison of Module Delivery Options Total and Daily Ground Traffic (number of trips) by Season and Year

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Winter 2022 (total)	32,760	32,760	0
Winter 2022 (daily)	270.7	270.7	0.0
Spring 2022 (total)	10,920	10,920	0
Spring 2022 (daily)	179.0	179.0	0.0
Summer 2022 (total)	0	0	0
Summer 2022 (daily)	0.0	0.0	0.0
Winter 2023 (total)	105,504	216,339	0
Winter 2023 (daily)	871.9	1,787.9	0.0
Spring 2023 (total)	35,168	72,113	0
Spring 2023 (daily)	576.5	1,182.2	0.0
Summer 2023 (total)	0	0	4,590
Summer 2023 (daily)	0.0	0.0	37.6
Fall 2023 (total)	0	0	0
Fall 2023 (daily)	0.0	0.0	0.0
Winter 2024 (total)	32,844	32,844	0
Winter 2024 (daily)	271.4	271.4	0.0
Spring 2024 (total)	10,948	10,948	0
Spring 2024 (daily)	179.5	179.5	0.0
Summer 2024 (total)	0	0	300
Summer 2024 (daily)	0.0	0.0	2.5
Fall 2024 (total)	0	0	0
Fall 2024 (daily)	0.0	0.0	0.0
Winter 2025 (total)	811,965	1,106,805	198,736
Winter 2025 (daily)	6,710.5	9,147.1	1,642.4
Spring 2025 (total)	270,655	368,935	66,252
Spring 2025 (daily)	4,437.0	6,048.1	1,086.1
Summer 2025 (total)	0	0	0
Summer 2025 (daily)	0.0	0.0	0.0
Winter 2026 (total)	32,829	32,829	0

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Winter 2026 (daily)	271.3	271.3	0.0
Spring 2026 (total)	10,943	10,943	0
Spring 2026 (daily)	179.4	179.4	0.0
Summer 2026 (total)	0	0	300
Summer 2026 (daily)	0.0	0.0	2.5
Fall 2026 (total)	0	0	0
Fall 2026 (daily)	0.0	0.0	0.0
Winter 2027 (total)	713,685	975,765	198,734
Winter 2027 (daily)	5,898.2	8,064.2	1,642.4
Spring 2027 (total)	237,895	325,255	66,248
Spring 2027 (daily)	3,899.9	5,332.0	1,086.0
Summer 2027 (total)	0	0	0
Summer 2027 (daily)	0.0	0.0	0.0
Season Total	**2,306,116**	**3,196,456**	**535,160**

Note: Ground trips are defined as one-way. Includes buses, light commercial trucks, short-haul trucks, passenger trucks, and other miscellaneous vehicles. Ground transportation also includes gravel hauling operations (i.e., B-70/Maxi Haul dump trucks). Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May).

5.4 Fixed-Wing Aircraft Traffic Comparisons

Table D.5.9. Summary of Fixed-Wing Air Traffic (total number of trips) by Location for Each Action Alternative and Module Delivery Option

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Fixed wing to/from Willow[a]	11,809	19,282	15,387	205	205	0
Fixed wing to/from Alpine[b]	292	292	3,651	25	25	28
Fixed wing to/from Kuparuk[b]	0	0	0	0	0	42
Fixed wing to/from Atigaru Point	0	0	0	96	0	0
Fixed wing to/from Point Lonely	0	0	0	0	96	0
Total fixed-wing trips	**12,101**	**19,574**	**19,038**	**326**	**326**	**70**

Note: Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Q400, Cessna, or similar. A single fixed-wing trip is defined as a landing and subsequent departure.
[a] Alternative C fixed-wing trips includes use of both the North and South Airstrips.
[b] Only includes flights to support the Project.

Table D.5.10. Comparison of Alternatives Total and Daily Fixed-Wing Aircraft Traffic to/from the Project (number of trips) by Season and Year

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads, South Airstrip	Alternative C: Disconnected Infield Roads, North Airstrip	Alternative D: Disconnected Access
Summer 2020 (total)	0	0	0	0
Summer 2020 (daily)	0.0	0.0	0.0	0.0
Winter 2021 (total)	0	0	0	0
Winter 2021 (daily)	0.0	0.0	0.0	0.0
Spring 2021 (total)	0	0	0	0
Spring 2021 (daily)	0.0	0.0	0.0	0.0
Summer 2021 (total)	0	0	0	0
Summer 2021 (daily)	0.0	0.0	0.0	0.0
Fall 2021 (total)	0	0	0	0
Fall 2021 (daily)	0.0	0.0	0.0	0.0
Winter 2022 (total)	21	0	0	0
Winter 2022 (daily)	0.2	0.0	0.0	0.0
Spring 2022 (total)	7	0	0	0
Spring 2022 (daily)	0.1	0.0	0.0	0.0
Summer 2022 (total)	3	8	0	0
Summer 2022 (daily)	0.0	0.1	0.0	0.0
Fall 2022 (total)	0	16	0	0
Fall 2022 (daily)	0.0	0.3	0.0	0.0
Winter 2023 (total)	114	139	0	228
Winter 2023 (daily)	0.9	1.1	0.0	1.9
Spring 2023 (total)	39	45	0	78
Spring 2023 (daily)	0.6	0.7	0.0	1.3
Summer 2023 (total)	13	16	0	26
Summer 2023 (daily)	0.1	0.1	0.0	0.2
Fall 2023 (total)	2	2	0	3
Fall 2023 (daily)	0.0	0.0	0.0	0.0
Winter 2024 (total)	481	340	0	278
Winter 2024 (daily)	4.0	2.8	0.0	2.3
Spring 2024 (total)	169	124	46	94
Spring 2024 (daily)	2.8	2.0	0.8	1.5
Summer 2024 (total)	72	63	256	22
Summer 2024 (daily)	0.6	0.5	2.1	0.2
Fall 2024 (total)	18	22	92	3
Fall 2024 (daily)	0.3	0.4	1.5	0.0
Winter 2025 (total)	435	704	805	603
Winter 2025 (daily)	3.6	5.8	6.7	5.0
Spring 2025 (total)	158	253	277	222
Spring 2025 (daily)	2.6	4.1	4.5	3.6
Summer 2025 (total)	77	111	118	107
Summer 2025 (daily)	0.6	0.9	1.0	0.9
Fall 2025 (total)	32	44	50	43
Fall 2025 (daily)	0.5	0.7	0.8	0.7
Winter 2026 (total)	430	562	561	530
Winter 2026 (daily)	3.6	4.6	4.6	4.4
Spring 2026 (total)	158	216	214	195
Spring 2026 (daily)	2.6	3.5	3.5	3.2
Summer 2026 (total)	103	155	154	119
Summer 2026 (daily)	0.8	1.3	1.3	1.0
Fall 2026 (total)	40	71	70	52
Fall 2026 (daily)	0.7	1.2	1.2	0.8
Winter 2027 (total)	443	734	455	665

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads, South Airstrip	Alternative C: Disconnected Infield Roads, North Airstrip	Alternative D: Disconnected Access
Winter 2027 (daily)	3.7	6.1	3.8	5.5
Spring 2027 (total)	160	253	152	241
Spring 2027 (daily)	2.6	4.2	2.5	3.9
Summer 2027 (total)	96	111	67	121
Summer 2027 (daily)	0.8	0.9	0.5	1.0
Fall 2027 (total)	38	41	24	56
Fall 2027 (daily)	0.6	0.7	0.4	0.9
Winter 2028 (total)	409	448	427	585
Winter 2028 (daily)	3.4	3.7	3.5	4.8
Spring 2028 (total)	154	156	151	204
Spring 2028 (daily)	2.5	2.6	2.5	3.3
Summer 2028 (total)	106	69	67	106
Summer 2028 (daily)	0.9	0.6	0.6	0.9
Fall 2028 (total)	48	27	26	37
Fall 2028 (daily)	0.8	0.4	0.4	0.6
Winter 2029 (total)	276	370	108	610
Winter 2029 (daily)	2.3	3.1	0.9	5.0
Spring 2029 (total)	112	145	39	216
Spring 2029 (daily)	1.8	2.4	0.6	3.5
Summer 2029 (total)	112	111	30	95
Summer 2029 (daily)	0.9	0.9	0.2	0.8
Fall 2029 (total)	56	52	14	37
Fall 2029 (daily)	0.9	0.9	0.2	0.6
Winter 2030 (total)	187	193	47	529
Winter 2030 (daily)	1.5	1.6	0.4	4.4
Spring 2030 (total)	71	74	18	196
Spring 2030 (daily)	1.2	1.2	0.3	3.2
Summer 2030 (total)	72	74	18	110
Summer 2030 (daily)	0.6	0.6	0.1	0.9
Fall 2030 (total)	36	37	9	51
Fall 2030 (daily)	0.6	0.6	0.1	0.8
Winter 2031–2050 (total)	3,538	3,719	896	4,580
Winter 2031–2050 (daily)	1.5	1.5	0.4	1.8
Spring 2031–2050 (total)	1,408	1,480	356	1,802
Spring 2031–2050 (daily)	1.2	1.2	0.3	1.4
Summer 2031–2050 (total)	1,408	1,480	356	1,700
Summer 2031–2050 (daily)	0.6	0.6	0.1	0.7
Fall 2031–2050 (total)	704	740	178	848
Fall 2031–2050 (daily)	0.6	0.6	0.1	0.3
Season Total	**11,806**	**13,202**	**6,081**	**15,387**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Total values may not match annual values presented elsewhere due to rounding. Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

Table D.5.11. Comparison of Module Delivery Options Total and Daily Fixed-Wing Aircraft Traffic to/from the Project (number of trips) by Season and Year

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Winter 2022 (total)	0	0	0
Winter 2022 (daily)	0.0	0.0	0.0
Spring 2022 (total)	0	0	0
Spring 2022 (daily)	0.0	0.0	0.0

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Summer 2022 (total)	0	0	0
Summer 2022 (daily)	0.0	0.0	0.0
Winter 2023 (total)	7	7	0
Winter 2023 (daily)	0.1	0.1	0.0
Spring 2023 (total)	3	3	0
Spring 2023 (daily)	0.0	0.0	0.0
Summer 2023 (total)	0	0	0
Summer 2023 (daily)	0.0	0.0	0.0
Fall 2023 (total)	16	16	0
Fall 2023 (daily)	0.3	0.3	0.0
Winter 2024 (total)	37	37	0
Winter 2024 (daily)	0.3	0.3	0.0
Spring 2024 (total)	17	17	0
Spring 2024 (daily)	0.3	0.3	0.0
Summer 2024 (total)	16	16	0
Summer 2024 (daily)	0.1	0.1	0.0
Fall 2024 (total)	16	16	0
Fall 2024 (daily)	0.3	0.3	0.0
Winter 2025 (total)	26	0	0
Winter 2025 (daily)	0.2	0.0	0.0
Spring 2025 (total)	12	26	0
Spring 2025 (daily)	0.2	0.2	0.0
Summer 2025 (total)	0	12	0
Summer 2025 (daily)	0.0	0.2	0.0
Winter 2026 (total)	7	7	0
Winter 2026 (daily)	0.1	0.1	0.0
Spring 2026 (total)	3	3	0
Spring 2026 (daily)	0.0	0.0	0.0
Summer 2026 (total)	0	0	0
Summer 2026 (daily)	0.0	0.0	0.0
Fall 2026 (total)	16	16	0
Fall 2026 (daily)	0.3	0.3	0.0
Winter 2027 (total)	24	24	0
Winter 2027 (daily)	0.2	0.2	0.0
Spring 2027 (total)	5	5	0
Spring 2027 (daily)	0.1	0.1	0.0
Summer 2027 (total)	0	0	0
Summer 2027 (daily)	0.0	0.0	0.0
Season Total	**205**	**205**	**0**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Total values may not match annual values presented elsewhere due to rounding. Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

Table D.5.12. Comparison of Alternatives Total and Daily Fixed-Wing Aircraft Traffic to/from the Alpine Development (number of trips) by Season and Year

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Summer 2020 (total)	0	0	0
Summer 2020 (daily)	0.0	0.0	0.0
Winter 2021 (total)	36	36	33
Winter 2021 (daily)	0.3	0.3	0.3
Spring 2021 (total)	12	12	17
Spring 2021 (daily)	0.2	0.2	0.3

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Summer 2021 (total)	12	12	20
Summer 2021 (daily)	0.1	0.1	0.2
Fall 2021 (total)	0	0	0
Fall 2021 (daily)	0.0	0.0	0.0
Winter 2022 (total)	81	81	52
Winter 2022 (daily)	0.7	0.7	0.4
Spring 2022 (total)	28	28	26
Spring 2022 (daily)	0.5	0.5	0.4
Summer 2022 (total)	10	10	0
Summer 2022 (daily)	0.1	0.1	0.0
Fall 2022 (total)	2	2	0
Fall 2022 (daily)	0.0	0.0	0.0
Winter 2023 (total)	52	52	164
Winter 2023 (daily)	0.4	0.4	1.4
Spring 2023 (total)	17	17	77
Spring 2023 (daily)	0.3	0.3	1.3
Summer 2023 (total)	6	6	0
Summer 2023 (daily)	0.0	0.0	0.0
Fall 2023 (total)	0	0	0
Fall 2023 (daily)	0.0	0.0	0.0
Winter 2024 (total)	21	21	196
Winter 2024 (daily)	0.2	0.2	1.6
Spring 2024 (total)	8	8	85
Spring 2024 (daily)	0.1	0.1	1.4
Summer 2024 (total)	4	4	0
Summer 2024 (daily)	0.0	0.0	0.0
Fall 2024 (total)	2	2	0
Fall 2024 (daily)	0.0	0.0	0.0
Winter 2025 (total)	1	1	184
Winter 2025 (daily)	0.0	0.0	1.5
Spring 2025 (total)	0	0	78
Spring 2025 (daily)	0.0	0.0	1.3
Summer 2025 (total)	0	0	0
Summer 2025 (daily)	0.0	0.0	0.0
Fall 2025 (total)	0	0	0
Fall 2025 (daily)	0.0	0.0	0.0
Winter 2026 (total)	0	0	151
Winter 2026 (daily)	0.0	0.0	1.2
Spring 2026 (total)	0	0	62
Spring 2026 (daily)	0.0	0.0	1.0
Summer 2026 (total)	0	0	0
Summer 2026 (daily)	0.0	0.0	0.0
Fall 2026 (total)	0	0	0
Fall 2026 (daily)	0.0	0.0	0.0
Winter 2027 (total)	0	0	184
Winter 2027 (daily)	0.0	0.0	1.5
Spring 2027 (total)	0	0	82
Spring 2027 (daily)	0.0	0.0	1.3
Summer 2027 (total)	0	0	0
Summer 2027 (daily)	0.0	0.0	0.0
Fall 2027 (total)	0	0	0
Fall 2027 (daily)	0.0	0.0	0.0
Winter 2028 (total)	0	0	153
Winter 2028 (daily)	0.0	0.0	1.3
Spring 2028 (total)	0	0	63

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Spring 2028 (daily)	0.0	0.0	1.0
Summer 2028 (total)	0	0	0
Summer 2028 (daily)	0.0	0.0	0.0
Fall 2028 (total)	0	0	0
Fall 2028 (daily)	0.0	0.0	0.0
Winter 2029 (total)	0	0	184
Winter 2029 (daily)	0.0	0.0	1.5
Spring 2029 (total)	0	0	82
Spring 2029 (daily)	0.0	0.0	1.3
Summer 2029 (total)	0	0	0
Summer 2029 (daily)	0.0	0.0	0.0
Fall 2029 (total)	0	0	0
Fall 2029 (daily)	0.0	0.0	0.0
Winter 2030 (total)	0	0	159
Winter 2030 (daily)	0.0	0.0	1.3
Spring 2030 (total)	0	0	66
Spring 2030 (daily)	0.0	0.0	1.1
Summer 2030 (total)	0	0	0
Summer 2030 (daily)	0.0	0.0	0.0
Fall 2030 (total)	0	0	0
Fall 2030 (daily)	0.0	0.0	0.0
Winter 2031-2050 (total)	0	0	1,080
Winter 2031-2050 (daily)	0.0	0.0	0.4
Spring 2031-2050 (total)	0	0	454
Spring 2031-2050 (daily)	0.0	0.0	0.4
Summer 2031-2050 (total)	0	0	0
Summer 2031-2050 (daily)	0.0	0.0	0.0
Fall 2031-2050 (total)	0	0	0
Fall 2031-2050 (daily)	0.0	0.0	0.0
Season Total	**292**	**292**	**3,651**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Total values may not match annual values presented elsewhere due to rounding. Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

Table D.5.13. Comparison of Module Delivery Options Total and Daily Fixed-Wing Air Traffic to/from the Alpine Development (number of trips) by Season and Year

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Winter 2022 (total)	15	15	0
Winter 2022 (daily)	0.1	0.1	0.0
Spring 2022 (total)	10	10	0
Spring 2022 (daily)	0.2	0.2	0.0
Summer 2022 (total)	0	0	0
Summer 2022 (daily)	0.0	0.0	0.0
Winter 2023 (total)	0	0	0
Winter 2023 (daily)	0.0	0.0	0.0
Spring 2023 (total)	0	0	0
Spring 2023 (daily)	0.0	0.0	0.0
Summer 2023 (total)	0	0	0
Summer 2023 (daily)	0.0	0.0	0.0
Fall 2023 (total)	0	0	0
Fall 2023 (daily)	0.0	0.0	0.0
Winter 2024 (total)	0	0	0

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Winter 2024 (daily)	0.0	0.0	0.0
Spring 2024 (total)	0	0	0
Spring 2024 (daily)	0.0	0.0	0.0
Summer 2024 (total)	0	0	0
Summer 2024 (daily)	0.0	0.0	0.0
Fall 2024 (total)	0	0	0
Fall 2024 (daily)	0.0	0.0	0.0
Winter 2025 (total)	0	0	9
Winter 2025 (daily)	0.0	0.0	0.1
Spring 2025 (total)	0	0	5
Spring 2025 (daily)	0.0	0.0	0.1
Summer 2025 (total)	0	0	0
Summer 2025 (daily)	0.0	0.0	0.0
Winter 2026 (total)	0	0	0
Winter 2026 (daily)	0.0	0.0	0.0
Spring 2026 (total)	0	0	0
Spring 2026 (daily)	0.0	0.0	0.0
Summer 2026 (total)	0	0	0
Summer 2026 (daily)	0.0	0.0	0.0
Fall 2026 (total)	0	0	0
Fall 2026 (daily)	0.0	0.0	0.0
Winter 2027 (total)	0	0	9
Winter 2027 (daily)	0.0	0.0	0.1
Spring 2027 (total)	0	0	5
Spring 2027 (daily)	0.0	0.0	0.1
Summer 2027 (total)	0	0	0
Summer 2027 (daily)	0.0	0.0	0.0
Season Total	**25**	**25**	**28**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Total values may not match annual values presented elsewhere due to rounding. Flights outlined are additional flights required beyond projected travel to/from non-Project airports (e.g., Anchorage, Fairbanks, Deadhorse). Fixed-wing aircraft includes Q400, C-130, DC-6, Twin Otter/CASA, Cessna, or similar.

5.5 Helicopter Traffic Comparisons

Table D.5.14. Summary of Air Traffic (total number of trips) by Location for Each Action Alternative and Module Delivery Option

Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Helicopter to/from Willow[a]	2,321	2,778	2,403	435	435	0
Helicopter to/from Alpine[b]	100	132	100	15	15	16
Total helicopter trips	**2,421**	**2,910**	**2,503**	**450**	**450**	**16**

Note: A single helicopter trip is defined as a landing and subsequent departure.
[a] Alternative C helicopter trips includes use of both the North and South Airstrips.
[b] Only includes flights to support the Project.

Table D.5.15. Comparison of Alternatives Total and Daily Helicopter Traffic to/from the Project (number of trips) by Season and Year

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads, South Airstrip	Alternative C: Disconnected Infield Roads, North Airstrip	Alternative D: Disconnected Access
Summer 2020 (total)	0	0	0	0
Summer 2020 (daily)	0.0	0.0	0.0	0.0
Winter 2021 (total)	0	0	0	0
Winter 2021 (daily)	0.0	0.0	0.0	0.0
Spring 2021 (total)	0	0	0	0
Spring 2021 (daily)	0.0	0.0	0.0	0.0
Summer 2021 (total)	0	0	0	0
Summer 2021 (daily)	0.0	0.0	0.0	0.0
Fall 2021 (total)	0	0	0	0
Fall 2021 (daily)	0.0	0.0	0.0	0.0
Winter 2022 (total)	0	0	0	0
Winter 2022 (daily)	0.0	0.0	0.0	0.0
Spring 2022 (total)	0	0	0	0
Spring 2022 (daily)	0.0	0.0	0.0	0.0
Summer 2022 (total)	25	57	0	25
Summer 2022 (daily)	0.2	0.5	0.0	0.2
Fall 2022 (total)	0	0	0	0
Fall 2022 (daily)	0.0	0.0	0.0	0.0
Winter 2023 (total)	0	0	0	0
Winter 2023 (daily)	0.0	0.0	0.0	0.0
Spring 2023 (total)	25	45	0	32
Spring 2023 (daily)	0.4	0.7	0.0	0.5
Summer 2023 (total)	57	100	0	50
Summer 2023 (daily)	0.5	0.8	0.0	0.4
Fall 2023 (total)	0	0	0	0
Fall 2023 (daily)	0.0	0.0	0.0	0.0
Winter 2024 (total)	0	0	0	0
Winter 2024 (daily)	0.0	0.0	0.0	0.0
Spring 2024 (total)	25	45	0	32
Spring 2024 (daily)	0.4	0.7	0.0	0.5
Summer 2024 (total)	57	100	0	50
Summer 2024 (daily)	0.5	0.8	0.0	0.4
Fall 2024 (total)	0	0	0	0
Fall 2024 (daily)	0.0	0.0	0.0	0.0
Winter 2025 (total)	0	0	0	0
Winter 2025 (daily)	0.0	0.0	0.0	0.0
Spring 2025 (total)	25	27	14	32
Spring 2025 (daily)	0.4	0.4	0.2	0.5
Summer 2025 (total)	57	60	44	50
Summer 2025 (daily)	0.5	0.5	0.4	0.4
Fall 2025 (total)	0	0	0	0
Fall 2025 (daily)	0.0	0.0	0.0	0.0
Winter 2026 (total)	0	0	0	0
Winter 2026 (daily)	0.0	0.0	0.0	0.0
Spring 2026 (total)	25	31	10	32
Spring 2026 (daily)	0.4	0.5	0.2	0.5
Summer 2026 (total)	57	63	30	50
Summer 2026 (daily)	0.5	0.5	0.2	0.4
Fall 2026 (total)	0	0	0	0
Fall 2026 (daily)	0.0	0.0	0.0	0.0
Winter 2027 (total)	0	0	0	0

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads, South Airstrip	Alternative C: Disconnected Infield Roads, North Airstrip	Alternative D: Disconnected Access
Winter 2027 (daily)	0.0	0.0	0.0	0.0
Spring 2027 (total)	25	39	7	32
Spring 2027 (daily)	0.4	0.6	0.1	0.5
Summer 2027 (total)	57	77	22	50
Summer 2027 (daily)	0.5	0.6	0.2	0.4
Fall 2027 (total)	0	0	0	0
Fall 2027 (daily)	0.0	0.0	0.0	0.0
Winter 2028 (total)	0	0	0	0
Winter 2028 (daily)	0.0	0.0	0.0	0.0
Spring 2028 (total)	25	39	7	32
Spring 2028 (daily)	0.4	0.6	0.1	0.5
Summer 2028 (total)	57	77	22	50
Summer 2028 (daily)	0.5	0.6	0.2	0.4
Fall 2028 (total)	0	0	0	0
Fall 2028 (daily)	0.0	0.0	0.0	0.0
Winter 2029 (total)	0	0	0	0
Winter 2029 (daily)	0.0	0.0	0.0	0.0
Spring 2029 (total)	25	35	0	32
Spring 2029 (daily)	0.4	0.6	0.0	0.5
Summer 2029 (total)	57	72	12	50
Summer 2029 (daily)	0.5	0.6	0.1	0.4
Fall 2029 (total)	0	0	0	0
Fall 2029 (daily)	0.0	0.0	0.0	0.0
Winter 2030 (total)	0	0	0	0
Winter 2030 (daily)	0.0	0.0	0.0	0.0
Spring 2030 (total)	25	22	0	32
Spring 2030 (daily)	0.4	0.4	0.0	0.5
Summer 2030 (total)	57	52	9	50
Summer 2030 (daily)	0.5	0.4	0.1	0.4
Fall 2030 (total)	0	0	0	0
Fall 2030 (daily)	0.0	0.0	0.0	0.0
Winter 2031–2050 (total)	0	0	0	0
Winter 2031–2050 (daily)	0.0	0.0	0.0	0.0
Spring 2031–2050 (total)	500	480	0	671
Spring 2031–2050 (daily)	0.4	0.4	0.0	0.5
Summer 2031–2050 (total)	1,140	1,000	180	1,051
Summer 2031–2050 (daily)	0.5	0.4	0.1	0.4
Fall 2031–2050 (total)	0	0	0	0
Fall 2031–2050 (daily)	0.0	0.0	0.0	0.0
Season Total	**2,321**	**2,421**	**357**	**2,403**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Values may not match the Annual totals presented elsewhere due to rounding. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.

Table D.5.16. Comparison of Module Delivery Options Total and Daily Helicopter Traffic to/from the Project (number of trips) by Season and Year

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Winter 2022 (total)	0	0	0
Winter 2022 (daily)	0.0	0.0	0.0
Spring 2022 (total)	0	0	0
Spring 2022 (daily)	0.0	0.0	0.0
Summer 2022 (total)	0	0	0
Summer 2022 (daily)	0.0	0.0	0.0
Winter 2023 (total)	78	78	0
Winter 2023 (daily)	0.6	0.6	0.0
Spring 2023 (total)	42	42	0
Spring 2023 (daily)	0.7	0.7	0.0
Summer 2023 (total)	90	90	0
Summer 2023 (daily)	0.7	0.7	0.0
Fall 2023 (total)	0	0	0
Fall 2023 (daily)	0.0	0.0	0.0
Winter 2024 (total)	0	0	0
Winter 2024 (daily)	0.0	0.0	0.0
Spring 2024 (total)	0	0	0
Spring 2024 (daily)	0.0	0.0	0.0
Summer 2024 (total)	40	40	0
Summer 2024 (daily)	0.3	0.3	0.0
Fall 2024 (total)	20	20	0
Fall 2024 (daily)	0.3	0.3	0.0
Winter 2025 (total)	50	0	0
Winter 2025 (daily)	0.4	0.0	0.0
Spring 2025 (total)	10	50	0
Spring 2025 (daily)	0.2	0.4	0.0
Summer 2025 (total)	0	10	0
Summer 2025 (daily)	0.0	0.2	0.0
Winter 2026 (total)	24	24	0
Winter 2026 (daily)	0.2	0.2	0.0
Spring 2026 (total)	12	12	0
Spring 2026 (daily)	0.2	0.2	0.0
Summer 2026 (total)	16	16	0
Summer 2026 (daily)	0.1	0.1	0.0
Fall 2026 (total)	8	8	0
Fall 2026 (daily)	0.1	0.1	0.0
Winter 2027 (total)	34	34	0
Winter 2027 (daily)	0.3	0.3	0.0
Spring 2027 (total)	11	11	0
Spring 2027 (daily)	0.2	0.2	0.0
Summer 2027 (total)	0	0	0
Summer 2027 (daily)	0.0	0.0	0.0
Season Total	**435**	**435**	**0**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Values may not match the Annual totals presented elsewhere due to rounding. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.

Table D.5.17. Comparison of Alternatives Total and Daily Helicopter Traffic to/from the Alpine Development (number of trips) by Season and Year

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Summer 2020 (total)	25	25	25
Summer 2020 (daily)	0.2	0.2	0.2
Winter 2021 (total)	0	0	0
Winter 2021 (daily)	0.0	0.0	0.0
Spring 2021 (total)	12	12	12
Spring 2021 (daily)	0.2	0.2	0.2
Summer 2021 (total)	38	38	38
Summer 2021 (daily)	0.3	0.3	0.3
Fall 2021 (total)	0	0	0
Fall 2021 (daily)	0.0	0.0	0.0
Winter 2022 (total)	0	0	0
Winter 2022 (daily)	0.0	0.0	0.0
Spring 2022 (total)	25	57	25
Spring 2022 (daily)	0.4	0.9	0.4
Summer 2022 (total)	0	0	0
Summer 2022 (daily)	0.0	0.0	0.0
Fall 2022 (total)	0	0	0
Fall 2022 (daily)	0.0	0.0	0.0
Winter 2023 (total)	0	0	0
Winter 2023 (daily)	0.0	0.0	0.0
Spring 2023 (total)	0	0	0
Spring 2023 (daily)	0.0	0.0	0.0
Summer 2023 (total)	0	0	0
Summer 2023 (daily)	0.0	0.0	0.0
Fall 2023 (total)	0	0	0
Fall 2023 (daily)	0.0	0.0	0.0
Winter 2024 (total)	0	0	0
Winter 2024 (daily)	0.0	0.0	0.0
Spring 2024 (total)	0	0	0
Spring 2024 (daily)	0.0	0.0	0.0
Summer 2024 (total)	0	0	0
Summer 2024 (daily)	0.0	0.0	0.0
Fall 2024 (total)	0	0	0
Fall 2024 (daily)	0.0	0.0	0.0
Winter 2025 (total)	0	0	0
Winter 2025 (daily)	0.0	0.0	0.0
Spring 2025 (total)	0	0	0
Spring 2025 (daily)	0.0	0.0	0.0
Summer 2025 (total)	0	0	0
Summer 2025 (daily)	0.0	0.0	0.0
Fall 2025 (total)	0	0	0
Fall 2025 (daily)	0.0	0.0	0.0
Winter 2026 (total)	0	0	0
Winter 2026 (daily)	0.0	0.0	0.0
Spring 2026 (total)	0	0	0
Spring 2026 (daily)	0.0	0.0	0.0
Summer 2026 (total)	0	0	0
Summer 2026 (daily)	0.0	0.0	0.0
Fall 2026 (total)	0	0	0
Fall 2026 (daily)	0.0	0.0	0.0
Winter 2027 (total)	0	0	0
Winter 2027 (daily)	0.0	0.0	0.0
Spring 2027 (total)	0	0	0

Season and Year	Alternative B: Proponent's Project	Alternative C: Disconnected Infield Roads	Alternative D: Disconnected Access
Spring 2027 (daily)	0.0	0.0	0.0
Summer 2027 (total)	0	0	0
Summer 2027 (daily)	0.0	0.0	0.0
Fall 2027 (total)	0	0	0
Fall 2027 (daily)	0.0	0.0	0.0
Winter 2028 (total)	0	0	0
Winter 2028 (daily)	0.0	0.0	0.0
Spring 2028 (total)	0	0	0
Spring 2028 (daily)	0.0	0.0	0.0
Summer 2028 (total)	0	0	0
Summer 2028 (daily)	0.0	0.0	0.0
Fall 2028 (total)	0	0	0
Fall 2028 (daily)	0.0	0.0	0.0
Winter 2029 (total)	0	0	0
Winter 2029 (daily)	0.0	0.0	0.0
Spring 2029 (total)	0	0	0
Spring 2029 (daily)	0.0	0.0	0.0
Summer 2029 (total)	0	0	0
Summer 2029 (daily)	0.0	0.0	0.0
Fall 2029 (total)	0	0	0
Fall 2029 (daily)	0.0	0.0	0.0
Winter 2030 (total)	0	0	0
Winter 2030 (daily)	0.0	0.0	0.0
Spring 2030 (total)	0	0	0
Spring 2030 (daily)	0.0	0.0	0.0
Summer 2030 (total)	0	0	0
Summer 2030 (daily)	0.0	0.0	0.0
Fall 2030 (total)	0	0	0
Fall 2030 (daily)	0.0	0.0	0.0
Winter 2031–2050 (total)	0	0	0
Winter 2031–2050 (daily)	0.0	0.0	0.0
Spring 2031–2050 (total)	0	0	0
Spring 2031–2050 (daily)	0.0	0.0	0.0
Summer 2031–2050 (total)	0	0	0
Summer 2031–2050 (daily)	0.0	0.0	0.0
Fall 2031–2050 (total)	0	0	0
Fall 2031–2050 (daily)	0.0	0.0	0.0
Season Total	**100**	**132**	**100**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Values may not match the Annual totals presented elsewhere due to rounding. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.

Table D.5.18. Comparison of Module Delivery Options Total and Daily Helicopter Traffic to/from the Alpine Development (number of trips) by Season and Year

Season and Year	Option 1: Atigaru Point Module Transfer Island	Option 2: Point Lonely Module Transfer Island	Option 3: Colville River Crossing
Winter 2022 (total)	0	0	0
Winter 2022 (daily)	0.0	0.0	0.0
Spring 2022 (total)	0	0	0
Spring 2022 (daily)	0.0	0.0	0.0
Summer 2022 (total)	15	15	0
Summer 2022 (daily)	0.1	0.1	0.0
Winter 2023 (total)	0	0	0
Winter 2023 (daily)	0.0	0.0	0.0
Spring 2023 (total)	0	0	0
Spring 2023 (daily)	0.0	0.0	0.0
Summer 2023 (total)	0	0	0
Summer 2023 (daily)	0.0	0.0	0.0
Fall 2023 (total)	0	0	0
Fall 2023 (daily)	0.0	0.0	0.0
Winter 2024 (total)	0	0	0
Winter 2024 (daily)	0.0	0.0	0.0
Spring 2024 (total)	0	0	0
Spring 2024 (daily)	0.0	0.0	0.0
Summer 2024 (total)	0	0	0
Summer 2024 (daily)	0.0	0.0	0.0
Fall 2024 (total)	0	0	0
Fall 2024 (daily)	0.0	0.0	0.0
Winter 2025 (total)	0	0	0
Winter 2025 (daily)	0.0	0.0	0.0
Spring 2025 (total)	0	0	0
Spring 2025 (daily)	0.0	0.0	0.0
Summer 2025 (total)	0	0	8
Summer 2025 (daily)	0.0	0.0	0.1
Winter 2026 (total)	0	0	0
Winter 2026 (daily)	0.0	0.0	0.0
Spring 2026 (total)	0	0	0
Spring 2026 (daily)	0.0	0.0	0.0
Summer 2026 (total)	0	0	0
Summer 2026 (daily)	0.0	0.0	0.0
Fall 2026 (total)	0	0	0
Fall 2026 (daily)	0.0	0.0	0.0
Winter 2027 (total)	0	0	0
Winter 2027 (daily)	0.0	0.0	0.0
Spring 2027 (total)	0	0	0
Spring 2027 (daily)	0.0	0.0	0.0
Summer 2027 (total)	0	0	8
Summer 2027 (daily)	0.0	0.0	0.1
Season Total	**15**	**15**	**16**

Note: A single flight is defined as a landing and subsequent takeoff. Daily values assume equal 24-hour distribution for each day of the season. Seasons are defined as follows: summer (122 days; June, July, August, September); fall (61 days; October, November); winter (121 days; December, January, February, March); and spring (61 days; April, May). Includes support for ice road construction, pre-staged boom deployment, hydrology and other environmental studies, and agency inspection during all phases of the Project. Values may not match the Annual totals presented elsewhere due to rounding. Typical helicopters include A-Star and 206 Long Ranger models, although other similar types of helicopters may be used.

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Willow Master Development Plan

Appendix D.2
Willow Mine Site Mining and Reclamation Plan

August 2020

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WILLOW MINE SITE
MINING AND RECLAMATION PLAN

Prepared for:

ConocoPhillips Alaska Inc.

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Prepared by:

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P N D
ENGINEERS, INC.

July 2020

Introduction

Purpose

The Willow Mine Site is required to supply gravel fill material for future development and operational requirements of the Willow Project. The purpose of this document is to establish an integrated mining and reclamation plan for excavation of material from within the mine site area.

Operator and Permittee Information

Operator Information

Operator Name: ConocoPhillips Alaska, Inc.
Mailing Address: P.O. Box 100360, Anchorage, AK 99510-0360
Phone Number: (907) 276-1215
Tax Payer ID No.: 94-2700433

Permittee Information

Permittee Name: ConocoPhillips Alaska, Inc.
Mailing address: P.O. Box 100360, Anchorage, AK 99510-0360
Point of contact (POC): Chris Wrobel
POC phone number: (907) 263-4691

Legal Description

Area 1

Legal Description: Umiat Meridian, Township 10N., Range 3E., Sections 11, 12, 13
Latitude: 70.2301° N
Longitude: 151.2788° W

Area 2

Legal Description: Umiat Meridian, Township 10N., Range 3E., Section 11
Latitude: 70.2359° N
Longitude 151.2987° W

Site Description

The Willow Mine Site is located adjacent to the Tiŋmiaqsiuġvik (Ublutuoch) River on the eastern edge of the Greater Mooses Tooth Unit and on un-unitized lands within the National Petroleum Reserve-Alaska (NPR-A), on the North Slope of Alaska. The site currently consists of tundra typical of Alaska's North Slope. Additional information regarding wildlife present in the vicinity and mitigation efforts to reduce, avoid, or minimize impacts to wildlife is described in the Willow Project Environmental Impact Statement (EIS). The Willow Mine Site consists of two distinct areas separated by the Tiŋmiaqsiuġvik River: Area 1 is located south of the confluence between Bills Creek and the Tiŋmiaqsiuġvik River. Area 2 is located on the west side of the Tiŋmiaqsiuġvik River, just northwest of Area 1. There are no existing utilities in the vicinity of the mine site.

To support gravel extraction, a total of approximately 185 acres of seasonal ice pads would be used for:

- Storing gravel mining equipment
- Housing construction equipment
- Overburden stockpile
- Ice pad around the mine site perimeter

The maximum disturbance, including temporary seasonal ice pads is 334.7 acres. After mine site reclamation is complete, the maximum final disturbance of the proposed mine site is 149.7 acres.

Access to the mine site will generally be from the northwest and will utilize seasonal ice roads, a permanent gravel access road is not planned. Access points will vary during each construction season, depending on the phasing and development of the mine site.

Equipment and Device List

B-70
Compactor, IR-SD150D
Compactor, Mikasa, Double Drum
Compressor, IR-XP-1400
Crane, 4100/4600 Manitowoc
Crusher, Pioneer
Dozer, 10N
Dozer, D8
Dozer, D9
Drill, Blast Hole, DCM2000
Excavator, 330B
Excavator, 345B
Light Plant
Loader, 950
Loader, 966
Loader, 988
Pumphouse, Gorman Rupp
Trimmer
Tucker
Welder, Lincoln, SAM400
Bus, 44 Passenger

Truck, 5th Wheel
Truck, Fuel
Truck, Mechanics
Truck, P/U, Crew Cab
Truck, Powder
Truck, Tire
Truck, Volvo A30
Heater, 1.2MM BTU
Shop, Portable
Envirovac
Trailer, Break
Trailer, Float
Trailer, Lowboy
Trailer, Office
Trailer, Tanker, Water, 110BBL
Trailer, Vac, 250BBL

Chieftan ATV
Grader, 14H
Grader, 16G
Pumpers
Pumphouse
Snowblower
Trimmer
Fuel Truck
K-Line End Dump
Mechanic Truck
Pickup
Truck, Water 135bbl
Water Buffalo

General Overview

This section provides a general overview of mine site features and development before detailed descriptions are presented in subsequent sections.

In general, materials at the mine site consist of an organic surface layer overlying an overburden layer consisting of ice, fine sands, and silt. The yield material is beneath the overburden layer, which consists of gravel and gravelly sands. Overburden material will be removed and stockpiled on ice pads adjacent to the excavation prior to extraction of the yield material. The location of the stockpiles will be based on construction sequencing, topography, and existing tundra vegetation to determine the location with least impact. Overburden material will be stockpiled for up to two summer seasons before being used for mine site reclamation, as described herein.

While mining operations are in progress, a perimeter ice pad will be installed around the excavation limits of the current season to provide access around the active mining area and to assist with removal of fly rock/debris at the end of each construction season. A 'perimeter berm' composed of overburden will be constructed on undisturbed tundra surrounding the mine areas as described below. The perimeter berm will serve to protect the mine site excavation from surface water flowing into the mine, maintain thermal stability of permafrost adjacent to the mine footprint, and create a physical barrier around the mine site for local residents.

Background

ConocoPhillips Alaska Inc. (CPAI) is currently in the planning and preliminary-design stage for the development of the Willow Project, which consists of multiple drill sites, a processing facility, and other associated infrastructure within the Bear Tooth Unit. The Willow Project will require approximately 5.0 million cubic yards of gravel material, 4.8 million cubic yards of which would be sourced from the Willow Mine Site. The remaining material will be sourced from the KRU mine site and used for Kuparuk road and dock improvements in support of the Willow Project.

Exploration for a suitable material source for the Willow Project has been ongoing since 2017. These exploration efforts discovered the proposed Willow Mine Site described herein. Results from recent geotechnical efforts have also determined that development of both areas within the Willow Mine Site is necessary to provide sufficient gravel for construction of the Willow Project.

The mine site layout will be designed to optimize material extraction while minimizing footprint with a deep excavation targeting the most suitable construction materials. This site will supply the Willow Project with material for a total duration of 7 years.

Limitations

This reclamation plan assumes that the Willow Mine Site will not be expanded beyond the proposed permit boundary. Final reclamation features will depend on the final configuration and the availability of overburden materials, which are not completely known at this time. A survey of mine site topography and water levels will be performed prior to final completion of reclamation activities. If final available overburden quantities differ from current estimates, the reclamation plan will be reviewed and revised accordingly.

Excavation Overview

Goals

Minimizing environmental impact and protecting worker health and safety during construction and mining is of the highest priority in this plan. The layout of the proposed mine aims to maximize access to the most suitable construction materials while minimizing disturbance to the surface. Gravel extraction is optimized based on analysis of the "Willow 2019 Geotechnical Exploration – Mine Site Engineering Report" geotechnical exploration report released October 1, 2019 by PND Engineers, Inc.

General Description of Work

Excavation of gravel at the Willow Mine Site will occur solely within the permitted footprint. The proposed area is covered by a layer of overburden with a thickness varying between 27 to 36 feet in Area 1 and is approximately 25 feet thick in Area 2. Additionally, some portions of Area 1 have an interbedded deleterious layer that separates two distinct yield layers. This deleterious layer will need to be mined separately from the yield material and stockpiled; this material is not suitable for use either alone or by mixing with other yield material. Generally, the mine site excavation is expected to take place in two distinct removal activities:

(1) removal of organic overburden;
(2) removal of inorganic overburden;
(3) removal of suitable gravel material (likely requiring two lifts within Area 1)

Where interbedded deleterious material exists within Area 1, additional removal activities will occur to remove the deleterious material and underlying yield material layer. The Mine Site will be excavated with vertical walls and horizontal benches such that the effective side slope is 3H:1V.

All overburden removal and gravel extraction will occur only during the North Slope winter construction seasons; typically, between December and April. Containment such as "duck ponds" will be in place under all parked or idle equipment present during mining operations.

Overburden material will be removed prior to extraction of the underlying yield material. The overburden consists of a thin (1-2 foot) organic layer overlying an inorganic layer. These layers will be removed separately. The organic layer will initially be loosened by using a rotary drum cutter or similar means to remove shallow material. Once loosened, organic materials will be moved within the mine site by any or all of the following equipment: excavator, dozer, and front-end loader. The material will be loaded into haul equipment and relocated to a location where it will be placed and shaped with equipment similar to that used in the mine site. The exact location of overburden placement will vary based on current construction phase and mine site configuration and is described in more detail in the following paragraphs. Inorganic overburden will be removed by drilling and blasting methods. Once loosened, it will be moved, stockpiled and shaped similarly to the methods described above. Similar equipment will be used to mix a portion of the inorganic overburden with the organic overburden that was removed previously. Mixing will occur at a ratio between 3:1 to 5:1 inorganic to organic overburden for use as a cap layer on the thermal berms and described in further detail below.

The overburden removal process will occur incrementally as needed over the construction phase of the Willow Project. It is not expected that the area in which overburden is removed will exceed the expected area to be mined in a particular season. When the mine is initially opened, some overburden materials will be used to form the perimeter berms around the planned mine site area (explained in detail below). Excess overburden remaining after construction of the perimeter berms will be stockpiled on ice pads adjacent to the excavation, but outside of the mine footprint for future use as reclamation material. It is expected that the overburden generated in Area 2 will remain stockpiled through one summer before being used as part of mine site reclamation. The overburden generated in Area 1 is expected to remain stockpiled through two summers before being used for mine site reclamation. Further information regarding the removal of these stockpiles and use of overburden for mine site reclamation is described in detail below.

Gravel extraction will also be performed by using drilling and blasting methods and will occur after overburden is removed in a particular area. After loosening the gravel with blasting methods, the materials will be moved within the mine site by any or all of the following equipment: excavator, dozer, and front-end loader. Stockpiling of gravel is generally not anticipated; however, temporary stockpiles may be needed and would be located within the mine pit or within the footprint of road/pad construction. The material will be loaded into haul equipment and hauled to the Project site for gravel road and pad construction. Capacity of gravel haul equipment ranges between 25 and 50 cubic yards. The estimated number of trips per day are shown in Appendix A. The number of trips shown is based on conservative estimates previously developed for the Willow Project EIS and derived from the number of equipment spreads expected to be onsite rather than the estimated gravel quantity to be hauled.

Processing of excavated materials will be limited to crushing of material needed for use as a surfacing course at the airstrip. Processing would occur within the Willow Mine Site areas. The remainder of the extracted material will be placed for construction without additional processing.

Mining operations, including processing, will occur during winter construction seasons. Construction equipment will be mobilized to the site by the contractor from Deadhorse, Nuiqsut, Kuparuk, Alpine, and Fairbanks for use during a given season. During the winter season, construction equipment will be stored on either gravel pads or seasonal ice pads. When a given winter construction season ends, equipment will be demobilized from the mine site area unless needed for summer dewatering. The layout of the mine upon the completion of each season will vary depending on construction phase. During the first two years, while the overburden is stockpiled as described above, it is anticipated that the excavated portion of the mine site will have high walls as indicated by the Typical Mine Site Section shown in the attached figures. During subsequent years, after the overburden stockpiles have been removed and reclamation has begun, the excavated portion of the mine will be a combination high walls and reclaimed area as shown in the Typical Thermal Berm Section of the attached figures. Minor sloughing is expected to occur during the summer months at high wall areas; however, this is expected to be contained within the mine site footprint and will stabilize upon installation of the overburden thermal berms.

While active mining is underway during the winter season, workers will be housed in a temporary camp located on the construction ice pad shown in the attached figures. This temporary work camp will be transported to the work site at the beginning of the winter season and removed at the end of each winter season. Wastewater will be treated at the camp and disposed offsite per the camp operator's wastewater disposal permit. Solid waste will be stored in wildlife-proof containers and be recycled or transported to the NSB Service Area 10 solid waste landfill. The construction ice pad will be used for placing an Envirovac (bathroom), equipment staging, temporary offices, shops, and materials. Approximately 20,000 gallons of fuel will be stored on the construction ice pad. Fuel storage will be in a double wall tank. Fuel storage locations will be located a minimum of 500 feet away from waterbodies. The fuel storage tank(s) will be located within site-erected secondary containment. The secondary containment will be designed according to the existing regulations from Alaska DEC and EPA. Additional details regarding this containment are dependent on the Construction Contractor performing the work and the fuel storage equipment they will use. These details will be described in a Spill Prevention, Control, and Countermeasure (SPCC) plan to be developed for the Project Site. The SPCC development is underway and will be provided upon its completion.

Refueling of the fuel storage tanks will occur via tanker truck transporting fuel directly to the work site storage tanks. Fuel for equipment will then be transported from the storage tanks to the mine site via a fuel truck. Fuel will be dispensed into the various equipment in a manner compliant with CPAI refueling standards. These standards will be included in the previously discussed SPCC. Lubricants and other maintenance products required for the work will be stored on the construction ice pad in secondary containment such as a spill pallet. Minor maintenance of equipment will occur onsite while using secondary containment. Major maintenance will occur at the Alpine Fleet Maintenance shop or contractor facilities outside of the Willow Project area.

During the years that the mine site is operational, pumping will be required to minimize or prevent water from ponding within the mine (see Figure 1 for discharge areas). These dewatering activities will occur during the summer. Dewatering is only expected to occur during years that mining activities are taking place. Discharge water will be pumped to the tundra through a diffuser. Historical experience indicates that certain tundra types are naturally effective at mitigating erosion and filtering turbidity from discharged water. Dewatering discharge locations will be monitored a minimum of once per twelve-hour shift while dewatering activities are taking place. Should any erosion or turbidity issues be discovered, dewatering activities will cease until the discharge location and diffuser can be refined as needed to mitigate negative impacts.

Overburden will be used to construct water diversion berms around the perimeter of the mine to minimize the amount of dewatering that is necessary while the mine site is open. These perimeter berms will prevent surface water from flowing into the mine, help maintain thermal stability of permafrost adjacent to the mine footprint, and create a protective physical barrier around the mine site for local residents (see figures for locations of safety signage). All of the planned perimeter berm will be installed initially; rather than installing the perimeter berm incrementally around just the section of the mine to be excavated in a particular season. Mine Site Area 1 and Area 2 will each have their own perimeter berms. These perimeter berms will surround the entire mine site area except for locations of the future deep-water area outlet and access locations for mining operations (see Figure 1). Perimeter berms will be installed directly on undisturbed tundra. It is estimated that a sufficient quantity of overburden will be generated for completion of both perimeter berms after excavating approximately three (3) acres of mine site area. Once reclamation begins, perimeter berms will be incrementally expanded into thermal berms as part of mine reclamation. Thermal berms will fill the mine excavation side slopes and tie in to perimeter berms, which will provide an additional thermal barrier to promote stability of the mine walls.

It is anticipated that approximately 4,700,000 in-situ cubic yards of overburden and 4,860,200 in-situ cubic yards of yield material will be removed from the entire extent of the proposed mine site area for development of ConocoPhillips' proposed project. Production quantity development and verification will occur by performing an as-built survey of the mine site at the end of each winter season and prior to beginning reclamation of the area to be surveyed. As-built survey's will be certified by a registered land surveyor or professional engineer and provided to the BLM within a month of survey completion, in PDF and AutoCAD formats.

