

COLVILLE DELTA 8 PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

OCTOBER 2026

US Army Corps
of Engineers

EXECUTIVE SUMMARY

Introduction and Purpose and Need

The U.S. Army Corps of Engineers (USACE) Alaska District received an application for a Clean Water Act (CWA) Section 404 permit from ConocoPhillips Alaska, Inc. (the Applicant, or CPAI), for the Colville Delta (CD) 8 Project (CD8 Project or Project) on April 10, 2025. The application (POA-2025-00203) under Section 404 of the CWA proposes to place 760,080 cubic yards of clean fill material over 65.9 acres of waters of the United States (WOTUS), including wetlands, to construct the Project.

In compliance with the National Environmental Policy Act (NEPA) and Section 404 of the CWA, USACE has prepared this environmental impact statement (EIS) to evaluate the potential impacts of the Project and to inform its permit decision. This EIS also considers potential avoidance, minimization, and mitigation measures to address the impacts from the Project. Following publication of the final EIS, the USACE will prepare a record of decision documenting USACE's evaluation of the permit application under NEPA, the CWA Section 404(b)(1) Guidelines, and the USACE public interest review.

The Project, as proposed by the Applicant, would further develop hydrocarbon resources from CPAI's existing oil and gas leases in the Colville River Unit (CRU). The Project would be located on Alaska's Arctic Coastal Plain (ACP), 2.1 miles east-northeast of Nuiqsut, between the East Channel and Niġliq Channel of the Colville River (Figure ES-1). The Project would target the Narwhal reservoir and include construction of a new 15.3-acre drillsite on a gravel pad, a 0.5-acre tie-in pad near CD4, a 6.1-mile gravel access road from CD4 to the drillsite, and 21 miles of pipelines connecting to existing CRU infrastructure and associated utilities (Figure ES-2).

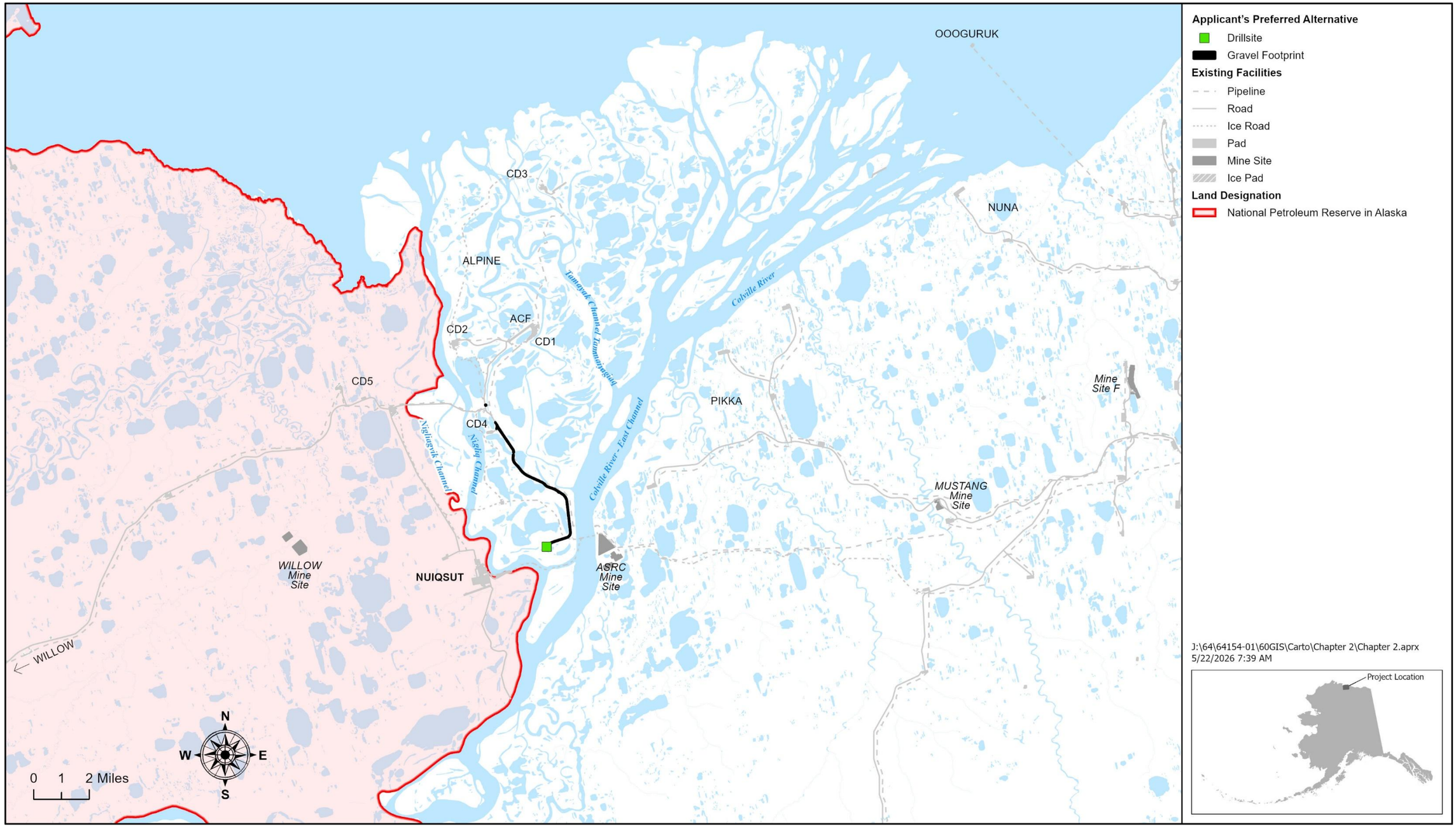


Figure ES-1. CD8 Project location.

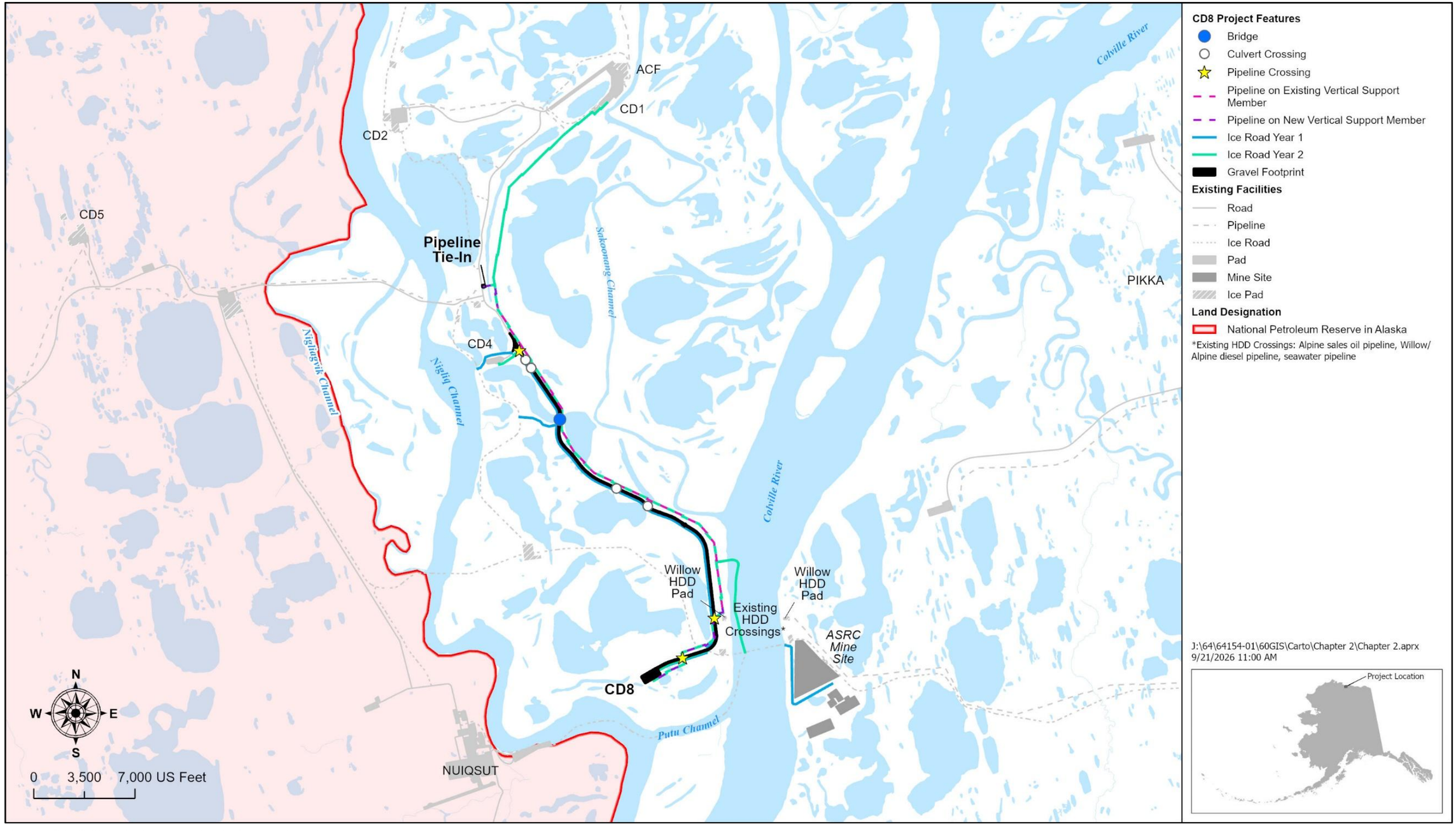


Figure ES-2. CD8 Project Applicant's Preferred Alternative.

Applicant's Stated Purpose and Need

CPAI's purpose for the CD8 Project is to construct the infrastructure necessary for the safe and economic 1) production of commercial quantities of oil and gas resources from lands leased by CPAI for oil and gas development in the southeastern portion of the CRU and 2) transportation of those resources to market via the Alpine Central Facility, consistent with applicable laws and legal obligations.

Development and production of oil and gas from the Project are necessary to access subsurface resources that cannot be reached from existing and currently permitted drillsites. The Project would extend the CRU field life by approximately 8 to 10 years, depending on reservoir outcome, Project timing, other Alpine oil field activities, and market conditions.

U.S. Army Corps of Engineers' Purpose and Need

USACE's defined purpose and need establishes the framework from which a reasonable range of alternatives is developed for analysis in the EIS. Consistent with USACE regulations (33 Code of Federal Regulations [CFR] 333), USACE has carefully considered the Applicant's stated purpose and need and USACE's statutory authority and has determined the proposed activity's underlying purpose and need to develop the alternatives, including the proposed action, evaluated in this EIS. The underlying purpose of the Project, as defined by USACE, is to construct infrastructure to safely and economically produce and transport commercial quantities of oil and gas resources from southeastern portions of the Narwhal reservoir that are unable to be reached from currently permitted drillsites via a pipeline to an existing processing facility and ultimately to market.

Per the CWA and its Section 404(b)(1) Guidelines, USACE also defines the basic and overall project purpose. The basic project purpose determines *water dependency* of a project and if it must be located in a special aquatic site.[1] The overall project purpose defines the geographic boundaries of an applicant's specific project; it is the basis for the alternatives analysis under the CWA and is used to determine if an applicant's proposed project is the least environmentally damaging practicable alternative.

The overall CD8 Project purpose allows for a robust consideration of alternatives while providing a foundation to determine practicability. The overall CD8 Project purpose is to safely and economically extract oil and gas resources from the southeastern portion of the Narwhal reservoir that cannot be reached from currently permitted drillsites.

Scope of Analysis

For the purposes of NEPA, the scope of analysis is limited to the specific activity requiring a USACE permit and any additional portions of the entire Project over which there is sufficient Federal control and responsibility to warrant a larger NEPA review beyond the USACE's limited statutory authorities. Factors USACE considered in determining whether sufficient control and responsibility exist include 1) whether the regulated activity comprises merely a link in a corridor-type project (e.g., a transportation or utility transmission project); 2) whether aspects of the upland facility in the immediate vicinity of the regulated activity would affect the location

[1] Special aquatic sites, including wetlands, are areas that possess special ecological characteristics of productivity, habitat, wildlife protection, or other important or easily disrupted ecological values per 40 CFR 230.3(q).

and configuration of the regulated activity; 3) the extent to which the entire Project would be within USACE jurisdiction; and 4) the extent of cumulative Federal control, responsibility, and legal authority (33 CFR 333.18(c)).

USACE regulatory jurisdiction over the Project includes the discharge of dredged and/or fill material in WOTUS, including wetlands, and work in, over, and under navigable WOTUS. Considering that the Project is almost entirely located in WOTUS, the USACE scope of analysis for the EIS includes the entire Project footprint, including dredge and/or fill placement associated with the construction of roads, pads, pipelines, and utilities. The scope of analysis also includes the footprint of Project-specific ice roads and ice pads as well as barging of materials to Oliktok Dock.

Actions not included in the NEPA scope of analysis are those that are already existing, permitted, and evaluated, such as the Alpine/Western North Slope multiyear ice road and ice bridge, gravel infrastructure at the Alpine Central Facility, screeding at Oliktok Dock, withdrawal of seawater at the existing CPAI Kuparuk Seawater Treatment Plant, and mining at the Arctic Slope Regional Corporation Mine Site or other permitted mine sites in the Kuparuk area.

The NEPA scope of analysis for this EIS includes all of the resource analysis areas described in Chapter 3 (Affected Environment and Environmental Consequences). Geographically, the NEPA analysis area contains the entire Project footprint (e.g., construction of Project-specific ice infrastructure, gravel infrastructure, pipelines, and utilities) and the path of Project-specific marine vessels dedicated to the construction of the Project. The analysis area for each resource is described in each relevant resource section in EIS Chapter 3.

In accordance with 33 CFR 333.18(c)(5)(ii), USACE chose to analyze environmental effects from other projects separate in time, or separate in place, or that fall outside of USACE regulatory authority, if the analysis would assist in USACE's reasoned decision making. EIS Chapter 3 (Affected Environment and Environmental Consequences) describes how USACE drew a reasonable and manageable line relating to its consideration of environmental effects from the regulated activity that extend outside the geographic territory of the Project or might materialize later in time.

Alternatives

Two regulations guided the development of alternatives: the USACE NEPA Implementing Procedures (33 CFR 333) and the CWA Section 404(b)(1) Guidelines (40 CFR 230). These regulations use different criteria to determine whether an alternative should be considered for analysis. Per 33 CFR 333.23(b)(3)(ii), the alternatives analysis should be thorough enough to inform agency decision making for permitting, including determinations of public interest and compliance with the CWA Section 404(b)(1) Guidelines (40 CFR 230). Thus, both NEPA and 404(b)(1) criteria for alternatives are applied in this EIS.

National Environmental Policy Act Alternatives

Under the USACE NEPA Implementing Procedures, an EIS must include a reasonable range of alternatives to an applicant's preferred alternative, including a no action alternative (33 CFR 333.23(b)(3)). Only alternatives considered to be reasonable are carried forward for detailed

analysis. **Reasonable** alternatives must be technically, legally, and economically feasible while still meeting the applicant's underlying purpose and need (33 CFR 333.23(b)(3)(i)). Any alternatives selected for detailed analysis should support the analysis required under the CWA Section 404(b)(1) Guidelines, as detailed in Section 2.1.2 (Clean Water Act Alternatives) (33 CFR 333.23(b)(3)(ii)) and should consider geographic changes in location (geographic alternatives) as well as design modifications (functional alternatives) from the applicant's preferred alternative (33 CFR 333.23(b)(3)(iv)).

Clean Water Act Requirements

Under the CWA Section 404(b)(1) Guidelines, USACE must review all practicable alternatives to the proposed activity with the purpose of identifying the least environmentally damaging practicable alternative (Section 404(b)(1)) on aquatic ecosystems. The Guidelines prohibit permitting an alternative if a practicable alternative would have a less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental impacts (40 CFR 230.10(a)). An alternative is considered **practicable** "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the Applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered" (40 CFR 230.10(a)(2)).

U.S. Army Corps of Engineers Public Interest Review

USACE's decision on whether to issue a permit is also based on an evaluation of the probable impacts, including cumulative impacts, of the Project and its intended use on public interest (33 CFR 320.4). As part of this process, USACE considers the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed work where there are unresolved conflicts as to resource use.

Development of Alternatives

Per the USACE NEPA Implementing Procedures (33 CFR 333.23(b)(3)) and the CWA Section 404(b)(1) Guidelines (40 CFR 230), USACE developed a reasonable and practicable range of alternatives that respond to USACE's overall Project purpose and the Project's underlying purpose and need while also addressing issues raised in scoping; see EIS Section 1.8 (Scoping and Issue Identification) and EIS Appendix C (Scoping Summary). The alternatives development process began with scoping and continued through workshops and document reviews with the cooperating agencies. USACE also incorporated input from Tribes and Alaska Native corporations during scoping and alternatives development; see EIS Section 1.9 (Consultation and Coordination). The location of the Project was a key issue raised in scoping. Commenters were concerned about the proximity of the drillsite to the community of Nuiqsut and suggested alternative locations to move the drillsite further away from the community to address concerns about air quality, visual impacts, noise, spill risk, and public health. Similar to the public scoping comments, the cooperating agencies in the alternatives development workshop focused on development of alternative locations that moved the Project further from the community.

Alternative concepts were solicited, discussed, and screened using the criteria described below. Rationale for retaining or eliminating alternatives from detailed analysis was documented and is provided in EIS Sections 2.2.3 and 2.2.4.

SCREENING CRITERIA

USACE applied screening criteria for alternatives from the USACE NEPA Implementing Procedures and from the CWA Section 404(b)(1) Guidelines to determine alternatives that should be carried forward for detailed analysis. Considerations for carrying forward an alternative for detailed analysis included:

1. Does the alternative have the potential to result in fewer environmental impacts (including impacts to WOTUS) than the Applicant's Preferred Alternative (CWA Section 404(b)(1) Guidelines)? Considerations for relative environmental effects were based on substantive issues raised during scoping; see EIS Section 1.8 (Scoping and Issue Identification). To that end, environmental criteria used included the potential for each alternative to
    - reduce the Project footprint,
    - reduce development in floodplains,
    - reduce potential health impacts (especially air emissions),
    - reduce visual and noise effects, and
    - maximize use of existing infrastructure.
2. Does the alternative meet USACE's overall Project purpose as well as the Project's underlying purpose and need, per the USACE NEPA Implementing Procedures and CWA Section 404(b)(1) Guidelines? See EIS Sections 1.1 (Applicant's Stated Purpose and Need) and 1.2 (USACE's Purpose and Need).
3. Is the alternative reasonable (i.e., technically, legally, and economically feasible, per 33 CFR 333.23(b)(3)(i))?
4. Is the alternative practicable (i.e., available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes, per the CWA Section 404(b)(1) Guidelines)?

Alternatives that meet all screening criteria were carried forward for detailed analysis. Alternatives advanced for detailed analysis in the EIS specifically addressed substantive issues identified during public and agency scoping.

RESULTS OF ALTERNATIVE SCREENING

Two additional action alternatives to the Applicant's Preferred Alternative were retained for detailed analysis.

Alternative A – No Action Alternative

Under the No Action Alternative, no Project permits would be issued by USACE; this could include a situation where

- a USACE permit is not needed due to Project reconfiguration to avoid all jurisdictional WOTUS on the site,

- a USACE permit is not needed due to siting the Project entirely in uplands off-site, or
- a USACE permit is denied.

The first two situations would be impracticable because approximately 82% of the ACP is wetlands (Alaska Department of Fish and Game [ADF&G] 2006), many of which may be jurisdictional, depending on site-specific delineations and regulatory determinations, and uplands are uncommon on the ACP. In this case, permit denial is the only practicable No Action Alternative and is analyzed in detail in the EIS. In a permit denial situation, the Project would not be constructed. The Applicant could continue oil and gas exploration in the area with proper permits and/or redesign the Project and apply for a new Section 404 permit from USACE.

Alternative B – Applicant's Preferred Alternative

CPAI would develop a drillsite and associated infrastructure 2.1 miles east/northeast of Nuiqsut to support resource extraction from the Narwhal reservoir (see EIS Figure 1.0-2 in EIS Appendix A). The alternative would include a 15.3-acre gravel drillsite pad, a 6.1-mile gravel access road, 2.5 miles of pipeline on new vertical support members (VSMs), 5.5 miles of pipeline co-located with existing pipeline infrastructure, and a bridge over Lake L9324. Pipelines would transport produced oil, injection water, and miscible injectant (MI)/gas injection (GI) between the drillsite and the Alpine Central Facility for processing and enhanced recovery. The drillsite would support the construction of up to 40 wells for production and injection as well as associated facilities for drilling, well stimulation, chemical storage, and operational support. Operations would result in an estimated 93 million barrels of oil (MMBO) over the 30-year Project life. A detailed description of Alternative B is provided in EIS Section 2.4 (Components Common to All Action Alternatives) and Table 2.5-1 in EIS Section 2.5 (Comparison of Action Alternatives).

Alternative C – Northern Alternative

Alternative C would move the drillsite 1 mile further north compared to Alternative B (see EIS Figure 2.2-3 in EIS Appendix A). This would increase the distance from the drillsite to Nuiqsut from 2.1 miles to 3.1 miles to address scoping comments about potential impacts to sound levels, the viewshed, public health, and safety in the event of a reservoir blowout or a low-pressure gas leak. Much of the design of Alternative C would be the same as Alternative B; however, the change in location would necessitate changes in routing of the gravel access road, which would be 3.6 miles compared to 6.1 miles under Alternative B (see EIS Table 2.5-1). This alternative would also address impacts to WOTUS by reducing the area of fill in WOTUS to 45.5 acres compared to 65.9 acres under Alternative B. The pipelines under Alternative C would also be shorter (1.8 miles of pipeline on new VSMs compared to 2.5 miles under Alternative B). The alternative would result in an estimated 67 MMBO over the 30-year Project life (a 28% reduction in resource recovery compared to Alternative B). A detailed description of Alternative C is provided in EIS Section 2.4 (Components Common to All Action Alternatives) and Table 2.5-1 in EIS Section 2.5 (Comparison of Action Alternatives).

Alternative D – Northwestern Alternative

Alternative D shares many of the same features as Alternative B and Alternative C but is located west of Alternative C (see EIS Figure 2.2-4 in EIS Appendix A), further from lakes known to support nesting yellow-billed loons (*Gavia adamsii*). The change in location would also increase

the distance from Nuiqsut to 2.5 miles under Alternative D compared to 2.1 miles under Alternative B and move the drillsite out of the direct line of prevailing winds. Much of the design of Alternative D would be the same as Alternative B; however, the change in location would necessitate changes in the gravel access road route, which would be 5.0 miles compared to 6.1 miles under Alternative B (see EIS Table 2.5-1). This alternative would also address impacts to WOTUS by reducing the area of fill in WOTUS to 60.9 acres from 65.9 acres under Alternative B. The pipelines under Alternative D would be longer (3.1 miles of pipeline on new VSMs compared to 2.5 miles under Alternative B). The alternative would result in an estimated 83 MMBO over the 30-year Project life (a 12% reduction in resource recovery compared to Alternative B). A detailed description of Alternative D is provided in EIS Section 2.4 (Project Components Common to All Action Alternatives) and in EIS Table 2.5-1.

Affected Environment and Environmental Consequences

Table ES-1 provides a comparison of all action alternatives, and Table ES-2 compares the Project impacts by action alternative.

Table ES-1. Summary of Action Alternatives

Project Component	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Distance to Nuiqsut	2.1 miles east-northeast	3.1 miles northeast	2.5 miles northeast
Total gravel footprint	67.3 acres	46.9 acres	62.3 acres
Drillsite	15.3 acres	15.0 acres	15.6 acres
Gravel road	51.1 acres	30.9 acres	45.8 acres
Pipeline tie-in pad	0.5 acre	0.5 acre	0.5 acre
Subsistence turn-out	0.4 acre	0.4 acre	0.4 acre
Gravel road	6.1 miles	3.6 miles	5.0 miles
Ice road	27.2 miles	22.5 miles	24.4 miles
Alpine/ Western North Slope ice road reduction per year	6.9 miles	4.4 miles	6.3 miles
Waterbody crossings	400-foot multi-span bridge at Lake L9324 4 culvert or culvert battery water track crossings	Bridge same as Alternative B 5 culvert or culvert battery water track crossings	Bridge same as Alternative B 60-foot bridge at Lake M9606 5 culvert or culvert battery water track crossings
Pipelines	Miles of pipeline: 7.6 miles produced oil pipeline 6.8 miles injection water pipeline 7.1 miles MI/GI pipeline Pipeline on new VSMs: 2.5 miles	Miles of pipeline: 5.1 miles produced oil pipeline (CD8 to pipeline tie-in pad) 4.4 miles injection water pipeline (CD8 to CD4) 4.6 miles MI/GI pipeline (CD8 to Alpine) Pipeline on new VSMs: 1.8 miles	Miles of pipeline: 6.4 miles produced oil pipeline (CD8 to pipeline tie-in pad) 5.7 miles injection water pipeline (CD8 to CD4) 5.9 miles MI/GI pipeline (CD8 to Alpine) Pipeline on new VSMs: 3.1 miles
Ground traffic	387,076 trips	375,597 trips After year 1, same as Alternative B.	391,936 trips After year 1, same as Alternative B.
Helicopter traffic	671 flights	Same as Alternative B	Same as Alternative B
Fixed-wing traffic	144 flights	Same as Alternative B	Same as Alternative B
Permanent impacts on WOTUS	65.9 acres	45.5 acres	60.9 acres
Production	93 MMBO	67 MMBO	83 MMBO

Table ES-2. Summary of Impacts by Action Alternative

Resources Affected	Impact Metrics	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
3.2 Air Quality	Criteria air pollutants (CAPs), hazardous air pollutants (HAPs), and volatile organic compounds (VOCs)	CAP concentrations would be below national and state air quality standards for analysis area and equal to or less than ambient concentrations in Nuiqsut. HAP and VOC concentrations would be below health-based standards in the analysis area and in common public areas in Nuiqsut. The predicted cancer risk at Nuiqsut is below the threshold for more detailed review (i.e., less than 1 in 100 million).	CAP, HAP, and VOC concentrations at Nuiqsut would be lower than Alternative B due to increased distance, less alignment with the prevailing wind direction and Nuiqsut, lower production rate, and reduced construction emissions during Year 0 and Year 1.	CAP, HAP, and VOC concentrations at Nuiqsut would be lower than Alternative B due to increased distance and less alignment with the prevailing wind direction and Nuiqsut.
3.3 Cultural Resources	Documented cultural resources in the physical impacts analysis area (Project footprint)	1 Indigenous Place Name (Kuukpik). No physical impacts expected.	Same as Alternative B	Same as Alternative B
3.3 Cultural Resources	Documented cultural resources in the non-physical impacts analysis area (2.5 miles)	Potential for non-physical impacts to 15 unique cultural resources.	Potential for non-physical impacts to 13 unique cultural resources.	Potential for non-physical impacts to 14 unique cultural resources.
3.3 Cultural Resources	Sites with increased likelihood of vandalism or looting of unique cultural resources	Two cultural resources (AHRS HAR-00158/ TLUIHAR079 and TLUIHAR059) could be affected by increased access.	Same as Alternative B	Same as Alternative B
3.4 Economics	Number of construction, drilling, and operations jobs	Construction: Up to 945 construction jobs over 2 years Drilling: 195 jobs per year over 5 years Operations: Up to 4 jobs per year over 27 years	Same as Alternative B	Same as Alternative B
3.4 Economics	Estimated labor income	Construction and drilling: $33.6 million direct labor income during construction (2 years) $190 million direct labor income during drilling (5 years) $25 to $68 million indirect and induced labor income during construction and drilling (7 years) Operations: $2.6–$3.5 million direct and indirect annually	Same as Alternative B	Same as Alternative B

Resources Affected	Impact Metrics	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
3.4 Economics	Project revenue for royalty owners, State government, North Slope Borough, and the Federal government	Royalty owners: $598–$1,217 State government: $183–$1,315 North Slope Borough property tax: $153 Federal government: $170–$551	Royalty owners: $427–$829 State government: $131–$900 North Slope Borough property tax: $157 Federal government: $135–$420	Royalty owners: $531–$1,084 State government: $172–$1,129 North Slope Borough property tax: $143 Federal government $162–$525
3.5 Noise	Estimated noise levels at Nuiqsut (under neutral or downwind conditions)	All sustained noise levels would be below the U.S. Environmental Protection Agency threshold of 55 A-weighted decibels (dBA); only exceedances would be short term (e.g., vibratory pile driving in downwind conditions and helicopter landings at the CD8 drillsite). Project noise sources would be upwind of Nuiqsut 52% of the year. Construction: 47.2–57.5 dBA L_{dn} for combined activities Drilling: 29.5–32.3 dBA L_{dn} for combined activities Construction + drilling overlap (Year 2): 56.7 dBA L_{dn} Operation + drilling overlap (Years 2–7): 39.4 dBA L_{dn} Operation: 36.2–39.0 dBA L_{dn}	Drillsite noise 3.4 dB less than Alternative B during construction and drilling due to increased distance to Nuiqsut. Project noise sources would be upwind of Nuiqsut 38% of the year.	Drillsite noise 1.5 dB less than Alternative B during construction and drilling due to increased distance to Nuiqsut. Project noise sources would be upwind of Nuiqsut 23% of the year.
3.5 Noise	Estimated noise levels for subsistence harvesters (under neutral or downwind conditions)	Noise levels would attenuate to ambient within <1 to 33.7 miles of noise sources. Although harvesters may avoid areas near Project facilities, most attenuation zones would remain in the mid-30s to 50s dBA and would not exceed the U.S. Environmental Protection Agency threshold of 55 dBA.	Same as Alternative B	Same as Alternative B
3.6 Public Health and Safety	Social determinants of health (employment and economic status, social connections and cultural continuity, mental health, general health)	Beneficial economic impacts through increased incomes and dividends (see EIS Section 3.4 [Economics]); however, employment may also limit residents' ability to participate in subsistence activities. Local employment or increased dividends may result in economic disparity and social tensions within Nuiqsut. Loss of traditional knowledge and degradation of social connections and cultural continuity from long-term changes to subsistence. Increased stress due to changes to subsistence and lifestyle combined with concerns about the proximity of the Project to Nuiqsut and the potential for a reservoir blowout or shallow gas leak could lead to or exacerbate mental health issues such as anxiety and depression. This, in turn, could lead to a decline in physical health and overall well-being.	Beneficial and adverse economic impacts would be similar to Alternative B, but lower production values could reduce dividends (see EIS Section 3.4 [Economics]). Impacts to social connections and cultural continuity and to mental health and general health would be similar to Alternative B; however, subsistence activities would be slightly less affected, and traffic, noise, and visual impacts in Nuiqsut would also be reduced because the drillsite would be 1 mile further from the community. Increased stress would be similar to Alternative B.	Beneficial and adverse economic impacts from jobs would be the same as Alternative B, but lower production values could reduce dividends (see EIS Section 3.4 [Economics]). Impacts to social connections and cultural continuity and to mental health and general health would be similar to Alternative B. The 0.4-mile increased distance between the drillsite and Nuiqsut would reduce Project-related noise and visual impacts that may affect mental health; however, there would be more traffic than under Alternative B. Increased stress would be similar to Alternative B.
3.6 Public Health and Safety	Exposure to potentially hazardous materials	CAP levels at Nuiqsut would be similar to or below measured background levels and would remain below the National Ambient Air Quality Standards and Alaska Ambient Air Quality Standards. Predicted cumulative impacts at Nuiqsut (the Project in combination with Pikka [Nanushuk Drillsite C] source emissions) are expected to be indistinguishable from background levels throughout the life of the Project. Though very unlikely, if a large spill occurred, it could expose Nuiqsut residents to spilled materials. In the very unlikely event of a reservoir blowout, oil could be deposited in the Niġliq Channel upstream of Nuiqsut. Aerosolized material could be carried by prevailing winds to Nuiqsut or the Nuiqsut water supply. If subsistence resources were exposed to spilled material, they could also be a source of exposure for those using subsistence resources.	Air pollutant concentrations at Nuiqsut would be less than Alternative B because the drillsite would be 1 mile further from the community and less aligned with the prevailing wind direction. Likelihood of a large spill would be the same as for Alternative B except that in the very unlikely event of a reservoir blowout, oil would be less likely to reach the Niġliq Channel and the community because the drillsite would be 1 mile further from the community and its water source, and out of the direction of prevailing winds. Additionally, key hunting and fishing areas along the Niġliq and East Channels would be further from the Project.	Similar to Alternative C, except oil fallout could be transported to the Niġliq Channel if a spill occurred during high river flows. The drillsite would be 0.4 mile further from the community and out of the direct line of prevailing winds.
3.6 Public Health and Safety	Food, nutrition, and subsistence activities	Decreases in subsistence resource availability, activities, and lifestyle could lead to related adverse health outcomes. Changes in resource availability, increased local employment rates/decreased subsistence participation, and decreased distribution of subsistence resources could all contribute to decreased food security in affected communities. Although it is unlikely that the community would experience a total loss of harvests, even a small reduction could come with high costs to social, cultural, and economic well-being, particularly to the more vulnerable low-income, unconnected, and low-harvest households.	Similar to Alternative B, but the reduction in gravel footprint, traffic, miles of pipelines on new VSMs, and fewer miles of gravel roads would reduce impacts to subsistence slightly relative to Alternative B, with commensurate reductions in impacts to food security.	Similar to Alternative B, but the increases in traffic and in miles of pipelines on new VSMs could increase impacts to subsistence relative to Alternative B, with commensurate increases in impacts to food security.
3.6 Public Health and Safety	Water and sanitation	No direct impacts to drinking water sources or sanitation services.	Same as Alternative B	Same as Alternative B
3.6 Public Health and Safety	Accidents and unintentional injuries	No direct increase in the potential for accidents and injuries for Nuiqsut residents.	Same as Alternative B	Same as Alternative B
3.6 Public Health and Safety	Non-communicable and chronic diseases	No direct impacts. Increased stress for Nuiqsut residents (see Social Determinants of Health) could increase disease susceptibility.	Similar to Alternative B, but potential for lower stress due to reduced subsistence impacts.	Similar to Alternative B, but potential for higher stress due to higher subsistence impacts.

Resources Affected	Impact Metrics	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
3.7 Sociocultural	Community and governance	Beneficial economic impacts to Nuiqsut through North Slope Borough property tax income distributions, bed tax revenues, and continued CPAI contributions to local philanthropy programs and grant funds. Potential for social tension due to differences in opinion about social benefits and costs of development.	Beneficial impacts similar to Alternative B, but production would be 28% lower so community income would be lower as well. Potential for social tensions would be lower than Alternative B due to the further distance of Project to Nuiqsut and reduced impacts.	Beneficial impacts similar to Alternative B, but production would be 12% lower so community income would be lower as well. Similar to Alternative C, but less potential for the reduction of social tensions because of the shorter distance of the Project to Nuiqsut.
3.7 Sociocultural	Employment and income	Beneficial economic impacts to residents through opportunities for employment and Alaska Native Claims Settlement Act dividends for some Nuiqsut residents. Increased dividends and local hires may result in the potential for social tensions regarding an uneven distribution of money in the community.	Similar to Alternative B, but dividends may be reduced.	Similar to Alternative B, but dividends may be reduced.
3.7 Sociocultural	Nuiqsut Cultural Landscape	15 unique cultural resources within 2.5 miles of Project footprint.	13 unique cultural resources within 2.5 miles of Project footprint.	14 unique cultural resources within 2.5 miles of Project footprint.
3.7 Sociocultural	Subsistence resource abundance and availability, harvester access	Described under EIS Section 3.8 (Subsistence).	Described under EIS Section 3.8 (Subsistence).	Described under EIS Section 3.8 (Subsistence).
3.7 Sociocultural	Subsistence traditions and knowledge	Changes to traditional hunting experience due to the proximity of development, and a gradual loss of traditional knowledge.	Same as Alternative B	Same as Alternative B
3.7 Sociocultural	Opportunities to speak Iñupiaq	Reduced due to disrupted subsistence activities or lack of time due to employment.	Same as Alternative B	Same as Alternative B
3.7 Sociocultural	Changes to quality of life	Increased noise described in EIS Section 3.5 (Noise). Changes to visual setting described in EIS Section 3.10 (Visual Resources). Increased traffic: Construction: 387,076 ground traffic trips total. Operations: No noticeable change from existing conditions	Increased noise described in EIS Section 3.5 (Noise). Changes to visual setting described in EIS Section 3.10 (Visual Resources). Increased traffic: Construction: 4% less ground traffic than Alternative B in the first winter. After Year 1, same as Alternative B. Operations: Same as Alternative B	Same as Alternative C, except construction ground traffic 1% more in the first winter than Alternative B.
3.7 Sociocultural	Increased or exacerbated stress	Sense of being surrounded by industry. Feeling trapped in the event of an industry-related emergency.	Similar to Alternative B, though slightly reduced because Project would be farther from Nuiqsut.	Same as Alternative C
3.7 Sociocultural	Other social determinants of health	Degraded mental or general health due to chronic stress (described above).	Similar to Alternative B, but possibly slightly reduced because Project would be farther from Nuiqsut.	Same as Alternative C
3.8 Subsistence	Changes in resource abundance	Reduced resource abundance within the analysis area due to habitat loss from gravel infrastructure, changes in habitat quality or deflection of caribou along roads and pipelines, and mortality from collisions with vehicles. Population-level effects on subsistence resources unlikely.	Same as Alternative B but of a lesser magnitude due to smaller footprint of infrastructure, reduced ground traffic volumes, and further distance from the drillsite to key fishing areas.	Same as Alternative C, except magnitude of impacts from ground traffic collisions and caribou deflections around pipelines would be slightly higher.
3.8 Subsistence	Changes in resource availability	Reduced availability and hunting success for subsistence users due to Project activities and infrastructure that may affect the movement, behavior, or distribution of caribou, furbearers, and birds. No change to availability of fish and marine mammals (subsistence use areas for these resources do not overlap with Project infrastructure). Possible avoidance of fish or vegetation resources near Project infrastructure that have a perceived or confirmed risk of contamination.	Same as Alternative B but of a lesser magnitude due to smaller footprint of infrastructure, reduced ground traffic volumes, and further distance of the drillsite to key subsistence harvesting areas.	Same as Alternative C, except magnitude of impacts resulting from ground traffic collisions would be slightly higher.
3.8 Subsistence	Changes in harvester access	Decreased access due to physical barriers and direct removal of land from community harvesting areas, security restrictions, and harvester avoidance. Impacts would be greatest in the immediate vicinity of Project infrastructure. The presence of infrastructure so close to Putu may further reduce the community's use of this area. Increased truck or ATV access to areas only accessible by river, boat, or snowmachine for Nuiqsut harvesters that choose to use Project roads for hunting and harvesting.	Same as Alternative B but of a lesser magnitude due to less overlap with moderate to high subsistence use areas, and further distance of the drillsite and roads from key harvesting areas along the Niġliq and East Channels.	Same as Alternative C
3.9 Terrestrial Mammals	Deflection of caribou movement from infrastructure	Presence of new roads and pipelines could cause deflection of caribou and displacement. Deflection potential would be highest along 3.12 miles of new gravel road (52% of new road total length) spaced less than 300 feet apart from pipeline.	Same as Alternative B but of a lesser magnitude due to fewer miles of new roads and pipelines. 2.79 miles of new gravel road spaced less than 300 feet apart from pipeline (79% of new gravel road).	Same as Alternative B but of a greater magnitude due to more miles of new roads and pipelines. 3.10 miles of new gravel road spaced less than 300 feet apart from pipeline (61% of new gravel road).
3.9 Terrestrial Mammals	Disturbance or displacement from vehicles	Increased ground traffic could prevent caribou from crossing roads. 387,076 ground trips total (traffic highest in the winter when caribou from Teshekpuk Caribou Herd are likely to be present).	Traffic impacts lower than Alternative B in Year 1, but the same as Alternative B for the remainder of the Project. 375,597 ground trips total.	Traffic impacts higher than Alternative B in Year 1, but the same as Alternative B for the remainder of the Project. 391,936 ground trips total.

Resources Affected	Impact Metrics	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
3.9 Terrestrial Mammals	Disturbance or displacement from aircraft noise	Increased aircraft use could cause caribou disturbance and displacement. Years 1 and 2: <1 fixed-wing trip per day 1 helicopter trip per day in summer Years 3–30: <1 helicopter per day. Zero fixed-wing flights after winter of Year 2/3	Same as Alternative B	Same as Alternative B
3.10 Visual	Visual Impacts on the community of Nuiqsut (foreground zone)	Strong contrasts from the drillsite and connected facilities (2.1 miles from Nuiqsut). Moderate contrasts from facilities further removed (e.g., gravel road and pipeline). Noticeable changes to landscape character from more visually dominant built features.	Slightly lower visibility of built features and lighting than Alternative B, because the drillsite would be 1 mile further from Nuiqsut. However, levels of visual contrast still strong, and changes to landscape character still noticeable.	Same as Alternative C
3.10 Visual	Visual impacts to subsistence harvesters along Putu Channel and Colville River confluence (foreground zone)	Strong contrasts from the drillsite and connected facilities (in the Putu area). Moderate contrasts from facilities further removed (e.g., gravel road and pipeline). Noticeable changes to landscape character from more visually dominant built features.	Same as Alternative B	Same as Alternative B
3.10 Visual	Visual Impacts to subsistence harvesters outside of Putu (middleground zone)	Moderate contrasts from new equipment, infrastructure, and traffic, since roads and pipelines co-located with Alpine facilities would not substantially change the visual dominance of built features in those areas, and the new drillsite would be visible, but less dominant from the middleground zone. Overall, the landscape character would remain similar to existing conditions since contrasts would be less dominant from further away.	Same as Alternative B	Same as Alternative B
3.10 Visual	Visual Impacts to subsistence harvesters (background zone)	Weak to moderate contrasts from new equipment, infrastructure, and traffic, depending on proximity to the drillsite (i.e., moderate contrasts would occur closer to drillsite). Overall, landscape character would remain similar to existing conditions since contrasts would be less dominant from further away.	Same as Alternative B	Same as Alternative B
3.11 Water Quality and Hydrology	Erosion and scour potential	Ice or gravel infrastructure could block or restrict flow during spring breakup. Total gravel footprint: 67.3 acres Total ice infrastructure: 398.9 acres 1 bridge and 4 culverts	Same as Alternative B but to a lesser extent because smaller gravel and ice footprint. Total gravel footprint: 46.9 acres Total ice infrastructure: 355.4 acres 1 bridge and 5 culverts	Same as Alternative B but to a greater extent because of 1 additional bridge and 1 additional culvert. Total gravel footprint: 62.3 acres Total ice infrastructure: 391.1 acres 2 bridges and 5 culverts
3.11 Water Quality and Hydrology	Largest estimated increase in water surface elevation (WSE) due to facilities during flooding	Placement of infrastructure in Colville River floodplain would increase WSEs during flood events, with largest increases on east side of CD8 access road. 50-year ice-affected event: +3.2 feet on east side CD8 access road. 200-year open-water event: +1.4 feet on east side CD8 access road.	WSE changes would generally be lower than Alternative B due to reduced gravel footprint. 50-year ice-affected event: +1.4 feet on east side CD8 access road. 200-year open-water event: +0.6 feet on east side CD8 access road.	WSE changes would either be similar to Alternative B, or higher under 200-year event due to different configuration of gravel road and pad. 50-year ice-affected event: +2.6 feet on east side CD8 access road. 200-year open-water event: +2.4 feet on east side CD8 access road.
3.11 Water Quality and Hydrology	Largest estimated increase in water velocity due to facilities during flooding	Placement of infrastructure in Colville River floodplain would increase velocities during flood events, with largest increases on east side of CD8 access road. 50-year ice-affected event: +7.1 feet per second on east side CD8 access road. 200-year open-water event: +0.7 feet per second on east side CD8 access road.	WSE changes would generally be lower than Alternative B due to reduced gravel footprint. 50-year ice-affected event: +3.8 feet per second on east side CD8 access road 200-year open-water event: +0.6 feet per second on east side CD8 access road	WSE changes higher than Alternative B due to different configuration of gravel road and pad. 50-year ice-affected event: +6.2 feet per second on east side CD8 access road. 200-year open-water event: +6.2 feet per second on east side CD8 access road.
3.11 Water Quality and Hydrology	Increased suspended sediment and turbidity	Construction of in-water structures, erosion or scour of those structures, stormwater runoff from gravel roads and pads, and generation of dust could contribute to sediment and increased turbidity. Total gravel footprint: 67.3 acres Dust shadow in waterbodies: 25.8 acres	Same as Alternative B but to a lesser extent and magnitude due to smaller gravel footprint and dust shadow in waterbodies. Total gravel footprint: 46.9 acres Dust shadow in waterbodies: 23.5 acres	Same as Alternative B but to a greater extent and magnitude due to 1 additional bridge and culvert and a larger dust shadow in waterbodies. Total gravel footprint: 62.3 acres Dust shadow in waterbodies: 31.1 acres
3.12 Wetlands and Waters	Loss and alteration of wetlands or waters	Placement of gravel fill in wetlands would permanently remove wetlands and reduce wetland functions by disrupting a wetland's ability to filter nutrients, reduce sedimentation, store water, and slow hydrological inputs. Permanent fill of 67 acres of high functioning wetlands.	Same as Alternative B but to a lesser extent and magnitude due to smaller gravel footprint. Permanent fill of 47 acres of high functioning wetlands.	Same as Alternative B but to a lesser extent and magnitude due to smaller gravel footprint. Permanent fill of 62 acres of high functioning wetlands.