Drilling and Blasting Procedures

As mentioned, gravel will be excavated using drilling and blasting methods. Details regarding storage and detonation of explosives are being developed and will be finalized after entering into a contract with a construction contractor to complete this work. The notification and road closure guidelines discussed in the following paragraphs are general and will be fully developed prior to blasting and after a construction contractor is under contract.

Prior to blasting, a weekly email will be distributed to the Nuiqsut community with information on blasting, gravel haul and related road closures. Additionally, one-hour prior to blasting, a VHF radio announcement will be provided to Nuiqsut residents, informing them of the upcoming blasting at the mine site.

Ice roads dedicated for gravel haul operations are closed to the public because of safety restrictions. Where restricted roads intersect roads that are open to the public, a full-time attendant is present with a traffic signal. The attendant directs traffic to safely cross the intersection to ensure that members of the public don't accidentally turn onto the restricted roads. Traffic control signals are posted at the intersections of the gravel haul ice road and gravel roads open to the public. The intersections are well-lighted with signage posted.

Thirty minutes prior to blasting, adjacent roads are closed and traffic is stopped. The closure distance varies depending on the road alignment but is a minimum of 2,500 feet. The road is closed at this time to ensure that any traffic traveling has enough time to safely proceed through the blasting zone. There are positions (blockers) to block access at key locations to ensure traffic does not proceed into the blast zone once the road has been closed. These positions communicate to the Blaster-In-Charge (BIC) that all vehicles have made it through and are clear of the area. After it is confirmed that all traffic has cleared the area, a sweeper vehicle drives the entire length of the blast zone to re-confirm the area is clear.

Once the shot has fired, the BIC must physically verify that all explosives have detonated. Traffic will be released and the road reopened for travel after the BIC gives the "ALL CLEAR." An example timeline of the blast sequence is outlined below:

- **5:00pm** VHF radio announcement to the community
- **5:30pm** Road Closes
- **5:35pm** Sweeper drives the closed blast zone area and provides a positive notification to the BIC that the area is clear.
- **5:45pm** Call for radio silence is given.
- **5:50pm** BIC Delivers the 10min warning and radios each blocker to verify the area is clear.
- **5:55pm** BIC Delivers the 5min warning and radios each blocker to verify the area is clear.
- **5:59pm** BIC Delivers the 1min warning and radios each blocker to verify the area is clear.
- **6:00pm** BIC Delivers "FIRE IN THE HOLE" call and blast is detonated.
- **6:10 – 6:20pm** BIC verifies the "ALL CLEAR" and instructs blockers to release traffic.

Reclamation Plan

Goals

The goal of this reclamation plan is to apply features similar to those utilized in other areas of Alaska's North Slope with emphasis on permafrost and tundra stabilization and revegetation.

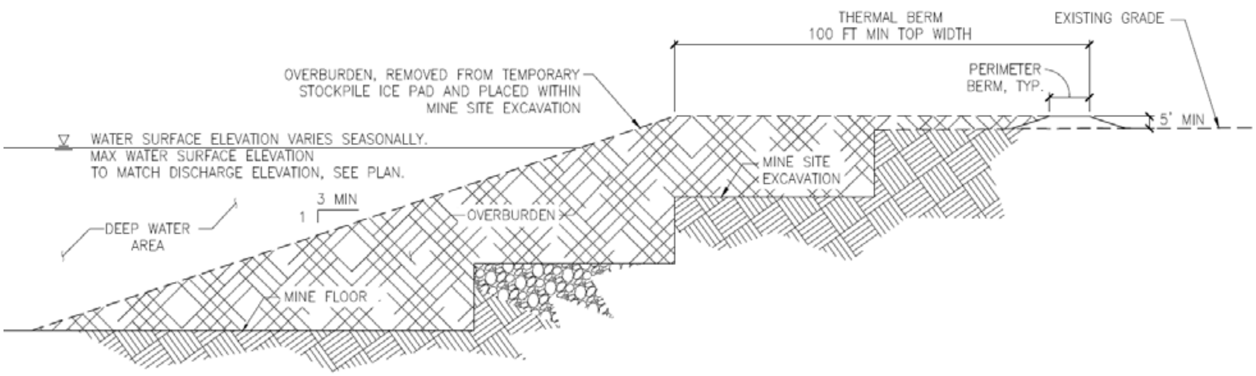
General Description of Work

Reclamation of the mine site will begin once excavation has progressed enough to provide room within the excavated area for performing both mining and reclamation activities concurrently. Reclamation materials will include overburden removed during mining and soils generated during construction of the Willow Project infrastructure. Such soils include those generated by excavation of the Constructed Fresh Water Reservoir (CFWR). As previously mentioned, overburden removed when the mine site is initially opened will be stockpiled on an ice pad outside of the excavated mine site footprint. The reclamation plan will minimize tundra impact by only stockpiling overburden as necessary until the excavated area is large enough to allow for placing newly excavated overburden within areas of the mine where mining is no longer occurring.

Once development of the mine reaches a size sufficient for maintaining all operations within the excavated footprint, the stockpiled overburden material will be removed from the ice pads and placed back into the excavated area of the mine site to begin reclamation of previously mined areas. It is expected that the overburden generated in Area 2 will remain stockpiled through one summer before being used as part of mine site reclamation. The overburden generated in Area 1 is expected to remain stockpiled through two summers before being used for mine site reclamation. Following removal of the overburden stockpiles, monitoring and treatment of the underlying tundra will be as described in the attached revegetation plan. This methodology is planned to occur at both Areas 1 and 2. When this point is reached, all subsequent overburden that is removed during mining operations will remain within the excavated mine site area. This overburden will be used for reclamation of previously mined areas during the same season the overburden is removed. Performing reclamation during the same season as mining will minimize the overall disturbance footprint by eliminating the need to continue stockpiling the overburden outside of the mined area. It will also reduce double-handling of materials, although in some areas it may still be necessary to temporarily stockpile overburden within the mine site until seasonal mining is complete.

Placement of overburden for reclamation will occur by building up the perimeter berms such that they are incorporated into the side slope of the mine as a thermal berm (as shown below) and in the attached figures. In areas of the mine that do not have a perimeter berm (i.e. outlet locations), the overburden will be placed along the sidewall to match the natural tundra grade. These berms will be installed to safeguard the stability of the mine walls and create a protective physical barrier around the mine site for local residents and snow machines. The portion of overburden that consists of mixed organics and inorganics will be used to cap the exposed portion of these thermal berms in a top layer that is a minimum of two feet in thickness.

Proposed Reclamation Section during Deep-Water Recharge



Public Safety

Access to the mine site during operations and reclamation will be limited to strictly those necessary for performance of the work in order to maintain the safety of the public. Additionally, the perimeter berms constructed around the footprint of each mine area will provide a physical barrier and indication of the mine avoidance area for local residents and snow machines. In addition, safety signage will be installed to provide warning to travelling snow machines (see attached figures for approximate sign locations).

Design Elements

Reclamation Area

The reclamation effort will focus on thermal protection of the permafrost near the mine site walls and creation of a deep-water area at the center of the reclaimed mine area. This will occur by placing overburden along the walls to create mine site slopes of 3H:1V. Overburden placement will tie into the perimeter berms that were constructed at the beginning of mine operations.

A project specific Stormwater Pollution Prevention Plan (SWPPP) will be developed for the Willow Project. The scope of the project SWPPP will include the Willow Mine Site and will discuss drainage and erosion control measures relating to mine operations and reclamation. The portion of the SWPPP relevant to the mine site will be provided prior to construction once development of the SWPPP is complete.

Settlement

All areas of overburden placement will be subject to thaw and associated settlement. The degree of settlement is expected to be highly variable and dependent on numerous factors which are difficult to predict or control, including material gradation, ice content of the overburden, thermal exposure and submerged depth. Historical experience indicates that settlement of the overburden after initial placement along the mine site walls may result in limited shallow-water areas which may become potential habitat for waterfowl and shorebirds, depending on the final water surface elevation and thaw consolidation of overburden. However, the creation of this habitat is not the primary objective. Historical mine site reclamation efforts have shown that focus on thermal stability along the mine walls provides greater benefit to the area.

Water Recharge

Prior to mine closure, water levels will be maintained (reduced) via pumping as needed for mine access and operation. Discharge area can be found on the attached figures. Mining operations within the Willow Mine Site are planned to continue for a duration of approximately 7 years and will occur in phases as gravel materials are needed. The entire mine site perimeter berm will be constructed during the first mining season, and will remain in place through the reclamation process.

The perimeter berm is intended to prevent surface water flow into the mine as surface water flows have shown to cause accelerated thermal erosion and thaw degradation. This occurs as a water flow channel cuts into the thaw sensitive overburden and ice wedges.

After mining operations are complete and prior to full recharge, minor erosion may occur along the mine side slopes located within the mine; however, this erosion will be contained within the reclaimed mine site footprint, undisturbed tundra should not be affected, and the erosion will stabilize once the mine site has been fully recharged.

Mine site recharge is expected to occur naturally via precipitation and collection of meltwater from snow drifts within the mine area. The duration required to fully recharge the mine site is unknown at this time but expected to be approximately a decade or more.

Deep-Water Area

The deep-water area is expected to be approximately 125 acres in total. The depth will vary throughout the area. The maximum depth of the deep-water area is expected to be approximately 70 feet in mine area 1 and approximately 50 feet in mine area 2, with the majority of the area greater than 30 feet in depth in both areas. Overburden material will be used to ensure all mine site slopes are a maximum steepness of 3H:1V.

Material Sources

Overburden removed during mining operations and excavation of the CFWR will provide all of the reclamation materials. Revegetation materials and techniques are described in the attached revegetation plan.

Perimeter Berms

The volume of the material to be used in the perimeter berm is expected to be approximately 77,000 cubic yards. The berms will be approximately 5-feet above existing grade, follow the natural grade of the existing tundra and 15-feet wide at the top of the berm during mining operations.

Access

The access roads into the mine site will be seasonal ice roads. These roads are constructed during the winter months after the tundra has reached the frost depth required for tundra approved vehicle use. Initial construction begins with the compaction of snow cover into a compact base. Ice chips are mined from lakes in locations with grounded ice. Water is hauled from lakes with a depth exceeding that of the naturally occurring ice thickness. Ice chips and water are laid in alternating fashion and graded similarly to that of a traditional gravel road. Once the desired ice road thickness has been achieved, road side delineators and traffic signage is installed. Equipment used for this work is listed above. The location and layout of these roads will vary season to season as the mine site is developed, but approximate locations are shown in the attached figures. Summer access will be provided via helicopter to perform mine site dewatering as needed.

Water Level Maintenance

As long as the Willow Mine Site is in operation, the water level in both mine areas will be maintained by pumping. This is necessary to prevent movement of water into the active mine areas. After closure of the mine, it is expected that recharge will occur by precipitation and snow drifts collecting within the reclaimed mine footprint. After each mine area is closed and recharged, the water level will be maintained naturally as water can freely drain from the low point of the mine perimeter (see Figure 3). The perimeter berms will not be constructed in these low points, creating outlets that will allow water to flow to the natural tundra. However, overburden will still be used for thermal protection of the mine site walls in these areas during reclamation (see Figure 4). The system of discharge will be similar to discharge that occurs from a natural lake, with water overtopping the lake bank and flowing across tundra to a nearby stream. As with natural lakes in the region, maximum flows are expected to occur once per year during spring break up. Significant releases are not expected during other times of the year. Summer releases are expected to be infrequent and/or insignificant due to low summer precipitation rates typical of the North Slope. The estimated total volume of overflow during spring break up is 28.7 acre-feet for Area 1 and 8.6 acre-feet for Area 2. These values are derived from USDA SNOTEL (snow telemetry) information for Site 1177 in Deadhorse and assumes that all precipitation between October 1st and May 31st is snow. Note that precipitation/snowfall data are not well known for the mine site area and actual volumes may vary from this estimate. This estimate does not account for sublimation/evaporation losses, or any changes due to snow drifting.

The outlet locations will provide for a slow and widely dispersed flow across the natural tundra. The intent is to maintain the natural tundra in the area to the extent possible and utilize an adaptive management approach to address any issues that may arise. Current data indicates that the gradient of the Area 1 runoff area is between 0.5%-2% for the first 400 feet and gradually increases to 4% slope thereafter. Current Area 2 data indicates that the runoff area gradient for Area 2 is between 0.5%-2.5%. Both runoff areas utilize natural, undisturbed tundra. The approximate lengths of the runoff areas are shown on Figure 3.

CPAI will perform a detailed survey of the outlet area in the field to confirm this design, or to revise it if necessary. The survey will look for existing channels or other features that could be susceptible to erosion. If modification to the area is deemed necessary, the design for the outlet area will be updated and submitted to BLM for approval. Note, drainage from the mine is not expected to occur for 10 or more years after completion of mining operations because the reclaimed mine areas will fill slowly. Additionally, the deep-water areas are expected to function as sedimentation ponds. Introducing sediment to the nearby creeks is not expected to occur as a result of overflow drainage from the deep-water areas. This concept uses an adaptive management approach, common at other North Slope rehabilitation sites and mine sites.

Reclamation Schedule

Current plans for the operation and maintenance of the Willow Project indicate that the Willow Mine Site will be active for approximately 7 years. It is expected that mining operations required to meet the Project needs will exhaust the mine site's deposit of yield material. Final site reclamation will commence when Project construction has been completed. Mining is planned to begin in Mine Site Area 2. As the gravel yield material is depleted from Mine Site Area 2, mining activity will begin in Area 1. These areas will be mined simultaneously until Area 2 has been exhausted. This is expected to occur in the second year of mining (2022). Note that anticipated construction sequencing does not require mining or reclamation operations during 2025 (year 5). A schedule is shown below.

Mining and Reclamation Schedule

Mine Site Area	2021 Year 1	2022 Year 2	2023 Year 3	2024 Year 4	2025 Year 5	2026 Year 6	2027 Year 7
Area 1	Open/Mine	Mine	Mine/Begin Reclamation	Mine and Reclamation		Mine and Reclamation	Mine and Reclamation
Area 2	Open/Mine	Mine and Reclamation					
Approx. Volumes (CY)	1,593,000	570,200	872,000	630,000		664,000	531,000
Est. Acreage	50	18	27	20		21	13.7

To the extent practical, reclamation activities will occur during the operation of the mine. Examples (described above) include constructing the perimeter berm and thermal berms over the excavated highwalls as space becomes available within the excavated area. Newly excavated highwalls may remain in place through up to two summer seasons before thermal berms are constructed to cover them as part of reclamation efforts.

Clean-up

Following completion of mining operations and reclamation effort, all equipment and waste materials, including food waste, non-burnable and burnable waste, and other hazardous or solid waste will be removed from the Project site. Waste materials will be brought to a permitted disposal location. For the Willow Project in general, waste associated with the proposed activity would be handled consistent with applicable BLM Best Management Practices (A-1, A-2, A-7) as described in BLM's 2013 NPR-A Integrated Activity Plan. Food and burnable waste will be incinerated at Alpine and/or Willow. Non-burnable waste will be recycled or transported to the NSB Service Area 10 landfill located in Prudhoe Bay. Other hazardous or solid waste will be managed under Alaska Department of Environmental Conservation (ADEC) and U.S. Environmental Protection Agency (EPA) regulations in addition to applicable BLM BMPs.

Reclamation Monitoring

Reclamation Construction

A CPAI representative with knowledge of the reclamation intent will monitor the construction of the reclamation features. The individual will work with the construction supervisor to address any issues that may arise and ensure that reclamation efforts are performed in accordance with the intent of this Mining and Reclamation Plan.

Post Construction

For four years after final reclamation activities are completed, a CPAI mining and reclamation representative will monitor the reclaimed site for erosion and thermal degradation. Baseline environmental conditions are described in the Willow Project EIS. Monitoring of vegetated areas is discussed in the attached revegetation plan.

Appendix A – Traffic Counts

SCOPE OF WORK	Vehicle Type	VEHICLE TRIPS PER YEAR 2021	2022	2023	2024	2025	2026	2027
ICE ROADS & PADS		----	----	----	----	----	----	----
Bus	Intercity Bus	2520	5040	8820	7560	10080	5040	5040
Fuel Truck	Single Unit Short Haul Trucks	2520	5040	8820	7560	10080	5040	5040
K-Line End Dump	Single Unit Short Haul Trucks	5040	10080	17640	15120	20160	10080	10080
Mechanic Truck	Single Unit Short Haul Trucks	1260	2520	4410	3780	5040	2520	2520
Pickup	Passenger Trucks	15120	30240	52920	45360	60480	30240	30240
Truck, Water 135bbl	Single Unit Short Haul Trucks	6720	13440	23520	20160	26880	13440	13440
Water Buffalo	Single Unit Short Haul Trucks	2520	5040	8820	7560	10080	5040	5040
GRAVEL ROADS & PADS								
Bus, 44 Passenger	Intercity Bus	3360	3360	10080	6720	0	3360	3360
Truck, 5th Wheel	Combination Short Haul Trucks	560	560	1680	1120	0	560	560
Truck, Fuel	Single Unit Short Haul Trucks	1680	1680	5040	3360	0	1680	1680
Truck, Mechanics	Single Unit Short Haul Trucks	1680	1680	5040	3360	0	1680	1680
Truck, P/U, Crew Cab	Passenger Trucks	3920	3920	11760	7840	0	3920	3920
Truck, Powder	Light Commercial Trucks	1120	1120	3360	2240	0	1120	1120
Truck, Tire	Single Unit Short Haul Trucks	1120	1120	3360	2240	0	1120	1120
Truck, Volvo A30	Single Unit Short Haul Trucks	3360	3360	10080	6720	0	3360	3360
B-70	Single Unit Short Haul Trucks	16800	16800	50400	33600	0	16800	16800

NOTE: The vehicle traffic trips provided are based on and consistent with the traffic values in the Willow MDP Draft EIS and Supplemental Draft EIS. The ice road and pad vehicle trips include vehicle traffic to support ice road construction and maintenance for gravel mining and gravel haul, as well as other infield construction activities, such as pipeline construction.

Appendix B – Revegetation Plan

REVEGETATION PLAN FOR THE PROPOSED WILLOW GRAVEL MINE SITE, NATIONAL PETROLEUM RESERVE-ALASKA

Prepared for **ConocoPhillips Alaska, Inc.**

by **ABR, Inc.—Environmental Research and Services**

Revised 29 April 2020

INTRODUCTION

ConocoPhillips Alaska, Inc. (CPAI) is proposing to develop a gravel mine site to support operations associated with the Willow Project, which is located in the northeast portion of the National Petroleum Reserve in Alaska (NPR-A). The structure of this plan complies with the requirements of the Bureau of Land Management Mining Plan checklist.

The location planned for the mine site is approximately 6 miles northwest of the community of Nuiqsut and near the Tinmiaqsiugvik (Ublutuoch) River. The maximum area to be disturbed is estimated at 334.7 acres, including 2 excavated pits with a combined area of 149.7 acres and approximately 185 acres of seasonal ice pads (see Figure 3 in Mining and Reclamation Plan). Vegetation in the vicinity is mostly tussock tundra and moist sedge-shrub tundra; fresh sedge marsh and wet sedge meadow tundra are present in lesser amounts. Access to the site will be primarily via a winter ice road, with minor helicopter access during summer to dewater the pit. Excavated overburden will be stored on ice pads that will remain in place for 1–2 growing seasons (over-summer ice pads), before being used to construct a perimeter berm and a thermal barrier/berm around each mine area (i.e., pit). Berms will not be constructed in the water discharge areas on the northwest side of Mine Area 1 and near the southeast corner of Mine Area 2 (see Figure 3 in Mining and Reclamation Plan).

Overburden placement for the thermal berm will tie into the perimeter berms that were constructed at the beginning of mine operations. The perimeter berm is intended to serve 2 purposes: to minimize surface drainage into the pit during active mining and to enhance safety for people traveling in the area by providing a physical barrier around the pit. The purpose of the thermal berm is to prevent the degradation of permafrost by covering the walls of the pit and the tundra between the mine walls and perimeter berm with insulating material (3H:1V slopes). The upper portion of the thermal berm side slope may be constructed at a less steep angle to aid vegetation establishment and improve habitat for waterfowl. The berms will remain in place after mining is complete.

This revegetation plan is intended to accompany the Mining and Reclamation Plan. The plan focuses on the thermal berms, but also addresses the possibility that revegetation may be needed for tundra affected by the over-summer ice pads. The deep water pits are not included in the revegetation plan, as the water in the pits is expected to be too deep to support rooted plants.

Due to uncertainties about how site conditions will develop over time, flexibility is needed with respect to the objectives and scheduling. This flexibility will allow response to unanticipated site changes while maintaining the overall rehabilitation goals and objectives. This adaptive management approach will allow for revisions to the schedule and treatment approaches as needed to address changing site conditions.

GOALS AND OBJECTIVES

THERMAL BERMS

The primary rehabilitation goal for the berms is to promote thermal stability of the sidewalls and shorelines of the flooded pits. The objective of the revegetation effort is to promote the establishment of indigenous vegetation in selected locations where conditions are suitable, to the extent feasible while achieving the primary rehabilitation goal.

To provide sufficient insulation value to achieve the primary goal, the final surface elevation of the berms will be approximately 5 feet above the grade of nearby tundra. The top 2–3 feet of material on the berms will consist of a mixture of organic and mineral overburden, to improve soil properties, including water holding capacity. However, soil moisture is not expected to be adequate to support substantial vegetation cover, for several reasons:

- Due to the thickness of the berms, there will be no hydrological connection between the plant rooting zone and the local groundwater supply.
- Rainfall during the growing season on the North Slope is low, and water loss through evaporation typically exceeds input from precipitation.

- Water from spring snowmelt will mostly be lost to runoff because the soil is frozen at that time of year and roots are unable to absorb moisture.

Thus, the potential for vegetation to establish on most of the berm area will likely be limited for the foreseeable future, as a direct consequence of leaving a thick layer of insulating material in place to protect the thermal stability of the shorelines and sidewalls. Accordingly, the proposed performance standards for vegetation are modest, consistent with similar rehabilitated North Slope sites: 1) total live cover of indigenous vascular plants ≥10% and 2) ≥5 indigenous vascular species present with ≥0.2% cover each. Plant cover will be measured using the any-hit metric, where one "hit" is recorded for each vascular plant species present at each sampling point. This metric ensures that growth forms potentially excluded by sampling only the top canopy (e.g., small forbs, dwarf shrubs) are included in cover estimates. The target is to achieve these standards within 10 years after the activities described in the Mining and Reclamation Plan are completed (see Table 1). .Year 10.. These levels of cover and diversity are not intended to indicate that vegetation development on the berms is complete; rather, achieving these standards will indicate that recovery is on a positive trajectory and no additional treatment or monitoring is needed.

TUNDRA AFFECTED BY ICE PADS

The revegetation objective for tundra affected by the over-summer ice pads is to promote the re-establishment of a plant community similar to that present before the ice pads were constructed, through natural recovery and/or plant cultivation treatments. The condition of the underlying tundra will be assessed near the end of the second growing season after the ice pads have melted, to determine whether the impacts warrant further monitoring and/or revegetation treatment. If treatments are applied to any tundra areas affected by the ice pads, the proposed performance standard for these areas is total live cover of vascular plants ≥50% of that in adjacent undisturbed tundra that is representative of pre-disturbance conditions (reference tundra). Plant cover will be measured using the any-hit metric (see details above under THERMAL BERMS). The target is to meet this standard within 10 years after removal of overburden from the ice pads is complete (see Table 3). This level of vascular plant cover is not intended to indicate that vegetation recovery on tundra affected by ice pads is complete; rather, achieving the standard will indicate that recovery is on a positive trajectory and no additional treatment or monitoring is needed.

REVEGETATION TREATMENTS

THERMAL BERMS

Site conditions, including soil moisture and natural colonization by indigenous plants, will be assessed near the end of the second growing season after activities described in the Mining and Reclamation Plan are complete (Year 2), to allow time for the surface to stabilize (see Table 1). The results of this assessment will be used to finalize planning of plant cultivation treatments for the berms. As explained above, conditions are expected be too dry for substantial plant establishment on most of the berm area, due to the need for a thick insulating layer to protect thermal stability. Moist soil conditions may develop along the shoreline on the southeast, southwest, and/or northeast sides of Area 1, providing a more favorable environment for plant growth. Soil moisture may also be moderate on the lower (approximately 1 foot) portion of the berm side slope, due to capillary rise from groundwater in the adjacent tundra. To increase the potential for successful revegetation, plant cultivation treatments may vary within the thermal berms to reflect variation in site conditions, particularly soil moisture. Treatments would be applied in Year 4, allowing seed of suitable species to be collected in Year 3.

Seed of indigenous North Slope plants is not available commercially but can sometimes be provided in limited quantities by the Alaska Plant Materials Center (APMC), or can be obtained by collecting from nearby natural populations. Species used near the shoreline or in other areas with wet soil likely will include sedges such as *Carex aquatilis* (water sedge), *C. maritima* (curved sedge), and *Eriophorum angustifolium* (tall cottongrass) and/or willows (*Salix* spp.). Forbs such as *Epilobium latifolium* (river beauty), *Artemisia* spp. (sage), and *Oxytropis* spp. (oxytrope) and/or the evergreen shrub *Dryas integrifolia* (entire-leaf mountain avens) may be seeded on the drier portions of the berms. Seeding likely will not be needed on the lower portion of the outer side slope; conditions in this area are expected to be favorable for natural colonization from the adjacent tundra. If time permits, seeds will be sent to the APMC for cleaning and germination testing, which will allow for the accurate calculation of seeding rates for each species (i.e., live seeds applied per unit area). Cleaned seed will be stored in a freezer at ABR (Fairbanks, AK) until needed.

In addition to seed, locally collected plugs of wetland vegetation (e.g., *C. aquatilis*) may be transplanted in locations where the moisture regime is suitable for wetland vegetation to establish. Plugs of the aquatic emergent grass *Arctophila fulva* (pendant grass) may be transplanted if areas with shallow standing water develop within the berm areas. Stem cuttings of willows (*Salix* spp.) may be transplanted at selected locations where soil conditions are moist to wet.

All seeds or live plant materials would consist of indigenous species collected from native populations on the North Slope. Depending on the locations of source populations, appropriate permits would be obtained from the Bureau of Land Management (BLM), the Alaska Department of Natural Resources (DNR) and/or the North Slope Borough (NSB).

This plan does not include seeding commercially available native-grass cultivars on the berms. There are several reasons to avoid this revegetation technique:

- Seeding grasses is not expected to contribute to thermal stability; the insulation value of intact tundra vegetation is provided by the surface mat of decomposing organic matter, which requires decades to develop. The living canopy and standing dead plant material have a negligible effect on the soil heat balance.
- These grasses require high nutrient levels. Unless fertilizer application is repeated every 3–5 years, they typically begin to die back, resulting in a canopy consisting primarily of dead plant material.
- Heavy grass cover, living and/or dead, may inhibit the development of a plant community dominated by local tundra species.
- All commercially produced seed may include a small percentage of weed seed, creating a risk of introducing non-native and potentially invasive plant species. Management of invasive species for the Willow project will be addressed in a separate plan.

TUNDRA AFFECTED BY ICE PADS

The revegetation approach for tundra affected by ice pads will vary depending on the severity of the impacts, which will be assessed separately for each ice pad. If impacts are negligible, no treatments will be applied. Areas where impacts are noticeable, but vegetation is largely intact, will be treated with fertilizer to promote natural recovery. If any tundra areas show sufficient impacts that natural recovery is not expected to meet the performance standards within 10 years, fertilizer and plant cultivation treatments will be applied. Depending on site conditions (e.g. hydrology, remaining vegetation cover), treatments could include seeding indigenous tundra plants such as *C. aquatilis* and *E. angustifolium* and/or transplanting tundra plugs. All seeds or live plant materials would consist of indigenous species collected from local populations, under appropriate permits from DNR, BLM, and/or NSB. This plan does not include seeding commercially available native-grass cultivars, for the reasons explained above (THERMAL BERMS).

MONITORING

Development of stable landforms and diverse plant communities on rehabilitated North Slope sites frequently requires many years. Therefore, this plan includes a multi-year monitoring period to assess whether the revegetation objectives have been met.

THERMAL BERMS

Qualitative assessments of surface stability and vegetation response are planned for Years 2, 3, 4, 7 and 10 after activities described in the Mining and Reclamation Plan are complete (Table 1). Permanent photo points will be established in Year 2 and photographs will be taken from the same points in each monitoring year, to allow tracking of visible changes over time. Quantitative vegetation monitoring will be conducted in Years 4, 7 and 10 to assess progress toward meeting the performance standards.

TUNDRA AFFECTED BY ICE PADS

An initial qualitative assessment of site conditions and vegetation health will be conducted in Year 2 after activities described in the Mining and Reclamation Plan are complete (Table 2), to assess whether any revegetation treatments are needed. Permanent photo points will be established to allow tracking of visible changes over time. The qualitative assessment, including repeat photographs from the permanent photo points, will be repeated in Years 3, 4, 7, and 10. If revegetation treatments (fertilizer or plant cultivation) are applied to any tundra areas affected by the ice pads, quantitative vegetation monitoring will be conducted in Years 7 and 10 to assess progress toward meeting the performance standard.

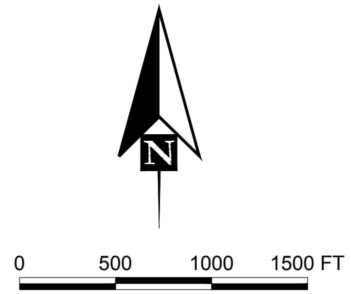
Table 1. Schedule for revegetation treatments and site monitoring for the thermal berms, Willow Mine Site, National Petroleum Reserve-Alaska. For each mine area, Year 2 is defined as the second growing season after activities described in the Mining and Reclamation Plan are complete. According to the current schedule, Year 2 will correspond to 2023 for Area 2 and 2028 for Area 1.

Schedule	Treatment and Monitoring
Year 2	• qualitatively assess site conditions, including soil moisture, surface stability and natural colonization by indigenous plants • establish permanent photo points for tracking visible changes over time
Year 3	• qualitatively assess site conditions, including soil moisture, surface stability and natural colonization by indigenous plants • take repeat photographs from permanent photo points • collect seed of indigenous vascular species for use in Year 4
Year 4	• qualitatively assess surface stability and natural colonization by indigenous vegetation • apply plant cultivation treatments (seeding and transplanting plugs) if needed • collect and apply additional seed if needed • take repeat photographs from permanent photo points • quantitatively monitor vegetation cover and diversity
Year 7	• qualitatively assess surface stability and vegetation response • take repeat photographs from permanent photo points • quantitatively monitor vegetation cover and diversity
Year 10	• qualitatively assess surface stability and vegetation response • take repeat photographs from permanent photo points • quantitatively monitor vegetation cover and diversity

Table 2. Schedule for revegetation treatments and site monitoring for tundra affected by over-summer ice pads, Willow Mine Site, National Petroleum Reserve-Alaska. Year 2 is defined as to the second growing season after removal of the overburden from each ice pad is complete. According to the current schedule, Year 2 will correspond to 2023 for the ice pads associated with Area 2 and 2024 for the ice pads associated with Area 1.

Schedule	Treatment and Monitoring
Year 2	• qualitatively assess surface stability and vegetation response; determine whether any areas require treatment • establish permanent photo points for tracking visible changes over time
Year 3	• qualitatively assess surface stability and natural vegetation recovery • take repeat photographs from permanent photo points • apply fertilizer to any areas that will be treated with fertilizer only • if needed, collect seed of indigenous vascular species for use in Year 4
Year 4	• qualitatively assess surface stability and natural vegetation recovery • apply plant cultivation treatments (seeding and transplanting plugs) if needed • collect additional seed if needed • take repeat photographs from permanent photo points
Year 7	• qualitatively assess surface stability and natural vegetation recovery • take repeat photographs from permanent photo points • quantitatively monitor vegetation response in any treated areas and in reference tundra
Year 10	• qualitatively monitor site stability and vegetation response • take repeat photographs from permanent photo points • quantitatively monitor vegetation response in any treated areas and in reference tundra

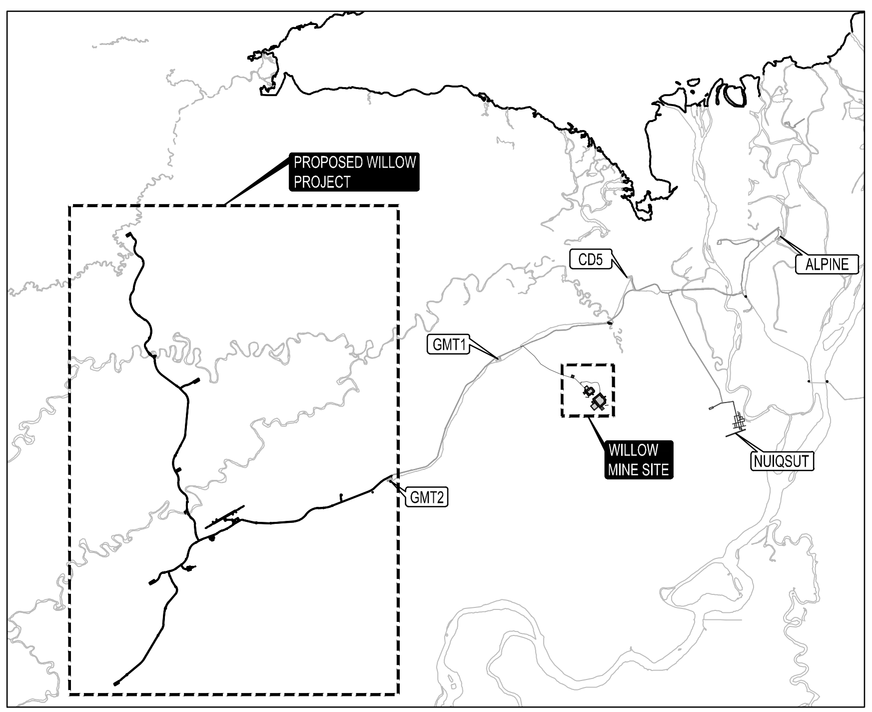
Figure 1 – Willow Mine Site Plan and Vicinity Map



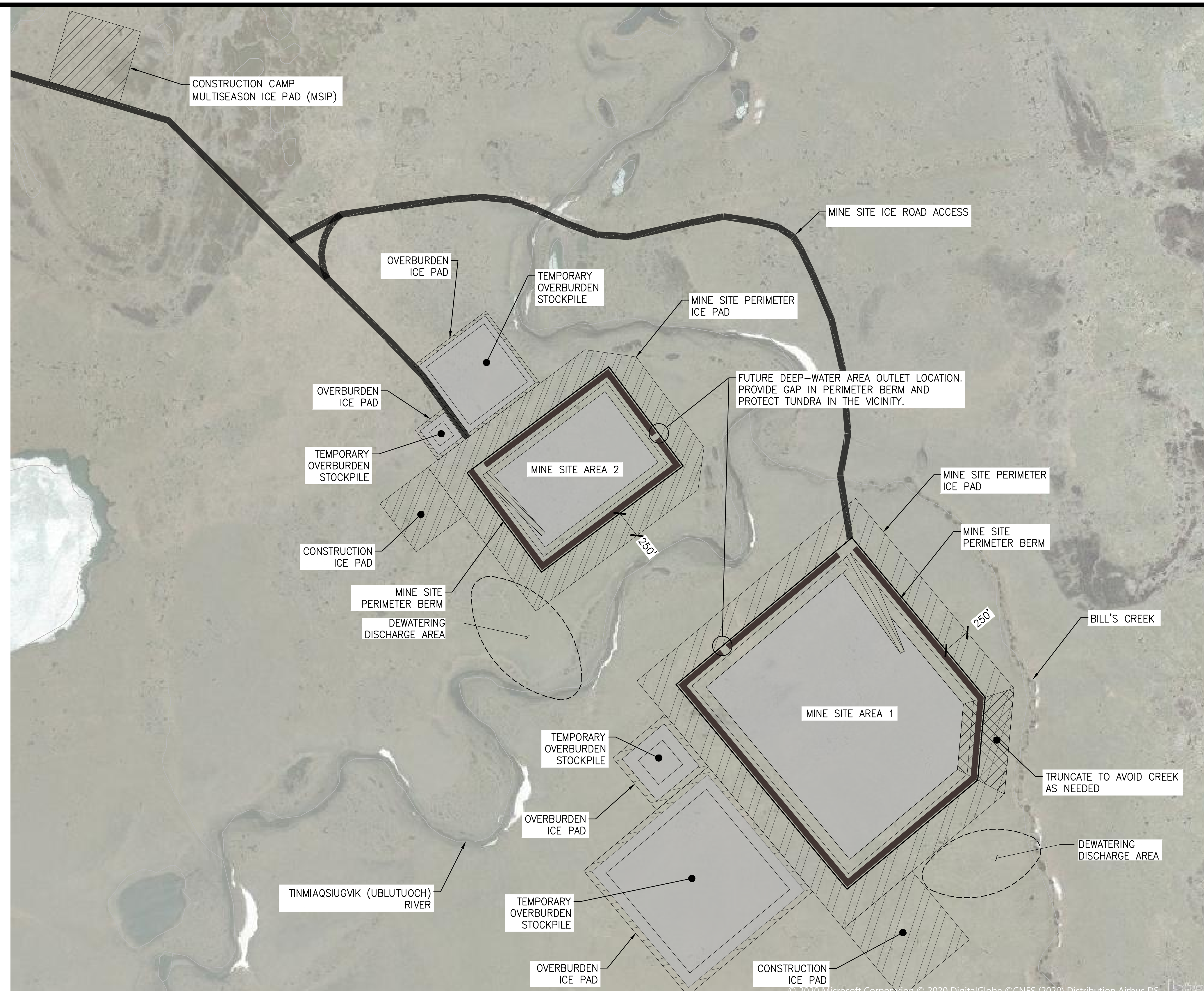
WILLOW MINE SITE QUANTITIES	
MINE SITE AREA 1 FOOTPRINT	109.3 AC
MINE SITE AREA 1 QUANTITY OF GRAVEL (AVAILABLE)	4.51 MCY
MINE SITE AREA 2 FOOTPRINT	40.4 AC
MINE SITE AREA 2 QUANTITY OF GRAVEL (AVAILABLE)	1.04 MCY
COMBINED MINE SITE FOOTPRINT	149.7 AC
COMBINED ICE PAD FOOTPRINT	185± AC
COMBINED MINE SITE QUANTITY OF GRAVEL (AVAILABLE)	5.55 MCY

NOTES:

1. GRAVEL IS PLANNED TO BE SOURCED FROM BOTH MINE SITE AREA 1 AND AREA 2 TO PROVIDE GRAVEL NEEDED FOR PROJECT.
2. OVERBURDEN ICE PADS SIZED TO ACCOMMODATE 50% OF ESTIMATED OVERBURDEN QUANTITY.
3. AREA 1 OVERBURDEN STOCKPILES ARE PLANNED TO REMAIN IN PLACE FOR UP TO TWO SUMMER SEASONS PRIOR TO BEING PLACED IN THE EXCAVATED MINE SITE. AREA 2 OVERBURDEN STOCKPILES ARE PLANNED TO REMAIN IN PLACE FOR ONE SUMMER SEASON PRIOR TO BEING PLACED IN THE EXCAVATED MINE SITE.
4. TIMING AND SPECIFIC ACREAGE OF ICE PADS FOR OVER SUMMERING OVERBURDEN WILL BE DETERMINED THROUGH FUTURE ENGINEERING.



WILLOW MINE SITE VICINITY MAP



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PROJECT:

WILLOW PROJECT MINING AND RECLAMATION PLAN

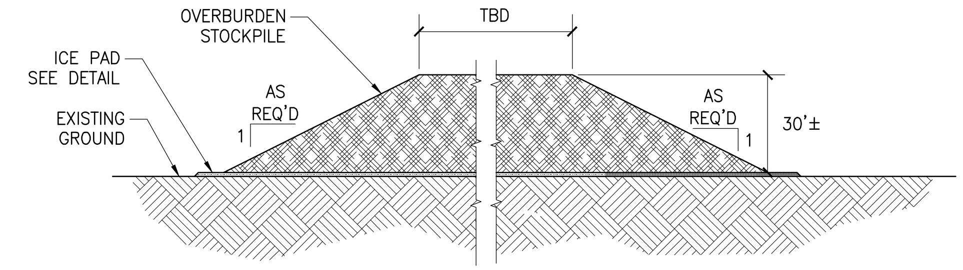
TITLE:

WILLOW MINE SITE PLAN AND VICINITY MAP

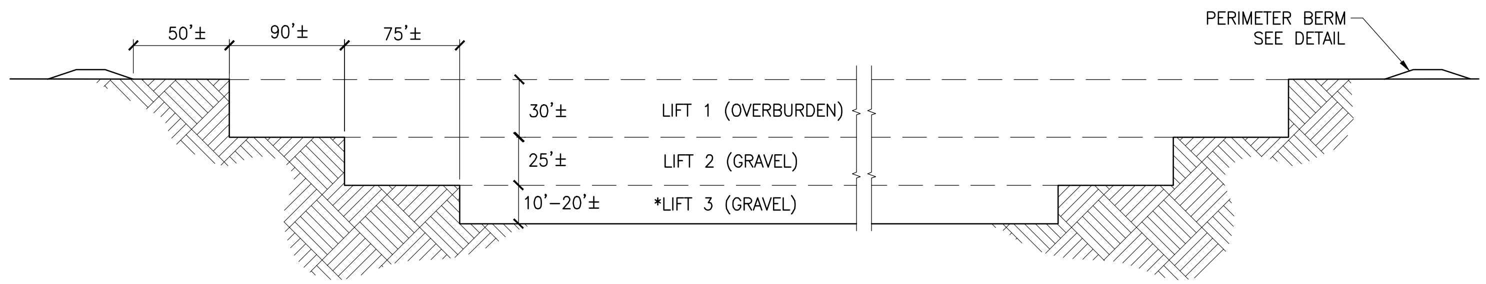
DESIGNED BY:	JYG	DATE:	7/27/20
CHECKED BY:	DST	PROJECT NO:	171012

FIGURE 1

Figure 2 – Willow Mine Site Typical Sections



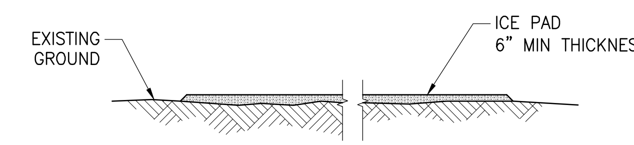
TEMPORARY OVERBURDEN STOCKPILE TYPICAL SECTION



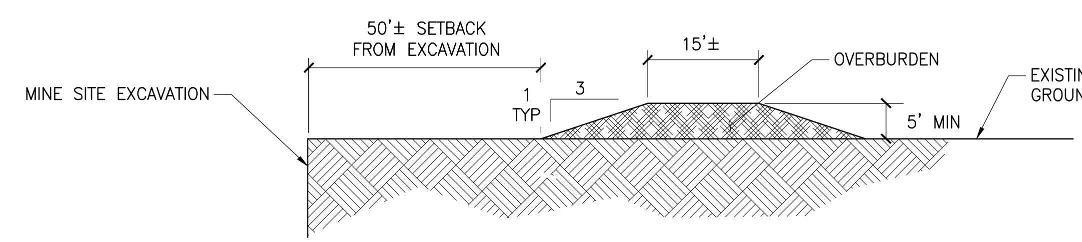
TYPICAL MINE SITE SECTION

NOTES:

1. LIFT THICKNESSES WILL VARY DEPENDING UPON LOCATION WITHIN MINE SITE.
2. *LIFT 3 (GRAVEL) WILL BE EXCAVATED WHERE BOREHOLE DATA INDICATES SUITABLE GRAVEL FILL MATERIALS. A LAYER OF DELETERIOUS MATERIAL MAY NEED TO BE REMOVED BETWEEN LIFTS 2 AND 3.



TYPICAL ICE PAD



TYPICAL PERIMETER BERM

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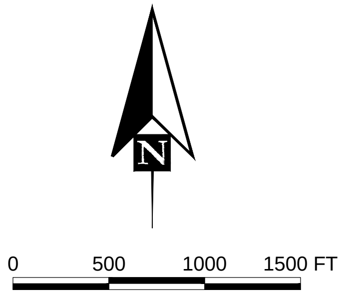
MINING AND RECLAMATION PLAN

TITLE:
WILLOW MINE SITE TYPICAL SECTIONS

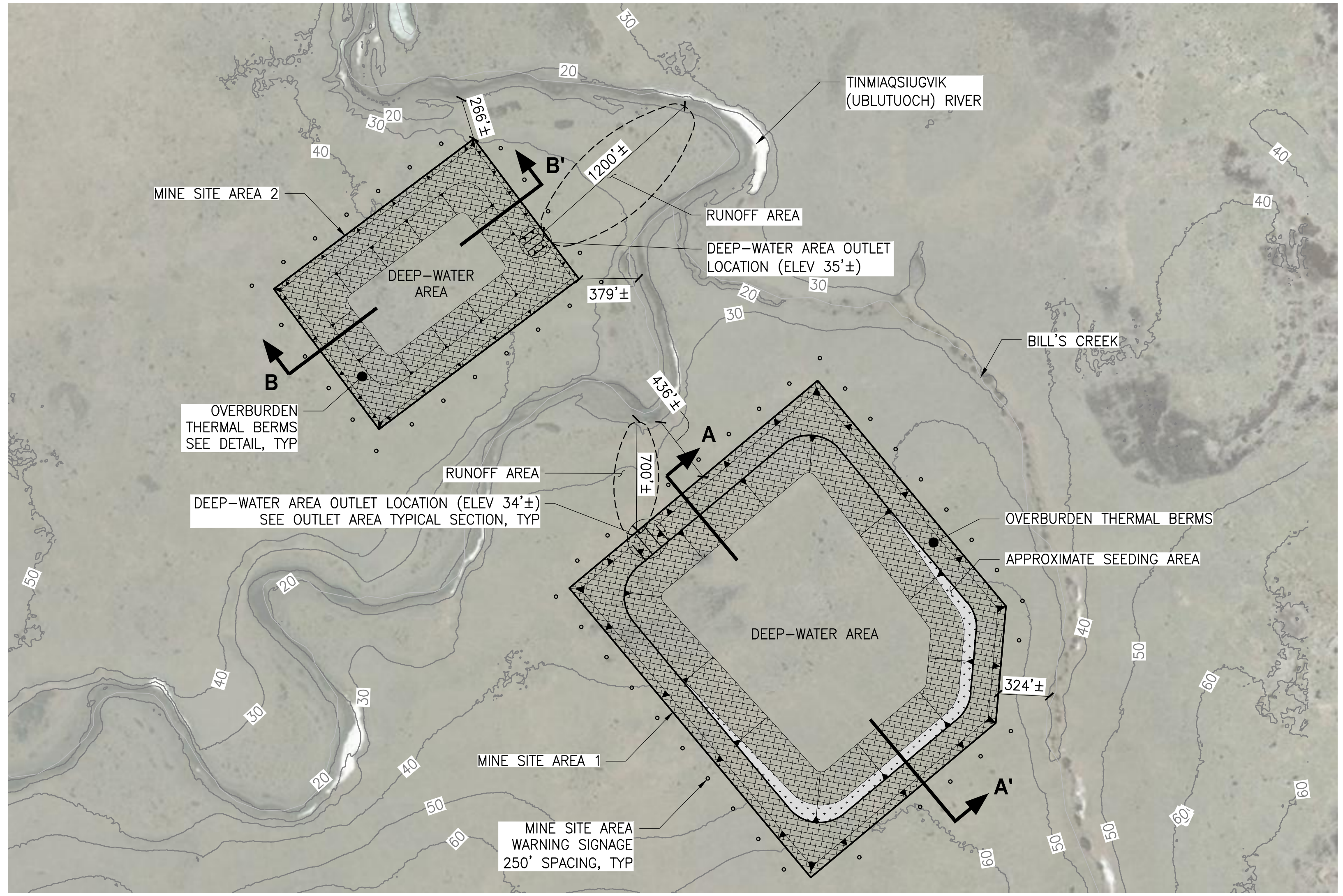
DESIGNED BY:	JYG	DATE:	7/27/20	FIGURE 2
CHECKED BY:	DST	PROJECT NO:	171012	

Figure 3 – Willow Mine Site Reclamation Plan and Sections

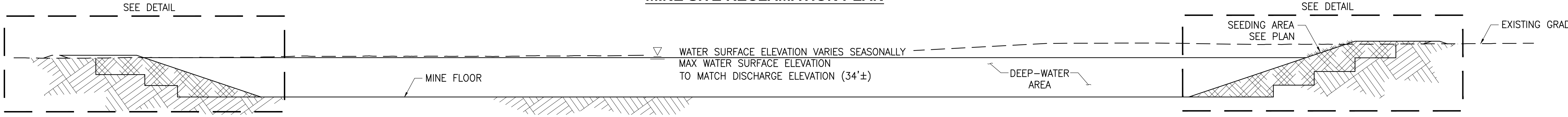


NOTES:

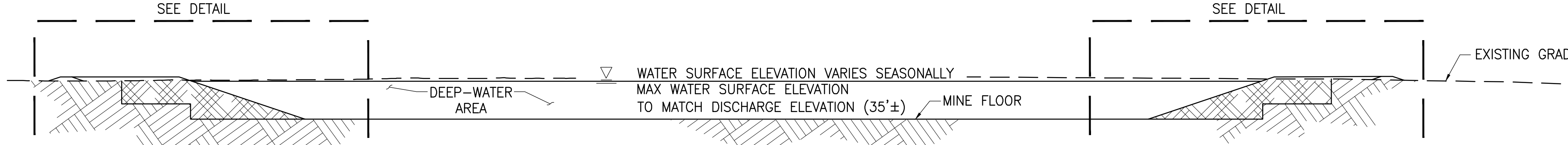
1. MINIMUM THERMAL BERM TOP WIDTH IS 100 FT. CONSTRUCTED WIDTH OF THERMAL BERMS WILL VARY DEPENDING ON QUANTITY OF OVERBURDEN AVAILABLE AND AMOUNT OF THAW CONSOLIDATION.
2. DEPTH OF DEEP-WATER AREA WILL VARY BY LOCATION WITHIN THE MINE AREA. IT IS EXPECTED THAT MOST OF THE AREA WILL BE GREATER THAN 30 FT IN DEPTH. THE MAXIMUM EXPECTED DEPTH IS APPROXIMATELY 70 FT.
3. SEE FIGURE 5 FOR (APPROXIMATE) PROPOSED CONTOURS.



MINE SITE RECLAMATION PLAN



AREA 1 RECLAMATION SECTION A - A'



AREA 2 RECLAMATION SECTION B - B'

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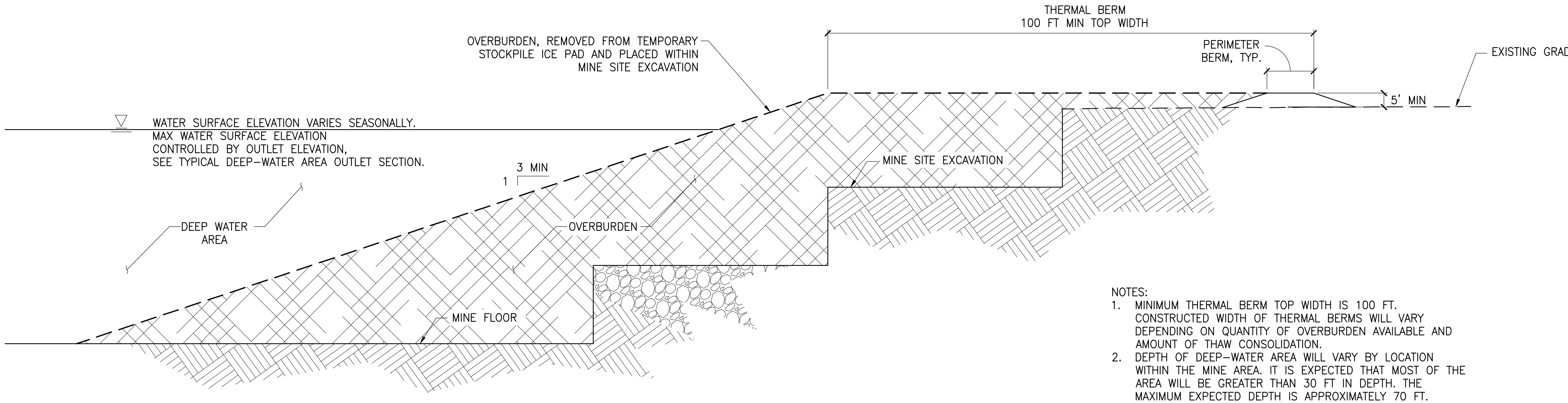
PROJECT:
WILLOW PROJECT MINING AND RECLAMATION PLAN

TITLE:
WILLOW MINE SITE RECLAMATION PLAN AND SECTIONS

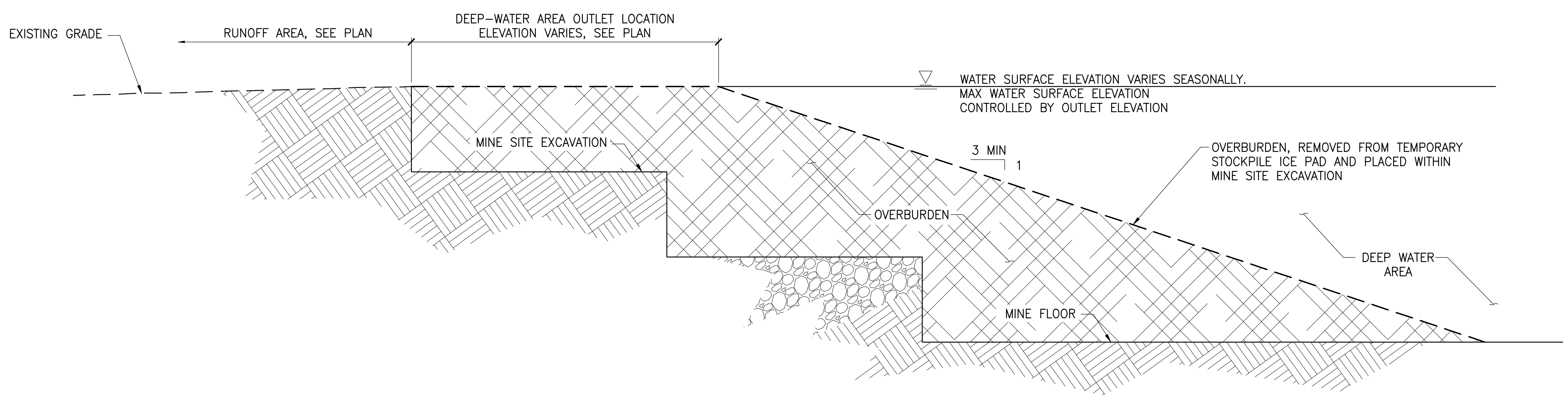
DESIGNED BY:	JYG	DATE:	7/23/20	FIGURE 3
CHECKED BY:	DST	PROJECT NO:	171012	

Figure 4 – Willow Mine Site Reclamation Typical Sections



NOTES:
1. MINIMUM THERMAL BERM TOP WIDTH IS 100 FT. CONSTRUCTED WIDTH OF THERMAL BERMS WILL VARY DEPENDING ON QUANTITY OF OVERBURDEN AVAILABLE AND AMOUNT OF THAW CONSOLIDATION.
2. DEPTH OF DEEP-WATER AREA WILL VARY BY LOCATION WITHIN THE MINE AREA. IT IS EXPECTED THAT MOST OF THE AREA WILL BE GREATER THAN 30 FT IN DEPTH. THE MAXIMUM EXPECTED DEPTH IS APPROXIMATELY 70 FT.

TYPICAL THERMAL BERM SECTION



TYPICAL DEEP-WATER AREA OUTLET SECTION

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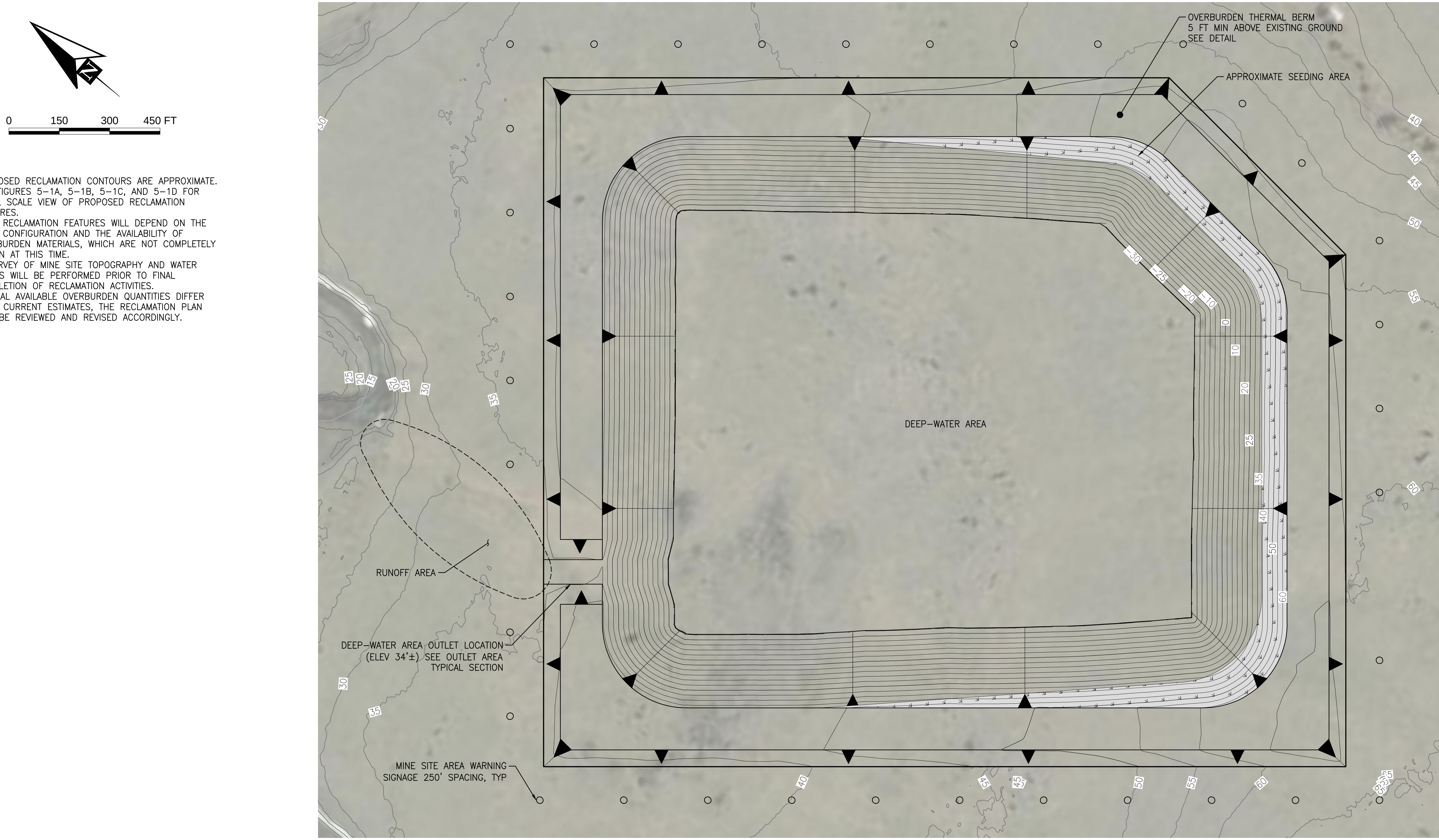
PROJECT:
**WILLOW PROJECT
MINING AND RECLAMATION PLAN**

TITLE:
WILLOW MINE SITE RECLAMATION
TYPICAL SECTIONS

DESIGNED BY: JYG	DATE: 7/27/20	FIGURE 4
CHECKED BY: DST	PROJECT NO: 171012	

Figure 5 – Willow Mine Site Reclamation Contours

NOTES:
1. PROPOSED RECLAMATION CONTOURS ARE APPROXIMATE.
2. SEE FIGURES 5-1A, 5-1B, 5-1C, AND 5-1D FOR SMALL SCALE VIEW OF PROPOSED RECLAMATION FEATURES.
3. FINAL RECLAMATION FEATURES WILL DEPEND ON THE FINAL CONFIGURATION AND THE AVAILABILITY OF OVERBURDEN MATERIALS, WHICH ARE NOT COMPLETELY KNOWN AT THIS TIME.
4. A SURVEY OF MINE SITE TOPOGRAPHY AND WATER LEVELS WILL BE PERFORMED PRIOR TO FINAL COMPLETION OF RECLAMATION ACTIVITIES.
5. IF FINAL AVAILABLE OVERBURDEN QUANTITIES DIFFER FROM CURRENT ESTIMATES, THE RECLAMATION PLAN WILL BE REVIEWED AND REVISED ACCORDINGLY.



MINE SITE AREA 1 RECLAMATION PLAN

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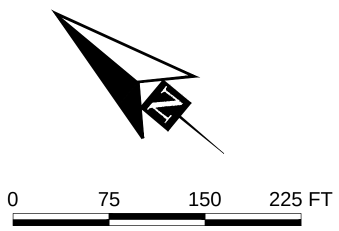
PROJECT:
WILLOW PROJECT
MINING AND RECLAMATION PLAN

TITLE:
WILLOW MINE SITE RELCAMATION PLAN
AREA 1 OVERVIEW

DESIGNED BY:	KN	DATE:	7/27/20	**FIGURE 5-1**
CHECKED BY:	MG	PROJECT NO:	171012	



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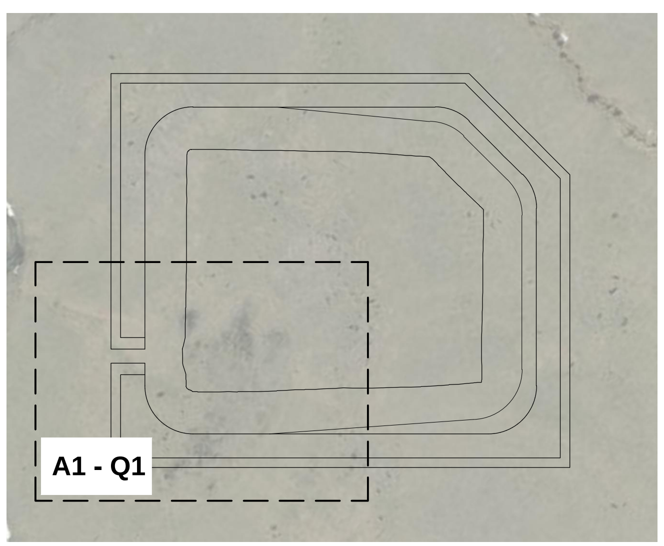

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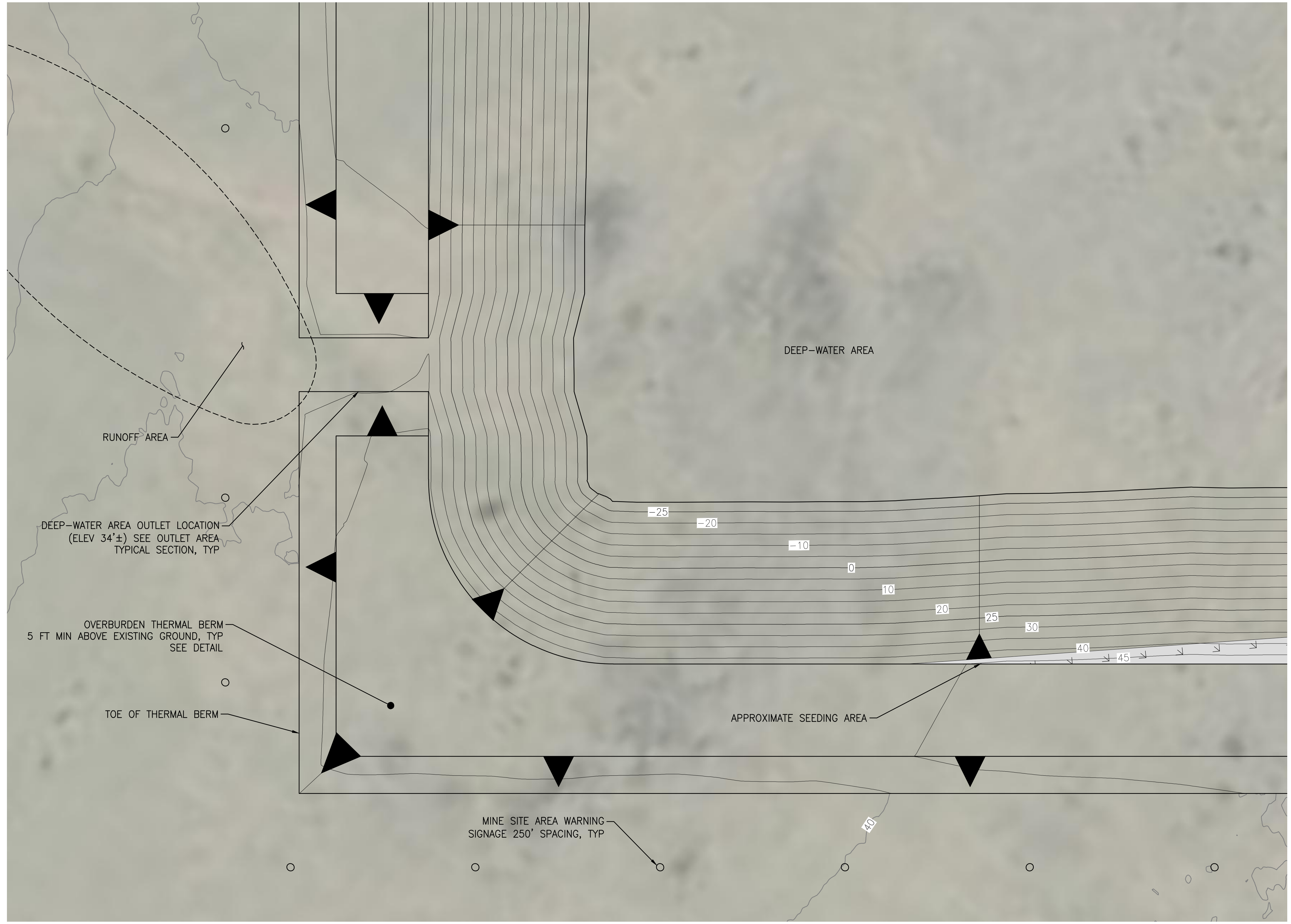

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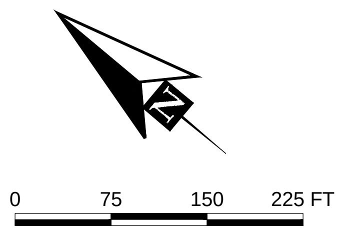

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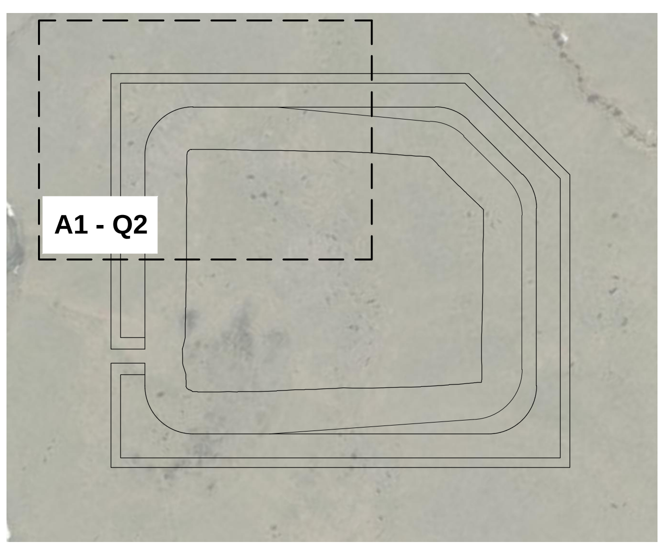

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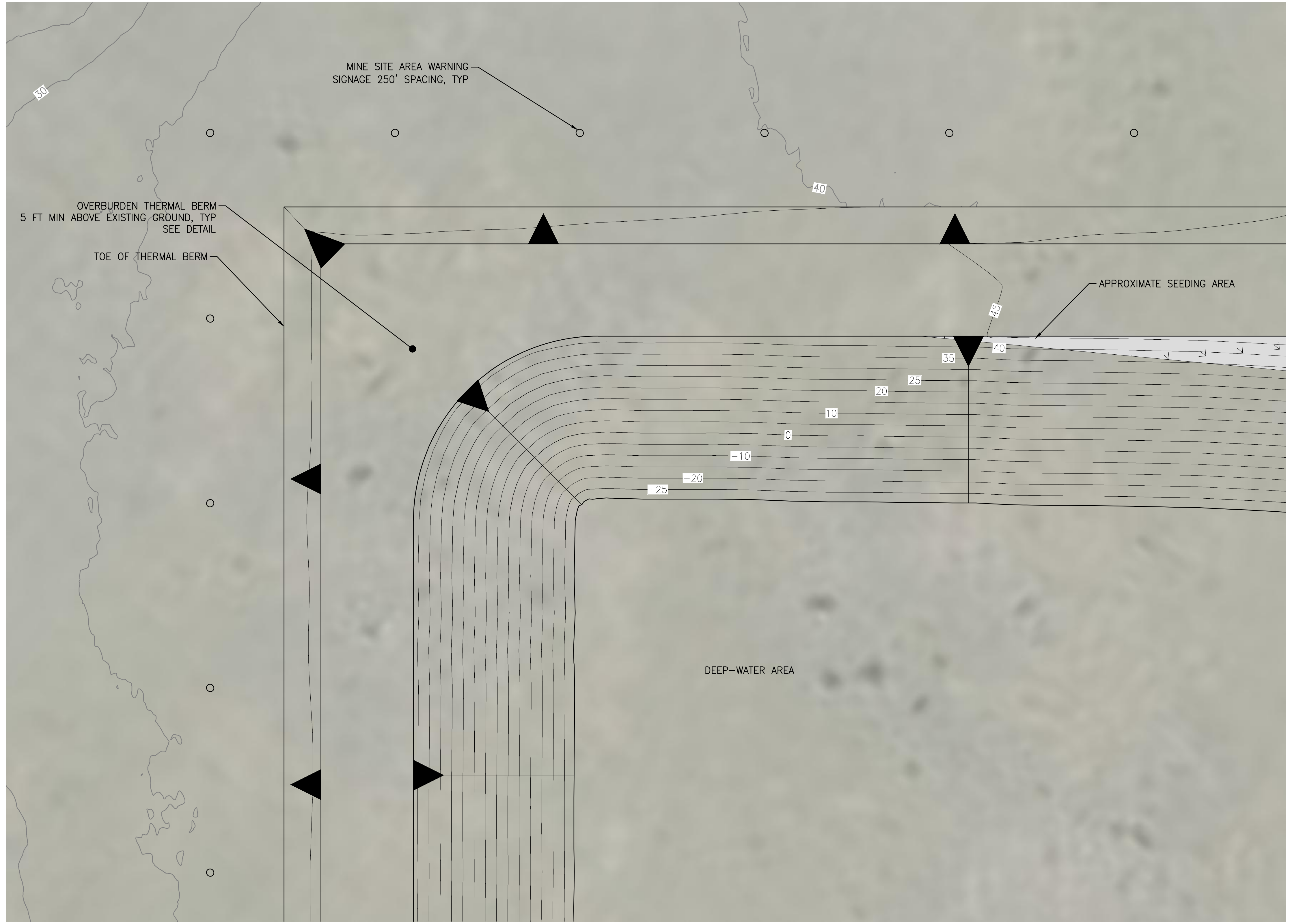

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AREA 1 - QUADRANT 2

DESIGNED BY:	KN	DATE:	7/27/20	FIGURE 5-1B
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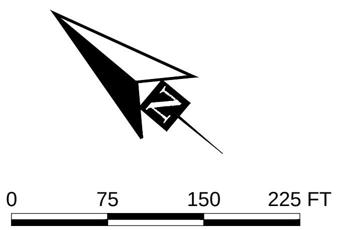

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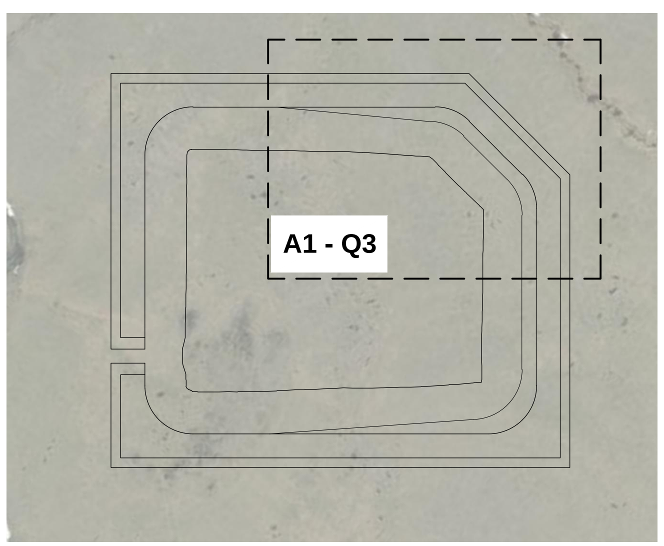

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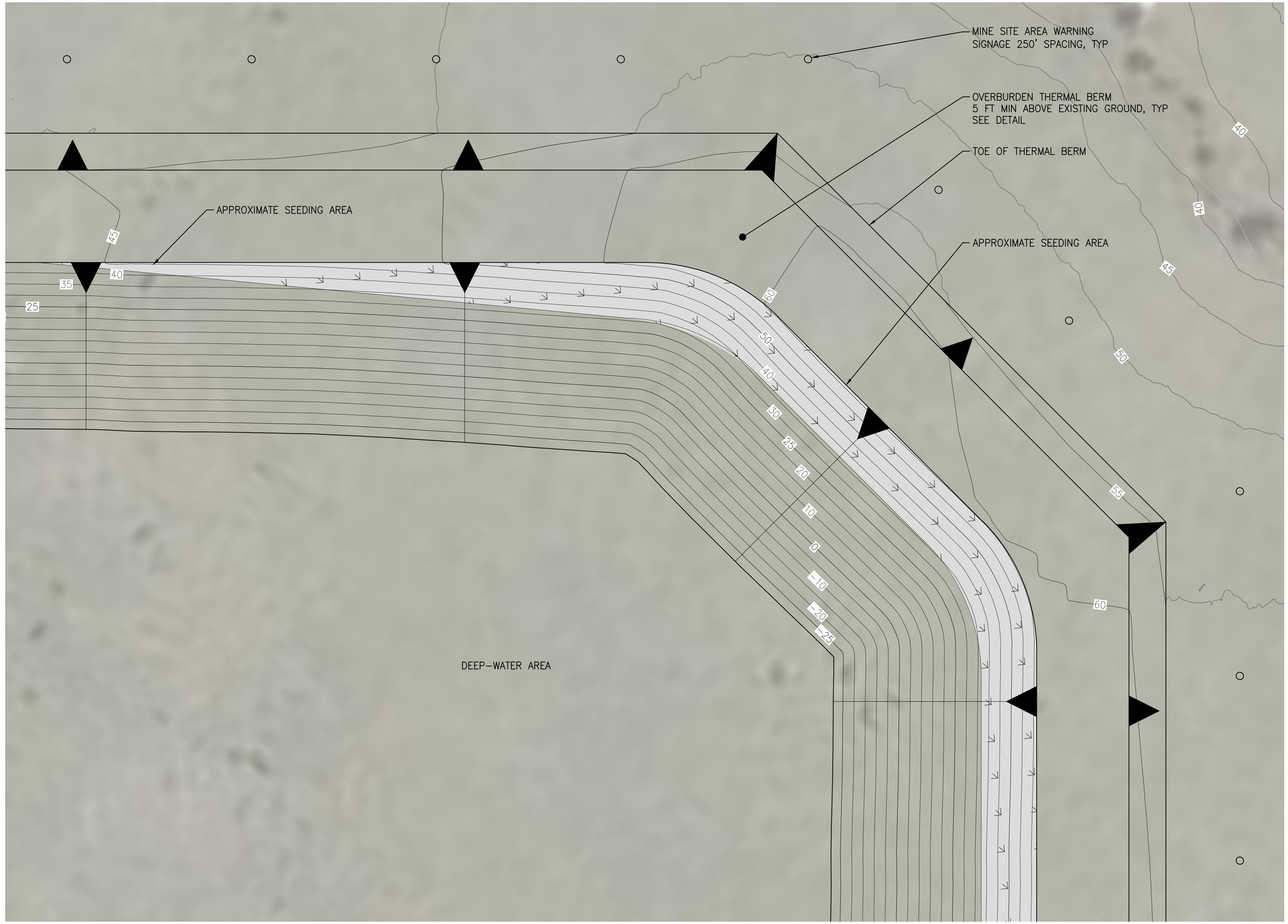

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AREA 1 - QUADRANT 3

DESIGNED BY:	KN	DATE:	7/27/20	FIGURE 5-1C
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0 75 150 225 FT

NOTES:
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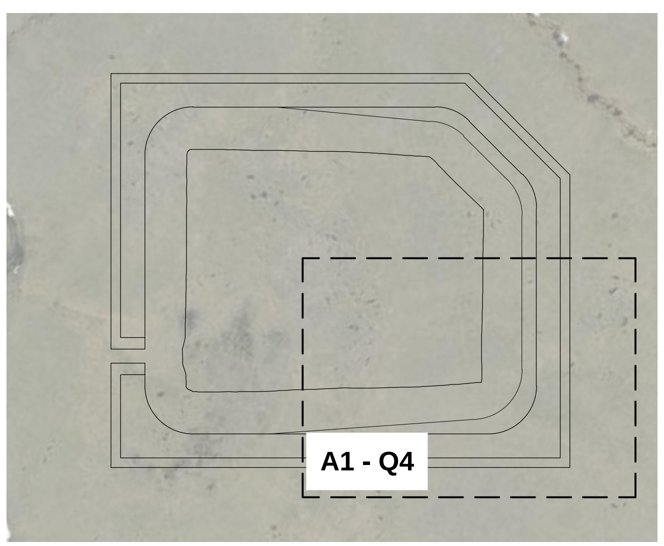

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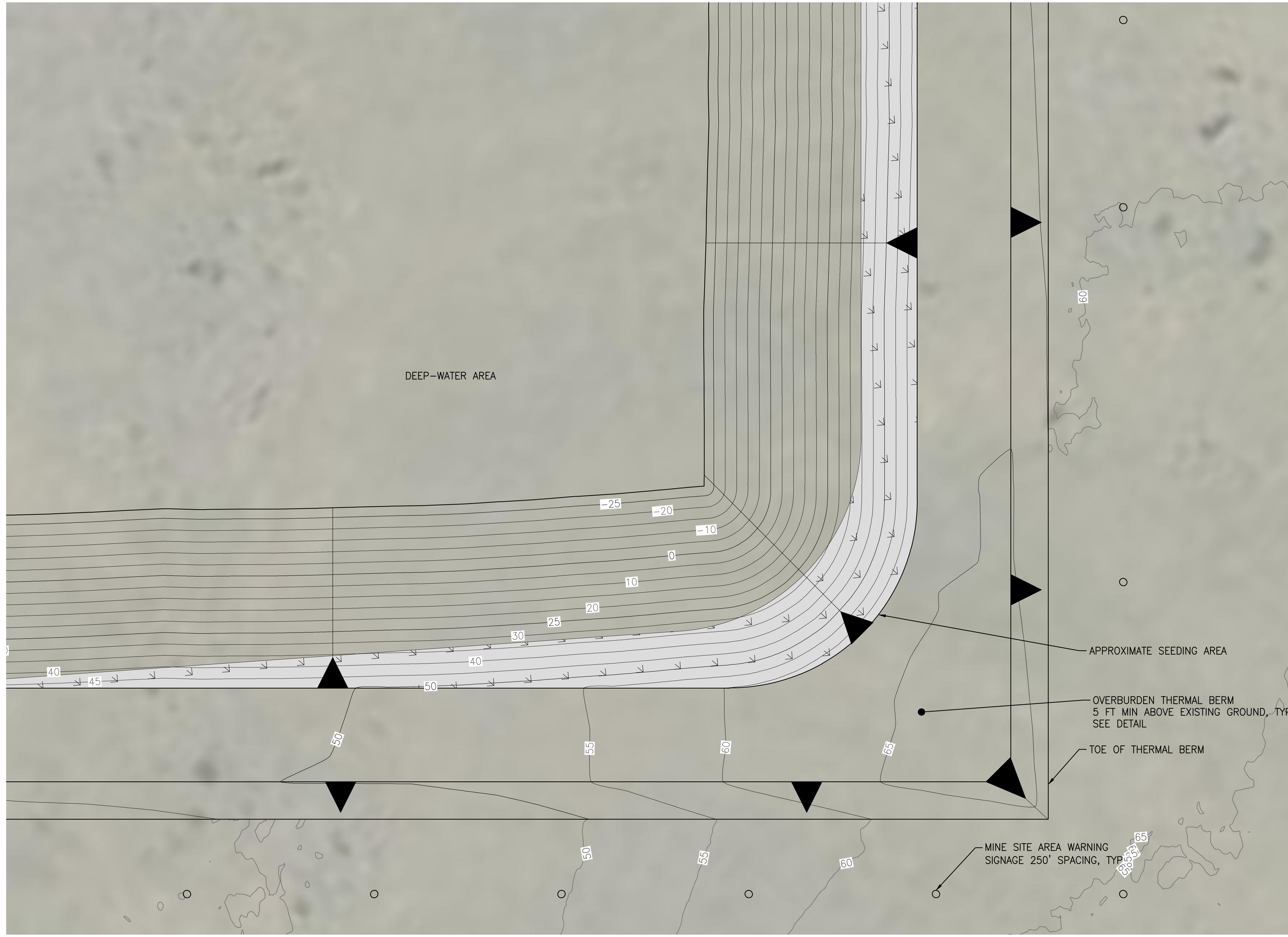

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AREA 1 - QUADRANT 4

DESIGNED BY:	KN	DATE:	7/27/20	**FIGURE 5-1D**
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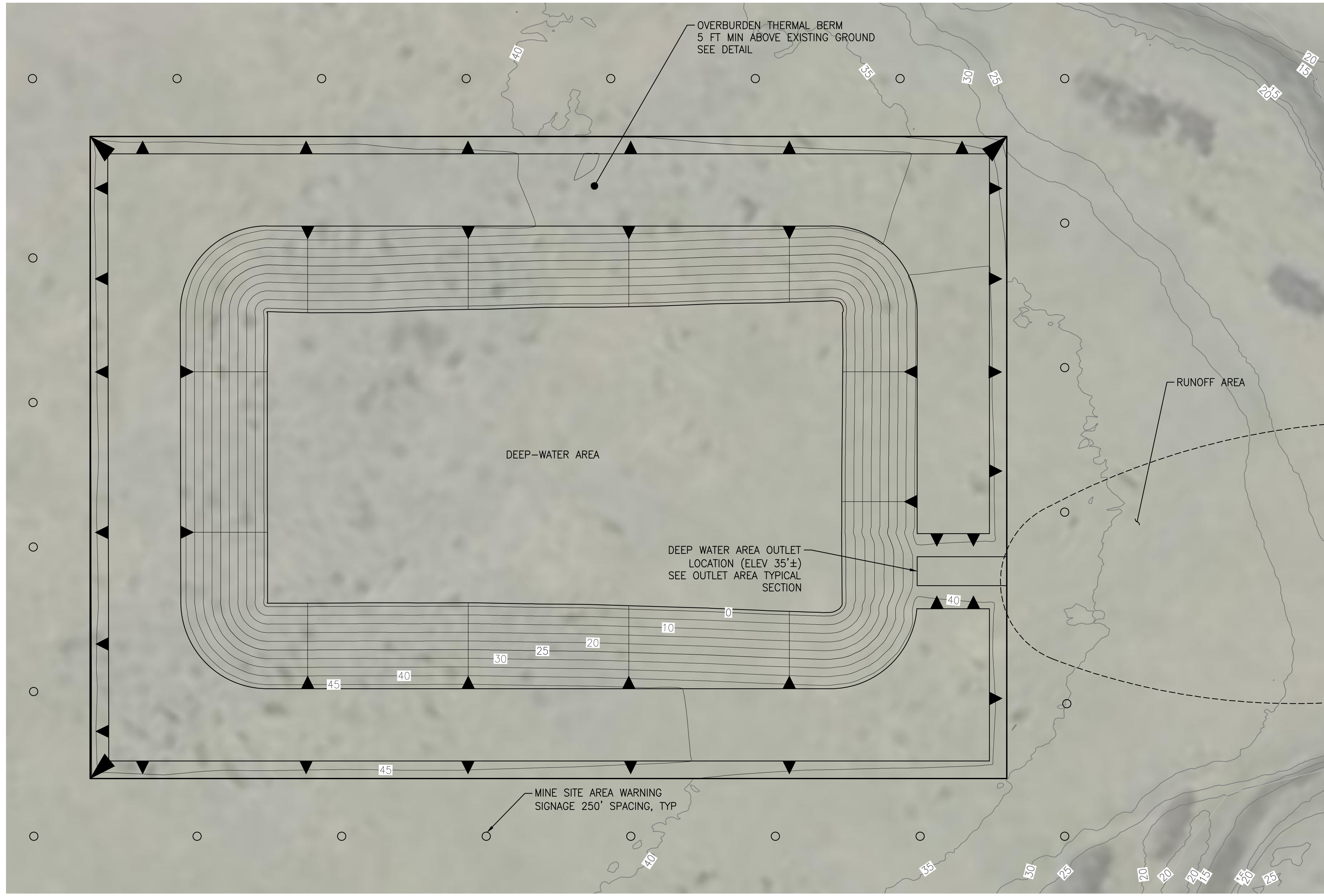

0 100 200 300 FT

NOTES:
1. PROPOSED RECLAMATION CONTOURS ARE APPROXIMATE.
2. SEE FIGURES 5-2A, 5-2B, 5-2C, AND 5-2D FOR SMALL SCALE VIEW OF PROPOSED RECLAMATION FEATURES.
3. FINAL RECLAMATION FEATURES WILL DEPEND ON THE FINAL CONFIGURATION AND THE AVAILABILITY OF OVERBURDEN MATERIALS, WHICH ARE NOT COMPLETELY KNOWN AT THIS TIME.
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MINE SITE AREA 2 RECLAMATION PLAN

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AREA 2 OVERVIEW

DESIGNED BY: KN	DATE: 7/27/20	FIGURE 5-2
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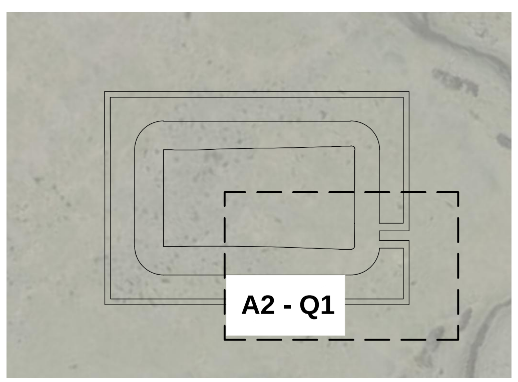

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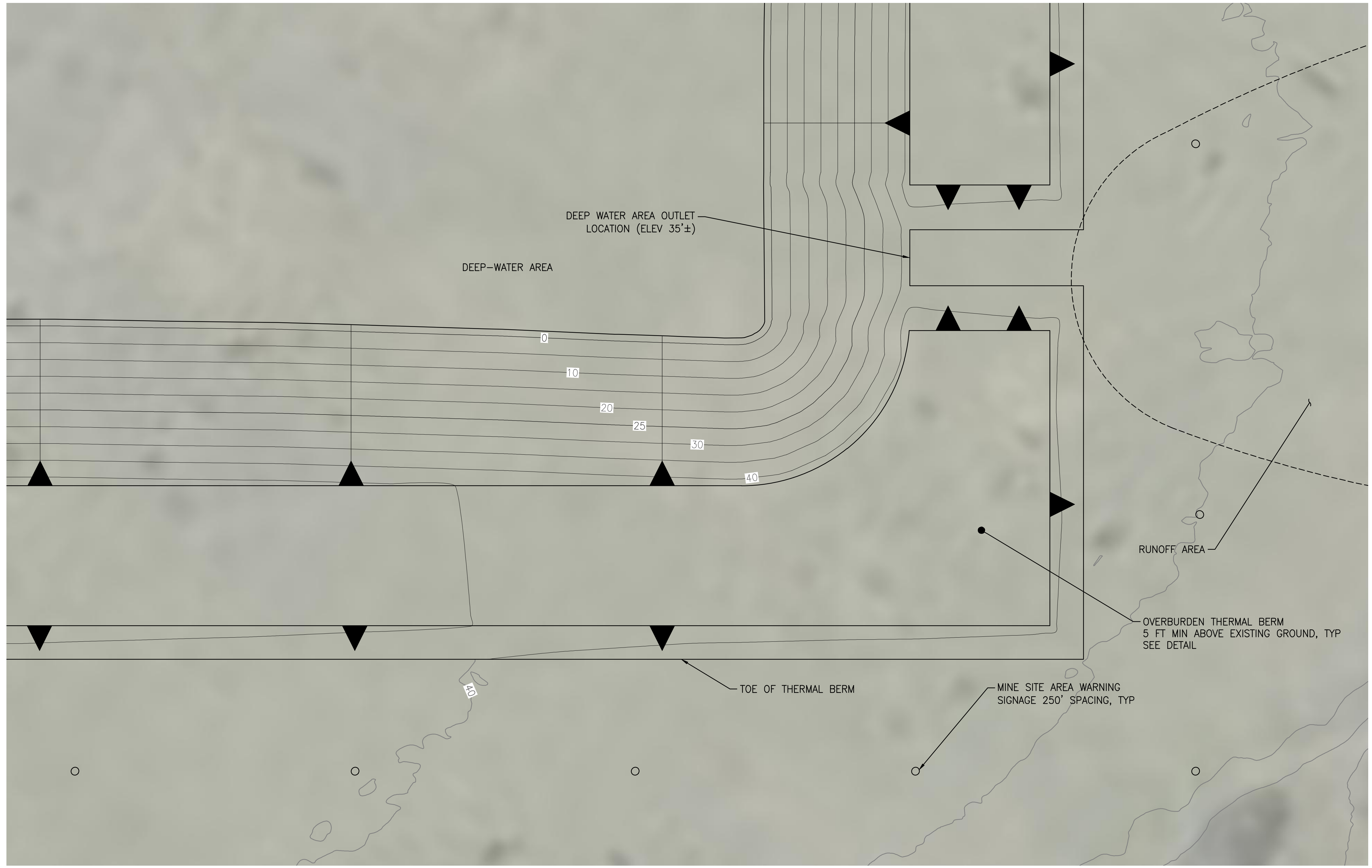

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DESIGNED BY:	KN	DATE:	7/27/20	FIGURE 5-2A
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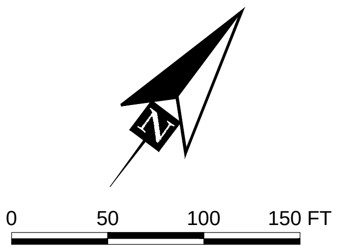

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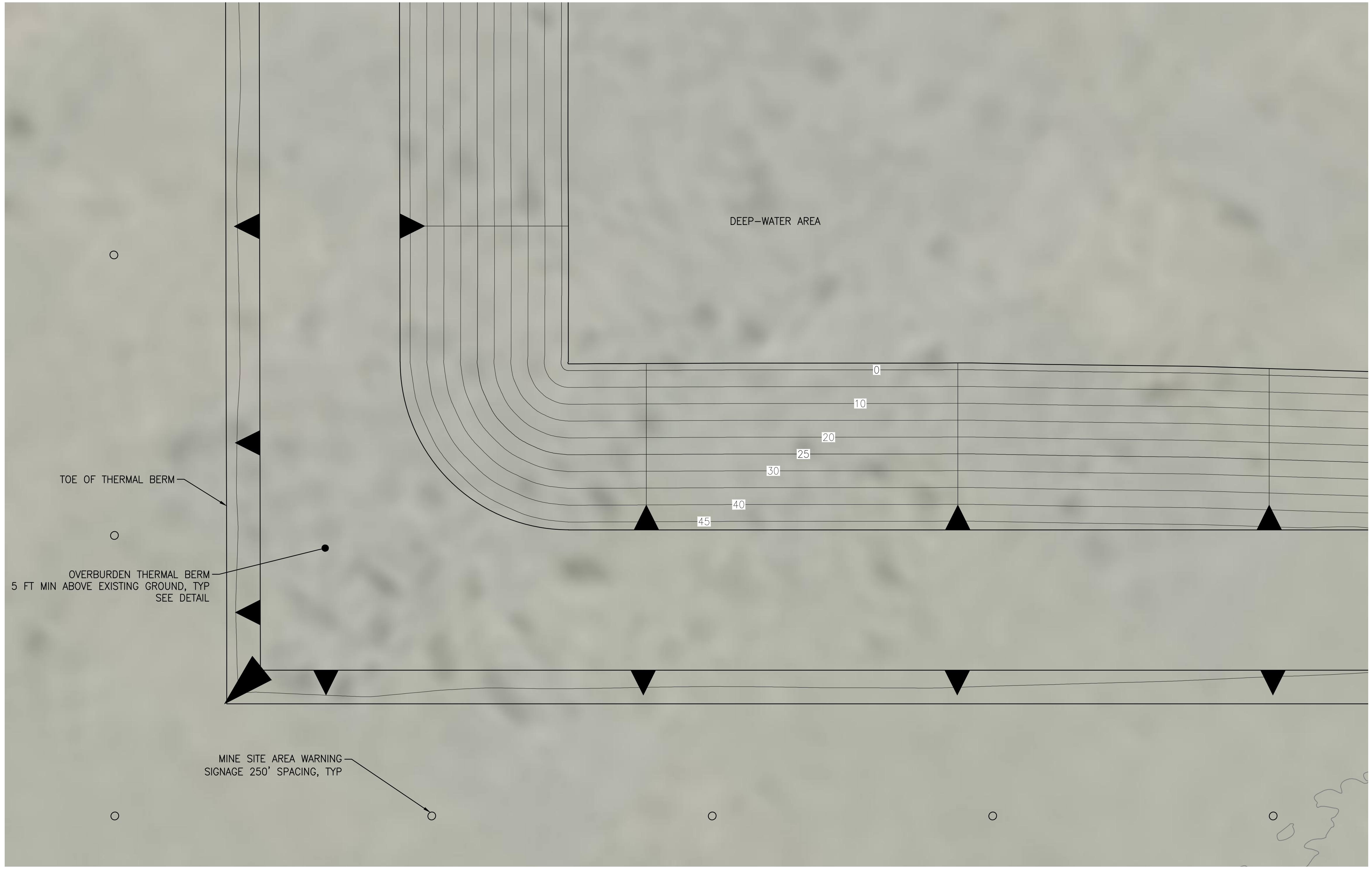
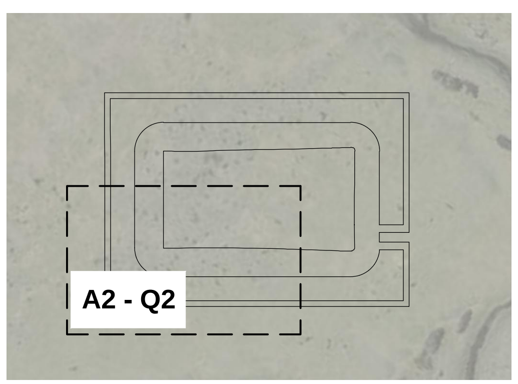


MINE SITE AREA 2 RECLAMATION PLAN



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AREA 2 - QUADRANT 2

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FIGURE 5-2B

0 50 100 150 FT

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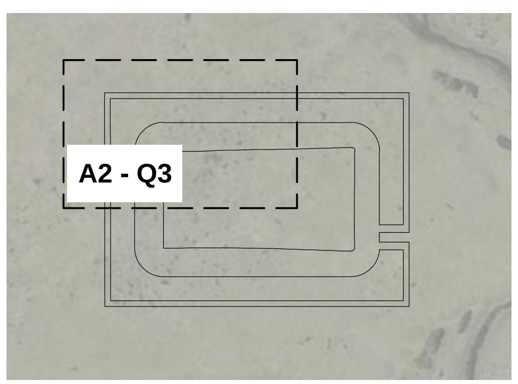

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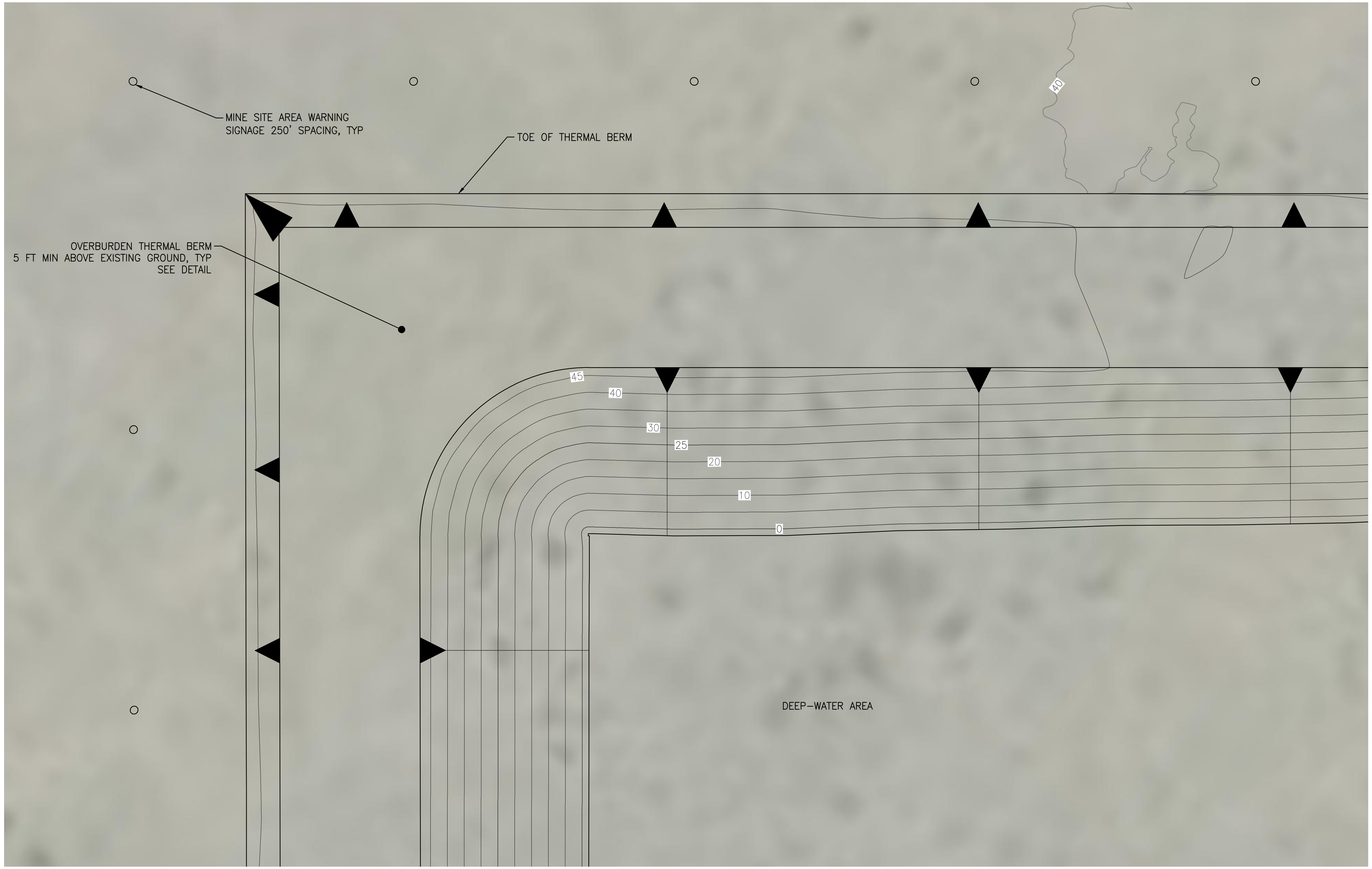

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AREA 2 - QUADRANT 3

DESIGNED BY:	KN	DATE:	7/27/20	FIGURE 5-2C
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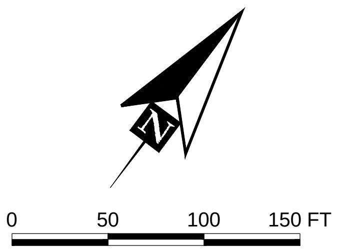

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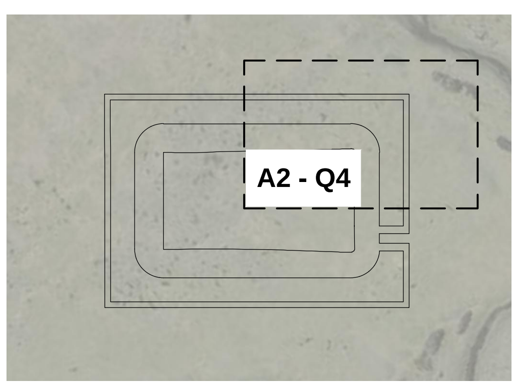

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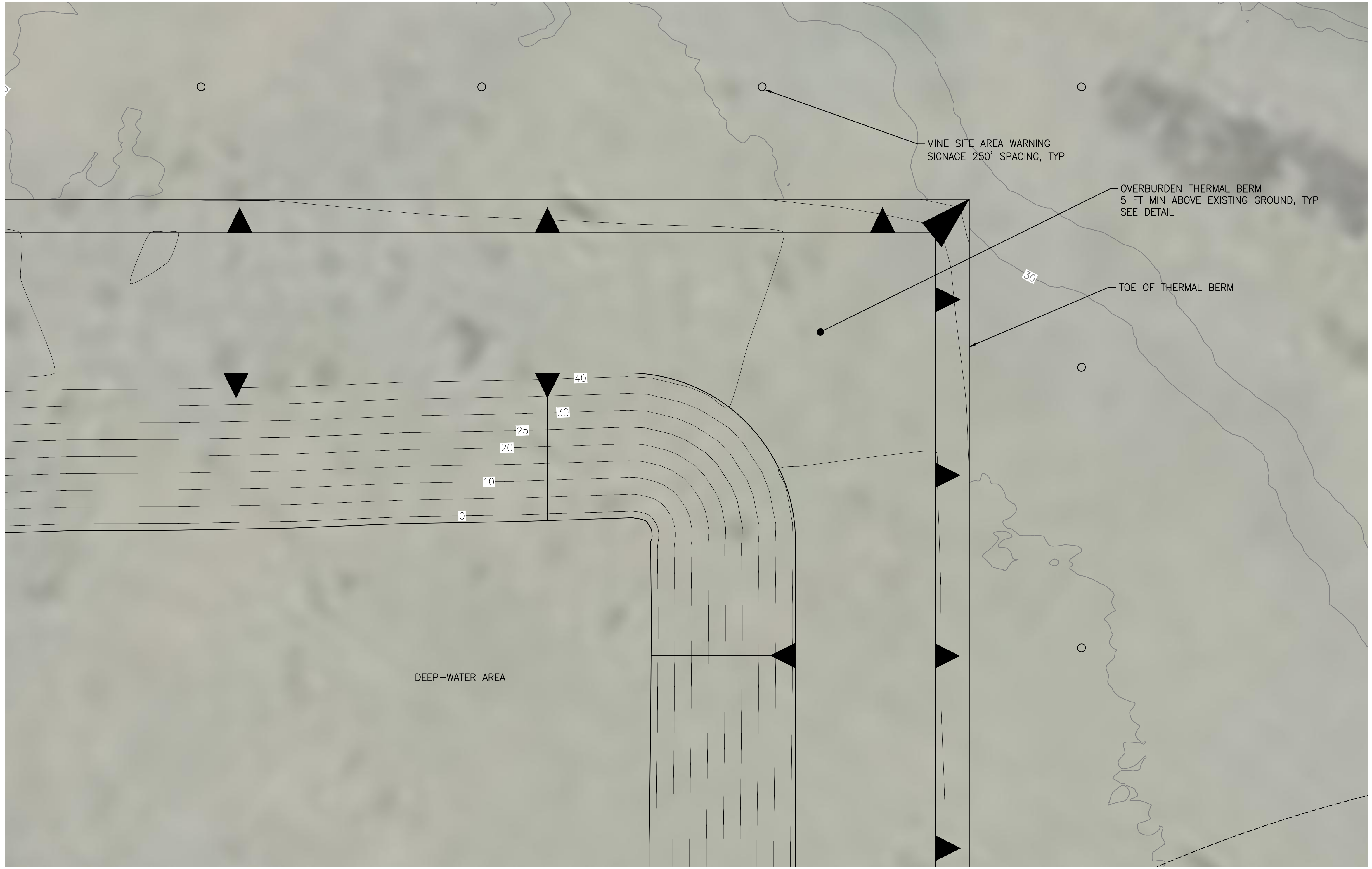

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AREA 2 - QUADRANT 4

DESIGNED BY:	KN	DATE:	7/27/20	**FIGURE 5-2D**
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Willow Master Development Plan

Appendix D.3
Ice Bridge Plan

August 2020

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2019 – 2020
WILLOW DEVELOPMENT
OCEAN POINT ICE BRIDGE REVISION

Submitted to:

ConocoPhillips Alaska, Inc.