Resources Affected	Impact Metrics	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
3.12 Wetlands and Waters	Vegetation and soil compaction	Ice roads and pads during construction could compact soils and damage vegetation. Short-term impacts of 403 acres of high functioning wetlands.	Same as Alternative B but to a lesser extent and magnitude due to smaller ice road/pad footprint. Short-term impacts of 347 acres of high functioning wetlands.	Same as Alternative B but to a greater extent and magnitude due to larger ice pad. Short-term impacts of 411 acres of high functioning wetlands.
3.12 Wetlands and Waters	Change in wetland composition	Dust shadows from gravel infrastructure would affect 498 acres of high functioning wetlands and waters, resulting in changes to soil and wetland composition.	Same as Alternative B but to a lesser extent and magnitude due to smaller gravel footprint and dust shadow (299 acres).	Same as Alternative B but to a lesser extent and magnitude due to smaller gravel footprint and dust shadow (411 acres).
4.0 Spills and Accidental Releases	Spills and accidental releases	Impacts would depend on the location, volume, duration, and season of the spill. In the very unlikely event (probability approaching zero) of a reservoir blowout, oil could reach the Niġliq Channel upstream of Nuiqsut. Impacts of a large spill would be long term. Residents may avoid large areas for subsistence harvest. Subsistence resource abundance could decline, and resources could be avoided for fear of contamination. Social tension and stress could increase over fear of lack of egress. A large spill or blowout could require extensive cleanup efforts that temporarily increase employment as well as human activity, noise, and traffic in the area.	Same as Alternative B, but fallout would be unlikely to reach the Niġliq Channel.	Same as Alternative B, but fallout could reach the Niġliq Channel downstream of Nuiqsut during high river flows.

Environmental Consequences Key Points

The action alternatives would result in similar types of impacts because the alternatives would involve similar levels of construction and operation of oil and gas infrastructure. Differences in the magnitude of effects arise between the action alternatives due to changes in the location of the infrastructure. Alternative B would be the closest to the community of Nuiqsut, and therefore would have greater potential impacts to air quality, noise, public health and safety, and the visual setting. Though unlikely, if a reservoir blowout occurred, Alternative B would have the greatest potential for oil fallout to enter the Niġliq Channel, and the point of entry could be upstream of Nuiqsut, which means the oil could be transported to the shoreline at and downstream of Nuiqsut. A reservoir blowout under Alternative C would be the least likely to deposit fallout into the Niġliq Channel; under Alternative D, fallout could reach the Niġliq Channel downstream of Nuiqsut during flooding. Alternative B would have the greatest amount of permanent impacts on WOTUS, largely due to the longer access road required to connect the proposed gravel pad and CD4. Overall, Alternative C would have the lowest magnitude of environmental and community impacts due to its smaller footprint and greater distance from Nuiqsut.

Summary of Mitigation Measures

Mitigation measures have been incorporated into the Project design to avoid or minimize impacts from Project activities. These measures are considered in the EIS analysis of each resource evaluated in Chapter 3 and are listed in detail in EIS Appendix E (Mitigation Measures). Where impacts on WOTUS cannot be avoided, the Project would implement compensatory mitigation consistent with USACE requirements under Section 404 of the CWA (33 CFR 332.1(c)(3)) to offset permanent losses of aquatic resources.

Literature Cited

Alaska Department of Fish and Game (ADF&G). 2006. *Our Wealth Maintained: A Strategy for Conserving Alaska's Diverse Wildlife and Fish Resources*. Anchorage: Alaska Department of Fish and Game.

CONTENTS

Chapter 1. Introduction and Purpose and Need 1-1
1.1 Applicant's Stated Purpose and Need 1-1
1.2 U.S. Army Corps of Engineers' Purpose and Need 1-1
1.3 Scope of Analysis 1-2
1.4 Decision to be Made 1-3
1.5 Project Location 1-3
1.6 Cooperating Agencies 1-4
1.7 Permitting Authorities 1-4
1.8 Scoping and Issue Identification 1-4
1.9 Consultation and Coordination 1-5
1.9.1 Endangered Species Act Consultation 1-5
1.9.2 Magnuson-Stevens Fishery Conservation and Management Act Coordination 1-5
1.9.3 National Historic Preservation Act Section 106 Consultation 1-5
1.9.4 Tribal Consultation 1-6
Chapter 2. Alternatives 2-1
2.1 Introduction 2-1
2.1.1 National Environmental Policy Act Alternatives 2-1
2.1.2 Clean Water Act Alternatives 2-1
2.2 Development of Alternatives 2-1
2.2.1 Screening Criteria 2-2
2.2.2 Identification of Action Alternatives 2-3
2.2.3 Alternatives Eliminated from Detailed Analysis 2-3
2.2.4 Alternatives Retained for Detailed Analysis 2-3
2.3 Reasonable Range of Alternatives 2-16
2.3.1 Alternative A – No Action Alternative 2-16
2.3.2 Alternative B – Applicant's Preferred Alternative 2-16
2.3.3 Alternative C – Northern Alternative 2-16
2.3.4 Alternative D – Northwestern Alternative 2-17
2.4 Components Common to All Action Alternatives 2-17
2.4.1 Design Criteria 2-17
2.4.2 Gravel Pads 2-18
2.4.3 Pipelines 2-20
2.4.4 Project Access 2-21
2.4.5 Other Infrastructure and Utilities 2-25
2.4.6 Waste 2-27
2.4.7 Material Sources 2-28
2.4.8 Barging of Materials 2-28
2.4.9 Erosion Control and Snow Removal 2-29
2.4.10 Drilling 2-29
2.4.11 Spill Prevention and Response 2-30
2.4.12 Abandonment and Reclamation 2-33

2.4.13 Schedule and Logistics 2-34
2.4.14 Design Features and Mitigation 2-35
2.4.15 Short-Term and Permanent Impacts to Waters of the United States 2-36
2.5 Comparison of Action Alternatives 2-36

Chapter 3. Affected Environment and Environmental Consequences 3-1
3.1 Analysis Methods 3-1
3.1.1 Past and Present Actions 3-2
3.1.2 Reasonably Foreseeable Future Actions and Trends Relevant to USACE Public Interest Review and Section 404(b)(1) Guidelines 3-8
3.1.3 Common Impacts 3-17
3.2 Air Quality 3-22
3.2.1 How would the Project construction, drilling, and operation activities impact air quality? 3-22
3.3 Cultural Resources 3-41
3.3.1 How would the Project impact the physical integrity of cultural resources (including historic properties, archaeological resources, and cultural landscapes)? 3-41
3.3.2 How would the Project impact non-physical attributes of cultural resources that influence their setting and feeling? 3-46
3.3.3 How would the Project affect access to cultural resources and, consequently, the likelihood of vandalism or looting? 3-54
3.4 Economics 3-57
3.4.1 How would Project employment and revenue affect local, regional, and State economies? 3-57
3.5 Noise 3-67
3.5.1 How would the Project affect noise levels in the analysis area? 3-67
3.6 Public Health and Safety 3-80
3.6.1 How Would the Project Impact Human Health and Safety? 3-80
3.7 Sociocultural Systems 3-102
3.7.1 How would the Project change community characteristics and culture? 3-102
3.8 Subsistence 3-124
3.8.1 How would the Project impact abundance of subsistence resources? 3-125
3.8.2 How would the Project impact availability of subsistence resources? 3-132
3.8.3 How would the Project impact harvester access to subsistence resources? 3-146
3.9 Terrestrial Mammals 3-155
3.9.1 How would the proposed infrastructure impact caribou habitat use and distribution? 3-155
3.10 Visual Resources 3-163
3.10.1 How would the Project affect levels of visual contrast and scenic quality for sensitive viewer groups? 3-163
3.11 Water Quality and Hydrology 3-173
3.11.1 How would Project infrastructure affect erosion and scour potential in waterbodies or areas adjacent to gravel fill? 3-173

3.11.2 How would Project infrastructure impact the potential for or extent of ice jams and flooding? ... 3-179
3.11.3 How would Project infrastructure impact freshwater water quality? ... 3-184
3.12 Wetlands and Waters ... 3-190
3.12.1 How would new Project infrastructure impact the functions of wetlands and waters? ... 3-190

Chapter 4. Spills and Inadvertent Releases ... 4-1
4.1 Spill Risk Assessment Approach ... 4-1
4.1.1 Types of Spills ... 4-1
4.1.2 Spill Likelihood and Size ... 4-1
4.1.3 Geographic Extent ... 4-2
4.1.4 Duration ... 4-2
4.2 Spill History ... 4-2
4.2.1 Alpine Spill History ... 4-2
4.3 Potential Spills During Construction ... 4-4
4.4 Potential Spills during Drilling and Operations ... 4-5
4.4.1 Blowout ... 4-5
4.4.2 Pipeline Rupture ... 4-7
4.4.3 Other Spills and Leaks ... 4-8
4.4.4 Spills Summary ... 4-9
4.5 Hazardous Materials ... 4-11
4.6 Quantitative Spill Analysis ... 4-12
4.7 Summary ... 4-13

Glossary ... Glossary-1

Literature Cited ... Literature Cited-1

Appendices

Appendix A. Figures
Appendix B. Regulatory Authorities and Framework
Appendix C. Scoping Summary
Appendix D. Issues Dismissed from Detailed Analysis
Appendix E. Mitigation Measures
Appendix F. Iñupiaq and Scientific Names

Tables

Table 1.6.1. Cooperating Agencies and their Authorities and Expertise 1-4
Table 2.2-1. Action Alternatives Considered During Alternatives Development 2-4
Table 2.2-2. Alternatives Considered but Eliminated from Further Analysis and the Rationale for Elimination 2-7
Table 2.2-3. Action Alternatives Carried Forward for Detailed Analysis and the Rationale for Retention 2-14
Table 2.4-1. CD8 Project Hydrologic Design Criteria 2-18
Table 2.4-2. Summary of Infield Pipelines for the CD8 Project 2-20
Table 2.5-1. Comparison of Action Alternatives 2-37
Table 2.5-2. Ground Traffic for Action Alternatives (number of trips) 2-40
Table 2.5-3. Air Traffic for all Action Alternatives (number of trips) 2-42
Table 3.1-1. Estimated Existing Ground Traffic in the CD8 Project Area 3-6
Table 3.1-2. Estimated Existing Air (fixed-wing and helicopter) Traffic in the Nuiqsut Area ... 3-6
Table 3.1-3. Reasonably Foreseeable Future Actions Considered in the Environmental Impact Statement 3-11
Table 3.1-4. Predicted Changes in Mean Annual Temperature, Mean Annual Precipitation, and Depth to Top of Permafrost for Nuiqsut 3-16
Table 3.1-5. Existing and Proposed Ground Traffic (number of trips) in the Project Area 3-18
Table 3.1-6. Existing and Proposed Air Traffic (number of trips) in the Nuiqsut Area 3-19
Table 3.1-7. Estimated Ground Traffic in the Project Area Per Hour and Season by Action Alternative 3-20
Table 3.1-8. Estimated Air Traffic to the Alpine Airstrip Per Day for All Action Alternatives 3-21
Table 3.2-1. Measured Ambient Criteria Air Pollutant Concentrations at the Nuiqsut Air Monitoring Station, 2023 through 2025 3-23
Table 3.2-2. Measured Ambient Hazardous Air Pollutants Concentrations at the Nuiqsut Monitoring Station, 2014 through 2021 3-26
Table 3.2-3. Air Quality Index Levels of Health Concern 3-27
Table 3.2-4. Air Quality Index Summary at Nuiqsut, 2023 through 2025 3-27
Table 3.2-5. Estimated Maximum CD8 Project Pollutant Concentrations for all Project Phases 3-29
Table 3.2-6. Predicted Project-Only Pollutant Concentrations at Nuiqsut 3-30
Table 3.2-7. Predicted Cumulative Pollutant Concentrations at Nuiqsut 3-32
Table 3.2-8. Predicted Project-Only Pollutant Concentrations at Nuiqsut with Power from the Alpine Central Facility 3-33
Table 3.2-9. Estimated Maximum Project Hazardous Air Pollutant Concentrations 3-34
Table 3.2-10. Estimated Carcinogenic Hazardous Air Pollutants Cancer Risk Near Nuiqsut .. 3-36
Table 3.2-11. Summary of Impacts to Air Resources by Action Alternative 3-37
Table 3.3-1. Documented Indigenous Place Name in the Physical Impacts Analysis Area 3-42
Table 3.3-2. Documented Cultural Resources in the Physical Impacts Analysis Area by Action Alternative 3-43

Table 3.3-3. Documented Alaska Heritage Resource Survey Sites in the Non-Physical Impacts Analysis Area 3-47
Table 3.3-4. Documented Traditional Land Use Inventory Sites in the Non-Physical Impacts Analysis Area 3-47
Table 3.3-5. Documented Indigenous Place Names in the Non-physical Impacts Analysis Area 3-48
Table 3.3-6. Documented Cultural Resources within 2.5 Miles of the Action Alternatives 3-50
Table 3.3-7. Unique Cultural Resources within 2.5 Miles of the Action Alternatives 3-50
Table 3.4-1. Key Employment and Income Data for the Analysis Area 3-57
Table 3.4-2. Direct Project Employment Estimates 3-61
Table 3.4-3. Statewide Average Annual Earnings for Selected Industries Associated with Direct Construction and Operations Jobs 3-63
Table 3.4-4. Estimated Project-Generated Government Revenues (in millions of dollars) 3-64
Table 3.5-1. Estimated Noise Impacts for Alternative B Based on Distance Attenuation Alone 3-71
Table 3.5-2. Estimated Wind-Enhanced Noise Levels at Nuiqsut for Alternative B 3-72
Table 3.6-1. Summary of Impacts to Public Health and Safety by Alternative 3-96
Table 3.7-1. Summary of Impacts to Sociocultural Systems by Action Alternative 3-115
Table 3.8-1. Selected Nuiqsut Harvest and Participation Data, Resource Category, Average across Available Study Years 3-125
Table 3.8-2. Selected Nuiqsut Harvest and Participation Data, Top Species Harvested, Average across Available Study Years 3-126
Table 3.8-3. Summary of Impacts to Subsistence by Action Alternative 3-130
Table 3.8-4. Nuiqsut Subsistence Harvesters Using Direct Effects Analysis Area by Resource, 2010 through 2022 3-133
Table 3.8-5. Nuiqsut Caribou Harvest Amounts, 2013 through 2023, Direct Effects Analysis Area 3-134
Table 3.8-6. Number of Subsistence Use Areas by Month of Use, 2010 through 2022, Direct Effects Analysis Area 3-135
Table 3.8-7. Percentage of Subsistence Harvesters Reporting Use Areas within the Direct Effects Analysis Area 3-136
Table 3.8-8. Percentage of Nuiqsut Caribou Harvests by Alternative 3-138
Table 3.8-9. Number of Subsistence Use Areas by Month of Use, 2010 through 2022, Direct Effects Analysis Area 3-147
Table 3.8-10. Percentage of Households Using Roads by Road Section, 2018 through 2023 3-150
Table 3.9-1. Estimated Caribou Density and Percentage of Collared Caribou from each Herd Present in the Colville River Delta by Season 3-156
Table 3.9-2. Length and Percentage of Road and Pipeline Closer Than 300 Feet Apart 3-159
Table 3.10-1. Summary of Existing Visual Resource Conditions in the Analysis Area 3-165
Table 3.10-2. Visual Impacts by Action Alternative 3-169
Table 3.10-3. Summary of Factors Influencing Visual Impacts for All Action Alternatives 3-169
Table 3.11-1. Comparison of Gravel and Ice Infrastructure and In-Water Structures for Action Alternatives 3-176

Table 3.11-2. Largest Estimated Increase in Water Surface Elevation Due to Facilities During 50-Year Ice-Affected Flood Event (feet) 3-180
Table 3.11-3. Largest Estimated Increase in Water Surface Elevation Due to Facilities During 200-Year Open-Water Flood Event (feet) 3-181
Table 3.11-4. Largest Estimated Increase in Water Velocity Due to Facilities During 50-Year Ice-Affected Flood Event (feet per second) 3-181
Table 3.11-5. Largest Estimated Increase in Water Velocity Due to Facilities During 200-Year Open-Water Flood Event (feet per second) 3-181
Table 3.11-6. Summary of Infrastructure Contributing to Potential Suspended Sediment and Turbidity 3-186
Table 3.11-7. Summary of Factors Contributing to Impacts to Water Quality From Spills 3-188
Table 3.12-1. Extent of Wetlands in the Analysis Area (acres) 3-191
Table 3.12-2. Wetland and Waterbody Types in the Hydrologic Unit Code 10 Watershed and Analysis Area 3-192
Table 3.12-3. Criteria for High Functioning Wetlands and Presence in the Analysis Area 3-196
Table 3.12-4. Impacts to Wetlands and Waterbodies by Action Alternative 3-198
Table 4.1-1. Spill Size Categories and Spill Volume Ranges 4-1
Table 4.2-1. Summary of Spills at the Alpine Oil Field, 1998 through 2025 4-3
Table 4.2-2. Causes of Spills at the Alpine Oil Field, 1998 through 2025 4-3
Table 4.4-1. Approximate Distance and Width of Oil Fallout from a Reservoir Blowout, Based on Percentage Discharged 4-6
Table 4.4-2. CD8 Pipeline Estimated Spill Volumes 4-7
Table 4.4-3. Potential Spill Types, Spill Volumes, Spill Likelihood, Spill Duration, and Estimated Geographic Extent of Spill during Drilling and Operations for Action Alternatives 4-10
Table 4.5-1. Summary of Selected Hazardous Material Spills on the North Slope, July 2019 through December 2025 4-11
Table 4.6-1. 2020 NPR-A IAP Spill Rates on the North Slope per Billion Barrels of Oil Produced, 2000 through 2018 4-12
Table 4.6-2. Average North Slope Spill Size, 2000 through 2018 4-12
Table 4.6-3. Alternative B Projected Number of Spills by Size Classification Based on Projected Oil Production (93 million barrels) 4-13
Table 4.6-4. Alternative C Projected Number of Spills by Size Classification Based on Projected Oil Production (67 million barrels) 4-13
Table 4.6-5. Alternative D Projected Number of Spills by Size Classification Based on Projected Oil Production (83 million barrels) 4-13

ABBREVIATIONS

°F	degrees Fahrenheit
AAAQS	Alaska Ambient Air Quality Standards
AAC	Alaska Administrative Code
ABR	ABR, Inc.—Environmental Research & Services
ACF	Alpine Central Facility
ACP	Arctic Coastal Plain
ACS	Alaska Clean Seas
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADHSS	Alaska Department of Health and Social Services
ADLWD	Alaska Department of Labor and Workforce Development
ADNR	Alaska Department of Natural Resources
ADOR	Alaska Department of Revenue
ADOT&PF	Alaska Department of Transportation and Public Facilities
AEGL	acute exposure guideline level
AERMOD	American Meteorological Society/EPA Regulatory Model
AHRS	Alaska Resource Heritage Site
ANCSA	Alaska Native Claims Settlement Act
ANTHC	Alaska Native Tribal Health Consortium
AOGCC	Alaska Oil and Gas Conservation Commission
APDES	Alaska Pollutant Discharge Elimination System
Applicant	ConocoPhillips Alaska, Inc.
AQI	Air Quality Index
AS	Alaska Statute
ASRC	Arctic Slope Regional Corporation
AST	aboveground storage tank
ATV	all-terrain vehicle
BLM	Bureau of Land Management
BMP	best management practice
BOEM	Bureau of Ocean Energy Management
CAA	Clean Air Act

CAH	Central Arctic Caribou Herd
CAP	criteria air pollutant
CD	Colville Delta
CD1–CD10	Colville Delta 1–10 Projects
CD8 Project	Colville Delta 8 Project
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CPAI	ConocoPhillips Alaska, Inc.
CPF1	Central Processing Facility 1
CPF2	Central Processing Facility 2
CRD	Colville River Delta
CRU	Colville River Unit
CWA	Clean Water Act
cy	cubic yard(s)
D/S/S	drill, set, and slurry
dB	decibels
dBA	A-weighted decibels
Doyon	Doyon Drilling, Inc.
DPS	distinct population segment
DS3	Pikka drillsite 3
DS2L	Kuparuk drillsite 2L
EI	emission inventory
EIA	U.S. Energy Information Administration
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERD	extended reach drilling
ESA	Endangered Species Act
FHWA	Federal Highway Administration
fps	feet per second

FR	*Federal Register*
GI	gas injection
GMT	Greater Mooses Tooth
GMT1/MT6	Greater Mooses Tooth 1/Mooses Tooth 6
GMT2/MT7	Greater Mooses Tooth 2/Mooses Tooth 7
GMTU	Greater Mooses Tooth Unit
H	horizontal
HAP	hazardous air pollutants
HDD	horizontal directional drilling
HEC	health effect category
HH	households
HIA	health impact assessment
HL	high likelihood
HSM	horizontal support member
HUC	hydrologic unit code
IAP	integrated activity plan
ICAS	Iñupiat Community of the Arctic Slope
IHLC	Iñupiat History, Language, and Culture
IMPLAN	Impact Analysis for Planning
IPAWS	Integrated Public Alert and Warming System
IPCC	Intergovernmental Panel on Climate Change
IPN	Indigenous place name
km	kilometer
K-Pad	Kuukpik pad
Kuukpik	Kuukpik Cooperation
L_{dn}	day-night average sound level
LEDPA	least environmentally damaging practicable alternative
L_{eq}	equivalent continuous sound level
LL	low likelihood
MBI	Michael Baker International
MI	miscible injectant
MI/GI	miscible injectant/gas injection

ML	medium likelihood
MMBO	million barrels of oil
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
Nanushuk EIS	*Nanushuk Project Final Environmental Impact Statement*
NDB	Nanushuk Drillsite B, Pikka project pad on the east side of the Colville River
NDC	Nanushuk Drillsite C, Pikka project pad on the east side of the Colville River
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NPR-A	National Petroleum Reserve in Alaska
NRHP	National Register of Historic Places
NSB	North Slope Borough
NVN	Native Village of Nuiqsut
NWI	National Wetlands Inventory
O_3	Ozone
ODPCP	oil discharge prevention and contingency plan
OHWM	ordinary high water mark
pb	lead
PIR	public interest review
PM	particulate matter
ppb	parts per billion
ppm	parts per million
Project	Colville Delta 8 (CD8) Project
Q200	200-year flood event
Q4	fourth quarter
Q50	50-year flood event
REL	reference exposure level
RfC	reference concentration for chronic inhalation
RFF	reasonably foreseeable future
ROD	record of decision
SECOR	SECOR International Incorporated
SEIS	supplemental environmental impact statement

SNAP	Scenarios Network for Alaska + Arctic Planning
SO_2	sulfur dioxide
SPCCP	spill prevention, control, and countermeasure plan
SRB&A	Stephen R. Braund & Associates
SWPPP	stormwater pollution prevention plan
TAPS	Trans-Alaska Pipeline System
TCH	Teshekpuk Caribou Herd
TCP	traditional cultural place
TLUI	traditional land use inventory
UAF	University of Alaska Fairbanks
UNEP	United Nations Environment Programme
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
V	vertical
VHL	very high likelihood
VLL	very low likelihood
VOC	volatile organic compound
VSM	vertical support member
Willow SEIS	*Willow Master Development Plan Supplemental Environmental Impact Statement*
WNS	Western North Slope
WOTUS	waters of the United States
WSE	water surface elevations
$\mu g/m^3$	micrograms per cubic meter

CHAPTER 1. INTRODUCTION AND PURPOSE AND NEED

The U.S. Army Corps of Engineers (USACE) Alaska District received an application for a Clean Water Act (CWA) Section 404 permit from ConocoPhillips Alaska, Inc. (the Applicant, or CPAI), for the Colville Delta (CD) 8 Project (CD8 Project or Project) on April 10, 2025. The application (POA-2025-00203) under Section 404 of the CWA proposes to place 760,080 cubic yards of clean fill material over 65.9 acres of waters of the United States (WOTUS), including wetlands, to construct the Project.

In compliance with the National Environmental Policy Act (NEPA) and Section 404 of the CWA, USACE has prepared this environmental impact statement (EIS) to evaluate the potential impacts of the Project and to inform its permit decision. This EIS also considers potential avoidance, minimization, and mitigation measures to address the impacts from the Project. Following publication of the final EIS, the USACE will prepare a record of decision (ROD) documenting USACE's evaluation of the permit application under NEPA, the CWA Section 404(b)(1) Guidelines, and the USACE public interest review (PIR).

The Project, as proposed by the Applicant, would further develop hydrocarbon resources from CPAI's existing oil and gas leases in the Colville River Unit (CRU). The Project would be located on Alaska's Arctic Coastal Plain (ACP), 2.1 miles east-northeast of Nuiqsut, between the East Channel and Niġliq Channel of the Colville River (Figure 1.0-1; all EIS figures are in Appendix A). The Project would target the Narwhal reservoir and include construction of a new 15.3-acre drillsite on a gravel pad, a 0.5-acre tie-in pad near CD4, a 6.1-mile gravel access road from CD4 to the drillsite, and 21 miles of pipelines connecting to existing CRU infrastructure and associated utilities (Figure 1.0-2).

1.1 APPLICANT'S STATED PURPOSE AND NEED

CPAI's purpose for the CD8 Project is to construct the infrastructure necessary for the safe and economic 1) production of commercial quantities of oil and gas resources from lands leased by CPAI for oil and gas development in the southeastern portion of the CRU and 2) transportation of those resources to market via the Alpine Central Facility (ACF), consistent with applicable laws and legal obligations.

Development and production of oil and gas from the Project are necessary to access subsurface resources that cannot be reached from existing and currently permitted drillsites. The Project would extend the CRU field life by approximately 8 to 10 years, depending on reservoir outcome, Project timing, other Alpine oil field activities, and market conditions.

1.2 U.S. ARMY CORPS OF ENGINEERS' PURPOSE AND NEED

USACE's defined purpose and need establishes the framework from which a reasonable range of alternatives is developed for analysis in the EIS. Consistent with USACE regulations (33 Code of Federal Regulations [CFR] 333), USACE has carefully considered the Applicant's stated purpose and need and USACE's statutory authority and has determined the proposed activity's underlying purpose and need to develop the alternatives, including the proposed action, evaluated in this EIS. The underlying purpose of the Project, as defined by USACE, is to construct infrastructure to safely and economically produce and transport commercial quantities

of oil and gas resources from southeastern portions of the Narwhal reservoir that are unable to be reached from currently permitted drillsites via a pipeline to an existing processing facility and ultimately to market.

Per the CWA and its Section 404(b)(1) Guidelines, USACE also defines the basic and overall project purpose. The basic project purpose determines *water dependency* of a project and if it must be located in a special aquatic site.[1] The overall project purpose defines the geographic boundaries of an applicant's specific project; it is the basis for the alternatives analysis under the CWA and is used to determine if an applicant's proposed project is the least environmentally damaging practicable alternative (LEDPA).

The overall CD8 Project purpose allows for a robust consideration of alternatives while providing a foundation to determine practicability. The overall CD8 Project purpose is to safely and economically extract oil and gas resources from the southeastern portion of the Narwhal reservoir.

1.3 SCOPE OF ANALYSIS

For the purposes of NEPA, the scope of analysis is limited to the specific activity requiring a USACE permit and any additional portions of the entire Project over which there is sufficient Federal control and responsibility to warrant a larger NEPA review beyond the USACE's limited statutory authorities. Factors USACE considered in determining whether sufficient control and responsibility exist include 1) whether the regulated activity comprises merely a link in a corridor-type project (e.g., a transportation or utility transmission project); 2) whether aspects of the upland facility in the immediate vicinity of the regulated activity would affect the location and configuration of the regulated activity; 3) the extent to which the entire Project would be within USACE jurisdiction; and 4) the extent of cumulative Federal control, responsibility, and legal authority (33 CFR 333.18(c)).

USACE regulatory jurisdiction over the Project includes the discharge of dredged and/or fill material in WOTUS, including wetlands, and work in, over, and under navigable WOTUS. Considering that the Project is almost entirely located in WOTUS, the USACE scope of analysis for the EIS includes the entire Project footprint, including dredge and/or fill placement associated with the construction of roads, pads, pipelines, and utilities. The scope of analysis also includes the footprint of Project-specific temporary ice roads and ice pads as well as barging of materials to Oliktok Dock.

Actions not included in the NEPA scope of analysis are those that are already existing, permitted, and evaluated, such as the Alpine/Western North Slope (WNS) multiyear ice road and ice bridge, gravel infrastructure at the ACF, screeding at Oliktok Dock, withdrawal of seawater at the existing CPAI Kuparuk Seawater Treatment Plant, and mining at the Arctic Slope Regional Corporation (ASRC) Mine Site or other permitted mine sites in the Kuparuk area.

The NEPA scope of analysis for this EIS includes all of the resource analysis areas described in Chapter 3 (Affected Environment and Environmental Consequences). Geographically, the NEPA analysis area contains the entire Project footprint (e.g., construction of Project-specific ice

[1] Special aquatic sites, including wetlands, are areas that possess special ecological characteristics of productivity, habitat, wildlife protection, or other important or easily disrupted ecological values per 40 CFR 230.3(q).

infrastructure, gravel infrastructure, pipelines, and utilities) and the path of Project-specific marine vessels dedicated to the construction of the Project. The analysis area for each resource is described in each relevant resource section in EIS Chapter 3.

In accordance with 33 CFR 333.18(c)(5)(ii), USACE chose to analyze environmental effects from other projects separate in time, or separate in place, or that fall outside of USACE regulatory authority, if the analysis would assist in USACE's reasoned decision making. EIS Chapter 3 (Affected Environment and Environmental Consequences) describes how USACE drew a reasonable and manageable line relating to its consideration of environmental effects from the regulated activity that extend outside the geographic territory of the Project or might materialize later in time.

1.4 DECISION TO BE MADE

The Federal action associated with the Project is USACE's authorization of fill in WOTUS, including wetlands, under Section 404 of the CWA (33 United States Code [USC] 1344).

Following the final EIS, USACE will prepare a ROD documenting USACE's evaluation of the permit application under NEPA. USACE will decide whether to approve the Project and CWA Section 404 permit, in whole or in part, based on the analysis contained in the EIS. If USACE approves the Project, it will decide under what terms and conditions. The ROD will also document USACE's evaluation of the permit application with regard to compliance with the CWA Section 404(b)(1) Guidelines (40 CFR 230), findings of the PIR (33 CFR 320.4), and compliance with other relevant Federal laws and regulations.

USACE's decision on the Project is separate from the decisions of the surface landowner (Kuukpik Corporation [Kuukpik] and the State of Alaska; Figure 1.4-1). USACE approval of work or structures does not convey a property right, nor authorize any injury to property or invasion of other rights (33 CFR 320.4(g)). Kuukpik negotiates "comprehensive land access agreements" with oil field operators (Kuukpik 2026) and will issue their own decision and conditions separate from the EIS process or USACE's decision on the Project. The State of Alaska manages leasing and land access through the Alaska Department of Natural Resources' (ADNR) Division of Mining, Land, and Water and will also issue its own authorizations and conditions independent of the EIS process and USACE's decision on the Project.

1.5 PROJECT LOCATION

The Project would be located 2.1 miles east-northeast of Nuiqsut, between the East Channel and Niġliq Channel of the Colville River, and in the CRU (see Figure 1.0-1). The CD8 drillsite would be approximately 7.5 miles south of the existing CD1 and ACF and 4.5 miles southeast of CD4. The drillsite would be part of CPAI's WNS operating and development area. The drillsite, pipeline tie-in pad, most of the pipeline, power and fiber-optic cables, and gravel road would be within the CRU and are on surface lands owned by Kuukpik (an Alaska Native Village Corporation) and the State of Alaska, with subsurface rights owned by the State of Alaska and the ASRC (Figure 1.5-1). However, the pipeline, cables, and gravel road would each cross a portion of the Pikka Unit.

1.6 COOPERATING AGENCIES

USACE is the lead agency for the EIS. Seven Federal, Tribal, State, regional, or local government entities are cooperating agencies (Table 1.6.1).

Table 1.6.1. Cooperating Agencies and their Authorities and Expertise

Agency	Authority and Expertise
U.S. Environmental Protection Agency	Responsibilities under the Clean Air Act, the CWA, and the Oil Pollution Act Expertise in sociocultural, public health, air quality, water resources, geology, and soils and permafrost
U.S. Fish and Wildlife Service	Responsibilities under the Endangered Species Act, Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and Marine Mammal Protection Act Expertise in fish and wildlife
Native Village of Nuiqsut	Expertise in sociocultural, subsistence, and cultural resources
City of Nuiqsut	Expertise in sociocultural, subsistence, and cultural resources
Iñupiat Community of the Arctic Slope	Expertise in spill response, sociocultural, subsistence, and cultural resources
North Slope Borough	Responsible for land use planning and regulation and emergency response Expertise in sociocultural, subsistence, cultural resources, fish and wildlife, wetlands and vegetation, water resources, soils and permafrost, and public health
State of Alaska	Responsible for adjudicating requests or applications for permits, easements, and leases on State land Authority for air, water use, wastewater permits, fish habitat, and spill planning and prevention Expertise in sociocultural, public health, fish and wildlife, subsistence, cultural resources, economics, land use, wetlands and vegetation, water resources, spill risk, contaminated sites, and soils and permafrost

1.7 PERMITTING AUTHORITIES

All action alternatives in the EIS would require Federal authorization by USACE. The State of Alaska, the North Slope Borough (NSB), and Kuukpik are responsible for surface and subsurface land management decisions, easements, leases, authorizations, and permits on their respective lands.

EIS Appendix B (Regulatory Authorities and Framework) provides a full list of anticipated permits, approvals, and consultations as well as a list of applicable Federal laws and executive orders.

1.8 SCOPING AND ISSUE IDENTIFICATION

USACE identified substantive issues to be addressed in the EIS through public and agency scoping and consultation with Alaska Native Tribes; see EIS Appendix C (Scoping Summary). The scoping period was 30 days and ended on October 22, 2025. Public scoping meetings were held virtually as well as in person in Anchorage, Fairbanks, Nuiqsut, and Utqiaġvik.

During the scoping period, 22 comment submissions were received, with 257 comments being unique. Comments were categorized as issues associated with resource topics, issues associated with USACE policy (and therefore not addressed in the EIS), or out-of-scope comments. Substantive issues were identified as those that could have significant effects; are necessary to make a reasoned choice among alternatives; or are needed to address points of disagreement,

debate, or dispute regarding an anticipated impact from the Project. Substantive issues within the scope of the EIS that were identified through scoping are addressed in the EIS in Chapter 3.

Resources and topics that were considered but dismissed from detailed analysis in the EIS are described in EIS Appendix D (Issues Dismissed from Detailed Analysis), along with the rationale for dismissal. Issues that were identified but did not warrant further detailed analysis are issues

- where the resource in question is not present in the analysis area,
- where applicant-committed measures or other mitigation would reduce impacts below significance,
- that are analyzed in other NEPA documents and incorporated by reference in the CD8 Project EIS, or
- where the impact context is so low that a detailed analysis was not needed to determine significance.

This EIS discusses impacts in proportion to their significance and has only a brief discussion of other-than-significant issues. In accordance with 33 CFR 333.23, the EIS is concise and focused on significant impacts.

1.9 CONSULTATION AND COORDINATION

1.9.1 Endangered Species Act Consultation

Consultation under Section 7 of the Endangered Species Act (ESA) and the Marine Mammal Protection Act is ongoing between USACE and the U.S. Fish and Wildlife Service (USFWS) and between USACE and the National Marine Fisheries Service, as appropriate, for species listed under the ESA and Marine Mammal Protection Act that have the potential to be impacted by the Project. Consultation is occurring parallel to the NEPA process and will be complete before publication of the Project's ROD.

1.9.2 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 the National Marine Fisheries Service, parallel to the NEPA process. Coordination will be complete before publication of the Project's ROD.

1.9.3 National Historic Preservation Act Section 106 Consultation

Consultation under Section 106 of the National Historic Preservation Act is occurring, and USACE will continue formal and informal Section 106 consultation through publication of the Project's ROD. Kuukpik, the Native Village of Nuiqsut (NVN), and NSB have elected to consult with USACE regarding places of historic or cultural importance or traditional use. USACE's consultation efforts identified specific concerns regarding places of historic or cultural importance or traditional use; input received during consultation informed the EIS analysis. As a

part of the consultation process, USACE will seek concurrence with the Alaska State Historic Preservation Officer on a Section 106 finding. Consultation is ongoing and will be complete before publication of the Project's ROD.

1.9.4 Tribal Consultation

USACE invited 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 Project:

- NVN
- Native Village of Barrow
- Iñupiat Community of the Arctic Slope (ICAS)
- Kuukpik
- ASRC

Government-to-government consultation meetings have been held regularly with Kuukpik. NVN and the ASRC have engaged in consultation with USACE during the NEPA process. Input received during consultation informed alternatives development, identification of substantive issues to be addressed in the EIS, and the EIS analysis; see Section 1.8 (Scoping and Issue Identification).

CHAPTER 2. ALTERNATIVES

2.1 INTRODUCTION

Two regulations guided the development of alternatives: the USACE NEPA Implementing Procedures (33 CFR 333) and the CWA Section 404(b)(1) Guidelines (40 CFR 230). These regulations use different criteria to determine whether an alternative should be considered for analysis. Per 33 CFR 333.23(b)(3)(ii), the alternatives analysis should be thorough enough to inform agency decision making for permitting, including determinations of public interest and compliance with the CWA Section 404(b)(1) Guidelines (40 CFR 230). Thus, both NEPA and 404(b)(1) criteria for alternatives are applied in this EIS.

2.1.1 National Environmental Policy Act Alternatives

Under the USACE NEPA Implementing Procedures, an EIS must include a reasonable range of alternatives to an applicant's preferred alternative, including a no action alternative (33 CFR 333.23(b)(3)). Only alternatives considered to be reasonable are carried forward for detailed analysis. **Reasonable** alternatives must be technically, legally, and economically feasible while still meeting the applicant's underlying purpose and need (33 CFR 333.23(b)(3)(i)). Any alternatives selected for detailed analysis should support the analysis required under the CWA Section 404(b)(1) Guidelines, as detailed in Section 2.1.2 (Clean Water Act Alternatives) (33 CFR 333.23(b)(3)(ii)) and should consider geographic changes in location (geographic alternatives) as well as design modifications (functional alternatives) from the applicant's preferred alternative (33 CFR 333.23(b)(3)(iv)).

2.1.2 Clean Water Act Alternatives

Under the CWA Section 404(b)(1) Guidelines, USACE must review all practicable alternatives to the proposed activity with the purpose of identifying the LEDPA (Section 404(b)(1)) on aquatic ecosystems. The Guidelines prohibit permitting an alternative if a practicable alternative would have a less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental impacts (40 CFR 230.10(a)). An alternative is considered **practicable** "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the Applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered" (40 CFR 230.10(a)(2)).

2.2 DEVELOPMENT OF ALTERNATIVES

Per the USACE NEPA Implementing Procedures (33 CFR 333.23(b)(3)) and the CWA Section 404(b)(1) Guidelines (40 CFR 230), USACE developed a reasonable and practicable range of alternatives that respond to USACE's overall Project purpose and the Project's underlying purpose and need while also addressing issues raised in scoping; see Section 1.8 (Scoping and Issue Identification) and EIS Appendix C (Scoping Summary). The alternatives development process began with scoping and continued through workshops and document reviews with the cooperating agencies. USACE also incorporated input from Tribes and Alaska Native

corporations during scoping and alternatives development; see Section 1.9 (Consultation and Coordination). The location of the Project was a key issue raised in scoping. Commenters were concerned about the proximity of the drillsite to the community of Nuiqsut and suggested alternative locations to move the drillsite further away from the community to address concerns about air quality, visual impacts, noise, spill risk, and public health. Similar to the public scoping comments, the cooperating agencies in the alternatives development workshop focused on development of alternative locations that moved the Project further from the community.

Alternative concepts were solicited, discussed, and screened using the criteria described below. Rationale for retaining or eliminating alternatives from detailed analysis was documented and is provided in Sections 2.2.3 and 2.2.4.

2.2.1 Screening Criteria

USACE applied screening criteria for alternatives from the USACE NEPA Implementing Procedures and from the CWA Section 404(b)(1) Guidelines to determine alternatives that should be carried forward for detailed analysis. Considerations for carrying forward an alternative for detailed analysis included:

1. Does the alternative have the potential to result in fewer environmental impacts (including impacts to WOTUS) than the applicant's preferred alternative (CWA Section 404(b)(1) Guidelines)? Considerations for relative environmental effects were based on substantive issues raised during scoping; see Section 1.8 (Scoping and Issue Identification). To that end, environmental criteria used included the potential for each alternative to
    - reduce the Project footprint,
    - reduce development in floodplains,
    - reduce potential health impacts (especially air emissions),
    - reduce visual and noise effects, and
    - maximize use of existing infrastructure.
2. Does the alternative meet USACE's overall Project purpose as well as the Project's underlying purpose and need, per the USACE NEPA Implementing Procedures and CWA Section 404(b)(1) Guidelines? See Sections 1.1 (Applicant's Stated Purpose and Need) and 1.2 (USACE's Purpose and Need).
3. Is the alternative reasonable (i.e., technically, legally, and economically feasible, per 33 CFR 333.23(b)(3)(i))?
4. Is the alternative practicable (i.e., available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes, per the CWA Section 404(b)(1) Guidelines)?

Alternatives that meet all screening criteria were carried forward for detailed analysis. Alternatives advanced for detailed analysis in the EIS specifically addressed substantive issues identified during public and agency scoping.

2.2.2 Identification of Action Alternatives

In addition to the No Action Alternative, 16 geographic alternatives (Alternatives 1–16) were developed through public and agency scoping and Tribal consultation that focused primarily on alternative drillsite locations to reduce potential impacts on Nuiqsut (Table 2.2-1) (Figure 2.2-1; all EIS figures are in EIS Appendix A). Eleven functional alternatives (Alternatives 17–27) were also considered that modified the design of the Applicant's Preferred Alternative (see Table 2.2-1). Table 2.2-1 summarizes each alternative considered and identifies its origin (i.e., whether it was suggested by the public or cooperating agencies, or was considered by the Applicant) and the key issues identified during scoping that it is intended to address.

2.2.3 Alternatives Eliminated from Detailed Analysis

Of the 27 geographic and functional alternatives USACE and the cooperating agencies considered (see Table 2.2-1), 24 alternatives were eliminated from further analysis because they did not meet the screening criteria identified in Section 2.2.1 (Table 2.2-2).

2.2.4 Alternatives Retained for Detailed Analysis

Following alternative screening, three geographic and no functional alternatives were carried forward for detailed analysis in addition to a No Action Alternative (Table 2.2-3).