Submitted by:

ICE DESIGN & CONSULT

Innovative Civil Engineering, Design and Consult
PO Box 211846
Anchorage, Alaska 99521-1846

June 9, 2020

CONTENTS

FIGURES

TABLES

APPENDICES

ABBREVIATIONS

ATM	Atmospheric Pressure
BPMSL	British Petroleum Mean Sea Level
CFDD	Cumulative Freezing Degree-Day
COVID	Coronavirus
CRIB	Colville River Ice Bridge
CWAT	Community Winter Access Trail (approximately 300 miles of groomed snow roads connecting Utqiagvik, Atqasuk, Wainwright, and Nuiqsut, to gravel infrastructure)
DS	Downstream
ft	Feet
ft^2	Square Feet
ft^3/sec	Cubic Feet Per Second
GMT2	Greater Moose's Tooth Drill Site 2
GPM	Gallons Per Minute
ICE	Innovative Civil Engineering, Design, and Consult
MBI	Michael Baker International
MT7	Moose's Tooth 7 (occasionally used interchangeably with GMT2)
NAD83	North American Datum 1983
OPIB	Ocean Point Ice Bridge
PT	Pressure Transducer
Q	Discharge
SPMT	Self-Propelled Modular Transporter

STA	Survey Station (feet)
US	Upstream
WSE	Water Surface Elevation

DEFINITIONS

Albedo	A ratio of the reflected insolation to the incident insolation for any of the natural or manmade materials
Insolation	Exposure to the sun's rays
Overflow	When water is present on the surface of the ice

1 EXECUTIVE SUMMARY

An investigation of the proposed Ocean Point Ice Bridge (OPIB) was conducted in the winter of 2019-2020. An updated ice bridge design is included in Appendix E that is suitable to support the Willow Development maximum module net weight of 3,200 tons loaded on a Self-Propelled Modular Transport (SPMT) with maximum allowable gross weight of 4,200 tons. The construction quantities are presented in Table 1.1.

TABLE 1.1: ICE CONSTRUCTION QUANTITIES OCEAN POINT ICE BRIDGE

Ocean Point Ice Bridge	Ice Quantity (yd^3)
****TOTAL =**	**36,500**

***The water equivalent quantity is 6.6 million gallons*

Observations from the winter of 2019-2020 have confirmed that there is a significant potential for overflow at the OPIB. Furthermore, there is a decrease in water discharge throughout the course of the winter. These two factors were the reason for the revised OPIB design.

Three potential overflow events were documented at Ocean Point in the winter of 2019–2020 during January, February, and March. The overflow event in March temporarily closed the Community Winter Access Trail (CWAT). The average depth of the overflow was estimated to be less than 1 foot.

Two direct discharge measurements were conducted at Ocean Point by Michael Baker International (MBI). The first and discharge, 135 ft^3/s (60,000 GPM) was measured on December 31, 2019. This had decreased to 9 ft^3/s (4,000 GPM) by February 25, 2020 (93% decrease). A third direct discharge measurement was planned for April 14, 2020 but it was cancelled due to COVID travel related protective measures. The discharge probably continued to decrease through April and prior to runoff.

Future data collection efforts should be conducted at Ocean Point to better understand how the water discharge varies throughout the winter. It is important to verify the frequency and magnitude of overflow events and the mechanisms that create them. Investigations should focus on the period between mid-February to mid-April. This is the planned timeframe for construction and use of the OPIB (2024-2025).

2 Introduction

During the winter of 2018-2019 data were collected at 6 locations along an 8.2-mile reach of the Colville River in the vicinity of Ocean Point. The primary objective of this investigation was to identify potential locations across the Colville River where a heavy haul ice bridge could be constructed with a load capacity greater than the Colville River Ice Bridge (CRIB), and unlike the CRIB can be traversed by Self-Propelled Modular Transports (SPMT). Two potential locations were identified that met these criteria:

1. *Transect #1* – Henceforth known as the **Upstream Site**
2. *Transect #5 / #6* – Henceforth known as the **Downstream Site**

Figure 2.1 shows the approximate positions of the two locations overlaid on the 'Willow Optimization Option 3' that is presented in Appendix A. A follow-on study was planned for the winter of 2019-2020. The Upstream Site was selected for study because of its location on existing permitted routes and its ease of access.

The objectives for the 2019-2020 investigation were to determine the ice and hydrological conditions of the Upstream Site. The Downstream Site is assumed to have similar hydrological, bathymetric, and topographic characteristics as the Upstream Site - the details of which are contained within this report.

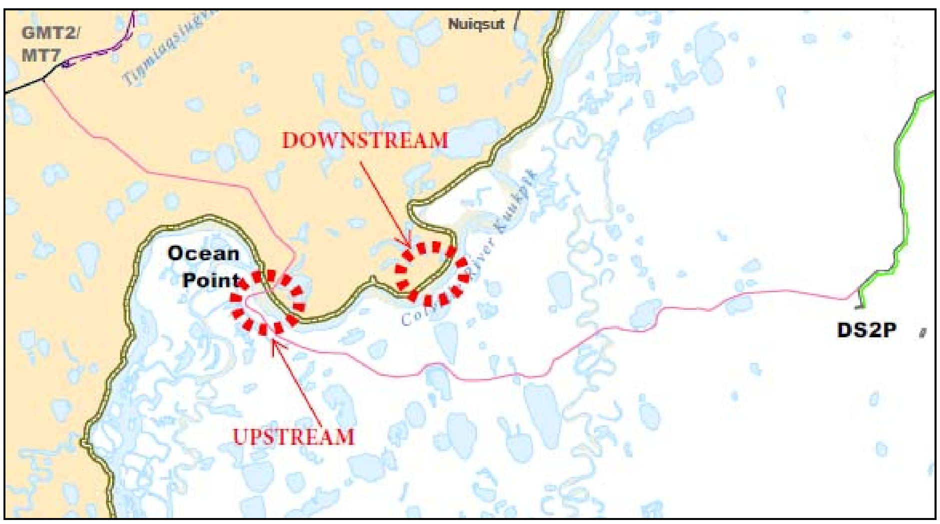


FIGURE 2.1: PROPOSED OCEAN POINT ICE BRIDGE CROSSINGS

2.1 Purpose of 2019-2020 Ocean Point Reconnaissance

The purpose of the 2019-2020 effort was to collect information about the Upstream Site for the Ocean Point Ice Bridge (OPIB). The data would be used to document and better understand how the crossing evolves throughout the course of the winter. Additionally, the new information has been used to revise the ice bridge design, construction quantities. To determine the maximum load capacity of the ice bridge the following data were collected:

1. Cumulative Freezing Degree-Days (CFDD)
2. Natural ice growth
3. Span of free water
4. Local weather observations
5. Water surface elevation (WSE)
6. Water Discharge (Q) (MBI 2020)
7. Overflow observations

The new information is presented in Section 4 and 5.

3 SUPPOSITIONS

The following suppositions should be considered while reviewing this report.

1. The first year of moving SPMTs with modules will likely be during the winter of 2024-2025.
2. The module move time span will be mid-February to mid-April.
3. The ice structures are subject to revision based on new information.
4. There is a potential for overflow at the proposed OPIB site.
5. This reports focus is limited to the Upstream Site for the OPIB. The Downstream Site is assumed to have similar physical characteristics (ice growth, water depths, discharge, construction volumes, topography, bathymetry, geometry, etc.).
6. The use of culverts is not addressed in this report and their potential usefulness has been published in the Innovative Civil Engineering, Design, and Consult (ICE) white paper: "20200602 – Culverts In Ice Bridges".
7. The proposed OPIB is not expected to be a grounded ice bridge and is not designed to be a grounded ice bridge.
8. Loaded and unloaded SPMTs are capable of traversing grades up to a maximum 5% longitudinal and a maximum of 1.5% transverse.

4 Data And Observations

The focus of the winter 2019-2020 data collection was at the proposed Upstream Site for the OPIB (N70.05348 W151.37277) (Figure 2.1). Three field investigations were made between December 31, 2019 and April 14, 2020. The timing of the field investigations was selection to coincide with early winter (December 31st), midwinter (February 25th), and prior the end of a typical ice road season (April 14th). Access to the Upstream Site was overland from GMT2/MT7 (Figure 2.1). A Rolligon and Hägglund were used on the first 2 visits and a Rolligon and Tucker on the last visit.

MBI engineers accompanied ICE engineers for the first two field visits (December 31st and February 25th). COVID related travel restrictions prohibited MBI from attending the last field visit (April 14th).

Ice profiles were surveyed during each field visit (Appendix B). The following data were recorded during each ice profile:

- - Span of ice
- - Ice thickness
- - Snow depth

- Span of free water under the ice
- Water depth

The surface of the ice was the basis of elevation for each of the ice profiles instead of British Petroleum Mean Sea Level (BPMSL). It is common practice to reference ice profiles to the water surface elevation. BPMSL ice elevations are not necessary during the early phases of ice bridge design.

The data collected from the ice profiles are necessary for calculating the following information:

1. Crossing Cross-sectional area
2. Construction Quantities
3. Direct Discharge (Calculated by MBI)

Figure 4.1 presents a sketch of the layout plan at the Upstream Site. In addition to ice profiles, pressure transducers (PT) were installed approximately 100 ft upstream (US) and downstream (DS) of the proposed Upstream Site centerline alignment. The PTs were installed on the channel bottom in the deepest part of the cross-section. The PTs measured absolute pressure which was translated into water depth by atmospheric (ATM) pressure corrections. The sample frequency of the PTs was set to 12-hour intervals (noon and midnight).

The CWAT was about 85 ft upstream and paralleled the ice profile alignments. The CWAT was not in place during the December 31st field visit.

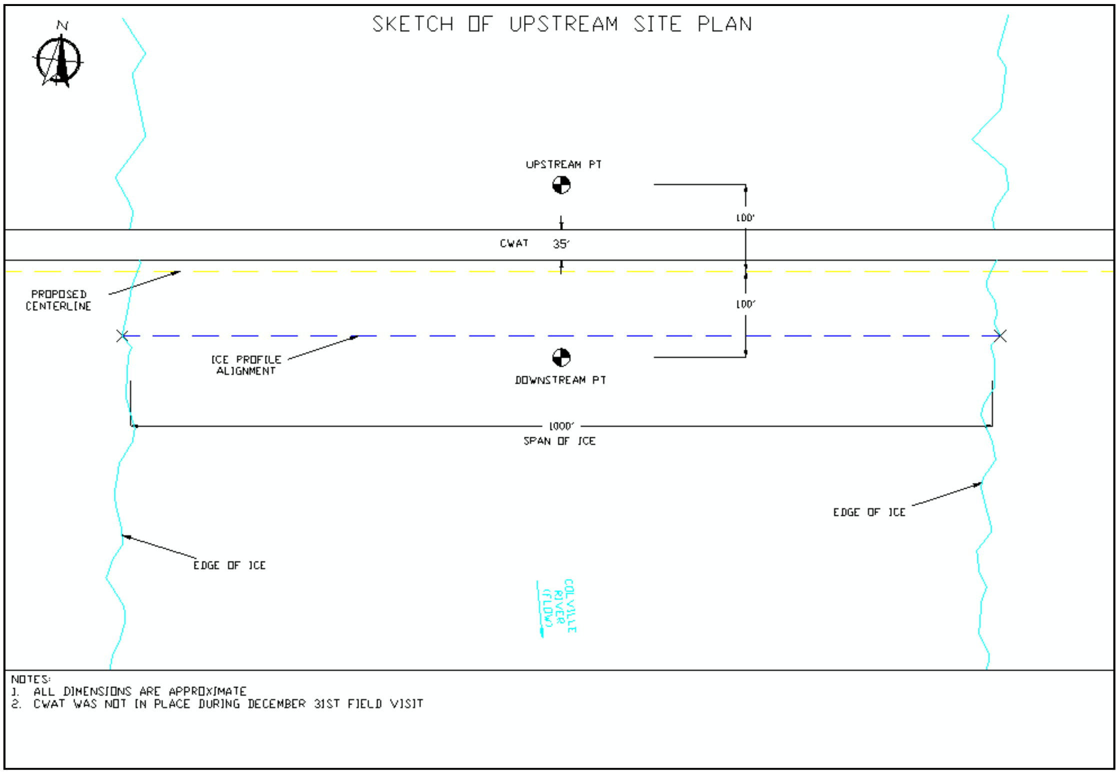


FIGURE 4.1: SKETCH OF UPSTREAM SITE PLAN

4.1 Cumulative Freezing Degree-Days

Cumulative Freezing Degree-Days (CFDD) are calculated as a sum of average daily degrees below freezing for a specified time period and are frequently used to measure and compare the coldness of winter from year to year. The annual CFDD has ranged from a high of 9,300°F (2011-2012 winter season) to a low of 6,200°F (2017-2018 winter season). Generally speaking, the higher the CFDD then the colder a winter was. However, a higher CFDD doesn't necessarily equate to a longer winter. Figure 4.2 presents the historical CFDD from 2002 to 2020.

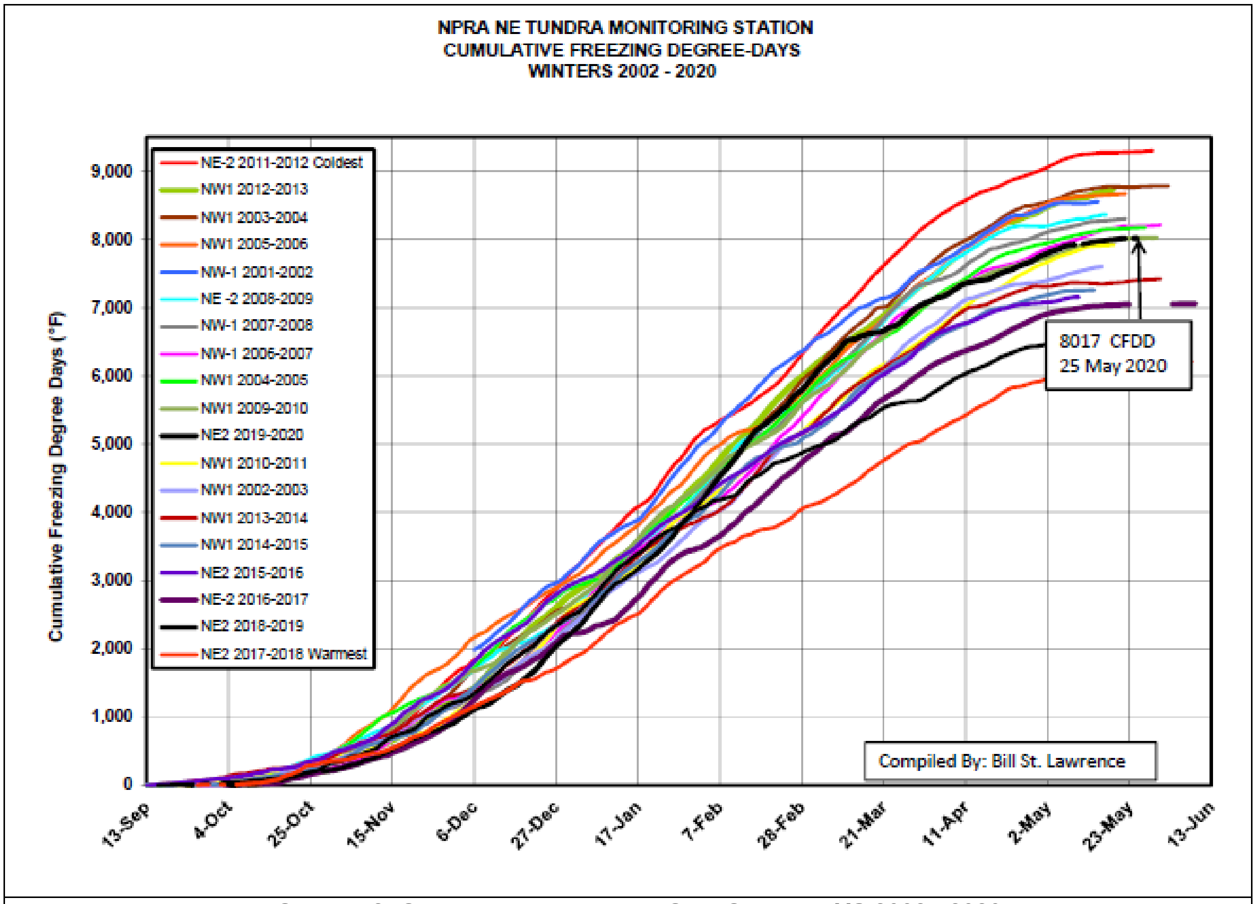


FIGURE 4.2: CUMULATIVE FREEZING DEGREE-DAYS 2002 - 2020

The air temperature CFDD index relates to:

1. Natural ice growth
2. Ice construction rates
3. Refreezing of seasonal thawed tundra

4.2 Span Of Ice

The span of ice is the distance between the two ice edges. The span of ice at the proposed Upstream Site crossing was approximately 1,000 ft (Figure 4.1). It was difficult to establish the precise edges of the ice the interfingering of ice and sediments made it difficult to establish the exact ice edge location. Generally, the river ice was blown clean of snowdrifts (snow depths <0.1 ft).

4.3 Natural Ice Growth

Table 4.1 presents the ice natural ice thickness at the proposed Upstream Site OPIB during the three field visits. Also presented is the ice growth rate. The ice growth rate was likely the highest between 25 February and 15 April. Historically, natural ice growth after mid-April is relatively low. This is due to the increase in average daily temperatures and the increase in daily solar radiation. The reduction in natural ice growth makes ice bridge repairs and construction difficult.

TABLE 4.1: NATURAL ICE THICKNESS AND GROWTH RATE

Field Visit Date	Average Floating Ice Thickness (feet)	Growth Rate From Previous Field Visit (feet per day)	Growth Rate From Previous Field Visit (feet per week)
December 31, 2019	2.7	0.027*	0.19*
February 25, 2020	4.6	0.034	0.24
April 14, 2020	5.6	0.020	0.14

**Day 1 is set to the day that CFDD > 1 (September 24, 2019)*

Natural river ice growth rates depend on air and water temperatures, water velocity, overflow, wind speeds and direction, ice snow cover, and ice thickness. Construction activities and techniques can modify ice growth to control production rates

4.4 Span Of Free Water

The span of free water under the ice at a given crossing is the distance measured between the edges of water below the ice. Figure 4.3 provides an illustration of how the span of free water is measured.

Table 4.2 presents the span of free water under the ice during each of the three field visits. Generally, as the ice thickness increases the span of free water and the maximum free water column height decreases.

During the April 14th field visit, the natural ice had come into contact with the river bottom about mid-way across the channel. This created two independent spans of free water measuring 117 ft and 94 ft wide (Appendix B – April 14, 2020 Ocean Point Crossing Profile).

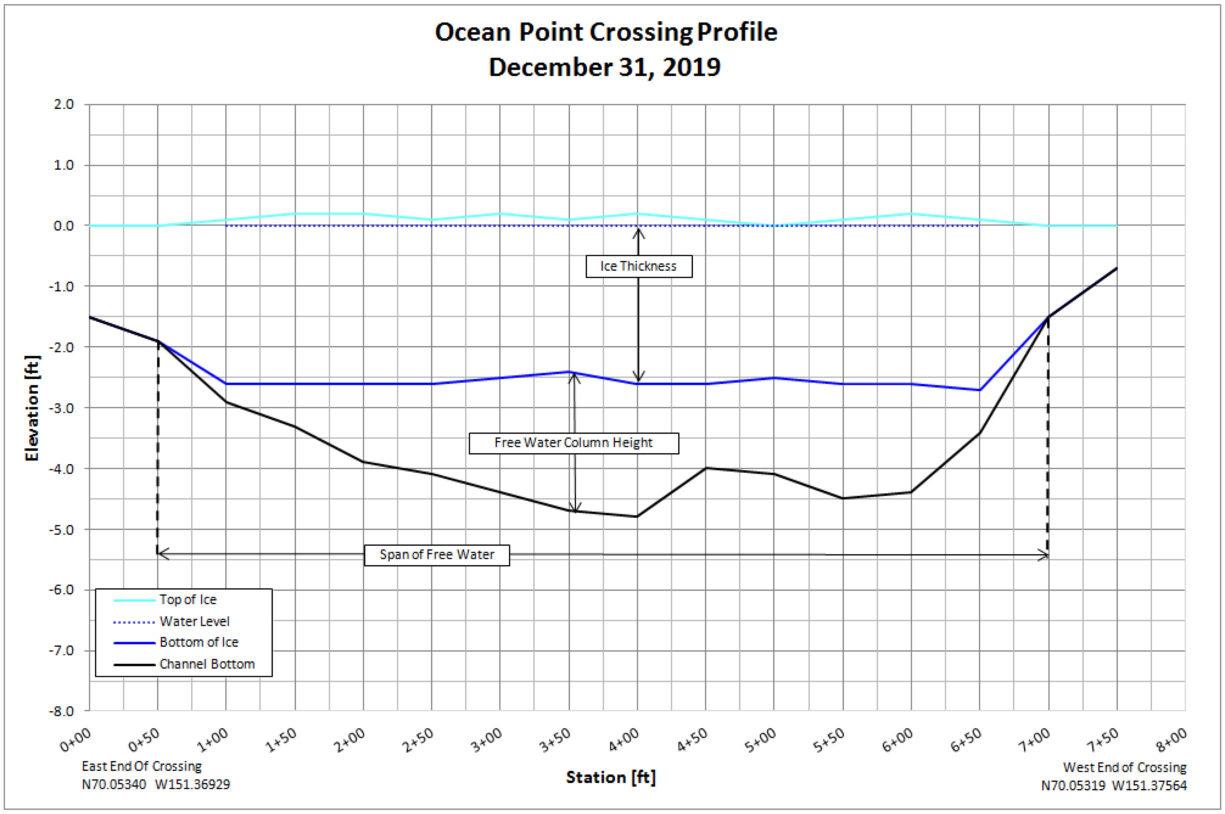


FIGURE 4.3: ICE PROFILE AND SPAN OF FREE WATER AREA

TABLE 4.2: SPAN OF FREE WATER

Field Visit Date	Span Of Free Water Under The Ice (feet)	Maximum Free Water Column Height Under Ice (feet)
December 31, 2019	650	3.0
February 25, 2020	400	1.2
April 14, 2020	*211**	0.9

**This is the combination of two independent spans of 117 ft and 94 ft that were separated by 94 ft of grounded ice*

4.5 Discharge Measurements

MBI conducted a direct discharge measurement during the first two field visits (Appendix C). A summary of the MBI discharge data are presented in Table 4.3 and Figure 4.4.

TABLE 4.3: MBI DISCHARGE MEASUREMENTS

Field Visit Date	Discharge (ft^3/s)	Discharge (GPM)	Average Velocity (ft/s)
December 31, 2019	135	60,600	0.15
February 25, 2020	9	4,000	0.04
April 14, 2020	**Data not obtained due to travel restrictions*		

The average water velocities and discharge decreased as winter progressed. Unlike the Mackenzie and Yukon Rivers, the Colville River is classified as an Arctic River. This means winter flow stops since the watershed is frozen. However, some flow continues from ground water as overflow.

4.6 Winter Water Depths

Generally, water depth in a river decreases as the tributary discharge decreases with freeze-up. However, in the case of Ocean Point the overall water depth increased slightly as winter progressed.

Figure 4.4 illustrates the PT water levels and the atmospheric pressure. Potential overflow events were likely recorded by the pressure increases during February and early March (Section 4.8). The water levels increased by late March at a rate of about 0.2 ft in 30 days. Overall water depths were less than 5.0 ft with the maximum 5.6 ft in February.

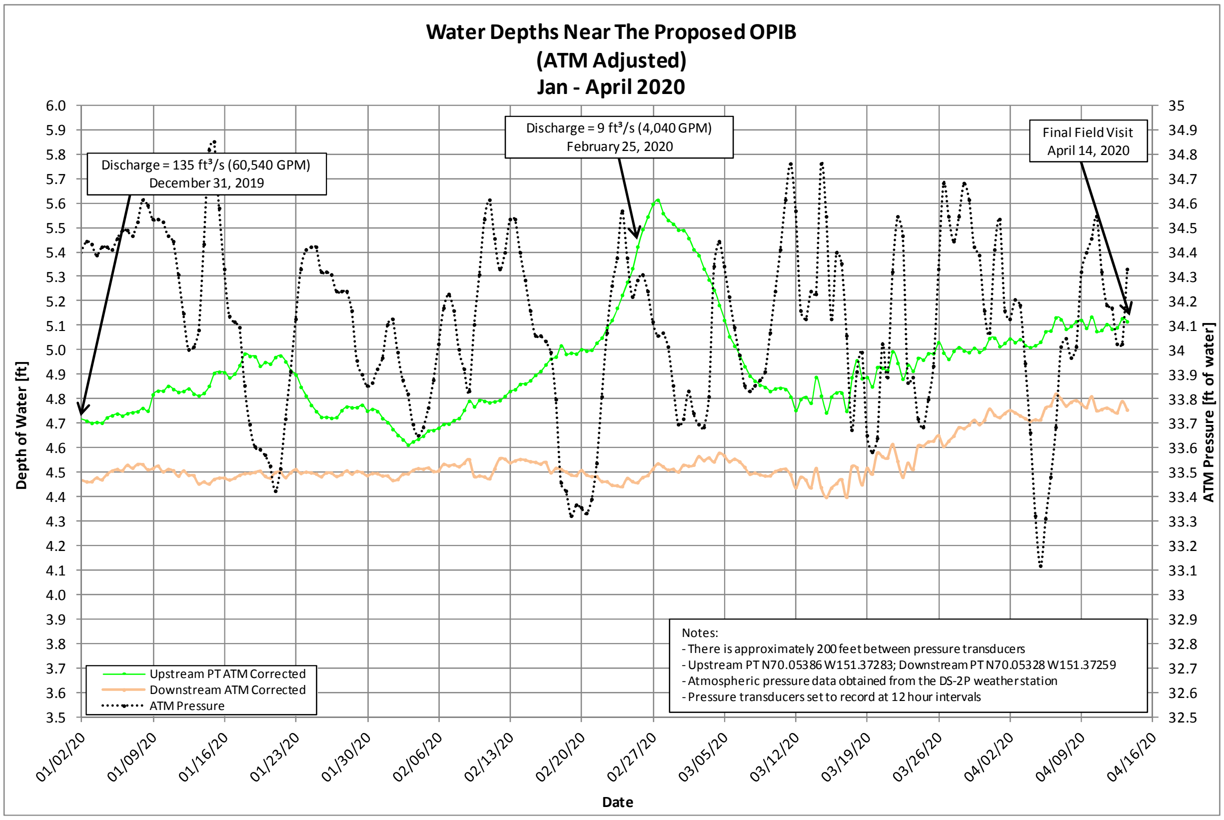


FIGURE 4.4: PT WATER DEPTHS NEAR THE PROPOSED OPIB

TABLE 4.4: MAXIMUM WATER DEPTHS

Field Visit Date	Maximum Water Depth (feet)
December 31, 2019	4.8
February 25, 2020	6.1
April 14, 2020	6.7

Possible explanations of the water depths whether rising or falling are a complex system of many unknown variables. A study of all the possible variations is beyond this report. Increasing ice thickness can constrict the flow and cause an increase in recorded pressure. During the coldest weeks of the winter, ground waters are emitted in larger volumes, but the waters freeze before moving far from the effluent. This makes the casual observations see what appears to be low flow.

4.7 Water Temperatures

In addition to pressure, water temperatures were recorded. Figure 4.5 presents the river bottom water temperatures and the average daily air temperature as recorded by the Drill Site 2P weather station (plotted on the right vertical axis). What is noteworthy in the data are the following:

1. There are spike-increases in the river bottom temperatures on February 28th and March 24th. These are likely related to overflow events and are discussed in further detail in Section 4.8.
2. For about 5 days starting on March 19th there was an event that caused the temperature to rise and fall -/+ 0.2°F at both PT locations. This is also likely related to an overflow event (Section 4.8) in addition to a potential phenomenon that is explained below in Section 4.7.3.
3. Daily temperature oscillations are visible in the data beginning on March 19th. These undulations are likely due to solar diurnal rhythms. The first annual sunrise at the OPIB latitude began on January 17th and by March 17th the daily sun exposure exceeded 12 hours per day.

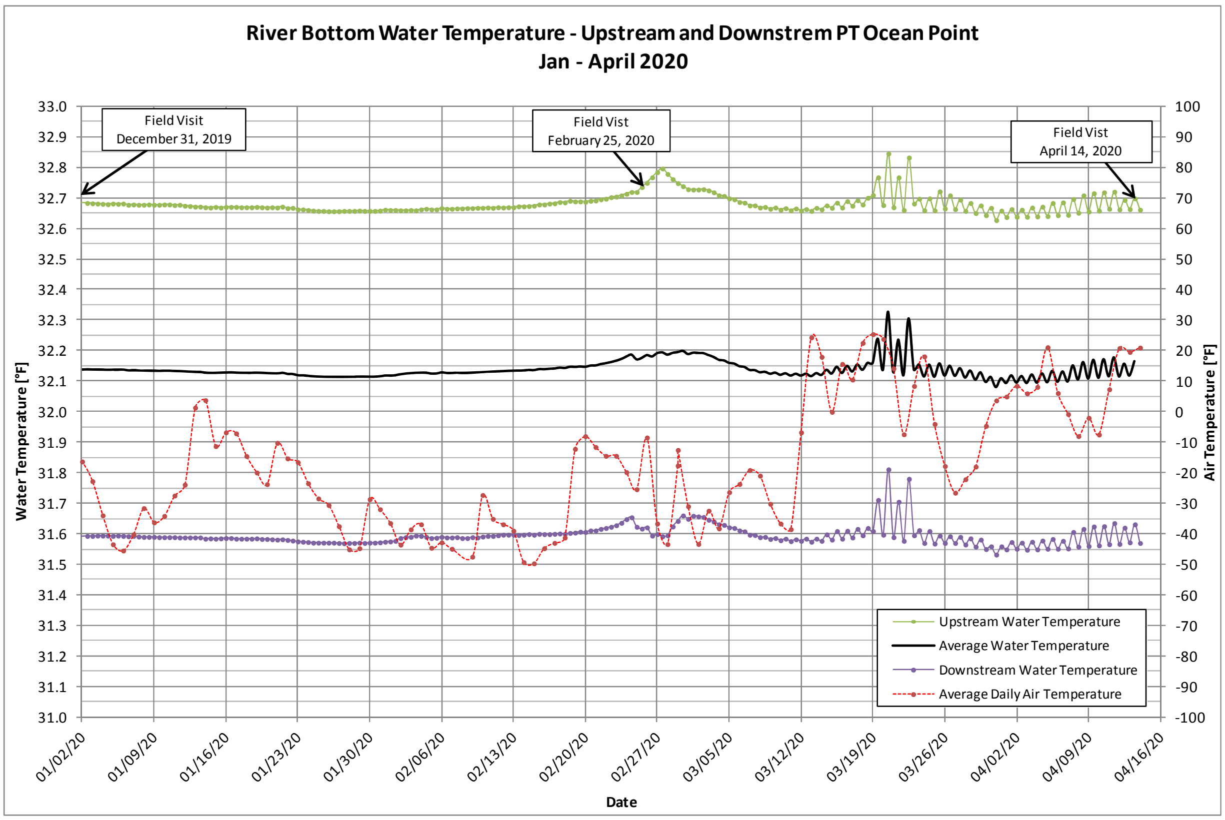


FIGURE 4.5: RIVER WATER TEMPERATURE – OCEAN POINT JANUARY TO APRIL 2020

4.8 Overflow Considerations, Characteristics, and Observations

A unique design consideration for the proposed Upstream Site OPIB is the potential for overflow. There is a high likelihood for overflow on the Colville River during any given winter. The frequency, location, triggers, and magnitude of overflow events can be difficult to predict and measure. Considerable attention was made during the data collection to record overflow events with instrumentation and observations. There were at least three potential overflow events during the winter of 2019-2020.

4.8.1 General Overflow Considerations At Ocean Point

Early in winter (November – December) overflow events are not typical. The thin ice (<2 ft) rises and falls with the changes in water levels. Discharge declines as the rains give water to snowfall and the watershed freezes. When overflow events do occur, they tend to be of lesser magnitude. Normally, when an overflow event occurs it breaches along the edges of the river where the ice has not become firmly grounded.

By the middle of winter (January – February) the potential for overflow events increase in frequency and magnitude. The river ice has become firmly grounded along the edges of the river and the cross-sectional area of free water is substantially reduced (80% reduction from the OPIB December 31st to the February 25th ice profile). This can lead to higher pressures, constrictions, and increased water velocity under the ice. Eventually the pressure becomes great enough to form cracks in the ice. The flowing water finds pathways through the cracks to the surface of the ice. The overflow from these events tends to flow in all directions on the surface of the river ice. These events can be difficult to observe if there is snow on the surface of the ice. Furthermore, the presence of snow can increase the amount of time required for the overflow to freeze.

Toward the end of winter (March – April), the potential for overflow is similar to that of the middle of winter with the additional contribution from increased solar radiation intensity and warmer air temperatures. Overflow from snowmelt due to solar radiation and warmer temperatures tend to result in ponding and minimal flow in any particular direction. Generally, there is little potential for runoff during this time period. However, runoff should be expected during the month of May.

4.8.2 Overflow Observations Summary

Table 4.5 summarizes the three potential overflow events recorded by the PTs. Figure 4.6 presents the relative water depth differential between the US and DS PTs. This difference is the DS PT water depth subtracted from the US water depth after each PT water level has been set to zero for its initial reading. Positive values on the graph indicate that the water levels were greater at the US PT than the DS PT. A water depth differential along the horizontal dashed line means that the water levels at the US and DS PTs are back to their initial (December 31, 2020) readings. Negative values on the graph indicate that the DS PT recorded water levels greater than the US PT.

TABLE 4.5: SUMMARY OF POTENTIAL OVERFLOW EVENTS

Approximate Date of Event	Notes
January 18, 2020	Evidence of this potential event was not observed during the February 25 field visit
February 28, 2020	The largest potential event recorded
March 24, 2020	CWAT reported event and travel suspended due to flooding

NOTE: The CWAT was located approximately 85 ft upstream of the ice profile centerline

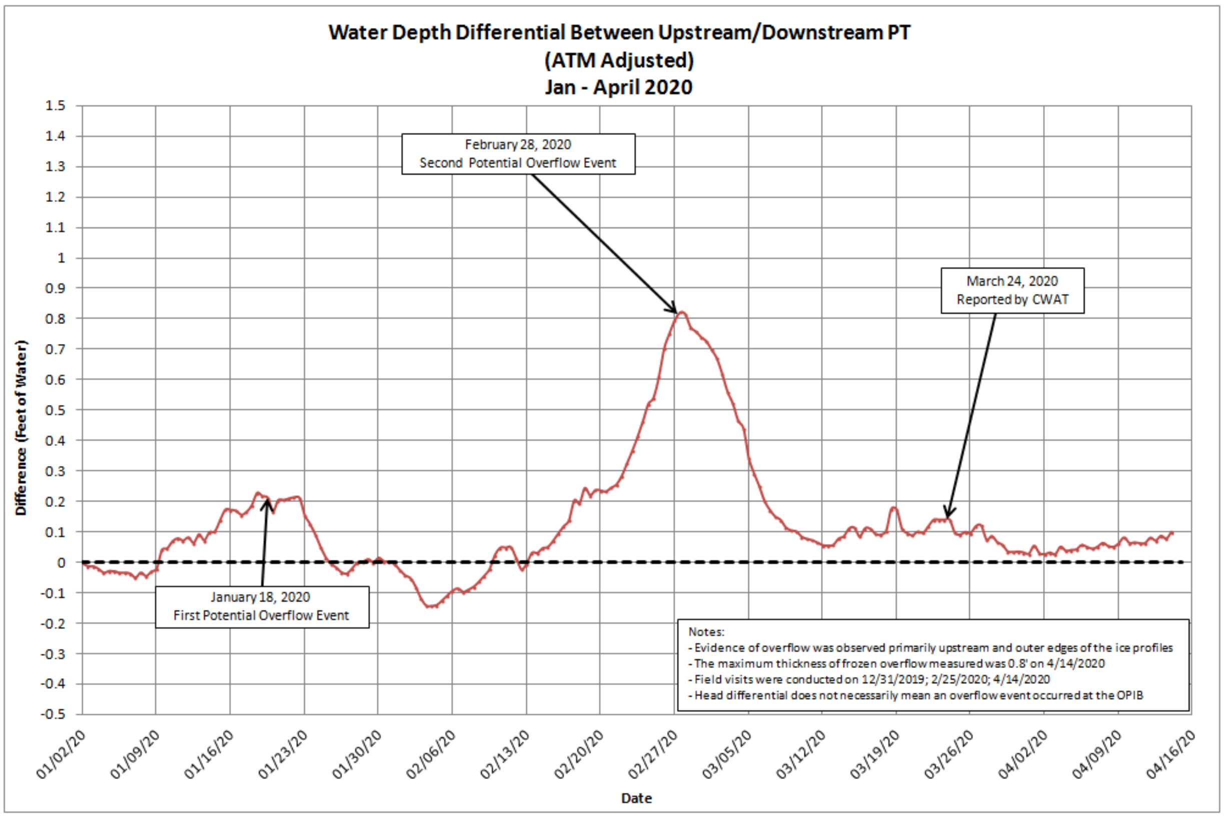


FIGURE 4.6: WATER DEPTH DIFFERENTIAL BETWEEN UPSTREAM AND DOWNSTREAM PTS

Once the potential February overflow event ended the water temperatures at the US and DS PTs returned to their typical differentials. It is likely that flow resumed under the ice. The overflow likely flowed toward the banks of the river and froze.

Evidence of this overflow event was observed during the April 14 field visit. While conducting the ice profile there was up to 0.8 ft of frozen overflow observed at the eastern and western edges of the profile. Frozen overflow is differentiated from natural ice in that it is opaque and rests atop natural ice that is clear. Frozen overflow was not observed between STA 3+00 and 6+00 of the ice profile.

An overflow event was observed and reported by CWAT users around March 24th. The CWAT snow bridge was located about 100 ft upstream from the ice profile centerline. The report stated that the snow bridge was flooded and deemed unsafe. This event was likely intensified by the warming air temperatures and the increased intensity of solar radiation. The overflow from this event was frozen by the time of the April 14 field visit.

4.9 Ocean Point Weather Station Installation

A weather station was installed on April 14, 2020 2.4 miles north of the proposed Upstream Site for the OPIB (N70.08730 W151.35590). Table 4.6 presents a summary of the parameters recorded by the Ocean Point weather station.

TABLE 4.6: OCEAN POINT WEATHER STATION INSTRUMENTATION

Wind Speed and Direction	Snow Depth
Solar Radiation	Atmospheric Pressure
Air Temperature	Ground Temperatures
Relative Humidity	*Soil Moisture Content**

**Planned installation for fall 2020*

The weather station summary report is included in Appendix D.

5 Ocean Point Ice Bridge Design

The OPIB design and construction quantities have been updated based on the data and observations from the winter of 2019–2020 investigation (Section 4). Further revisions will be issued as more information is obtained. The revised ice bridge design (Appendix E) includes new design features based on recent discoveries (overflow, ice profiles, etc.). The subsections below provide explanations for the updates and revisions of the OPIB design.

5.1 Overflow Monitoring

Any overflow, if it occurs, should be monitored beginning in December during the first year of heavy haul use (winter 2024-2025). Monitoring stations with remote capabilities would be installed prior to construction of the ice bridge and removed before breakup. Overflow monitoring will assist with mitigation management outlined in Section 5.2.

5.2 Overflow Mitigation Management

Overflow mitigation should be included in the OPIB design. Overflow events may impact the construction and use of the OPIB (Section 4.8).

Overflow mitigation actions can be classified into two broad categories; passive and active. Both mitigation requirements should be incorporated into any OPIB design.

5.2.1 Passive Overflow Mitigation

Passive overflow mitigation are preventative actions put into place to prevent overflow at an ice structure. Passive mitigation should not require constant attention and maintenance to remain effective; although routine maintenance may be required. Passive mitigation includes berms, passageways, and other diversion structures. Passive mitigation designs may require some cleanup and recovery depending on the impacts and magnitude of an overflow event.

5.2.2 Active Overflow Mitigation

Active overflow mitigation operates in combination with passive mitigation. Active overflow mitigation are preventative actions established if the passive mitigation systems become insufficient. Due to the likelihood of overflow events, active overflow mitigation will be necessary for the heavy haul ice bridge over the Colville at Ocean Point.

Two available forms of active mitigation are high-volumetric flow pumps and designated rapid response heavy equipment. The pumps would be staged at the site to move water from the upstream side of the ice structures to the downstream side if passive mitigation becomes insufficient. Rapid response heavy equipment would be used to clear new pathways for water to flow away from the ice structures. Furthermore, the heavy equipment would be utilized to repair, maintain, and restore passive mitigation structures.

All active mitigation measures must be readily available to assist with overflow management. A comprehensive 'overflow management plan' should be developed as more data is collected in the vicinity of the OPIB.

5.3 Ramp Designs

The revised ramp designs of the proposed OPIB have been modified to conform to the maximum design specification of 5%. The 3% grade of the central ramps will ensure that the ramps have overall lengths greater than that of the maximum specified SPMT length (220 ft) to avoid high-centering.

The ramps are 65 ft wide based on the maximum ice fill thickness. The east ramp width may increase depending upon the topographic survey of the east bank.

5.4 Ice Bridge Construction Quantities

Table 5.1 presents a summary of the ice material quantities required to construct the OPIB based on the most recent information. The average natural floating ice thickness is expected to be between 4 and 5 ft by February.

TABLE 5.1: SUMMARY OF MATERIAL QUANTITIES

Ice Structure	Ice Quantity (yd^3)
West Ramp	7,800
Central Ramps and Elevated Ice Bridge	16,100
East Ramp	11,200
Areas Between Elevated Ice Bridge and East/West Ramps	1,400
***TOTAL =**	**36,500**

**The water equivalent quantity is 6.6 million gallons*

Most of the construction material is required to build the ice ramps and the elevated ice bridge over the span of free water. In addition to supporting the loads, the elevated ice bridge performs other key functions, which include:

1. Elevate the driving surface away from the overflow zone.
2. Increase the maximum allowable width of the free water under the bridge by increasing the pressure area at the base of the ice sheet.
3. Reduce the amount of snow that accumulates on the driving surfaces.

5.5 Emergency Bypass / Access Road And Ramps

An emergency bypass/access roads and ramps should be constructed on the downstream side of the elevated ice bridge and ramps. These roads will provide access around the SPMTs while they are navigating ice structures when crossing the OPIB. Specific design details of the emergency bypass/access roads will be provided later.

6 Conclusions & Recommendations

Conclusions and recommendations are subject to change as new information becomes available.

6.1 Conclusions

1. The proposed Upstream Site OPIB will be a non-grounded ice bridge with a capacity that is suitable for the 3,200 ton module loaded onto a SPMT with a 4,200-ton allowable gross weight.
2. There is a high probability that at least one overflow event will occur in the vicinity of Ocean Point each winter.
3. More information regarding water discharge and water levels in the vicinity of the Ocean Point between the months of February and mid-April is needed. This is the timeframe of construction and heavy haul use.

6.2 Recommendations

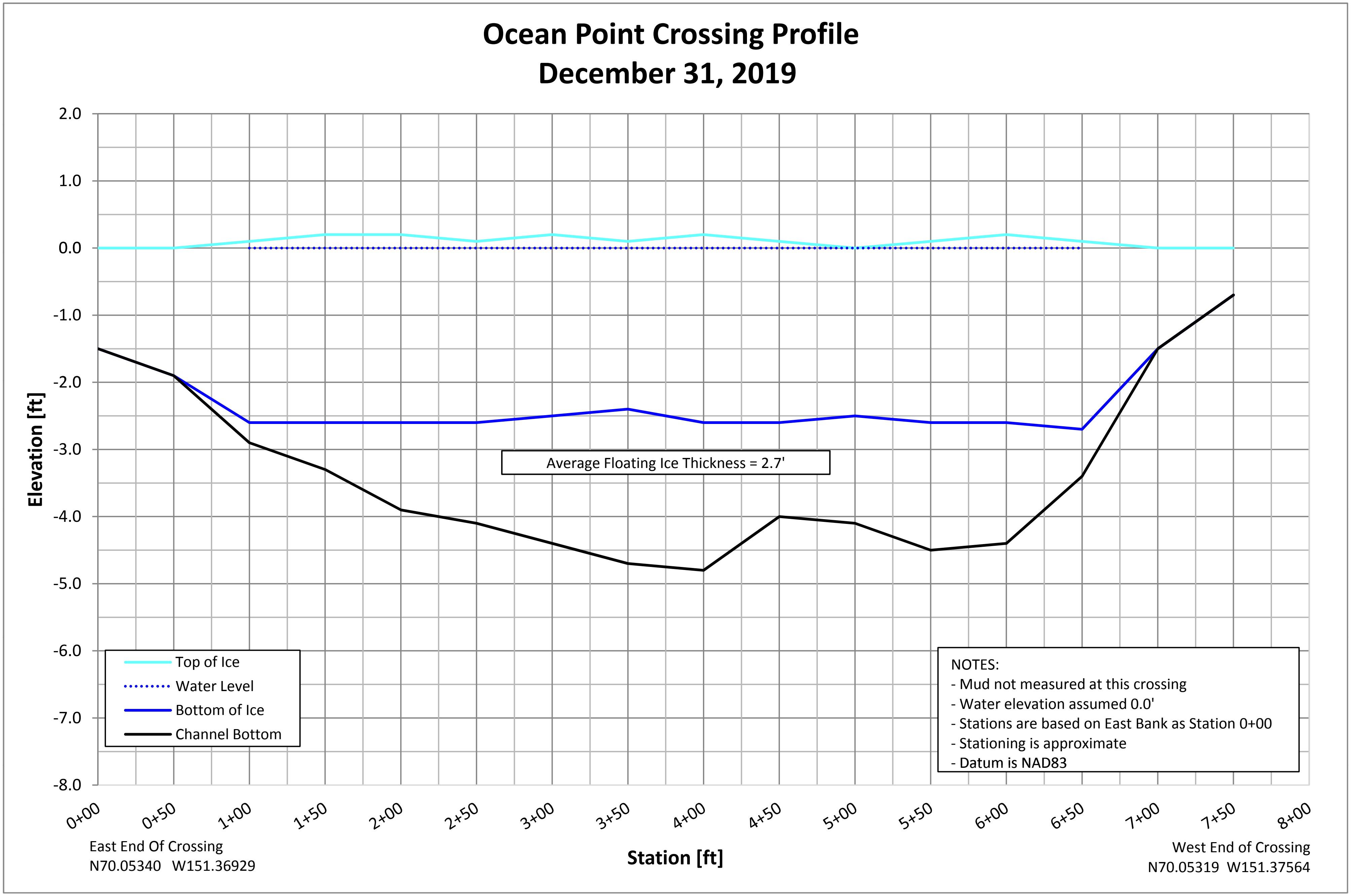
1. MBI should conduct weekly discharge measurements at the OPIB from mid-February to mid-April during the winter of 2020–2021.
2. Ice profiles at the OPIB should be performed on a monthly basis during the winter of 2020-2021, with weekly ice profiles between mid-February to mid-April.
3. Delay any geotechnical investigation until 2023-2024; this task may not be necessary.
4. Install remote monitoring sites at the OPIB to collect water level, air temperature, and air pressure throughout the winter of 2020-2021.
5. Perform a topographic survey from the top of bank to the top of bank along the heavy haul ice road alignment at the Upstream Site during the winter of 2020-2021.