Table 2.2-1. Action Alternatives Considered During Alternatives Development

Alternative Identifier	Alternative Name	Origin	Alternative Description	Issue Addressed
Geographic Alternatives				
1	Applicant's Preferred Alternative*	CPAI	As proposed by CPAI, construct a drillsite northeast of Nuiqsut, connected by a gravel access road to the ACF. Distance to Nuiqsut: 2.1 miles northeast	Applicant's purpose and need
2	Maximized Resource Alternative	CPAI	Move the drillsite to the west side of the Niġliq Channel of the Colville River closer to the target reservoir† location. This would result in 10% more resource recovery than under the Applicant's Preferred Alternative. Distance to Nuiqsut: 1.5 miles east	Maximized resource recovery
3	CPAI Road Alignment Alternative	CPAI	Adjust the road alignment compared to the Applicant's Preferred Alternative. Distance to Nuiqsut: 2.1 miles northeast	Reduce impacts to WOTUS
4	Northern Alternative	CPAI	Move the drillsite north of where the Applicant's Preferred Alternative is proposed so that it is farther from Nuiqsut and out of direct alignment with the prevailing northeasterly winds. An access road and pipeline would be constructed similar to the route for the Applicant's Preferred Alternative. Distance to Nuiqsut: 3.1 miles northeast	Proximity to Nuiqsut (air quality, noise, visual impacts, spill risk, wetlands and water resources) and alignment with prevailing winds
5	Northwestern Alternative	Cooperating agency	Move the drillsite northwest of where the Applicant's Preferred Alternative is proposed, but west of the Northern Alternative, so that it is farther from Nuiqsut and out of direct alignment with the prevailing northeasterly winds. An access road and pipeline would be constructed similar to the route for the Applicant's Preferred Alternative. Distance to Nuiqsut: 2.5 miles north	Yellow-billed loon (*Gavia adamsii*) nesting habitat, proximity to Nuiqsut (air quality, noise, visual impacts, spill risk), and alignment with prevailing winds
6	Un-unitized Eastern Alternative Option 1	CPAI USACE Public comments	Move the drillsite to the east side of the Colville River onto land currently leased for surface use by Santos in an un-unitized area. This would move the drillsite farther from Nuiqsut and out of direct alignment with the prevailing northeasterly winds. Various access and pipeline route options were considered for this alternative, as discussed in the access and pipeline functional alternatives (Alternatives 17–21). Distance to Nuiqsut: 5.4 miles southeast	Proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk) and alignment with prevailing winds
7	Un-unitized Eastern Alternative Option 2	USACE Public comments	Move the drillsite to the east side of the Colville River onto land currently leased for surface use by Santos to reduce impacts on Nuiqsut. Various access and pipeline route options were considered for this alternative, as discussed in the access and pipeline functional alternatives (Alternatives 17–21). Distance to Nuiqsut: 4.1 miles southeast	Proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk) and alignment with prevailing winds

Alternative Identifier	Alternative Name	Origin	Alternative Description	Issue Addressed
8	Pikka Eastern Alternative	USACE	Move the drillsite to the east side of the Colville River within the Pikka Unit. Various access and pipeline route options were considered for this alternative, as discussed in the access and pipeline functional alternatives (Alternatives 17–21). Distance to Nuiqsut: 5.3 miles east	Proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk)
9	ASRC Mine Site Alternative	USACE Cooperating agency	Move the drillsite to the east side of the Colville River and within previously disturbed land at the ASRC Mine Site. Various access and pipeline route options were considered for this alternative, as discussed in the access and pipeline functional alternatives (Alternatives 17–21). Distance to Nuiqsut: 4.5 miles east	Proximity to Nuiqsut and Putu (air quality, noise, visuals impacts, spill risk)
10	Cooperator East Side Alternative	Cooperating agency	Move the drillsite to the east side of the Colville River and south of the ASRC Mine Site within CPAI leased lands (in the CRU) to reduce impacts on Nuiqsut. Various access and pipeline route options were considered for this alternative, as discussed in the access and pipeline functional alternatives (Alternatives 17–21). Distance to Nuiqsut: 3.4 miles southeast	Proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk) and alignment with prevailing winds
11	Putu Channel Island Alternative	Cooperating agency	Move the drillsite east of Nuiqsut and south of the Putu Channel on the small island west of the Main Channel of the Colville River to move it out of direct alignment with the prevailing northeasterly winds to reduce impacts on Nuiqsut. A gravel access road would be constructed similar to the Applicant's Preferred Alternative, with an additional bridge over the Putu Channel. Fluids would be processed at the ACF via a pipeline under the river. Distance to Nuiqsut: 1.7 miles southeast	Proximity to Nuiqsut (air quality, noise, visual impacts, spill risk) and alignment with prevailing winds
12	Modified Reservoir Target Alternative	USACE Public comment	Move the drillsite north to target a different portion of the reservoir to reduce impacts to Nuiqsut. An access road would connect to the ACF. Distance to Nuiqsut: 13 miles northeast	Proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk)
13	CD4 Infrastructure Upgrade Alternative	USACE Cooperating agency	Modify CD4 with upgraded or expanded infrastructure to reduce impacts to Nuiqsut. No access road would be required. Distance to Nuiqsut: 5.1 miles north	Proximity to Nuiqsut (air quality, noise, visual impacts, spill risk)
14	Shared Pad Alternative	USACE Public comment Cooperating agency	Share and potentially expand the existing Santos pad on the east side of the Colville River (Nanushuk Drillsite C [NDC] pad) to reduce impacts on Nuiqsut. No new access road would be required. Distance to Nuiqsut: 7 miles northeast.	Proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk)
15	Roadless Alternative	USACE Cooperating agency Public comment	Eliminate the gravel road by using an airstrip or helipad for operations and safety access to reduce the amount of infrastructure that can limit subsistence access or affect subsistence resources and to reduce the amount of fill in wetlands or impacts to hydrologic flow. The location of the drillsite would remain as described for the Applicant's Preferred Alternative. Distance to Nuiqsut: 2.1 miles northeast	Caribou migration, wetlands and water resources

Alternative Identifier	Alternative Name	Origin	Alternative Description	Issue Addressed
16	South of Nuiqsut Alternative	USACE CPAI	Move the drillsite south of Nuiqsut into the un-unitized area. A gravel access road would connect to existing roads that lead to the ACF. Fluids would be processed at the ACF via a pipeline under the Niġliq or Putu Channels. Distance to Nuiqsut: 1.9 miles south	Proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk) and alignment with prevailing winds
Functional Alternatives				
17	Access: Gravel Road to Mustang, Pikka, or Kuparuk drillsite 2L (DS2L)	USACE	Build a gravel road to connect either the bridge over the Colville River or a pad on the east side of the Colville River to Mustang, Pikka, or DS2L. (Pikka road to NDC was permitted in 2018 but has been constructed only as far as Nanushuk Drillsite B [NDB].) This would provide permanent access to the existing road system that connects to Kuparuk. This functional alternative could be added to any alternative on the east side of the Colville River so that drillsites further from the community could be considered.	Egress and proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk)
18	Access: Bridge over the Colville River	USACE Public comment	Build a bridge over the Colville River to provide permanent access to the existing road system at Mustang, Pikka, or DS2L. This functional alternative would require the Gravel Road to Mustang, Pikka, or DS2L Access Alternative 17. This functional alternative could be added to any alternative on the east side of the Colville River so that drillsites further from the community could be considered and/or the community would have access to the road system, including an egress route in the event of an emergency.	Cumulative impacts, egress, and proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk)
19	Access: Cable Ferry	USACE	Build a cable ferry across the Colville River to connect to the existing road system at Mustang, Pikka, or DS2L. This functional alternative would require the Gravel Road to Mustang, Pikka, or DS2L Access Alternative 17. This functional alternative could be added to any alternative on the east side of the Colville River so that drillsites further from the community could be considered and/or the community would have access to the road system, including an egress route in the event of an emergency.	Cumulative impacts, egress, and proximity to Nuiqsut and Putu (air quality, noise, visual impacts, spill risk)
20	Access: Foam Board Road Construction	Cooperating agency	Use foam board (entirely or in segments) in gravel road construction to reduce the height of the gravel road and thus reduce the gravel footprint.	Wetlands and water resources, subsistence
21	Pipeline: Transport Fluids to Kuparuk Central Processing Facility 1 (CPF1) or Central Processing Facility 2 (CPF2)	USACE	Build a pipeline east to transport multiphase (unprocessed) fluids to CPF1 or CPF2. This functional alternative could be added to any alternative on the east side of the Colville River so that drillsites further from the community could be considered.	Wetlands and water resources
22	Pad on Pilings	USACE	Elevate the gravel pad onto piles to reduce the amount of infrastructure on the ground and fill in wetlands that would impact wetland function and modify hydrologic flow. The location of the Project would remain as described for the Applicant's Preferred Alternative.	Wetlands and water resources

Alternative Identifier	Alternative Name	Origin	Alternative Description	Issue Addressed
23	No Hydraulic Fracturing	USACE Public comment	Eliminate the use of hydraulic fracturing to reduce the potential for contaminants to enter groundwater. This functional alternative could be added to any geographic alternative.	Water quality
24	Bridges in Place of Culverts	USACE Cooperating agency	Replace proposed culverts with bridges or other structures to reduce impacts to hydrologic flow and aquatic resources. This functional alternative could be added to any geographic alternative.	Wetlands and waters resources, fisheries
25	Open Bottom Arch Culvert Design	USACE Cooperating agency	Replace proposed culverts with open bottom arch culverts to reduce impacts to hydrologic flow and aquatic resources. This functional alternative could be added to any geographic alternative.	Wetlands and waters resources, fisheries
26	Corrugated Plate Culvert Design	USACE Cooperating agency	Replace proposed culverts with corrugated plate culvert design to reduce impacts to hydrologic flow and aquatic resources. This functional alternative could be added to any geographic alternative.	Wetlands and waters resources, fisheries
27	Concrete Box Culvert Design	USACE Cooperating agency	Replace proposed culverts with concrete box culverts to reduce impacts to hydrologic flow and aquatic resources. This functional alternative could be added to any geographic alternative.	Wetlands and waters resources, fisheries

* USACE is neither an opponent nor proponent of the Applicant's proposal; therefore, USACE does not identify an agency-preferred alternative in the EIS. The Applicant's proposal is considered the Applicant's Preferred Alternative (33 CFR 333.23(a)).
†The target reservoir is the area of the reservoir targeted by the Project based on oil and gas leaseholds.

Table 2.2-2. Alternatives Considered but Eliminated from Further Analysis and the Rationale for Elimination

Alternative Identifier	Alternative	Rationale for Elimination*
Geographic Alternatives		
2	Maximized Resource Alternative	**Fewer environmental impacts**: No. Would be closer to Nuiqsut and would increase impacts to the human and biological environment compared to the Applicant's Preferred Alternative. **Meets the purpose and need**: Yes **Reasonable**: Yes **Practicable**: Yes
3	CPAI Road Alignment Alternative	**Fewer environmental impacts**: No. Would not result in markedly reduced environmental impacts to WOTUS and would not substantially address issues compared to the Applicant's Preferred Alternative. The road alignment for the alternative would be in an area of higher elevation and thus would require less gravel per mile of road. However, this would result in an increase in road length (6.9 miles compared to 6.1 miles under the Applicant's Preferred Alternative), which would result in a larger gravel footprint (72.7 acres compared to 67.3 acres for the Applicant's Preferred Alternative) and a higher quantity of gravel fill (562,000 cubic yards compared to 517,000 cubic yards for the Applicant's Preferred Alternative) and consequently would have more impacts to WOTUS. **Meets the purpose and need**: Yes **Reasonable**: Yes **Practicable**: Yes

Alternative Identifier	Alternative	Rationale for Elimination*
6	Un-unitized Eastern Alternative Option 1	**Fewer environmental impacts**: No. Would not result in reduced environmental impacts to WOTUS. The drillsite would require a gravel access road (see Alternative 17) that would increase the amount of fill in WOTUS compared to the Applicant's Preferred Alternative. Would require a new horizontally directionally drilled (HDD) pipeline across the Colville River to transport multiphase (unprocessed) fluids to the ACF for processing†. Would not maximize use of existing infrastructure. Placing the pipeline belowground would make inspections and maintenance difficult and potentially result in an increased likelihood of spills to WOTUS, increasing the risk to human health and safety, a key issue raised during scoping. Additionally, multiphase pipelines carry an increased risk of corrosion, and, therefore a spill risk[2] (Nesic 2007, 2012). **Meets the purpose and need**: No. Does not meet the overall Project purpose. The drillsite would be farther from the target reservoir (see Figure 2.2-2a) and would therefore result in an estimated 82% reduction in resource recovery compared to the Applicant's Preferred Alternative. **Reasonable**: No. Does not meet the Project purpose and need and is therefore not reasonable. **Practicable**: No. Would be located in a hydrologically unstable area that experiences dynamic flooding and frequent ice jams and ice floes that direct much of the floodwater (35%) to the eastern floodplain (Michael Baker International [MBI] 2025, 2026). Because the east bank of the Colville River is lower than the central and west bank, the east bank receives higher-velocity floodwaters as water moves around ice jams that form in the main channel (MBI 2026). At times, flooding to the east can be significant—deep enough to float and transport lake ice more than 5 feet thick. Also, because the east bank of the river is lower than the west bank, significant overbank flooding can move channel ice out of the channel and into the eastern floodplain in the form of ice floes that can impact facilities and infrastructure. Placing fill or facilities in the Colville River eastern floodplain near the bifurcation of the East Channel and Niġliq Channel would cause the greatest hydraulic risk to those facilities, as well as existing facilities at Alpine and in Nuiqsut (MBI 2026).This could result in an increased likelihood of spills to WOTUS, increasing the risk to human health and safety, a key issue raised during scoping. Flooding velocity and intensity become progressively worse further south along the east bank due to flood inputs from the Itkillik River floodplain. Additionally, the alternative would not be practicable when considering the combination of the following: • The added logistics of operating an Alpine drillsite on the east side of the Colville River when staff, maintenance and operational support, and emergency response would have to be supported from the Kuparuk Operations Center, 35 miles away (approximately 27 miles further than the Applicant's Preferred Alternative). The new Alpine drillsite would be inaccessible from the ACF and CD1 (Alpine main camp, operations and emergency response center) 8 months out of the year. • The added cost and maintenance of a 10.1-mile gravel access road (see Alternative 17) and a new HDD pipeline (maintenance of multiphase pipelines is more complicated because the water in the multiphase product increases the chance of corrosion in the pipeline system). • The added risk of spills due to the increased likelihood of corrosion on a multiphase HDD pipeline crossing of the Colville River. • The 82% reduction in resource recovery.

[2] Existing HDD crossings of the Colville River do not transport unprocessed multiphase fluids. Multiphase fluids typically carry high concentrations of corrosive gases (carbon dioxide and hydrogen sulfide) (Nesic 2012). Because the environment outside the pipe is cooler than the saturated vapor inside the pipe, the acidic vapors condense on the upper inside of the pipe. This area cannot be reached by chemical corrosion inhibitors (a standard method to combat corrosion) (Nesic 2012). Also, oil and water in the multiphase product separate based on density, with water and corrosive sediment pooling along the bottom of the pipe and at low points within an HDD crossing, further concentrating corrosive conditions and increasing maintenance requirements (Alyeska Pipeline Service Company 2011; Association for Materials Protection and Performance 2022; Nesic 2012). Longer pipeline routes may also further increase the potential for liquid and solid accumulation by reducing flow velocities (Alyeska Pipeline Service Company 2011; Association for Materials Protection and Performance 2022). Lastly, to keep the oil viscous and flowing, multiphase pipelines typically operate at elevated temperatures. Higher temperatures inherently accelerate electrochemical corrosion rates (Nesic 2007; Thomas Industrial Coatings 2026).

Alternative Identifier	Alternative	Rationale for Elimination*
7	Un-unitized Eastern Alternative Option 2	**Fewer environmental impacts**: Same as Alternative 6. **Meets the purpose and need**: Same as Alternative 6, except distance from target reservoir (see Figure 2.2-2a) would result in an estimated 45% reduction in resource recovery compared to the Applicant's Preferred Alternative. **Reasonable**: Same as Alternative 6. **Practicable**: Same as Alternative 6.
8	Pikka Eastern Alternative	**Fewer environmental impacts**: Same as Alternative 6 **Meets the purpose and need**: Same as Alternative 6, except distance from target reservoir (Figure 2.2-2b) would result in an estimated 78% reduction in resource recovery compared to the Applicant's Preferred Alternative. **Reasonable**: Same as Alternative 6. **Practicable**: Same as Alternative 6.
9	ASRC Mine Site Alternative	**Fewer environmental impacts**: Same as Alternative 6. **Meets the purpose and need**: Same as Alternative 6, except distance to target reservoir (Figure 2.2-2b) would result in an estimated 37% reduction in resource recovery compared to the Applicant's Preferred Alternative. **Reasonable**: Same as Alternative 6. **Practicable**: Same as Alternative 6, except would have additional practicability issues. The ASRC Mine Site has mine cells that are over 60 feet deep that are regularly flooded. The flooding and subsequent freeze-thaw cycle of the water in the mine cells result in an unstable subsurface environment. This subsurface instability would introduce irreducible safety, constructability, and operability risks.
10	Cooperator East Side Alternative	**Fewer environmental impacts**: Same as Alternative 6 **Meets the purpose and need**: Same as Alternative 6, except distance to target reservoir (see Figure 2.2-2a) would result in a 19% reduction in resource recovery compared to the Applicant's Preferred Alternative. **Reasonable**: Same as Alternative 6. **Practicable**: Same as Alternative 6, except would also have to be within 800 feet of the east bank of the Colville River to remain on CPAI leases. This would introduce irreducible safety, constructability, and operability risks.
11	Putu Channel Island Alternative	**Fewer environmental impacts**: No. Would require more waterbody crossings and be near to known cultural resources. Would require a bridge across the Putu Channel at least 1,000 feet long (see Figure 2.2-1), which would increase fill in WOTUS. Both road and pipeline routes from the HDD area south would also be almost entirely within the 0.5-mile Colville River Alaska Department of Natural Resources setback. Would require an HDD pipeline across the Putu Channel of the Colville River to transport multiphase fluids to the ACF for processing (see Figure 2.2-1). Would not maximize use of existing infrastructure. Placing the pipeline belowground would make inspections and maintenance difficult and potentially result in an increased likelihood of spills to WOTUS, increasing the risk to human health and safety, a key issue raised during scoping. **Meets the purpose and need**: Yes. **Reasonable**: Yes **Practicable**: No. Would be located in an area with sandbars within braided streams and rivers, which are dynamic systems and have questionable stability. This would introduce irreducible safety, constructability, and operability risks. As a result, there could be an increased likelihood of spills to WOTUS, increasing the risk to human health and safety, a key issue raised during scoping.

Alternative Identifier	Alternative	Rationale for Elimination*
12	Modified Reservoir Target Alternative	**Fewer environmental impacts**: No. Would occur in an area more heavily used by caribou (*Rangifer tarandus granti*) and Federally listed eiders (spectacled eider [*Somateria fischeri*] and Steller's eider [*Polysticta stelleri*]) and would therefore result in more impacts to those species. **Meets the purpose and need**: No. **Reasonable**: No. Does not meet the Project purpose and need and is therefore not reasonable. **Practicable**: No. CPAI can only extract resources from areas where they have a lease. CPAI does not hold a lease in the alternative location and cannot obtain a lease because it is already held by Santos.
13	CD4 Infrastructure Upgrade Alternative	**Fewer environmental impacts**: Yes. **Meets the purpose and need**: Yes. **Reasonable**: No. Would not be technologically feasible. The target reservoir cannot be reached from CD4 with existing technology or technology that is reasonably foreseeable to be developed in the permitting phase of the Project (see Figure 2.2-2b). **Practicable**: Yes.
14	Shared Pad Alternative	**Fewer environmental impacts**: Same as Alternative 6. **Meets the purpose and need**: No. **Reasonable**: No. Does not meet the Project purpose and need and is therefore not reasonable. Would not be technologically feasible. The target reservoir cannot be reached from the NDC pad with existing technology or technology that is reasonably foreseeable to be developed in the permitting phase of the Project (see Figure 2.2-2a). **Practicable**: No. Uncertain practicability due to permitting uncertainty. It is not certain that Santos would allow CPAI access to the NDC pad for drilling operations.
15	Roadless Alternative	**Fewer environmental impacts**: No. Would add 6,245 air traffic trips close to Nuiqsut. Due to the direction of prevailing winds and thus the required northeast-southwest orientation of a potential airstrip or helicopter pad, the aircraft takeoffs and landings would be immediately over the community and result in substantial increases in noise, activity, and air emissions. This would have cascading effects on human health, subsistence resources, and sociocultural systems, which were key issues raised in scoping. (These flights represent landings at the CD8 airstrip only. Flights would originate and return to the Alpine airstrip, adding the same number of takeoffs and landings to the Alpine airstrip.) The heaviest air traffic would occur in the summer (when there would be no ice road), which would temporally and spatially overlap with caribou use of the area for oestrid fly relief. Caribou could use the airstrip for insect relief and would require regular hazing. This potential disturbance could result in caribou displacement that is similar to or greater than having an all-season gravel road connection to the drillsite. Muskox (*Ovibos moschatus*) also use this area and could be disturbed by the increase in air traffic. Would substantially increase freshwater use over the life of the Project to annually construct resupply ice roads from the drillsite to the ACF and Kuparuk. Would increase impacts to public health and numerous environmental resources 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 impacts to wetlands and WOTUS by 7 acres compared to the Applicant's Preferred Alternative because of the need for an additional airstrip and storage. **Meets the purpose and need**: Yes. **Reasonable**: No. Roadless design is infeasible. **Practicable**: No. Would not be practicable considering logistics involved to achieve Project purpose and provide adequate emergency response.

Alternative Identifier	Alternative	Rationale for Elimination*
16	South of Nuiqsut Alternative	**Fewer environmental impacts**: No. Would be adjacent to Tagruk Lake, the drinking water source for the community of Nuiqsut, and would therefore have increased potential impacts to public health and sociocultural systems as compared to the Applicant's Preferred Alternative. A drillsite in this location would either overlap or be located immediately outside of the Alaska Department of Environmental Conservation's designated Drinking Water Protection Area (Zones A and B for PWSID AK2320264) for Nuiqsut's drinking water source, Tagruk Lake, and would also be fewer than 1,000 feet from the lake edge. Access to the drillsite location would require 9 or more miles of new roads and pipelines that would likely wrap around the community to reach the location (see Figure 2.2-1). Would require a HDD pipeline across the Niġliq or Putu Channel to transport multiphase fluids to the ACF for processing. Would not maximize use of existing infrastructure. Placing the pipeline belowground would make inspections and maintenance difficult and potentially result in an increased likelihood of spills to WOTUS, increasing the risk to human health and safety, a key issue raised during scoping. **Meets the purpose and need**: Yes. **Reasonable**: Yes. **Practicable**: No. Uncertain practicability due to permitting uncertainty. Proximity to the community drinking water source at Tagruk Lake, including overlap with or adjacency to the Alaska Department of Environmental Conservation (ADEC) Drinking Water Protection Area, could introduce additional permitting constraints and regulatory scrutiny related to protection of public water supplies.
Functional Alternatives		
17	Access: Gravel Road to Mustang, Pikka, or DS2L	**Fewer environmental impacts**: Depends on the access route. A gravel road from near the ASRC mine site (Alternatives 8 and 9) following the Alpine/WNS multiyear ice road (a likely general route of a gravel road and an area that has already been impacted by soil compaction) would be approximately 10 miles to the existing Pikka Road to NDB, 15 miles to Mustang, or 13 miles to DS2L (see Figure 1.0-1 and Figure 2.2-1). Any of these routes would require more fill in wetlands and WOTUS compared to the Applicant's Preferred Alternative. Because of the increase in gravel infrastructure, it would also create more dust, which would have indirect impacts to WOTUS, fish and wildlife habitat, soils and permafrost, cultural resources, visual resources, etc. The addition of a long linear feature would increase impacts to caribou movement and migration. A road connecting to the Pikka NDC pad (expected to be constructed in winter 2026–2027, POA-2015-00025-M9) would likely result in reduced gravel fill compared to the Applicant's Preferred Alternative (4.5 miles compared to 6.1 miles, respectively) (see Figure 2.2-1). **Meets the purpose and need**: Yes. **Reasonable**: Yes. **Practicable**: No. A gravel access road on the east side of the Colville River would have to connect to Pikka, Mustang, or DS2L. Such a configuration is not practicable considering the following combination of logistics and cost involved to achieve Project purpose: • The added logistics of operating an Alpine drillsite on the east side of the Colville River when staff, maintenance and operational support, and emergency response would have to be supported from the Kuparuk Operations Center, 35 miles away (approximately 27 miles further than the Applicant's Preferred Alternative to the ACF). The new Alpine drillsite would be inaccessible from the ACF and CD1 (Alpine main camp, operations and emergency response center) 8 months out of the year. • The added cost of construction and maintenance of a longer gravel access road (for all routes except to the Pikka NDC pad). Potential additional road crossings of either the Alpine sales oil pipeline or the Project pipeline from a drillsite on the east side of the Colville River. Pipeline crossings of roads are typically placed underground, which would make inspections and maintenance difficult and potentially result in an increased likelihood of spills. • The reduction in resource recovery from sites on the east side of the Colville River, which would mean less revenue in combination with added costs. • The unknown costs and logistics associated with a new use agreement and cost of using another operator's infrastructure (for the route to the Pikka NDC pad only).

Alternative Identifier	Alternative	Rationale for Elimination*
		• The potential delays in construction and operation from connecting to a pad that has not yet been constructed (Pikka NDC pad) or would take longer to construct because it would be longer (all other routes).
18	Access: Bridge over the Colville River	**Fewer environmental impacts**: No. Would result in more fill in WOTUS. **Meets the purpose and need**: No. Is not part of the Applicant's purpose and need or the overall Project purpose. **Reasonable**: No. Does not meet the Project purpose and need and is therefore not reasonable. Would not be reasonable or practicable because it has substantial technical and economic feasibility constraints. An all-season bridge in the same general location as the Alpine WNS multiyear ice bridge is estimated to cost between $411 million and $1.6 billion to construct (based on a 2019 State of Alaska study [ASRC 2019] adjusted for inflation). These costs do not include maintenance. **Practicable**: No. Would not be practicable considering the combination of logistics, technical feasibility, and cost involved to achieve Project purpose. No alternatives on the east side of the Colville River were brought forward for detailed analysis, and the Gravel Road to Mustang, Pikka, or DS2L functional alternative (Alternative 17) was similarly dismissed.
19	Access: Cable Ferry	**Fewer environmental impacts**: Yes. **Meets the purpose and need**: Yes. **Reasonable**: No. Uncertain technical feasibility, especially during high river flows. **Practicable**: No. Would be located in a hydrologically unstable area that experiences erosion and frequent ice jams. Could only be used after ice breakup and before freeze-up, leaving part of the year without access.
20	Access: Foam Board Road Construction	**Fewer environmental impacts**: Yes. **Meets the purpose and need**: Yes. **Reasonable**: Yes. **Practicable**: No. The proposed road alignments are not suitable for use of foam board due to three main factors: 1) the road height for most of the route cannot be reduced because the road height is determined by the floodwater surface elevation hydrologic design criteria; 2) portions of the road exposed to floodwaters would be at risk of washout of the foam board due to scour and dislodging; and 3) most of the route outside of flood areas has significant hilly terrain, which would likely require trimming of natural grade to provide a smooth enough surface for construction of insulated road embankments. (In areas where foam board is being used at Willow, the terrain is more consistent, and the gravel embankment height is not controlled by hydrologic design criteria.)
21	Pipeline: Transport Fluids to Kuparuk CPF1 or CPF 2	**Fewer environmental impacts**: No. Would require additional fill in wetlands and WOTUS compared to the Applicant's Preferred Alternative because it would require a longer pipeline and supporting gravel access road (see Alternative 17). Would increase impacts to caribou movement and migration with the addition of more linear infrastructure (a new multiphase pipeline next to the existing Alpine sales oil pipeline). **Meets the purpose and need**: Yes. Would meet underlying and overall Project purpose. **Reasonable**: No. Would not be technically feasible. CPF2 is operating at capacity for process water and could not accommodate additional fluids from the Project. **Practicable**: No. Delivery of fluids to CPF1 would require additional infrastructure and equipment. Given the distance of the pipeline (approximately 35 miles), pipeline hydraulics would result in low line velocities and slugging, which could lead to flow and corrosion issues that increase the likelihood of spills.

Alternative Identifier	Alternative	Rationale for Elimination*
22	Pad on Pilings	**Fewer environmental impacts**: No. Would not substantially reduce impacts due to shading of wetlands below the elevated pad. **Meets the purpose and need**: Yes. **Reasonable**: Yes. **Practicable**: No. Would not be practicable considering the combination of logistics, technical feasibility, and cost involved to achieve Project purpose. Would increase safety concerns due to reduced access for emergency personnel, equipment, and egress
23	No Hydraulic Fracturing	**Fewer environmental impacts**: No. Approximately 25% of conventional oil and gas development on the North Slope use hydraulic fracturing to develop production wells (AECOM 2017). The most frequent concern to arise from the use of hydraulic fracturing operations is the potential for groundwater contamination. The North Slope is underlain by a thick layer of permafrost, leaving little to no liquid water to depths of 1,000 to 2,000 feet beneath the ground surface; below the permafrost layer, only salt water is present (Alaska Oil and Gas Conservation Commission 2015). However, regardless of subsurface conditions, all hydraulically fractured stimulated wells are held to the same Alaska Oil and Gas Conservation Commission standards and regulations per 20 Alaska Administrative Code 25.283. **Meets the purpose and need**: No. Would not meet the overall Project purpose. Without hydraulic fracturing, there would be a 35% reduction in recovery of oil. However, until CPAI obtains additional well data and penetrations in the CD8 target reservoir, additional uncertainty exists as to whether reservoir characteristics near CD8 mirror those characteristics near CD4. Given this, the loss of recovery could be as high as 80%, which would not be economically feasible. **Reasonable**: No. Does not meet the Project purpose and need and is therefore not reasonable. Would not be economically feasible as described above. **Practicable**: Yes.
24	Bridges in Place of Culverts	**Fewer environmental impacts**: No. Would increase wetland footprint by 0.6 acre and increase scour potential during flooding compared to Applicant's Preferred Alternative, increasing secondary effects on the aquatic ecosystm. Because water surface elevations would be higher on the upstream side of the road during flooding, a wider opening at the waterbody crossing would allow more water to flow through at a faster rate, which would increase the potential for scour. (More information on flood conditions and water surface elevations in Section 3.11, Water Quality and Hydrology.) **Meets the purpose and need**: Yes. **Reasonable**: No. Bridge construction would cost 20 times the Applicant's Preferred Alternative. **Practicable**: No. Bridge construction would cost 20 times the Applicant's Preferred Alternative
25	Open Bottom Arch Culvert Design	**Fewer environmental impacts**: Yes. Would reduce fill in littoral wetland by 0.1 acre compared to Applicant's Preferred Alternative. However, would have increased scour risk during floods when water would be funneled through a narrow opening. **Meets the purpose and need**: Yes. **Reasonable**: Yes. **Practicable**: No. Bottom-less culverts in permafrost conditions do not provide a stable structure capable of supporting transport of a drill rig
26	Corrugated Plate Culvert Design	**Fewer environmental impacts**: No. Would result in an additional 0.4 acre of fill in littoral wetlands compared to Applicant's Preferred Alternative. **Meets the purpose and need**: Yes. **Reasonable**: Yes. **Practicable**: No. Corrugated plate culverts cannot support drill rig transport.

Alternative Identifier	Alternative	Rationale for Elimination*
27	Concrete Box Culvert Design	**Fewer environmental impacts**: No. Wetland impacts would be the same as the Applicant's Preferred Alternative. **Meets the purpose and need**: Yes. **Reasonable**: Yes. **Practicable**: No. Concrete box culverts cannot support drill rig transport.

* Production estimates are based on a 25-year production profile; a 28-year production profile would be proportionally similar.
† Processing fluids at CPF1 is also not practicable because the hydraulics of a 35-mile multiphase pipeline would require additional compression infrastructure and equipment. Also, given the distance of the pipeline, it would have low line velocities and significant slugging, which could lead to flow and corrosion issues that increase the likelihood of spills. Processing fluids at CPF2 is also not technically feasible because the facility is at capacity for handling process water; see Alternative 20.

Table 2.2-3. Action Alternatives Carried Forward for Detailed Analysis and the Rationale for Retention

Alternative Identifier	Alternative	Rationale for Retention
Geographic Alternatives		
1	Applicant's Preferred Alternative	**Fewer environmental impacts**: This is the alternative in CPAI's CWA Section 404 permit application and is therefore the alternative to which other alternatives are compared. See Figure 1.0-2. **Meets the purpose and need**: Yes **Reasonable**: Yes **Practicable**: Yes
4	Northern Alternative	**Fewer environmental impacts**: Yes. This alternative has a shorter gravel access road and pipeline than the Applicant's Preferred Alternative and fewer waterbody crossings (culverts). Therefore, it has 19 fewer acres of fill in WOTUS. This alternative is 1 mile further away from Nuiqsut. See Figure 2.2-3. This alternative is not directly in alignment with the prevailing wind patterns that could transport air emissions from the Project to Nuiqsut. It is farther away from Nuiqsut so air emissions would be more dispersed and diluted before reaching Nuiqsut. **Meets the purpose and need**: Yes. Although this alternative would result in an estimated 28% reduction in resource recovery compared to the Applicant's Preferred Alternative, the reduced impacts to WOTUS and greater distance from Nuiqsut justify advancing this alternative for detailed analysis. **Reasonable**: Yes **Practicable**: Yes

Alternative Identifier	Alternative	Rationale for Retention
5	Northwestern Alternative	**Fewer environmental impacts**: Yes. Although the access road would be approximately 1 mile shorter than the Applicant's Preferred Alternative, it would have additional bridge crossings and require an elevated road embankment and thicker pad due to flooding concerns. Therefore, the gravel road and pad would have a wider footprint and, and this alternative would only nominally reduce the gravel footprint and fill in WOTUS by 5 acres. This alternative is 0.4 mile further away from Nuiqsut. See Figure 2.2-4. This alternative is not directly in alignment with the prevailing wind patterns that could transport air emissions from the Project to Nuiqsut. It is farther away from Nuiqsut so air emissions would be more dispersed and diluted before reaching Nuiqsut. The drillsite under this alternative would be farther from yellow-billed loon nesting and brooding lakes. **Meets the purpose and need**: Yes. Although this alternative would result in an estimated 10% reduction in resource recovery compared to the Applicant's Preferred Alternative, the reduced impacts to WOTUS and greater distance from Nuiqsut justify advancing this alternative for detailed analysis. **Reasonable**: Yes **Practicable**: Yes

2.3 REASONABLE RANGE OF ALTERNATIVES

This section summarizes alternatives retained for detailed analysis, including the No Action Alternative, and provides a comparison of alternative components (Figure 2.3-1). The No Action Alternative is required per 33 CFR 333.23(b)(3) to serve as a baseline of comparison for impact analysis. For simplicity in the analysis, alternatives carried forward for detailed analysis are hereafter referred to as Alternatives A through D; their names remain the same as in Tables 2.2.1 through 2.2-3.

2.3.1 Alternative A – No Action Alternative

Under the No Action Alternative, no Project permits would be issued by USACE; this could include a situation where

- a USACE permit is not needed due to Project reconfiguration to avoid all jurisdictional WOTUS on the site,
- a USACE permit is not needed due to siting the Project entirely in uplands off-site, or
- a USACE permit is denied.

The first two situations would be impracticable because approximately 82% of the ACP is wetlands (Alaska Department of Fish and Game [ADF&G] 2006), many of which may be jurisdictional, depending on site-specific delineations and regulatory determinations, and uplands are uncommon on the ACP. In this case, permit denial is the only practicable No Action Alternative and is analyzed in detail in the EIS. In a permit denial situation, the Project would not be constructed. The Applicant could continue oil and gas exploration in the area with proper permits and/or redesign the Project and apply for a new Section 404 permit from USACE.

2.3.2 Alternative B – Applicant's Preferred Alternative

CPAI would develop a drillsite and associated infrastructure 2.1 miles east/northeast of Nuiqsut to support resource extraction from the Narwhal reservoir (see Figure 1.0-2). The alternative would include a 15.3-acre gravel drillsite pad, a 6.1-mile gravel access road, 2.5 miles of pipeline on new vertical support members (VSMs; Figure 2.3-2), 5.5 miles of pipeline co-located with existing pipeline infrastructure, and a bridge over Lake L9324. Pipelines would transport produced oil, injection water, and miscible injectant (MI)/gas injection (GI) between the drillsite and the ACF for processing and enhanced recovery. The drillsite would support the construction of up to 40 wells for production and injection as well as associated facilities for drilling, well stimulation, chemical storage, and operational support. Operations would result in an estimated 93 million barrels of oil (MMBO) over the 30-year life of the Project. A detailed description of Alternative B is provided in Section 2.4 (Components Common to All Action Alternatives) and Table 2.5-1 in Section 2.5 (Comparison of Action Alternatives).

2.3.3 Alternative C – Northern Alternative

Alternative C would move the drillsite 1 mile further north compared to Alternative B (see Figure 2.2-3). This would increase the distance from the drillsite to Nuiqsut from 2.1 miles to 3.1 miles to address scoping comments about potential impacts to sound levels, the viewshed, public health, and safety in the event of a reservoir blowout or a low-pressure gas leak. Much of the

design of Alternative C would be the same as Alternative B; however, the change in location would necessitate changes in routing of the gravel access road, which would be 3.6 miles compared to 6.1 miles under Alternative B (see Table 2.5-1). This alternative would also address impacts to WOTUS by reducing the area of fill in WOTUS to 45.5 acres compared to 65.9 acres under Alternative B. The pipelines under Alternative C would also be shorter (1.8 miles of pipeline on new VSMs compared to 2.5 miles under Alternative B; see Figure 2.3-2). The alternative would result in an estimated 67 MMBO over the 30-year Project life (a 28% reduction in resource recovery compared to Alternative B). A detailed description of Alternative C is provided in Section 2.4 (Components Common to All Action Alternatives) and Table 2.5-1 in Section 2.5 (Comparison of Action Alternatives).

2.3.4 Alternative D – Northwestern Alternative

Alternative D shares many of the same features as Alternative B and Alternative C but is located west of Alternative C (see Figure 2.2-4), further from lakes known to support nesting yellow-billed loons (*Gavia adamsii*). The change in location would also increase the distance from Nuiqsut to 2.5 miles under Alternative D compared to 2.1 miles under Alternative B and move the drillsite out of the direct line of prevailing winds. Much of the design of Alternative D would be the same as Alternative B; however, the change in location would necessitate changes in the gravel access road route, which would be 5.0 miles compared to 6.1 miles under Alternative B (see Table 2.5-1). This alternative would also address impacts to WOTUS by reducing the area of fill in WOTUS to 60.9 acres from 65.9 acres under Alternative B. The pipelines under Alternative D would be longer (3.1 miles of pipeline on new VSMs compared to 2.5 miles under Alternative B; see Figure 2.3-2). The alternative would result in an estimated 83 MMBO over the 30-year Project life (a 12% reduction in resource recovery compared to Alternative B). A detailed description of Alternative D is provided in Section 2.4 (Components Common to All Action Alternatives) and in Table 2.5-1.

2.4 COMPONENTS COMMON TO ALL ACTION ALTERNATIVES

2.4.1 Design Criteria

The Project would use the design criteria summarized in Table 2.4-1 to ensure that Project infrastructure is compatible with the area's climate and hydrologic regimes and can withstand modeled 50-year ice-affected and 200-year open-water flood events. The timing and magnitude of spring breakup flooding in the Colville River Delta (CRD) has been determined through annual monitoring since 1992 (Michael Baker International [MBI] 2025). Since the development of Alpine (see Section 3.1.1.1.1 [Alpine Development]), CPAI has also been documenting post-breakup conditions near their infrastructure as required by permit stipulations set forth by USACE and ADF&G as detailed in MBI (2025). Permit stipulations include documentation of annual hydrologic conditions, direct measurements, indirect calculations of discharge through drainage structures, and documentation of pad and road erosion caused by spring breakup flooding. These long-term datasets were used to inform the CD8 Project design.

The criteria in Table 2.4-1 are the basis for siting gravel pads, roads, and pipelines; minimum road/pad surface and bridge clearance elevations for flooding events; and location and sizing of the necessary drainage structures. Analysis of water surface elevations (WSEs) considered snow

and ice impacts as well as open-water flood levels within the CRD and is based on a regional open-water and ice-affected hydrology model (MBI 2020), discussed more in Section 3.11 (Hydrology and Water Quality).

All Project design drawings are in CPAI's CWA Section 404 permit application, which is available on the Project website: www.cd8eis.com.

Table 2.4-1. CD8 Project Hydrologic Design Criteria

Project Component	Design Criteria
Gravel pads and pipelines	Greater of the following: • Q200 open water + 3 feet or • Q50 ice-affected WSE + 1 foot
Gravel roads	Greater of the following: • Q200 open water or • Q50 ice-affected WSE
Bridges	• Q200 open water + 5 feet or • Q50 ice-affected WSE + 3 feet
Culverts	Water track crossing: Q50 open water with headwater-to-diameter ratio of 1 or less Cross drainage: As required to maintain natural drainage patterns
Erosion protection	Q50 open water + 1 foot: • Where velocity is >2 feet per second, or • design wave height is >0.7 feet, or • combined velocity is >1.0 feet per second and wave height is 0.4 feet.

Note: Q50 = 50-year flood event; Q200 = 200-year flood event. For the purposes of this EIS, a water track is a narrow, often curving feature where soils remain wetter than surrounding areas and where water typically moves below the soil but above the permafrost during periods of thaw.

Design criteria are also informed by CPAI's routine inspection, maintenance, and corrective actions on their existing infrastructure to address changing site conditions, settlement, wear, or other factors that may affect facility performance. CPAI considered current and reasonably foreseeable changing Arctic conditions during Project design, including permafrost characteristics, surface hydrology, precipitation, flooding potential, and other site-specific geotechnical factors. Though Arctic conditions may continue to evolve over time, potential effects on infrastructure are expected to occur incrementally and would be addressed through existing engineering, maintenance, and asset integrity processes. The Project's mitigation measures (Section 2.4.14 [Design Features and Mitigation] and EIS Appendix E [Mitigation Measures]), together with established inspection, maintenance, and operational practices, would provide an effective basis for managing infrastructure performance throughout the life of the Project.

2.4.2 Gravel Pads

Gravel pads would be a minimum of 5 feet thick to maintain a stable thermal regime. Pads may be thicker if needed to meet the Project hydrologic design criteria (see Table 2.4-1). Embankment side slopes would have a horizontal (H) to vertical (V) ratio of approximately 2H:1V. Based on a preliminary evaluation for the potential for erosion, riprap would be included in locations along gravel pads and the gravel road. The total acres of gravel pads are summarized by alternative in Table 2.5-1.

2.4.2.1 Drillsite Pad

The CD8 drillsite would be a gravel pad designed to accommodate drilling and operations facilities such as wellhead shelters, drilling material storage, and well work equipment. The drillsite would be sized to accommodate up to 40 wells with typical 20-foot wellhead spacing.

Additional drillsite facilities would include the following packaged in truckable and/or barged modules, including some enclosed modules:

- Emergency shutdown equipment
- Fuel gas pressure let-down and conditioning equipment
- Well test and associated metering facilities
- Electrical and instrumentation control equipment
- Pig launchers/receivers
- Chemical injection facilities (including tanks and small pumps within modules, containment, and exterior tank fill connections)
- Exterior storage tanks and containment (chemicals and freeze-protection fluid)
- Equipment and tanks to support drilling and well work operations
- Production heater and associated equipment (approximately 30 million British thermal units per hour)
- Tank truck loading/unloading area
- Transformer (oil-insulated) and platform
- Pipe rack and/or manifold piping/valves
- Communications infrastructure, including a tower up to 80 feet high
- High-mast lights

In addition to the facilities listed above, at various times throughout the Project's producing lifetime, temporary modules and tanks, equipment, spill response equipment containers, and other structures may be used at the CD8 drillsite to address short-term needs. Permanent equipment and buildings on the pad are planned to be 35 feet or less in height.

CPAI would use passive **thermosyphons** to protect Project infrastructure and underlying permafrost for facilities located on gravel pads. Thermosyphons operate via passive heat exchange using natural convection without the need for power or a pump; the process pulls heat from beneath a structure, thus preventing thawing of the substrate. Thermosyphon design includes a sealed fluid-filled tube with portions aboveground and belowground. Thermosyphons are a routinely used design feature in Arctic environments and would be used adjacent to well rows and at-grade structures on Project pads (see mitigation measure 30 in EIS Appendix E [Mitigation Measures]).

The Project would use extended reach drilling (ERD) and hydraulic fracturing to access the targeted hydrocarbon deposits and develop production wells. ERD 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 (see Section 2.4.10.1 [Extended Reach Drilling]). Hydraulic fracturing is a well-stimulation technique used to increase the flow of oil and natural gas (see Section 2.4.10.2 [Hydraulic Fracturing]).

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

2.4.2.2 Pipeline Tie-in Pad

The CD8 produced oil pipeline would tie in to existing pipeline infrastructure at a new pipeline tie-in gravel pad located near the CD4 pad. One or more modules would be installed on this pad for pigging.

2.4.2.3 New Facilities on Existing Pads

The Project may include installation of modules and equipment on the existing ACF at CD1 and CD4 gravel pads. New equipment that could be installed on the existing ACF pad includes tie-ins for power and fiber-optic cables and routing of cables. Modules and equipment that could be installed at the CD4 pad include pigging equipment to ensure pipeline integrity. Expansion of existing pads would not be needed.

2.4.3 Pipelines

The Project would construct three types of infield pipelines, as summarized in Table 2.4-2. The total length of new pipeline and VSMs is summarized by alternative in Table 2.5-1. Freshwater would be transported to the Project by truck; no freshwater pipelines are proposed. A pipeline schematic is provided in Figure 2.4-1. Pipelines may change service (for example switch from oil to seawater) during Project construction or operations.

Table 2.4-2. Summary of Infield Pipelines for the CD8 Project

Pipeline	General Location	Summary
Produced oil	CD8 to the pipeline tie-in pad	Transport produced crude oil, gas, and water (multiphase product that is not yet separated) from CD8 for processing at the ACF. Requires new VSMs from CD8 to the Willow horizontal directional drilling (HDD) pad and from the MI/GI pad area to the pipeline tie-in pad.
Injection water	CD8 to CD4	Transport seawater or produced water to CD8 to maintain reservoir pressure and support enhanced oil recovery. Shares new VSMs with CD8 produced oil pipeline from CD8 to the Willow HDD pad. Requires new VSMs from the CD4 junction to CD4.
MI/GI	CD8 to Alpine MI/GI pad area	Transports MI and/or lean gas to CD8 for artificial lift to support enhanced oil recovery, reservoir pressure support, and fuel gas. Shares new VSMs with CD8 produced oil pipeline from CD8 to the Willow HDD pad.

Pipelines to or from CD8 would leverage tie-ins with existing pipelines and/or facilities to avoid parallel pipelines to the extent practicable. Pipelines would rest on common horizontal support members (HSMs) atop VSMs and would use existing slots on Willow pipeline HSMs to avoid

the need to install new VSMs and HSMs for most of the CD8 pipelines' length (see Figure 2.3-2). Pipelines (including suspended cables) on new VSMs would be a minimum of 7 feet aboveground except where pipelines meet gravel pads and at road crossings. (New pipelines that would cross gravel roads would be buried in a casing embedded in the road prism.) New pipelines that share existing VSMs and HSMs would match the existing HSM heights. New VSMs and HSMs would also be sized with sufficient room to allow for additional future pipeline installation (e.g., a potential gas injection pipeline to support Project needs should they arise). No VSMs are proposed for placement below the ordinary high water mark (OHWM).

Where located on new VSMs and HSMs, the CD8 pipelines would typically have supports with a single VSM, except where anchor supports are used and in expansion loops, where two VSMs per pipeline support would be used. New VSMs would typically be placed approximately 55 feet apart and have a typical diameter of 12 to 30 inches and a disturbance footprint diameter of 18 to 40 inches. VSMs would be installed using a similar method as described for bridge pilings (drilling, setting, and applying freeze-back slurry) or may be driven into an undersized hole using a vibratory hammer based on engineering design. The pipelines would be strung, welded, tested, and then installed in pipe saddles on top of the HSMs. Where Project pipelines parallel existing pipelines on new VSMs, the new VSMs would be aligned with the existing VSMs and constructed as close to the existing pipelines as practicable. A typical distance between HSMs of adjacent pipelines is 5 feet to allow adequate space for maintenance and safety.

Pipeline design would conform to American Society of Mechanical Engineers Codes B31.4 and B31.8 as appropriate, applicable Federal and State standards, and CPAI internal specifications. Typical pipeline construction would consist of carbon steel pipe as dictated by service, pipeline size, and code; externally coated with fusion-bonded epoxy to prevent external corrosion; and covered with rigid polyurethane insulation and metal jacketing, as necessary. External metal jacketing would be non-reflective or would be buffed in the field. All pipelines would be hydrostatically tested prior to startup as required by the appropriate design code (e.g., B31.4 and B31.8). Pigging facilities would be installed for the produced oil and injection water pipelines to allow pipeline inspection and maintenance.

The only flaring related to the CD8 Project would be from the initial wells necessary to start up and commission the pipeline to the ACF. On-site flaring would occur during well testing to provide sufficient fluids to charge the pipeline and enable continuous flow to the ACF. Once the pipeline to ACF is commissioned, there would be no flaring on the CD8 drillsite.

2.4.4 Project Access

The Project would be accessed from the ACF and CD1 and other WNS pads via ground transportation on seasonal ice roads and existing and proposed gravel roads. Ground transportation from Kuparuk or Deadhorse to CD8 would occur seasonally via the Alpine/WNS multiyear ice road. Helicopters may be used to access the Project but would be limited to emergency response to the CD8 pad, ice road cleanup during construction years, and required monitoring studies. Helicopters would depart from the helicopter base of operations (likely at CD5 or Willow) and land directly on the tundra.

Access for personnel, equipment, and supplies to and from the North Slope would primarily occur by ground on existing roads, by fixed-wing aircraft to the airstrip at CD1/ACF, and by barge to the existing Oliktok Dock. CPAI estimates that air traffic at the CD1/ACF airstrip would

increase slightly relative to existing traffic during construction but would not increase during drilling and operations. The estimated total number of marine, ground, and air traffic trips are summarized by alternative in Tables 2.5-1 through 2.5-3.

Limited off-road travel would occur annually in the winter for pipeline inspections, pipeline maintenance, and culvert clearing. CPAI would observe ADNR and NSB tundra travel requirements, including observing soil temperature and snow depth criteria for winter travel opening and closing. The scope and scale of annual pipeline inspections and maintenance vary year to year but could range from 20 to 50 trips annually. Additional trips may be required for larger pipeline maintenance work; this type of work is less common, and the number of trips would be dependent on the scope of work to be performed. Off-road travel to clear culverts typically consists of very short trips that occur daily, immediately off the gravel road system beginning in early to mid-April.

2.4.4.1 Ice Roads

During construction, ice roads would be used to construct the Project pipeline, gravel pads, gravel road, and bridge. The total miles of Project-specific ice road are summarized by alternative in Table 2.5-1. During drilling and operations, planned ice road use would be limited to drilling rig mobilization or demobilization. Because of heavy equipment size and frequency of construction traffic, safety considerations dictate using separate ice roads for hauling gravel and general traffic.

During drilling and operations, seasonal ground access from Deadhorse and Kuparuk to CD8 would occur via the existing Alpine/WNS multiyear ice road. The Alpine/WNS multiyear ice road would be able to connect to the CD8 gravel road once it is complete, thus shortening the total length of the annual ice road. The total miles of annual ice road that would be reduced are summarized by alternative in Table 2.5-1.

Ice road construction is dependent on ground temperature and precipitation (i.e., sufficient snow for prepacking of routes) and typically begins annually in November or December. Vehicle access via ice road depends on dates of opening and closing of the ice road by ADNR and the distance from existing infrastructure. The usable ice road season for travel to the Project area would be similar to Alpine operations because of the logistical synergies within the CRU. The 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. Ice road widths vary based on purpose: a 35-foot-wide surface for general access; 50-foot-wide surface for hauling gravel; and an 80 to 120-foot-wide surface for pipeline, power, and fiber-optic cable installation.

2.4.4.2 Gravel Roads

A new gravel road would provide year-round access to the CD8 drillsite from CD4. The total miles of gravel road are summarized by alternative in Table 2.5-1. The gravel road is designed to maintain the existing thermal regime, is based on the Project-specific hydrologic basis of design (and would be a minimum of 5 feet thick and have 2H:1V side slopes). The road would be 32 feet wide (crown width) with an average toe-to-toe width of approximately 55 feet where erosion protection is not located and 75 feet where erosion protection is located. Additional mitigation measures for wildlife, including caribou (*Rangifer tarandus granti*), that give wildlife the right-

of-way near roads are described in CPAI's *Wildlife Avoidance and Interaction Plan* (CPAI 2023).

Although the road and pipeline routes are constrained by existing infrastructure and topography, where possible, roads and pipelines would be spaced to minimize potential caribou disturbance, prevent excessive snow accumulation from snowdrifts, and facilitate snow removal. However, pipelines would typically be constructed within 1,000 feet of roads to allow for visual inspection from the road. The gravel road would cross the existing pipeline corridor just east of CD4, using a 40-foot bridged crossing that would require a wider road bed.

2.4.4.3 Waterbody Crossings

The gravel road system would include construction of bridged crossings, culvert crossings of water tracks, and other culverts for cross drainage. For the purposes of this EIS, a water track is a feature in a wetland complex that is stream-like, narrow, and often curving. Soils remain wetter in a water track than in surrounding areas, and water typically moves along the surface or below the soil but above permafrost during periods of thaw. Many channel and valley characteristics that are considered indicators of OHWMs may be different or even absent in water tracks. The only infrastructure below the OHWM are bridge pilings (see Section 2.4.4.3.1 [Bridges]) and culverts (see Section 2.4.4.3.2 [Culverts]). The total number and type of crossings are summarized by alternative in Table 2.5-1.

2.4.4.3.1 BRIDGES

Bridges would be constructed on steel pile pier groups made up of sets of four pilings positioned approximately 50 to 80 feet apart with sheet pile abutments located above the OHWM at each end of the bridge. The bridge decks would have a removable guardrail and would be designed to support a drill rig. The bridges would be designed based on the Project-specific hydrologic basis of design.

Bridge construction would occur in the winter from ice pads. Bridge pilings would be installed below the OHWM by drilling, setting, and applying freeze-back slurry, or by using a vibratory hammer, depending on geotechnical conditions. Vibratory driving would be used to install the sheet pile abutments above the OHWM. For pier and pile installation, ice may be thickened or grounded at the pile locations or under construction and drilling equipment to provide a safe working surface. If liquid water is present below the ice at the pier locations, steel surface casings would be installed with a vibratory hammer to seal off the water. No coffer dams or dewatering would be used during construction.

Riprap would be placed along the sides of the gravel fill slopes and around the sides of the sheet pile abutments outside of the OHWM to protect gravel slopes from erosion during 50-year flood events. Existing banks and bank slopes would remain to promote long-term stability of the existing shoreline and the proposed bridge abutment. Collection of additional bathymetry and OHWM elevation data would occur prior to detailed engineering design in the summer before the start of Project construction.

2.4.4.3.2 CULVERTS

The Project would need culverts or culvert battery crossings at water tracks. Culverts would be placed perpendicular to the road, where feasible. The size, layout, and quantity of culverts crossing water tracks would be based on Project-specific hydrologic basis of design (see Table 2.4-1) and site-specific conditions determined later in the permitting process. Typical culverts would be steel pipe pile. Culverts would extend approximately 2 feet past the toe of the slope and have a minimum of 3 feet of cover (dependent on pipe material, wall size, and loading). Neighboring culverts would be spaced a minimum of 3 feet between outer walls to provide for proper gravel compaction and vehicular load distribution.

Though the exact number and size of water track crossings would be determined later in the permitting process, a small water track crossing may require two culverts, whereas a large water track crossing could have 10 or more culverts (likely in groups of 2–4 to best fit the terrain and anticipated flows along separate drainage paths). The culvert batteries for the CD8 Project are expected to be on the larger side, similar to those along the existing CD4 road. For example, the existing crossing nearest CD4 has two sets of four culverts, and the northernmost crossing has one set of four culverts and one set of five culverts.

Riprap outlet protection would range from 500 square feet for a small crossing to 5,000 or more square feet for a large crossing. Based on these assumptions and depending if culverts are large or small, riprap across all culvert batteries at water track crossings and/or potential flood drainage paths would be between 0.6 and 1.2 acres.

Where fish or aquatic organism passage is required (as designated by the ADF&G or USACE), culverts would be designed with at least one of the culverts in the 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 culvert diameter) to provide conditions similar to a streambed within the culvert. Fish passage culverts would either be corrugated steel plate or steel pipe pile. Baffles may be added on a site-specific basis and in consultation with permitting agencies.

Cross-drainage culverts would also be placed in the road to maintain surface drainage patterns. Preliminary culvert locations for crossflow would be selected based on aerial photography. CPAI 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 locations of the culverts would be completed after the field survey. The estimated spacing of culverts is every 1,000 feet; however, some culverts may be spaced closer or farther than 1,000 feet, as-is common on roads associated with oil and gas development on the North Slope. The culverts would be installed with the gravel road prior to spring breakup; additional culverts may be placed after breakup as site-specific needs are further assessed with regulatory agencies.

2.4.4.4 Subsistence Access Ramps

The gravel roads would include a tundra access road turnout for subsistence activities with ramps located according to community input and vegetation type. The turnout would allow local residents to access the area for subsistence use. The design and locations of the tundra access road turnout would be finalized using community input and lessons learned from Greater Mooses

Tooth (GMT) 1 (previously CD6) and GMT2 (previously CD7) and would include using a gentler grade, designing subsistence access ramps to fan out at the bottom, and including a flat landing pad at the top of the ramp before connecting to the road.

2.4.5 Other Infrastructure and Utilities

2.4.5.1 Ice Pads

Project-specific ice pads would be used during construction to stage construction equipment and support construction activities. Ice pads would be used at the material source, to support bridge construction, to support pipeline tie-in pad construction, to support module mobilization along the Alpine/WNS multiyear ice road, and at other locations as needed near infrastructure. During drilling, an ice pad may also be constructed annually adjacent to the drillsite. The total acres of ice pads are summarized by alternative in Table 2.5-1.

2.4.5.2 Camps

Construction workers would be housed at the main camp located at CD1, an existing camp located at the Kuukpik pad (K-Pad) (near the intersection of the Nuiqsut Spur Road and CD5), a new temporary construction camp located at the material source or elsewhere close to the Project work area, or a combination of the three depending on availability. Housing of construction workers at existing camps in Nuiqsut (Arctic Wolf Camp and Kuukpik Hotel) is also possible; in the event construction workers are housed within Nuiqsut, commuting would be limited to only light-duty vehicles.

Temporary construction camps would be placed on an existing gravel pad, as space allows, and/or on single-season ice pads close to active construction work areas (e.g., near the ASRC Mine Site). Construction camps are typically self-sufficient leased facilities that are on-site for a short duration (typically ice pad season) and include their own power, water treatment, and waste and wastewater handling facilities.

During drilling, workers would be housed year-round in a mobile drill rig camp at CD4 or CD8, and/or at the CD1 main camp or an existing camp located on K-Pad. If used, a drill rig camp would be placed on an existing or proposed gravel pad as space and logistics allow or on a single-season ice pad if needed only in the winter months. Drilling camps are similar to construction camps but may remain in place longer and, if so, may be connected to the pad's power source.

Operations would be carried out by personnel housed at the CD1 main camp.

2.4.5.3 Power and Fiber-Optic Cables

Electrical power for the Project would be generated by the existing gas-fired-turbine power plant at the ACF and delivered using a power cable. The power cable would be used to power the drillsite including the drill rigs, except during facility maintenance. Fiber-optic and power cables would be suspended via messenger cable attached to the new and existing HSMs. Power and fiber-optic cables would connect to existing facilities at the ACF. The total miles of power and fiber-optic cables is summarized by alternative in Table 2.5-1. At pipeline crossings of gravel roads, fiber-optic and power cables may be installed in the tundra by trench. Trenches would be

dug in winter, and trenched materials would be temporarily sidecast onto plywood, plastic sheeting, or an ice pad adjacent to the trench. Excavated materials would be backfilled into the excavation once trenching is complete. Trenches would be 1 foot wide and approximately 5 feet deep. The total acres of temporary impacts to WOTUS due to trenching is summarized by alternative in Table 2.5-1.

During construction, prior to completion of the permanent power supply connection, portable generators fueled by ultra-low-sulfur diesel would provide temporary power at the drillsite. Portable diesel-fired generators would also be available to provide emergency backup power after completion of the permanent power supply connection. These generators would also be used during drilling if transient power loads are experienced.

2.4.5.4 Communication Tower

An 80-foot-tall self-supporting lattice communication tower would be constructed on the drillsite pad. The communication tower would be equipped with lights to meet applicable Federal Aviation Administration and Federal Communications Commission requirements. The lattice tower would avoid use of guy-wires. One additional temporary tower (approximately 25 feet tall) may be erected at the drillsite for the duration of the construction period (2 years); this tower would be pile-supported and may require guy-wire supports. Guy-wires would seasonally include devices to mitigate bird strikes, such as bird diverters. Bird diversion tactics may be installed, as practicable, given the equipment layout, potential for snow and ice loading, and associated concerns.

2.4.5.5 Fuel and Chemical Storage

The CD8 drillsite would have temporary tanks to support drilling operations and well completions, including brine tanks, cuttings and mud tanks, and drill rig diesel fuel tanks for emergency backup power built in as part of the drill rig structure. Production operations storage tanks at the drillsite would include chemical storage tanks that may contain any of the following, depending on operational needs: corrosion inhibitor, methanol, scale inhibitor, emulsion breaker, anti-foam, weathered crude, or diesel. Portable oil storage tanks to support well and pad operational activities and maintenance (i.e., well work and well testing) may be present on an as-needed basis.

CPAI would comply with local, State, and Federal oil pollution prevention requirements, including applicable USACE, State, and NSB mitigation measures and best management practices (BMPs) related to storage and use of fuels, hazardous substances, and waste. These include compliance with the *Alpine WNS Oil Discharge Prevention and Contingency Plan* (ODPCP) (CPAI 2025a) and *Alpine Spill Prevention, Control, and Countermeasure Plan* (SPCCP) (CPAI 2025b). Secondary containment for fuel and oil storage tanks would be sized as appropriate to container type and according to governing regulatory requirements in 18 AAC 75 and 40 CFR 112.

2.4.5.6 Water Sources and Uses

2.4.5.6.1 FRESHWATER

During construction, freshwater would be needed for domestic use at construction camps, construction and maintenance of ice roads and pads, hydrostatic testing, and dust suppression. During drilling, freshwater would be needed for domestic use at the drilling camp and for drilling activities (i.e., mud). During operations, freshwater would be used on an annual basis (primarily in the summer) for miscellaneous operational purposes (i.e., dust suppression, hydrostatic testing, and other oil and gas activities). No domestic use is anticipated at the drillsite during the Project operations.

Freshwater for domestic use during construction and drilling would be supplied from nearby permitted lakes, which are already permitted for existing Alpine operations (Figure 2.4-2). Some lakes have existing permanent intake structures (i.e., Lakes L9312 and L9313). Water would be trucked from the intake structure to the Project area and is accounted for in the traffic estimates in Table 2.5-2. Freshwater for construction of Project-specific ice roads and ice pads, hydrostatic testing, dust suppression, and drilling would be supplied from lakes permitted for existing operations (see Figure 2.4-2).

Annual freshwater use would be more than offset by the volume of water that is saved. The total gallons saved from replacement of a segment of the annual Alpine/WNS multiyear ice road with a gravel road is summarized in Table 2.5-1.

2.4.5.6.2 SEAWATER

Seawater piped from the ACF, which originates from CPAI's Kuparuk Seawater Treatment Plant, via the injection water pipeline would be used during drilling and operations. Seawater would be used for well stimulation during the drilling phase. If the injection water pipeline is not available, trucks would be used to transport the seawater for well stimulation. During operations, seawater would also be injected into the Narwhal reservoir to enhance oil recovery.

2.4.6 Waste

2.4.6.1 Wastewater

Sanitary wastes generated from construction and drilling camps would be hauled to an existing wastewater treatment facility. The wastewater hauling trips are summarized by alternative in Table 2.5-1. These trips are included in the total Project ground traffic detailed in Table 2.5-2.

Freshwater used for hydrostatic testing of the new CD8 pipelines would be discharged to the tundra following filtration and sampling to ensure compliance with water quality standards. Alternatively, the hydrostatic test water may be disposed of at an approved disposal well or beneficially reused for enhanced oil recovery.

2.4.6.2 Solid Waste

During construction, solid waste would be hauled off-site and disposed of in accordance with applicable regulations. Burnable waste would be incinerated at an approved facility (likely the ACF or Willow processing facility), and non-burnable waste would be recycled or transported to

the NSB landfill at Deadhorse. Hazardous and other solid waste associated with the Project would be managed under Alaska Department of Environmental Conservation and U.S. Environmental Protection Agency (EPA) regulations.

2.4.6.3 Drilling Waste

Drilling waste (i.e., drilling muds and cuttings) would be disposed of on-site through annular disposal (i.e., pumped down the well through the space between two casing strings) and/or stored in tanks and bins and transported to an approved disposal well such as an ACF Class I disposal well. Reserve pits would not be required or constructed. If there is a disruption to the disposal process, temporary lined storage cells may be used for a brief period while the disruption is resolved. Temporary lined storage cells would be built on the drillsite's gravel pad or on an adjacent ice pad using standard North Slope design. The size of the cell would be determined by the volume of drilling waste to be stored. Cells would be lined with reinforced geomembrane. When built on a gravel pad, the sides of the cell would be wooden timbers, and the bottom would be plywood with felt. When built on an ice pad, the sides of the cell would be ice berms, and the bottom would be an additional slab of ice. Both designs would comply with EPA requirements for temporary storage cells.

During operations, produced water would be processed at the ACF and reinjected to the subsurface through injection wells to maintain pressure in the reservoir and enhance oil recovery. Well work waste materials would be managed according to the *Alaska Waste Disposal and Reuse Guide* (CPAI and Hilcorp North Slope, LLC. 2021).

2.4.7 Material Sources

The total cubic yards of gravel fill, riprap, and sand slurry are summarized by alternative in Table 2.5-1. Gravel and sand for the Project would primarily originate from the existing ASRC Mine Site. Though this mine site is expected to have a more-than-sufficient volume of material for the Project, if needed, material may also be obtained from an existing open and permitted site in Kuparuk (Mine Sites F or C). Gravel is anticipated to be collected, hauled, and placed in a single winter season.

The ASRC Mine Site (approximately 1 mile east of and across the East Channel of the Colville River from the Project) would be accessed via the existing Alpine WNS multiyear ice road and new ice roads constructed for the CD8 Project. The ASRC Mine Site was permitted in 1997 (POA-1996-869) with a Phase 3 expansion area permitted in 2016 (POA-1996-869-M10). Material for the Project would be obtained from the Phase 3 expansion area, which is anticipated to contain up to 15 million cubic yards of sand and gravel over 430 acres.

Riprap (Class I and Class II) (needed in some locations to protect gravel infrastructure from erosion) would be sourced from a permitted mine in the Brooks Range near Galbraith Lake (POA-2014-00355) and trucked to the Project area using existing gravel and ice roads.

2.4.8 Barging of Materials

One Project-specific barge would be used to deliver bulk materials, such as VSMs, HSMs, pipeline pipe, and drillsite module(s), to the North Slope at Oliktok Dock during construction. To accommodate barge delivery and offload, CPAI may conduct screeding (i.e., redistributing and

contouring the existing marine sediments) in front of the dock face. Screeding in front of Oliktok Dock is a routine and permitted activity (POA-2020-00066-M1; approved September 2025).

From Oliktok, Project materials and module(s) offloaded from the barge would be staged at or near Oliktok Dock on an existing gravel pad until winter. The materials and module(s) would be transported first on existing gravel roads, then on the annual Alpine/WNS multiyear ice road, and finally on a Project-specific ice road connecting the Alpine/WNS multiyear ice road to the CD8 drillsite.

2.4.9 Erosion Control and Snow Removal

The Project would follow the *Alpine Storm Water Pollution Prevention Plan & Best Management Practices Plan* (SWPPP) (CPAI 2024) and *Alpine Facilities Erosion Control Plan* (CPAI 2021), which would be updated to encompass the CD8 facilities as needed. The SWPPP describes management of surface water drainage for the drill pad. The *Alpine Facilities Erosion Control Plan* contains procedures for operation, monitoring, and maintenance of various erosion control methods. The plan also contains snow removal and dust control measures. Snow removal would follow the Alpine snow removal plan outlined in the *Alpine Facilities Erosion Control Plan* (CPAI 2021). CPAI selects snow push areas annually based on avoiding areas of thermokarst, proximity to waterbodies, and evaluating the area based on previous years' activities. Gravel roads would be watered to minimize dust impacts on the tundra and maintain the integrity of the roads.

2.4.10 Drilling

The Project would use a drill rig approximately 165 feet tall at its highest point (the rig crown).

2.4.10.1 Extended Reach Drilling

ERD is directional drilling with very long horizontal wells, generally with a horizontal to vertical ration equal to or greater than 2:1. ERD is employed to reach a larger area from one surface location and to keep a production well in the target reservoir (the area of the reservoir targeted by the Project based on oil and gas leaseholds) for a longer distance in order to maximize productivity and resource recovery. All Project wells would be ERD based on the horizontal departure to vertical depth ratio. ERD limitations can be based on drilling equipment (lifting capacity, pump rate and/or pressure, drill string components, support infrastructure to operate) and well characteristics (well friction, well hole size, ultimate well length, circulating pressures, wellbore instability, physical limits to run and cement casing strings). The farther from the target reservoir, the longer the reach from the drillsite, and thus the lower the volume of oil that is recoverable. The State of Alaska considers the volume of recoverable resources when permitting oil and gas projects. Per Alaska Statutes (AS) 31.05.095, the waste of oil and gas in the state is prohibited.

The drill stadiums (i.e., the area within reach of the drillsite) for each drillsite are depicted in Figure 2.2-2c.

2.4.10.2 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 and injection 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.

Hydraulic fracturing would only be used during the initial stage of drilling to stimulate flows at the production and injection wells. Well stimulation for CD8 would occur within the target reservoir approximately 4,400 feet below the surface. Though ERD would create very long horizontal wells, well stimulation would occur in only 150 to 200 vertical feet within the reservoir, which is isolated from the surface by 4,400 feet of impermeable rock (i.e., shales, siltstones, mudstones). Thus, rock above the reservoir would not be hydraulically fractured.

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 include stringent well construction requirements that are designed to protect underground sources of water and ensure mechanical integrity during production and injection operations. These regulations also require the disclosure of chemicals used in the hydraulic fracturing process, including the anticipated volume of fluids to be used in the operation. To ensure compliance with regulations, every operator is required to install pressure measurement devices on every well and monitor those devices daily. If a measurement device indicates a compromise of mechanical integrity, the operator is required to shut-in the well immediately and to notify the AOGCC. In addition to these measurement devices, the AOGCC requires periodic mechanical integrity tests on all wells. In more than 50 years of oil and gas production, Alaska has yet to suffer a single documented instance of subsurface damage to an underground source of drinking water. As long as each well is properly constructed and its mechanical integrity is maintained, hydraulic fracturing should have no potential to damage any freshwater.

Other agencies (e.g., EPA, Alaska Department of Environmental Conservation, ADNR) maintain some regulatory oversight over hydraulic fracturing, although this is primarily limited to surface activities associated with the equipment and materials used in the hydraulic fracturing process.

2.4.11 Spill Prevention and Response

CPAI would implement numerous spill prevention and response planning measures to help prevent spills and minimize damage to human health and the environment in the unlikely event a spill occurs. Spill prevention measures include the following:

- Specific design features to detect and contain leaks (secondary containment of hydrocarbon-based and other hazardous materials)
- Systems to notify operators of potential leaks

- Procedures to inspect and maintain the pipelines and other infrastructure
- Adherence to State and Federal regulations regarding use and storage of hazardous materials

Response planning measures include the following:

- Developing numerous response planning documents for a variety of spill scenarios
- Providing necessary equipment to prevent and respond to spills
- Ensuring personnel are trained and knowledgeable about the procedures to respond efficiently and effectively to oil spills and inadvertent releases

2.4.11.1 Spill Prevention

CPAI would follow the WNS ODPCP (CPAI 2025a) and Alpine SPCCP (CPAI 2025b) and would amend the plans to include CD8, as applicable, based on State and Federal regulatory requirements. Spill prevention and response measures that would be used during construction, drilling, and operations would be outlined in the updated ODPCP and the SPCCP. The intent of the ODPCP and SPCCP is to demonstrate CPAI's capability to prevent oil spills from entering the water or land and to ensure rapid response in the event a spill occurs. The ODPCP would comply with applicable State of Alaska requirements (AS 46.04.030; 18 AAC 75) for spill prevention and Federal EPA regulations in 40 CFR 112, D (Facility Response Plans). The SPCCP would comply with the Federal EPA regulations contained in 40 CFR 112.

CPAI would design and construct pipelines to comply with State, Federal, and local regulations. Pipelines would be constructed of high-strength steel and would have wall thicknesses in compliance with design code regulatory requirements. Pipeline welds would be validated using nondestructive examination (i.e., radiography or ultrasonic) during pipeline construction to ensure their integrity, and pipelines would be hydrostatically tested prior to operation. The production fluids and water injection pipelines would be fully capable of accommodating pigs for cleaning and corrosion inspection.

There would be an increased potential for pipeline spills where pipelines cross under roads due to corrosion of the buried portion of the pipelines (see Figure 2.3-2). (All Project design drawings and cross sections are in CPAI's CWA Section 404 permit application, which is available on the Project website: www.cd8eis.com.) The likelihood of corrosion occurring would be reduced through design and monitoring. CPAI would maintain corrosion control and inspection programs that include ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss deflection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared technology. The inspection programs are American Petroleum Institute Standard 570–based programs that focus inspection efforts on areas with the greatest potential for spills.

CPAI would follow requirements for routine pipeline visual inspection in accordance with the WNS ODPCP and Alpine SPCCP. Consistent with these plans and as required by 40 CFR 112.9(d)(4)(ii), CPAI would conduct visual inspections of pipelines on a periodic and regular schedule, weather and safety permitting. Visual inspection may be ground-based occurring from the gravel road or from the air by fixed-wing aircraft. Aerial visual inspection can be aided by infrared technology as appropriate. Infrared technology, employed either aerially using aircraft or from the ground using handheld systems, is a leak detection method using the temperature

"signature" that results when warm fluid leaks. Infrared technology can detect warm spots in low-light conditions or when other circumstances such as light fog or drifted snow limit visibility. Infrared technology also can identify trouble spots along the pipeline, such as damaged insulation, before a problem occurs.

Fuel and oil storage would comply with local, State, and Federal oil pollution prevention requirements, according to the ODPCP and SPCCP. Secondary containment for fuel and oil storage tanks would be sized, as appropriate, to container type and according to the requirements in 18 AAC 75 and 40 CFR 112.

CPAI provides regular training for its employees and contractors on the importance of preventing spills of oil or hazardous substances. CPAI provides new employee orientation, annual environmental training seminars, and appropriate certification classes for specific issues, covering spill prevention. CPAI employees and contractors participate in frequent safety meetings, which address spill prevention, as appropriate.

2.4.11.2 Spill Response

CPAI is a member of the oil spill response cooperative Alaska Clean Seas (ACS), which would serve as the primary response action contractor in the event of a spill. ACS has established tactics for containing and recovering spills from tundra and water during all seasons. The tactics, equipment, and personnel used to respond to spills are described in detail in the *ACS Technical Manual, Volume 1, Tactics Descriptions* (ACS 2024). Tactics address such issues as mechanical recovery of lightly oiled snow, use of portable skimmers, and use of booms.

Through the revised ODPCP, 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 (ACS) and U.S. Coast Guard–classified oil spill removal organization would serve as CPAI's primary response action contractors and would provide trained personnel to manage all stages of a spill response, including containment, recovery, and cleanup.

The threat to waterbodies from a possible pipeline spill would be minimized by quickly intercepting, containing, and recovering spilled oil near the waterway-pipeline crossing points. The road would be used for access and staging for spill response. Spill response equipment would be pre-staged at strategic locations as outlined in the ODPCP for an initial response. This strategy would facilitate the rapid deployment of equipment by personnel to contain and recover spilled oil, reducing the overall affected area.

When conditions allow for access without jeopardizing personnel safety, mechanical responses would be used as outlined in the ODPCP (CPAI 2025a). Pre-staged containment booms would be placed at strategic locations using boats and/or helicopters to facilitate a rapid response. If a spill occurs, spill response activity could include watercraft (e.g., airboats, jetboats) use to access affected areas.

CPAI currently pre-stages and pre-deploys equipment throughout the Alpine and GMT developments, including spill response equipment and a pre-deployed boom. Response equipment is centrally located for quick retrieval and deployment. Figure 2.4-3 shows the locations of pre-staged and pre-deployed spill response equipment. Dedicated oil spill response

equipment (e.g., boom, anchors, skimmers, hoses, pumps, portable storage) would be pre-staged and stored in connexes at dedicated storage locations near the pipelines. Diversionary or exclusion booms may also be pre-deployed in waterbodies near the pipeline each summer. At each pre-staging site, boom sections and anchors would be staged on the shoreline in a manner that optimizes the boom's intended use for containment and recovery. Response equipment would be maintained in such a manner that it could be rapidly deployed and in a condition for immediate use. CPAI would routinely inspect and test on-site response equipment. CPAI's spill response contractor would also perform routine inspection and maintenance of all response equipment.

During an approximately 2- to 3-week period in both the spring and fall, breakup and freeze-up conditions may create unstable access conditions off-road or in river channels for personnel and limit the deployment of mechanical cleanup equipment. As described in CPAI's ODPCP (CPAI 2025a:3-29) and the ACS Technical Manual (ACS 2024:Tactic L-6), on-water response effectiveness in broken ice conditions may be reduced by 100% during spring break up and by 80% during fall freeze up. Over-ice flow and high water in the Colville River during spring breakup may reduce response effectiveness by approximately 30% for a 12 to 15 day period. In general, temperature and visibility do not present a significant impact to response effectiveness, though short periods of high winds and gusts can occur, reducing response effectiveness by approximately 10% to 15%.

Although primary access for spill response would be via the gravel road, if a spill occurs under spring or fall conditions, CPAI could request approval to conduct in-situ burning (burning the oil on the surface where it was spilled) from the Federal on-scene coordinator and State on-scene coordinator. In-situ burning must be approved by State and Federal on-scene coordinators, who would use the *Alaska Inland Area On-Scene Coordinator In Situ Burning Checklist* (ADEC 2022) to document and facilitate the decision-making process, including the potential burning's proximity to resident populations (CPAI 2025a).

The CPAI Incident Management Team participates in regularly scheduled training programs and conducts spill response exercises in coordination with Federal, State, and local agencies. Employees are encouraged to participate in the North Slope Spill Response Team. Team members receive regularly scheduled spill response training to ensure immediate availability of skilled spill responders on the North Slope.

CPAI's WNS emergency response plans include a community communication plan to key individuals in Nuiqsut and the NSB. The WNS Emergency Stakeholder Outreach Plan (CPAI 2025c) addresses ways to coordinate activities and information with stakeholder groups on the North Slope such as Tribes, municipalities, and counties, as well as nongovernmental stakeholders such as property owners and Native corporations. In 2025, CPAI donated an office trailer for use as the designated Nuiqsut Emergency Response Center, where spill response coordination and communication with the community can be centered. See the health effect category (HEC) 1 section in Section 3.6.1.2.2 (Public Health and Safety, Alternative B) for more on existing emergency response systems in Nuiqsut.

2.4.12 Abandonment and Reclamation

The potential abandonment and reclamation of Project facilities would be determined at or before the time of site closure and would be subject to input from several Federal, State, and

local authorities as well as private landowners. Other stakeholders would also provide comment on the abandonment and reclamation plan. Controlling factors may include the following:

- State of Alaska easement
- AOGCC requirements for plugging and abandonment of wells
- NSB Municipal Code Title 19
- Private agreements addressing private lands
- USACE Section 404 permit conditions

For the purposes of this EIS, the impacts analysis assumes gravel infrastructure would be permanent and would not be removed. Although the design life of the Project is 30 years, the Trans-Alaska Pipeline System (TAPS) and many of the Kuparuk facilities have been operating for nearly 50 years and could continue to operate for 10 or more years, making the assumption of permanent gravel placement reasonable. The analysis assumes operational activity would cease after 30 years, but the gravel would remain in place. Depending on the extent of operational cessation required by the above-listed factors, road and air traffic levels may increase temporarily but would likely be at lower intensity levels and for shorter durations than levels observed during construction.

2.4.13 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 facilities. The schedule presented in this EIS is an estimated schedule that is dependent on subsequent detailed Project planning and a variety of contingencies. Subject to those qualifications, Project construction would occur over approximately 2 years (Figure 2.4-4). First oil would likely occur between the fourth quarter (Q4) of Year 2 of construction and the Q4 of Year 3. Operations would run to the end of the Project's field life so long as the ACF continues operating. For the purposes of analysis, the life of the Project is estimated to be 30 years.

2.4.13.1 Construction Phase

Gravel mining and placement would be conducted almost exclusively in the winter. A typical construction season begins with prepacking of snow in November, or as soon as conditions allow, with ice road construction occurring primarily in December and January to allow for use by February 1. The schedule anticipates typical weather conditions and is subject to change based on annual field conditions.

Gravel facilities would be built by constructing an ice road followed by laying gravel directly on the tundra. Gravel laying would consist of surveying and staking the gravel footprint boundaries. Snow would then be removed from the site, leaving a thin layer of snow on the tundra; the tundra surface would not be disturbed. Gravel would be placed and spread within the staked footprint in a series of lifts, which would then be compacted. Subsequent lifts would be installed and compacted in the same way until the road or pad achieves its design elevation. Gravel would be transported to the site using B-70 tractors and maxi-haul trucks.

Following gravel placement, gravel conditioning and compaction (seasoning) would occur in the summer months. Following gravel conditioning, gravel pads would continue to be prepared for on-pad modules and pipelines, including excavation and recompaction of gravel and installation of module support piles and casings.

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 in the winter from ice roads and ice pads. Erosion protection (riprap) would be installed in the winter season, prior to spring breakup. Gravel conditioning and compaction occur in the summer (typically July to October) to expose, thaw, and dewater the deeper layers and recompact the gravel.

Once gravel pads are completed, on-pad facilities would be constructed. The drillsite modules would be delivered by barge as early as summer of Year 1. During the summer open-water season before barge arrival, screeding of the area in front of Oliktok Dock would occur around mid-July once the risk of ice encroachment has passed. Once offloaded, modules would be transported to CD8 via a combination of gravel roads and ice roads during the following winter.

Pipelines would be installed in the winter from ice roads. First, VSM locations would be surveyed and drilled. In locations where new VSMs are required, a VSM and HSM would be assembled and installed using a sand slurry fill. Engineering design would determine which method would be used for any given new VSM. The pipelines would be strung, welded, tested, and then installed in pipe saddles on top of the HSMs.

2.4.13.2 Drilling Phase

Drilling would begin following drill rig mobilization to the drillsite. Drilling would be conducted year-round and would progress at a rate of approximately 25 to 50 days per well. The initial phase of drilling is expected to take approximately 2.5 years, with subsequent drilling occurring for up to 2.5 additional years based on reservoir performance and executional efficiency. For the purposes of analysis, the drilling phase includes both phases of drilling for a drilling period of approximately 5 years. It is assumed that the CD8 wells would be drilled consecutively; however, CPAI would determine the timing of drilling based on drilling results, economics, rig availability, and any other relevant factors that arise during the drilling program.

2.4.13.3 Operations Phase

Once sustained production to the ACF has been achieved, typical operations would consist of well operations, production operations, and transportation of produced hydrocarbons. Sustained production is expected to begin between the Q4 of Year 2 and the Q4 of Year 3. Well maintenance operations and routine drilling activities would occur intermittently throughout the life of the Project. CPAI operations and maintenance practices similar to those used at Alpine would be implemented.

2.4.14 Design Features and Mitigation

CPAI designed the Project with features to minimize and avoid impacts. These measures and other mitigation are detailed in EIS Appendix E (Mitigation Measures).

2.4.15 Short-Term and Permanent Impacts to Waters of the United States

The Project would result in unavoidable short-term and permanent impacts to jurisdictional WOTUS, including wetlands (Table 2.5-1). In addition, the Project would include placement of structures (culverts and pilings) below the OHWM to construct waterbody crossings (see Section 2.4.4.3 [Waterbody Crossings]).

Trenching would be used to bury power and communications cables at pipeline road crossings and where cables enter or exit gravel pads. The temporary sidecast of materials is not included as a temporary discharge because trenched materials would be sidecast onto plywood, plastic sheeting, or an ice pad adjacent to the trench to avoid a discharge of fill material into WOTUS. Sidecasting materials would not change the bottom elevation of WOTUS, convert a WOTUS to upland, or result in the loss of wetland function.

2.5 COMPARISON OF ACTION ALTERNATIVES

Tables 2.5-1 through 2.5-3 and Figure 2.3-1 provide a comparison of all action alternatives.

Table 2.5-1. Comparison of Action Alternatives

Project Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Total permanent footprint	67.3 acres: • 15.3 acres drillsite gravel pad • 0.5 acre pipeline tie-in gravel pad • 51.1 acres gravel access road • 0.4 acre subsistence access turnout • <0.1 acre pipeline VSMs	46.9 acres: • 15.0 acres drillsite gravel pad • 0.5 acre pipeline tie-in gravel pad • 30.9 acres gravel access road • 0.4 acre subsistence access turnout • <0.1 acre pipeline VSMs	62.3 acres: • 15.6 acres drillsite gravel pad • 0.5 acre pipeline tie-in gravel pad • 45.8 acres gravel access road • 0.4 acre subsistence access turnout • <0.1 acre pipeline VSMs
Drillsite (gravel pad)	15.3 acres 2.1 miles from Nuiqsut east-northeast 1.0 mile west of the East Channel of the Colville River 0.5 mile east-northeast of the Niġliq Channel of the Colville River	15.0 acres 3.1 miles from Nuiqsut northeast 1.2 miles west of the East Channel of the Colville River 2.0 miles east of the Niġliq Channel of the Colville River	15.6 acres 2.5 miles from Nuiqsut northeast 2.5 miles west of the East Channel of the Colville River 1.1 mile east of the Niġliq Channel of the Colville River
Pipeline tie-in (gravel pad)	0.5 acre	0.5 acre	0.5 acre
Gravel access road	6.1 miles 51.1 acres 1 bridged road crossing of the existing pipeline corridor	3.6 miles 30.9 acres 1 bridged road crossing of the existing pipeline corridor	5.0 miles 45.8 acres 1 bridged road crossing of the existing pipeline corridor
Waterbody crossings	400-foot multispan bridge at Lake L9324 5 piers below the OHWM 20 piles below the OHWM Pile diameter: 48 to 66 inches Total area below the OHWM: 475 square feet 4 culvert or culvert battery water track crossings	400-foot multispan bridge at Lake L9324 same as Alternative B 5 culvert or culvert battery water track crossings	400-foot multispan bridge at Lake L9324 same as Alternative B 60-foot bridge at Lake M9606 drainage 0 piers below the OHWM 5 culvert or culvert battery water track crossings
Ice pad (Project-specific)	201.9 acres: • Year 0/1: 115.2 acres • Year 1/2: 61.7 acres • Years 2/3–6/7: 5.0 acres per year (25 acres total)	196.1 acres: • Year 0/1: 111.0 acres • Year 1/2: 60.1 acres • Years 2/3–6/7: 5.0 acres per year (25 acres total)	211.7 acres: • Year 0/1: 122.5 acres • Year 1/2: 64.2 acres • Years 2/3–6/7: 5.0 acres per year (25 acres total)

Project Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Ice road (Project-specific)	197.0 acres: • Year 0/1: 72.3 acres • Year 1/2: 124.6 acres 27.2 miles: • Year 0/1: 14.0 miles • Year 1/2: 13.2 miles	159.3 acres: • Year 0/1: 60.5 acres • Year 1/2: 98.8 acres 22.5 miles: • Year 0/1: 11.3 miles • Year 1/2: 11.2 miles	179.4 acres: • Year 0/1: 61.4 acres • Year 1/2: 118.0 acres 24.4 miles: • Year 0/1: 11.9 miles • Year 1/2: 12.5 miles
Change to Alpine WNS ice road	Reduction of 6.9 miles (29.3 acres) per year	Reduction of 4.4 miles (18.7 acres) per year	Reduction of 6.3 miles (26.7 acres) per year
Pipelines	Miles of pipeline: • 7.6 miles produced oil pipeline (CD8 to pipeline tie-in pad) • 6.8 miles injection water pipeline (CD8 to CD4) • 7.1 miles MI/GI pipeline (CD8 to Alpine) Pipeline on new VSMs: 2.5 miles Buried crossings of new pipeline: 2	Miles of pipeline: • 5.1 miles produced oil pipeline (CD8 to pipeline tie-in pad) • 4.4 miles injection water pipeline (CD8 to CD4) • 4.6 miles MI/GI pipeline (CD8 to Alpine) Pipeline on new VSMs: 1.8 miles Buried crossing of new pipeline: 1	Miles of pipeline: • 6.4 miles produced oil pipeline (CD8 to pipeline tie-in pad) • 5.7 miles injection water pipeline (CD8 to CD4) • 5.9 miles MI/GI pipeline (CD8 to Alpine) Pipeline on new VSMs: 3.1 miles Buried crossing of new pipeline: 1
New VSMs	350 new VSMs (total footprint <0.1 acre)	275 total	400 total
Power and fiber-optic cables	10.8 miles	8.3 miles	9.6 miles
Ground traffic	387,076 trips See Table 2.5-2 for additional detail	375,597 trips See Table 2.5-2 for additional detail	391,936 trips See Table 2.5-2 for additional detail
Helicopter traffic	671 flights See Table 2.5-3 for additional detail	Same as Alternative B	Same as Alternative B
Fixed-wing air traffic	144 flights See Table 2.5-3 for additional detail	Same as Alternative B	Same as Alternative B
Barging	1 barge trip to Oliktok Dock (Year 1) Supported by 1 tugboat, 8 support vessels	Same as Alternative B	Same as Alternative B
Fill quantity	746,100 cubic yards of gravel 1,400 cubic yards sand 12,580 cubic yards riprap	529,100 cubic yards of gravel 1,100 cubic yards sand 10,880 cubic yards riprap	776,100 cubic yards of gravel 1,600 cubic yards sand 19,980 cubic yards riprap

Project Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Short-term impacts to WOTUS	402.7 acres: • <0.1 acre cable and fiber-optic trenching • 190 acres ice road (Project-specific) • 201.9 acres ice pad (Project-specific): ○ Year 0/1: 115.2 acres ○ Year 1/2: 61.7 acres	346.8 acres: • <0.1 acre cable and fiber-optic trenching • 156 acres ice road (Project-specific) • 180.3 acres ice pad (Project-specific): ○ Year 0/1: 76.0 acres ○ Year 1/2: 104.3 acres	411 acres: • <0.1 acre cable and fiber-optic trenching • 175 acres ice road (Project-specific) • 213.9 acres ice pad (Project-specific): ○ Year 0/1: 89.2 acres ○ Year 1/2: 124.7 acres
Permanent impacts to and fill in WOTUS	65.9 acres fill: • 15.3 acres drillsite • 0.5 acre tie-in pad • 49.7 acres gravel road • 0.4 acre subsistence turnout • <0.1 acre pipeline VSMs 1,400 cubic yards sand slurry fill (pipeline VSMs) 12,580 cubic yards riprap fill: • 1,000 cubic yards drillsite • 280 cubic yards tie-in pad • 11,300 cubic yards gravel road 746,100 cubic yards gravel fill: • 218,000 cubic yards drillsite • 7,100 cubic yards tie-in pad • 517,000 cubic yards gravel road • 4,000 cubic yards subsistence turnout	45.5 acres fill: • 15.0 acres drillsite • 0.5 acre tie-in pad • 29.5 acres gravel road • 0.4 acre subsistence turnout • <0.1 acre pipeline VSMs 1,100 cubic yards sand slurry fill (pipeline VSMs) 10,880 cubic yards riprap fill: • 600 cubic yards drillsite • 280 cubic yards tie-in pad • 10,000 cubic yards gravel road 529,100 cubic yards gravel fill: • 201,000 cubic yards drillsite • 7,100 cubic yards tie-in pad • 317,000 cubic yards gravel road • 4,000 cubic yards subsistence turnout	60.9 acres fill: • 15.5 acres drillsite • 0.6 acre tie-in pad • 44.4 acres gravel road • 0.4 acre subsistence turnout • <0.1 acre pipeline VSMs 1,600 cubic yards sand slurry fill (pipeline VSMs) 19,880 cubic yards riprap fill: • 2,100 cubic yards drillsite • 280 cubic yards tie-in pad • 17,500 cubic yards gravel road 776,100 cubic yards gravel fill: • 265,000 cubic yards drillsite • 7,100 cubic yards tie-in pad • 500,000 cubic yards gravel road • 4,000 cubic yards subsistence turnout
Workforce	Construction • Year 0: 20 seasonal peak, 0 annual average • Year 1: 525 seasonal peak 50 annual average • Year 2: 400 seasonal peak 280 annual average Drilling • Year 2: 195 annual average* • Year 3 to winter of Year 6/7: 120 annual average* Operations • Winter of Year 2/3 to Year 30: Up to 4	Same as Alternative B	Same as Alternative B
Production	93 MMBO	67 MMBO	83 MMBO

Project Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Communication tower	1 permanent tower up to 80 feet high (unguyed) 1 temporary tower with guy-wires	Same as Alternative B	Same as Alternative B
Lighting	Drill pad includes high-mast lights Communication tower with lights	Same as Alternative B	Same as Alternative B
Water use	196.3 million gallons: • 120.4 million gallons construction • 49.8 million gallons drilling • 26.1 million gallons operations 6.9 million gallons per year saved from shorter Alpine WNS ice road	184.8 million gallons: • 108.9 million gallons construction • 49.8 million gallons drilling • 26.1 million gallons operations 4.4 million gallons per year saved from shorter Alpine WNS ice road	196.7 million gallons: • 120.8 million gallons construction • 49.8 million gallons drilling • 26.1 million gallons operations 6.3 million gallons per year saved from shorter Alpine WNS ice road
Project duration	30 years • 2 years construction • Up to 5 years of drilling • 28 years operation (concurrent with drilling)	Same as Alternative B	Same as Alternative B

* 120 people on shift at a time.