Appendix A
- Willow Optimization Option 3

Document Name: Willow_Optimization_Option3.mxd

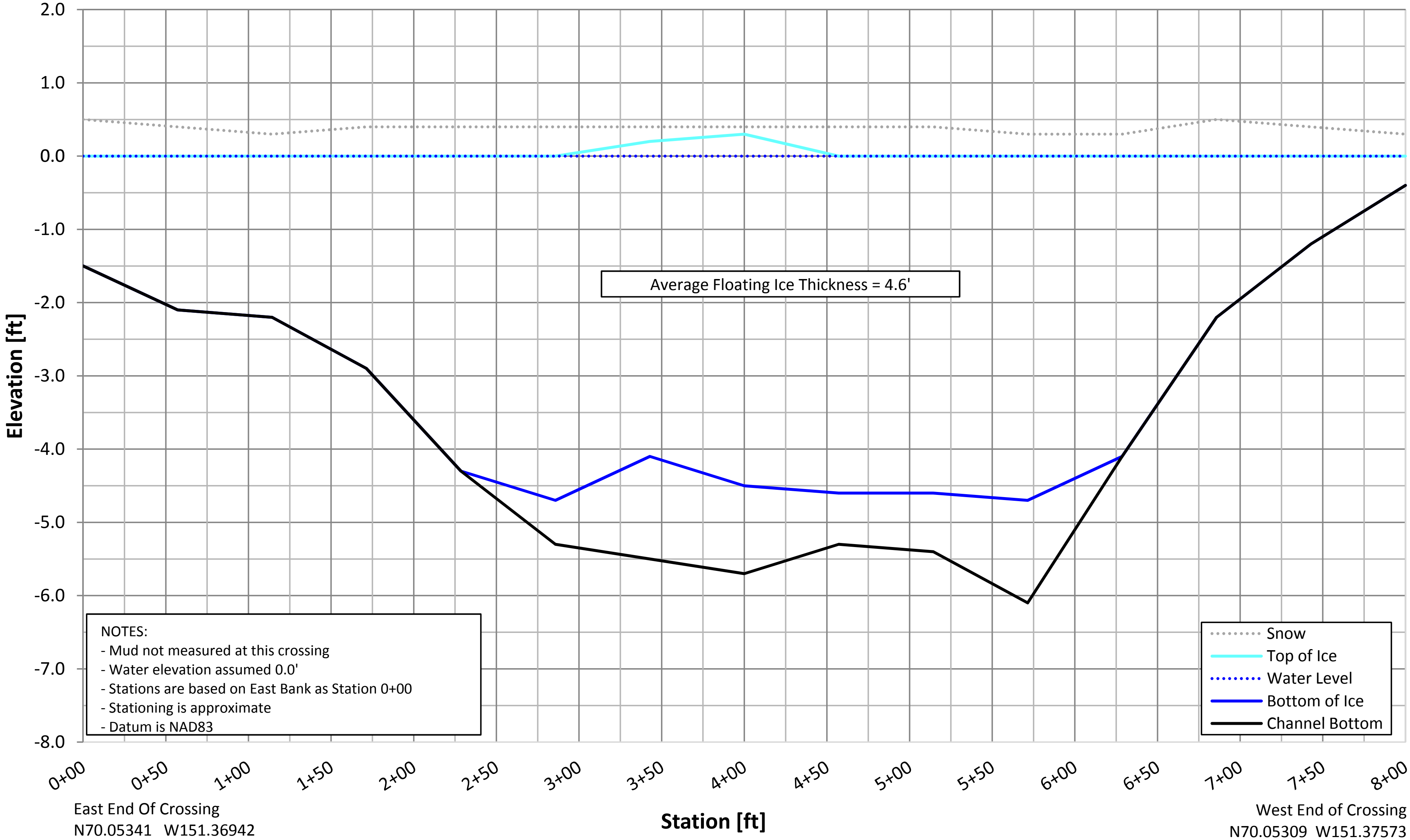
Appendix B
- ICE PROFILES

Submitted By: M. Hendee
Conducted By: M. Hendee

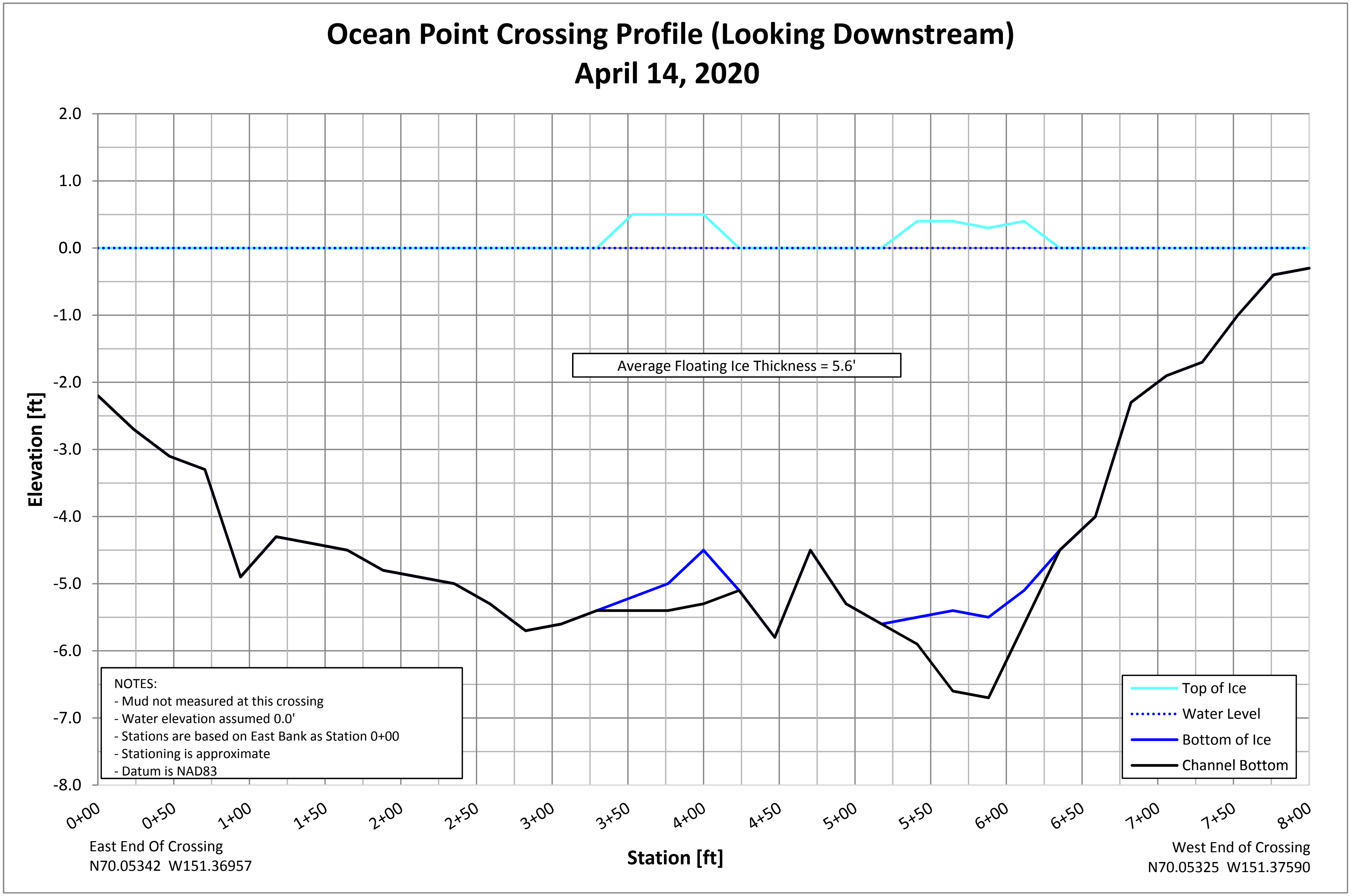


Submitted By: E. Keib
Conducted By: E. Keib

Ocean Point Crossing Profile
February 25, 2020



Submitted By: E. Keib
Conducted By: E. Keib



Appendix C

- MICHAEL BAKER INTERNATIONAL
WILLOW ICE ROAD – OCEAN POINT
WATER RESOURCES FIELD INVESTIGATION

2019-2020

Summary Report

Willow Ice Road – Ocean Point
Water Resources Field Investigation

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PREPARED FOR:
ConocoPhillips
Alaska

MSA Contract No. 2969377

TABLE OF CONTENTS

FIGURES

TABLES

CHARTS

PHOTOS

ACRONYMS & ABBREVIATIONS

% sat	percent saturation
°C	degrees Celsius
ADCP	acoustic doppler current profiler
cfs	cubic feet per second
COPA	ConocoPhillips Alaska, Inc.
DO	dissolved oxygen
ft	feet
ft/s	feet per second
ICE	ICE Design & Consult
µS/cm	microsiemens per centimeter
mg/L	milligrams per liter
Michael Baker	Michael Baker International
NAVD88	North American vertical datum of 1988
OPUS	Online Positioning User Service
Ocean Point Downstream	the North transect, Transect #6, the east crossing, the downstream crossing, Ocean Point North
Ocean Point Upstream	the South transect, Transect #1, the Rolligon crossing, the west crossing, the upstream crossing, Ocean Point South
Peak	Peak Oilfield Services Company
ppt	parts per thousand
Q	discharge
RM	river mile
UMIAQ	UMIAQ, LLC
USGS	United States Geological Survey
v	velocity
Willow	Willow Project
WSE	water surface elevation

1.0 INTRODUCTION

Michael Baker International (Michael Baker) collected water resources data for Conoco Phillips Alaska, Inc. (COPA) in support of the Willow Project (Willow). Two proposed crossings of the Colville River were investigated at Ocean Point. Data was collected during three field events occurring between Fall 2019 and Spring 2020. This report summarizes the methods and results of that effort.

ICE Design & Consult (ICE), UMIAQ, LLC (UMIAQ), Soloy Helicopters, Peak Oilfield Services Company (Peak) and CPAI Alpine Helicopter and Field Environmental Coordinators provided support during the field program and contributed to a safe and productive field season.

2.0 LOCATIONS

Two transects near Ocean Point were investigated: Ocean Point Downstream (Downstream) and Ocean Point Upstream (Upstream, Figure 1). These are two among six transects investigated during the 2018-2019 ice road season. The Downstream and Upstream transects were selected based on shallow water depths relative to the other transects investigated. Ocean Point Downstream is approximately 6.5 miles direct or 8.3 river miles (RM) downstream of Ocean Point Upstream. There is one minor tributary that enters the Colville River from the south between the two locations. This tributary is a meandering beaded stream that drains multiple lakes. There is also a tributary that enters the Colville River from the northwest at the Downstream transect. This tributary is a paleochannel which drains a series of lakes that formed in abandoned meanders after the reach of river between the Downstream and Upstream transects migrated south. This area is inundated during spring breakup-induced flooding.

Ocean Point Downstream (Figure 2, also historically referred to as “Transect #6”, the “east crossing”, the “downstream crossing”, or “Ocean Point North”) is the alternate proposed crossing location. Ocean Point Upstream (Figure 3, also historically referred to as “Transect #1”, the “Rolligon crossing”, the “west crossing”, the “upstream crossing”, “Ocean Point South”) is an historic crossing location. It was the location of a snow road during the 2018-2019 season and is the preferred proposed crossing location.

Table 1 provides a summary of dates and data collected at the locations investigated. Table 2 provides a summary of measurements collected.

Table 1: Field Events

<table>
<tr><th rowspan="2">Data Collection</th><th colspan="4">Ocean Point Downstream</th><th colspan="4">Ocean Point Upstream</th></tr>
<tr><th>9/5/2019</th><th>12/31/2019</th><th>2/25/2020</th><th>4/14/2020</th><th>9/5/2019</th><th>12/31/2019</th><th>2/25/2020</th><th>4/14/2020</th></tr>
<tr><td>Discharge</td><td>✓</td><td rowspan="4" colspan="3">Crossing characterized as similar to Ocean Point Upstream so winter investigations were not performed</td><td>✓</td><td>✓</td><td>✓</td><td rowspan="4">Planned field event was cancelled</td></tr>
<tr><td>Water quality</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Water surface elevation survey</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>Bank active layer investigation</td><td>✓</td><td>✓</td><td></td><td></td></tr>
</table>

Table 2: Data Collected

Data Collected		Units	
Discharge	water depth	feet	ft
	water depth, under ice[1]	feet	ft
	ice thickness[1]	feet	ft
	snow depth[1]	feet	ft
	freeboard[1]	feet	ft
	flow width	feet	ft
	flow cross-sectional area	square feet	sqft
	velocity	feet per second	ft/s
	discharge	cubic feet per second	cfs
Water Quality	temperature	degrees Celsius	°C
	conductivity	microSiemens per centimeter	µS/cm
	specific conductance	microSiemens per centimeter	µS/cm
	salinity	parts per thousand	ppt
	dissolved oxygen	percent saturation	% sat
	dissolved oxygen	milligrams per liter	mg/L
Water Surface Elevation	water surface elevation	feet North American Vertical Datum of 1988	ft NAVD88
Bank Active Layer	thawed soil depth	feet	ft

Notes:
1. data collected only in the winter

ConocoPhillips Alaska

Miles
0 1 2

Date:	5/20/2020	Scale:	1 Inch = 5,280 Feet
Drawn:	HLR	Project:	174311
Checked:	ALS	File:	OceanPointUS&DS.mxd

Transect

Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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2019-2020
Willow Ice Road
Ocean Point H&H
Upstream & Downstream
Transects

FIGURE 1

ConocoPhillips Alaska

Feet
0 250 500 1,000

Date: 5/20/2020	Scale: 1 Inch = 528 Feet
Drawn: HLR	Project: 174311
Checked: ALS	File: OceanPointDS.mxd

Transcept — **Measured Flow Width**

2/25/2020 - not measured

Active Layer

12/31/2019 - not measured

estimated

9/5/2019

Photo

Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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2019-2020
Willow Ice Road
Ocean Point H&H
Downstream Transect

FIGURE 2

ConocoPhillips Alaska

Feet
0 250 500 1,000

Date:	5/20/2020	Scale:	1 Inch = 528 Feet
Drawn:	HLR	Project:	174311
Checked:	ALS	File:	OceanPointUS.mxd

Transect

Active Layer
estimated

Photo

Measured Flow Width
2/25/2020
12/31/2019
9/5/2019

Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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2019-2020
Willow Ice Road
Ocean Point H&H
Upstream Transect

FIGURE 3

3.0 METHODS

Field sampling methods were based on United States Geological Survey (USGS 2006a and 2006b) methods. Safety precautions were followed using the North Slope Water Resources 2019 Health, Safety, and Environment Plan (Michael Baker 2019a) and the 2019-2020 Winter Hydrology Programs – Job Safety Analysis (Michael Baker 2019b).

3.1 OPEN WATER – FALL 2019

Open water tasks were completed over the course of multiple days during one field event and were timed to occur late in the fall season, prior to freeze up. Sites were accessed via helicopter and inflatable rafts with outboard motors. The effort was conducted by a three-person field crew. The data collected includes cross-sectional river bottom profiles, discharge, velocity, water depth, water surface elevation, site conditions, and in-situ water quality. Soil active layer depths were also investigated for both banks of each crossing.

Discharge, velocity, and cross-sectional river bottom profiles were measured using a RiverRay acoustic doppler current profiler (ADCP) (Photo 3.1). The ADCP was mounted in a trimaran. The trimaran was tethered via boom to the side of a 13-ft Achilles inflatable raft powered by outboard motor (Photo 3.2).

Photo 3.1: Discharge measurement at Ocean Point Upstream Transect; 9/5/19

Water surface elevation (WSE) at the time of discharge and water quality measurements were determined using temporary benchmarks installed by UMIAQ surveyors and Michael Baker. UMIAQ benchmarks are aluminum cap survey control referenced to OPUS NAVD88 elevation. Michael Baker benchmarks are aluminum cap survey control tied by level loop technique to the UMIAQ control.

Photo 3.2: In-situ water quality sampling at Ocean Point Downstream Transect; 9/5/19

In-situ water quality parameters including temperature, conductivity (C), and salinity were recorded using the YSI ProPlus meter; dissolved oxygen (DO) was measured using the YSI ProODO meter. Specific conductance (SC) referenced to 25 degrees Celsius was calculated based on temperature, conductivity, and a conversion coefficient of 0.0196 based on empirical data. Measurements were collected at the deepest portion of each cross-section; two depths were investigated at each to confirm that parameters were consistent throughout the water column.

Photo 3.3: Investigating soil active layer at Ocean Point Downstream Transect; right/east bank; 9/4/19

The soil active layer was investigated to characterize the depth of permafrost below the surface in the transition zones adjacent to the river. This investigation was performed on the right and left banks of each transect, perpendicular to the channel. Probing was performed using a 5-foot long T-bar probe driven by hand (Photo 3.3). Spacing was approximately 5-foot increments and at major grade breaks, between water's edge and the top of the riverbank. Results were provided directly to Golder as a separate deliverable and included in this report along with discharge and water quality in Attachment A.

3.2 ICE COVER – WINTER 2019 - 2020

Three field events were planned to investigate the trend in flow quantity and water quality over the course of the ice-cover season. Freeze-up typically initiates in mid-October and breakup typically initiates in mid-May. Ice cover field events were one day apiece. The first was performed early in the season, the second in the middle of the season, and a third was planned at the end of the season. The third field event was cancelled due to circumstances related to COVID-19 and changing project priorities. Data was collected at one transect, Ocean Point Upstream. This included under-ice cross-sectional river bottom profiles, discharge, velocity, water depth, ice thickness, water surface elevation, site conditions related to overflow, and in-situ water quality.

A one-person Michael Baker field crew conducted both events, supported by an ICE engineer who performed crossing profiling. UMIAQ and Peak provided transportation to the sampling locations and general field support. The sites were accessed by Hägglund and Rolligon.

Water measurements were facilitated by mechanically drilling through the river surface ice cover. Thermal drill probing was performed by ICE to identify the extents of under-ice water bounded at the left and right by ice grounded against the channel bed. Investigation of soils or groundwater within the channel bed was not performed. Discharge was determined using USGS mid-section techniques. Velocity was measured using a handheld Hach flow meter (Photo 3.4) and a handheld Sontek flow meter. These were attached to a fixed rod and lowered to 0.6 the water depth below the ice. In-situ water quality parameters investigated were the same as those in the fall. Measurements were collected at multiple depths from one location in the deepest portion of the cross-section.

Photo 3.4: Attaching Hach flow meter to fixed rod at Ocean Point Upstream; 2/25/20

Previously submitted ice cover season field data is provided in Attachment C and Attachment D.

4.0 RESULTS AND CONCLUSIONS

A summary of Colville River Ocean Point water resources information is provided below. Previously submitted trip reports and field data are provided in Attachment B through Attachment D.

4.1 TRANSECT LOCATIONS

The Ocean Point Downstream transect is located where a tributary enters the Colville River on the left/west bank. It is unknown what, if any, flow is contributed from this tributary during the ice-cover season. Bankfull width at this location is approximately 2,500 feet based on aerial imagery. This reach of the Colville River is relatively straight. Bars are exposed during low water. The low water channel lies approximately central to the cross section and the thalweg lies toward the left/west portion of the low water channel. Both banks are steep. The right/east bank is steeper than the left/west with sloughing and block failure; evidence of both thermal and mechanical erosion. The tops of both banks and overbanks are vegetated. Vegetation is present on the upper left/west bank below the top. Vegetation is present on the right/east bank.

The Ocean Point Upstream transect is located where the Colville River is conveyed within a single channel with a bankfull width of approximately 3,200 feet based on aerial imagery. The Colville River transitions from relatively straight to a wide bend at this location. The left/east bank is on the cut-bank inside of the bend and the right/west bank is on the point-bar outside of the bend. Bars are exposed during low water. The low water channel is located closer to the left/east bank and the thalweg lies toward the in the right/west portion of the low water channel. Both banks are steep. The left/east bank is steeper than the right/west bank. The tops of both banks and overbanks are vegetated. Vegetation is present on the upper left/east bank below the top. Vegetation is present on the right/west bank.

No springs were observed at the bank of either transect during the open water field event. No overflow, aufeis, or evidence of any other notable hydraulic occurrence was observed at Ocean Point Upstream during the ice-cover field events. Open water data collected at Ocean Point Downstream were compared against those collected at Ocean Point Upstream. With respect to discharge quantity and water quality parameters, values were similar between the two locations.

Photo 4.1: Field investigation at Ocean Point Upstream, looking toward the left/east bank; 2/25/20

Ice-cover investigation was performed only at Ocean Point Upstream (Photo 4.1). This was determined considering: the comparison of open water discharge quantity and water quality values, the better suitability of the Upstream transect to the Downstream transect based on the potential for undesirable geomorphological and hydraulic influences (i.e. actively eroding and sloughing bank and a tributary at Ocean Point Downstream), the remoteness of Ocean Point relative to facilities and the challenges of winter accessibility, the time available for investigation, and the historical use of the upstream transect.

4.2 BANK ACTIVE LAYER

The active layer was investigated in September, at the end of the thawing season. Elevations were not surveyed. Depths of thawed soil, as measured by probing to refusal, ranged from 1.75 feet to greater than 5 feet. Thaw depths were shallower at the tops of banks and deeper approaching the channel. A summary of thaw depths is provided in Table 3. Approximate locations probed are provided in Figure 2 and Figure 3.

Table 3: Colville River Ocean Point Bank Thaw Depth Summary

Ocean Point Downstream				Ocean Point Upstream			
bank thaw depth (ft)							
Left/West Bank		Right/East Bank		Left/East Bank		Right/West Bank	
mean	median	mean	median	mean	median	mean	median
4.4	5.0	2.2	1.8	4.1	4.3	4.0	3.6

Notes:

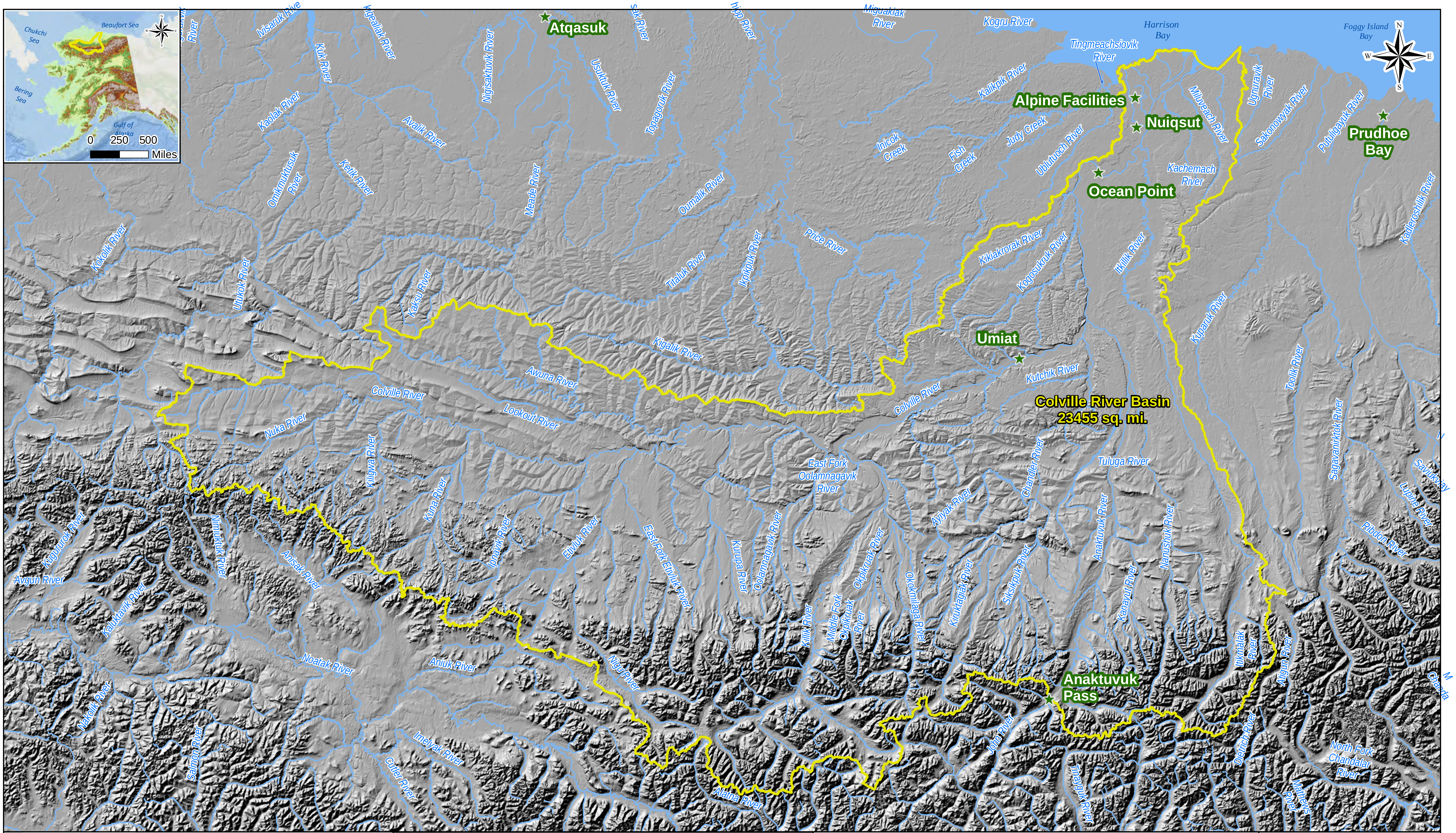
Thaw depths of 5 feet indicated frozen ground was not encountered. These were assumed to be 5 feet for calculated averages though actual values are greater.

4.3 PHYSICAL WATER MEASUREMENTS

Colville River open water discharge measured at the Ocean Point Downstream transect was within 200 cfs, or 0.7% difference, of the discharge measured at the Ocean Point Upstream transect. The errors associated with each discharge measurement transect (two at the Downstream transect and four at the Upstream transect) were less than +/-1.5%. The total average error associated with discharge measured at each location was 0.0%, with a standard deviation of 0.3% at Ocean Point Downstream and 1.1% at Ocean Point Upstream.

Measuring discharge under ice cover is subject to limitations not applicable to open water measurements. Unlike open water where it is obvious where the edge of water exists, it is not possible to see the extents of the cross-sectional area of flow under the ice. Further, it is not possible to profile the entire cross-section. It is assumed that the cross-sectional area is relatively uniform upstream of, downstream of, and between measurement stations. However, the potential exists for “unseen” grounded or relatively shallow areas which would influence measured velocity direction and magnitude if occurring upstream or downstream of a measurement station. Grounded areas between measurement stations would reduce the estimated cross-sectional area of flow and resulting discharge. Colville River discharge measured at Ocean Point Upstream during the ice-cover season was significantly less than discharge measured during the open water season. Discharge decreased as the ice-cover season progressed.

This decreasing trend is also apparent in the Colville River at Umiat where a continuous gage station is operated by the USGS (USGS 2020). This location is approximately 70 RM upstream of Ocean Point (Figure 4). The drainage area between is expansive, including multiple large tributaries as well as an unknown quantity of groundwater springs. Despite this, general comparison regarding seasonal discharge trends can be made.



ConocoPhillips Alaska

Miles
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Date:	5/14/2020	Scale:	1 Inch = 21.71 Miles
Drawn:	JEG	Project:	174311
Checked:	HLR	File:	ColvilleDrainage.mxd

Community
Stream
Colville River Drainage Basin

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2019-2020
Willow Ice Road
Ocean Point H&H
Colville River Basin

FIGURE 4

The USGS Colville River gage at Umiat (USGS 15875000 COLVILLE R AT UMIAT AK) was established in 1953. Hydrologic stage and discharge data are available from this site. Values provided are historical and current; they are alternatively measured, instantaneous, time-averaged, and statistical. Direct measurements validate calculated results. River hydraulics and environmental factors differ between the open water and ice-cover seasons, which necessitates different approaches to data collection and calculation during each.

During the open water season, instantaneous stage at Umiat is measured and provided. Instantaneous discharge is determined based on stage using a stage-discharge rating curve. The rating curve was developed by plotting measured stage events against measured concurrent discharge events. The accuracy of the rating curve is directly proportional to the accuracy and quantity of the measurements used to plot it. Numerous factors affect discharge measurements including temporal site conditions, equipment and technique used, and experience of the hydrologist (USGS 2010). USGS evaluates discharge measurements qualitatively by the ratings “excellent” (within 2%), “good” (within 5%), “fair” (within 8%), and “poor” (greater than 8%). Since 2002, 153 direct discharge measurements have been made by the USGS at the Umiat gage site. Of these, 102 have occurred during the open water season. Of those, 24% were rated “good”, 61% were rated “fair”, and 18% were rated “poor”. None were rated “excellent” and one was not rated. Open water time-averaged and statistical values, i.e. daily means, mean of daily means, peaks, etc. for stage and discharge are determined based on instantaneous and measured values.

Instantaneous, time-averaged, and statistical stage values at Umiat are not provided during the ice-cover season. Time-averaged and statistical discharge values are provided, however. Measured stage and discharge values are also provided. There have been 37 direct measurements performed under the influence of surface ice cover. Of those, 5% were rated “good”, 16% were rated “fair”, and 76% were rated “poor”. None were rated “excellent” and one was not rated. Daily mean discharge is determined not based on stage, but instead on storage depletion modeling based on time and using a low-flow value immediately prior to freeze-up as the controlling factor. Umiat daily mean discharges for the 2019-2020 ice-cover season have yet to be validated and made available. The mean of daily mean values, however, are available for comparison to measurements collected at Ocean Point. The period of record informing those is between October 1, 2001 and September 30, 2019.

Colville River discharges measured at Ocean Point are provided in Table 4. Colville River discharges at Umiat are provided for comparison.

Table 4: Colville River Discharge

Date	Ocean Point Downstream		Ocean Point Upstream		Umiat[1]	Percent difference[2]
	measured discharge (cfs)	rating	measured discharge (cfs)	rating	mean discharge (cfs)	%
9/5/2019	28,900	fair	29,000	good	19,900[3]	46%
12/31/2019	-		135	poor	41[4]	229%
2/25/2020	-		9	fair	6.2[4]	45%
4/14/2020	-				2.9[4]	-

Notes:
1. USGS Gage 15875000 COLVILLE R AT UMIAT AK
2. Between Colville River Umiat and Ocean Point Upstream
3. Daily mean discharge record; mean of daily mean discharge is 20,100 cfs
4. No daily mean discharge record yet available for this date; value is mean of daily mean between 10/01/2001 and 09/30/2020

The lowest annual mean of daily mean discharges for the Colville River at Umiat is 2.9 cfs. This occurs between April 13 and April 21. Discharge is similarly low during the month of April and relatively low throughout the winter season. Discharge increases by orders of magnitude as breakup processes initiate in mid-May, peaking at the end of May. These data are provided in Table 5 and graphically in Chart 1 and Chart 2.

Table 5: Mean of Daily Mean Discharge Values for Colville River at Umiat

00060, Discharge, cubic feet per second,												
Day of	Mean of daily mean values for each day for water year of record in, ft3/s (Calculation Period 2001-10-01 -> 2019-09-30)											
month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	40	13	5.5	3	15	90,400	17,700	15,300	20,100	5,950	676	157
2	39	13	5.4	3	39	83,600	17,800	19,400	21,700	5,900	641	149
3	36	12	5.2	3	121	79,100	17,600	18,700	22,700	6,730	610	144
4	35	12	5.1	3	215	78,100	20,600	19,200	22,500	9,670	574	133
5	34	11	5	3	151	79,200	17,800	22,700	20,100	8,710	549	129
6	34	11	4.8	3	133	76,000	15,500	21,600	18,200	6,620	517	123
7	32	11	4.7	3	121	75,800	14,100	19,400	17,400	5,610	501	113
8	30	11	4.6	3	110	69,300	12,800	19,200	17,400	4,830	475	109
9	29	10	4.3	3	105	62,100	12,200	18,300	16,400	4,170	448	104
10	28	10	4.3	3	111	58,700	13,100	16,700	15,800	3,630	422	99
11	27	9.4	4.2	3	100	56,700	15,500	15,500	15,400	3,120	405	95
12	26	9.2	4.1	2.9	101	51,300	16,200	15,300	13,900	2,800	378	90
13	25	9.1	4	2.9	105	43,900	15,100	17,100	13,300	2,610	364	87
14	24	9	4	2.9	2,140	38,000	14,000	22,100	12,800	2,420	346	82
15	24	8.6	3.8	2.9	4,740	33,700	13,600	26,600	13,300	2,070	327	79
16	23	8.5	3.7	2.9	4,110	31,600	14,800	24,700	13,700	1,890	313	75
17	22	8	3.7	2.9	7,270	29,400	13,700	22,100	13,600	1,720	301	73
18	21	7.8	3.6	2.9	14,200	27,200	13,800	24,100	12,700	1,580	278	70
19	20	7.5	3.5	2.9	20,000	25,600	15,000	27,000	12,000	1,450	271	68
20	19	7.5	3.5	2.9	23,700	25,100	17,600	24,300	11,200	1,370	257	64
21	19	7.2	3.3	2.9	29,600	24,200	20,100	21,600	10,500	1,280	249	63
22	18	7	3.3	3	36,300	24,300	19,500	20,800	10,200	1,200	231	59
23	18	6.6	3.3	3	45,100	24,000	18,900	21,600	10,400	1,120	224	57
24	17	6.5	3.2	3.1	57,000	25,900	19,900	22,500	9,890	1,060	210	56
25	17	6.2	3.2	3.1	59,300	23,400	18,700	22,300	9,040	990	204	53
26	16	6.1	3.2	3.2	65,900	21,600	16,400	22,300	8,470	944	196	51
27	15	5.9	3.2	3.2	66,600	22,000	16,200	21,100	7,730	894	187	49
28	15	5.8	3.2	3.3	65,500	23,300	15,600	22,100	7,190	844	178	47
29	14	3.5	3.2	3.5	73,000	22,400	13,900	21,400	6,600	797	172	45
30	14		3.2	6.5	89,200	19,500	12,400	20,200	6,250	755	164	43
31	14		3		94,700		12,500	19,900		708		41

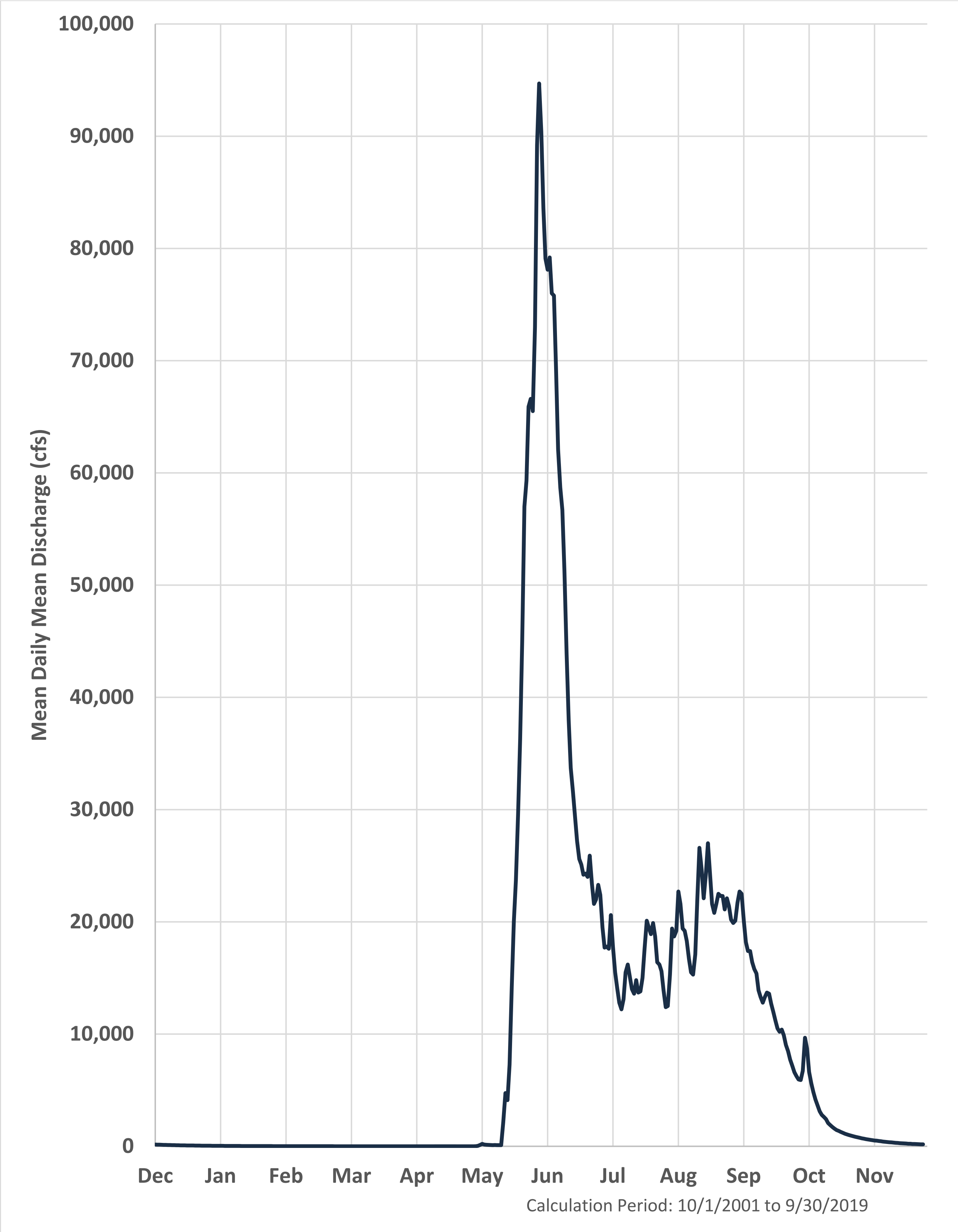

Chart 1: USGS Mean of Daily Mean Discharge Values for Colville River at Umiat - Annual

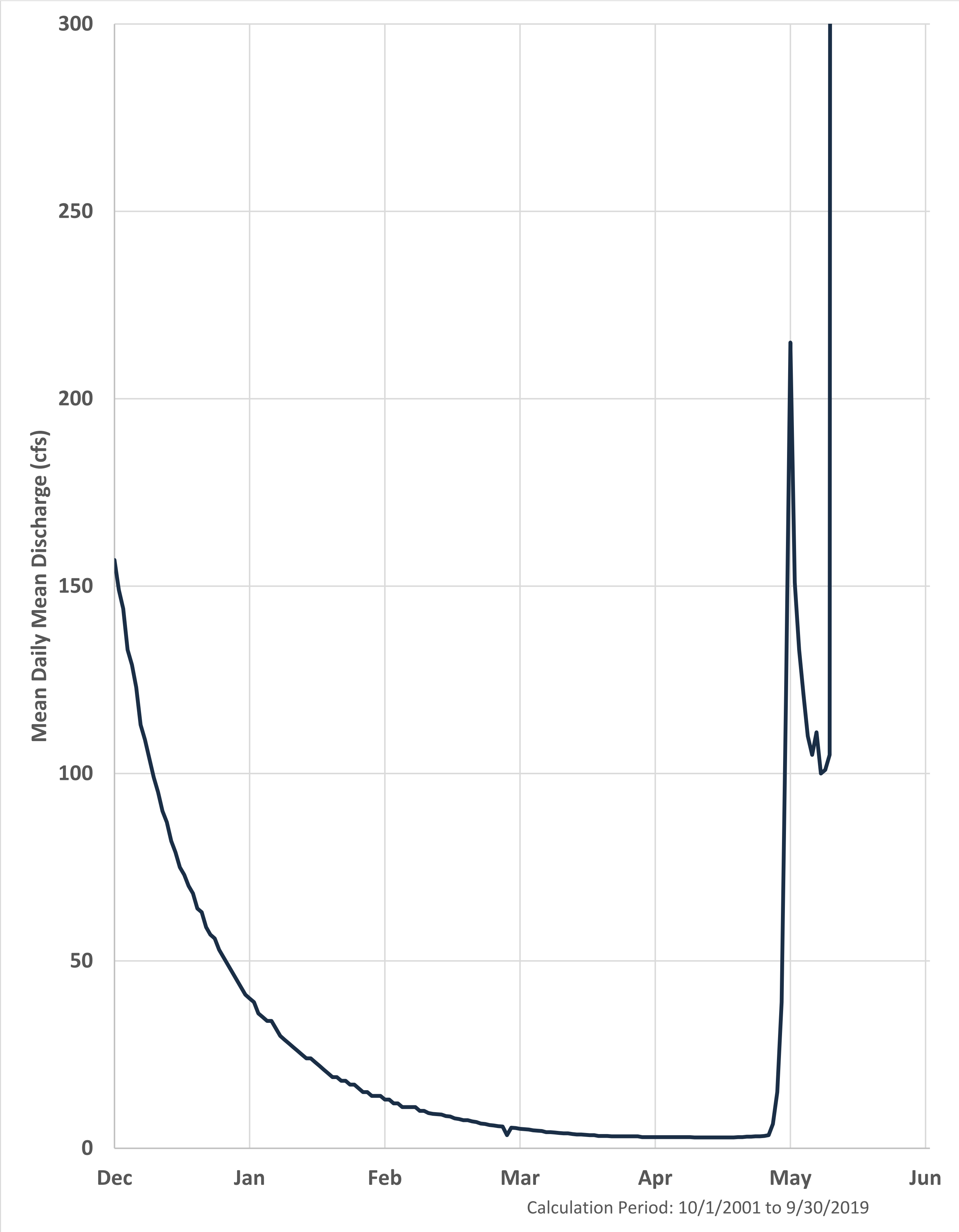

Chart 2: USGS Mean of Daily Mean Discharge Values for Colville River at Umiat – December through May

It is reasonable to assume that Colville River seasonal discharge trends at Ocean Point are similar to those at Umiat. Direct measurements at Ocean Point support this conclusion. Lacking evidence suggesting otherwise, it is further reasonable to assume that mid-April discharge at Ocean Point, had it been measured, would have been lower than the 9 cfs measured in February.

A summary of additional physical parameters measured during the project performance period are provided in Table 6 through Table 9.

Table 6: Colville River Ocean Point Discharge and Water Surface Elevation Summary

Date	Ocean Point Downstream		Ocean Point Upstream	
	measured discharge (cfs)	water surface elevation (ft NAVD88)	measured discharge (cfs)	water surface elevation (ft NAVD88)
9/5/2019	28,900	8.82	29,000	11.67
12/31/2019	-		135	-
2/25/2020	-		9	5.48

Table 7: Colville River Ocean Point Velocity Summary

Date	Ocean Point Downstream		Ocean Point Upstream	
	measured velocity (ft/s)			
	maximum	average	maximum	average
9/5/2019	9.1	2.8	10.5	3.0
12/31/2019	-		0.25	0.15
2/25/2020	-		0.11	0.04

Table 8: Colville River Ocean Point Water Depth Summary

Date	Ocean Point Downstream		Ocean Point Upstream	
	effective water depth (ft/s)			
	maximum	average	maximum	average
9/5/2019	13.2	5.5	12.0	5.0
12/31/2019	-		2.3	1.5
2/25/2020	-		1.3	0.8

Table 9: Colville River Ocean Point Flow Width Summary

Date	Ocean Point Downstream	Ocean Point Upstream
	flow width (ft)	
9/5/2019	1,803	1,270
12/31/2019	-	650
2/25/2020	-	304

4.4 WATER QUALITY MEASUREMENTS

Salinity and conductivity measurements throughout the monitoring period suggest this location is upstream of coastal influence. While values increased between the open water and ice-cover seasons, results are indicative of freshwater rather than a saline environment. Increases are likely attributable to concentration as a result of the freshwater freezing process, which readily excludes entrained materials. Temperature decreased between the open water and ice-cover season. Dissolved oxygen also decreased. This is typical of water bodies under the influence of ice cover, which prevents the introduction and mixing of atmospheric oxygen.

Table 10: Colville River Ocean Point Water Quality Summary

Date	Ocean Point Downstream							Ocean Point Upstream						
	total depth	temperature	conductivity	specific conductance	dissolved oxygen	dissolved oxygen	salinity	total depth	temperature	conductivity	specific conductance	dissolved oxygen	dissolved oxygen	salinity
	(ft)	(°C)	(µS/cm)	(µS/cm)	(mg/L)	(%)	(ppt)	(ft)	(°C)	(µS/cm)	(µS/cm)	(mg/L)	(%)	(ppt)
9/5/2019	10.0	10.0	202	286	11.3	99.8	0.14	9.0	9.9	204	289	11.2	99.2	0.14
12/31/2019	-							5.0	0.1	225	440	5.7	39.5	0.20
2/25/2020	-							5.5	0.4	288	557	2.6	17.7	0.26

5.0 REFERENCES

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Attachment A Photos – Riverbanks

Note: Photo locations are provided in Figure 2 and Figure 3. Photo elevations are unknown.

Photo A.1: Ocean Point Downstream transect left/west bank, looking upstream/southwest toward tributary; 9/5/19

Photo A.2: Ocean Point Downstream transect right/east bank; looking upstream/southwest; 9/4/19

Photo A.3: Ocean Point Downstream transect right/east bank; looking toward channel/west; 9/4/19

Photo A.4: Ocean Point Downstream transect right/east bank; looking downstream/northeast; 9/4/19

Photo A.5: Ocean Point Upstream transect left/east bank exposed bar; looking upstream/northwest; 9/5/19

Photo A.6: Ocean Point Upstream transect left/east bank; looking downstream/southeast; 9/5/19

Photo A.7: Ocean Point Upstream transect right/west bank; looking upstream/northwest; 9/4/19

Photo A.8: Ocean Point Upstream transect right/west bank; looking toward channel/east; 9/4/19

Photo A.9: Ocean Point Upstream transect right/west bank exposed bar; looking upstream/northwest; 9/5/19

Attachment B Open Water – September 5, 2019 Field Report

2019 Willow Ice Road
Fall Field Trip Report

Michael Baker International
3900 C Street Suite 900
Anchorage, AK 99503

Prepared for:

ConocoPhillips
Alaska

MSA Contract No. 296937

Table of Contents

Figures

Photos

Tables

Acronyms & Abbreviations

°C	degrees Celsius
ADCP	acoustic doppler current profiler
cfs	cubic feet per second
CPAI	ConocoPhillips Alaska, Inc.
fps	feet per second
ft	feet
µS/cm	microsiemens per centimeter
mg/L	milligrams per liter
Michael Baker	Michael Baker International
NAVD88	North American vertical datum of 1988
OPUS	Online Positioning User Service
ppt	parts per thousand
Q	discharge
v	velocity
WSE	water surface elevation

1. INTRODUCTION

Michael Baker International (Michael Baker) collected open water data for Conoco Phillips Alaska, Inc. (CPAI) for the Willow ice road project. This field event was the first of multiple trips between Fall 2019 and Spring 2020; it occurred between September 4 and September 6, 2019. These efforts are designed to support the characterization of two proposed ice road crossings of the Colville River near Ocean Point. This document presents a summary of this field effort and the preliminary results of the data collection.

2. LOCATIONS

Two transects near Ocean Point were investigated: Transect #1 and Transect #6 (Figure 1). These are two among six transects investigated during the 2018-2019 ice road season. Both were selected based on shallow water depths relative to the other areas. Transect #1 (also referred to as the “rolligon crossing”, the “west crossing”, or the “upstream crossing”) is an historic crossing location. It was the location of a snow road during the 2018-2019 season and is the preferred proposed heavy haul crossing location. Transect #6 (also referred to as the “east crossing” or the “downstream crossing”) is the alternate proposed crossing location.

ConocoPhillips Alaska

Miles
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Date:	07/26/2019	Project:	170782
Drawn:	BTG	File:	Figure 1
Checked:	HLR	Scale:	1 in = 1 miles

Legend

Transect

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2019-2020
Alpine Ice Road H&H
Ocean Point

FIGURE: 1

(SHEET 1 of 1)

3. METHODS

Michael Baker collected field data at two proposed crossing locations across the Colville River near Ocean Point. Data included cross-sectional river bottom profiles, discharge, velocity, water depth, water surface elevation, site conditions, and general in-situ water quality parameters. Soil active layer depths were also investigated for both banks of each crossing.