Table 2.5-2. Ground Traffic for Action Alternatives (number of trips)

Year	Alternative B – Applicant's Proposed Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Year 0 (fall)	714	714	714
Year 0/1 (winter)	71,613	64,981	75,098
Year 1 (spring)	15,314	12,612	16,578
Year 1 (summer)	2,145	1,662	2,256
Year 1 (fall)	1,050	1,050	1,050
Year 1/2 (winter)	65,714	65,714	65,714
Year 2 (spring)	26,732	26,732	26,732
Year 2 (summer)	12,972	12,972	12,972
Year 2 (fall)	5,554	5,554	5,554
Year 2/3 (winter)	10,756	10,756	10,756
Year 3 (spring)	5,378	5,378	5,378
Year 3 (summer)	10,756	10,756	10,756

Year	Alternative B – Applicant's Proposed Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Year 3 (fall)	5,378	5,378	5,378
Year 3/4 (winter)	10,756	10,756	10,756
Year 4 (spring)	5,378	5,378	5,378
Year 4 (summer)	10,756	10,756	10,756
Year 4 (fall)	5,378	5,378	5,378
Year 4/5 (winter)	10,756	10,756	10,756
Year 5 (spring)	5,378	5,378	5,378
Year 5 (summer)	10,756	10,756	10,756
Year 5 (fall)	5,378	5,378	5,378
Year 5/6 (winter)	10,756	10,756	10,756
Year 6 (spring)	5,378	5,378	5,378
Year 6 (summer)	10,756	10,756	10,756
Year 6 (fall)	5,378	5,378	5,378
Year 6/7 (winter)	10,756	10,756	10,756
Year 7 (spring)	320	320	320
Year 7 (summer)	640	640	640
Year 7 (fall)	320	320	320
Year 7/8 to Year 30 (annual winter)	640	640	640
Year 8 to Year 30 (annual spring)	320	320	320
Year 8 to Year 30 (annual summer)	640	640	640
Year 8 to Year 30 (annual fall)	320	320	320
Total	**387,076**	**375,597**	**391,936**

Note: Ground traffic includes buses, light commercial trucks, short-haul trucks, passenger trucks, gravel hauling operations, and other miscellaneous vehicles.
Winter = December, January, February, March; spring = April, May; Summer = June, July, August, September; fall = October, November

Table 2.5-3. Air Traffic for all Action Alternatives (number of trips)

Year	Helicopter Traffic	Fixed-Wing Traffic	Total Air Traffic
Year 0 (fall)	16	4	20
Year 0/1 (winter)	0	38	38
Year 1 (spring)	20	18	38
Year 1 (summer)	100	8	108
Year 1 (fall)	0	4	4
Year 1/2 (winter)	0	34	34
Year 2 (spring)	14	18	32
Year 2 (summer)	101	16	117
Year 2 (fall)	0	4	4
Year 2/3 (winter)	0	0	0
Year 3 to Year 30 (annual spring)	4	0	4
Year 3 to Year 30 (annual summer)	11	0	11
Year 3 to Year 30 (annual fall)	0	0	0
Year 3/4 to Year 30 (annual winter)	0	0	0
Total	**671**	**144**	**815**

* Fixed-wing aircraft includes C-130, DC-6, Twin Otter/CASA, Q400, Cessna, or other similar small aircraft.
Winter = December, January, February, March; spring = April, May; Summer = June, July, August, September; fall = October, November.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ANALYSIS METHODS

This chapter describes the existing condition of resources and uses in the Project area and the effects of the alternatives on those resources and uses. The affected environment for each resource describes the past and present actions that have contributed to the environmental baseline and the reasonably foreseeable future (RFF) actions and trends that will contribute to the baseline under any alternative, including the No Action Alternative. Impacts are those changes to the human environment from the Project that are reasonably foreseeable and have a reasonably close causal relationship to the Project (33 CFR 333.61[d]). Impacts include those changes that occur at the same time and place as the Project and those changes that may occur later in time or are further removed in distance from the Project but are still reasonably foreseeable.

This chapter was developed using the best available data for each resource. Numerous other NEPA documents evaluate oil and gas projects on the North Slope with similar types of actions as CD8. This EIS incorporates several of those documents by reference, as follows, to the extent that they still represent the best available data:

- 2004 *Alpine Satellite Development Plan Final Environmental Impact Statement* (Bureau of Land Management [BLM] 2004a)
- 2012 *Point Thomson Project EIS Final Environmental Impact Statement* (USACE 2012)
- 2015 *Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project* (BLM 2015)
- 2018 *Nanushuk Project Final Environmental Impact Statement* (Nanushuk EIS) (now called the Pikka Project) (USACE 2018)
- 2018 *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project, Final Supplemental Environmental Impact Statement* (GMT 2 Supplemental Environmental Impact Statement [SEIS]) (BLM 2018)
- 2023 *Willow Master Development Plan Supplemental Environmental Impact Statement* (Willow SEIS) (BLM 2023)

The scope of the EIS analysis is described in Section 1.3 (Scope of Analysis). The spatial extent of the analysis area for each resource is described in each resource section in Chapter 3. The analysis is commensurate with the potential for resources to experience significant impacts. Per 33 CFR 333.23(b), the EIS is concise and focused on significant impacts. This EIS discusses impacts in proportion to their significance and has only a brief discussion of other-than-significant issues. Issues considered and eliminated from detailed analysis are described in Section 1.8 (Scoping and Issue Identification) and in Appendix D (Issues Dismissed from Detailed Analysis).

3.1.1 Past and Present Actions

Past and present actions are part of the existing conditions of the affected environment (also referred to as the environmental baseline) for resources analyzed in Chapter 3. West of the Colville River, these actions include existing oil and gas infrastructure (e.g., gravel and ice roads, pipelines, processing facilities) in the Alpine, GMT, and Willow oil fields (Figure 3.1-1; all EIS figures are in EIS Appendix A) (see Section 3.1.1.1), which are regularly serviced by aircraft and ground traffic (Table 3.1-1). East of the Colville River, additional development occurs at the ASRC Mine Site; and at the Pikka, Nuna, Oooguruk, and Mustang oil and gas developments (see Section 3.1.1.2). Further east, the Kuparuk oil field includes similar but more extensive development, with existing mine sites, airstrips, reservoirs, a dock (Oliktok Dock), and a seawater treatment facility. The Kuparuk oil field experiences more ground and air traffic and ground traffic travels at higher speeds than the developments west of the Colville River. There are several buried HDD pipeline crossings of the Colville River just north of the ASRC Mine Site (see Figure 3.1.1). This is also the location of the Alpine/WNS multiyear ice bridge across the Colville River and ice road linking Alpine to Kuparuk (see Figure 3.1.1).

Exploration activities by a variety of entities occur throughout the North Slope. Exploration activities typically include construction and use of ice roads and pads (and sometimes ice airstrips), heavy equipment operation, traffic, water withdrawal, exploration well drilling, and seismic surveys.

Other past and present actions in the Project area are subsistence and research (not associated with oil and gas activities), which contribute additional vehicle, boat, air, foot, and off-road vehicle traffic.

The climate is warming across the North Slope, and changing Arctic conditions are part of the existing condition of the affected environment for all resources analyzed in Chapter 3. Existing observed climate trends are detailed in Section 3.1.1.3 (Changing Arctic Conditions) and considered for all resources analyzed in the EIS.

RFF actions and trends in the Project area are described in Section 3.1.2.

3.1.1.1 West of the Colville River

The community of Nuiqsut supports approximately 492 to 616 residents, depending on the data source[3] (NSB 2022; U.S. Census Bureau [USCB] 2024a, 2024b; described in Section 3.6 [Public Health and Safety]). The community has an airstrip, roads within the community, a power plant, and other infrastructure. The community is not connected to the Alaska road system by gravel road; although, the community can use the annual Alpine/WNS multiyear ice bridge across the Colville River (see Section 3.1.1.1.1 [Alpine Development]) and the annual Alpine/WNS multiyear ice road to connect to Kuparuk, Prudhoe Bay, and the Alaska road system in the winter. Seasonal snow trails and roads occur across the North Slope for community access (NSB 2018).

[3] Because of the small size of many NSB communities, changes in how the USCB counts nonresident workers on the North Slope, and low participation rates in NSB socioeconomic surveys, demographic data for the NSB and its small communities are limited and inconsistent between different data sources, such as USCB data and NSB data. The EIS analysis relied on both USCB data and NSB demographic survey data where available.

The area surrounding Nuiqsut on the west side of the Colville River is a mixture of undeveloped land and land leased for oil and gas development. Most of the land in this area is within the National Petroleum Reserve in Alaska (NPR-A) (see Section 3.1.1.1.2).

3.1.1.1.1 ALPINE DEVELOPMENT

The Alpine project, consisting of the CD1 drillsite, the ACF and airstrip, the CD2 drillsite, a connecting gravel road between the two drillsites, and associated pipelines and utilities, began producing oil in 2000–2001 (see Figure 3.1-1). The 2004 *Alpine Satellite Development Plan Record of Decision* (BLM 2004b) approved five additional drillsites: CD3 through CD7. CD3 and CD4 began producing oil in 2006, and CD5 began producing oil in 2015.

CD1 through CD5 are located in the CRU, which consists of State of Alaska oil and gas leases, ASRC oil and gas leases, jointly owned State and ASRC oil and gas leases, and BLM oil and gas leases. The CRU is jointly managed by the State, ASRC, and BLM under the CRU agreement (ADNR 2000).

CD6 and CD7, which are located on Federal lands (see Section 3.1.1.1.2 [NPR-A]), were initially approved for construction under the Alpine ROD (BLM 2004b). However, before construction began, CPAI determined that the drillsites would produce oil and gas from a different reservoir than the one that supplies CD1 through CD5. In 2008, BLM approved the formation of a new unit, the GMT Unit (GMTU), and CD6 and CD7 became known as GMT1 and GMT2, respectively (see Figure 3.1-1).

BLM issued the ROD for GMT1 in 2015 (BLM 2015) and a joint ROD and permit evaluation for GMT2 in 2018 (BLM and USACE 2018). Oil production began at GMT1 in 2018 and at GMT2 in 2021, and is expected to peak at 25,000 to 30,000 barrels of oil per day, respectively, for each project.

As part of the operation of Alpine, CPAI maintains the Alpine/WNS multiyear ice road and ice bridge to connect Alpine to the gravel road system at Kuparuk. See Section 3.1.1.1.3 (Air and Ground Traffic) for a summary of the existing use of this system.

In 2016, CPAI applied to expand the CRU to include 21 joint State/ASRC leases, later termed the 5th Expansion Area, south of the existing unit. Hydrocarbons were discovered in 2008 by Brooks Range Petroleum Corporation through three exploration wells (Tofkat 1, 1A, and 1B) in the eastern portion of the leases. The ADNR and ASRC approved the expansion in August 2017. During the 2017–2018 winter season, CPAI drilled the Putu 2 and Putu 2A wells from an ice pad connected to the Alpine/WNS multiyear ice road and ice bridge. Both targeted the Narwhal reservoir and confirmed significant thickness and quality. The wells were later plugged and abandoned, and CPAI subsequently announced the Narwhal discovery.

3.1.1.1.2 NATIONAL PETROLEUM RESERVE IN ALASKA

The NPR-A is owned by the Federal government and has been under the administration of BLM since 1976. The first leases for oil and gas in this area were released in 1981 and 1984, though interest in the area peaked after the discovery of the Alpine oil field in 2016 (DeSantis and Ryan 2025). Projects in the NPR-A are subject to lease stipulations and require operating procedures described in the *National Petroleum Reserve in Alaska Integrated Activity Plan Record of Decision* (BLM 2022). These stipulations and procedures direct where and how oil and gas

development may occur within the NPR-A and provide context for past and present actions west of the Project.

Three oil and gas projects have been leased in the NPR-A: GMT1 (BLM 2015), GMT2 (BLM 2018), and Willow (BLM 2023). GMT1 and GMT2 are in operation and include gravel drill pads, gravel access roads, and pipelines that connect back to the ACF for processing (see Figure 3.1-1). These two projects are supported from Alpine but have infrastructure in the NPR-A.

Willow (approximately 26 miles from Nuiqsut) is under construction and will consist of three drillsites (BT1, BT2, and BT3) that will support up to 199 wells, the Willow processing facility, a new airstrip, gravel access roads to connect the GMT2 road structure to the Willow facilities, support facilities, a gas-fired power plant, infield and support pipelines and supporting pads, a gravel mine site (6.8 miles west of Nuiqsut), and seasonal ice roads (see Figure 3.1-1). Willow is expected to produce up to 180,000 barrels of oil per day at its peak.

3.1.1.1.3 AIR AND GROUND TRAFFIC

Existing air and ground traffic in the CD8 area consists of traffic supporting drilling and operations at Alpine, GMT1, and GMT2; traffic supporting construction of Willow; and scheduled air service to the Nuiqsut Airport. Table 3.1-1 summarizes existing ground traffic in the CD8 Project area, and Table 3.1-2 summarizes existing air traffic in the Nuiqsut area. For the purpose of this analysis, should USACE approve the Project, construction would begin in 2028 under any action alternative.

The average annual traffic on the Alpine/WNS multiyear ice road, as described in Table 3.1-1, was calculated using the average trips on the ice road from 2020 through 2025. Because these data include traffic for large construction efforts (GMT2, CD4 expansion, and Willow), exploration programs, and general support for existing CPAI operations, they likely overestimate existing traffic levels for years without construction and exploration.

Operations and drilling traffic typically includes trips within a development or oil field (e.g., between the ACF and a drillsite) and is referred to as *infield traffic*. Although CPAI does not annually quantify total infield traffic trips within the Alpine or GMT oil fields, this EIS analysis assumes that existing infield operations traffic for each drillsite at Alpine, GMT1, and GMT2 is the same as that proposed for CD8. Willow operations traffic in the CD8 Project area will be minimal starting in 2027 and is accounted for in the annual average Alpine/WNS multiyear ice road traffic. Similarly, this EIS analysis assumes that existing infield drilling traffic within the Alpine and GMT oil fields is 1.5 times that proposed for CD8 drilling. This is based on a recent historic average of 1.5 drill rigs in use at any given time within the Alpine and GMT oil fields.

Fixed-wing aircraft and helicopters use the Alpine airstrip and Nuiqsut Airport. The Alpine airstrip supports industry-related flights that originate from the Kuparuk airfield and Deadhorse Airport and typically include C-130s, Twin Otters, Cessnas, and similar fixed-wing support planes as well as A-Star and 206 LongRanger helicopters (BLM 2023). The Nuiqsut Airport typically supports non-industry flights, but may include flights for industry-related purposes. Data for existing flights into and out of the Alpine airstrip are tracked by ConocoPhillips and includes all flights that originate or terminate at the Alpine airstrip. Data for the Nuiqsut Airport were obtained from the Bureau of Transportation Statistics aviation statistics, which include only flights from certificated carriers that report their activity (Bureau of Transportation Statistics

2025). Since these data rely on the accuracy and consistency of carrier reporting and exclude flights from carriers that are not required to report, the dataset likely underrepresents the total air traffic into and out of the Nuiqsut Airport.

Flights for Willow construction activities currently use the Alpine airstrip while the Willow airstrip is constructed, which is estimated to be completed in 2027. Once the Willow airstrip is completed, no Willow air traffic will use the Alpine airstrip (Table 3.1-2).

Ground and air traffic contribute to the environmental baseline for noise, dust, visual contrast, and sociocultural considerations for the Project area and some of the analysis areas described in the Chapter 3 resource sections.

Table 3.1-1. Estimated Existing Ground Traffic in the CD8 Project Area

Season	Annual Average* Traffic on Alpine/WNS Multiyear Ice Road†	Estimated Existing Infield Traffic - Operations	Estimated Existing Infield Traffic - Drilling	Total
Winter‡	12,388	4,480	15,174	**32,042**
Spring	4,129	2,240	7,587	**13,956**
Summer	0	4,480	15,174	**19,654**
Fall	0	2,240	7,587	**9,827**
Total	**16,517**	**13,440**	**45,522**	**75,479**

* Annual average from 2020 through 2025.
† Ground traffic estimates are for one-way trips.
‡ Winter = December, January, February, March; spring = April, May; summer = June, July, August, September; fall = October, November.

Table 3.1-2. Estimated Existing Air (fixed-wing and helicopter) Traffic in the Nuiqsut Area

Year	Season	Willow Flights to/from Alpine Airstrip (helicopter)	Willow Flights to/from Alpine Airstrip (fixed-wing)	Alpine Flights to/from Alpine Airstrip (helicopter)	Alpine Flights to/from Alpine Airstrip (fixed-wing)	Flights to/from Nuiqsut Airport (helicopter and fixed-wing)§	Total Flights (helicopter and fixed-wing)
2027	Winter*	0	482	0	338	533	1,353
2027	Spring	25	170	48	173	569	985
2027	Summer	57	73	435	483	780	1,828
2027	Fall	0	19	0	233	964	1,216
Subtotal for 2027	All	**82**	**744**	**483**	**1,227**	**2,846**	**5,382**
2028–2057 (annually)	Winter	0	0	0	338	533	871
2028–2057 (annually)	Spring	0	0	48	173	569	790
2028–2057 (annually)	Summer	0	0	435	483	780	1,698
2028–2057 (annually)	Fall	0	0	0	233	964	1,197
Subtotal for 2028–2057 (annually)	All	**0**	**0**	**483**	**1,227**	**2,846**	**4,556**

* Winter = December, January, February, March; spring = April, May; Summer = June, July, August, September; fall = October, November.
§ Data from Bureau of Transportation Statistics (2025).

3.1.1.2 East of the Colville River

Existing development east of the Colville River includes multiple oil and gas developments in various stages of production (see Figure 3.1-1).

Infrastructure to support the development of oil and gas is also present east of the Colville River, including mine sites, gravel roads, seasonal ice roads, ice and gravel pads, airstrips, pipelines, and supporting facilities. This includes Oliktok Dock, which provides barge access to the surrounding area. There is existing marine infrastructure at Oliktok Point. Most of the shoreline around Oliktok Point has been armored or altered with sheet pile and other revetment (e.g., gravel bags). Likewise, areas around Oliktok Point are screeded (2.5 acres) and dredged (5.84 acres) annually with the dredged materials disposed of above the high tide line for erosion control (POA-2020-00066).

The ASRC Mine Site is the closest mine site to the Project (see Figure 3.1-1). The ASRC Mine Site was permitted in 1997 (POA-1997-869) and has been through several expansions. Ground traffic for the oil and gas projects east of the Colville River does not use the Alpine/WNS multiyear ice road or ice bridge for construction, drilling, or operation purposes. These developments have their own processing facilities, access roads, and support infrastructure.

3.1.1.3 Changing Arctic Conditions

Elevated levels of greenhouse gases (carbon dioxide [CO_2], nitrous oxide [N_2O], and methane [CH_4]) have been detected in the earth's atmosphere. These gases originate from natural internal processes (e.g., solar cycles, volcanic eruptions) and from external anthropogenic sources (e.g., burning of fossil fuels). Elevated greenhouse gases contribute to increased heat retention, which has resulted in a global trend of elevated temperatures and changing Arctic conditions (Intergovernmental Panel on Climate Change [IPCC] 2021). The Arctic, which includes the North Slope of Alaska, has warmed at more than double the global rate over the last 2 decades (Druckenmiller et al. 2025; IPCC 2022). Existing trends in temperature and precipitation on the North Slope are detailed in BLM (2018), BLM (2023), BLM (2023:Appendix E.2A), and USACE (2018) and are incorporated by reference and summarized below.

The interaction between Arctic features and an increase in annual temperatures has led to feedback loops of continued warming. Higher Arctic temperatures cause a reduction of sea ice and snow cover extent and duration. Snow and sea ice typically reflect the sun's energy. With less snow and sea ice cover, more of the sun's energy is absorbed, which leads to a warmer atmosphere (Melillo et al. 2014). Additionally, the reduced snow cover extent and duration leads to increased vegetation growth and productivity, which leads to more flammable conditions and increased potential for wildfires (National Park Service 2019). Wildfires release large amounts of CO_2 that contributes to further warming of the atmosphere. Warming has also led to an increased rate of permafrost thawing. When permafrost thaws, it releases greenhouse gases into the atmosphere (CO_2, CH_4, and potentially N_2O), causing further warming of the atmosphere (Jones et al. 2020; Markon et al. 2012; Voigt et al. 2017). These feedback loops, in addition to elevated levels of greenhouse gases globally, have led to continued loss of sea ice and snow cover duration and extent and increased rate of permafrost thawing over the past few decades.

Since the 1970s, across Alaska, temperatures have risen at a rate of 0.7 degrees Fahrenheit (°F) per decade. This has impacted the human environment through changes in species distribution

and abundance (including subsistence resources), subsidence that threatens infrastructure, stability threats to food security, sea level rise, and increased storm surges and coastal erosion (IPCC 2019; NSB 2023). These trends are expected to continue (see Section 3.1.2.2 [Reasonably Foreseeable Future Trends]). Although warming temperatures typically align with increased precipitation rates, this has been variable across the North Slope over the past decades. Statewide annual precipitation for Alaska increased by 10% from 1949 and 2005, but Utqiaġvik (approximately 150 miles west of Nuiqsut) experienced a decrease of 36% between 1949 and 1998 (Markon et al. 2012). Variations in precipitation can influence vegetation growth and productivity as well as snow cover and duration. In addition to changes in precipitation rates, changing Arctic conditions have led to changes in the frequency and intensity of extreme precipitation events, including atmospheric rivers (Druckenmiller et al. 2025). Changes in precipitation rates and storm frequency and intensity, combined with permafrost thaw, have also led to changes in freshwater availability and lake recharge across the Arctic, with some areas experiencing increased or decreased freshwater availability and lake area depending on local conditions (U.S. Geological Survey 2025).

For the oil and gas industry, changing Arctic conditions have led to a decreased ice road season and necessitated changes in infrastructure design and safety practices to address the risk of subsidence from permafrost thaw (Cao, Li, et al. 2024; Cao, Ma, et al. 2024; IPCC 2019). As permafrost thaws from changing Arctic conditions, as well as the addition of heat from pipelines carrying oil and gas, the ground around infrastructure can destabilize, increasing the risk of a spill or leak (Cao, Li, et al. 2024). Permafrost thaw and subsequent development of a thaw bulb may have been a contributing factor in the natural gas leak at Alpine in March 2022 (CPAI 2022).

A Statewide Threat Assessment in 2019 identified potential risks to communities, including from permafrost thaw and subsidence, erosion, and flooding (Denali Commission 2019). The potential for permafrost thaw and subsidence was evaluated based on ice content of the soil, the likely distribution of permafrost within the community, the temperature of the permafrost, anticipated thaw settlement, and known problems, whereas flooding and erosion risk was determined using an impact rating matrix. For permafrost and subsidence, Nuiqsut was placed in Group 1, which is categorized as having a high risk of damage due to thawing permafrost with a large amount of thaw settlement (Denali Commission 2019; NSB 2023). For flooding and erosion risk, Nuiqsut was placed in Group 2, which indicated that infrastructure was not at immediate risk, but that potential for damage was present (Denali Commission 2019; NSB 2023). Out of the 115 communities evaluated, Nuiqsut was ranked 44th, indicating that the community has a relatively higher probability of facing multiple threats than other rural Alaska communities (Denali Commission 2019).

3.1.2 Reasonably Foreseeable Future Actions and Trends Relevant to USACE Public Interest Review and Section 404(b)(1) Guidelines

This section identifies and evaluates RFF actions and trends in the area that may be relevant to USACE's decision-making under its PIR (33 CFR 320.4) and the CWA Section 404(b)(1) Guidelines (40 CFR 230), both of which require consideration of cumulative impacts of individual actions. This section focuses on the collective effects of the alternatives in conjunction

with other RFF actions in the same watershed or region, to support USACE's determination of whether the proposed activity would cause or contribute to significant degradation of WOTUS and to inform USACE's overall PIR.

3.1.2.1 Reasonably Foreseeable Future Actions

RFF actions considered in this EIS are presented in Table 3.1-3 and in Figure 3.1-2. RFF actions include oil and gas exploration, pipeline development, and transportation projects that are likely to affect resources in similar ways as the Project. Permitted exploration activity is described in Table 3.1-3. However, due to the disparate and constantly changing details about activities by a wide variety of project proponents and the uncertainty related to any one proponent's exploration plans beyond the currently permitted activity, this EIS assumes that exploration activities by a variety of entities will likely continue to occur throughout the North Slope, with concentrated activity likely to occur within the NPR-A (see Section 3.1.2.2 [Reasonably Foreseeable Future Trends]) and in areas east of Nuiqsut. Typical activities associated with exploration could include fixed-wing aircraft and helicopter use; seismic activities; exploration drilling; and development of exploration well infrastructure including ice roads, ice pads, and airstrips.

Changes to leasing programs (i.e., changes that would open new or additional areas to leasing) are included as RFF actions because they would change the types of activities that could occur in an area. Individual lease sales are not included as RFF actions because of their speculative nature, which is influenced by a number of factors, such as whether or not leases would be approved, the extent and magnitude of lease sales, 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. Excluding individual lease sales from RFF actions 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. Approximately 5% of the tracts leased have been commercially developed for oil and gas production. Of the 53 lease sales on the North Slope on State land from 1959 through January 2026, an average of 47% of the acres offered have been leased (range: 8%–91%) (ADNR 2026a). Kornbrath (1995) reported that, of the tracts leased, approximately 11% have been drilled. That number is likely higher today since the total number of exploration wells on the North Slope has nearly doubled since 1995, going from 350 wells to 666 wells (ADNR 2026b). This is due in part to advancements in technology and expansion of North Slope infrastructure. Kornbrath (1995) also reported that, of the tracts leased, 5% of the tracts leased have been commercially developed for oil and gas production. That number is also likely higher today because, as of June 6, 2026, there are 1,107 active leases on the North Slope, and 22% (243 leases) are paying royalties on production (ADNR 2026c).

For Federal lease sales in Alaska, the probability of development is even smaller. Of the NPR-A lease sales between 1999 and 2024, 12% of the acreage offered were leased (Congressional Research Service 2024). From these leases, three projects have progressed to development: GMT1, GMT2, and Willow. In the revised integrated activity plan (IAP) for the NPR-A, BLM evaluated three future development scenarios ranging from low to high (BLM 2020). BLM estimated between 356 and 2,475 acres of surface disturbance within NPR-A lease sales could result from oil and gas development (BLM 2020).

Although it is difficult to predict the time period that each RFF action could occur given individual project uncertainty, some projects listed in Table 3.1-1 could occur simultaneously as well as during key subsistence periods.

USACE considered public and agency input (EIS Appendix C [Scoping Summary]) and used the technical analyses conducted for the EIS to identify and focus on cumulative effects that must be considered in USACE's permit evaluation process.

Table 3.1-3. Reasonably Foreseeable Future Actions Considered in the Environmental Impact Statement

Type	Project	Entity	Description	Unit/Location	Distance to CD8 (miles)
Oil and gas exploration	Horseshoe	Oil Search Alaska, LLC (Santos)	New 156,000-acre unit that spans the Colville River (BLM-administered and State of Alaska–managed lands) (Santos 2025).	Horseshoe Unit	17
Oil and gas exploration	Umiat	IPB Petroleum Limited	Exploration and appraisal program ongoing (Cashman 2025).	No unit (near Umiat)	65
Oil and gas exploration	Project Phoenix	IPB Petroleum Limited	Exploration and appraisal program ongoing (88 Energy 2026).	No unit	58
Oil and gas exploration	Miscellaneous seismic exploration	Multiple	Seismic exploration is ongoing throughout the region; conducted by multiple firms for different operators.	Multiple	Varies
Oil and gas exploration	West Willow (Greater Willow 1)	CPAI	Oil and gas discovery with two exploration wells (West Willow 1 and 2). The area has a resource potential of approximately 30 million barrels of recoverable resource subject to future success of additional appraisal drilling.	West of the Bear Tooth Unit	36
Oil and gas exploration	Other NPR-A	CPAI	Seismic survey (Colville West 3D), exploration drilling (Tinnik 3 and Kavlaq 2 wells), geotechnical studies, and well plugging (Flat Top 1 and Tinmiaq 20) in winter 2026. Potential further seismic survey, appraisal drilling, well plugging, and/or future drillsite tiebacks.	Un-unitized	12–50
Oil and gas exploration	Greater Willow 2	CPAI	Area between West Willow and the current known extent of the Willow oil reservoir. Estimated resource potential of approximately 45 million barrels of recoverable resource subject to appraisal drilling. Appraisal drilling (Tinmiaq 19 well) program in winter 2026. Potential further seismic survey, appraisal drilling, well plugging, and/or future drillsite tieback.	Bear Tooth Unit	30
Oil and gas exploration	Minke	CPAI	Oil and gas prospect with several penetrations from existing gravel infrastructure. Potential further seismic survey, appraisal drilling, well plugging, and/or future drillsite tieback around Suqqaq 4 well (drilled in winter 2026).	GMTU	10
Oil and gas exploration	Ahpun	Great Bear Pantheon LLC	Approved to construct two gravel pads and begin exploration drilling program (Bailey 2025).	Alkaid and Talitha Unit	56
Oil and gas exploration	Kodiak	Great Bear Pantheon LLC	Drilled exploration well (Theta West 1) and stimulated flowed oil (flow testing cut short due to weather) (Pantheon 2026).	Un-unitized	35
Oil and gas exploration and development	Quokka	Oil Search Alaska, LLC (Santos)	A new 7-acre gravel pad and 7-mile gravel road with pipeline originating from near the Mustang Pad (ADNR 2022).	Quokka Unit	14
Oil and gas development	Pikka	Oil Search Alaska, LLC (Santos)	Permitted and partially constructed development on the east side of the Colville River. Nanushuk Drillsite C (NDC, previously called Drillsite 3 or DS3) and associated access road not yet constructed.	Pikka	3

Type	Project	Entity	Description	Unit/Location	Distance to CD8 (miles)
Oil and gas development	Kuparuk projects	CPAI	Potential development of ENEWS Project (new drillsite and/or drillsite expansion near CPF1). Additional wells with potential gravel pad expansion at drillsites 3S and 3T. Routine operational projects with small footprints.	Kuparuk River Unit	18–30
Oil and gas development	Alpine upgrades	CPAI	New disposal well at CD1; CD4 pad expansion (up to 1.2 acres to complete permitted gravel expansion and new wells); expansion of existing drillsite(s) in the CRU to add well slots to access resource and additional gravel pads for staging and other routine operational projects with small footprints.	CRU	0.5–3.0
Oil and gas development	K-Pad expansion	Kuukpik	5- to 10-acre expansion to the existing pad near the Nuiqsut Spur Road.	CRU	5
Oil and gas development	K3 Pad expansion	Kuukpik	5-acre expansion to the existing pad used for storage and staging of equipment and materials related to recent oil and gas development activity in the Pikka Unit.	Pikka Unit	10
Oil and gas development	K4 Pad	Kuukpik	New 33-acre gravel pad near GMT2 that would be leasable by oil and gas operators for equipment laydown, material staging, etc., to support activities in NPR-A. Pad construction could occur in 2026 or 2027.	GMT Unit	19
Oil and gas development	Ongoing upgrades and maintenance to existing infrastructure	Multiple	Ongoing maintenance, modifications, and upgrades to existing facilities that would not have ground-disturbing activities.	All	Varies
Oil and gas development	Alaska Stand Alone Pipeline or Alaska Liquid Natural Gas	State of Alaska	Only one of two natural gas pipelines would be constructed. Alaska Liquid Natural Gas: Natural gas line from the North Slope to Nikiski; would include compression and liquefication facilities. Alaska Standalone Pipeline: Natural gas pipeline for in-state distribution that would follow the TAPS from the gas conditioning facility in Prudhoe Bay south to a connection with the existing ENSTAR natural gas pipeline system in the Matanuska-Susitna Borough.	North Slope	32
Oil and gas reclamation	Legacy well cleanup in NPR-A	BLM	Up to nine legacy wells surrounding Willow would be cleaned, plugged, and abandoned over the next 8 years. Access snow or ice roads may cross or be near the Project area.	NPR-A	Varies
Remediation	Umiat Formerly Used Defense Site	USACE	Remedial design (expected to be available to the public in 2026) and future remedial action activities.	Umiat	67
Mining	Miscellaneous mine site expansions	Multiple	The opening of new cells at existing mine sites on the North Slope, such as Mine Sites E and F and the ASRC Mine Site.	Multiple	Varies (1 mile closest)
Transportation	Arctic Strategic Transportation and Resources Project	State of Alaska/ NSB	Planning-level effort to identify North Slope community needs; includes potential roads (seasonal ice, snow, or all-season gravel) that may connect communities to the Dalton Highway or the development of utilities, fiber-optic networks, or port and shipping facilities.	North Slope	Unknown

Type	Project	Entity	Description	Unit/Location	Distance to CD8 (miles)
Transportation	Community Winter Access Trail	NSB	Annual overland snow trails (approximately 250 miles) to connect Atqasuk, Wainwright, Utqiaġvik, and Nuiqsut to the Dalton Highway. It is estimated 200 to 300 vehicles would use the trail each winter season (Erickson 2024).	Multiple	Varies
Community development	Colville River access boat ramp	NVN	Proposed boat ramp at the terminus of the Colville River access road to support subsistence access.	Nuiqsut	3
Community development	Kisik/Cultural Center/ Package Facility/Teen Center	City of Nuiqsut	In 2025, Nuiqsut received a grant from the NPR-A Impact Grant Program for $10.1 million for the Kisik/Cultural Center/Package Facility/Teen Center (Alaska Department of Commerce, Community, and Economic Development 2025).	Nuiqsut	2
Community development	NPR-A Impact Grant Program projects	Multiple	Various projects to support essential public services and facilities (such as construction or maintenance of a youth center, a boat ramp, a community center, etc.), priority given to areas most directly or severely impacted by development in NPR-A, such as Nuiqsut.	Multiple	Varies

3.1.2.2 Reasonably Foreseeable Future Trends

An RFF trend is an existing trend that is likely to continue in the RFF. RFF trends considered in this EIS are continued changing Arctic conditions and continued oil and gas exploration and development in the NPR-A and areas east of Nuiqsut near the Colville River.

Continued changing Arctic conditions: The state of Alaska, including the North Slope, is projected to experience continued warmer average annual temperatures, increased precipitation, increased ocean acidification, an increase in extreme climate events, decreases in sea ice and snow cover extent and duration, increased areas burned by wildfires, and continued thawing of near-surface permafrost (Kim et al. 2025; Scenarios Network for Alaska and Arctic Planning [SNAP] 2025; United Nations Environment Programme [UNEP] 2022; U.S. Global Change Research Program [USGCRP] 2023) (Table 3.1-4). Projections anticipate an increase in temperatures for Alaska of 8°F to 14°F by the late-twenty-first century under a moderate and high emissions scenario, respectively (Kim et al. 2025; SNAP 2025; USGCRP 2023) (see Table 3.1-4).

Average annual total precipitation is projected to increase in northern Alaska by more than 20% by midcentury under an intermediate emissions scenario and 36% under a high emissions scenario (USGCRP 2023), and increase from 25% to 46% by the end of the twenty-first century (Kim et al. 2025; SNAP 2025) (see Table 3.1-4), although this can be highly variable on the North Slope (Markon et al. 2012). Extreme weather events are predicted to increase in duration and frequency: annual maximum 1-day precipitation in Alaska is projected to increase by more than 15% in northern Alaska (USGCRP 2018). However, based on historical data, precipitation may be more variable on the North Slope. Snow cover depth and duration are anticipated to decrease, with a later first snowfall and earlier snowmelt. This will increase the growing season, which is expected to result in increased wildfire risk as well as insect outbreaks in the Arctic by the end of the century (Kim et al. 2024; UNEP 2022; USGCRP 2023).

Warmer temperatures will also lead to permafrost thaw and a deeper active layer in soils. Permafrost thaw is projected to result in an estimated 16% to 24% loss of permafrost by the end of this century (SNAP 2025; USGCRP 2018) (see Table 3.1-4). Permafrost thawing could lead to thermokarsting or slumping, causing more nutrient loading and suspended sediment in lakes and rivers. Thawing may lead to an increase in the frequency of lake-tapping events (sudden drainage) as degrading ice wedges integrate into drainage channels at a lower elevation.

The ACP is predicted to experience significant coastline changes by 2100 under medium and high emissions scenarios as sea levels rise, permafrost thaws, extreme weather events increase in frequency, and sea ice decreases in cover and duration (Creel et al. 2024; IPCC 2021). Erosion and inundation will account for a change in six to eight times more land loss than coastal erosion, which threatens coastal villages and oil field infrastructure (Creel et al. 2024; Manos et al. 2025). Additionally, across Alaska, stream flows are expected to experience shifts in peak timing to earlier in the season in response to warming temperatures, with a shift in the northern Alaska of up to 10 days earlier (Michalek et al. 2025). Steams in the northernmost regions are predicted to also have a 40% increase in the peak discharge magnitude in response to changes in precipitation and temperature (Michalek et al. 2025).

Predicted trends in Alaska and the North Slope are provided in BLM (2018), BLM (2023), BLM (2023:Appendix E.2A), and USACE (2018) and are hereby incorporated by reference.

Continued oil and gas exploration and development: BLM recently updated the IAP for NPR-A to open more areas within NPR-A to oil and gas activities (BLM 2025a, BLM 2025b). Although the location and frequency of exploration activity change from year to year, trends may arise across some years. In recent years, exploration activity in the NPR-A and areas east of Nuiqsut has increased as additional recoverable resources have been discovered in these less developed areas. In 2026, the first lease sale of a mandated five over the next 10 years drew record bidding, resulting in $163 million in high bids on an estimated 1.3 million acres (Alaska Beacon 2026). This trend is likely to continue in the foreseeable future. Specific oil and gas exploration and development RFF actions are detailed in Table 3.1-3.

Table 3.1-4. Predicted Changes in Mean Annual Temperature, Mean Annual Precipitation, and Depth to Top of Permafrost for Nuiqsut

Condition	Historic (1950–2009)	2020–2029	2030–2039	2040–2049	2050–2059	2060–2069	2070–2099
Mean annual temperature*	10.5°F	12.5°F–15.6°F	12.8°F–16.3°F	13.0°F–17.6°F	14.9°F–18.5°F	15.2°F–20.0°F	17.5°F–22.4°F
Mean annual precipitation†	2.0 inches	2.1–2.3 inches	2.2–2.4 inches	2.2–2.4 inches	2.2–2.5 inches	2.4–2.7 inches	2.5–2.7 inches
Depth to top of permafrost‡	Unknown	2.0–2.1 feet	2.2–2.3 feet	2.3 feet	2.4–2.5 feet	2.5 feet	2.6–3.0 feet

* Temperature calculations are the range of the mean predicted temperatures for three models (Community Climate System Model version 4, Meteorological Research Institute – Coupled Global Climate Model Intercomparison 3, and the 5 Model Average [average of 5 models that perform well in Alaska and the Arctic]) as provided in SNAP (2025).

† Precipitation calculations are the range of the mean predicted precipitation for three models (Community Climate System Model version 4, Meteorological Research Institute – Coupled Global Climate Model Intercomparison 3, and the 5 Model Average) as provided in SNAP area for Nuiqsut (SNAP 2025).

‡ Permafrost calculations are the range of the upper boundary of permafrost below the surface calculated from the 5 Model Average for the Representative Concentration Pathway 4.5 and 8.5 as provided in SNAP area for Nuiqsut (SNAP 2025).

3.1.3 Common Impacts

The total number of ground and air traffic trips and the number of ground and air traffic trips per hour and day are included in the EIS analysis for multiple resources. To minimize repetition, the impact tables for these features are provided in this section for reference throughout the EIS.

Table 3.1-5. Existing and Proposed Ground Traffic (number of trips) in the Project Area

Year	Project Phase	Season	Existing Ground Traffic*	Proposed Ground Traffic Alternative B	Percent Increase over Existing Ground Traffic Alternative B	Proposed Ground Traffic Alternative C	Percent Increase over Existing Ground Traffic Alternative C	Proposed Ground Traffic Alternative D	Percent Increase over Existing Ground Traffic Alternative D
Year 0	Construction	Fall	9,827	714	7%	714	7%	714	7%
Year 0/1	Construction	Winter	32,042	71,613	224%	64,981	202%	75,098	234%
Year 1	Construction	Spring	13,956	15,314	110%	12,612	90%	16,578	119%
Year 1	Construction	Summer	19,654	2,145	11%	1,662	9%	2,256	12%
Year 1	Construction	Fall	9,827	1,050	11%	1,050	11%	1,050	11%
Year 1/2	Construction	Winter	32,042	65,714	205%	65,714	205%	65,714	205%
Year 2	Construction	Spring	13,956	26,732	192%	26,732	192%	26,732	192%
Year 2	Construction	Summer	19,654	12,972	66%	12,972	66%	12,972	66%
Year 2	Construction, drilling	Fall	9,827	5,554	57%	5,554	57%	5,554	57%
Year 2/3	Construction, drilling, operations	Winter	32,042	10,756	34%	10,756	34%	10,756	34%
Year 3	Drilling, operations	Spring	13,956	5,378	39%	5,378	39%	5,378	39%
Year 3	Drilling, operations	Summer	19,654	10,756	55%	10,756	55%	10,756	55%
Year 3	Drilling, operations	Fall	9,827	5,378	55%	5,378	55%	5,378	55%
Year 3/4	Drilling, operations	Winter	32,042	10,756	34%	10,756	34%	10,756	34%
Year 4	Drilling, operations	Spring	13,956	5,378	39%	5,378	39%	5,378	39%
Year 4	Drilling, operations	Summer	19,654	10,756	55%	10,756	55%	10,756	55%
Year 4	Drilling, operations	Fall	9,827	5,378	55%	5,378	55%	5,378	55%
Year 4/5	Drilling, operations	Winter	32,042	10,756	34%	10,756	34%	10,756	34%
Year 5	Drilling, operations	Spring	13,956	5,378	39%	5,378	39%	5,378	39%
Year 5	Drilling, operations	Summer	19,654	10,756	55%	10,756	55%	10,756	55%
Year 5	Drilling, operations	Fall	9,827	5,378	55%	5,378	55%	5,378	55%
Year 5/6	Drilling, operations	Winter	32,042	10,756	34%	10,756	34%	10,756	34%
Year 6	Drilling, operations	Spring	13,956	5,378	39%	5,378	39%	5,378	39%
Year 6	Drilling, operations	Summer	19,654	10,756	55%	10,756	55%	10,756	55%

Year	Project Phase	Season	Existing Ground Traffic*	Proposed Ground Traffic Alternative B	Percent Increase over Existing Ground Traffic Alternative B	Proposed Ground Traffic Alternative C	Percent Increase over Existing Ground Traffic Alternative C	Proposed Ground Traffic Alternative D	Percent Increase over Existing Ground Traffic Alternative D
Year 6	Drilling, operations	Fall	9,827	5,378	55%	5,378	55%	5,378	55%
Year 6/7	Drilling, operations	Winter	32,042	10,756	34%	10,756	34%	10,756	34%
Year 7	Operations	Spring	13,956	320	2%	320	2%	320	2%
Year 7	Operations	Summer	19,654	640	3%	640	3%	640	3%
Year 7	Operations	Fall	9,827	320	3%	320	3%	320	3%
Years 7/8–30 (annual)	Operations	Winter	32,042	640	2%	640	2%	640	2%
Years 7/8–30	Operations	Spring	13,956	320	2%	320	2%	320	2%
Years 7/8–30 (annual)	Operations	Summer	19,654	640	3%	640	3%	640	3%
Years 7/8–30 (annual)	Operations	Fall	9,827	320	3%	320	3%	320	3%

* As described in Section 3.1.1.1.3.
§ Winter = December, January, February, and March; spring = April and May; summer = June, July, August, and September; fall = October and November.

Table 3.1-6. Existing and Proposed Air Traffic (number of trips) in the Nuiqsut Area

Year	Project Phase	Existing Helicopter Traffic*	Existing Fixed-wing Traffic*	Proposed Helicopter Traffic	Percent Increase over Existing Helicopter Traffic	Proposed Fixed-wing Traffic	Percent Increase over Existing Fixed-wing Traffic
Year 0	Construction	565	1,971	16	3%	4	<1%
Year 1	Construction	565	1,971	120	21%	68	3%
Year 2	Construction, drilling	483	1,227	115	23%	72	6%
Years 3–30 (annual)	Construction, drilling, operations	483	1,227	15	3%	0	0%

* As described in Section 3.1.1.1.3
Note: Proposed air traffic is the same for all action alternatives.

Table 3.1-7. Estimated Ground Traffic in the Project Area Per Hour and Season by Action Alternative

Season and Year	Project Phase	Estimated Existing Vehicles per Hour*	Proposed Vehicles Per Hour Alternative B	Percent Increase over Existing Vehicles Per Hour Alternative B	Vehicles Per Hour Alternative C	Percent Increase over Existing Vehicles Per Hour Alternative C	Vehicles Per Hour Alternative D	Percent Increase over Existing Vehicles Per Hour Alternative D
Year 0 (fall)	Construction	7	<1	7%	<1	7%	<1	7%
Year 0/1 (winter)†	Construction	11	25	224%	22	202%	26	234%
Year 1 (spring)	Construction	10	11	110%	9	90%	11	119%
Year 1 (summer)	Construction	7	1	11%	1	9%	1	12%
Year 1 (fall)	Construction	7	1	11%	1	11%	1	11%
Year 1/2 (winter)	Construction	11	23	205%	23	205%	23	205%
Year 2 (spring)	Construction	10	18	192%	18	192%	18	192%
Year 2 (summer)	Construction	7	4	66%	4	66%	4	66%
Year 2 (fall)	Construction, drilling	7	4	57%	4	57%	4	57%
Year 2/3 (winter)	Construction, drilling, operations	11	4	34%	4	34%	4	34%
Year 3 (spring)	Drilling, operations	10	4	39%	4	39%	4	39%
Year 3 (summer)	Drilling, operations	7	4	55%	4	55%	4	55%
Year 3 (fall)	Drilling, operations	7	4	55%	4	55%	4	55%
Year 3/4 (winter)	Drilling, operations	11	4	34%	4	34%	4	34%
Year 4 (spring)	Drilling, operations	10	4	39%	4	39%	4	39%
Year 4 (summer)	Drilling, operations	7	4	55%	4	55%	4	55%
Year 4 (fall)	Drilling, operations	7	4	55%	4	55%	4	55%
Year 4/5 (winter)	Drilling, operations	11	4	34%	4	34%	4	34%
Year 5 (spring)	Drilling, operations	10	4	39%	4	39%	4	39%
Year 5 (summer)	Drilling, operations	7	4	55%	4	55%	4	55%
Year 5 (fall)	Drilling, operations	7	4	55%	4	55%	4	55%
Year 5/6 (winter)	Drilling, operations	11	4	34%	4	34%	4	34%
Year 6 (spring)	Drilling, operations	10	4	39%	4	39%	4	39%
Year 6 (summer)	Drilling, operations	7	4	55%	4	55%	4	55%

Season and Year	Project Phase	Estimated Existing Vehicles per Hour*	Proposed Vehicles Per Hour Alternative B	Percent Increase over Existing Vehicles Per Hour Alternative B	Vehicles Per Hour Alternative C	Percent Increase over Existing Vehicles Per Hour Alternative C	Vehicles Per Hour Alternative D	Percent Increase over Existing Vehicles Per Hour Alternative D
Year 6 (fall)	Drilling, operations	7	4	55%	4	55%	4	55%
Year 6/7 (winter)	Drilling, operations	11	4	34%	4	34%	4	34%
Year 7 (spring)	Operations	10	<1	2%	<1	2%	<1	2%
Year 7 (summer)	Operations	7	<1	3%	<1	3%	<1	3%
Year 7 (fall)	Operations	7	<1	3%	<1	3%	<1	3%
Years 7/8–30 (annual winter)	Operations	11	<1	2%	<1	2%	<1	2%
Years 8–30 (annual spring)	Operations	10	<1	2%	<1	2%	<1	2%
Years 8–30 (annual summer)	Operations	7	<1	3%	<1	3%	<1	3%
Years 8–30 (annual fall)	Operations	7	<1	3%	<1	3%	<1	3%

* Assumes equal 24-hour distribution for each day of the season.
† Winter = December, January, February, and March; spring = April and May; summer = June, July, August, and September; fall = October and November.
‡ Assuming 2,904 hours in winter, 1,464 hours in spring, 2,928 hours in summer, and 1,464 hours in fall.