Discharge, velocity, and cross-sectional river bottom profiles were measured using a RiverRay acoustic doppler current profiler (ADCP) (Photo 1). The ADCP was mounted in a trimaran. The trimaran was tethered via boom to the side of a Zodiac inflatable raft powered by outboard motor (Photo 2).

Photo 1. Discharge measurement in progress at Transect #1; Sept 5, 2019

In-situ water quality parameters including temperature, conductivity (C), and salinity were recorded using the YSI ProPlus meter; dissolved oxygen (DO) was measured using the YSI ProODO meter. Specific conductance (SC) referenced to 25 degrees Celsius was calculated based on temperature, conductivity, and a conversion coefficient of 0.0196 based on empirical data. Measurements were collected at the deepest portion of each cross-section; two depths were investigated at each to confirm that parameters were consistent throughout the water column.

Photo 2. In-situ water quality sampling at Transect #6; Sept 5, 2019

Water surface elevation (WSE) at the time of discharge and water quality measurements were determined using temporary benchmarks installed by UMIAQ surveyors and Michael Baker. UMIAQ benchmarks are aluminum cap survey control referenced to OPUS NAVD88 elevation. Michael Baker benchmarks are aluminum cap survey control tied by level loop technique to the UMIAQ control.

The soil active layer was investigated to characterize the depth of permafrost below the surface in the transition zones adjacent to the river. This investigation was performed on the right and left banks of each transect, perpendicular to the channel. Probing was performed using a 5-foot long T-bar probe driven by hand (Photo 3). Spacing was approximately 5-foot increments and at major grade breaks, between water's edge and the top of the riverbank. Results were provided directly to Golder as a separate deliverable and included in this report as Appendix A.

Photo 3. Investigating soil active layer at Transect #6; left bank. Sept 4, 2019

These tasks were completed over the course of multiple days during one field event and were timed to occur late in the fall season, prior to freeze up.

4. RESULTS

Results of the field effort are presented below.

4.1. Colville River Ocean Point Measured Discharge

TRANSECT #1

Location: Transect #1/Rolligon Route

Date & Time: September 5, 2019 2:50 PM

Equipment: RiverRay ADCP attached to the side of an inflatable raft with outboard motor

WSE (ft NAVD88): 11.67

Discharge ([Q] cfs): 29,000

Velocity ([v] fps): 2.7

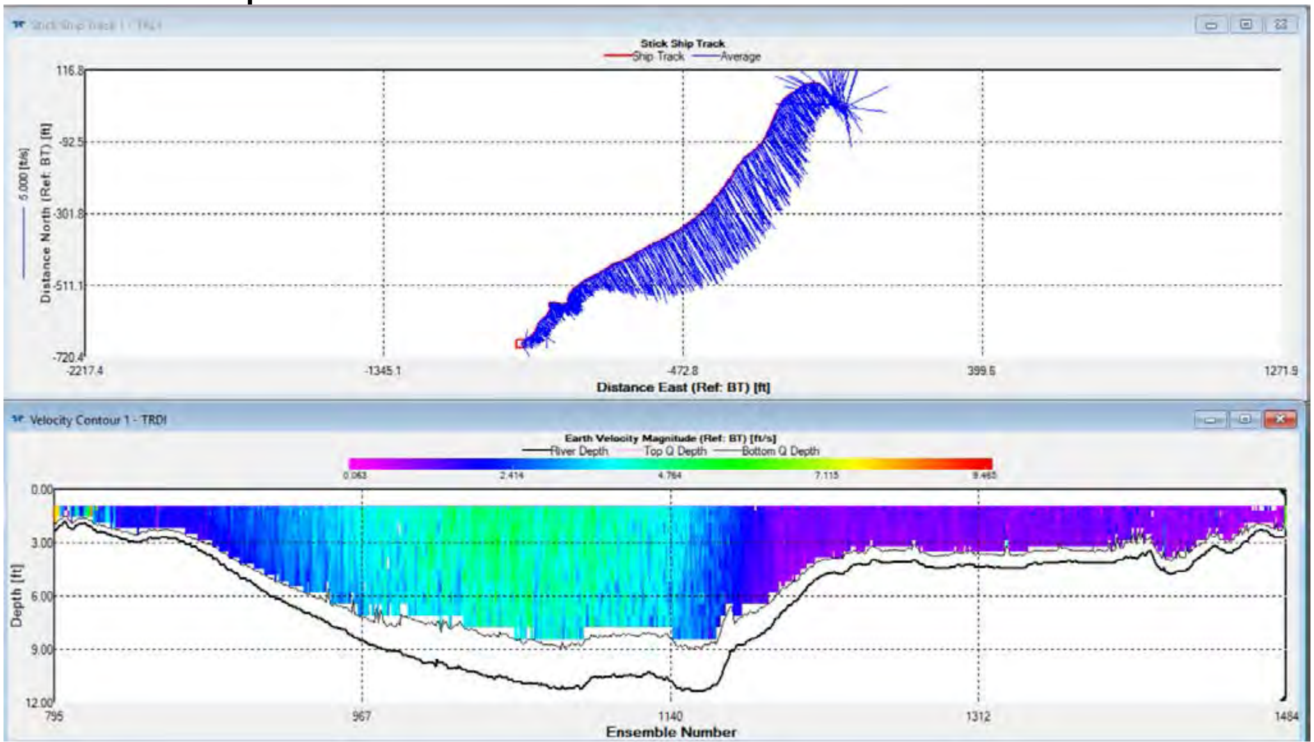
Measurement Rating: Good

Measurement Notes At the time of the measurement, open-channel conditions were present. Wind was negligible and surface waves were not present. Prior to deployment, diagnostic tests were performed, and the internal compass calibrated.

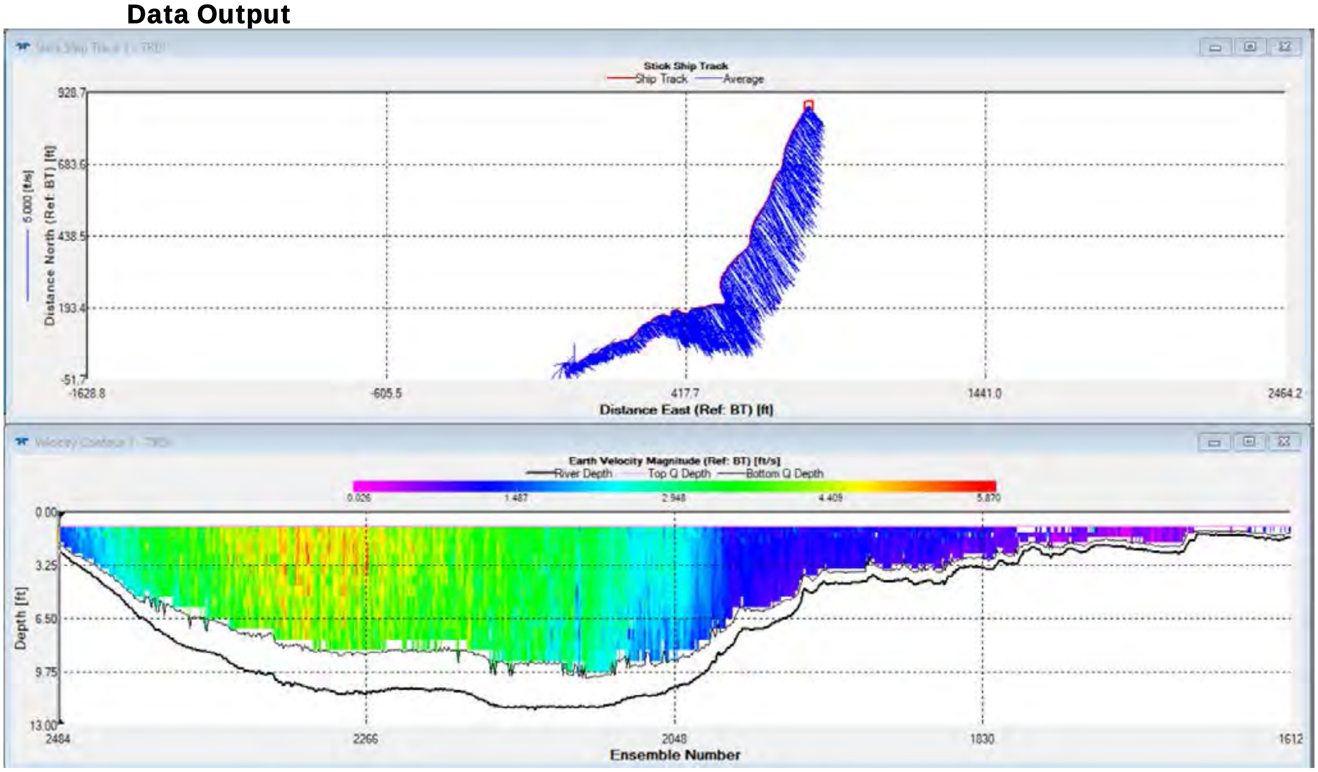
Table 1. Colville River Ocean Point Transect #1 Measured Discharge Summary

Measurement Transect #	Starting Bank	Total Q (cfs)	Delta Q (%)	Measured Q (cfs)	Delta Measured Q (%)	Measured Width (ft)	Measured Area (Q/v) (ft^2)	Total Area (ft^2)	Measured Velocity (ft/s)	Total Velocity (ft/s)
001	Left	28,811	-0.88%	20,083	-0.71%	1,256	8,056	9,468	2.49	3.04
002	Right	29,436	1.27%	20,470	1.20%	1,264	7,567	9,913	2.71	2.97
003	Left	29,228	0.55%	20,238	0.05%	1,258	7,551	9,666	2.68	3.02
004	Right	28,795	-0.94%	20,117	-0.54%	1,300	7,106	9,738	2.83	2.96
	Average:	**29,068**		**20,227**		**1,270**	**7,570**	**9,696**	**2.68**	**3.00**

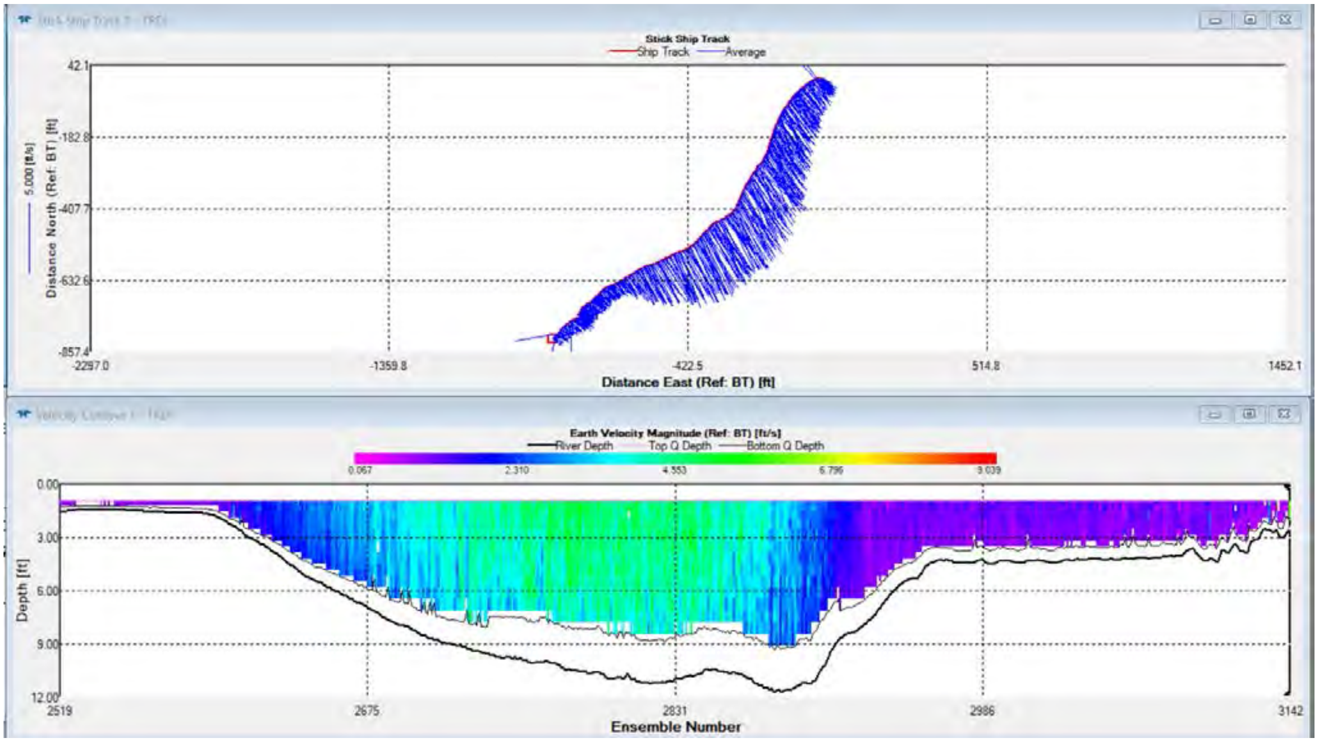
A. **Colville River Ocean Point Transect#1/Rolligon Route: Measurement Transect 001 Raw Data Output**



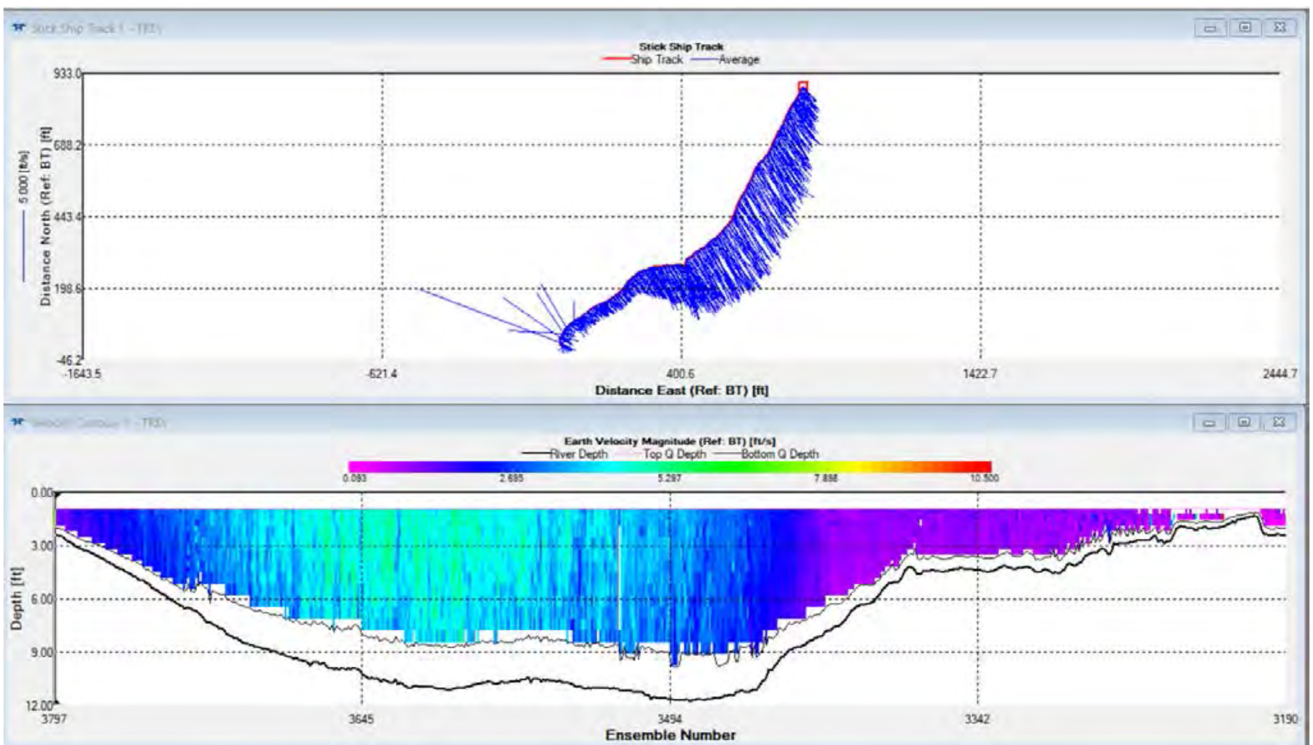
B. **Colville River Ocean Point Transect#1/Rolligon Route: Measurement Transect 002 Raw Data Output**



C. Colville River Ocean Point Transect #1 / Rolligon Route: Measurement Transect 003 Raw Data Output



D. Colville River Ocean Point Transect #1 / Rolligon Route: Measurement Transect 004 Raw Data Output



TRANSECT #6

Location: Transect #6

Date & Time: September 5, 2019 4:50 PM

Equipment: RiverRay ADCP attached to the side of an inflatable raft with outboard motor

WSE (ft NAVD88): 8.82

Discharge ([Q] cfs): 28,900

Velocity ([v] fps): 2.8

Measurement Rating: Fair

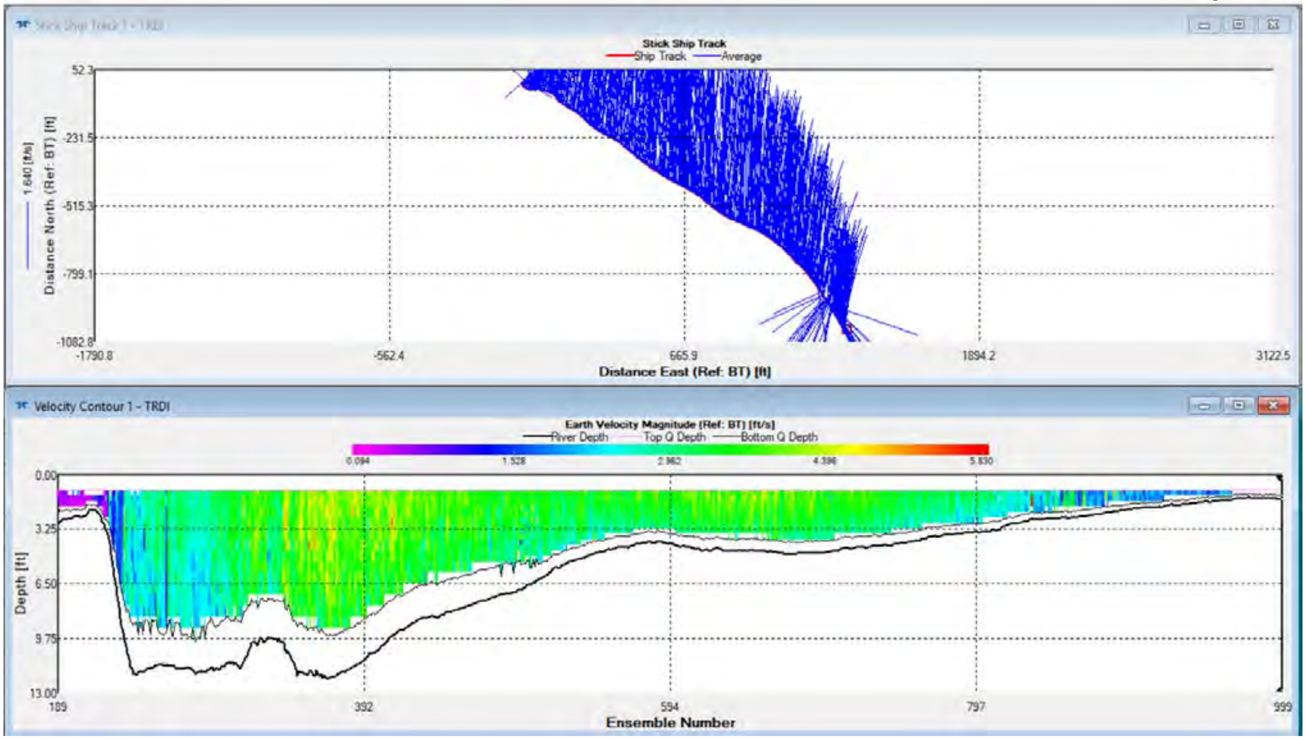
Measurement Notes: At the time of the measurement, open-channel conditions were present. Wind was negligible and surface waves were not present. Prior to deployment, diagnostic tests were performed, and the internal compass calibrated.

A tributary enters the Colville River at this crossing location. Discharge was measured just downstream of the tributary. The deeper channel bathymetry influenced by this tributary is evident in the left bank side of the profile in the figures below.

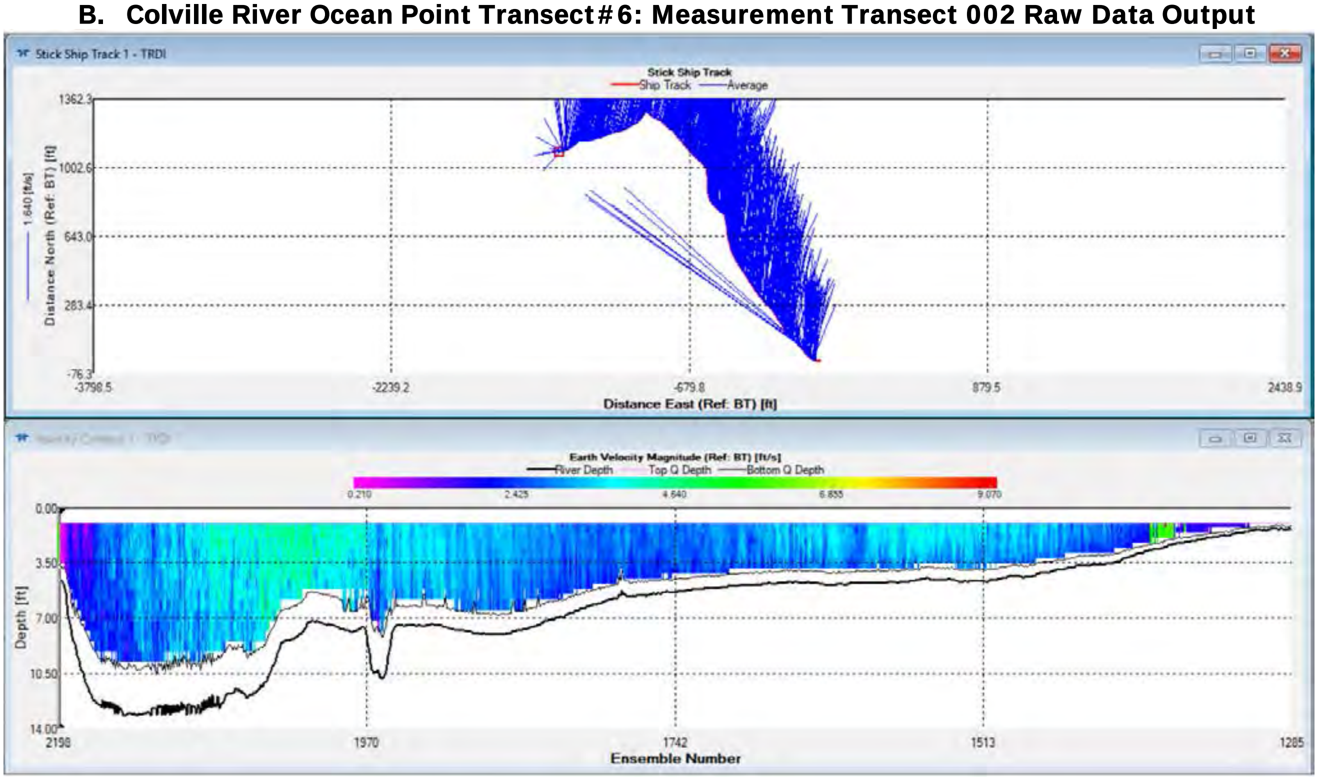
Table 2. Colville River Ocean Point Transect #6 Measured Discharge Summary

Measurement Transect #	Starting Bank	Total Q (cfs)	Delta Q (%)	Measured Q (cfs)	Delta Measured Q (%)	Measured Width (ft)	Measured Area (Q/v) (ft^2)	Total Area (ft^2)	Measured Velocity (ft/s)	Total Velocity (ft/s)
000	Left	28,809	-0.23%	18,864	-0.48%	1,771	6,163	10,313	3.06	2.79
002	Right	28,939	0.23%	19,046	0.48%	1,836	6,216	10,100	3.06	2.87
	Average:	**28,874**		**18,955**		**1,803**	**6,189**	**10,206**	**3.06**	**2.83**

A. Colville River Ocean Point Transect#6: Measurement Transect 000 Raw Data Output



B. Colville River Ocean Point Transect#6: Measurement Transect 002 Raw Data Output



4.2. Colville River Ocean Point Measured Water Quality

Table 3. Measured Water Quality Parameters

Location	Date & Time	Total Depth (ft)	Depth (ft)	Temp (°C)	Conductivity (µS/cm)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Salinity (ppt)
Transect #1/ Rolligon Route N70.0513° W151.3705°	9/05/19 3:50pm	9	4	10	204	288	11.22	99.1	0.14
			8	9.8	203	290	11.23	99.2	0.14
Transect #6 N70.0652° W151.1012°	9/05/19 5:40pm	10	4	10	201	285	11.18	99.2	0.13
			8	9.9	202	287	11.32	100.3	0.14

Notes:
(1) Sample depth is measured from the water surface.
(2) Temperature, conductivity, and salinity were measured using a YSI ProPlus meter.
(3) Dissolved oxygen was measured using a YSI ProDO meter.
(4) Specific conductance (referenced to 25°C) was obtained using a conversion coefficient of 0.0196 based on empirical data.

Appendix A. Active Layer Investigation Results

Transect 1 - Right Bank					
Distance (ft)	Depth (ft)	Note	Distance (ft)	Depth (ft)	Note
-15	3.70	Top of bluff	150	3.50	
-10	5.00	Face of bluff	155	3.45	
0	4.35	Bottom of bluff	160	3.40	
5	4.50		165	3.25	
10	4.55		170	3.30	
15	5.00		175	3.30	
20	5.00		180	3.30	
25	5.00		185	3.30	
30	5.00		190	3.30	
35	5.00		195	3.30	
40	5.00		200	3.30	
45	5.00		205	3.20	
50	5.00		210	3.20	
55	5.00		215	3.20	
60	5.00		220	3.20	
65	5.00		225	3.20	
70	5.00		230	3.20	
75	5.00		235	3.20	
80	5.00		240	3.10	
85	5.00		245	3.10	
90	5.00		250	3.10	
95	5.00		255	3.10	
100	5.00		260	3.10	
105	5.00		265	3.10	
110	5.00		270	3.10	
115	4.80		275	3.10	
120	4.10		280	3.10	
125	3.90		285	3.10	
130	3.70		290	3.10	
135	3.65		295	3.10	
140	3.65		300	3.10	Edge of Water
145	3.60				

*Thaw depths of 5 feet indicate frozen ground was not encountered.

Transect 1 - Left Bank		
Distance (ft)	Depth (ft)	Note
-30	2.30	tundra behind bluff
-10	2.80	
0	3.25	Top of bluff
5	4.50	Top of bluff, out of willows
10	5.00	Face of bluff
15	5.00	Face of bluff
20	4.00	Bottom of bluff
25	4.10	
30	4.50	
35	5.00	Edge of Water

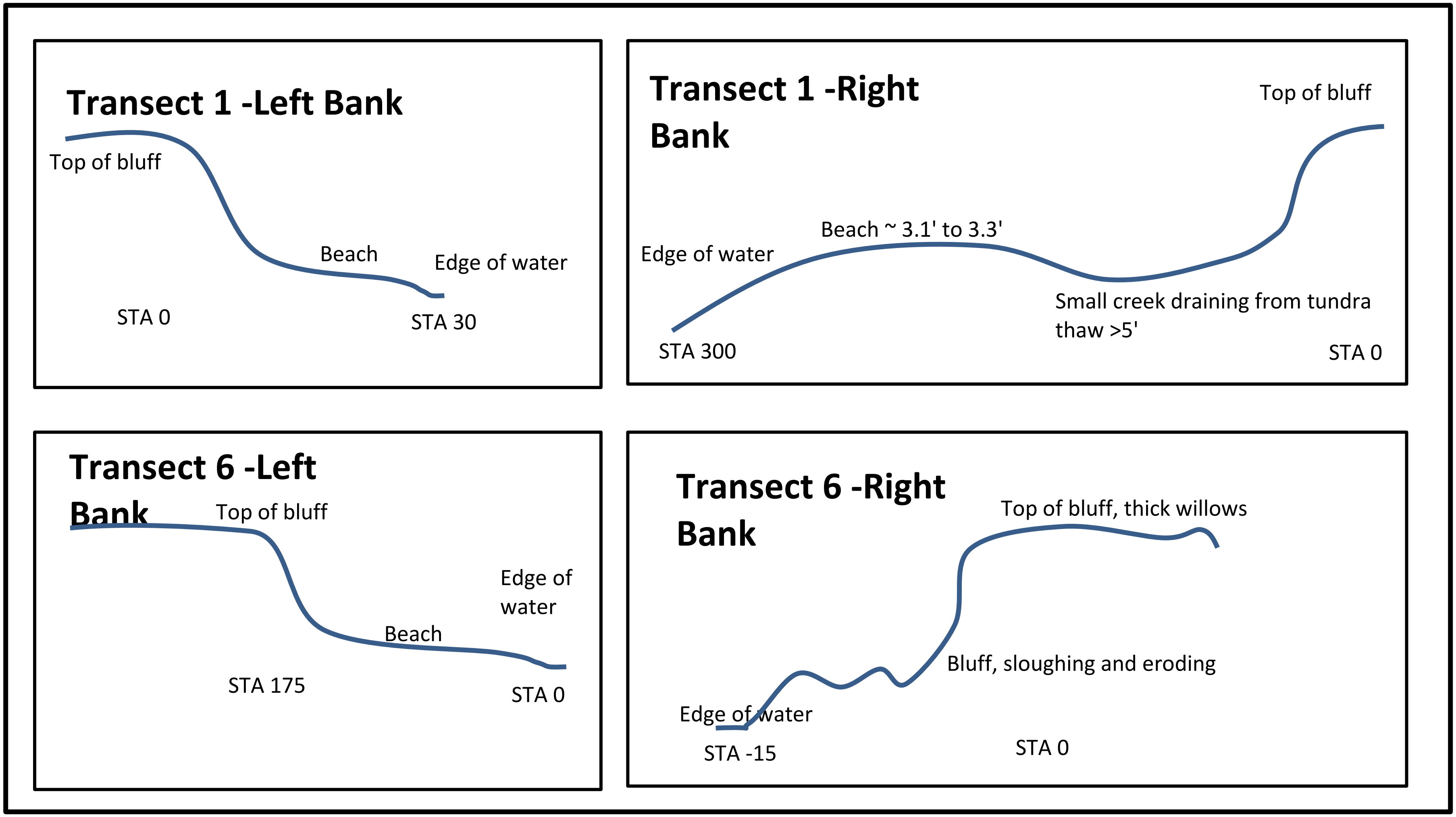
Notes:
Approximate locations of active layer probe transects are provided in Figure 2 and Figure 3 of main report.
Active layer bank elevations were not surveyed.

Transect 6 - Right Bank		
Distance (ft)	Depth (ft)	Note
-15	5.00	edge of water
-5	3.00	face of bluff
0	3.35	Top of bluff
5	1.75	tundra
10	1.75	tundra
15	1.75	tundra
20	1.75	tundra
25	1.75	tundra
30	1.75	tundra
35	1.75	tundra
40	1.75	tundra
45	1.75	tundra
50	1.75	tundra

*Thaw depths of 5 feet indicate frozen ground was not encountered.

Transect 6 - Left Bank		
Distance (ft)	Depth (ft)	Note
0	5.00	Edge of water
5	5.00	
10	5.00	
15	5.00	
20	5.00	
25	5.00	
30	5.00	
35	5.00	
40	5.00	
45	5.00	
50	5.00	
55	4.50	
60	4.00	
65	3.65	
70	3.75	
75	3.30	
80	2.95	
85	2.90	
90	3.50	ordinary high water/edge of beach
95	3.35	
100	3.75	
105	3.25	
110	3.50	
115	3.45	
120	4.10	
125	4.40	Beach to bluff transition
130	5.00	
135	5.00	
140	5.00	
145	5.00	
150	5.00	
155	5.00	
160	5.00	
165	5.00	
170	5.00	
175	4.50	top of bluff
180	2.90	tundra near bluff
195	3.50	

Notes:
Approximate locations of active layer probe transects are provided in Figure 2 and Figure 3 of main report.
Active layer bank elevations were not surveyed.



Notes:
Approximate locations of active layer probe transects are provided in Figure 2 and Figure 3 of main report.
Active layer bank elevations were not surveyed.

Attachment C Ice Cover – December 31, 2019 Field Data

Michael Baker INTERNATIONAL

Discharge Measurement Notes

Location Name: Colville River at Ocean Point - South (Transect #1) Date Collected: 12/31/2019

Field Party: C. Lematta, M. Hendee (ICE) Computed By: G. Yager Checked By: H. Runa

Start Time: 11:20 Finish Time: 14:10 Weather: winds 7mph WNW, Partly Cloudy Temp: -20 °F

Channel Characteristics: Effective Width: 650 ft Average Velocity: 0.15 fps

Effective Area: 880 sq ft Discharge: 135 cfs

Measurement Details: Method: Midsection; 0.6 depth Number of Sections: 12

Crossing: Wading Cable [Under Ice] Boat Meter: HACH FH950

Side of bridge: Upstream Downstream [N/A] N/A ft above bottom of weight

GAGE READINGS			
Gage	Start	Finish	Change
N/A			

Weight: N/A lbs

Count: N/A

Spin Test: N/A revolutions

after N/A minutes

Measurement Rated: Excellent Good Fair [Poor] based on "Descriptions"

Descriptions:

From Field Notes:

All water columns were less than 2.5 ft. deep. Measurement began on the East/Left Edge of Water (Sta 0+00). Velocity measurements were inititally collected with a Sontek acoustic doppler velocity meter but results were inconsistent and unreliable. Measurements were then collected with a Hach electromagnetic velocity meter beginning at Sta 5+00 and remeasured at Sta 5+50 and 6+00. Large quantites of sediment encountered while drilling through ice results in dulling of all bits beyond ability for use at station 3+50. The thermal drill does not create holes large enough for velocity meter probes. Ice and water depths were measured between stations 3+50 and 0+00 and velocity at those stations is estimated.

Calculation Notes:

The average measured velocity was extrapolated to stations where velocity measurements were not acquired (Sta 3+50 to 0+00). This resulted in a computed discharge of 135 cfs. To provide a range of uncertainty, if the minimum velocity was extrapolated to these stations, the computed discharge would be 111 cfs, and if the maximum velocity was extrapolated, the computed discharge would be 176 cfs.

Colville River at Ocean Point Transect #1
Date Collected: 12/31/2019

Distance from initial point	Total Depth	Ice Thickness	Effective Depth	Section Width	Effective Area	Measurem ent Depth Below Ice	VELOCITY				Discharge
							V1	V2	V3	Average V	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft^2)	(ft)	(fps)	(fps)	(fps)	(fps)	(cfs)
0	1.5	1.5	0.0	-	-	-	-	-	-	-	-
50	1.9	1.9	0.0	25.0	0.0	-	-	-	-	-	-
100	3.0	2.7	0.3	50.0	15.0	2.9	-	-	-	*0.15*	*2.3*
150	3.5	2.8	0.7	50.0	35.0	3.2	-	-	-	*0.15*	*5.4*
200	4.1	2.8	1.3	50.0	65.0	3.6	-	-	-	*0.15*	*10.1*
250	4.2	2.7	1.5	50.0	75.0	3.6	-	-	-	*0.15*	*11.6*
300	4.6	2.7	1.9	50.0	95.0	3.8	-	-	-	*0.15*	*14.7*
350	4.8	2.5	2.3	50.0	115.0	3.9	-	-	-	*0.15*	*17.8*
400	5.0	2.8	2.2	50.0	110.0	4.1	0.17	0.18	0.17	0.17	19.1
450	4.1	2.7	1.4	50.0	70.0	3.5	0.27	0.25	0.23	0.25	17.5
500	4.1	2.5	1.6	50.0	80.0	3.5	0.10	0.09	0.11	0.10	8.0
550	4.6	2.7	1.9	50.0	95.0	3.8	0.10	0.10	0.10	0.10	9.5
600	4.6	2.8	1.8	50.0	90.0	3.9	0.17	0.15	0.13	0.15	13.5
650	3.5	2.8	0.7	50.0	35.0	3.2	-	-	-	*0.15*	*5.4*
700	1.5	1.5	0.0	25.0	0.0	-	-	-	-	-	-
750	0.7	0.7	0.0	-	-	-	-	-	-	-	-
Shaded velocities were not measured because of equipment failure. These represent the average of the measured velocities.											

Total Discharge: **134.8** cfs

Velocity Measurement

Location: Colville River Ocean Point South (Transect #1)
Weather: -20°F, 7 mph wind

Method: under ice; 0.6 depth
Meter: HACH FH950

Station	Location (NAD83)	Ice Thickness (ft)	Under Ice Water Depth (ft)	Velocity (ft/s)
0+00	East/Left Bank; N70.05340 W151.36929	1.5	grounded	-
0+50	-	1.9	grounded	-
1+00	N70.05338 W151.37006	2.7	0.3	0.15*
1+50	-	2.8	0.7	0.15*
2+00	N70.05331 W151.37088	2.8	1.3	0.15*
2+50	-	2.7	1.5	0.15*
3+00	N70.05330 W151.37166	2.7	1.9	0.15*
3+50	-	2.5	2.3	0.15*
4+00	N70.05330 W151.37262	2.8	2.2	0.17
4+50	N70.05326 W151.37303	2.7	1.4	0.25
5+00	N70.05325 W151.37349	2.5	1.6	0.10
5+50	N70.05324 W151.37389	2.7	1.9	0.10
6+00	N70.05322 W151.37436	2.8	1.8	0.15
6+50	-	2.8	0.7	0.15*
7+00	N70.05320 W151.37521	1.5	grounded	-
7+50	West/Right Bank; N70.05319 W151.37564	0.7	grounded	-

Notes: All water columns were less than 2.5 feet deep. Measurement began on the East/Left Edge of Water (Station 0+00).

Velocity measurements were initially collected with the Sontek acoustic doppler velocity meter, but results were inconsistent and unreliable. Measurements were then collected with a Hach electromagnetic velocity meter.

Large quantities of sediment encountered while drilling though ice results in dulling of all bits beyond ability for use between station 3+50 and 0+00. Thermal drill does not create holes large enough for velcity meter probes. Ice and water depths were measured between stations 3+50 and 0+00 and velocity is estimated for each station, indicated by an " * ".

Michael Baker
INTERNATIONAL

Submitted By: M. Hendee
Conducted By: M. Hendee

Ocean Point
Crossing Profile
December 31, 2019

Waypoint	Station	Ice Thickness [ft]	Total Depth [ft]	Freeboard	Mud [ft]	Comments
003	0+00	1.5	1.5	Grounded		East Bank; N70.05340 W151.36929
	0+50	1.9	1.9	Grounded		
004	1+00	2.7	3.0	0.1		N70.05338 W151.37006
	1+50	2.8	3.5	0.2		
005	2+00	2.8	4.1	0.2		N70.05331 W151.37088
	2+50	2.7	4.2	0.1		
006	3+00	2.7	4.6	0.2		N70.05330 W151.37166
	3+50	2.5	4.8	0.1		
002	4+00	2.8	5.0	0.2		N70.05330 W151.37262
007	4+50	2.7	4.1	0.1		N70.05326 W151.37303
008	5+00	2.5	4.1	0.0		N70.05325 W151.37349
009	5+50	2.7	4.6	0.1		N70.05324 W151.37389
010	6+00	2.8	4.6	0.2		N70.05322 W151.37436
	6+50	2.8	3.5	0.1		
011	7+00	1.5	1.5	Grounded		N70.05320 W151.37521
012	7+50	0.7	0.7	Grounded		West Bank; N70.05319 W151.37564
Avg floating ice thickness =		2.7				

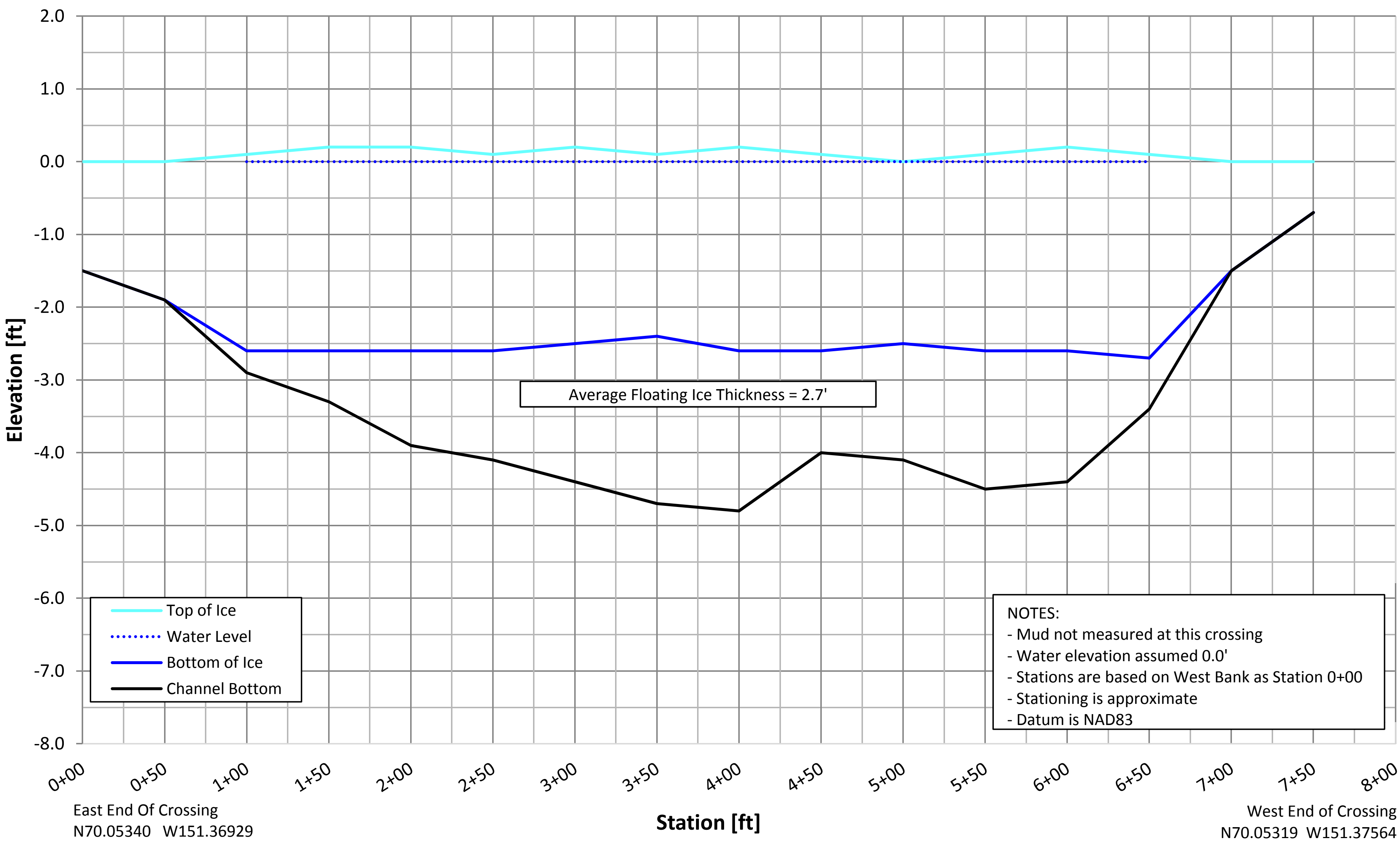
General Comments:

GPS coordinates given in NAD83. Mud not measured.

V1.0

Submitted By: M. Hendee
Conducted By: M. Hendee

Ocean Point Crossing Profile
December 31, 2019



Colville River at Ocean Point- Transect #1
Water Quality

Michael Baker INTERNATIONAL

Sample Date: December 31, 2019

Location & Time	Water Depth (ft)	Ice Thickness (ft)	Freeboard (ft)	Sample Depth (ft)	Temp (C)	Conductivity (µS/cm)	Specific Conductance (µS/cm)	DO (mg/L)	DO (% Saturation)	Salinity (ppt)
Sta 400+00 N70.05330° W151.37262° 2:20 PM	5.0	2.8	0.2	3.0	0.1	225	440	5.69	39.1	0.2
				3.5	0.1	225	440	5.74	39.4	0.2
				4.0	0.1	225	440	5.81	39.9	0.2

Notes:

(1) Sample location coordinates referenced to NAD83 datum.

(2) Freeboard is the distance from the top of ice to the water surface.

(3) Sample depth is measured from the water surface.

(4) Temperature, salinity, and conductivity were measured using a YSI Pro1030 meter.

(5) Specific conductance (referenced to 25°C) was obtained using a conversion coefficient of 0.0196 based on empirical data.

(6) Dissolved oxygen was measured using a YSI ProODO meter.

(7) Time shown indicates the start of the measurement.

(8) Temperature measurements have an accuracy of +/- 0.2°C

Attachment D Ice Cover – February 25, 2020 Field Data

Michael Baker INTERNATIONAL

Discharge Measurement Notes

Location Name: Colville River at Ocean Point - South (Transect #1) Date Collected: 2/25/2020

Field Party: D.Roe, J. Varga (UMIAQ) Computed By: D. Roe Checked By: H. Runa

Start Time: 13:25 Finish Time: 16:00 Weather: winds 5 mph, Sunny Temp: -5 °F

Channel Characteristics: Effective Width: 304 ft Average Velocity: 0.04 fps

Effective Area: 228 sq ft Discharge: 9 cfs

Measurement Details: Method: Midsection; 0.6 depth Number of Sections: 13

Crossing: Wading Cable **[Under Ice]** Boat Meter: HACH FH950

Side of bridge: Upstream Downstream **[N/A]** N/A ft above bottom of weight

GAGE READINGS			
Gage	Start	Finish	Change
Sta 2+85	5.48 ft NAVD88	-	RTK survey

Weight: N/A lbs

Count: N/A

Spin Test: N/A revolutions

after N/A minutes

Measurement Rated: Excellent Good **[Fair]** Poor based on "Descriptions"

Descriptions:

From Field Notes:

Negative freeboard occurred between Sta 5+12 and 5+72, averaging 0.2' above the top of ice surface. Positive occurred between Sta 2+85 and 4+52, averaging 0.2' below the ice surface. Ice was grounded in the middle of the channel from Sta 4+72 to 4+92. Depth of ice was not recorded at these locations but is estimated at approximately 5.0'. Discharge was measured beginning where water was encountered at Sta 5+72; observations were spaced every 20' using RTK GPS to where grounded ice was encountered at Sta 2+85.

Calculation Notes:

Colville River at Ocean Point Transect #1
Date Collected: 02/25/2020

Distance from initial point (ft)	Total Depth (ft)	Ice Thickness (ft)	Effective Depth (ft)	Section Width (ft)	Effective Area (ft^2)	Measurement Depth Below Ice (ft)	VELOCITY V1 (fps)	V2 (fps)	V3 (fps)	Average V (fps)	Discharge (cfs)
0+00	1.5	1.5									
0+57	2.1	2.1									
1+14	2.2	2.2									
1+71	2.9	2.9									
2+29	4.3	4.3									
2+85	5.1	4.9	0.2	41.5	8.3	5.0	0.04	0.03	0.05	0.04	*0.3*
3+12	5.3	4.9	0.4	23.5	9.4	5.1	0.03	0.04	0.06	0.04	*0.4*
3+32	5.5	4.8	0.7	20.0	14.0	5.2	0.06	0.06	0.06	0.06	*0.8*
3+52	5.7	4.8	0.9	20.0	18.0	5.3	0.04	0.05	0.06	0.05	*0.9*
3+72	5.8	4.6	1.2	20.0	24.0	5.3	0.05	0.10	0.19	0.11	*2.7*
3+92	5.8	4.9	0.9	20.0	18.0	5.4	0.05	0.04	0.08	0.06	*1.0*
4+12	5.5	4.9	0.6	20.0	12.0	5.3	-0.01	0.15	0.13	0.09	*1.1*
4+32	5.1	5.0	0.1	20.0	2.0	5.1	0.10	0.11	0.13	0.11	*0.2*
4+52	5.7	5.0	0.7	20.0	14.0	5.4	0.07	0.07	0.00	0.05	*0.7*
4+72	5.0	5.0									
4+92	5.0	5.0									
5+12	5.3	4.9	0.4	20.0	8.0	5.1	0.01	0.01	0.02	0.01	*0.1*
5+32	5.9	4.7	1.2	20.0	24.0	5.4	0.03	0.03	0.02	0.03	*0.6*
5+52	5.9	4.6	1.3	20.0	26.0	5.4	0.01	0.01	0.01	0.01	*0.3*
5+72	5.9	4.6	1.3	38.5	50.1	5.4	0.00	0.00	0.00	0.00	*0.0*
6+29	4.1	4.1									
6+86	2.2	2.2									
7+43	1.2	1.2									
8+00	0.4	0.4									

Total Discharge: **9.2** cfs

Project Name: Willow Ice Road Support
Project Number: 174311

Field Personnel: D. Roe
Date Collected: February 25, 2020

Velocity Measurement

Location: Colville River Ocean Point South (Transect #1)
Weather: -5°F, 5 mph wind

Method: under ice; 0.6 depth
Meter: HACH FH950

Station	Location (NAD83)	Ice Thickness (ft)	Under Ice Water Depth (ft)	Velocity (ft/s)
0+00	East/Left Bank; N70.053397 W151.369398	1.5	grounded	-
0+57	-	2.1	grounded	-
1+14	-	2.2	grounded	-
1+71	-	2.9	grounded	-
2+29	-	4.3	grounded	-
2+85	N70.053343 W151.371671 (see "Survey")	4.9	0.2	0.04
3+12	-	4.9	0.4	0.04
3+32	-	4.8	0.7	0.06
3+52	-	4.8	0.9	0.05
3+72	-	4.6	1.2	0.11
3+92	-	4.9	0.9	0.06
4+12	-	4.9	0.6	0.09
4+32	-	5	0.1	0.11
4+52	-	5	0.7	0.05
4+72	-	5	grounded	0.00
4+92	-	5	grounded	0.00
5+12	-	4.9	0.4	0.01
5+32	-	4.7	1.2	0.03
5+52	-	4.6	1.3	0.01
5+72	N70.053262 W151.373960	4.6	1.3	0.00
6+29	-	4.1	grounded	-
6+86	-	2.2	grounded	-
7+43	-	1.2	grounded	-
8+00	West/Right Bank; N70.053197 W151.375716	0.4	grounded	-

Survey: Water surface elevation surveyed at station 2+85 = 5.48 ft NAVD88.

Notes: All water columns were less than 1.3 feet deep. Measurement began on the East/Left Edge of Water (Station 0+00).

Velocity measurements were attempted using the Sontek acoustic doppler velocity meter, but results were inconsistent and unreliable. Measurements were then collected with a Hach electromagnetic velocity meter instead.

Negative freeboard occurred between station 5+12 and 5+72, averaging 0.2' above the top of ice surface. Postive freeboard occurred between stations 2+85 and 4+52, averaging 0.2' below the ice surface.

Submitted By: E. Keib
Conducted By: E. Keib

Ocean Point
Crossing Profile
February 25, 2020

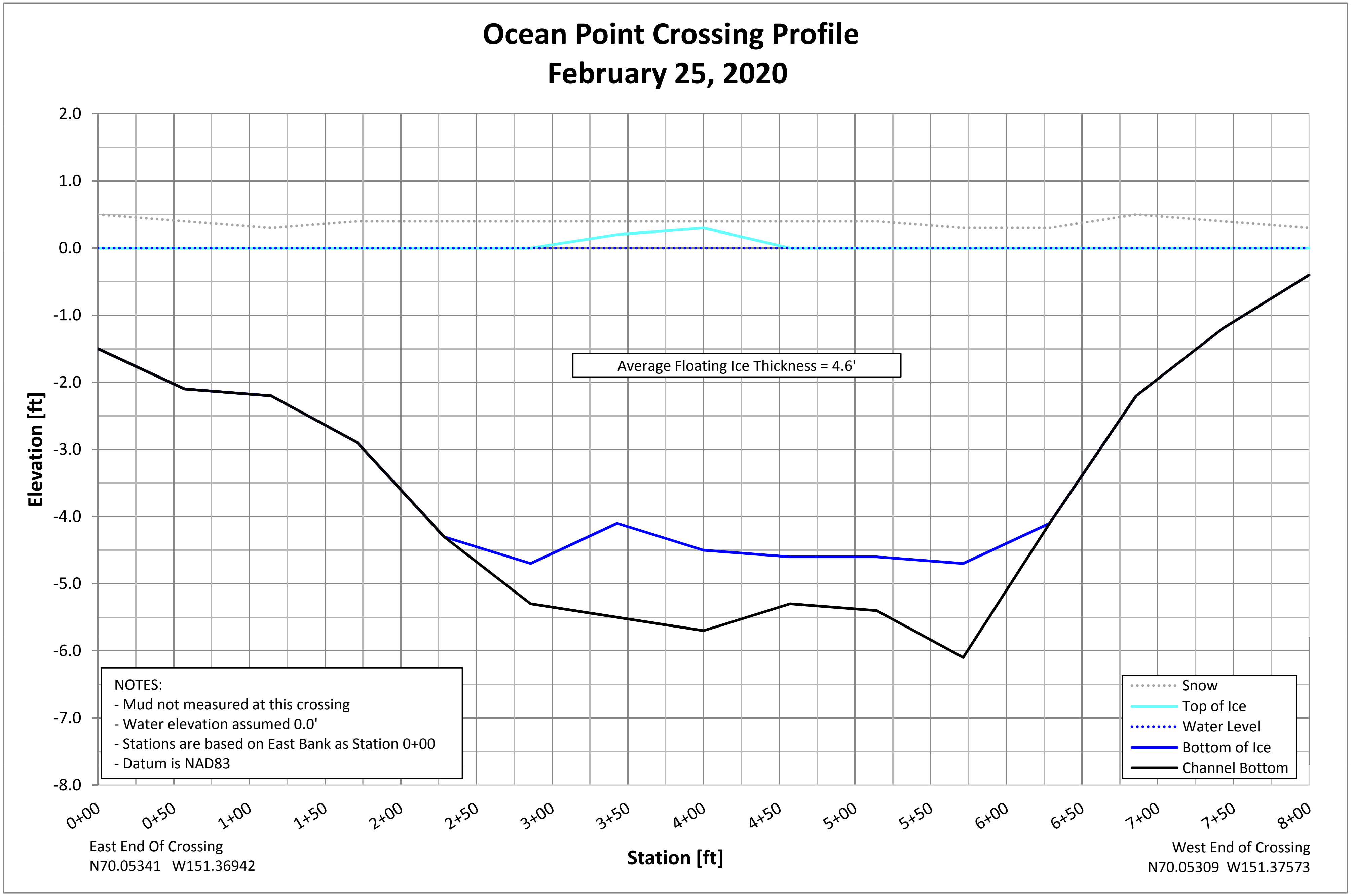
ICE DESIGN & CONSULT

Waypoint	Distance	Ice Thickness [ft]	Total Depth [ft]	Freeboard	Snow [ft]	Comments
055	0+00	1.5	1.5	Grounded	0.5	East Bank; N70.05341 W151.36942; Crossed Blue Tipped Lath Placed Here
	0+57	2.1	2.1	Grounded	0.4	
	1+14	2.2	2.2	Grounded	0.3	
	1+71	2.9	2.9	Grounded	0.4	
	2+29	4.3	4.3	Grounded	0.4	
	2+86	4.7	5.3	0.0	0.4	Single Blue Tip Lath Placed Here - Edge of Floating Ice
	3+43	4.3	5.7	0.2	0.4	
	4+00	4.8	6.0	0.3	0.4	
	4+57	4.6	5.3	0.0	0.4	
	5+14	4.6	5.4	+	0.4	
	5+71	4.7	6.1	+	0.3	Single Blue Tip Lath Placed Here - Edge of Floating Ice
	6+29	4.1	4.1	Grounded	0.3	
	6+86	2.2	2.2	Grounded	0.5	
	7+43	1.2	1.2	Grounded	0.4	
	8+00	0.4	0.4	Grounded	0.3	West Bank; N70.05309 W151.37573; Crossed Blue Tipped Lath Placed Here
Avg floating ice thickness =		4.6				

General Comments:

GPS coordinates given in NAD83. Mud not measured. Water depth at upstream transducer = 5.6'; Water depth at downstream transducer = 5.6'; the snow birdge has been installed between the transducers and upstream of the ice profile survey; RTK survey was conducted on the edge of ice, edge of water, transducer locatoins, and at each velocity measurement location.

Submitted By: E. Keib
Conducted By: E. Keib



Colville River at Ocean Point- Transect #1
Water Quality

Michael Baker INTERNATIONAL

Sample Date: **February 25, 2020**

Location & Time	Water Depth (ft)	Ice Thickness (ft)	Freeboard (ft)	Sample Depth (ft)	Temp (°C)	Conductivity (µS/cm)	Specific Conductance (µS/cm)	DO (mg/L)	DO (% Saturation)	Salinity (ppt)
Sta 400+00 N70.05330° W151.37262° 3:15 PM	5.5	4.6	0.2	4.5	0.0	288	565	2.48	17.0	0.3
				5.0	0.7	288	550	2.63	18.4	0.3

Notes:

(1) Sample location coordinates referenced to NAD83 datum.

(2) Freeboard is the distance from the top of ice to the water surface.

(3) Sample depth is measured from the water surface.

(4) Temperature, salinity, and conductivity were measured using a YSI Pro1030 meter.

(5) Specific conductance (referenced to 25°C) was obtained using a conversion coefficient of 0.0196 based on empirical data.

(6) Dissolved oxygen was measured using a YSI ProODO meter.

(7) Time shown indicates the start of the measurement.

(8) Temperature measurements have an accuracy of +/-0.2 degrees Celcius

Appendix D
- Ocean Point Weather Station Report

OCEAN POINT WEATHER STATION

SYSTEM DESCRIPTION

14 APRIL 2020

Mike Hendee
ICE Design Consult
Mikal.Hendee@icedesignconsult.com
(907) 244-3807

ICE
DESIGN & CONSULT

Contents

OCEAN POINT WEATHER STATION

OVERVIEW

The Ocean Point weather station was installed on 14 April 2020 for the purpose of monitoring weather and climate parameters. The station is located 12 miles SW of Nuiqsut, Alaska on the north side of the Colville River where it bends to the south at Ocean Point. The vicinity map is shown in Figure 1. The geographical coordinates of the weather station are N70.08730, W151.35590. The site elevation is approximately 129 feet above mean sea level. The location map is shown in Figure 2.

The weather station monitors, in real-time, wind speed and direction, solar radiation, air temperature, relative humidity, snow depth, barometric pressure, and ground temperature.

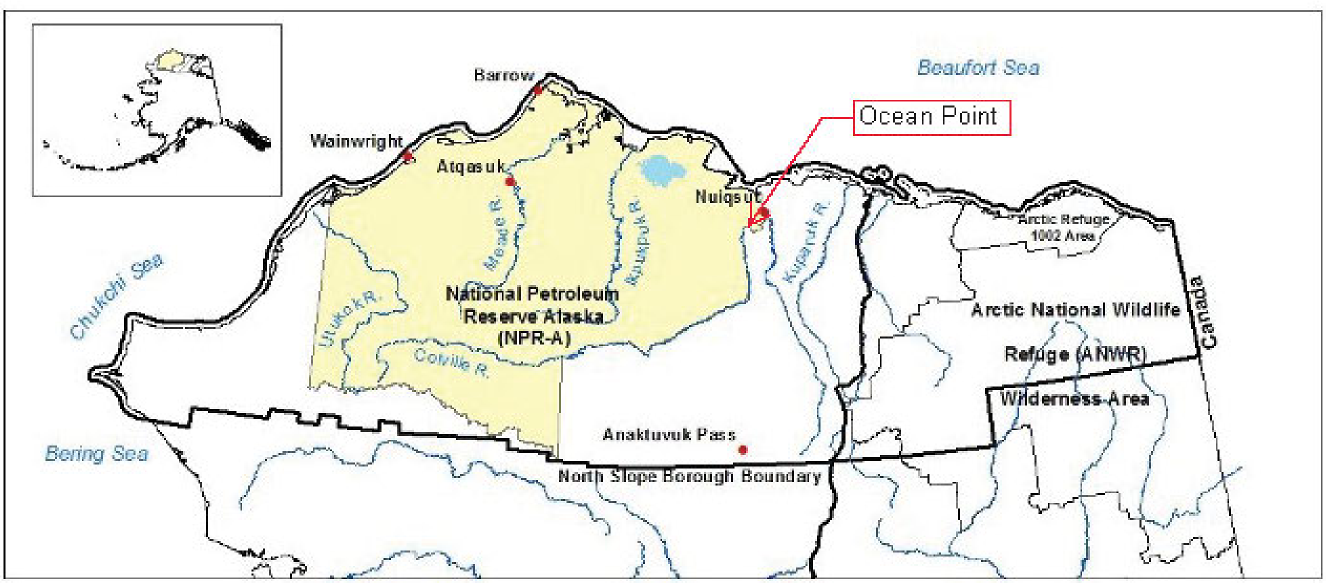


Figure 1 – Ocean Point Weather Station Vicinity Map

Figure 2 – Ocean Point Weather Station Location Map

The Ocean Point weather station is configured with the following instruments that are depicted in Figure 3:

1. Wind monitor (wind speed and direction)
2. Pyranometer (solar radiation)
3. Air temperature sensor
4. Relative humidity sensor
5. Snow depth sensor
6. Barometric pressure sensor
7. Ground temperature sensor array

The sensor information is processed by a CR1000X data processor and transmitted to a remote server via satellite modem. Power is supplied by a single 12-volt deep cycle battery that is recharged by a 50-watt solar panel.

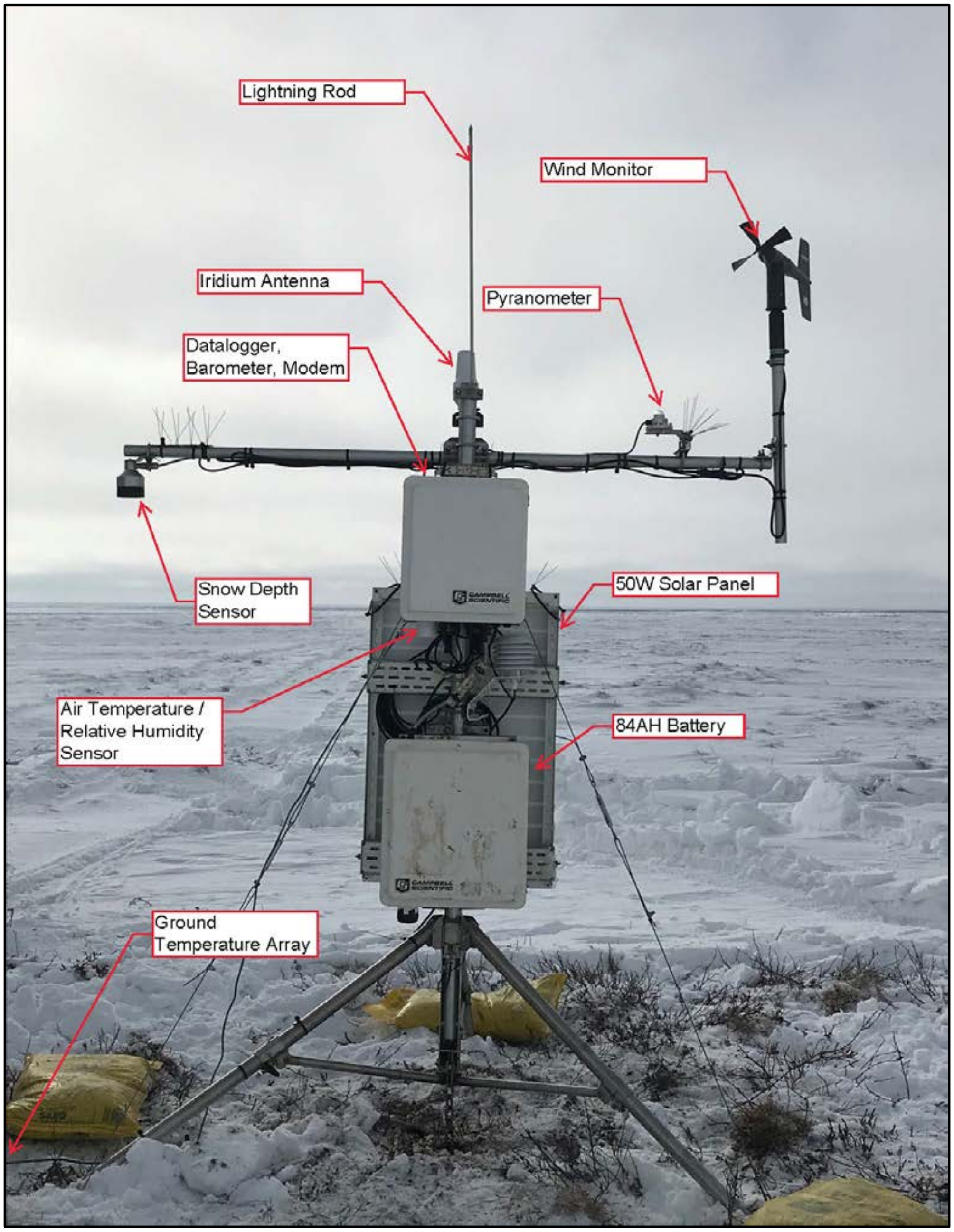


Figure 3 – Ocean Point Weather Station Configuration

INSTRUMENTATION SPECIFICATIONS

Data Processor

Campbell Scientific Inc. CR1000X
Serial number: 3236

Wind Monitor:

R. M. Young Model 05108-45 Alpine Version Wind Monitor
Serial number: WM164717
Operating temperature range: -50°C to +60°C
Wind speed range: 0 to 224 mph
Accuracy: +/- 0.6 mph or 1% of reading
Starting Threshold: 2.2 mph
Wind Direction Range: 0 to 360°
Accuracy: +/- 3°
The wind monitor is mounted at a height of 7 feet above the ground

Pyranometer

Hukseflux LP02
Serial number: 47571
Light spectrum waveband: 285 to 3000 nm
Maximum irradiance: 2000 W/m^2
Sensitivity (nominal): 15 μV/(W/m^2)
Operating temperature range: -40°C to +80°C
Temperature dependence: <0.15% per °C
ISO classification: Second class

Snow Depth Sensor

Campbell Scientific, Inc. SR50A Sonic Ranging Sensor
Serial number: 335867
Operating temperature range: -45°C to +50°C
Measurement range: 1.6 ft to 32.8 ft
Resolution: 0.01 in
Accuracy: +/- 0.4 in or 0.4% of distance to target (whichever is greater)
Height above ground (HAG) = 64.25 in

Air Temperature / Relative Humidity Sensor

HygroVUE5 Digital Temperature and Relative Humidity Sensor
Sensor element: SHT35
Temperature range: -40°C to +70°C
Tolerance: +/- 0.4°C (over -40°C to +70°C range)
Response time: 130s (wind speed of 1 m/s)
Resolution: 0.001°C
Long-term drift: < +/- 0.03°C per year
Humidity range: 0% to 100% RH
Accuracy (at 25°C): +/- 1.8% (over 0% to 80%), +/- 3% (over 80% to 100%)
Additional errors (-40°C to +60°C): +/- 1%
Short-term hysteresis: < 1%
Response time: 8s (wind speed of 1 m/s at +25°C)

Barometer

Setra CS100
Serial number: 7325117
Pressure range: 600 mBar to 1100 mBar
Accuracy: +/- 0.5 mBar (+20°C)
+/- 1.0 mBar (0°C to 40°C)
+/- 1.5 mBar (-20°C to +50°C)
+/- 2.0 mBar (-40°C to +60°C)
Linearity: +/- 0.4 mBar
Hysteresis: +/- 0.05 mBar
Repeatability: +/- 0.03 mBar

Modem

Iridium 9522B

Ground Temperature Array

BeadedStream Digital Acquisition Cable
Serial number: 3484
Operating temperature range: -55°C to +125°C
Sensor accuracy: +/- 0.1°C from -10°C to +30°C

DATA PROCESSING and TRANSMISSION

The following parameters are sampled at 30 second intervals:

Wind speed and direction

Solar radiation

Air temperature

The following parameters are sampled at 10 minute intervals:

Ground temperature

The following parameters are sampled hourly:

Snow Depth

Barometric Pressure

The parameters are transmitted hourly via the Iridium modem to a host computer operated by Polar Alpine Inc. The information is presented on a private web page.

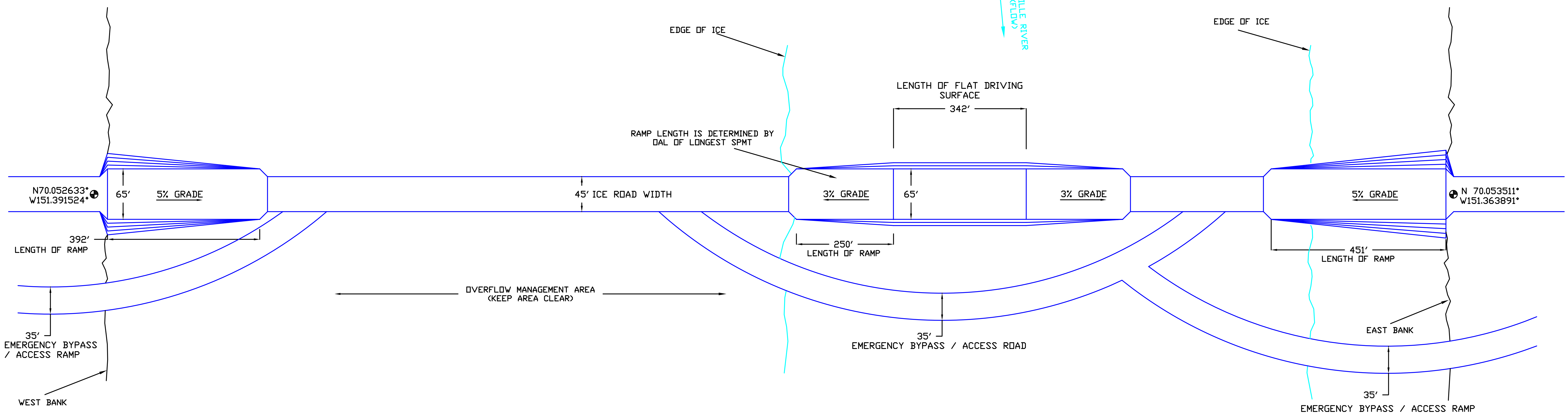
APPENDIX A – POWER SUPPLY INFORMATION

The Ocean Point weather station is powered by the following equipment:

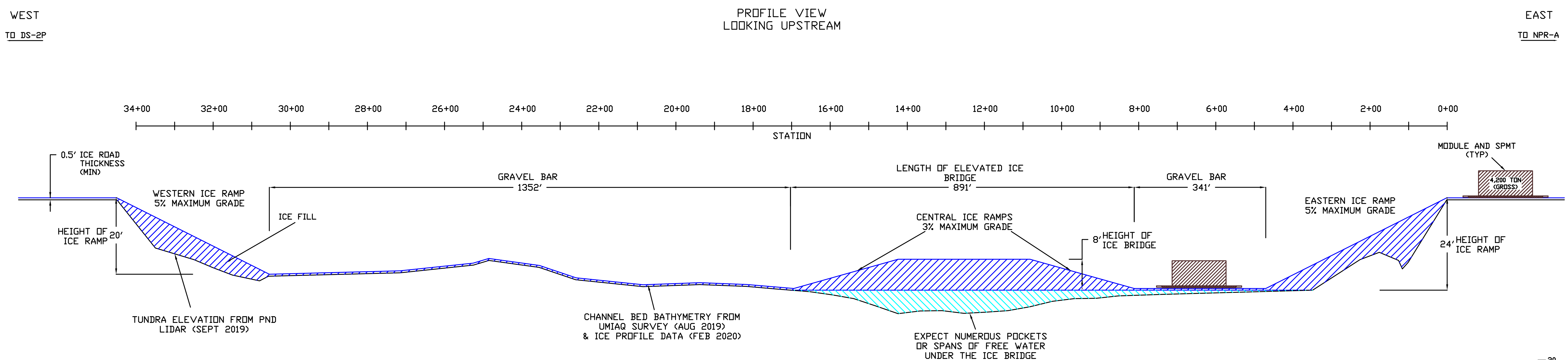
Sun Xtender® PVX-840T Solar Battery
Campbell Scientific, Inc. SP50 Solar Panel
Campbell Scientific, Inc. CH150 Charging Regulator

Appendix E
- Ocean Point Ice Bridge Design Drawings

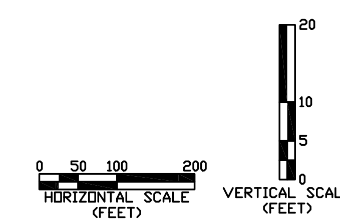
PLAN VIEW



PROFILE VIEW
LOOKING UPSTREAM



NOTES:
1. ALL DIMENSIONS AND STATIONING ARE APPROXIMATE
2. ICE BRIDGE CONSTRUCTION ASSUMED TO BEGIN IN FEBRUARY
3. RAMP WIDTHS MAY INCREASE IF MORE THAN 8′ OF FILL IS REQUIRED
4. ICE BRIDGE IS SUITABLE FOR 3,200 TON MODULE LOADED ONTO A SPMT WITH A MAXIMUM ALLOWABLE GROSS WEIGHT OF 4,200 TONS
5. OVERALL LENGTH OF CROSSING OBTAINED FROM GOOGLE EARTH (NAD83)
6. BATHYMETRY BASED ON ICE PROFILE FEB 25, 2020; TUNDRA ELEVATIONS BASED ON PND LIDAR DATA SEPT 2019
7. THE ICE BRIDGE WILL BE NON-GROUNDED; ESTIMATED AMOUNT OF FILL REQUIRED = 36.5K CU YDS (6.6 MGALS WATER EQUIVALENT)



PRELIMINARY		
DATE: 20200522	SCALE: AS SHOWN	REVISION: 1.2
DRAWN BY: EJK	SHEET SIZE: 11x17 LANDSCAPE	REVISION DATE: 20200611
CHECKED BY: WSTL; RIL; MKH	DRAWING NUMBER: PROPOSED UPSTREAM SITE OCEAN PPOINT ICE BRIDGE PLAN/PROFILE	

ICE DESIGN & CONSULT

PLAN / PROFILE
PROPOSED UPSTREAM SITE OCEAN POINT ICE BRIDGE
WILLOW DEVELOPMENT MODULES

DRAWING FOR: CPAI

PAGE: 1 OF 1

Willow Master Development Plan

Appendix E.1

Iñupiaq and Scientific Names

August 2020

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Contents

List of Tables

List of Figures

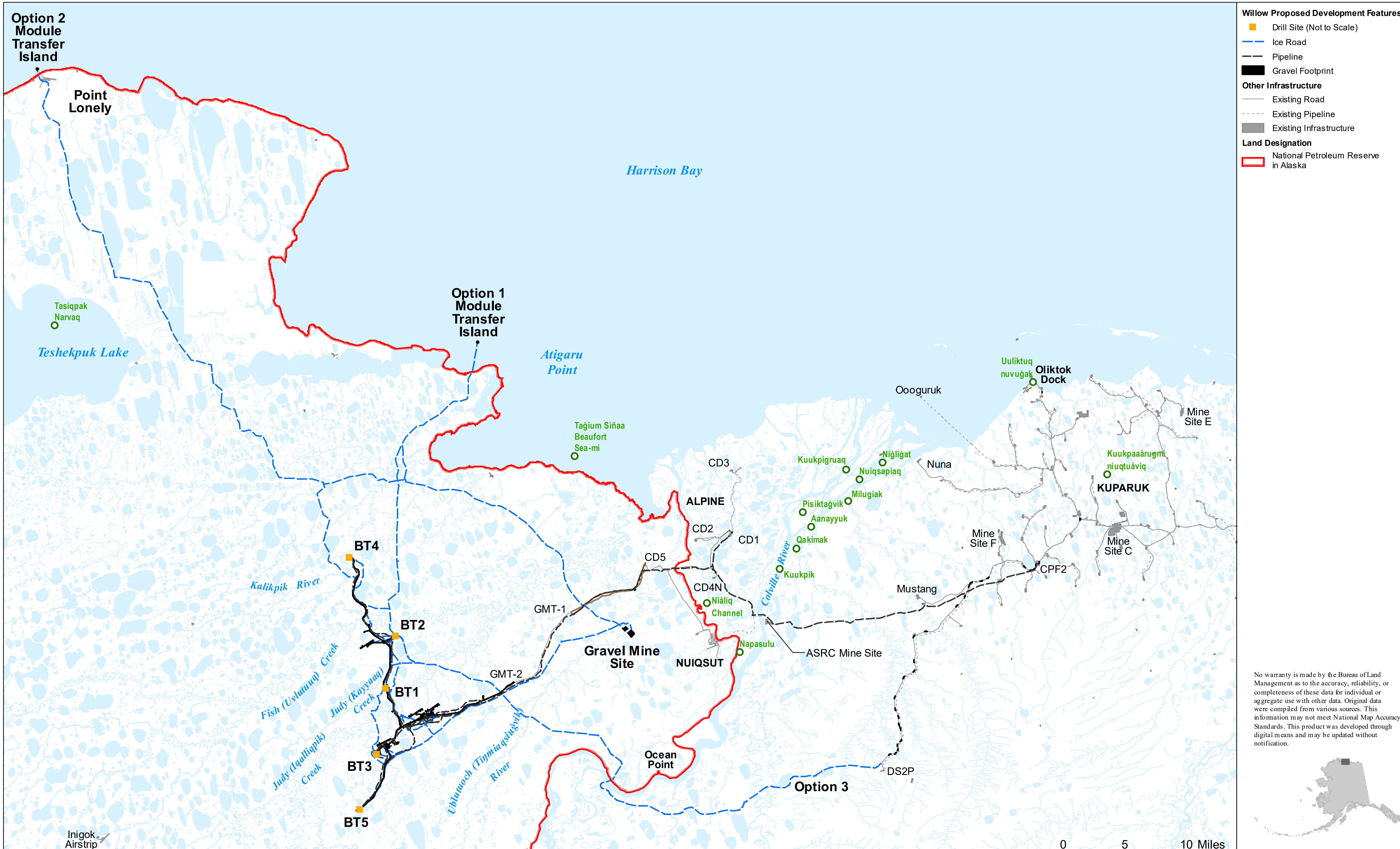
1.0 IÑUPIAQ AND SCIENTIFIC NAMES

Some readers may better recognize locations, and common plant and animal names by their Iñupiaq or scientific names. The appendix provides Iñupiaq names for places (Table E.1.1), and Iñupiaq and scientific names for plants (Table E.1.2), mammals (Table E.1.3), fish (Table E.1.4), and birds (Table E.1.5). If an Iñupiaq name did not have a known scientific name, it was labeled as unknown (UNK), and vice versa. Figure E.1.1 shows locations of the Iñupiaq place names.

Table E.1.1. Place Names

Iñupiaq Name	Location
Aanayyuk	Site near the mouth of the Miluveach River
Anaqtuuvak	Anaktuvuk Pass
Bering Sea-mi Taġiuq	Bering Sea
Iiguaåruich	Arctic foothills
Kuukpik	Colville River
Kuukpaaårugmi niuqtuåviq	Kuparuk oil field
Kuukpaaårugmi qimiqqat	Kuparuk Hills
Kuukpaaåruk Piÿu	Kuparuk Pingo
Kuukpaagruk	Kuparuk River
Kupigruak	East Channel of the Colville River
Kuukpigruaq	Kupigruak Channel
Milugiak	Miluveach River and surrounding area
Napasalu	Channel connecting Niġliq Channel to the Colville River
Niġliġat	'Second Nuiqsut', located on the East Channel of the Colville River, near the mouth of the Colville River
Niåliq Channel	Niġliq Channel - Westernmost channel of the Colville River Delta, where Nuiqsut is located
Nuiqsapiaq	Old village site on Nuekshat Island in the East Channel of the Colville River
Uuliktuq nuvuġak	Oliktok Point
Pisiktaġvik	Site on a large island in the East Channel of the Colville River, between the mouths of the Miluveach and Kachemach rivers; frequently used for caribou hunting
Qakimak	Kachemach River and surrounding area
Taġium Siñaa Beaufort Sea-mi	Beaufort Sea coast
Tasiqpak Narvaq	Teshekpuk Lake

Source: (HDR 2015; NSB 2016a, 2016b; OHA 2016; SRB&A 2014, 2016; USACE 2012)


Option 2 Module Transfer Island
Point Lonely
Harrison Bay
Tasiqpak Narvaq
Teshekpuk Lake
Option 1 Module Transfer Island
Atigaru Point
Uuliktuq nuvuġak
Oliktok Dock
Oooguruk
Mine Site E
Taġium Siñaa Beaufort Sea-mi
CD3
Kuukpigruaq
Niġliġat
Nuiqsapiaq
Nuna
Kuukpaaġruġmi niuqtuáviq
KUPARUK
ALPINE
Pisiktaġvik
Milugiak
Aanayyuk
CD2
CD1
Mine Site F
Mine Site C
Qakimak
BT4
CD5
Colville River
Kuukpik
CPF2
Kalikpik River
CD4N
Mustang
Niáliq Channel
GMT-1
BT2
Gravel Mine Site
Napasulu
NUIQSUT
ASRC Mine Site
Fish (Uvlutuuq) Creek
Judy (Kayyaaq) Creek
GMT-2
BT1
Ubluruch (Tiġmiaġsiuġvik) River
Judy (Iqalliqpik) Creek
BT3
Ocean Point
DS2P
Option 3
BT5
Inigok Airstrip
0
5
10 Miles
Willow Proposed Development Features
Drill Site (Not to Scale)
Ice Road
Pipeline
Gravel Footprint
Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure
Land Designation
National Petroleum Reserve in Alaska
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

E.1.1

Table E.1.2. Plants

Iñupiaq Name	Scientific Name	Common Name
UNK	*Arctophila fulva*	Pendant grass
UNK	*Carex aquatilis*	Water sedge
Niqaaq	*Cladonia rangiferina*	Lichen
UNK	*Draba micropetala*	Alpine draba
UNK	*Draba pauciflora*	Fewflower draba
Pauŋġaq, Pauŋġak, Pauŋġat, Asiaq (Ti), Asiavik (Ti)	*Empetrum nigrum*	Crowberry
Pikniq, Pikniik, Pitniq	*Eriophorum* spp.	Cottongrass
Qimmiurat	*Eriophorum* spp.	Cottongrass stems
UNK	*Eriophorum vaginatum*	Tussock cottongrass
UNK	*Geum* spp.	Mountain avens
UNK	*Hordeum jubatum*	Foxtail barley
UNK	*Koeleria asiatica*	Eurasian junegrass
UNK	*Oxytropis arctica var. barnebyana*	Barneby's locoweed
UNK	*Pleuropogon sabinei*	False semaphoregrass
UNK	*Poa hartzii* ssp. *Alaskana*	Alaskan bluegrass
UNK	*Poa sublanata*	Cottonball bluegrass
UNK	*Potamogeton subsibiricus*	Yenisei River pondweed
UNK	*Alix pulchra*	Diamond-leaf willow
Uqpik, Ugpiik, Uqpiich, Uqpiit	*Salix* spp.	Willow
UNK	*Symphyotrichum pygmaeum*	Pygmy aster
UNK	*Taraxacum officinale*	Dandelion, common
Qimmiksit, Uġruq	UNK	Moss, sphagnum
Asiaq (Nu), Asiraq, Asiat, Asiavik	*Vaccinium uliginosum*	Blueberry
Kimmigłaq, Kimmigñaq, Kimmiŋñat, Kimmigñauraq, Kikminnaq	*Vaccinium vitis-idaea*	Lowbush cranberry or lingonberry

Note: spp. (species); UNK (unknown)
Source: MacLean 2014

Table E.1.3. Terrestrial and Marine Mammals

Iñupiaq Name	Scientific Name	Common Name
Tuttuvak	*Alces americanus*	Moose
Tiġiganniaq	*Alopex lagopus*	Arctic fox (white)
Aġviq	*Balaena mysticetus*	Bowhead whale
UNK	*Balaenoptera acutorostrata*	Minke whale
UNK	*Balaenoptera musculus*	Blue whale
UNK	*Balaenoptera physalus*	Fin whale
UNK	*Berardius bairdii*	Baird's beaked whale
Amaġuq	*Canis lupus*	Wolf
UNK	*Cystophora cristata*	Hooded seal

Iñupiaq Name	Scientific Name	Common Name
Qiḷalugaq, Sisuaq	*Delphinapterus leucas*	Beluga whale
Qiḷaŋmiutaq	*Dicrostonyx groenlandicus*	Collared lemming
UNK	*Enhydra lutris kenyoni*	Northern sea otter
Ugruk	*Erignathus barbatus*	Bearded seal
Aġviġluaq	*Eschrichtius robustus*	Gray whale
UNK	*Eubalaena japonica*	North Pacific right whale
Ugrugruaq	*Eumetopias jubatus*	Steller sea lion
Qavvik	*Gulo gulo*	Wolverine
Qaiġulik	*Histriophoca fasciata*	Ribbon seal
Aviŋŋapiaq	*Lemmus trimucronatus*	Brown lemming
UNK	*Lagenorhynchus obliquidens*	Pacific white-sided dolphin
Ukalliatchiaq	*Lepus americanus*	Snowshoe hare
UNK	*Megaptera novaeangliae*	Humpback whale
UNK	*Mesoplodon stejnegeri*	Steineger's beaked whale
Avinnaq	*Microtus miurus*	Singing vole
Aviŋŋaq, Avinnaq	*Microtus oeconomus*	Root/tundra vole
Qiḷalugaq tuugaalik	*Monodon monoceros*	Narwhal
Itiġiaq	*Mustela erminea*	Ermine
Itiġiaq, Naulayuq	*Mustela nivalis*	Least weasel
Aiviq	*Odobenus rosmarus divergens*	Pacific walrus
UNK	*Ondatra zibethicus*	Muskrat
Aaġlu	*Orcinus orca*	Killer whale
Umiŋmak	*Ovibos moschatus*	Muskox
Natchiq, Qayaġulik	*Phoca hispida, Pusa hispida*	Ringed seal
Qasiġiaq	*Phoca largha pallas*	Spotted seal
Aġvisuaq	*Phocoena phocoena*	Harbor porpoise
UNK	*Phocoenoides dalli*	Dall's porpoise
UNK	*Physeter macrocephalus*	Sperm whale
Tuttu	*Rangifer tarandus*	Caribou
Ugrugnaq	*Sorex tundrensis*	Tundra shrew
Ugrugnaq	*Sorex ugyunak*	Barren ground shrew
Siksrik, Sigrik	*Spermophilus parryii*	Arctic ground squirrel
Akłaq	*Ursus arctos*	Grizzly (brown) bear
Nanuq	*Ursus maritimus*	Polar bear
Kayuqtuq, Qianġaq, Qiġñiqtaq	*Vulpes vulpes*	Red fox
UNK	*Ziphius cavirostris*	Cuvier's beaked whale

Note: UNK (unknown)
Source: MacLean 2014

Table E.1.4. Fish

Iñupiaq Name	Scientific Name	Common Name
Iqalugaq	*Boreogadus saida*	Arctic cod
Milugiaq	*Catostomus catostomus*	Longnose sucker
Qaaktaq	*Coregonus autumnalis*	Arctic cisco
Tiipuq	*Coregonus laurettae*	Bering cisco
Aanaakłiq	*Coregonus nasus*	Broad whitefish
Pikuktuuq	*Coregonus pidschian*	Humpback whitefish
Iqalusaaq	*Coregonus sardinella*	Least cisco
Kanayuq	*Cottus cognatus*	Slimy sculpin
Iłuuqiñiq	*Dallia pectoralis*	Alaska blackfish
Uugaq	*Eleginus gracilis*	Saffron cod
Siulik, Siułik	*Esox lucius*	Northern pike
Kakiḷaġnaq, Kakiḷasak, Kakalisauraq	*Gasterosteus aculeatus*	Threespine stickleback
Nimibiaq	*Lethenteron camtschaticum*	Arctic lamprey
UNK	*Liopsetta glacialis*	Arctic flounder
Tittaaliq	*Lota lota*	Burbot
Paŋmaksraq, Paŋmagrak, Paŋmaġraq	*Mallotus villosus*	Capelin
Kanayuq	*Myoxocephalus quadricornis*	Fourhorn sculpin
Amaqtuuq	*Oncorhynchus gorbuscha*	Pink salmon (humpy)
Iqalugruaq, Qalugruaq	*Oncorhynchus keta*	Chum salmon (dog)
Iqalugruaq	*Oncorhynchus kisutch*	Coho salmon
Iqalugruaq	*Oncorhynchus nerka*	Red salmon (sockeye)
Iqalukpak, Taġyaqpak	*Oncorhynchus tshawytscha*	King salmon (Chinook)
Iłhuaġniq	*Osmerus mordax*	Rainbow smelt
Saviġuunnaq	*Prosopium cylindraceum*	Round whitefish
Kakalisauraq	*Pungitius pungitius*	Ninespine stickleback
Iqalukpik, Paikḷuk, Aŋayuqaksraq, Qalukpik	*Salvelinus alpinus*	Arctic char
Qalukpik	*Salvelinus malma*	Dolly Varden
Iqaluaqpak, Qaluaqpak	*Salvelinus namaycush*	Lake trout
Siiġruaq, Sii	*Stenodu leucichthys*	Sheefish or inconnu
Sulukpaugaq	*Thymallus arcticus*	Arctic grayling
Aqalugruaq	UNK	Salmon

Note: UNK (unknown)
Source: MacLean 2014

Table E.1.5. Birds

Iñupiaq Name	Scientific Name	Common Name
Saqsakiq	*Acanthis flammea* and *A. hornemanni*	Redpoll
Kurugaq	*Anas acuta*	Northern pintail
Kurugaġnaq	*Anas americana*	American wigeon
Qaqlutuuq, Alluutaq	*Anas clypeata*	Northern shoveler
Qaiŋŋiq	*Anas crecca*	Green-winged teal
Kurugaqtaq	*Anas platyrhynchos*	Mallard
Niġlivik, Niġlivialuk	*Anser albifrons*	Greater white-fronted goose
Tatirgaq	*Antigone candensis*	Sandhill crane
Tiŋmiaqpak	*Aquila chrysaetos*	Golden eagle
Tullignaq	*Arenaria interpres*	Ruddy turnstone
Nipailuktaq	*Asio flammeus*	Short-eared owl
Qaqłutuuq	*Aythya affinis*	Lesser scaup
Qaqłukpalik	*Aythya marila*	Greater scaup
UNK	*Aythya valisineria*	Canvasback
UNK	*Bartramia longicauda*	Upland sandpiper
Niġlinġaq	*Branta bernicla*	Brant goose
Iqsraġutilik	*Branta canadensis*	Canada goose
Ukpik	*Bubo scandiacus*	Snowy owl
Qilġiq	*Buteo lagopus*	Rough-legged hawk
Qupałuk, Putukiułuk	*Calcarius lapponicus*	Lapland longspur
Kimmitquilaq	*Calidris alba*	Sanderling
Siigukpaligauraq	*Calidris alpina*	Dunlin
Puviaqtuuyaaq	*Calidris bairdii*	Baird’s sandpiper
Sigukpaligauraq	*Calidris canutus*	Red knot
Siiyukpaligauraq	*Calidris fuscicollis*	White-rumped sandpiper
Siigukpaligauraq	*Calidris himantopus*	Stilt sandpiper
Siigukpaligauraq	*Calidris mauri*	Western sandpiper
Puvviaqtuuq	*Calidris melanotos*	Pectoral sandpiper
Livilivillauraq	*Calidris minutilla*	Least sandpiper
Livilivillakpak	*Calidris pusilla*	Semipalmated sandpiper
UNK	*Catharus minimus*	Gray-cheeked thrush
Iŋaġiq	*Cepphus grylle*	Black guillemot
Kurraquraq	*Charadrius semipalmatus*	Semipalmated plover
Kaŋuq	*Chen caerulescens*	Snow goose
Papiktuuq	*Circus cyaneus*	Northern harrier
Aaqhaaliq	*Clangula hyemalis*	Long-tailed duck

Iñupiaq Name	Scientific Name	Common Name
Tulugaq	*Corvus corax*	Common raven
Qugruk	*Cygnus columbianus*	Tundra swan
Kirgaviatchauraq	*Falco columbarius*	Merlin
Kirgavik	*Falco peregrinus tundrius*	Arctic peregrine falcon
Aatqarruaq	*Falco rusticolus*	Gyrfalcon
UNK	*Gallinago delicata*	Wilson’s snipe
Tuullik	*Gavia adamsii*	Yellow-billed loon
Taasiŋiq	*Gavia immer*	Common loon
Malġi	*Gavia pacifica*	Pacific loon
Qaqsrauq	*Gavia stellata*	Red-throated loon
Tiŋmiaqpak	*Haliaeetus leucocephalus*	Bald eagle
Aqargiq, Nasaullik	*Lagopus lagopus*	Willow ptarmigan
Niksaaktuŋiq	*Lagopus mutus*	Rock ptarmigan
Nauyavaaq	*Larus argentatus*	Herring gull
UNK	*Larus glaucescens*	Glaucous-winged gull
Nauyavasrugruk	*Larus hyperboreus*	Glaucous gull
UNK	*Larus thayeri*	Thayer’s gull
Sigukpalik	*Limnodromus scolopaceus*	Long-billed dowitcher
Turraaturaq	*Limosa lapponica*	Bar-tailed godwit
UNK	*Luscinia svecica*	Bluethroat
UNK	*Mareca strepera*	Gadwall
Tuungaagrupiaq	*Melanitta americana*	Black scoter
Killalik	*Melanitta fusca*	White-winged scoter
Aviḷuqtuq	*Melanitta perspicillata*	Surf scoter
UNK	*Melospiza lincolnii*	Lincoln’s sparrow
Paisugruk, Aqpaqsruayuuq	*Mergus serrator*	Red-breasted merganser
Misiqqaaqauraq, Piiġaq	*Motacilla tschutschensis*	Eastern yellow wagtail
Sigguktuvak	*Numenius phaeopus*	Whimbrel
Ukpisiuyuk	*Passerculus sandwichensis*	Savannah sparrow
Ikłiġvik	*Passerella iliaca*	Fox sparrow
Auksruaq	*Phalaropus fulicarius*	Red phalarope
Auksruaq	*Phalaropus lobatus*	Red-necked phalarope
Suŋaqpaluktuŋiq	*Phylloscopus borealis*	Arctic warbler
Amaułłigaaluq	*Plectrophenax nivalis*	Snow bunting
Tullik	*Pluvialis dominica*	American golden-plover
Tullivak	*Pluvialis squatarola*	Black-bellied plover
Aqpaqsruayuuq	*Podiceps grisegena*	Red-necked grebe

Iñupiaq Name	Scientific Name	Common Name
Igniqauqtuq	*Polysticta stelleri*	Steller's eider
UNK	*Rissa tridactyla*	Black-legged kittiwake
Qavaasuk	*Somateria fischeri*	Spectacled eider
Amauligruaq	*Somateria mollissima*	Common eider
Qiŋalik	*Somateria spectabilis*	King eider
Misapsaq	*Spizella arborea*	American tree sparrow
Isuŋŋaq	*Stercorarius longicaudus*	Long-tailed jaeger
Migiaqsaayuk	*Stercorarius parasiticus*	Parasitic jaeger
Isuŋŋaġluk	*Stercorarius pomerinus*	Pomarine jaeger
Mitqutaiḷaq	*Sterna paradisaea*	Arctic tern
Uviñŋuayuuq	*Tringa flavipes*	Lesser yellowlegs
Satqagiiøaq	*Tryngites subruficollis*	Buff-breasted sandpiper
Iqirgagiaq	*Xema sabina*	Sabine's gull
Nuŋaktuaġruk	*Zonotrichia leucophrys*	White-crowned sparrow

Note: UNK (unknown)
Source: MacLean 2014

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Willow Master Development Plan

Appendix E.2
Climate and Climate Change
Technical Appendix

August 2020

Appendix E.2A
Climate and Climate Change

Appendix E.2B
Market Substitutions and Greenhouse Gas Downstream Emissions Estimates

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Willow Master Development Plan

Appendix E.2A
Climate and Climate Change
Technical Appendix

August 2020

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Table of Contents

List of Tables

List of Acronyms

BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
C	Celsius
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPAI	ConocoPhillips Alaska, Inc.
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
F	Fahrenheit
FHWA	Federal Highway Administration
IWG	Interagency Working Group on Social Cost of Carbon
GHG	greenhouse gas
GWP	global warming potential
Hw/D	headwater-diameter ratio
m	meter
MDP	Master Development Plan
MMT	million metric tons
NEPA	National Environmental Policy Act
N_2O	nitrous oxide
Project	Willow Master Development Plan Project
SCC	social cost of carbon
UNEP	United Nations Environment Programme
W/m^2	Watts per square meter

Glossary Terms

Active Layer – The top layer of ground subject to annual thawing and freezing in areas underlain by permafrost.
Anthropogenic – Resulting from the influence of human beings on nature.
Albedo – A measure of how a surface reflects incoming radiation; a surface with a higher albedo reflects more radiation than a surface with lower albedo.
Black Carbon – A component of fine particulate matter that is formed from the incomplete combustion of fossil fuels and biomass.
Carbon Dioxide Equivalent (CO_2e) – The amount of greenhouse gases that would have an equivalent global warming potential as carbon dioxide when measured over a specific timescale.
Greenhouse Gas (GHG) – Gaseous compounds, such as carbon dioxide, methane, and nitrous oxide, among others, that block heat from escaping to space and warm the Earth's atmosphere.
Lake-Tapping – The sudden drainage of lakes caused by ice melting or dislodging and opening up a drainage channel.
Positive Forcing – When earth receives more incoming energy from sunlight than it radiates to space.
Particulate Matter 2.5 ($PM_{2.5}$) – Particulate matter less than 2.5 microns in aerodynamic diameter in ambient air; this fraction of particulate matter penetrates most deeply into the lungs.
Thermokarst – A land surface with karst-like features and hollows produced by melting ice-rich soil or permafrost.

1.0 AFFECTED ENVIRONMENT

Climate change is affecting natural systems across the globe with enhanced impacts in the Arctic. The atmosphere and oceans have warmed, ice cover is shrinking, and permafrost is melting in high-latitude and high-elevation regions. The dominant cause of the observed warming since the mid-twentieth century can be attributed to human influences (IPCC 2014).

1.1 Greenhouse Gases and Climate Change Overview

Major **greenhouse gases** (GHGs) include carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4). GHGs are produced both naturally through volcanoes, forest fires, and biological processes, and through **anthropogenic** activities such as the burning of fossil fuels, land use and water management changes, and agricultural processes. Since GHGs absorb infrared radiation emitted from the Earth's surface, they block heat from escaping to space and warm the Earth's atmosphere. GHGs are necessary for keeping the planet at a habitable temperature, and without GHGs, Earth's surface temperature would be around 60 degrees Fahrenheit (F) cooler than it is now. Natural biological and geological processes regulate levels of naturally occurring GHGs in the atmosphere; however, anthropogenic emissions haven driven atmospheric concentrations of GHGs to levels unprecedented in the last 800,000 years. Concentrations of CO_2, N_2O, and CH_4, have increased by 40%, 150%, and 20%, respectively, since 1750, largely due to economic and population growth (IPCC 2014). Ongoing emissions of GHGs are expected to continue to warm the planet in the future.

Although **black carbon** is not a GHG, it affects climate in a variety of ways. Black carbon is emitted as a combustion byproduct, and the concentration of black carbon can vary spatially, seasonally, and vertically in the atmosphere (AMAP 2015; Creamean, Maahn et al. 2018; Stohl, Klimont et al. 2013; Xu, Martin et al. 2017). Black carbon affects the climate by absorbing and scattering solar radiation (i.e., sunlight). It can also influence clouds by altering the size and number of water droplets and ice crystals in water and ice clouds. Black carbon in cloud droplets decreases cloud **albedo**, which heats and dissipates the clouds. This also alters the temperature structure within and around the cloud, changing cloud distribution.

1.2 Regulatory Framework

On March 28, 2017, Executive Order (EO) 13783, "Promoting Energy Independence and Economic Growth," was issued. EO 13783 required agencies to immediately review existing regulations and suspend, revise, or rescind those that burden the development of domestic energy resources beyond the degree necessary to protect the public interest or otherwise comply with the law. As a result, many of the previous existing Eos and federal guidance related to climate change have been revoked or rescinded.