Table 3.1-8. Estimated Air Traffic to the Alpine Airstrip Per Day for All Action Alternatives

Season and Year	Project Phase	Estimated Existing Helicopter Traffic per Day	Proposed Helicopter Traffic per Day	Existing Estimated Fixed-wing Air Traffic per Day	Proposed Fixed-wing Air Traffic per Day
Year 0	Construction	2	<1	5	<1
Year 1	Construction	2	<1	5	<1
Year 2	Construction, drilling	1	<1	3	<1
Years 3–30 (annually)	Construction, drilling, operations	1	<1	3	0

3.2 AIR QUALITY

3.2.1 How would the Project construction, drilling, and operation activities impact air quality?

The analysis area for air quality is the area within 3.1 miles (5 km) from the Project drillsite (Figure 3.2-1) and includes Nuiqsut, which is 2.1 miles (3.4 km) southwest of the Project drillsite. Impacts due to emissions from sources outside the analysis area were also considered in the cumulative analysis. The temporal scale of the analysis ranges from acute (1 hour) to the life of the Project (approximately 30 years).

Project impacts on air quality related values[4], including visibility and regional haze, at Class I areas[5] were dismissed from detailed analysis because the impact context is so low that a detailed air quality related values analysis was not needed to determine significance (see AIR-1 in EIS Appendix D [Issues Dismissed from Detailed Analysis]).

3.2.1.1 Affected Environment

Existing air quality in the analysis area is described in this section through a review of the regional climate and meteorology, existing emission sources, and air quality monitoring data. The following information on the existing conditions is summarized from CPAI's Nuiqsut Ambient Air Quality and Meteorological Monitoring Program 2023, 2024, and 2025 annual reports (SLR 2024, 2025a, 2026a) and from CPAI's semi-annual volatile organic compound (VOC) reporting (SLR 2021). Each of these documents is incorporated by reference. New data are included where available.

3.2.1.1.1 CRITERIA AIR POLLUTANTS

The Clean Air Act (CAA) is the primary Federal law that regulates air emission sources to protect public health and welfare in the United States. The CAA requires EPA to establish National Ambient Air Quality Standards (NAAQS) for six common pollutants referred to as criteria air pollutants (CAPs): carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) (composed of $PM_{2.5}$ and PM_{10}, i.e., PM less than or equal to 2.5 or 10 microns in aerodynamic diameter respectively), and sulfur dioxide (SO_2). In Alaska (located in EPA Region 10), the Alaska Department of Environmental Conservation (ADEC) is the regulatory authority responsible for implementing and enforcing the Alaska Air Quality Control Regulations under 18 AAC 50 per the EPA-approved state implementation plan (ADEC 2026). The Alaska Ambient Air Quality Standards (AAAQS) are promulgated in 18 AAC 50 and include the Federal NAAQS and additional air quality standards. The current NAAQS and AAAQS, and ambient air pollutant concentrations at CPAI's Nuiqsut Air and Meteorological Monitoring Station from 2023 through 2025, are included in Table 3.2-1. In addition to the NAAQS and AAAQS, air quality in Alaska is regulated through the Prevention of Significant Deterioration program (40 CFR 52.21; 18 AAC 50.306), which limits the maximum allowable increase in ambient CAP concentrations to the extent that the NAAQS and AAAQS are not exceeded.

[4] Air quality related values are resources at Federally managed Class I areas that may be adversely affected by a change in air quality; this may include visibility or a specific scenic, cultural, physical, biological, ecological, or recreational resource.

[5] Class I areas are established by Congress as areas of special national or regional natural, scenic, recreational, or historic value, such as national parks greater than 6,000 acres that were in existence before 1977.

Table 3.2-1. Measured Ambient Criteria Air Pollutant Concentrations at the Nuiqsut Air Monitoring Station, 2023 through 2025

Pollutant[*]	NAAQS/AAAQS[†]	Units	Averaging Period	Rank[‡]	Ambient Concentrations (µg/m³)				Percentage of NAAQS and AAAQS
					2023	2024	2025	3-year Average	
NO_2	53 100	ppb µg/m³	Annual	Annual mean	2.00 3.76	2.00 3.76	2.00 3.76	**2.00** **3.76**	**3.77%**
	100 188	ppb µg/m³	1-hour	Annual 98th percentile of 1-hour daily maximum averaged over 3 years	24.60 46.30	20.80 39.10	31.20 58.70	**25.53** **48.03**	**25.53%**
O_3	0.070 137	ppm µg/m³	8-hour	Annual 4th highest 8-hour daily maximum, averaged over 3 years	0.04 84.42	0.05 92.27	0.05 90.31	**0.05** **89.00**	**64.76%**
CO	35 40,000	ppm µg/m³	1-hour	2nd highest/not to be exceeded more than once per year	1.00 1,145.60	1.00 1,145.60	1.00 1,145.60	**1.00** **1,145.60**	**2.86%**
	9 10,000	ppm µg/m³	8-hour	2nd highest/not to be exceeded more than once per year	1.00 1,145.60	1.00 1,145.60	0.00 0.00	**0.67** **763.73**	**7.41%**
SO_2 (primary)	75 196	ppb µg/m³	1-hour	Annual 99th percentile of 1-hour daily maximum averaged over 3 years	1.40 3.67	1.10 2.88	2.00 5.24	**1.50** **3.93**	**2.00%**
	0.5 1,300	ppm µg/m³	3-hour	2nd highest/not to be exceeded more than once per year	0.00 0.00	0.00 0.00	0.00 0.00	**0.00** **0.00**	**0.00%**
	0.14 365	ppm µg/m³	24-hour	2nd highest/not to be exceeded more than once per year	0.00 0.00	0.00 0.00	0.00 0.00	**0.00** **0.00**	**0.00%**
	0.030 80	ppm µg/m³	Annual	Averaged over 3 years	0.00 0.00	0.00 0.00	0.00 0.00	**0.00** **0.00**	**0.00%**
$PM_{2.5}$	9 (NAAQS as of 2024)[†] 12 (AAAQS, NAAQS 2023)[†]	µg/m³	Annual	Averaged over 3 years	2.60	2.00	4.30	**2.76**	**32.96%** **24.72%**[§]
	35	µg/m³	24-Hour	98th percentile, averaged over 3 years	8.00	8.00	10.00	**8.67**	**24.76%**
PM_{10}	150	µg/m³	24-Hour	2nd highest/not to be exceeded more than once per year on average over 3 years	30.00	60.00	60.00	**50.00**	**33.33%**

Source: SLR (2024, 2025a, 2026a).
Notes: µg/m³ = micrograms per cubic meter; ppb = parts per billion; ppm = parts per million.
[*] Pb was not assessed due to low levels of Pb emissions from the Project and the analysis area is in attainment for the Pb standards.
[†] AAAQS, while not listed, are generally equivalent to the NAAQS for these pollutants, even though AAAQS use different units in some cases. NAAQS for $PM_{2.5}$ was changed in 2024 to 9 µg/m³. The AAAQS remains at 12 µg/m³.
[‡] See 40 CFR 50 and 18 AAC 50 for detailed information regarding procedures for calculating monitored values for comparison with the NAAQS and AAAQS.
[§] $PM_{2.5}$ NAAQS and AAAQS were exceeded on January 15, 2025, corresponding to regional weather conditions that resulted in elevated PM levels at ground level. Similar ambient $PM_{2.5}$ concentrations were also recorded at other monitoring sites in the region. The 98th percentile averaged over 3 years has not exceeded the standard.

Air quality is assessed by comparing monitored ambient CAP concentrations with the NAAQS and AAAQS. The CD8 Project is within an area designated as "attainment/unclassified" with respect to the NAAQS and AAAQS. This classification indicates that ambient concentrations of CAPs in the area are below the NAAQS and AAAQS, or that adequate air monitoring data are not available to determine attainment. The nearest nonattainment area (for $PM_{2.5}$) is a portion of the Fairbanks North Star Borough, approximately 380 miles (611.5 km) south of the Project area (EPA 2026).

Air quality in the analysis area is generally good because there are relatively few anthropogenic and natural emission sources close to the analysis area. Additionally, persistent regional winds dilute emissions from distant sources before the emissions reach the analysis area. Emission sources in the analysis area include diesel-fired generator engines and heaters, snow machines, ATVs, small aircraft, road vehicles, and occasional open burning. (See Section 3.1.3 [Common Impacts] for details on the quantity of existing ground and air traffic in the Nuiqsut area.) Most homes in Nuiqsut are heated by natural gas, and the Nuiqsut Power Plant generates electric power for residents. Regional emissions sources consist of oil and gas development and production facilities, which include Alpine, Pikka, Kuparuk, Milne Point, Prudhoe Bay, North Star, Willow, and Endicott. Emissions sources at the Alpine production and drilling facilities include gas-fired turbines and heaters, incinerators, flares, diesel-fired engines, storage tanks, fugitive emissions from valves, fittings and flanges, and mobile sources (vehicle and aircraft traffic). Ambient air quality data collected in Nuiqsut represent local impacts from emissions sources in the community of Nuiqsut. Naturally occurring windblown PM in the analysis area originates from riverbanks, sandbars, dirt and gravel roads, gravel mine sites, and occasional tundra fires (SECOR International Incorporated [SECOR] 2000; AECOM 2011a, 2011b). Windblown dust events tend to occur more frequently in the summer when sandbars along the CRD riverbeds are not covered by snow and ice and dry out due to above-freezing ambient temperatures (SECOR 2000).

3.2.1.1.2 VOLATILE ORGANIC COMPOUNDS AND HAZARDOUS AIR POLLUTANTS

VOCs are organic compounds that evaporate under normal atmospheric conditions of temperature and pressure (EPA 2025a). Although there are no NAAQS or AAAQS for VOCs, they are regulated by EPA to prevent the formation of O_3, a constituent of photochemical smog, and secondary $PM_{2.5}$. Many VOCs are also hazardous air pollutants (HAPs). HAPs are pollutants that are known or suspected to cause cancer or other serious health effects. Inhalation of VOCs can cause difficulty breathing, nausea, and damage to the central nervous system and other organs. VOCs are components of natural gas and may be emitted from well drilling oil and gas operations and leaks from pipelines, valves, flanges, and pneumatic devices.

The CAA mandates that EPA regulate 188 HAPs that are known or suspected of causing serious health effects or adverse environmental effects (42 USC 7412). EPA established National Emission Standards for Hazardous Air Pollutants to regulate specific categories of stationary sources that emit one or more HAPs (40 CFR 63). There are no applicable Federal or State ambient air quality standards for HAPs. Therefore, reference exposure levels (RELs), acute exposure guideline levels (AEGLs), and reference concentrations for chronic inhalation (RfCs) are used to evaluate potential health effects due to exposure to HAPs. RELs define the concentrations for each HAP that are not expected to cause adverse health effects for specific

exposure durations. AEGLs are guidelines for acute exposures (single, non-repetitive exposures that do not exceed 8 hours). RfCs define the continuous inhalation exposure concentrations for each HAP at which no long-term adverse health impacts are expected. These benchmarks represent exposure limits established by human health protection authorities below which adverse health effects are not expected to occur, even for sensitive populations. Exceeding these levels does not indicate an adverse health impact, but rather an increased likelihood that the health effect will occur (ADEC 2017; EPA 2023).

3.2.1.1.3 EXISTING MONITORING DATA

Ambient CAP concentrations monitoring data have been collected by CPAI in Nuiqsut since 1999 as part of Alpine. Monthly VOC sampling was initiated in 2014, and continuous VOC monitoring was added in 2022 to further address concerns from Nuiqsut residents. Data from the Nuiqsut monitoring station became available in real-time via the ADEC air quality website in October 2022. The Nuiqsut Monitoring Program operates in accordance with an ADEC-approved quality assurance project plan. Table 3.2-1 summarizes representative ambient CAP concentrations air quality data collected by CPAI at Nuiqsut from 2023 to 2025. The monitored ambient CAP concentrations at the CPAI Nuiqsut Monitoring Station are below the NAAQS and AAAQS, indicating that the existing air quality in the analysis area is good.

The initial 2014 VOC study demonstrated that ambient VOC concentrations were below national toxic screening levels of concern, and the long-term trend has been consistent with those findings. As of September 2025, detected ambient VOC concentrations at Nuiqsut were very low, with less than 48 detections exceeding 10 parts per billion (ppb) over the history of the program. At CD4 and CD1, there were 58 detections exceeding 10 ppb over the history of the program. Of the detected compounds at Nuiqsut or at CD4 and CD1, only benzene and ethylbenzene in October 2022 and 2-propanol (isopropyl alcohol) in April 2019 exceeded ADEC and EPA screening levels since the commencement of VOC sampling in 2014. Chloroform and 2-Propanol have also been detected on one or more occasions above screening levels, but there is low confidence in the validity of these data due to a high likelihood of laboratory contamination or a lack of replication in duplicate samples (SLR 2025b).

The VOC detections do not correlate well with concurrent wind data, suggesting that VOC detections in Nuiqsut are not directly attributable to a single local source but are more likely representative of regional ambient concentrations that could originate from numerous natural and anthropogenic sources. Acetone is known to be emitted naturally from land vegetation (mainly evergreens) and from anthropogenic sources such as vehicle exhaust and is a common solvent in many household products. Methanol is known to be emitted naturally from volcanic gases, vegetation, microbes, biological decomposition, and from anthropogenic sources such as vehicle exhaust and several household products (SLR 2025b). VOCs detected at CD1 may have originated at CD1 or another nearby facility (SLR 2025b). VOC samples collected at the North Slope sites continue to demonstrate lower ambient VOC concentrations than those observed elsewhere in Alaska and provide further evidence of good air quality conditions on the North Slope (CPAI 2024).

This EIS focuses on select relevant HAPs that are commonly emitted during oil and gas development: benzene, ethylbenzene, toluene, and xylene; n-hexane; formaldehyde; acetaldehyde; ethylene glycol; and methanol (40 CFR 63:Table 1). These HAPs were selected

because prior analyses have indicated that they are the predominant HAPs emitted from oil and gas development activities at levels that warrant review (BLM 2014, 2018, 2023; USACE 2018).

The measured ambient concentrations of these HAPs at the CPAI Nuiqsut monitoring station from 2014 through 2021 are presented in Table 3.2-2. These measurements are part of a long-term sampling program that began in April 2014 for which a sample is typically collected once per month. As shown in Table 3.2-2, since the start of the long-term sampling program there have been very few detections of the selected HAPs. Further, when concentrations were above the detection limit, the measured ambient HAP concentrations were below corresponding RELs and AEGLs (SLR 2021).

Table 3.2-2. Measured Ambient Hazardous Air Pollutants Concentrations at the Nuiqsut Monitoring Station, 2014 through 2021

Pollutant	Number of Samples Above Detection Limits	Average of Measurements Above Detection Limits (µg/m^3)*	Maximum of Measurements Above Detection Limits (µg/m^3)*	Acute REL or AEGL (µg/m^3)†
Benzene‡	2.00	0.86	0.89	27.00
Ethylbenzene‡	1.00	0.78	0.78	140,000.00§
Formaldehyde¶	N/A	N/A	N/A	55.00
n-hexane	3.00	1.48	2.15	10,000,000.00§
Toluene	5.00	19.55	74.20	5,000.00
Xylene#	3.00, 5.00 (o-xylene, m/p-xylene)	2.69	3.95	22,000.00

Source: SLR (2021).
Note: N/A = not available; µg/m^3 = micrograms per cubic meter.
* Values converted from parts per billion to µg/m3 at standard temperature and pressure.
† Data from EPA (2021:Table 2).
‡ Benzene, ethylbenzene, and n-hexane measurements are reported from EPA Method TO-12, and toluene measurements are reported from EPA Method TO-15.
§ AEGLs specified for these two pollutants (ethylbenzene and n-hexane) as RELs are not available; RELs are specified for the other pollutants in the table.
¶ Formaldehyde is not measured by the long-term sampling program.
Xylene measurement reported equals the sum of o-xylene and m/p-xylene by the TO-12 method.

3.2.1.1.4 AIR QUALITY INDEX

The EPA Air Quality Index (AQI) is a tool used to communicate health concerns related to outdoor air quality. The AQI has six different levels of health concern (Table 3.2-3). AQI values are calculated from actual observed ambient pollutant concentrations. The higher the AQI value, the greater the ambient concentrations of pollutants in the air, and the greater the health concerns. An AQI value of 100 closely corresponds to the NAAQS for that pollutant, which is the level EPA has set to protect public health. AQI values at or below 100 are generally considered acceptable. When AQI values are above 100, air quality is considered to be unhealthy. Values from 101 to 150 are unhealthy for sensitive groups of people, and values above 150 are unhealthy for everyone.

Table 3.2-3. Air Quality Index Levels of Health Concern

Level	Range	Description
Good	0.00 to 50.00	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51.00 to 100.00	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101.00 to 150.00	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151.00 to 200.00	Everyone may begin to experience health effects: members of sensitive groups may experience more serious health effects.
Very Unhealthy	201.00 to 300.00	Health alert; everyone may experience more serious health effects.
Hazardous	301.00 to 500.00	Health warnings of emergency conditions. The entire population is more likely to be affected.

Source: AirNow (2026).

Table 3.2-4 summarizes daily AQI data for Nuiqsut over the last 3 years, which have generally been *good*, though there have been several exceedances each year of $PM_{2.5}$ or PM_{10} that are primarily due to naturally occurring windblown dust or wildfires (CPAI 2024, 2026).

Table 3.2-4. Air Quality Index Summary at Nuiqsut, 2023 through 2025

Year	Air Quality Index Summary
2025	Daily AQI primarily Good. Days with elevated ambient $PM_{2.5}$ concentrations that resulted in an AQI that was Moderate: 11. Days with elevated ambient $PM_{2.5}$ concentrations that resulted in an AQI that was Unhealthy for Sensitive Groups: 1. This event was caused by regional weather conditions that resulted in elevated PM levels at ground level and was recorded at other monitoring sites in the region. Days with elevated ambient PM_{10} concentrations that resulted in an AQI that was Moderate: 3.
2024	Daily AQI primarily Good. Days with elevated ambient $PM_{2.5}$ concentrations that resulted in an AQI that was Moderate: 1. Days with elevated ambient PM_{10} concentrations that resulted in an AQI that was Moderate: 2.
2023	Daily AQI primarily Good. Days with elevated ambient $PM_{2.5}$ concentrations that resulted in an AQI that was Unhealthy for Sensitive Groups: 1. Canadian wildfire smoke was transported to the region during August 2023 contributing to an AQI that was Unhealthy for Sensitive Groups. This event was widespread across the ACP.

Sources: CPAI (2024, 2025, 2026).

3.2.1.1.5 OTHER REGULATIONS FOR AIR QUALITY

Other Federal and State air quality regulations that may apply to the Project include New Source Performance Standards (40 CFR 60); General Compliance Provisions for Highway, Stationary, and Nonroad Engines (40 CFR 1068); Mandatory Reporting of Greenhouse Gases (40 CFR 98); and ADEC minor source air quality permitting (18 AAC 50.502–560). Flaring field gas would also be regulated by AOGCC (AS 31.05). The specific regulatory requirements applicable to the Project would be determined during permitting.

3.2.1.1.6 CHANGING ARCTIC CONDITIONS

The existing trend of changing Arctic conditions is expected to continue (see Section 3.1.2.2 [Reasonably Foreseeable Future Trends]). Given this, air and water temperatures will increase and Arctic sea ice will decrease (Forster et al. 2021). With warming temperatures, the IPCC

projects with "low confidence" that an estimated 3 to 41 metric gigatons of carbon will be released from melting permafrost per 1.8 °F (1 degree Celsius) of global warming by 2100 (Forster et al. 2021).

Climate projections indicate that Alaska could experience potential increases in the area burned annually due to wildfires (USGCRP 2018). Warming temperatures in the Arctic are extending the growing season length; increasing the productivity of vegetation; and thawing permafrost, which is increasing the flammability of vegetation and other fuels (UNEP 2022). Permafrost thawing is expected to increase wildfire burning in the Arctic by the end of the century (UNEP 2022).

3.2.1.2 Environmental Consequences

3.2.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.1.1) would continue, as would associated traffic, drilling, production, and other activities that contribute to the existing air quality conditions.

3.2.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

The Project's development and operational profile is consistent with those of most drillsites constructed on the North Slope. Specifically, it is consistent with drillsites evaluated in five recent EISs: GMT1 SEIS (BLM 2014), GMT 2 SEIS (BLM 2018), Nanushuk EIS (USACE 2018), 2020 NPR-A IAP EIS (BLM 2020), and Willow SEIS (BLM 2023). Most of these EISs have air quality monitoring data recorded since drillsite inception. Consistent with 33 CFR 333.23, USACE minimized the undertaking of new research and used reliable existing data from analogous developments to estimate potential pollutant concentrations attributable to the Project. Because prior analyses did not include recently constructed nearby and upwind emission sources, USACE used supplemental dispersion modeling results to evaluate potential cumulative impacts in Nuiqsut from the Project in combination with recently permitted emission sources (SLR 2026d).

An emission inventory (EI) was prepared for the Project that estimates monthly emissions of CAPs, HAPs, and greenhouse gas emissions from infrastructure construction through well construction (drilling and completions) and routine operations for the 30-year Project life (SLR 2026b). The EI presents emissions based on the defined Project schedule and anticipated Project activities and also uses existing data from analogous developments to estimate potential air pollutant emissions from Project activities. This EI is based on information from other CPAI North Slope projects, including drillsites in the NPR-A, such as GMT1, GMT2[6], and Willow drillsites. The methodologies and assumptions used for developing the EI are provided in the *CD8 Emissions Inventory Technical Supporting Document* (SLR 2026b).

[6] Some existing air quality permits may refer to GMT1 and GMT2 as MT6 and MT7 respectively.

Criteria Air Pollutants

Predicted Maximum Criteria Air Pollutant Concentrations

Table 3.2-5 presents a summary of estimated maximum predicted CAP concentrations in comparison to the NAAQS and AAAQS based on a review of data from analogous projects (SLR 2026c). The table shows that the estimated Project CAP concentrations, when added to ambient CAP concentrations, are less than the NAAQS and AAAQS. Additional information regarding how the estimated Project CAP concentrations in Table 3.2-5 were derived is provided in the *CD8 Project. Air Quality Impact Analysis Report - Rev 02* (SLR 2026c).

Table 3.2-5. Estimated Maximum CD8 Project Pollutant Concentrations for all Project Phases

Pollutant	Averaging Period	Estimated Maximum Project Concentration (µg/m^3)*	Ambient Concentrations (µg/m^3)	Cumulative Concentration (µg/m^3)	Percentage of NAAQS and AAAQS	NAAQS and AAAQS (µg/m^3)
NO_2	1-hour	166.20†		166.20	91%	188
	Annual	55.00	2.90	57.90	60%	100
CO	1-hour	1,435.00	10,301.00	11,736.00	30%	40,000
	8-hour	1,124.00	3,434.00	4,558.00	50%	10,000
SO_2	1-hour	25.50	9.00	34.50	20%	196
	3-hour	55.00	10.00	65.00	5.0%	1,300
	24-hour	13.00	9.30	22.30	6.1%	365
	Annual	0.90	1.80	2.70	3.4%	80
PM_{10}	24-hour	66.40	67.90	134.30	93%	150
$PM_{2.5}$	24-hour	22.30	7.00	29.30	86%	35
	Annual	5.83	2.20	8.03	89%	9

Source: SLR (2026c).

* The analysis assumes that impacts from nearby emissions sources other than the CD8 Project are adequately characterized by existing ambient air quality data. Thus, the estimated maximum project concentration values represent impacts from only the CD8 Project and no other sources (SLR 2026c).

† Ambient 1-hour NO_2 concentrations are included in the estimated maximum project concentration values and cannot be broken out because of the way that the dispersion model (AERMOD) was configured for the analysis (SLR 2026d).

Table 3.2-5 shows that CAP concentrations during the life of the Project are expected to be below the NAAQS and AAAQS, with the possibility that short-term CAP concentrations could approach the NAAQS and AAAQS (SLR 2026c). Long-term CAP concentrations due to Project construction emissions are predicted to remain below applicable standards because construction activities that would result in relatively high levels of CAP emissions would be short term and intermittent and, therefore, would not significantly contribute to long-term average CAP concentrations (SLR 2026c).

Air Quality Modeling at Nuiqsut

Air quality modeling was conducted for the Project to quantify potential CAP concentrations in Nuiqsut. This analysis included an evaluation of estimated potential short-term average concentrations of NO_2, PM_{10}, and $PM_{2.5}$ and annual concentrations of $PM_{2.5}$ from Project sources during several scenarios throughout the 30-year Project life. Modeling is described in detail in

CD8 Project Cumulative Ambient Air Quality Impact Assessment Supplemental Modeling at Nuiqsut (SLR 2026d), which is incorporated by reference and summarized here.

MODELING METHODOLOGY

Air quality modeling was conducted using the current version of the EPA-approved American Meteorological Society/EPA Regulatory Model (AERMOD) (Version 24142) and AERMOD model pre-processors. The modeling domain included a 1 × 1–km cartesian receptor grid with receptors placed every 100 meters. The grid was centered on Nuiqsut to predict air pollutant concentration gradients across the community.

PROJECT-ONLY MODELING RESULTS

Project-only concentrations at Nuiqsut for all modeled scenarios are summarized in Table 3.2-6. The highest predicted concentrations would occur during the overlap of operations and drilling, although impacts during the overlap of drilling and construction are comparable. The drilling and construction scenario is representative of activities expected to occur for approximately 1 year. Concurrent operations and drilling activities are anticipated to occur for 3 years. Estimated Project-only impacts during operations alone are an order of magnitude lower than those from any other phase or overlapping combination of phases. In all cases, modeled concentrations are similar to or less than measured ambient concentrations and are below the NAAQS and AAAQS. The first year of Project construction was not modeled because the highest Project emission rates during construction would occur during Year 2 when construction would overlap with drilling. Therefore, the results of the construction and drilling model scenario provide an upper-bound estimate of the pollutant concentrations that would occur during Year 1 of construction and show that concentrations from construction alone would be below the NAAQS and AAAQS.

Table 3.2-6. Predicted Project-Only Pollutant Concentrations at Nuiqsut

Pollutant and Averaging Period	Maximum Predicted Design Value Concentration (µg/m^3)	Percentage of NAAQS and AAAQS	NAAQS and AAAQS (µg/m^3)
Construction and Drilling (Year 1, Month 11–Year 2, Month 10)			
1-hour NO_2	35.90	19.40%	188.00
24-hour PM_{10}	1.82	1.21%	150.00
24-hour $PM_{2.5}$	0.69	1.96%	35.00
Annual $PM_{2.5}$	0.09	1.04%	9.00
Operations and Drilling (Years 3–5)			
1-hour NO_2	37.40	19.89%	188.00
24-hour PM_{10}	1.91	1.27%	150.00
24-hour $PM_{2.5}$	0.73	2.08%	35.00
Annual $PM_{2.5}$	0.10	1.10%	9.00
Operations (Years 8–30)			
1-hour NO_2	3.47	1.85%	188.00
24-hour PM_{10}	0.59	0.39%	150.00
24-hour $PM_{2.5}$	0.13	0.37%	35.00
Annual $PM_{2.5}$	0.018	0.20%	9.00

Source: SLR (2026d).

CUMULATIVE MODELING RESULTS

The permitted (but not yet constructed) Pikka drillsite 3 (DS3, now called Nanushuk Drillsite C [NDC]; see Table 3.1-3) is approximately 4.3 miles (7 km) northeast of the CD8 drillsite. Because NDC emissions are not represented in the existing ambient air pollutant data, NDC was modeled using emissions data provided in the air quality minor permit for the Pikka drillsite B, which was recently issued by ADEC. Potential air quality impacts from other off-site sources are represented in the ambient air quality data.

Cumulative estimated CAP concentrations at Nuiqsut for all Project scenarios are presented in Table 3.2-7. The estimated cumulative concentrations are the sum of 1) the ambient concentration, 2) predicted CD8 emissions, and 3) predicted NDC emissions at the locations of maximum predicted concentration within the model receptor grid.

Table 3.2-7 shows that the maximum modeled air pollutant concentrations when added to the respective ambient concentrations would be less than 55% of the respective NAAQS and AAAQS. Predicted Project-only PM_{10} and $PM_{2.5}$ concentrations at Nuiqsut for all modeled scenarios would be at least an order of magnitude below the respective ambient concentrations. In contrast, the model-predicted maximum cumulative 1-hour average NO_2 concentration at Nuiqsut would be greater than the respective ambient 1-hour average NO_2 concentration. Adding the ambient 1-hour average NO_2 concentration to the maximum modeled 1-hour average NO_2 concentration results in a maximum 1-hour average NO_2 concentration equal to 99.6 $\mu g/m^3$, which is 53.0% of the 1-hour average NO_2 AAAQS. Across all scenarios, the predicted 1-hour NO_2 cumulative concentrations would be approximately half of the NAAQS and AAAQS.

Table 3.2-7. Predicted Cumulative Pollutant Concentrations at Nuiqsut

Pollutant	Maximum Predicted Concentration (µg/m^3)		Ambient Concentration (µg/m^3)	Cumulative Concentration (µg/m^3)	Percentage of NAAQS and AAAQS	NAAQS and AAAQS (µg/m^3)
	CD8 Only	Nearby Sources				
Construction and Drilling (Year 1, Month 11–Year 2, Month 10)						
1-hour NO_2	33.00	17.20	48.03	98.23	52.25%	188.00
24-hour PM_{10}	1.84	0.37	70.00	72.21	48.14%	150.00
24-hour $PM_{2.5}$	0.72	0.27	8.67	9.66	30.00%	35.00
Annual $PM_{2.5}$	0.09	0.03	2.76	2.89	34.00%	9.00
Operations and Drilling (Year 3–5)						
1-hour NO_2	34.40	17.20	48.03	99.63	52.99%	188.00
24-hour PM_{10}	1.93	0.37	70.00	72.30	48.20%	150.00
24-hour $PM_{2.5}$	0.76	0.27	8.67	9.70	30.00%	35.00
Annual $PM_{2.5}$	0.10	0.035	2.76	2.89	34.00%	9.00
Operations (Year 8–30)						
1-hour NO_2	3.26	12.40	48.03	63.69	33.88%	188.00
24-hour PM_{10}	0.47	0.38	70.00	70.85	47.24%	150.00
24-hour $PM_{2.5}$	0.13	0.15	8.67	8.94	30.00%	35.00
Annual $PM_{2.5}$	0.02	0.02	2.76	2.80	33.00%	9.00

Source: SLR (2026d).
Note: The design values for the cumulative model scenarios are appropriately based on the sum of impacts from modeled sources that are then ranked for comparison to the NAAQS/AAAQS. Given this, the maximum CD8-only impacts in this table are not expected to equal the independently ranked CD8-only impacts in Table 3.2-6.

ADDITIONAL ANALYSIS OF DRILLING WITH POWER FROM THE ALPINE CENTRAL FACILITY

Electrical power for drilling would be predominantly supplied by power from the ACF. This would be supplemented by approximately three 1.6-megawatt diesel-fired reciprocating generator engines onboard the drill rig to address transient loads or to control the rig when electricity from ACF is unavailable. The EI and the modeling described above conservatively assumed that the engines would operate at approximately 25% load. However, when power is supplied via power cable, a single supplemental engine would likely operate at less than 10% load.

Therefore, an additional analysis was conducted with the same modeling approach but incorporating a reduced operating load for drill rig generator engines. The results of this analysis indicate that the Project-only maximum 1-hour average NO_2 concentration predicted in Nuiqsut for the highest-emitting operating scenario (operations combined with drilling) would be 20.2 µg/m^3 (Table 3.2-8). This is a 46% decrease from the modeled Project-only maximum 1-hour average NO_2 impact in Nuiqsut shown in Table 3.2-6. The modeled Project-only maximum particulate (PM_{10} and $PM_{2.5}$) concentrations are predicted to be 30% to 35% lower in Nuiqsut in comparison to the modeled 25% engine load scenario. In all cases, modeled concentrations would be similar to or below measured ambient concentrations and remain below the NAAQS and AAAQS. Incorporating electrical power supplied by power cable would reduce predicted maximum concentrations at Nuiqsut for all modeled scenarios.

Table 3.2-8. Predicted Project-Only Pollutant Concentrations at Nuiqsut with Power from the Alpine Central Facility

Pollutant and Averaging Period	Maximum Predicted Design Value Concentration (µg/m^3)	Percentage of NAAQS and AAAQS	NAAQS and AAAQS (µg/m^3)
Construction and Drilling (Year 1, Month 11–Year 2, Month 10)			
1-hour NO_2	18.70	10.00%	188.00
24-hour PM_{10}	1.34	0.89%	150.00
24-hour $PM_{2.5}$	0.47	1.33%	35.00
Annual $PM_{2.5}$	0.06	0.70%	9.00
Operations and Drilling (Years 3–5)			
1-hour NO_2	20.20	10.74%	188.00
24-hour PM_{10}	1.43	0.95%	150.00
24-hour $PM_{2.5}$	0.51	1.44%	35.00
Annual $PM_{2.5}$	0.07	0.76%	9.00

Source: SLR (2026d).

Volatile Organic Compounds and Hazardous Air Pollutants

Table 3.2-9 summarizes the maximum predicted HAPs concentrations in comparison to the applicable health-based standards (RELs, AEGLs, and RfCs) based on the analysis of data from analogous projects (SLR 2026c). HAP concentrations resulting from Project emissions are predicted to reach a maximum within 0.06 mile (100 meters) of activities and decrease from that point outward based on the results from previous analyses of analogous drillsites on the North Slope (BLM 2014, 2018, 2023). HAP concentrations in Nuiqsut due to Project sources are

anticipated to be orders of magnitude lower because of atmospheric dispersion and thus would be below health-based standards.

Table 3.2-9. Estimated Maximum Project Hazardous Air Pollutant Concentrations

Pollutant	Averaging Period	Estimated Maximum Project HAP Concentration (µg/m^3)	Percentage of Standard	Standard (µg/m^3)
Benzene	1-hour	12.9¶	47.78%	27.00 (acute REL)
	8-hour	9.00	<1.00%	29,000.00 (8-hour AEGL)
	Annual	1.30	4.33%	30.00 (non-cancer chronic RfC)
Ethylbenzene	1-hour	340.00	<1.00%	140,000.00*
	8-hour	220.00	<1.00%	140,000.00 (8-hour AEGL)
	Annual	7.70	2.96%	260.00 (RfC)
Formaldehyde	1-hour	10.00	18.18%	55.00 (acute REL)
	8-hour	4.20	<1.00%	1,100.00 (AEGL)
	Annual	0.30	3.06%	9.80 (non-cancer chronic RfC)
n-Hexane	1-hour	1,300.00	<1.00%	10,000,000.00*
	8-hour	550.00	<1.00%	10,000,000.00 (8-hour AEGL)
	Annual	20.00	2.86%	700.00 (RfC)
Toluene	1-hour	62.00	1.24%	5,000.00 (acute REL)
	8-hour	26.00	<1.00%	250,000.00 (8-hour AEGL)
	Annual	1.00	<1.00%	5,000.00 (non-cancer chronic RfC)
Xylene	1-hour	660.00	3.00%	22,000.00 (acute REL)
	8-hour	440.00	<1.00%	560,000.00 (8-hour AEGL)
	Annual	15.00	15.00%	100.00 (RfC)
Acetaldehyde†	1-hour	3.20	< 1.00%	81,000.00 (8-hour AEGL)
	8-hour	1.30	< 1.00%	81,000.00 (8-hour AEGL)
	Annual	0.10	1.11%	9.00 (RfC)
Ethylene Glycol‡	1-hour	0.00	0.00%	NA
	8-hour	0.00	0.00%	NA
	Annual	0.00	0.00%	400.00 (RfC)
Methanol§	1-hour	2,400.00	<1.00%	690,000.00 (1-hour AEGL)
	8-hour	1,500.00	<1.00%	350,000.00 (8-hour AEGL)
	Annual	56.00	<1.00%	20,000.00 (RfC)

Note: Project concentration is estimated to 2 significant digits and includes the ambient concentration. Values presented in this table are from projects most representative of the CD8 Project. For definitions, refer to EPA (2025b). For standards, refer to EPA (2021).

* No REL available for these air toxics. Values shown are AEGLs for mild effects (AELG-1) (ethylbenzene) and moderate effects (AEGL-2) (n-hexane).

† Acetaldehyde: Estimated concentrations are derived from formaldehyde predictions using a ratio of the emission factors documented by EPA diesel fuel combustion (EPA 2025c:Table 3.4-3).

‡ Ethylene glycol: The Project is not a source of ethylene glycol emissions.

§ Methanol: Estimated concentrations are derived from ethylbenzene predictions using a factor of 7, which is the ratio of Project methanol emissions to ethylbenzene emissions.

¶ The most conservative and representative estimated maximum Project 1-hour benzene concentration is from the 2020 NPR-A IAP EIS (BLM 2020).

Cancer risks for the analyzed carcinogenic HAPs (benzene, ethylbenzene, and formaldehyde) were calculated and assessed against a 1-in-1-million cancer threshold based on information in the Superfund National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300). This plan states that for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper-bound lifetime cancer risk to an individual of between 1 in 10,000 and 1 in 1 million.

Cancer inhalation risk due to long-term exposure to carcinogenic HAPs was calculated by multiplying the estimated annual HAP concentration near Nuiqsut by the cancer unit risk factor and multiplying this product by the exposure adjustment factor. The only receptor where the cancer risk was calculated was at Nuiqsut, where individuals would be potentially exposed on a long-term basis. The exposure adjustment factor is intended to represent the ratio of projected exposure time (the life of the Project: 30 years) to 70 years. The calculated cancer risk was compared to a risk range of one in one million (EPA 2006).

Table 3.2-10 presents the estimated carcinogenic HAP risks near Nuiqsut due to HAPs emissions from the Project (SLR 2026c). Predicted carcinogenic HAPs concentrations at Nuiqsut would be two orders of magnitude below the one-in-one million cancer risk screening threshold.

Modeling conducted for analogous drillsites indicates that short- and long-term air pollutant concentrations attributable to the Project are expected to be below the health-based standards throughout the life of the Project (BLM 2014, 2018, 2023). Discrete VOC sampling confirms modeled predictions that have been conducted for analogous drillsites (SLR 2025b).

Table 3.2-10. Estimated Carcinogenic Hazardous Air Pollutants Cancer Risk Near Nuiqsut

HAP	NEPA Analysis Resulting in the Estimated Maximum HAP Concentration	Estimated Maximum Project Annual HAP Concentration near the Project ($\mu g/m^3$)	Diffusion Estimate Ratio at 2.5 miles*	Estimated Maximum Project Annual HAP Concentration Near Nuiqsut ($\mu g/m^3$)	Cancer Unit Risk Factors ($1/(\mu g/m^3)$)†	Exposure Adjustment Factor‡	Calculated Cancer Risks Near Nuiqsut	Cancer Threshold§
Benzene	GMT2 SEIS	1.29	0.0067	0.01	7.80E-06	0.43	2.88E-08	1.00E-06
Ethylbenzene	Willow SEIS	7.70		0.05	2.50E-06		5.52E-08	1.00E-06
Formaldehyde	GMT2 SEIS	0.30		<0.01	1.30E-05		1.12E-08	1.00E-06
						Total	**9.52E-08**	1.00E-06

* Based on a slightly unstable atmosphere typical of the North Slope maximum HAP concentrations predicted for representative projects have been adjusted using diffusion estimates from Turner (1970) to estimate Project HAP concentrations near Nuiqsut, where at 2.5 miles (approximate distance from CD8), concentrations are scaled by a ratio of 0.00001/0.0015 to estimate the predicted concentration at that distance.

† Values referenced from EPA 2021.

‡ The exposure adjustment factor is the same as used in the Willow SEIS (BLM 2023), which is based on a ratio of the projected exposure time (life of the project as 30 years) divided by 70 years.

§ Threshold based on the Superfund National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300).

Spills and Inadvertent Releases

Chapter 4 (Spills and Inadvertent Releases) describes the likelihood, types, and sizes of spills that could occur because of the Project. Under all action alternatives, spills and inadvertent releases of oil or other hazardous materials could occur. Spills associated with the storage, use, and transport of waste or hazardous materials (e.g., diesel, gasoline, other chemicals) during all Project phases would likely be contained on gravel or ice pads, inside structures, or within secondary containment structures. Therefore, these types of spills could result in VOC and HAP emissions from the spill itself as well as NO_X, SO_2, CO, PM, VOCs, and HAPs emissions associated with equipment used for containment, transportation, and cleanup (including burning); therefore, they would contribute incrementally to increased air concentrations of VOCs, NO_2, CO, SO_2, $PM_{2.5}$, PM_{10}, and HAPs.

Large spill cleanup activities could require burning crude residues in place, which would cause smoke releases and local and regional haze impacts. ADEC, U.S. Geological Survey (USGS), and EPA have developed approved guidelines for burning (ADEC et al. 2008). These guidelines would be used to authorize an emergency burn of oil. Such a spill occurrence requiring this level of spill cleanup activity would be unlikely (see Chapter 4). Emissions from spill cleanup activity would be possible and the magnitude would depend on the extent of the spill.

Summary

Table 3.2-11 summarizes Project impacts to air quality.

Table 3.2-11. Summary of Impacts to Air Resources by Action Alternative

Air Resources Impact Metric	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
CAPs	Predicted maximum concentrations in the analysis area would be below the NAAQS and AAAQS. Modeled Project-only air pollutant concentrations at Nuiqsut would be equivalent to, or less than, measured ambient concentrations.	Predicted maximum concentrations at Nuiqsut would be lower than Alternative B. Predicted concentrations at Nuiqsut would be lower than Alternative B due to increased distance, less alignment with the prevailing wind direction and Nuiqsut, lower production rate, and reduced construction emissions during Year 0 and Year 1. Predicted concentrations are expected to be near-ambient concentrations at Nuiqsut (3.1 miles from the Alternative C drillsite). Predicted concentrations at Nuiqsut would be below the NAAQS and AAAQS.	Predicted concentrations at Nuiqsut would be lower than Alternative B. Predicted cumulative concentrations at Nuiqsut would be lower than Alternative B due to increased distance and less alignment with the prevailing wind direction and Nuiqsut. Predicted cumulative concentrations at Nuiqsut would be below the NAAQS and AAAQS.

Air Resources Impact Metric	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
HAPs and VOCs	Predicted concentrations would remain below health-based standards in the analysis area and at locations commonly accessed by the public in Nuiqsut. Predicted concentrations would decrease with increasing distance from the Project drillsite. A Project-specific cancer risk analysis at Nuiqsut indicates that the risk from carcinogenic pollutants potentially emitted by the Project is approximately two orders of magnitude lower than the threshold that would trigger a more detailed review (i.e., less than 1 in 100 million).	Predicted concentrations at Nuiqsut would be lower than Alternative B. Predicted maximum concentrations would decrease with increasing distance from the Project drillsite. Predicted concentrations at locations commonly accessed by the public in Nuiqsut (3.1 miles from the Alternative C drillsite) would be below health-based standards. The risk from carcinogenic pollutants potentially emitted by the Project would be similar to Alternative B but lower due to increased distance from the source. Thus, impacts to air quality due to Alternative C VOC and HAP emissions would be negligible.	Same as Alternative C.

3.2.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C (3.1 miles from Nuiqsut) would have the same types of air quality impacts as Alternative B, but the magnitude of impacts in Nuiqsut would be reduced because the drillsite would

- be located 1 mile further from the community;
- be less aligned with the prevailing wind direction (see Figure 4.4-2) and Nuiqsut; and
- have lower production, decreased construction emissions due to the reduced number of truck trips (Year 0 and Year 1), a smaller gravel footprint, and a shorter gravel access road compared to Alternative B.

Thus, the predicted pollutant concentrations at Nuiqsut from Alternative C would be lower than the predicted pollutant concentrations at Nuiqsut from Alternative B.

Furthermore, the Alternative C drillsite would be situated northeast of Nuiqsut and divergent to the prevailing east-northeast wind direction. Thus, the prevailing winds would result in Nuiqsut being upwind of the Alternative C drillsite most of the time, rather than downwind. Analysis of meteorological data indicates that Nuiqsut would be downwind of the Alternative C drillsite approximately 38% of the year, compared to 52% of the year under Alternative B. Wind direction and its relation to local emission sources and a nearby ambient air quality monitor can have a demonstrable impact on the measured ambient concentration. For example, the 3-year average of the annual 98th percentile of the ambient 1-hour daily maximum NO_2 concentrations measured at the CPAI Nuiqsut air quality monitoring station from 2023 through 2025 is 40.6 micrograms per cubic meter ($\mu g/m^3$) when winds originate from the north through southeast, but increases to 53.2 $\mu g/m^3$ when winds come from the southeast through the north (SLR 2026d). Thus, Alternative C would have less of an impact on air quality at Nuiqsut compared to Alternative B.

The types of impacts to air quality from potential spills or other incidental releases under Alternative C would be the same as Alternative B, but the magnitude of impacts at Nuiqsut would be reduced because the drillsite would be 1 mile further from the community and less aligned with the prevailing wind direction.

3.2.1.2.4 ALTERNATIVE D – NORTHWEST ALTERNATIVE

Like Alternative C, the types of impacts to air quality under Alternative D (2.5 miles from Nuiqsut) would be the same as Alternative B, but the magnitude of impacts at Nuiqsut would be reduced because the drillsite would be 0.4 mile further from the community and at a north-northeast bearing, which is less aligned with the prevailing wind direction (see Figure 4.4-3). An analysis of meteorological data shows that the community is downwind of the Alternative D drillsite approximately 23% of the year, the lowest of the three alternatives and roughly half the frequency of Alternative B. Although Alternative D is only 0.4 mile farther from Nuiqsut than Alternative B, the substantially reduced downwind frequency indicates that Project emissions would be dispersed toward Nuiqsut far less frequently under this alternative.

Spills and other incidental releases under Alternative D would likewise result in the same types of impacts to air quality as described for Alternative B, but the magnitude of impacts at Nuiqsut would be reduced compared to Alternative B because the drillsite would be 0.4 mile further from the community and less aligned with the prevailing wind direction.

3.2.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions in the analysis area include continued oil and gas exploration and development. Most RFF oil and gas projects would be between 10 and 60 miles from the CD8 Project area; CPAI and Kuukpik each have one small expansion project within 3 miles of the CD8 Project area. RFF actions also include several community development projects, including a cultural center, a teen center, a boat ramp, and other community improvements. Section 3.1.2 (Reasonably Foreseeable Future Actions and Trends Relevant to USACE Public Interest Review and Section 404(b)(1) Guidelines) describes RFF actions in more detail.

In addition, Pikka DS3 (now called NDC, a permitted, but not-yet-constructed emission source included in the modeling) and potential impacts from RFF oil and gas activities could be distributed over a large regional area. As concluded in the GMT1 Supplemental EIS (BLM 2014), emissions associated with these routine program activities would increase, although all applicable standards would continue to be met. Maximum concentrations of air pollutants would occur within 0.06 mile (100 m) of the source and would dissipate as distance from the facility increases. Cumulative interaction between other regional developments would be unlikely to occur.

As described in Section 3.2.1.1.6 (Changing Arctic Conditions) and in Section 3.1.2.2 (Reasonably Foreseeable Future Trends), the existing trend of changing Arctic conditions is expected to continue in the Project area with projected increases in average annual temperature, precipitation, and dates for freeze and thaw. The Project would contribute to this RFF trend through direct greenhouse gas emissions during all phases of construction, drilling, and operations.

3.2.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OFFEDERAL RESOURCES

Air resources are managed under the CAA and thus are Federal resources. Impacts to air resources would not be irretrievable or irreversible because emissions would cease after Project decommissioning. Based on distance and location of the Project relative to Nuiqsut, Alternative B would have the highest level of irretrievable impacts on this Federal resource, whereas Alternative C would have the least.

3.3 CULTURAL RESOURCES

3.3.1 How would the Project impact the physical integrity of cultural resources (including historic properties, archaeological resources, and cultural landscapes)?

Cultural resources are finite, non-renewable resources located in a physical place and within a specific context or environment; thus, the analysis area for the physical integrity of cultural resources (i.e., the physical impacts analysis area) is the Project footprint (Figures 3.3-1 and 3.3-2). The footprint includes Project gravel roads and pads, bridges, culverts, ice infrastructure, and pipelines on new VSMs. The construction of these components has the potential to negatively impact the physical integrity of cultural resources. The temporal scale for analysis is the 30-year Project life and beyond since the gravel infrastructure is likely to remain in place. Temporary impacts would be present during a discrete point in time, whereas permanent impacts would last the life of the Project (30 years) or beyond.

3.3.1.1 Affected Environment

Cultural resources include historic properties, archaeological resources, and cultural landscapes and their associated contributing elements. Cultural resources are typically identified through field surveys, historical documentation, oral history, and contemporary interviews. Cultural resource surveys using pedestrian survey and low-elevation helicopter reconnaissance have occurred over much of the analysis area, particularly along Alternative B and shared elements between all three action alternatives (Lobdell 1995, 1997, 2000; Northern Land Use Research 2004; Reanier 2001, 2004, 2009, 2010, 2012, 2016, 2025; Ramsey 2017). Cultural resources in the analysis area broadly represent a long history of Indigenous land use culminating in the most recent land use by present-day Iñupiat with post-contact influences from Euro-Americans beginning in the nineteenth century (see BLM 2018:155–163 for a discussion of historic context). Previously identified cultural resources in the Project area are primarily documented in the Alaska Heritage Resource Survey (AHRS) (ADNR 2026); the NSB Iñupiat History, Language, and Culture (IHLC) traditional land use inventory (TLUI) (IHLC 2026); and Indigenous place name (IPN) databases (Smith and Kari 2025). Notably, cultural resources in these databases are primarily mapped as points, and point data are insufficient to accurately represent the extents of certain cultural resources, particularly those that reference larger areas (e.g., trails; villages; and traditional hunting, fishing, or camping areas).

IPNs, particularly landscape features (e.g., lakes, rivers), have not previously been analyzed as cultural resources in recent NEPA analyses in the region (BLM 2018, 2023). IPNs encode historical events, spiritual associations, and subsistence practices that may not be visible in the archaeological record. They are a form of Indigenous knowledge collected about culturally important places. As a result, IPNs can identify culturally significant areas that might otherwise be overlooked in standard cultural resource surveys. IPNs are particularly useful in documenting traditional cultural places (TCPs) and cultural landscapes. TCPs and cultural landscapes are not limited to discrete archaeological sites; they include networks of places connected through travel routes, subsistence areas, spiritual locations, and named features on the land. IPNs provide critical information for identifying these relationships and assessing potential impacts of proposed actions.

Additional information in this section is derived from relevant cultural resource literature (e.g., oral histories, reports, gray literature, academic journals). Cultural resources may be eligible for the National Register of Historic Places (NRHP); if eligible, they are called "historic properties." None of the cultural resources discussed in this EIS have had previous determinations of eligibility; see Section 3.3.1.2.6.

There is one documented cultural resource within the physical impacts analysis area (Table 3.3-1). This cultural resource is an IPN for the Kupigruak Channel/East Channel of the Colville River, which is recorded within the Alaska Place Name Database as "Kuukpik" and has been instrumental in the lifeways of the Iñupiat as both a traditional travel route and harvest area. An additional documented cultural resource, TLUIHAR059, which is represented as a point in the TLUI database, is mapped outside of the physical impacts analysis area but possibly extends into the physical impacts analysis area (see discussion below in Section 3.3.1.2.2 [Alternative B – Applicant's Preferred Alternative]). TLUIHAR059 is a fishing area and associated trail near CD4.

Table 3.3-1. Documented Indigenous Place Name in the Physical Impacts Analysis Area

IPN	Translation	Location
Kuukpik	None provided	Kupigruak Channel/East Channel of the Colville River

Source: Smith and Kari (2025).

Undocumented cultural resources could be present within the physical impacts analysis area, particularly in portions of the footprint of the action alternatives that have not been surveyed for cultural resources. Areas with high potential for undocumented cultural resources in the analysis area include areas of dry stable ground and areas close to known cultural resources. Therefore, there is a likelihood of compromising the physical integrity of undocumented cultural resources during ground-disturbing activities in the analysis area. Additionally, within the analysis area is the Nuiqsut Cultural Landscape, first described in Brown (1979). Although there is no designation in either the AHRS or NRHP for the Nuiqsut Cultural Landscape, there is a recognition that additional cultural material related to this landscape could be present in the analysis area, and individual resources related to the cultural landscape may qualify for the AHRS or NRHP. Many of the AHRS, TLUI, and IPNs documented within the analysis area are contributing elements to the Nuiqsut Cultural Landscape. For more on how the Nuiqsut Cultural Landscape relates to development, see BLM (2018:166–167).

Past and present actions associated with Alpine, portions of which intersect the physical impacts analysis area, involved (or involve) construction of ice and gravel infrastructure, pipelines, and HDD crossings of the Colville River near known cultural resources, which carried (or carry) the potential to directly damage or destroy the physical integrity of cultural resources. These actions also carried the potential for inadvertent direct effects to undocumented resources during construction. However, development of Alpine generally avoided or mitigated impacts on the physical integrity of cultural resources in the physical impacts analysis area through Section 106 consultation and the implementation of protective measures (e.g., cultural resource surveys and management plans) (BLM 2004:646–649).

Changing Arctic conditions may be contributing to the loss of cultural resources. Because the full range of cultural materials that existed historically is unknown, it is not possible to determine the extent of resources that may already have been lost. Additionally, because many factors

influence changing Arctic conditions, it is difficult to predict and analyze its impacts on known cultural resources as many negative effects are localized and somewhat unpredictable. In general, cultural material is affected by changing conditions through erosion and the loss of permafrost, which can lead to mass wasting of organic remains at cultural resource sites; see BLM 2023:Appendix F (Cultural Resources Findings: Process and Analysis) for more information.

3.3.1.2 Environmental Consequences

The CD8 Project could impact the physical integrity of cultural resources through the installation of gravel infrastructure, ice roads, and pipelines. Because cultural material has a physical presence on the landscape, either on the surface, in the subsurface, or as the landscapes themselves, they would be threatened by actions that disturb those contexts. Table 3.3-2 presents the documented cultural resources within the physical impacts analysis area, by alternative. The IPN Kuukpik is the only previously documented cultural resource within the analysis area, and TLUIHAR059 could also extend into the analysis area.

Table 3.3-2. Documented Cultural Resources in the Physical Impacts Analysis Area by Action Alternative

Dataset	Alternative B – Applicant's Proposed Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
AHRS sites	0	0	0
TLUI sites	0	0	0
IPNs	1	1	1
Total	**1**	**1**	**1**

3.3.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.1.1.1 [Affected Environment]) would continue. Existing and RFF trends, such as changing Arctic conditions and increased development around the NPR-A, would likely continue. RFF actions may affect the physical integrity of cultural resources; however, future development on Federal lands or having a Federal nexus (i.e., the majority of RFF actions in the physical impacts analysis area) will be subject to project-specific analyses, and historic properties would be subject to National Historic Preservation Act Section 106 consultation along with associated measures to avoid and minimize potential adverse effects.

3.3.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Alaska Heritage Resource Survey Sites

There are no cultural resource sites in the physical impacts analysis area currently listed in the AHRS database. This does not preclude the presence of cultural resources eligible for the AHRS, as there is potential for previously undocumented cultural material to occur in the Alternative B footprint. However, cultural resource surveys have been conducted for the Alternative B footprint, which lessens the potential for undocumented cultural resources to be encountered. These surveys have included a combination of pedestrian survey and low-altitude helicopter reconnaissance, most recently examined by Reanier (2025).

Traditional Land Use Inventory Sites

No TLUI sites are documented in the physical impacts analysis area. TLUIHAR059 is north of the analysis area at the north end of the proposed gravel road. TLUIHAR059 is a point used to represent a trail and fishing area. Therefore, the full extent of the cultural resource has not been mapped, and it is unknown whether it would overlap with nearby Project components (the nearest of which would be a temporary ice road approximately 300 feet away and the gravel road approximately 450 feet away). Reanier (2025) concluded that the TLUI site's location was in doubt and that no cultural material had been observed during helicopter reconnaissance survey by any researcher over the last two decades.

Indigenous Place Names

There is one IPN within the Alternative B footprint: Kuukpik (Kupigruak Channel/East Channel of the Colville River). During Year 2, a Project-specific ice road would be constructed on the IPN between the existing Alpine WNS ice road and the existing Alpine sales oil pipeline. However, because the ice road would be temporary and this IPN represents a long, linear water feature that would be intersected in one small locale by the Project ice roads, no negative effects are anticipated.

Spills and Inadvertent Releases

Chapter 4 describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. The impact of spills has been well documented in other Alaskan contexts and has shown that hydrocarbon contamination and subsequent cleanup efforts can adversely affect surface and subsurface cultural materials (Dekin et al.1993; Haggarty et al. 1990).

Small spills are likely to occur and have occurred across the North Slope. Spills of oil from leaking wellheads, facility piping, process piping, or aboveground storage tanks (ASTs) would likely be contained to, and cleaned up on, gravel pads or their immediate fringes. These types of spills would not have the potential to impact the physical integrity of cultural material near facilities or structures.

In the very unlikely event that a reservoir blowout occurs at the drillsite (likelihood approaching zero, as described in Chapter 4), the extent of the inadvertent release could be much larger. A reservoir blowout under Alternative B would have the most pronounced impacts on the physical integrity of cultural resources because of the proximity of the drillsite to Putu. Should a blowout occur, fallout could reach the Niġliq Channel and affect sites downstream (Section 4.4.1.2 [Reservoir Blowout] and Figure 4.4-1).

Large spill cleanup activities could require burning crude residues in place, which in turn could adversely affect the physical integrity of cultural resources should they be present in the burn area. In-situ burning would be approved in accordance with ADEC guidelines, which require coordination with cultural resource agencies and emergency consultation with SHPO under Section 106 of the National Historic Preservation Act (ADEC 2022).

Summary

There is one documented cultural resource within the Alternative B footprint. The IPN Kuukpik (Kupigruak Channel/East Channel of the Colville River) is unlikely to be negatively impacted by Alternative B due to the nature of the resource (a river channel used for traditional travel and harvesting) and the short-term and seasonal nature of the associated Project activity (an ice road). TLUIHAR059 is mapped approximately 450 feet outside the Project's gravel infrastructure; however, because this cultural resource is a larger use area represented by a point, there is potential for unmapped elements of this resource to extend into the physical impacts analysis area. If so, TLUIHAR059's physical integrity could be adversely affected by Alternative B.

Given the current understanding of the cultural resources in the physical impacts analysis area, Alternative B is unlikely to impact the physical integrity of cultural resources. The Alternative B alignment has previously been surveyed for cultural resources at varying intensities. Although unlikely, there remains the potential for previously undocumented cultural material, particularly near known cultural resources. Furthermore, the absence of a recorded cultural resource should not be interpreted as the absence of cultural significance as many culturally significant places are landscape-based and continue to be identified through Tribal knowledge and ongoing consultation versus archaeological field surveys. EIS Appendix E mitigation measures 49 and 62 would require archaeological surveys prior to site selection and would require avoidance of facility placement within 500 feet of identified cultural resource sites, Native allotments, and cabins.

3.3.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of impacts to the same documented cultural resources as Alternative B. The IPN Kuukpik would be within the Alternative C footprint, and TLUIHAR059 would be within 500 feet of Alternative C. Compared to Alternative B, Alternative C would have less potential to impact previously undocumented cultural resources due to its smaller footprint (46.9 acres compared to 67.3 acres) and greater distance from areas with higher archaeological potential such as those along Putu Channel. Alternative C would have the smallest gravel footprint and shortest access road, which are the Project activities that would have the greatest potential to damage the integrity of cultural resources. Though most of Alternative C has been recently surveyed for cultural resources at varying intensities, these surveys do not appear to have included the areas where Alternative C footprint deviates from Alternative B, particularly from a pedestrian survey standpoint. However, based on the available information, Alternative C has lower potential to impact cultural resources than Alternative B.

Should a large spill or reservoir blowout occur under Alternative C, oil fallout would be unlikely to reach the Niġliq Channel (see Chapter 4 and Figure 4.4-2).

3.3.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of impacts to the same documented cultural resources as Alternative B. The IPN Kuukpik would be within the Alternative D footprint and TLUIHAR059 would be within 500 feet of Alternative D. Compared to Alternative B, Alternative D would have less potential to impact previously undocumented cultural resources due to its smaller footprint (62.3 acres compared to 67.3 acres) and greater distance from areas with higher archaeological potential. Alternative D would have the second smallest gravel

footprint and second-shortest access road, which are the Project activities that would have the greatest potential to damage the integrity of cultural resources. Although most of the Alternative D footprint has been recently surveyed for cultural resources at varying intensities, these surveys do not appear to have included the areas where Alternative D deviates from Alternative B, particularly from a pedestrian survey standpoint, although the actual Alternative D pad location was previously surveyed during a survey for an ice road in 2004 (Northern Land Use Research 2004).

Should a large spill or reservoir blowout occur under Alternative D, oil fallout would not reach the Niġliq Channel, although oil fallout could be transported to the Niġliq Channel if the spill occurred during high river flows and affect sites downstream (see Chapter 4 and Figure 4.4-2).

3.3.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions in the physical impacts analysis area would be limited to Alpine upgrades (see Section 3.1.2.1 and Table 3.1-3). When combined with the CD8 Project, RFF actions that involve ground-disturbing activities may affect the physical integrity of cultural resources in the physical impacts analysis area through direct damage or destruction, unless avoided or mitigated through consultation and siting to avoid known resources.

Further, development of RFF actions in the surrounding area could increase access to cultural resources in otherwise remote areas, which could increase the likelihood of vandalism, looting, and the unintentional disturbance of cultural material that affects the physical integrity of a cultural resource. However, there are no recorded instances of vandalism or looting of cultural resource sites near CPAI facilities on the North Slope. See the additional two cultural issues sections (Sections 3.3.2 and 3.3.3) for a discussion of the impacts associated with development outside the physical impacts analysis area. The continuing trend of changing Arctic conditions is the most likely to affect the physical integrity of cultural resources through associated erosion and permafrost thaw. See BLM 2023:Appendix F for further discussion on climate impacts to cultural resources in the Project area.

3.3.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

There are no known NRHP-listed or NRHP-eligible historic properties (i.e., Federal resources) that occur within the physical impacts analysis area. However, none of the cultural resources that are documented within the analysis area have been evaluated for NRHP eligibility. Therefore, it is unknown at this time whether there would be an irreversible and irretrievable commitment of Federal resources if a permit were issued. The Section 106 process, which is occurring concurrently with the NEPA process, will address NRHP eligibility for cultural resources within the analysis area.

3.3.2 How would the Project impact non-physical attributes of cultural resources that influence their setting and feeling?

Non-physical impacts to cultural resources are changes to the feeling, setting, character, or associations with the landscape or other cultural resources. This includes changes to the visual setting or ambient sound level. The analysis area for these types of non-physical impacts is the

area within 2.5 miles of the Project footprint for all action alternatives (i.e., the non-physical impacts analysis area) (see Figures 3.3-1 and 3.3-2). The temporal scale of analysis is the life of the Project (30 years) and beyond if the character of the landscape has been permanently altered.

3.3.2.1 Affected Environment

Alaska Heritage Resource Survey

There are nine AHRS sites within the non-physical impacts analysis area, including a scientific exploration camp, historic subsistence camps, and paleontological resources (Table 3.3-3). No formal NRHP determination of eligibility has been conducted for any of the AHRS sites. The one historic exploration site, HAR-00114, has been partially destroyed and most likely dates to 1964–1965 seismic studies in the region. Five AHRS sites (HAR-00089, HAR-00155, HAR-00156, HAR-00157, and HAR-00158) are related to historic Iñupiat subsistence activities and camps. One of the two paleontological sites (HAR-00170) is reported as destroyed in the AHRS; the second (HAR-00031) is approximately 2,500 feet north of Nuiqsut on a bluff above the Niġliq Channel and contains mammoth remains. Paleontological resources listed in the AHRS are noted here but are not addressed further in the environmental consequences portion of this chapter as they are not strictly cultural resources. See PAL-1 in EIS Appendix D (Issues Dismissed from Detailed Analysis).

Table 3.3-3. Documented Alaska Heritage Resource Survey Sites in the Non-Physical Impacts Analysis Area

AHRS Number	Site Name	NRHP Eligibility	Site Summary
HAR-00031	PA, V-50 Bluff Sections On Edge of River	No determination of eligibility	Paleontological
HAR-00055	Caribou Bone	No determination of eligibility	Modern faunal remains
HAR-00089	Nappaun (Napaun)	No determination of eligibility	Fishing, hunting, and camping area
HAR-00114	Seismic Camp	No determination of eligibility	Seismic camp
HAR-00155	Uyagagviit	No determination of eligibility	Net stone quarry; subsistence
HAR-00156	Nanuq	No determination of eligibility	Reindeer herding camp
HAR-00157	Niġlivik 2	No determination of eligibility	Sod house
HAR-00158	Putu	No determination of eligibility	Sod houses
HAR-00170	Mammoth Bone	No determination of eligibility	Paleontological

Source: ADNR (2026).

Traditional Land Use Inventory

There are eight documented TLUI sites within the non-physical impacts analysis area (Table 3.3-4). These sites refer to the village of Nuiqsut, subsistence areas, and historic camps. The TLUI is a primary source of information regarding Iñupiat traditional use areas in the NSB.

Table 3.3-4. Documented Traditional Land Use Inventory Sites in the Non-Physical Impacts Analysis Area

TLUI Number	Name	Site Summary
TLUIHAR059	Apkuġaruk	Fishing area and possible trail
TLUIHAR061	Nuiqsut	Village
TLUIHAR077	Napasalgun	Hunting/camping area

TLUI Number	Name	Site Summary
TLUIHAR079	Putu	Sod houses; grave
TLUIHAR080	Uyabagvik	Net stone quarry; subsistence
TLUIHAR081	Nappaun	Sod house
TLUIHAR082	Nanuq	Bear den; subsistence
TLUIHAR103	Sigiaruk	Fishing, hunting, and camping area

Source: IHLC (2026).

Indigenous Place Names

There are 11 documented IPNs within the non-physical impacts analysis area (Table 3.3-5). These IPNs refer to a stone net quarry, fish camps, hunting camps, a reindeer herding camp, a lake, and streams. Hunting and fishing camps represent places where there were once and likely still are ties to natural resources and the land. Named landscape features contribute to people's sense of identity and are part of the Nuiqsut Cultural Landscape and can be useful in identifying historic use areas (e.g., where you can get many rocks) (BLM 2018:166–167).

Table 3.3-5. Documented Indigenous Place Names in the Non-physical Impacts Analysis Area

IPN	Site Type	Translation	Source(s)	USGS Name
Apkuġaruk	None provided	None provided	Stephen R. Braund & Associates (SRB&A) 2018	–
Uyaġaġviit	Quarry; fish camp	Where you can get many rocks	Brown 1979; SRB&A 2018	–
Niġlivik	Fish camp	None provided	Brown 1979; SRB&A 2018	–
Niġliq	Stream	New deep channel	Smith and Kari 2025; SRB&A 2018	Niġliq Channel
Nanuq	Camp; reindeer herding station	Polar bear	Brown 1979; SRB&A 2018	–
Nanuq	Lake	Polar bear	Smith and Kari 2025	Nanuk Lake
Putu	Hunting camp	Hole/whirlpool	Brown 1979; SRB&A 2018	–
Nuiqsat	Village	None provided	Smith and Kari 2025	Nuiqsut
Kuukpik	Stream	None provided	Smith and Kari 2025; SRB&A 2018	Kupigruak Channel/East Channel of the Colville River
–	Stream	Big curves	Smith and Kari 2025	Sakoonang Channel
–	Stream	It is lost	Smith and Kari 2025	Tamayayak Channel

Sources: Brown (1979), Smith and Kari (2025), SRB&A (2018).
Note: Smith and Kari (2025) is a database of compiled place names and may not be the original source for an IPN. Thus, a site may have a USGS name and translation but no IPN.

Summary of Cultural Resources

All five AHRS sites with Iñupiat affiliation—HAR-00089 (Nappaun), HAR-00155 (Uyaġaġviit), HAR-00156 (Nanuq), HAR-00157 (Niġlivik), and HAR-00158 (Putu)—appear in either local IPN sources or in the TLUI inventory, and their relationship to each alternative is discussed below. In general, there is significant overlap between all three cultural resource datasets, although they are often recorded in slightly different coordinates in IPN sources and the AHRS and TLUI databases. The highest locational variance is TLUIHAR059, which is mapped approximately 1.52 miles southeast of the IPN Apkuġaruk, which shares the same name but has

no description in the IPN source. The IPN point likely refers to the original mapped location of the cultural resource (Reanier 2025). Both the IPN and TLUI are recorded as points, and the description in the TLUI describes a fishing area and trail. Both the IPN and TLUI points could represent different parts of the trail or the fishing area. Putu (AHRS HAR-00158; TLUIHAR079) is also mapped in three different locations, with the IPN approximately 0.55 mile east of the AHRS point and approximately 0.89 mile east of the TLUI point. The site is more likely to be near either the ARHS point or the TLUI point, as it is described as being on a Native allotment. Most of the descriptions are consistent across the different data sources, with Nanuq (AHRS HAR-00156) described as a contemporary subsistence camp and the home of historic reindeer herders in the TLUI and AHRS, whereas one IPN source references Nanuk Lake just north of the AHRS/TLUI point (Smith and Kari 2025). For this analysis, both the lake and camp are included as distinct cultural resource locations.

Past and present actions in the non-physical impacts analysis area primarily include Alpine, the ASRC Mine Site, community infrastructure in Nuiqsut, and existing air and ground traffic. These actions have impacted non-physical attributes of cultural resources through changes to the landscape's visual character and ambient sound levels. Impacts have generally been less severe because the actions were farther away from cultural resources. Changing Arctic conditions contribute to non-physical impacts to cultural resources in ways similar to those described in Section 3.3.1.1 (Affected Environment) and 3.3.1.2.6 (Summary of Irreversible and Irretrievable Commitments of Federal Resources).

3.3.2.2 Environmental Consequences

3.3.2.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.3.2.1 [Affected Environment]) would continue. Existing and RFF trends, such as changing Arctic conditions and increased development around NPR-A, would likely continue. RFF actions in the non-physical impacts analysis area may affect the feeling and setting of cultural resources through noise, visual, and olfactory impacts; however, future development on Federal lands or having a Federal nexus (i.e., most of the RFF actions in the non-physical impacts analysis area) would be subject to project-specific analyses, and historic properties would be subject to National Historic Preservation Act Section 106 consultation along with associated measures to avoid and minimize potential adverse effects.

3.3.2.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

The CD8 Project has the potential for audio, visual, and olfactory impacts to cultural resources. These impacts occur as a result of introducing new sources of noise, lighting, dust, and vibrations associated with construction and operation of Project infrastructure and equipment (gravel and ice infrastructure, bridges, culverts, a communication tower, pipelines, drill rigs, chemical storage tanks, and equipment). These types of non-physical impacts can affect the integrity of cultural resources related to their setting, feeling, and historic associations.

Because cultural resources often rely on context, modifying the landscape in their vicinity can threaten their integrity. As described in Section 3.3.2.1, there are seven AHRS sites, eight TLUI sites, and 11 IPNs within the non-physical impacts analysis area (Table 3.3-6). Because many

resources appear in more than one database, Table 3.3-7 consolidates them into unique cultural resource locations. Accounting for duplicates across the datasets, there are 16 unique cultural resources that are considered within the non-physical impacts analysis area (Table 3.3-7). In the Environmental Consequences section, resources that appear as more than one data type (AHRS, TLUI, and IPN) are primarily discussed in the first relevant subsection unless other data sources provide further relevant context.

Table 3.3-6. Documented Cultural Resources within 2.5 Miles of the Action Alternatives

Dataset	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
AHRS sites	6	6	7
TLUI sites	7	5	6
IPNs	10	9	10

Note: Most cultural resources referenced appear in more than one category.

Table 3.3-7. Unique Cultural Resources within 2.5 Miles of the Action Alternatives

Unique Cultural Resource	AHRS Number	TLUI Number	IPN Identifier (name/USGS)	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
1	HAR-00055	N/A	N/A	Yes	Yes	Yes
2	HAR-00089	TLUIHAR081	N/A	Yes	Yes	Yes
3	HAR-00114	N/A	N/A	Yes	Yes	Yes
4	HAR-00155	TLUIHAR080	Uyaġaġviit	No	No	Yes
5	HAR-00156	TLUIHAR082	Nanuq	Yes	Yes	Yes
6	HAR-00157	N/A	Niġlivik	Yes	Yes	Yes
7	HAR-00158	TLUIHAR079	Putu	Yes	Yes	Yes
8	N/A	TLUIHAR059	Apkuġaruk	Yes	Yes	Yes
9	N/A	TLUIHAR061	Nuiqsut	Yes	No	No
10	N/A	TLUIHAR077	N/A	Yes	No	No
11	N/A	TLUIHAR103	N/A	Yes	Yes	Yes
12	N/A	N/A	Nanuq Lake	Yes	Yes	Yes
13	N/A	N/A	Niġliq Channel	Yes	Yes	Yes
14	N/A	N/A	Tamayayak Channel	Yes	Yes	Yes
15	N/A	N/A	Sakoonang Channel	Yes	Yes	Yes
16	N/A	N/A	Kuukpik	Yes	Yes	Yes
Total sites within 2.5 miles	–	–	–	15	13	14

Note: Resources are presented in the order in which they are described below.

Alaska Heritage Resource Survey Sites

Six AHRS sites are within 2.5 miles of Alternative B (see Table 3.3-7). HAR-00155 is in the non-physical analysis area but is not within 2.5 miles of Alternative B; it is also recorded as a TLUI site and an IPN. The six sites would be approximately 800 feet to 2.2 miles from

Alternative B infrastructure. The two closest sites to permanent Project infrastructure would be Nanuq (HAR-000156; approximately 0.5 mile) and Putu (HAR-00158; approximately 0.6 mile). Both sites are recorded in the TLUI and have documented IPNs. Nanuq is approximately 300 feet from existing pipelines and 500 feet from existing gravel roads and therefore would be unlikely to receive new non-physical impacts from the Project. Putu is approximately 600 feet from existing pipelines, but no roads or other major developments are currently constructed within 1 mile of either the TLUI point or the AHRS point. Alternative B would be most likely to impact Putu by introducing new sources of infrastructure, light, and noise, thereby altering the cultural resource's feeling and setting. No other intact AHRS sites are near Alternative B and they would therefore be less likely to experience non-physical impacts from Alternative B infrastructure.

Traditional Land Use Inventory Sites

Seven TLUI sites are within 2.5 miles of Alternative B (see Table 3.3-7). Of those, TLUIHAR059, TLUIHAR061, TLUIHAR077, and TLUIHAR103 were not previously analyzed as AHRS sites. The four sites that are unique to the TLUI database are the village of Nuiqsut and three camping or subsistence areas. TLUIHAR059 would be nearest to the Project infrastructure: approximately 300 feet from a temporary ice road and approximately 450 feet from the gravel road. This site is approximately 0.25 mile from CD4 and approximately 850 feet from an associated pipeline; its proximity to Alternative B would likely introduce new or intensified non-physical impacts. Additionally, the site is likely also mapped 1.52 mile to the northwest as an IPN. It is unclear which point is more accurate for the cultural resource. Because the description of the TLUI site records the cultural resource as an “old trail” and a fishing area, both points could accurately encompass the extent of this cultural resource.

The remaining three TLUI sites are mapped approximately 2.4 to 1.5 miles from Alternative B permanent infrastructure. TLUIHAR103 is also approximately 0.27 mile from the temporary ice road, so non-physical impacts to the cultural resource would be minimal and temporary. Alternative B is unlikely to cause new non-physical impacts to these three cultural resources.

Indigenous Place Names

There are 10 IPNs within 2.5 miles of Alternative B. Of those, five of the IPNs have not been discussed in the previous sections. Nanuq Lake, Niġliq Channel, Tamayayak Channel, Sakoonang Channel, and Kuukpik (Kupigruak Channel/East Channel of the Colville River) are bodies of water and are unlikely to experience non-physical impacts from Alternative B due to the long, linear nature of these features and that non-physical impacts to these resources are reduced by mitigation measure 1, which includes setbacks from Colville River by 0.5 mile and fish-bearing waters by 500 feet or as much as possible; see EIS Appendix E (Mitigation Measures).

Spills and Inadvertent Releases

Spills and inadvertent releases can have non-physical impacts to cultural resources in the same ways as described for physical impacts, see the Spills and Inadvertent Releases section in Section 3.3.1.2.2 (Alternative B). However, because non-physical impacts can be experienced over a larger area than physical impacts, more cultural resources would be impacted. In addition, the noise, increased human activity, traffic, equipment, and smoke plumes or haze (e.g., if in-situ

burning is used) associated with cleanup efforts would change the feeling, setting, character, or associations with the landscape of cultural resources until the cleanup is completed. Alternative B would have the largest potential for non-physical impacts from a spill and inadvertent release because of its proximity to more cultural resources than the other action alternatives (see Table 3.3-7).

Summary

There are 26 cultural resource sites within 2.5 miles of Alternative B, of which many are recorded in multiple databases and sources. After considering repeated cultural resources, there are 15 unique documented cultural resources within 2.5 miles of Alternative B (see Table 3.3-7). Most of these sites are unlikely to experience new non-physical impacts from Alternative B (or would experience minimal impacts) because they are either farther away from Project facilities or they are already near similar installations. The site most likely to experience non-physical impacts related to Alternative B infrastructure is TLUIHAR059, which is 300 feet from ice infrastructure and 450 feet from gravel infrastructure. Additionally, Putu (AHRS HAR-00158; TLUI HAR079) is 0.6 mile from Alternative B permanent infrastructure and would also experience non-physical impacts, particularly from light and noise, that could alter the site's feeling and setting.

Given the current understanding of cultural resources in the non-physical impacts analysis area, there is potential for cultural resources to experience non-physical impacts from Alternative B. Furthermore, Tribal knowledge and input on the EIS from NVN expressed that these non-physical impacts should not be evaluated solely based on proximity to known sites (e.g., AHRS, TLUI, place names) and that broader landscape values and cultural patterns of traditional use are connected cultural resources that could experience non-physical impacts.

3.3.2.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of potential impacts as Alternative B, but to a lesser extent and magnitude, because of its smaller footprint (46.9 acres compared to 67.3 acres), fewer cultural resources impacted (13 sites compared to 15 sites), and greater distance from known cultural resources (for example, Alternative B is 0.6 mile from Putu compared to 2.4 miles under Alternative C). Twenty cultural resource sites (13 unique) are within 2.5 miles of the Alternative C footprint (see Table 3.3-7); effects to these sites would be the same as those described for Alternative B. Notably, gravel infrastructure under Alternative C would be approximately 2.4 miles from Putu (AHRS HAR-00158; TLUIHAR079) as opposed to 0.6 mile under Alternative B. TLUIHAR059 would be the same distance from Alternative C as Alternative B and would likely experience the same type and magnitude of non-physical impacts.

Should a large spill or reservoir blowout occur under Alternative C, the same types of impacts would occur as described for Alternative B, but fewer cultural resources would be impacted because of the proximity of the alternative to known resources and less chance for oil to enter the Niġliq Channel.

3.3.2.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of potential impacts as Alternative B, but to a lesser extent and magnitude, because of its smaller footprint (62.3 acres compared to 67.3 acres), fewer

cultural resources impacted (14 sites compared to 15 sites), and greater distance from known cultural resources (2.4 miles from Putu compared 0.6 mile). Notably, Alternative D would be constructed closer to existing gravel infrastructure, limiting the potential to introduce new non-physical impacts to cultural resources. There are 23 cultural resources (14 unique) within 2.5 miles of Alternative D; effects to these sites would be the same as those described for Alternative B. Uyaġaġviit (AHRS HAR-00155; TLUIHAR080), which was not described in Section 3.3.2.2.2 (Alternative B), is located on the west side of the Niġliq Channel, and would be approximately 1.5 miles from Alternative D gravel infrastructure. It is unlikely to experience non-physical impacts.

Should a large spill or reservoir blowout occur under Alternative D, the same types of impacts would occur as described for Alternative B, but fewer cultural resources would be impacted because of the proximity of the alternative to known resources and less chance for oil to enter the Niġliq Channel.

3.3.2.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions in the non-physical impacts analysis area (Colville River access boat ramp, Alpine upgrades, ASRC Mine Site expansion; see Table 3.1-3, see Figure 3.1-2), combined with the CD8 Project, would affect the feeling and setting of cultural resources in similar ways to past and present development (described in Section 3.3.2.1 [Affected Environment]). The intensity of development, the permanence of infrastructure, and proximity to cultural resources would have additive non-physical impacts on those resources. In general, the closer the RFF actions are to existing cultural resources, the greater the level of non-physical impacts to those resources (i.e., close to visual obstructions, louder noises, stronger smells).

Non-physical impacts to cultural resources may seem minor on a project-by-project basis, but comments from Nuiqsut residents indicate a feeling of being boxed in by development (see Section 3.7 [Sociocultural Systems]), which is also a consideration for cultural resources as they lose their connection with the wider landscape that they rely on for their feel, setting, and association.

Continuing changes to Arctic conditions, including warming temperatures and increased rates of erosion, may impact cultural resources in the non-physical impacts analysis area (see BLM 2023:Appendix F for further discussion on these types of impacts on cultural resources). Examples of this include changes to setting and feeling through loss of historic access to sites (e.g., shallow water in rivers, lack of snow for winter travel) or changes to the environment around sites (e.g., drying-out lakes, changes in vegetation). The development of Project roads that provide access to areas that are losing historic access could offset or reduce the level of impact caused by changing Arctic conditions.

3.3.2.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

None of the cultural resources within the non-physical impacts analysis area are NRHP-listed or NRHP-eligible historic properties (i.e., Federal resources). However, similar to the physical impacts analysis area, none of the cultural resources within the non-physical analysis area have been evaluated for NRHP eligibility. Therefore, it is unknown at this time whether there would

be an irreversible and irretrievable commitment of Federal resources if a permit were issued. The Section 106 process, which is occurring concurrently with the NEPA process, will address NRHP eligibility for cultural resources within the area of potential effects.

3.3.3 How would the Project affect access to cultural resources and, consequently, the likelihood of vandalism or looting?

The analysis area for increased access would be the same as the non-physical impacts analysis area, i.e., the area within 2.5 miles of the Project footprint for all action alternatives (see Figures 3.3-1 and 3.3-2). The impacts associated with increased access to cultural resources are vandalism and looting, although inadvertent disturbance by individuals could also occur. The presence of Project personnel could also be seen as an intrusion into a culturally sensitive or valued area. These impacts are more likely to occur along access roads and pads where individuals occur regularly throughout construction and operation, but may also occur along pipelines during construction. The temporal scale of analysis is the duration that Project personnel would be present and that facilities and roads near cultural resources would be used, which would be the life of the Project (30 years) and beyond.

3.3.3.1 Affected Environment

The cultural resources in the analysis area are described in Section 3.3.2.1 (Affected Environment).

3.3.3.2 Environmental Consequences

3.3.3.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.3.2.1 [Affected Environment]) would continue, and access to cultural resources in the region would remain unchanged.

3.3.3.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

The Project has the potential to impact cultural resources by increasing access to previously remote cultural resources through the construction of gravel and ice roads and pads. These impacts would be mitigated, where possible, by intentionally siting new infrastructure with and using existing infrastructure to the extent possible and by routing the gravel road in the Alpine WNS multiyear ice road alignment (i.e., an area that has been previously accessible).

The issue of increased access facilitating looting or vandalism of cultural resources is evaluated in the Willow SEIS (BLM 2023:7), which is incorporated by reference and summarized here. The issue was determined to be insignificant and unlikely to lead to vandalism and looting due to 1) CPAI's operating procedures that control access to Project infrastructure and limit public access and 2) requirements for personnel to undergo cultural awareness training prior to deployment. There are no recorded instances of vandalism or looting of cultural resource sites near CPAI facilities on the North Slope. Cultural awareness training would also be required for the CD8 Project and would inform personnel on how to identify and avoid disturbing archaeological materials, thereby reducing the risk of inadvertent disturbance of culturally

significant sites. Additionally, although new ice or gravel roads would increase access, frozen and snow-covered conditions in the winter would hinder surface visibility, and off-road travel across tundra would be required, which is suboptimal by foot or vehicle in summer months, and would limit the likelihood of illegal collection, subsidence, and erosion.

Alaska Heritage Resource Survey

Increased access does not pose a significant risk to most of the AHRS sites in the non-physical impacts analysis area. Putu (AHRS HAR-00158; TLUIHAR079) is the only site not near development or roads, where Alternative B could increase access to the cultural resource. The likelihood of impacts to the site is low due to limited public access to the drillsite, CPAI's cultural resource awareness training (mitigation measure 47), and the site's distance from the drillsite (approximately 0.6 mile). Additionally, the cultural resource is located on a Native allotment, and Project personnel would not be permitted to access the allotment.

Traditional Land Use Inventory

One TLUI site (TLUIHAR059) is located approximately 300 feet from a temporary ice road and approximately 450 feet from a permanent gravel road. The site is approximately 0.25 mile from CD4. The site, although somewhat accessible due to CD4 infrastructure, would become more accessible with the addition of CD8. The likelihood of disturbance would be somewhat mitigated by the temporary nature of the closer ice road and the likelihood that cultural resources would not be disturbed in the winter because of snow and ice cover. Furthermore, no cultural materials have been identified at this site in past research attempts. No other TLUI sites would be affected by increased access from Alternative B.

Indigenous Place Name

No IPN cultural resources would be impacted by increased access to cultural resources. Several of the IPNs are landscape features and lack known physical remains of cultural material. They are 500 feet or farther from Alternative B gravel infrastructure, although several are within 500 feet of temporary ice infrastructure.

Spills and Inadvertent Releases

Spills and inadvertent releases are unlikely to increase access to cultural resources, except in the event of a large-scale spill where cleanup activities may bring personnel closer to cultural resources in downstream areas.

Summary

There are 15 unique cultural resources within the non-physical impacts analysis area. Most of these cultural resources would be unlikely to experience new impacts from increased access under Alternative B. One TLUI site, TLUIHAR059, would be within 450 feet of the gravel road and could be impacted by increased access, potentially leading to intrusion of Project personnel into a traditionally valued area. Mitigation measure 47 (EIS Appendix E) requires cultural awareness training for all Project employees and contractors to reduce the risk of unintentional disturbance of cultural resources.

3.3.3.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same changes to access to cultural resources as Alternative B. The only site that would have increased access is TLUIHAR059, which would be the same distance from Alternative C as Alternative B (within 450 feet of the gravel road).

3.3.3.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same changes to access to cultural resources as Alternative B. One cultural resource, TLUIHAR059, would have increased access due to Alternative D. This TLUI site is the same distance from Alternative D as Alternative B (within 450 feet of the gravel road). Another cultural resource (Uyaġaġviit [AHRS HAR-00155; TLUI HAR080]) is not analyzed in Section 3.3.3.2.2 (Alternative B) and would be approximately 1.5 miles from Alternative D gravel infrastructure. At that proximity, it would be unlikely to experience increased access from Alternative D as it is located on the west side of the Niġliq Channel on the outer edge of the non-physical impacts analysis area.

3.3.3.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions within the non-physical impacts analysis area (Colville River access boat ramp, Alpine upgrades, ASRC Mine Site expansion; see Table 3.1-3, see Figure 3.1-2), combined with the CD8 Project, would affect access to cultural resources by bringing more people (e.g., construction and operation workers) into the area. However, the combination of these RFF actions and the Project is unlikely to exacerbate the overall risk of vandalism and looting to cultural resources, which would remain low for the following reasons. First, Alpine upgrades and the ASRC Mine Site expansion would not introduce new roads into the analysis area, and the Colville River access boat ramp would specifically be used to facilitate increased access for subsistence activities (see Table 3.1-3). Second, surface visibility would be hindered for much of the year due to frozen and snow-covered conditions. Third, off-road travel across tundra would be required, which is suboptimal by foot or vehicle in summer months, and would limit the likelihood of illegal collection, subsidence, and erosion due to increased access.

3.3.3.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

None of the cultural resources within the non-physical impacts analysis area are NRHP-listed or NRHP-eligible historic properties (i.e., Federal resources). However, similar to the physical impacts analysis area, none of the cultural resources within the non-physical analysis area have been evaluated for NRHP eligibility. Therefore, it is unknown at this time whether there would be an irreversible and irretrievable commitment of Federal resources if a permit were issued. The Section 106 process, which is occurring concurrently with the NEPA process, will address NRHP eligibility for cultural resources within the area of potential effects.

3.4 ECONOMICS

3.4.1 How would Project employment and revenue affect local, regional, and State economies?

The analysis area for economics is the community of Nuiqsut (local economy), the NSB (regional economy), and the State of Alaska (State economy) because Project-generated employment and revenues would accrue to individuals and entities throughout these economies. Although some economic effects would also flow to individuals and entities out of state, these effects would be extremely diffuse and are not addressed in detail (see ECON-1 in EIS Appendix D [Issues Dismissed from Detailed Analysis]). The temporal scale for this analysis is defined as the life of the Project (30 years) because economic effects of construction and operations would occur throughout this period.

3.4.1.1 Affected Environment

A detailed description of local, regional, and State economies is available in the Willow SEIS (BLM 2023:291–295) and Nanushuk EIS (USACE 2018:3-717–3-719), which are hereby incorporated by reference with relevant information summarized below. Table 3.4-1 summarizes key employment and income data for the analysis area, using the most recent data available from the USCB (2024a, 2024b).

Table 3.4-1. Key Employment and Income Data for the Analysis Area

Economic Indicator	Nuiqsut	NSB	State of Alaska
Population*	492 to 616†	10,810	740,133
Civilian labor force	269	6,187	363,709
Unemployment rate‡	24.9%	7.6%	6.0%
Mean/Median household income	$101,626/$78,438	$127,358/$95,694	$122,082/$95,665
People below poverty level	21.1%	11.1%	10.2%
Per capita income	$33,218	$57,430	$47,267

Sources: USCB (2024a, 2024b).
* Population estimates include all residents, regardless of race or ethnicity.
† Population estimates for Nuiqsut vary across data sources. The population estimate in this table is based on USCB data. and census data from the *Nuiqsut Comprehensive Plan* (NSB 2022).
‡ Unemployment rates for Nuiqsut and NSB vary across data sources. The unemployment rates listed in this table are based on USCB data. However, the *NSB 2019 Economic Profile & Census Report* indicates that the actual unemployment rates may be substantially higher (approximately 32.2% for the NSB as of 2019) after accounting for individuals who are underemployed or not employed but not actively seeking work due to lack of job opportunities (NSB 2020).

3.4.1.1.1 NUIQSUT (LOCAL ECONOMY)

Nuiqsut is a small, mostly Iñupiat community with an estimated population of approximately 492 to 616 residents, depending on the data source[7] (NSB 2022; USCB 2024a, 2024b). Nuiqsut has a mixed subsistence-market economy in which residents depend on a mixture of wage employment, dividend income, and subsistence activities.

[7] Because of the small size of many NSB communities, changes in how the USCB counts nonresident workers on the North Slope, and low participation rates in NSB socioeconomic surveys, demographic data for the NSB and its small communities are limited and inconsistent between data sources. The EIS analysis relied on both USCB data and NSB demographic survey data, where available.