On October 30, 2009, the U.S. Environmental Protection Agency (EPA) issued the reporting rule for major sources of GHG emissions (40 CFR 98). The rule required a wide range of sources and source groups to record and report selected GHG emissions. Various oil and gas operations are required to monitor and report GHG emissions under this regulation. The State of Alaska does not have any GHG regulations beyond federal regulations.

1.3 Observed Climate Trends

1.3.1 Arctic

Global warming impacts observed globally and nationally are amplified in the Arctic. Mean air temperature increases in the Arctic are double the global rate of increase. Average air temperatures in the region have increased by 3 degrees F annually and by 6 degrees F in winter over the past 60 years (Melillo, Richmond et al. 2014). From October 2018 to September 2019, the land north of 60 degrees North experienced the second largest annual average air temperature anomaly (meaning the departure from average conditions) since 1900, after 2015 to 2016 (Richter-Menge, Overland et al. 2017).

Spring snow cover extent, observed by satellites, has been decreasing over arctic land since 2005, especially in May and June (Derksen, Brown et al. 2017). In 2017, the snow cover extent was the lowest on record for April and May in the North American Arctic, and in 2016, the snow cover extent was the lowest on record for June. With decreased snow cover extent and shorter snow cover duration in the Arctic, more of the sun's energy is absorbed by the dark land surface, warming the surface further. This results in a reinforcing feedback effect that further reduces snow cover (Melillo, Richmond et al. 2014).

The 2017 winter maximum Arctic ice extent was the lowest on record. This was the third consecutive year of record low sea ice extent (Richter-Menge, Overland et al. 2017). Recent measurements show that the sea ice extent has been approximately halved since measurements began in September 1979 (Melillo, Richmond et al. 2014). The extent of multiyear sea ice (ice that does not melt in summer) has also decreased, now only comprising 1.2% of ice cover in 2019, compared to 33% in 1985 (Richter-Menge, Overland et al. 2017). Generally, the Arctic sea ice extent is two to three times larger at the end of winter (March) than at the end of summer (September) (Perovich, Meier et al. 2017). But from 1981 to 2010, anomalies in the ice extent show ice losses of 2.7% per decade in March and 13.2% per decade in September (Perovich, Meier et al. 2017). For the past two winters (2018 and 2019), the Bering Sea ice extent was the lowest on record (Richter-Menge, Overland et al. 2017). Similar to decreases in snow cover extent, decreased sea ice extent also has a feedback effect on climate. An increased amount of the sun's energy is absorbed by the open ocean relative to oceans covered by ice, leading to an increased rate of sea ice melting. Reductions in sea ice also make the Arctic more accessible by ships for transportation, oil and gas exploration, and tourism. This can lead to increased GHG emissions as well as other risks such as oil spills and drilling or maritime-related accidents (Melillo, Richmond et al. 2014).

Rising air temperatures over land affect the Arctic permafrost layer. Permafrost is material that exists at or below 32 degrees F (0 degrees Celsius [C]) for at least 2 years, and the **active layer** is the layer above the permafrost that thaws seasonally. The northern circumpolar permafrost zone stores 1,700 petagrams (or 1,700 gigatons) of organic carbon, locked in place due to the slow rate of plant material decomposition in the frozen ground (Schuur, Abbott et al. 2013). With rising temperatures and decreasing snow cover, the permafrost extent is predicted to decrease significantly by the year 2100 (Slater and Lawrence 2013). Thawing permafrost releases CO_2 and CH_4 to the atmosphere and delivers organic-rich soils to the bottoms of lakes, resulting in decomposition that releases further CH_4. These emissions can accelerate climate feedback effects (Markon, Trainor et al. 2012).

A reduction in sea ice has led to increased primary productivity (i.e., the rate at which energy is converted through photosynthetic and chemosynthetic processes into organic substances) in the Arctic Ocean (Richter-Menge, Overland et al. 2017). Warmer temperatures combined with reduced ice cover have led to the greening of the tundra and increases in soil moisture and the amount of snow meltwater available. These changes have led to an increased active layer depth, changes in herbivore activity patterns, and reductions in human usage of the land due to ground being frozen for a shorter period of time (Clement, Bengtson et al. 2013; Epstein, Bhatt et al. 2017). Although the greening of the tundra can store carbon as biomass, the effect of these changes in the Arctic has been a net release of carbon into the atmosphere (Epstein, Bhatt et al. 2017; Richter-Menge, Overland et al. 2017).

Black carbon has a magnified impact on climate in the Arctic due to the snow and ice albedo feedback. This feedback occurs when black carbon settles on top of snow or ice and decreases the reflectivity (albedo) of the surface. This allows more heat to be absorbed by the surface, leading to increased melting, which further decreases the albedo. This feedback is prominent in the Arctic because so much of the surface is snow and ice, which have high albedo.

1.3.2 North Slope

Similar to the Arctic as a whole, the North Slope has experienced increased average temperatures, decreased sea ice and snow cover extent, an expanded growing season, and thawing permafrost. Annual average temperatures on the North Slope are expected to be -11.2 degrees F to -9.0 degrees F by the end of this decade (i.e., 2019). This is 2.3 degrees F higher than the annual average from 1961 to 1990, which ranged from -13.5 degrees F to 11.3 degrees F. By 2050, the annual average temperature is expected to be -8.9 degrees F to -6.8 degrees F (SNAP 2018).

Over the 35-year record (1982 to 2016), the North Slope has shown substantial increases in tundra greenness (Richter-Menge, Overland et al. 2017). A warming climate, in addition to regulatory changes and methods for measuring frost depth, has contributed to a reduction in the tundra travel season from 200 days in the 1970s to less than 120 days in 2003 (NSB 2014). With continued climate warming and precipitation changes, the tundra travel season is expected to shorten further. Since the mid-1980s, Alaskan permafrost on the Arctic coast has warmed between 6 degrees F to 8 degrees F at a depth of 3.3 feet (1 meter [m]). In 2016, all but one permafrost observational site documented record high temperatures at a depth of 65.6 feet (20 m) on the North Slope. Depth temperatures at 65.6 feet (20 m) in this region have been increasing at rates between 0.38 degrees F and 1.19 degrees F per decade since 2000. The active layer depth was at a 210-year maximum on the North Slope in 2016 (Richter-Menge, Overland et al. 2017).

1.4 Observed Greenhouse Gas Trends

1.4.1 National

GHG emissions in the U.S. are tracked by the EPA and documented in the Inventory of U.S. Greenhouse Gases and Sinks. In 2017, 6,457 million metric tons (MMT) of **carbon dioxide equivalent** (CO_2e) were emitted in the U.S. The major economic sectors contributing to GHG emissions in the U.S. in 2017 were transportation (29%), electricity generation (28%), industry (22%), and agriculture (9%) (EPA 2019). CO_2 from fossil fuel combustion has accounted for approximately 77% of U.S. GHG emissions since 1990. From 1990 to 2017, CO_2 emissions from fossil fuel combustion increased by 3.7%, and in 2016, the U.S. accounted for 15% of global fossil fuel emissions (EPA 2019).

1.4.2 Alaska

The EPA documents GHG emissions from Alaska in the Alaska Greenhouse Gas Emissions Inventory. Emissions are calculated using a top-down approach, where emissions factors are applied to statewide activity data from 1990 to 2015. In 2015, approximately 40 MMT CO_2e were emitted in Alaska. This is a decrease of approximately 8% from 1990 levels and a decrease of approximately 23% from the peak emissions observed in 2005 (ADEC 2018).

The industrial sector, including the oil and gas industry, is the major contributor to GHG emissions in Alaska, followed by the transportation, residential and commercial, and electrical generation sectors. The waste, agricultural, and industrial process sectors each contribute less than 1% of GHG emissions in Alaska (ADEC 2018). In 2015, Alaska was the 40^{th} highest state in the U.S. in terms of total energy-related CO_2 emissions and the 4^{th} highest in terms of per capita emissions (USEIA 2018). Alaska represents about 0.61% of total U.S. GHG emissions (EPA 2017) and 0.09% of global GHG emissions (IPCC 2014).

1.5 Projected Climate Trends and Impacts in the Project Area

The Intergovernmental Panel on Climate Change (IPCC) Special Report *Global Warming of 1.5°C* (2018b) estimates with high confidence that in order to limit global warming to 1.5 degrees Celsius I, global GHG emissions in 2030 would need to be 40% to 50% lower than 2010 emissions. Based on the IPCC (2018b) findings, the United Nations Environment Programme (UNEP) *Emissions Gap Report* (2019) estimates global GHG emissions in 2030 would need to be 55% lower than 2018 to limit global warming to 1.5 degrees C. UNEP analyzed projected future global GHG emissions rates and determined that expected GHG emissions levels in 2030 are 53% higher than levels expected for a 2-degree-C temperature increase and 120% higher than levels expected for a 1.5-degree-C temperature increase (2019). An analysis by Tong, Zhang et al. (2019) indicates that future global CO_2 emissions anticipated from existing and proposed energy infrastructure already exceed the carbon emissions budget needed to limit global warming to 1.5 degrees C; however, other studies suggest that attaining a 1.5-degree-C warming limit is possible by replacing existing infrastructure with zero-carbon alternatives at the end of their lifespans, enabling us to meet climate goals (Smith, Forster et al. 2019). For U.S. emissions, the U.S. Energy Information Administration estimates trends in future U.S. CO_2 emissions in the *Annual Energy*

Outlook 2020 Report (2020). U.S. CO_2 emissions are predicted to continue to decrease relative to both 2010 and 2018 levels but then increase sometime between the late 2020s through 2045, depending on economic conditions.

Climate trends in Alaska predict that snow cover duration is expected to drop with a later date of first snowfall and an earlier snowmelt (Markon, Trainor et al. 2012). Models predict permafrost thawing will continue, with some models predicting that large parts of Alaska will lose all near-surface permafrost by the end of the century. This will impact rural Alaskan communities by likely disrupting sewage systems and community water supplies. The increasing trend in the length of the Alaska growing season is also projected to continue. This change will reduce water storage as well as increase the risk and extent of wildfires and insect outbreaks in the region. Warmer temperatures, wetland drying, and increased summer thunderstorms have increased the number of wildfires in Alaska. The annual area burned is projected to double by mid-century and triple by the end of the century, releasing more carbon into the atmosphere (Melillo, Richmond et al. 2014).

Warmer temperatures in the Willow Master Development Plan (MDP) Project (Project) area will lead to a deeper active layer, which would affect the surrounding ecosystem. A deeper active layer would allow improved water drainage and the migration of deeper-rooted plant communities farther north. Changes in plant communities would also be driven by the expanded growing season and warmer, drier soils. These vegetation changes would promote soil formation as root development and organic matter in the soil profile increase.

As the active layer deepens, damage from traffic over the surface during non-frozen periods would likely increase, due to accelerated erosion and subsidence of permafrost. Permafrost thawing could also lead to **thermokarst** or slumping, resulting in increased nutrient loading and suspended sediment in lakes and rivers. Warmer temperatures may lead to an increase in the frequency of **lake tapping** (sudden drainage) events as degrading ice wedges integrate into drainage channels at lower elevations.

Arctic fish species will be affected by increased water temperatures as air temperatures increase, but this impact is difficult to predict. Arctic bird species will be affected by habitat loss as aquatic and semiaquatic habitats are converted into drier habitats. A reduction in available habitat would likely cause changes in bird distributions, increased competition for resources, and declines in productivity.

Paleontological resources could be adversely affected by climate change, but the impact is difficult to determine. Paleontological sites may more rapidly decompose in a warmer climate, and sites on hillsides, bluff faces, riverbanks, and terraces may be destroyed by mass wasting. Erosion may lead to increased exposure of known paleontological sites. Many known paleontological sites in the Project area have been exposed due to erosion with few negative impacts.

As with paleontological resources, cultural resources on the North Slope could also be impacted by mass wasting, warmer temperatures, and erosion. In addition, as the permafrost thaws and the active layer deepens, cultural resources may be incorporated into the active layer. These sites would then be exposed to cryoturbation (frost mixing) and subject to vertical disturbances that may cause sites at different vertical layers to become mixed. These disturbances can occur in both vertical directions as seasonal frost cracking can cause downward movement, and frost heaving and sorting, ice wedging, and involutions can push artifacts upward.

Climate change may impact the accessibility of mineral material deposits on the North Slope. While the existence and location of these deposits will not be affected, the excavation process may be made easier, due to the thawing permafrost, or more difficult, as developing deposits in areas with thawed permafrost may require water removal or excavation in swampy conditions.

2.0 ANALYSIS METHODS

2.1 Overview

To evaluate the potential contribution of the Project to global climate change, GHG emissions from the Project were used as a proxy for climate change impacts. The amount of GHG emissions emitted by the Project under various alternatives was calculated. Emission metrics facilitate multicomponent climate policies by allowing emissions of different GHGs and other climate forcing agents to be expressed in a common unit (so-called CO_2-equivalent or CO_2e emissions). The global warming potential (GWP) was introduced in the IPCC's first assessment report, where it was also used to illustrate the difficulties in comparing components with differing physical properties using a single metric. Each GHG has a GWP that accounts for the intensity of the GHG's heat trapping effect and its longevity in the atmosphere.

The 100-year GWP was adopted by the United Nations Framework Convention on Climate Change (IPCC 2014) and its Kyoto Protocol and is now used widely as the default metric. In addition, the EPA uses the 100-year time horizon in its *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2017* (EPA 2019).

The 100-year GWP is only one of several possible emission metrics and time horizons. The choice of emission metric and time horizon depends on the type of application and policy context; hence, no single metric is optimal for all policy goals. All metrics have shortcomings and choices contain value judgments, such as the climate effect considered and the weighting of effects over time (which explicitly or implicitly discounts impacts over time) and the climate policy goal and the degree to which metrics incorporate economic or only physical considerations. There are significant uncertainties related to metrics, and the magnitudes of the uncertainties differ across the metric type and time horizon. Three such metrics type/time horizon combinations are listed in Table E.2.1 and were used in the GHG analysis. In general, the uncertainty increases for metrics along the cause and effect chain from emission to effects.

All Project GHG emissions were converted to units of CO_2e for ease of comparison using the GWP values shown in Table E.2.1.

Table E.2.1. Global Warming Potential Factors

Time Horizon	CO_2	CH_4	N_2O	Rationale for Time Horizon
100 years	1	25	298	Used by the U.S. Environmental Protection Agency in its GHG inventories and GHG reporting rule requirements under 40 CFR 98(a) (EPA 2019).
100 years	1	28	265	Used by IPCC in its climate change synthesis report of the fifth assessment report (IPCC 2014).
20 years	1	84	265	Used by IPCC in its climate change synthesis report of the fifth assessment report (IPCC 2014).

Note: CH_4 (methane); CO_2 (carbon dioxide); GHG (greenhouse gas); IPCC (Intergovernmental Panel on Climate Change); N_2O (nitrous oxide).

2.2 Direct Greenhouse Gas Emissions Calculation Methods

ConocoPhillips Alaska, Inc. (CPAI) developed a Project emissions inventory (CPAI 2019) of all known emissions sources (e.g., vehicles, aircraft, drill rigs, generators) that would be present during the construction and life of the Project for Alternative B (Proponent's Project). The Bureau of Land Management (BLM) reviewed the emissions inventory and used it as the basis for estimating emissions from Alternatives C (Disconnected Infield Roads) and D (Disconnected Access). GHG emissions were calculated for each alternative as part of this inventory to estimate the Project's direct GHG emissions.

All action alternatives would include construction, drilling, routine operations, well workovers and interventions, and module delivery. Emissions from these activities would come from stationary combustion sources, mobile on-road and nonroad tailpipe combustion sources, fugitive sources, aircraft sources, and marine vessel sources. GHG emissions quantified from these activities include CO_2, CH_4, and N_2O. The GWPs shown in Table E.2.1 were used to calculate total CO_2e. For additional information regarding the methods used to estimate emissions for each alternative, see Chapter 2 of the Willow MDP

Environmental Impact Statement (EIS) Air Quality Technical Support Document provided as to Appendix E.3B, *Air Quality Technical Support Document*.

For Alternatives B and C, the Project would begin construction in the year 2020 and end production in 2050 for a 30-year Project lifetime. For Alternative D, the Project would begin construction in 2020 and end production in 2051 for a 31-year Project lifetime.

2.3 Indirect Greenhouse Gas Emissions Calculation Methods

The Bureau of Ocean Energy Management's (BOEM's) Greenhouse Gas Lifecycle Model (Wolvovsky and Anderson 2016) is used to estimate indirect GHG emissions from transportation, refinement, and oil usage. This model was developed to support the Outer Continental Shelf Oil and Gas Leasing Program 2017–2022 Preliminary EIS and it represents the best available resource for estimating indirect GHG emissions from petroleum products refined and consumed domestically. A description of the model's capabilities and methodology can be found in Wolvovsky and Anderson (2016).

For the EIS, BOEM estimated the downstream GHG emissions associated with consumption of the oil and gas produced from the Project as well as the energy substitutes (ranging from other oil sources to renewable sources). BOEM's Market Simulation Model estimates these energy substitutes that could replace production from the Project or, equivalently, be displaced due to the Project. BOEM's Office of Environmental Programs developed the GHG Lifecycle Model to estimate the full lifecycle emissions from both production and consumption of Outer Continental Shelf resources. For this Project, only the downstream portion of the model was used, as the upstream component is derived in combination with an offshore-specific separate model. BOEM's GHG analysis for the Project is limited to the emissions associated with the processing and consumption of oil and gas resources and not the actual production of the resources that were calculated, as discussed in Section 2.2, *Direct Greenhouse Gas Emissions Calculation Methods*. For Alternatives B and C, oil production would begin in 2024 and end in 2050. For Alternative D, oil production would begin in 2026 and end in 2051.

2.4 Social Cost of Carbon

A protocol to estimate what is referenced as the "social cost of carbon" (SCC) associated with GHG emissions was developed by a federal Interagency Working Group on Social Cost of Carbon (IWG), to assist agencies in addressing EO 12866, which requires federal agencies to assess the cost and benefits of proposed regulations as part of their regulatory impact analyses. The SCC is an estimate of the economic damages associated with an increase in carbon dioxide emissions and is intended to be used as part of an economic cost-benefit analysis for proposed rules. As explained in the Executive Summary of the 2010 SCC Technical Support Document "[t]he purpose of the [SCC] estimates . . . is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO_2) emissions into cost-benefit analyses of regulatory actions that have small, or 'marginal,' impacts on cumulative global emissions" (IWG 2010). While the SCC protocol was created to meet the requirements for regulatory impact analyses during rulemakings, BLM has received requests to expand the use of SCC estimates to program and project-level National Environmental Policy Act (NEPA) analyses.

The decision was made not to expand the use of the SCC protocol for the oil and gas Project discussed in the EIS for several reasons. Most notably, this Project-level action is not rulemaking for which the SCC protocol was originally developed. Second, on March 28, 2017, President Donald J. Trump issued EO 13783, which, among other actions, directed that the IWG be disbanded and that the technical support documents upon which the protocol was based be withdrawn as no longer representative of governmental policy. The EO further directed agencies to ensure that estimates of the social cost of carbon and GHGs used in regulatory analyses "are based on the best available science and economics" and are consistent with the guidance contained in Office of Management and Budget Circular A-4, "including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates" (EO 13783, Section 5I). In compliance with Circular A-4 guidance, interim protocols have been developed for use in the rulemaking context. However, Circular A-4 does not apply to non-rulemaking program or project decisions, so there is no EO requirement to apply the SCC protocol to Project decisions like the EIS.

Further, NEPA does not require a cost-benefit analysis (40 CFR 1502.23), although NEPA does require consideration of “effects” that include “economic” and “social” effects (40 CFR 1508.8(b)). The economic analysis in the EIS is discussed in Section 3.15, *Economics*. Any increased economic activity that is expected to occur from the Project is simply an economic impact rather than an economic benefit. Some people may perceive increased economic activity as a positive impact that they desire to have occur, whereas another person may view increased economic activity as negative or undesirable due to the potential increase in the local population, the competition for jobs, and concerns that changes in population will change the quality of the local community. Economic impacts are distinct from “economic benefits,” as defined in economic theory and methodology (Kotchen 2011; Watson, Wilson et al. 2007), and the socioeconomic impact analysis required under NEPA is distinct from an economic cost-benefit analysis, which is not required.

The fact that climate impacts associated with GHG emissions were not quantified in terms of monetary costs does not mean that climate impacts were ignored in the EIS. Readers are referred to Sections 3.2.1.1, *Observed Climate Trends and Impacts in the Arctic and on the North Slope*, and 3.2.1.2, *Projected Climate Trends and Impacts in the Arctic and on the North Slope*, of the EIS and Sections 1.2, 1.3 and 1.5 of this appendix for descriptions of climate change trends in the Arctic and on the North Slope and for a discussion of the potential effects of climate change on the region. In addition to the qualitative climate change information discussed above, BLM quantified the direct and indirect GHG emissions associated with the action alternatives in the EIS (see Table 3.2.2 in Chapter 3.2, *Climate and Climate Change*, of the EIS; and Tables E.2.2, E.2.3, and E.2.4 in this appendix). Furthermore, Section 3.2.1.3, *Trends in U.S. and Alaska Greenhouse Gas Emissions*, in the EIS provides an inventory of recent GHG emissions at various geographic scales, in units of MMT per year, against which Project-related direct and indirect emissions are compared for each action alternative (Sections 3.2.2.2, *Alternative A: No Action*; 3.2.2.3, *Alternative B: Proponent’s Project;* and 3.2.2.4, *Alternative C: Disconnected Infield Roads*) to provide an estimate of the relative contribution of such emissions at various geographic scales.

BLM took the approach of referencing climate change trends and potential climate impacts at different scales and calculating direct and indirect GHG emissions because climate change and potential climate impacts, in and of themselves, are often not well understood by the public (Etkin and Ho 2007; NRC 2009). Therefore, BLM has provided data and information in a manner that follows many of the guidelines for effective climate change communication developed by the National Academy of Sciences (NRC 2010) by making the information more readily understood and relatable to the decision-maker and the public. This approach recognizes that there are adverse environmental impacts associated with the development and use of fossil fuels, discusses potential impacts qualitatively, and effectively informs the decision-maker and the public of the potential for GHG emissions and the potential implications of climate change.

Finally, the SCC protocol does not measure the actual incremental impacts of a project on the environment and does not include all damages or benefits from carbon emissions. The SCC protocol estimates economic damages associated with an increase in CO_2 emissions—typically expressed as a 1 metric ton increase in a single year—and includes, but is not limited to, potential changes in net agricultural productivity, human health, and property damages from increased flood risk over hundreds of years. The estimate is developed by aggregating results “across models, over time, across regions and impact categories, and across 150,000 scenarios” (Rose, Turner et al. 2014). The dollar cost figure arrived at based on the SCC calculation represents the value of damages avoided if, ultimately, there is no increase in carbon emissions. However, the dollar cost figure is generated in a range and provides little benefit in assisting the BLM Authorized Officer’s decision for program or project-level analyses, especially given that there are no current criteria or thresholds that determine a level of significance for SCC monetary values.

3.0 ENVIRONMENTAL CONSEQUENCES

3.1 Effects of the Project on Climate Change

3.1.1 Alternative A: No Action

Under Alternative A, the Project would not occur. Direct and indirect GHG emissions from the Project would not occur and hence not contribute to climate change. Current trends in global, U.S., and Alaska GHG emissions would continue, unaffected by the Project. For ease of comparison to the action alternatives, GHG emissions in the No Action Alternative are assigned a baseline value of zero in the EIS, reflecting the status quo and current GHG emissions trends in the absence of the Project.

3.1.2 Alternative B: Proponent's Project

Alternative B direct and indirect CO_2e emissions are quantified and described in the following sections. Black carbon effects on climate are also discussed.

3.1.2.1 Direct Greenhouse Gas Emissions

Direct and indirect emissions of the GHGs CO_2, CH_4, and N_2O will impact the climate. The Project is also expected to produce a small amount of sulfur dioxide, a GHG that has an overall cooling effect; however, the effect of sulfur dioxide emissions would be negligible. Direct emissions for the Project include, but are not limited to, emissions from vehicle traffic, air traffic, power generation, and drill rigs.

GHGs have long lifetimes of 10 to 100 years before they are chemically broken down or otherwise removed from the atmosphere through absorption or deposition. Since GHGs are relatively stable, changes in GHG emissions have long-lasting effects on the climate. Alternative B direct GHG emissions estimated over the 30-year Project lifetime are provided in the main body of the EIS (Table 3.2.2 in Section 3.2.2.3). Emissions are given in CO_2e units to account for the GWP of pollutants and were calculated using GWP values for both 100-year and 20-year time horizons (Table E.2.1). Note that the Project activities vary considerably over the life of the Project and GHG emissions in any given year may be higher or lower than annual average GHG emissions (Table E.2.2). The annual average emissions for Alternative B shown are for gross GHG emissions and do not account for the market substitution effects discussed in Section 3.2.2.2.

Table E.2.2. Annual Average Gross Greenhouse Gas Emissions for Alternative B (thousand metric tons per year)

GHG Emissions	CO_2	CH_4	N_2O	CO_2e (100-year AR4 GWP)	CO_2e (100-year AR5 GWP)	CO_2e (20-year AR5 GWP)
Direct	762	0.294	0.0018	770	771	787
Indirect	7,825	0.433	0.0667	7,855	7,855	7,879
Total[a]	**8,587**	**0.727**	**0.0685**	**8,625**	**8,626**	**8,666**

Note: AR4 (fourth assessment report of the Intergovernmental Panel on Climate Change); AR5 (fifth assessment report); CO_2 (carbon dioxide); CO_2e (carbon dioxide equivalent); CH_4 (methane); GHG (greenhouse gas); GWP (global warming potential); N_2O (nitrous oxide).
[a] Total values may have small differences due to rounding.

3.1.2.2 Indirect and Total Greenhouse Gas Emissions

Indirect emissions are expected to come from transportation, refinement, and downstream consumption of the oil extracted by the Project. Natural gas extracted from the Project would be reinjected into the well and would not be transported for consumption.

Indirect GHG emissions estimated over the 30-year Project lifetime are shown in Table 3.2.2 in Section 3.2.2. The Alternative B annual average indirect and total GHG emissions (Table E.2.2) are calculated by dividing the indirect and total GHG emissions (gross emissions) by the 30-year Project lifetime. As in the case of direct emissions, GHG emissions in any given year may be higher or lower than annual average GHG emissions because Project activities vary considerably over the life of the Project.

3.1.2.3 Black Carbon Effects on Climate

Black carbon is a short-lived pollutant with a lifetime of several days to weeks (AMAP 2011, 2015; Paris, Stohl et al. 2009). Estimates of black carbon's effect on climate is highly uncertain, but according to the 2015 Arctic Monitoring and Assessment Programme Assessment, there is a "very high probability that black carbon emissions . . . have a **positive forcing** and warm the climate." In addition, the IPCC has stated that black carbon emissions must fall by at least 35% across all sectors from 2010 levels by 2050 to limit global warming to 1.5 degrees C (2.7 degrees F) (IPCC 2018a).

Black carbon is a by-product of incomplete combustion. It is removed from the atmosphere through wet and dry deposition. Concentrations of black carbon vary depending on the season (AMAP 2015), spatial location (Creamean, Maahn et al. 2018), and vertical height in the atmosphere (Creamean, Maahn et al. 2018; Stohl, Klimont et al. 2013; Xu, Martin et al. 2017). On Alaska's North Slope, black carbon can come from international transportation sources (Matsui, Kondo et al. 2011; Stohl 2006; Xu, Martin et al. 2017), biomass burning (Creamean, Maahn et al. 2018; Stohl 2006; Xu, Martin et al. 2017), shipping (Corbett, Lack et al. 2010; Lack and Corbett 2012), oil and gas exploration and production activities (Creamean, Maahn et al. 2018; Stohl, Klimont et al. 2013), and residential combustion (Stohl, Klimont et al. 2013). In particular, black carbon emitted from shipping can be deposited directly onto sea ice, and ice breakers can deposit black carbon onto the ice pack itself (Brewer 2015). Black carbon emitted onto ice and snow can increase melting and exacerbate warming as darker and more absorbent land and water surfaces are exposed as a result. With Project construction, black carbon would be emitted as part of particulate matter less than 2.5 microns in aerodynamic diameter **($PM_{2.5}$)** emissions from diesel-fired equipment, including engines, boilers, heaters, pumping units, and other equipment, such as aircrafts and flares.

Black carbon has a strong impact on Arctic regions due to its ability to change the reflective properties of ice and snow. When black carbon is deposited on ice or snow, it darkens the ground, decreasing the reflectiveness of the surface (the albedo) and warming the surface (+0.13 Watts per square meter [W/m^2]). Since black carbon emitted in the Arctic has a higher probability of being deposited onto snow or ice, this "snow- and ice-albedo feedback effect" is stronger when black carbon is emitted in the Arctic than when it is transported from lower latitudes (Sand, Berntsen et al. 2013). Black carbon that is not deposited can increase warming when it absorbs solar radiation in the lower troposphere and boundary layer, decreasing cloud cover and leading to increased melting, further enhancing the snow- and ice-albedo feedback effect as the surface turns from bright snow and ice into darker water. In fact, black carbon has a strong direct radiative effect, meaning it is effective at warming the climate through the direct absorption of radiation and is the component of $PM_{2.5}$ that is most effective at absorbing solar energy. Bond, Doherty et al. (2013) estimate the direct radiative effect of black carbon to be +0.71 W/m^2. Black carbon can also affect the formation of clouds and change their radiative properties, leading to increased warming (+0.23 W/m^2). When black carbon mixes with other pollutants in the atmosphere, a coating can form around the black carbon particle, causing it to grow in size. It is predicted that black carbon particles that have reacted with chemical compounds in this way may have an increased warming effect (Kodros, Hanna et al. 2018).

Black carbon can also cool the climate. When black carbon is lofted high into the atmosphere, it can block solar radiation from reaching the surface in a process called surface dimming (Flanner 2013; Sand, Berntsen et al. 2013). Surface dimming also decreases the equatorial-polar temperature gradient, causing less heat to be transported to the Arctic from lower latitudes. Black carbon can also increase reflected incoming solar radiation by increasing high-altitude clouds that reflect solar radiation. Bond et al. (2013) also find that black carbon is coemitted with other pollutants, and these pollutants can reduce the amount of warming caused by black carbon alone (-0.06 W/m^2).

The effect of black carbon, although expected to be positive overall, is highly variable and dependent on the location and timing of the emissions, the mixing state of the atmosphere, and deposition processes. The complex interactions and feedbacks between black carbon and the environment all contribute to the effect of black carbon on the arctic climate.

Black carbon would be emitted by sources and activities under Alternative B. For the Project, black carbon emissions were not explicitly quantified; however, black carbon is a component of $PM_{2.5}$ and black carbon emissions are included in $PM_{2.5}$ emissions that are quantified in the air quality analysis (Chapter 3.3, *Air Quality*).

3.1.3 Alternative C: Disconnected Infield Roads

Alternative C GHG emissions estimated for the 30-year Project lifetime are provided in Table 3.2.2 in Section 3.2.2.3. Annual average GHG emissions (Table E.2.3) are calculated by dividing the Project's lifetime GHG emissions by the 30-year Project duration. As in the case of Alternative B, GHG emissions in any given year may be higher or lower than annual average GHG emissions (Table E.2.3) because Project activities vary considerably over the life of the Project.

Black carbon would be emitted by sources and activities under Alternative C. Although black carbon is not explicitly quantified, it is a component of $PM_{2.5}$, and $PM_{2.5}$ emissions would be greater under Alternative C than Alternative B (see the Air Quality Technical Support Document provided as an Appendix E.3B). Therefore, it is anticipated that black carbon emissions would also be greater under Alternative C than Alternative B, and the effects of black carbon on the environment would increase under Alternative C relative to Alternative B. The annual average emissions for Alternative C shown in Table E.2.3 are for gross GHG emissions and do not account for the market substitution effects discussed in Section 3.2.2.2.

Table E.2.3. Annual Average Gross Greenhouse Gas Emissions for Alternative C (thousand metric tons per year)

GHG Emissions	CO_2	CH_4	N_2O	CO_2e (100-year AR4 GWP)	CO_2e (100-year AR5 GWP)	CO_2e (20-year AR5 GWP)
Direct	834	0.297	0.0021	843	843	860
Indirect	7,825	0.433	0.0667	7,856	7,855	7,879
Total[a]	**8,659**	**0.730**	**0.0688**	**8,699**	**8,698**	**8,739**

Note: AR4 (fourth assessment report of the Intergovernmental Panel on Climate Change); AR5 (fifth assessment report); CH_4 (methane); CO_2 (carbon dioxide); CO_2e (carbon dioxide equivalent); GHG (greenhouse gas); GWP (global warming potential; N_2O (nitrous oxide).
[a] Total values may have small differences due to rounding.

3.1.4 Alternative D: Disconnected Access

As mentioned in Section 2.2 of this appendix and explained in more detail in Chapter 2.0, *Alternatives*, Alternative D would have a 31-year Project lifetime rather than the 30-year Project lifetime for Alternatives B and C. Alternative D GHG emissions estimated over the 31-year Project lifetime are shown in Table 3.2.2 in Section 3.2.2.3. Project activities vary considerably over the life of the Project, and GHG emissions in any given year may be higher or lower than the annual average GHG emissions (Table E.2.4).

Black carbon would be emitted by sources and activities under Alternative D. Although black carbon is not explicitly quantified, it is a component of $PM_{2.5}$, and $PM_{2.5}$ emissions would be greater under Alternative D than Alternative B and emissions under Alternative D would be less than Alternative C (see the Air Quality Technical Support Document provided as Appendix E.3B). Therefore, it is anticipated that black carbon emissions would be greater under Alternative D than Alternative B but reduced relative to Alternative C. Similarly, the effects of black carbon on the environment described in Section 3.2.1, *Affected Environment*, would increase under Alternative D relative to Alternative B. The annual average emissions shown in Table E.2.4 are for gross GHG emissions under Alternative D and do not account for the market substitution effects discussed in Section 3.2.2.2.

Table E.2.4. Annual Average Greenhouse Gas Emissions for Alternative D (thousand metric tons per year)

GHG Emissions	CO_2	CH_4	N_2O	CO_2e (100-year AR4 GWP)	CO_2e (100-year AR5 GWP)	CO_2e (20-year AR5 GWP)
Direct	718	0.275	0.0017	725	726	742
Indirect	7,336	0.406	0.0625	7,365	7,364	7,386
Total[a]	**8,054**	**0.681**	**0.0642**	**8,090**	**8,090**	**8,128**

Note: AR4 (fourth assessment report of the Intergovernmental Panel on Climate Change); AR5 (fifth assessment report); CH_4 (methane); CO_2 (carbon dioxide); CO_2e (carbon dioxide equivalent); GHG (greenhouse gas); GWP (global warming potential; N_2O (nitrous oxide).
[a] Total values may have small differences due to rounding.

3.1.5 Module Delivery Options

Project lifetime and annual average direct GHG emissions from module delivery options alone are shown in Table E.2.5 for Option 1 (Atigaru Point Module Transfer Island), Option 2 (Point Lonely Module Transfer Island) and Option 3 (Colville River Crossing). Note that emissions from Option 3 vary based on the action alternative it is paired with for analysis. Table E.2.5 also provides the differences between Options 1 and 2 from Option 3. Annual average GHG emissions for module delivery options are calculated by dividing the Project lifetime GHG emissions by the expected duration of module delivery emissions, which is 6 years. Direct GHG emissions from Option 2 are more than twice the emissions from Option 1 because the distance vehicles would travel a longer distance to reach Point Lonely. Direct GHG emissions from Option 3 are considerably less than Options 1 and 2 (under all action alternatives) because Option 3 would make use of the existing Oliktok Dock and construct the least amount of new infrastructure to support sealift module delivery. Total GHG emissions for the Project would be the sum of the selected alternative and the selected module delivery option.

Black carbon would be emitted by sources and activities as part of all module delivery options. Although black carbon is not explicitly quantified, it is a component of $PM_{2.5}$, and $PM_{2.5}$ emissions would be greatest under Option 2 and lowest under Option 3 (under all action alternatives). Therefore, it is anticipated that black carbon emissions would also be greatest under Option 2 and lowest under Option 3 (under all action alternatives), and the effects of black carbon on the environment described in Section 3.1.2.3, *Black Carbon Effects on Climate*, would be greatest under Option 2 and lowest under Option 3 (under all action alternatives).

Table E.2.5. Direct Greenhouse Gas Emissions Associated with Module Delivery Options (thousand metric tons)

GHG Emissions	Total CO_2e (100-year AR4 GWP)	Annual Average CO_2e (100-year AR4 GWP)	Total CO_2e (100-year AR5 GWP)	Annual Average CO_2e (100-year AR5 GWP)	Total CO_2e (20-year AR5 GWP)	Annual Average CO_2e (20-year AR5 GWP)
Option 1: Atigaru Point MTI	140	23	140	23	141	24
Option 2: Point Lonely MTI	341	57	341	57	342	57
Option 3: Colville River Crossing – Alternatives B and C	40	7	40	7	40	7
Option 3: Colville River Crossing – Alternative D	43	7	43	7	43	7
Option 1 minus Option 3 (Alternatives B and C)	100	16	100	16	111	17
Option 1 minus Option 3 (Alternative D)	97	16	97	16	97	16
Option 2 minus Option 3 (Alternatives B and C)	301	50	301	50	302	50
Option 2 minus Option 3 (Alternative D)	298	50	298	50	299	50

Note: AR4 (fourth assessment report of the Intergovernmental Panel on Climate Change); AR5 (fifth assessment report); CO_2e (carbon dioxide equivalent); GHG (greenhouse gas); GWP (global warming potential); MTI (module transfer island).

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Willow Master Development Plan

Appendix E.2B

Market Substitutions and Greenhouse Gas Downstream Emissions Estimates

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Prepared by Bureau of Ocean and Energy Management (January 2020)

Prepared for Bureau of Land Management

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Market Substitutions and Greenhouse Gas Downstream Emissions Estimates for BLM's Willow Master Project

Overview

The Willow Master Environmental Impact Statement (EIS) includes an analysis on climate change that has been drafted with support from the Bureau of Ocean Energy Management (BOEM). BOEM has two models, the Market Simulation Model (MarketSim) and the Greenhouse Gas Lifecycle Model (GHG Model), that were collectively used to help estimate the carbon emissions from consumption of oil produced from the project, net of the emissions that would have occurred absent the project.

This appendix provides a comparison of the downstream emissions from the Willow Master Project and those from energy sources that would be displaced if the project is implemented (i.e., the emissions that would occur without the project, under the No Action Alternative). BOEM uses MarketSim to estimate the energy sources that could be displaced by the proposed Willow Master Project and then uses the GHG Model to estimate emissions associated with the consumption of both the Willow Master Project production and the displaced energy sources.

The analysis for the Willow Master Project is limited to only the emissions associated with the processing and consumption of the oil from the project and the energy substitutes displaced by the project. The emissions estimates in this analysis do not include any estimated emissions from the actual production of resources from the Willow Master Project or the production or upstream transport of any resources produced through the No Action Alternative (Alternative A).

This appendix first discusses MarketSim and the estimated displaced energy sources with the approval of the Willow Master Project. The GHG Model and the resulting emissions estimates are then described.

BOEM's Market Simulation Model and the Energy Market Substitutions

MarketSim models oil, gas, coal, and electricity markets, and is calibrated to a special run of the National Energy Modeling System by the Energy Information Administration (EIA). The baseline used in MarketSim is a modified version of the EIA's 2018 *Annual Energy Outlook* reference case; the modification involves omission of new OCS lease sales starting in 2019. Removing the EIA's expectation of production from new OCS leasing allows investigation of alternative new OCS leasing scenarios within the EIA's broad energy market projection using MarketSim. MarketSim uses price elasticities derived from EIA and other published elasticity studies to quantify the changes that could occur to prices and energy production and consumption over the time of production.

BOEM developed MarketSim to calculate the energy sources that would replace new offshore oil and natural gas production in the absence of new leases under a National Outer Continental Shelf (OCS) Oil and Gas Leasing Program. These substitute energy sources include additional oil and gas imports, onshore oil and gas production, fuel switching (e.g., using coal instead of oil), and reduced consumption of energy. Energy market substitution occurs due to changes in the feedback loop among supply, demand, and prices.

Using EIA data, MarketSim assumes a baseline supply (production) and demand (consumption) of energy from various sources, as well as their baseline prices and elasticities. That baseline is the No Action Alternative, or a scenario in which none of the project action alternatives would be approved. The model then calculates how introducing production from each action alternative would impact those baseline supply, price, and demand assumptions. Increased oil supply from the project would drive oil prices down, if only slightly. A reduction in oil prices would cause demand for oil to increase even as consumers of energy switched (substituted) from other energy sources like coal, natural gas, or oil from other sources such as imports or domestic onshore/offshore production. Due to this increased demand, the displacement of other sources does not account for 100% of the change from the baseline. The full MarketSim documentation is entitled *Consumer Surplus and Energy Substitutes for OCS Oil and Gas Production: The 2017 Revised Market Simulation Model (MarketSim)*.[1]

Applicability of MarketSim to BLM Decisions

While MarketSim is specifically designed to calculate the energy market substitutes for offshore oil production anticipated from proposed lease offerings, the basic model calculations allow for its use in modeling the substitutes for other oil and gas sources, including new onshore production. Since MarketSim is designed to treat production from new offshore leases as the exogenous variable, modelling substitution effects of new onshore production requires inputting the projected Willow Master production as new offshore oil production. This modelling approach results in a couple of limiting assumptions, including the following:

- Additional onshore production from the Willow Master Project essentially generates the same types of energy market substitutes as offshore production.
- The model will not include displacement of production from new offshore leases as a result of new Alaska onshore production. The model does assume some displacement of existing offshore production (i.e., for areas currently under lease).

Even with these limiting assumptions, BOEM believes that MarketSim reasonably approximates the displacement of energy market substitutes by production from the onshore project. Further, the emissions analysis used for this EIS only considers the mid- and downstream emissions. That is, only the emissions from refining and consumption activities are included in the analysis. Given that scope, the specific substitutions of onshore production, offshore production, or imports are not important in the overall emissions analysis conducted for the Willow Master EIS, as that analysis is driven by the substitution of oil, gas, or coal. A version of MarketSim is being adapted to BLM's needs and will be used for future energy market substitution analyses.

MarketSim Modeling Assumptions

The production schedule used to analyze the three alternatives is shown in Table 1.

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[1] Industrial Economics, Inc. 2017. *Consumer surplus and energy substitutes for OCS oil and gas production: the 2017 revised Market Simulation Model (MarketSim)*. U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-039. Available at: https://espis.boem.gov/final%20reports/5612.pdf

Table 1: Willow Master Project Alternative Production Schedules

Alternative	Production (barrels)	Start Year	End Year
Alternative B	586,014,435	2026	2050
Alternative C	586,014,435	2026	2050
Alternative D	586,014,435	2027	2051

Note: Alternative A is the No Action Alternative—rejection of Alternatives B through D.

MarketSim Results

MarketSim provided estimates of the energy sources displaced with development of the Willow Master Project, and that is how they are described in this appendix. Conversely, these energy substitutions are the same as the energy market sources that would displace forgone oil production from the Willow Master Project if the proposal were not approved.

MarketSim estimates the different types of substitute fuels as well as the origin of the fuel (i.e., onshore, offshore, or imports). These details are then used to model the upstream impacts associated with the production of offshore energy and substitute sources. However, for this study, only the mid- and downstream emissions were estimated. Thus, only the type of substituted fuel is required, as the location of substitute production is not necessary.

Table 2 shows the proportional displacement of energy substitutes that would be displaced by Willow Master Project oil production under each of the three action alternatives (Alternatives B through D). The *percentage* of substitutions for Alternatives B and C are identical. However, Alternative D has slightly different substitution percentages, which are driven by the different years over which the oil would be produced. The underlying EIA data differ by year, and the impacts would similarly vary given the year of additional production. This is noticeable in the substitution of coal, which is less heavily displaced in Alternative D because the EIA projects that coal will compose a slightly smaller proportion of the U.S. energy composition in the later years.

For example, 93.69% of the oil production from Willow Master under all three Alternatives (B, C, and D) would displace oil from other sources (oil that would have been produced from other domestic projects or imported). However, 1.98% of the production under Alternatives B and C would displace natural gas, while that percentage is 2.18% for Alternative D. Similarly, Alternatives B and C displace coal by 0.71% of their production totals, while Alternative D displaces coal by 0.53%. These differences have to do with the delay of 1 year in production under Alternative D. All three have equal displacement of biofuels and electricity from other sources. The remaining forecasted production represents increased demand over the baseline. However, again due to time, the new demand created by the increased production is divided with slight differences among energy sources.

As shown in Table 2, approval of the proposed project would lead to an increase in oil consumption (totaling about 5.39% of the Willow Master production for Alternative B and C; 5.43% for alternative D), coupled with a smaller decrease in consumption of other energy sources. The net effect on overall energy consumption is that it would be slightly higher with Willow Master production than under the No Action Alternative (i.e., the status quo without the project). The increase in demand is estimated to be the energy equivalent of about 3.24% of Willow Master production. Under all three action alternatives, more than 96% of the anticipated production would displace other carbon-emitting fuel sources.

Table 2: Displaced Fuels and Increased Demand

Percent of Willow Master Oil that:	Alternative B	Alternative C	Alternative D
*Displaces Oil	93.69%	93.69%	93.69%
*Displaces Natural Gas	1.98%	1.98%	2.18%
*Displaces Coal	0.71%	0.71%	0.53%
Displaces Biofuels and Electricity from other sources	0.38%	0.38%	0.36%
Represents New Demand (Not Displacing other sources)	3.24%	3.24%	3.24%
Oil	5.39%	5.39%	5.43%
Natural Gas	-1.49%	-1.49%	-1.50%
Coal	-0.21%	-0.21%	-0.22%
Electricity	-0.46%	-0.46%	-0.46%

Notes: Emissions are calculated for displaced oil, natural gas, and coal. Alternative A is the No Action Alternative—rejection of the Proposed Action. MarketSim treats the No Action Alternative as a baseline; therefore, the results for each of the action alternatives are relative to Alternative A.

GHG Model

The GHG Model was developed to estimate emissions that could be anticipated as a result of the consumption of new offshore oil and natural gas production. For the Willow Master Project, the GHG Model is used to estimate emissions from oil and gas refining, processing, storage, and consumption, as well as the emissions associated with energy market substitutes in the absence of oil production from the proposed project (i.e., the No Action Alternative). The full GHG Model documentation is entitled *OCS Oil and Natural Gas: Potential Lifecycle Greenhouse Gas Emissions and Social Cost of Carbon.*[2]

Adaptation of the GHG Model

The GHG Model calculates the impacts of consumption of oil, gas, and coal and is not specific to the origin (domestic onshore, domestic offshore, or imports) of the oil consumed. As such, it is appropriate for use in calculating the greenhouse gas emissions from the consumption of oil and gas from the Willow Master Project.

To reiterate, onsite emissions (i.e., emissions associated with the production of the oil and natural gas) are not calculated in this analysis. To estimate these onsite emissions, a separate model designed to analyze GHG emissions from the onshore equipment and facilities would be required. Further, the upstream transportation emissions from displaced sources are not included. For example, the fairly

[2] Wolvovsky, E. and Anderson, W. 2016. *OCS Oil and Natural Gas: Potential Lifecycle Greenhouse Gas Emissions and Social Cost of Carbon.* BOEM OCS Report 2016-065. 44 pp. Available at: https://www.boem.gov/OCS-Report-BOEM-2016-065/.

significant emissions associated with transportation of imported oil by tanker to the U.S. under the No Action Alternative are not considered.

Since publishing the above-cited technical documentation, the annual emissions from refineries and natural gas processing and storage systems have been updated, along with updates to reflect oil and gas consumption patterns in the United States as of 2018.

GHG Model Results

The GHG Model estimates only the emissions from the mid- and downstream activities for both the project production and the displaced energy sources. Only the emissions from displaced oil, natural gas, and coal are modeled. Emissions from biofuels are not included, and electricity from other sources is assumed to have no emissions from the mid- and downstream. The results of the GHG Model are shown in Table 3 and Table 4. The lower prices for oil and other energy sources associated with increased U.S. production as a result of the Willow Master project would affect both domestic and foreign energy consumption. However, currently neither BOEM nor BLM has the ability to estimate differences in GHG emissions caused by changes in foreign consumption. This estimation would require detailed data on proportional consumption changes and the most likely energy substitutions, as well as on emissions from refineries, natural gas systems, coal processing, and other emission factors specific to the energy substitutes for all countries worldwide.

As shown in Table 2, oil from the Willow Master Project would displace other sources of oil, natural gas, and coal production, resulting in more oil and coal consumption and less natural gas consumption than under the No Action Alternative. Given that natural gas has a similar methane (CH_4) emissions factor, and coal has a higher CH_4 emissions factor compared to oil, CH_4 emissions from the displaced substitutes are higher than under any of the three action alternatives (i.e., Alternative B through D). However, because oil has far higher carbon dioxide (CO_2) emissions factor compared to natural gas, the overall CO_2 equivalent (CO_{2e}) displaced is lower than the amount forecasted with production from the Willow Master Project.

Table 3: Downstream GHG Emissions and Displaced Emissions for each Willow Master Production Action Alternative

Alternative	Willow Master Production				Displaced Substitutes			
	CO_{2e}	CO_2	CH_4	N_2O	CO_{2e}	CO_2	CH_4	N_2O
Alternative B	235,658	234,747	13	2	223,624	222,660	16	2
Alternative C	235,658	234,747	13	2	223,624	222,660	16	2
Alternative D	235,658	234,747	13	2	222,934	221,971	16	2

Key: CH4 = methane; CO2 = carbon dioxide; CO2e = carbon dioxide equivalent; N2O = nitrous oxide
Note: Emissions estimates in thousands of metric tons.

Table 4: Net Emissions from the Willow Master Production

Alternative	Net Emissions from Willow Master Production			
	CO_{2e}	CO_2	CH_4	N_2O
Alternative B	12,034	12,087	-3	0
Alternative C	12,034	12,087	-3	0
Alternative D	12,724	12,776	-3	0

Key: CH4 = methane; CO2 = carbon dioxide; CO2e = carbon dioxide equivalent; N2O = nitrous oxide

Note: Emissions estimates in thousands of metric tons.