As of 2019, Nuiqsut Iñupiat households received 57% of their income from dividend payments (e.g., Kuukpik and ASRC), 13% from the Alaska Permanent Fund Dividend, 27% from wages, and the rest from other sources such as social security, pension, retirement, and child support (NSB 2020). Kuukpik, the ANCSA village corporation for Nuiqsut, was established in 1973 and owns surface rights to land in Nuiqsut and the Project area (see Figures 1.4-1 and 3.4-1). Kuukpik generates revenues from its subsidiaries involved in ice road construction, gravel mining and hauling, civil construction, drilling, seismic exploration, camp support (catering and security), and lodging services in Nuiqsut. ASRC, established in 1972, is the ANCSA regional corporation and owns the subsurface titles to land in Nuiqsut and the Project area (BLM 2023:291–292) (see Figure 1.5-1 and 3.4-2). (ASRC and the State of Alaska have joint ownership of the subsurface oil and gas rights under the Kuukpik surface-owned lands in the Project area.)

Most employed Nuiqsut residents work for the local government, school districts, or village corporations (NSB 2022). Nuiqsut's private sector employment was estimated at approximately 16.7% in 2024, which includes oil and gas employment (ICAS 2024:48). Although the oil industry is a major private industry employer in the area, most oil industry jobs require specific skill sets and are filled by workers from outside the North Slope (Alaska Department of Labor and Workforce Development [ADLWD] 2026; BLM 2023:292).

According to USCB data (see Table 3.4-1), Nuiqsut has a higher unemployment rate and lower mean/median and per capita incomes than the NSB and State. The high unemployment rate in Nuiqsut (24.9%) (see Table 3.4-1) reflects the lack of employment opportunities for community residents. This estimate, which comes from the USCB's recent 2020–2024 American Community Survey data, generally aligns with the NSB's unemployment rate for Nuiqsut (26.3%) reported in their 2019 economic profile (NSB 2020). Due to differences in how unemployment statistics are reported between State, Federal, and NSB data sources, the unemployment rate in Nuiqsut may be similar to or lower than that of the NSB, based on the NSB's self-reported unemployment rate for the NSB (32.2%) in their 2019 economic profile (NSB 2020). Approximately 21.2% of people in Nuiqsut were living below the Federal poverty level as of 2024.

The cost of living in remote Alaskan communities like Nuiqsut is substantially higher (estimated at approximately 45% in 2020) than the U.S. average (Fried 2020). Given the high cost of living, subsistence harvests provide a substantial amount of economic value by reducing food costs and providing local sources of food and nutrition (ICAS 2024) (see Section 3.7 [Sociocultural Systems] and Section 3.6 [Public Health and Safety]). In 2019, 95% of Iñupiat households in the NSB used subsistence food resources, and 80% of households used subsistence resources for more than half of their diet (NSB 2020).

3.4.1.1.2 NORTH SLOPE BOROUGH (REGIONAL ECONOMY)

The NSB is responsible for regional governance of eight villages in the North Slope, including Nuiqsut. The NSB has taxing authority and provides public services for Nuiqsut and other communities, including planning and zoning, water and wastewater service, trash pickup, road maintenance, power utility services, emergency services, and managing and maintaining the airport, among others (ICAS 2024; NSB 2022).

The oil industry's most significant contribution to the NSB's regional economy is through property tax revenues (NSB 2020). The NSB projected $455 million in property taxes for fiscal year 2025–2026, most which comes from oil and gas property tax (ICAS 2024; NSB 2025). These revenues are the primary funding source for NSB government operations and capital projects, which in turn support jobs and generate income in NSB communities (ICAS 2024). The NSB's expenditures related to oil and gas activities include the maintenance of public roads, airports, emergency services on oil field roads, and other infrastructure and management needs (ICAS 2024).

According to NSB (2020), estimated unemployment rates in the NSB are often lower in USCB data and the State's ADLWD data due to the way statistics are collected; people who are underemployed (e.g., working less than they want to) or people who are not employed but are not actively looking for work (e.g., due to lack of opportunities) are not counted in unemployment statistics. A substantial percentage of NSB residents fall into these categories, resulting in lower estimates of unemployment by State and Federal agencies (NSB 2020). Based on NSB-collected survey data, which include these types of individuals in the labor force, the NSB estimated that unemployment rates in 2019 were approximately 32.2%, compared to ADLWD estimates of 7.3% for the same year (NSB 2020).

The majority of people employed on the North Slope work in the public sector (e.g., local or Tribal governments) or in the education and health industries (ICAS 2024). Although approximately 80% of the state's oil and gas workers are employed in the NSB region (ADLWD 2026), most direct oil and gas jobs are filled by workers from outside the North Slope (ADLWD 2026; BLM 2023:292; ICAS 2024). However, oil and gas activity on the North Slope creates indirect and induced jobs, such as jobs in support services like catering, security, and construction and maintenance work, as well as jobs linked to property taxes paid by the industry that support NSB operations.

3.4.1.1.3 STATE OF ALASKA (STATE ECONOMY)

Alaska's economy is also closely tied to the oil and gas industry, which is a significant source of unrestricted revenue for the State. These revenues are generated by taxes on production, property, and corporate income, royalties, and other minor sources. Unrestricted petroleum revenue amounted to $1.9 billion in fiscal year 2025, and is forecasted at $1.4 billion for fiscal years 2026 and 2027 (Alaska Department of Revenue [ADOR] 2025a).

Production tax is intended to be used for oil and hazardous substance release prevention and response, and is how the State allocates funding toward those types of emergencies (ICAS 2024).

The oil and gas industry accounted for approximately 3.4% of the State's total industry employment in 2024 (ADLWD 2025a). The average annual wage earnings of oil industry workers are 2.4 times higher than the statewide average (ADLWD 2026). The annual average wage of producing jobs in 2019 was $232,546, drilling jobs paid $112,690, and support jobs paid an average of $103,564 per year (Teel 2022). For each job in Alaska's oil industry, there are 15 additional jobs in the Alaska economy connected to the industry. Given this, the oil industry is estimated to account for one-quarter of Alaska jobs and one-half of the overall economy when the spending of State revenues from oil production is considered (McDowell Group 2020).

3.4.1.1.4 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

The Willow SEIS describes how past and present actions have impacted the economy, and how RFF actions would impact local, regional, and State economies in the future, and is incorporated by reference (BLM 2023:418). Past, present, and RFF oil and gas development has influenced, and will continue to influence, economics through the formation of the regional Native corporations, village corporations, and municipal incorporations; employment in the oil and gas industry, supporting sectors, and government; and through the accrual of significant government revenues from petroleum development activities.

Changing Arctic conditions have the potential to effect economic conditions by negatively impacting subsistence activities (e.g., reduced resource abundance and harvest success) and the associated subsistence economy for Nuiqsut and the NSB; opening Arctic waters (e.g., Northwest Passage) and creating new commercial shipping, tourism, and resource extraction opportunities; causing infrastructure damage (e.g., from land subsidence and coastal erosion) and increasing associated cost burdens for government entities (ICAS 2024).

3.4.1.2 Environmental Consequences

North Slope communities have a mixed cash and subsistence economy. The effects on the subsistence economy are described in detail in Section 3.7 (Sociocultural Systems) and are not repeated in this section.

An assessment of the potential cash economy effects of the CD8 Project alternatives was prepared by Northern Economics, Inc. (2026). The potential economic and fiscal benefits or consequences of the Project were estimated in terms of potential revenues, employment, and labor income. The following impact criteria were used to analyze Project economic effects:

- Direct, indirect, and induced[8] employment effects associated with the construction phase and operations phase of the Project. Employment effects reflect the total number of average part-time and full-time jobs resulting from the proposed construction and production (operations) activities.
- Estimates of the potential labor income effects associated with the construction and operations phases of the Project.
- Estimates of the potential government and landowner revenue streams, including State revenues from royalites, property tax, production tax, oil surcharge, and corporate income tax; Federal revenues from corporate income tax; NSB revenues from property tax; and landowners royalty revenues.

[8] Direct jobs are the jobs generated as a result of the initial spending by industry during the construction and the operations phases of the proposed action (jobs in the construction sector and in the oil and gas sector). Indirect jobs are created in supporting industries (the suppliers of materials, equipment, and services) to the construction sector during the construction phase and to the oil and gas industry during the operations phase. Induced jobs are the jobs that arise from increased consumer spending by employees who have jobs created during construction and operations (workers' spending of wages in the regional economy generates induced effects in grocery stores, gasoline stations, utility companies, and other businesses that support households).

3.4.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE and there would be no economic changes in Nuiqsut, the NSB, or the state resulting from the Project. However, the Applicant could continue oil and gas exploration in the area, which would continue to generate jobs. Employment, income, and government revenues generated by existing and RFF actions would continue to influence economies at the local, regional, and state level as described in Section 3.4.1.1.4.

3.4.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

The Project would result in increased North Slope oil production and generate economic benefits for the local, regional, and State economies through increased employment opportunities during construction and operation; the accrual of Project royalties, taxes, and revenues to local, regional, and State governments; and increased spending and demand for local services.

Employment and Income

The potential direct, indirect, and induced employment and labor income for the Project was estimated using the IMPLAN (IMpact Analysis for PLANning) model of the Alaska economy (Northern Economics, Inc. 2026). IMPLAN is an input-output model that is commonly used in economic impact studies to measure the multiplier or stimulus effects of an economic development project.

Table 3.4-2 presents direct employment estimates for the construction and drilling phases of the Project. Construction is anticipated to occur over approximately 2 years, with peak employment occurring in the winter seasons: 525 workers in Year 1, and 400 workers in Year 2. The annual average for construction employment is expected to be 50 workers in Year 1 and 280 workers in Year 2. In total, up to 945 construction workers are estimated to be engaged on the North Slope over approximately 2 years.

Drilling would occur over 5 years starting in Year 2, with an annual average of 195 workers, or a total of 975 jobs over the entire drilling phase. North Slope–based workers would be on a 2-week rotation, so the number of workers on-site at a time would be half of the numbers noted. Drilling would be conducted year-round.

Direct construction and drilling activities would also support on average a range of approximately 360 to 450 indirect and induced part-time and full-time jobs per year (890 to 980 jobs at peak levels of activity) in other sectors of the State's economy over the construction and drilling phases of the Project.

Table 3.4-2. Direct Project Employment Estimates

Year	Construction Peak	Construction Average	Drilling Average	Operations
Year 0	20	0	0	0
Year 1	525	50	0	0
Year 2	400	280	195	0
Year 3	0	0	195	Up to 4
Year 4	0	0	195	Up to 4

Year	Construction Peak	Construction Average	Drilling Average	Operations
Year 5	0	0	195	Up to 4
Year 6	0	0	195	Up to 4
Years 7–30	0	0	0	Up to 4

Project operations would generate up to four positions (day and night shifts working on rotation). In addition to the direct jobs, annual operations and maintenance activities are estimated to create an additional 30 to 50 indirect and induced jobs per year.

It is unknown at this time exactly how many of the Project's direct construction, drilling, and operations jobs would be filled by workers residing in the North Slope, other areas of Alaska, or out of state. Oil field development projects on the North Slope typically require workers with specialized skills, and, as a result, these jobs are typically held by non-local or out-of-state workers. The share of oil industry workers who are not Alaska residents has grown since 2010, ranging from 36% nonresident in 2015 to 40% in 2024 (ADLWD 2026). More commonly, the types of opportunities for North Slope residents living near existing oil developments would include jobs such as ice road monitors, camp security and facilities operators, and subsistence representatives.

Table 3.4-3 shows the prevailing average yearly earnings of workers in various industries in Alaska that are associated with the direct construction and operations jobs described above. It is estimated that $33.6 million in direct labor income would be generated over the 2-year construction period and $190 million in direct labor income would be generated over the 5-year drilling phase. Construction and drilling activities are also projected to generate between $25 to $68 million in indirect and induced labor income. It is estimated that total annual average direct, indirect, and induced labor income generated during the operations phase would range between $2.6 to $3.5 million.

Wages associated with employment would result in increased incomes locally, regionally, and statewide. Most employment and wages associated with operations are likely to go to Alaskans that do not live on the North Slope, and the increase in household incomes would be spread across the state. However, some NSB and Nuiqsut residents would be directly employed by the Project or would benefit from indirect and induced jobs and associated wages. Additionally, local industry support companies, such as those owned by Kuukpik and ASRC, would likely have earnings from the Project, increasing corporation dividends to shareholders that would contribute to local and regional household incomes.

For example, during construction of Willow in 2026, 11 Nuiqsut residents were employed full-time on the project (3 directly with CPAI and 8 through contractors), 44 residents were employed as seasonal subsistence representatives and ice road monitors for Kuukpik, and 15 residents worked as seasonal employees for contractors. Additionally, 36 Nuiqsut students participated in CPAI's 2026 career development and internship programs. These employment numbers reflect a major construction year, which was projected to require almost three times as many direct construction workers during peak construction as CD8. Therefore, although the number of local hires would likely be less for CD8, the types of jobs fulfilled by local hires are expected to be similar.

Table 3.4-3. Statewide Average Annual Earnings for Selected Industries Associated with Direct Construction and Operations Jobs

Industry	Average Annual Earnings
Oil and gas industry	$178,920
Oil and gas extraction	$251,052
Support activities for mining*	$139,416
Construction (industry-wide average)	$101,700
Construction of buildings	$92,964
Heavy construction	$140,160
Specialty trade contractors	$83,256
Indirect and induced sectors†	$68,818

Source: ADLWD (2025b).
* Examples include jobs in security, catering, accommodations, transportation, and logistics services.
† Includes jobs in a variety of other sectors of the Alaska economy that provide goods and services to the oil and gas industry and its direct workers.

Revenues

Project facilities are proposed to be constructed on surface lands owned by Kuukpik, with some of the segments crossing lands owned by the State of Alaska and managed by the ADNR. The subsurface mineral rights of the Project are jointly owned by the State of Alaska and ASRC.

Property tax revenues would accrue to the State of Alaska and the NSB, beginning during construction. At the State level, the Project would also be subject to production tax (also known as severance tax) at a rate of 35% the production value; an oil surcharge, which is intended to be used for oil and hazardous substance release prevention and response; and corporate income tax. In addition, the Federal government would receive revenues from corporate income tax.

Royalty revenues from the Project would accrue to the subsurface landowners (the primary royalty owners): the State of Alaska and ASRC. A portion of ASRC revenue would be distributed to ANCSA corporations (including Kuukpik) across the state as required by Sections 7(i) and 7(j) of ANCSA (43 USC 1606). In addition to the primary royalty owners, there are several Overriding Royalty Interest owners that would also receive royalty revenues.

As described in Section 2.4.5.2 (Camps), there is a possibility for some construction workers to be housed at existing camps in Nuiqsut, which includes the Kuukpik Hotel. Therefore, the City of Nuiqsut could benefit from higher bed tax revenues from higher hotel occupancy during the initial construction years while mobilization of construction equipment is occurring and even during operations. The City of Nuiqsut currently has a 12% bed tax. The change in the level of hotel occupancy, however, is difficult to quantify at this point because the timing and level of activities are uncertain and may vary.

Potential revenues for the Project were estimated using a cash-flow model developed by ADNR for evaluation of oil and gas projects on the North Slope, and was adapted and modified to reflect the CD8 Project development plan (e.g., estimated annual production volumes and costs). Modeling was performed under two oil price scenarios (using 2025 projections from U.S. Energy Information Administration [EIA] and ADOR[9]) resulting in the range of possible revenue

[9] ADOR price projections were published in the *Spring 2025 Revenue Forecast* (ADOR 2025b) and are more conservative, whereas EIA projections were published in the *Annual Energy Outlook 2025* (EIA 2025) and are higher.

outcomes presented in Table 3.4-4. The royalty revenues in Table 3.4-4 are preliminary estimates based on publicly available data for the Narwhal Participating Area; however, allocated royalty revenues would ultimately depend on subsurface data collected during drilling and production.

Table 3.4-4. Estimated Project-Generated Government Revenues (in millions of dollars)

Revenue Category	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Royalty Owners			
State of Alaska royalties	$304–$620	$217–$422	$270–$552
ASRC royalties	$254–$518	$182–$353	$226–$461
Overriding Royalty Interest royalties	$39–$80	$28–$55	$35–$71
Total royalties	*$598–$1,217*	*$427–$829*	*$531–$1,084*
State Government			
Property tax	$17	$18	$16
Production tax	$77–$1,005	$45–$684	$75–$869
Oil surcharge	$4	$3	$3
Corporate income tax	$86–$290	$66–$195	$78–$242
Total State taxes	*$183–$1,315*	*$131–$900*	*$172–$1,129*
NSB			
Property tax	$153	$157	$143
Federal Government			
Corporate income tax	$170–$551	$135–$420	$162–$525

Source: Northern Economics, Inc. (2026).
Note: All dollar amounts are in millions of dollars.

Other Indirect Local Economic Impacts

Changes in subsistence activities (described in Section 3.8 [Subsistence]) could result in indirect local economic impacts due to harvesters having to travel greater distances, spend greater amounts of time and effort, and spend more on fuel and other supplies to harvest subsistence resources. NVN expressed that household costs in Nuiqsut may increase due to these subsistence-related Project impacts. Section 3.8.3.2.2 (Subsistence, Alternative B) includes an additional discussion of subsistence-related economic impacts, including results of an economic study of subsistence impacts for GMT1.

Household costs would continue to be offset by financial benefits to the community of Nuiqsut from development in the area, such as cheaper natural gas and seasonal accessibility to the Alaska road system and Deadhorse Airport for cheaper access to goods and services. Since 2008, CPAI has provided up to 1 million cubic feet of natural gas per day to Nuiqsut from the Alpine facility at no cost. Natural gas costs for residents are therefore significantly cheaper than elsewhere in rural Alaska ($25 per month to the Nuiqsut Gas Cooperative for costs associated with the local distribution system) (CPAI 2026). Because the Project would extend the CRU field life by approximately 8 to 10 years, it would extend Alpine-related benefits to the community.

Spills and Inadvertent Releases

Chapter 4 describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. The impact of spills on economics is detailed in the Willow SEIS (BLM 2023:300) and Nanushuk EIS (USACE 2018:3-717–3-719).

Under Alternative B, spills and inadvertent releases could occur. Most spills or inadvertent releases would be contained to the gravel pad. These types of spills would be unlikely to affect economics because employment of additional workers to assist with cleanup efforts would not likely be needed. For larger spills that require more extensive cleanup efforts, employment at the local, regional, and/or state levels could increase over the response period, due to increased demand for support services.

Summary

The Project would provide economic benefits through employment, labor income, and government revenues. Alternative B would provide the highest royalties and State and Federal taxes of all the action alternatives based on having the highest production volume and the largest facility footprint. Local taxes accrued to NSB under Alternative B would be slightly higher than under Alternative D but slightly lower than under Alternative C. Based on the following mitigation measures (see EIS Appendix E [Mitigation Measures]), CPAI has stated it would support and promote the hiring of local residents in the following ways:

- CPAI would continue to work with Kuukpikmiut Subsistence Oversight Panel to coordinate panel activities and continue to hire local subsistence representatives and ice road monitors to monitor activities (measure 53).
- CPAI would continue its internship program (Career Quest) to introduce Nuiqsut high school students to jobs and careers in the oil fields and in their community (measure 57).
- CPAI would strive to hire qualified Nuiqsut, NSB, and Alaska residents for jobs in the oil fields (measure 58).

3.4.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Under Alternative C, the number of direct construction and operation jobs would be the same as Alternative B, but production volumes would be 28% lower, and the footprint of permanent facilities would be 30% smaller. As a result, the estimated revenue from royalties and State and Federal taxes would be reduced by a proportionate amount relative to Alternative B (see Table 3.4-4). Local property taxes accrued to NSB under Alternative C would be marginally higher than under Alternative B. Potential economic effects resulting from spills and inadvertent releases would be the same as previously described for Alternative B; see Spills and Inadvertent Releases in Section 3.4.1.2.2.

3.4.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Under Alternative D, the number of direct construction and operation jobs would be the same as Alternative B, but production volumes would be 12% lower, and the footprint of facilities would be 7% smaller. As a result, the estimated revenue from royalties and State and Federal taxes would be reduced by a proportionate amount relative to Alternative B (see Table 3.4-4). Local property taxes accrued to NSB would be slightly lower under Alternative D compared to other

action alternatives. Potential economic effects resulting from spills and inadvertent releases would be the same as previously described for Alternative B; see Spills and Inadvertent Releases in Section 3.4.1.2.2.

3.4.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

The Project economic effects, when combined with RFF actions and trends (i.e., miscellaneous mine site expansions and Alpine upgrades) (see Table 3.1-3, see Figure 3.1-2), would increase economic activity at the local, regional, and State level due to direct industry spending on labor, materials, and services; increased government revenues from shared royalties, tax payments such as property taxes, corporate income taxes, production taxes, and other local taxes; increase job opportunities for Alaskans, including residents of communities in the NSB; and increase labor income in regions where industry spending would occur and where the oil and gas workforce would reside. Most direct wages from new employment generated by the Project and other RFF actions would go to nonresidents of the NSB, but many indirect and induced jobs and wages would accrue in both the local and regional economy, along with dividend payments.

3.4.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

Because economics are not a Federal resource, there would not be any irreversible and irretrievable commitments of Federal resources with regard to economics.

3.5 NOISE

3.5.1 How would the Project affect noise levels in the analysis area?

The analysis area for noise encompasses the area within approximately 33.7 miles of Project facilities and activities. This area was chosen because it is where the loudest noise generated during construction, drilling, and operation could exceed ambient levels (Figure 3.5-1).

The temporal scale for construction-related impacts is the duration of construction (2 years), after which construction equipment and activities would no longer produce noise. The temporal scale for drilling impacts is 5 years and for operational impacts is the life of the Project (approximately 30 years).

An assessment of the potential noise impacts of the CD8 Project alternatives was prepared by SWCA (2026) and is hereby incorporated by reference with relevant information summarized in this EIS section. This EIS section focuses on Project-related noise levels (in decibels) for human noise-sensitive receptors in the analysis area. The effects of noise on fish and wildlife are discussed in BIO-2, BIO-6, BIO-11, BIO-14 in EIS Appendix D (Issues Dismissed from Detailed Analysis) and in Section 3.9 (Terrestrial Mammals). The impacts of Project-related noise on other resources or aspects of the human environment are discussed in other resource sections. Section 3.3.2 (Cultural Resources) addresses impacts of noise on cultural resources' non-physical attributes (i.e., setting and feeling). Section 3.6.1 (Public Health and Safety; specifically, HEC-1, Social Determinants of Health) addresses impacts of noise on cultural continuity and mental health. Section 3.7 (Sociocultural Systems) addresses impacts of noise and other non-traditional influences on community members' cultural ties to the land. Section 3.8 (Subsistence) addresses impacts of noise on resource availability and harvester access or avoidance.

3.5.1.1 Affected Environment

A detailed description of the existing noise environment for the analysis area is available in the Willow SEIS (BLM 2023:97–98) and is hereby incorporated by reference with relevant information summarized below.

The acoustic environment is influenced by both natural (e.g., wildlife, wind, water) and human-made (e.g., traffic, construction, oil production, aircraft, hunting) sources of noise. Noise could affect people in the analysis area by interfering with activities such as sleeping or conversation, or by disrupting or diminishing one's quality of life.

Site conditions strongly influence how noise is generated and transmitted across the landscape. The flat, open terrain of the analysis area—consisting of tundra wetlands, shallow lakes, and broad river channels—provides little topographic relief to block or absorb sound, allowing noise from construction, drilling, aircraft, and vehicles to travel long distances with minimal attenuation. In the winter, frozen ground can further enhance sound propagation by creating hard, reflective surfaces, whereas in the summer, the soft, saturated surface of the tundra and its vegetation layer can provide meaningful ground absorption that partially offsets sound propagation (Piercy et al. 1977). The Project's proximity to Nuiqsut and its location within an

area heavily used for subsistence activities, where natural ambient noise levels are typically low, heighten the sensitivity to noise.

The primary sources of ambient noise in the analysis area include wind, existing oil and gas developments, the community of Nuiqsut, subsistence activities, and air traffic. The Alpine, Pikka, GMT, and Willow oil fields contribute human-made noise (daily air and ground traffic) to the ambient soundscape in the analysis area, and the ASRC Mine Site contributes impulsive and non-impulsive noise[10] during winter operations.

Aircraft noise is generated from flights to and from Nuiqsut and the Alpine airstrip. Nuiqsut experiences relatively higher levels of air traffic than other small communities on the ACP because of its proximity to oil and gas activity (Stinchcomb 2017). See Table 3.1-2 for details on existing air traffic in the area. Nuiqsut residents have expressed concerns over the impacts that aircraft, construction, and oil and gas noise have on their general well-being, wildlife, and subsistence resource availability during public engagement efforts for previous oil and gas developments and during the public scoping for this Project (USACE 2018).

High winds are common in the analysis area, and wind is the primary natural noise source in Nuiqsut (BLM 2004). Nuiqsut residents also travel widely for subsistence activities, using boats with outboard motors, snow machines and all-terrain vehicles (ATVs), and firearms, all of which contribute to human-made noise in the analysis area.

A detailed overview of sound fundamentals (e.g., key terms, thresholds of human perception, and factors affecting sound propagation and attenuation) is provided in the Willow SEIS (BLM 2023:99). There are no Federal, State, or local noise standards or regulations that directly regulate environmental noise related to the construction or operation of the Project. In the absence of enforceable standards, this analysis uses EPA's recommended outdoor noise guideline of 55 A-weighted decibels[11] (dBA) L_{dn} (day-night average sound level) as the benchmark for evaluating potential community noise impacts (EPA 1974). This threshold corresponds to approximately 48.6 dBA L_{eq} (equivalent continuous sound level) for a noise source operating continuously over a 24-hour period. At or below this level, adverse effects such as sleep disturbance, speech interference, and general annoyance are unlikely. EPA's recommended level of 55 dBA L_{dn} serves as the benchmark for evaluating potentially adverse noise impacts.

L_{dn} averages sound over a 24-hour period and applies a 10-decibel (dB)[12] penalty for nighttime noise (10 p.m.–7 a.m.) to account for increased sensitivity during those hours, whereas L_{eq} averages sound over a specified period and is useful for simplifying complex fluctuating noise sources into a single, constant sound level. Because some Project activities, including drilling, may operate continuously during both daytime and nighttime hours, L_{dn} provides an appropriate metric for evaluating sustained community noise exposure. For intermittent or daytime-only sources, such as construction equipment and aircraft, L_{eq} values are also reported to better

[10] Impulsive noise is short-term, instantaneous noise with a high intensity, short persistence, abrupt onset, and rapid decay; impulsive noise bursts may occur in rapid succession. Non-impulsive noise has a steady intensity and longer persistence, such as noise created by dump trucks, bulldozers, compaction rollers, and other construction equipment. Sound levels generated by impulsive noise, such as pile driving or blasting, may significantly exceed the ambient sound level for a very short duration. Non-impulsive, more continuous noise sources typically emit lower levels of noise and are less likely to be audible at a distance.

[11] Airborne sound levels are quantified using dBA, where dB is a unit of sound pressure referenced to 20 micropascals. A-weighting is a system for weighting measured airborne sound levels to reflect the frequencies that people hear best.

[12] Sound levels are measured in dB, a logarithmic unit that describes sound pressure amplitude.

represent the actual acoustic conditions during those activities. Both metrics are presented in this analysis to facilitate comparison with the EPA guideline of 55 dBA L_{dn} and the measured median ambient sound level in the Nuiqsut vicinity of 35 dBA.

Noise-sensitive receptors in the analysis area include Nuiqsut residents and subsistence harvesters. Subsistence occurs throughout the analysis area. The Putu area at the Colville River confluence is immediately adjacent to Nuiqsut and is an important area for subsistence and traditional use activities. Section 3.8 (Subsistence) describes subsistence use areas in more detail.

Ambient sound levels around Nuiqsut and the lower Colville River were documented by Stinchcomb (2017) from June through August 2016 (a period of peak subsistence use) to quantify natural ambient sound and aircraft noise levels. Natural ambient sound levels ranged from 25 to 47 dBA, with a median level of 35 dBA. The median sound exposure level of aircraft ranged from 55 to 69 dBA (Stinchcomb 2017). Stinchcomb's (2017) measured ambient sound levels were verified against American National Standards Institute standards for predicting ambient sound levels based on land use categories (American National Standards Institute, Inc. 2013), which confirmed that the Stinchcomb measurements are consistent with expected sound levels for a remote area with limited industrial activity.

Additional oil and gas development has occurred in the area since these sound levels were monitored, including the Willow project, which is currently under construction and contributing to the ambient sound levels in the Nuiqsut area. The Willow project is approximately 25 miles west of Nuiqsut, except for the Willow mine site, which is 6.8 miles west of Nuiqsut. Mining at the Willow mine site is expected to be complete by spring of 2027 and would not overlap with construction of CD8. By the time construction of CD8 begins, all Willow construction activity would be located at Willow (25 miles west of Nuiqsut), and the activities with the loudest sources of noise (gravel mine blasting and impact pile driving in winter) would be complete. Sound levels near Nuiqsut would be up to 39 dBA during Willow operation (BLM 2023). The loudest operational source of noise for Willow is aircraft, which would be intermittent and short lived, and would occur at the Willow airstrip (24.8 miles west of Nuiqsut). Given that the more constant noise sources associated with Willow construction and operation (general construction [31 dBA at Nuiqsut], drilling [23 dBA at Nuiqsut], and the Willow processing facility [9 dBA at Nuiqsut]) are expected to be below the measured median ambient sound level of 35 dBA, these sources would likely not have a notable effect on ambient sound levels for Nuiqsut. Therefore, the 2016 measurements of ambient sound levels (median level of 35 dBA) remain representative of current conditions for the area around Nuiqsut and the lower Colville River.

3.5.1.2 Environmental Consequences

3.5.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE, and there would be no new sources of noise resulting from the Project. Existing human-made noise sources from oil and gas exploration and development, gravel mining at the ASRC Mine Site, subsistence activities, and air and ground traffic would continue to affect the soundscape as described in Section 3.5.1.1 (Affected Environment).

3.5.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

All phases of the Project would have noise-generating activities or equipment. Project noise levels were modeled to determine sound levels in Nuiqsut (2.1 miles from the Alternative B

drillsite) and the distance needed for Project noise to attenuate to the ambient level of 35 dBA. Noise levels were estimated based on distance attenuation (also called spherical spreading), which assumes sound energy radiates uniformly outward from a point source, and that sound levels decrease by approximately 6 dB for each doubling of distance from the source. This calculation does not account for additional attenuation from ground absorption, topographic shielding, or vegetation. These additional attenuation factors are mainly associated with summer conditions when the ground is soft and saturated. As a result, the noise levels predicted in the EIS represent a conservative upper bound on expected actual noise conditions at Nuiqsut. Table 3.5-1 presents the estimated noise levels resulting from construction, drilling, and operation under Alternative B, based on distance attenuation alone. Values exceeding the EPA guideline of 55 dBA L_{dn} are shown in bold.

In addition to distance attenuation, meteorological conditions can influence sound propagation over long distances. Wind-induced refraction occurs when vertical gradients in wind speed cause sound waves to bend downward in the downwind direction, enhancing received noise levels at the ground. Under downwind propagation conditions, this effect can increase noise levels by approximately 2 to 5 dB relative to neutral atmospheric conditions, depending on wind speed, atmospheric stability, and distance (Piercy et al. 1977). On flat, open terrain such as the ACP, where topographic shielding is absent and frozen ground surfaces are acoustically reflective for much of the year, the potential for wind-enhanced noise propagation is elevated. Conversely, ambient wind noise recorded at a community receptor can mask construction noise perceived by the listener, particularly during high-wind events. Although this masking does not change the physical sound levels of Project sources, it affects perceived audibility. The Alternative B drillsite would be located approximately 2.1 miles east-northeast of Nuiqsut (bearing approximately 66 degrees from north) (see Figure 2.3-1). This orientation closely aligns with the dominant east-northeast wind direction, meaning that winds blowing from the drillsite toward Nuiqsut (downwind propagation) occur frequently (SWCA 2026).

To assess whether meteorological conditions could meaningfully affect predicted noise levels at Nuiqsut, a screening-level wind enhancement analysis was conducted for the CD8 Project using site-specific meteorological data and the Conservation of Clean Air and Water in Europe (CONCAWE) noise propagation model, which was developed specifically for predicting noise propagation from petroleum and petrochemical facilities (Manning 1981). Two metrics were calculated to characterize the meteorological effect on noise levels at Nuiqsut. First, a long-term average was computed considering seasonal changes in dominant wind direction and speed, which represents the net meteorological effect over a 5-year period, and results in an effective enhancement of approximately +1 dB compared to the neutral conditions listed in Table 3.5-1. Second, a downwind-condition average was computed, which represents conditions during which sound propagation from the Alternative B drillsite toward Nuiqsut is actively enhanced by wind and atmospheric conditions, resulting in an enhancement of approximately +2.8 dB compared to the neutral conditions listed in Table 3.5-1. Table 3.5-2 presents the estimated noise levels at Nuiqsut after accounting for both distance attenuation and wind enhancement. Values are presented for neutral conditions (same as what is presented in Table 3.5-1), the long-term average (+1 dB), and the downwind average (+2.8 dB); values exceeding the EPA guideline of 55 dBA L_{dn} are shown in bold.

Table 3.5-1. Estimated Noise Impacts for Alternative B Based on Distance Attenuation Alone

Project Phase	Noise Source	Duration	Distance to Nuiqsut (miles)	Source Level* (dBA)	Predicted L_{eq} (dBA) at Nuiqsut	Estimated L_{dn} (dBA)† at Nuiqsut	Distance at Which Noise Attenuates to 35 dBA (miles)‡
Construction	Drill, set, and slurry pile installation (primary)	Years 1–2, winter only	2.1	77 L_{eq} at 50 feet§	30.1	36.5	1.2
Construction	Vibratory pile installation (secondary, limited use)	Years 1–2, winter only	2.1	94.5 L_{eq} at 50 feet§	47.5	53.9	8.9
Construction	General equipment	Years 1–2	2.1	87 L_{eq} at 50 feet§	40.0	46.4	3.7
Construction	Haul trucks	Years 1–2	2.1	76 L_{max} at 50 feet§	29.7	36.1	1.0
Construction	Combined (primary: drill, set, and slurry and general equipment and trucks)¶	Years 1–2	2.1	–	40.8	47.2	4.3
Construction	Combined (secondary: vibratory and general equipment and trucks)¶	Years 1–2 (limited)	2.1	–	48.3	54.7	9.7
Drilling	Drill rig, ACF-powered (primary)	Years 2–7	2.1	67 at 50 feet#	20.1	26.5	0.4
Drilling	Drill rig, on-site backup power (secondary)	Years 2–7 (occasional)	2.1	70 at 50 feet#	23.1	29.5	0.5
Operations	All steady-state equipment (combined)††	Years 2–30	2.1	–	29.8	36.2	1.0
All	Truck traffic	All years	2.1	77 L_{max} at 50 feet§	29.7	36.1	1.0
All	Fixed-wing aircraft	Years 1–2	8.0§§	69–81 at 1,000 feet§§	Up to 39	–¶¶	–¶¶
All	Helicopter	All years	2.1§§	70–80 at 1,000 feet§§	**Up to 59**	–¶¶	33.7

Note: Values exceeding the EPA guideline of 55 dBA L_{dn} are shown in bold.

* All predicted levels are calculated using distance attenuation (i.e., spherical spreading attenuation), which assumes 6 dB per doubling of distance from the source level at the reference distance. Calculations do not account for ground absorption, atmospheric attenuation, topographic shielding, or barriers; predictions, therefore, are conservative (worst-case) estimates.

† L_{dn} values for continuous sources are calculated as L_{eq} +6.4 dBA, reflecting the 10-dB nighttime penalty applied over a 24-hour period for sources assumed to operate continuously.

‡ Ambient sound level of 35 dBA is based on median measured L_{eq} levels near Nuiqsut (Stinchcomb 2017). Attenuation distances in this column are calculated using this L_{eq}-based ambient level and are not directly comparable to the L_{dn} values in the preceding column, which include a 6.4 dB adjustment for the 24-hour day-night averaging period.

§ Data from Federal Highway Administration's (FHWA) Roadway Construction Noise Model database (FHWA 2011). Construction equipment source levels represent typical L_{eq} values from the Roadway Construction Noise Model; haul truck values represent L_{max}.

¶ Combined construction levels calculated by logarithmic addition. The primary scenario uses drill, set, and slurry (77 dBA L_{eq} at 50 feet) for pile installation; the secondary scenario uses vibratory (94.5 dBA L_{eq} at 50 feet). Combined values conservatively assume all sources operate simultaneously and continuously; in practice, pile installation would occur only during discrete work windows.

Drill rig source level (primary) derived from measured source levels for conventional land drilling rigs (BLM 2003; Radtke 2016; SLR Consulting 2011),minus 11 dB for the field insertion loss of the STC-35 acoustic enclosure and 5 dB for ACF-supplied electrical power in place of on-site diesel prime movers. The secondary value for on-site backup power is based on a +3-dB adjustment for supplementary on-site diesel generation.

†† Combined operational level calculated by logarithmic addition of individual steady-state sources (truck traffic and tie-in pad equipment). Does not include intermittent sources (aircraft). Produced-water injection noise is excluded because the pumps are located at the ACF and are part of the existing facility infrastructure, not a new CD8 source.

§§ Fixed-wing aircraft noise at Nuiqsut is based on the Willow EIS (BLM 2023:Table 3.6.3), which reports up to 39 dBA for comparable aircraft types with flight paths approximately 8 miles from the community. The 69- to 81-dBA values represent noise levels directly beneath the flight path at 1,000 feet altitude, not a horizontal reference distance. Helicopter noise is estimated at the CD8 drillsite (2.1 miles from Nuiqsut) using spherical spreading from the 1,000-foot overhead level; this is conservative because atmospheric absorption is not included.

¶¶ L_{dn} is not reported for aircraft because these sources are intermittent and short-duration events. L_{dn} represents a 24-hour average and is not a meaningful descriptor for infrequent noise events. The L_{eq} values shown represent the predicted peak sound level during an individual event, not a sustained condition.

Table 3.5-2. Estimated Wind-Enhanced Noise Levels at Nuiqsut for Alternative B

Project Phase	Noise Source	Neutral L_{dn} (dBA)	Long-Term Average L_{dn} (dBA)*	Downwind L_{dn} (dBA)†
Construction	Drill, set, and slurry pile installation (primary)	36.5	37.5	39.3
Construction	Vibratory pile installation (secondary)	53.9	54.9	**56.7**
Construction	General equipment	46.4	47.4	49.2
Construction	Haul trucks	36.1	37.1	38.9
Construction	Combined (primary: drill, set, and slurry and general equipment and trucks)	47.2	48.2	50.0
Construction	Combined (secondary: vibratory and general equipment and trucks)	54.7	**55.7**	**57.5**
Drilling	Drill rig, ACF power (primary)	26.5	27.5	29.3
Drilling	Drill rig, on-site backup power (secondary)	29.5	30.5	32.3
Operations	Combined steady-state equipment	36.2	37.2	39.0
Construction and drilling	Drilling and drill, set, and slurry pile installation (primary overlap)	36.9	37.9	39.7
Construction and drilling	Drilling and vibratory construction (worst-case overlap)	53.9	54.9	**56.7**
Drilling and operations	Drilling and operations (expected sequenced schedule)	36.6	37.6	39.4

Note: Bold values exceed the EPA guideline of 55 dBA L_{dn}.
* Energy-weighted average across all CONCAWE meteorological categories (1–6) over the 5-year period of record (2020–2024). Represents the net meteorological effect including both enhanced (downwind) and attenuated (upwind) conditions.
† Energy-weighted average for CONCAWE Categories 5 and 6 (downwind propagation conditions), which occur approximately 52% of the time at the Alternative B bearing.

Construction Noise

Construction would occur during Years 1–2 and would generate intermittent but relatively high short-duration noise from pile installation, heavy equipment (bulldozers, graders, scrapers, loaders), haul trucks, and pipeline installation equipment. The use of general construction equipment would occur throughout the entire Project area, whereas pile installation would be done more intermittently and only where needed in winter (for the pad, new VSMs along pipeline alignment, and bridge piers). Pile installation would be the loudest construction noise source and would use two different methods. The primary installation method for the CD8 pad, pipeline alignment, and bridge piers would be drill, set, and slurry (D/S/S), which is substantially quieter than vibratory installation. Vibratory pile installation is expected to be used as a secondary method on a limited basis, primarily within an approximately 1- to 2-week window on the CD8 pad where access constraints, hydrology, or soils may make D/S/S impractical. Vibratory installation would also be used for bridge sheet piles, which cannot be installed using D/S/S.

Construction equipment would generate intermittent, high-intensity noise during construction periods, with sound levels near active construction zones reaching up to 94.5 dBA at 50 feet individually (FHWA 2011). Noise levels in Nuiqsut during D/S/S pile installation (primary scenario) would range from approximately 36.5 dBA L_{dn} (based on distance attenuation alone) up to 39.3 dBA L_{dn} under downwind conditions. Noise levels at Nuiqsut during vibratory pile driving (secondary method) would range from approximately 53.9 dBA L_{dn} (based on distance alone) up to 56.7 dBA L_{dn} under downwind conditions. Noise levels from general construction equipment would range from approximately 46.4 dBA L_{dn} (based on distance alone) up to 49.2 dBA L_{dn} under downwind conditions.

Worker and material transport via ground vehicles would also occur during construction. The estimated number of Project vehicle trips would increase baseline ground traffic levels west of the Colville River by up to 224% during peak construction in winter of Year 0/1 (see Table 3.1-5). Noise levels from haul trucks would range from approximately 36.1 L_{dn} (based on distance alone) up to 38.9 dBA L_{dn} under downwind conditions.

When construction sources (not including aircraft) are combined logarithmically to represent periods when multiple activities (e.g., pile installation, general equipment, and haul trucks) could occur simultaneously, the combined construction sound level at Nuiqsut during D/S/S pile installation (most common scenario) would range from approximately 47.2 dBA L_{dn} (based on distance alone) up to 50.0 dBA L_{dn} under downwind conditions. During vibratory pile installation, which would occur less frequently, the combined construction sound level at Nuiqsut would range from approximately 54.7 dBA L_{dn} (based on distance attenuation alone) up to 57.5 dBA L_{dn} under downwind conditions. These combined levels exceed the ambient level of 35 dBA by approximately 12.2 to 22.5 dBA, which would be perceived as a dramatic change. However, the combined construction noise levels would remain under the EPA guideline of 55 dBA L_{dn} for the majority of construction and would exceed the EPA threshold for limited periods of time if and when vibratory pile driving occurs under downwind conditions. During these circumstances, the EPA threshold could be exceeded by up to 2.5 dBA. It is important to note that these combined estimates conservatively assume all construction sources are operating simultaneously and continuously, which overstates the actual condition since pile installation

occurs only during discrete work windows and would not run concurrently with all other equipment at all times.

The estimated distance at which construction noise sources would attenuate to ambient levels (35 dBA) ranges from approximately 1.0 to 8.9 miles for individual sources or from 4.3 to 9.7 miles for all construction sources combined (see Table 3.5-1). These distances indicate that construction noise, particularly during pile-installation activities, would be perceptible well beyond the immediate work area, though sound levels at Nuiqsut would remain below levels associated with adverse community noise impacts with limited exceptions (i.e., vibratory pile driving during downwind conditions). Subsistence harvesters could be affected by construction noise if they are within the attenuation zones for construction activities (up to 9.7 miles). It is likely that subsistence harvesters would avoid areas near to construction areas where Project noise would be highest and where noise may be intrusive or uncomfortable (BLM 2023:105). However, locations not in the immediate vicinity of Project elements would be subject to lower Project noise levels, with most attenuation zones identified in Table 3.5-1 experiencing levels in the mid-30s to 50s dBA. Such levels, although audible, would be characterized as "very quiet" to "quiet" (BLM 2023:105). Construction noise would be limited to Years 1 and 2, would primarily occur in the winter and spring, would be less intensive in the summer and fall, and would diminish once pile installation and heavy equipment operations cease. Therefore, construction noise is not expected to result in sustained impacts on Nuiqsut or surrounding subsistence use areas.

Fixed-wing aircraft activity to and from the Alpine airstrip (approximately 8 miles from Nuiqsut) would only occur during construction for worker and material transport (see Table 2.5-3). Fixed-wing air traffic occurs regularly at the Alpine and Nuiqsut airstrips (see Table 3.1-2). The estimated number of Project fixed-wing aircraft trips would increase baseline fixed-wing air traffic volumes to and from the Alpine airstrip by approximately 3% during Year 1 and 6% during Year 2 of construction (see Table 3.1-6). Fixed-wing aircraft used in support of Project construction would typically generate 69 to 81 dBA at 1,000 feet from the source (BLM 2023) or up to 39 dBA L_{eq} at Nuiqsut during individual takeoff and landing events (see Table 3.5-1). Although the Project would increase the frequency of fixed-wing aircraft noise in Nuiqsut by 3% to 6% during construction, it would not change the existing location or intensity of noise sources associated with fixed-wing aircraft.

Helicopters use would be limited to emergency response, ice road cleanup during construction, and required monitoring studies. The estimated number of Project helicopter trips would increase baseline helicopter traffic volumes at the Alpine airstrip by approximately 21% during Year 1 and 23% during Year 2 of construction (see Table 3.1-6). Although fewer helicopter trips are proposed for Year 2 (115 trips), there would be less existing helicopter traffic, so the total increase in helicopter traffic for Year 2 would be 23%, the highest percent increase for all alternatives. Flights would not occur over the community; however, in the rare event a helicopter landing is needed at the CD8 drillsite, noise levels at Nuiqsut would be approximately 59 dBA L_{eq} during individual events, based on source levels of 70 to 80 dBA at 1,000 feet from the source (BLM 2023).

Aircraft events would be intermittent and short in duration. L_{dn} is not a meaningful metric for infrequent noise events because a single brief overflight has a negligible effect on a 24-hour average. The L_{eq} values reported here represent the peak predicted level during an individual

event, not a sustained condition. Although individual helicopter events may briefly exceed both the ambient level and EPA's L_{eq}-equivalent threshold of 48.6 dBA, these events would be infrequent and would not contribute to sustained community noise exposure. Aircraft noise would not meaningfully alter the long-term acoustic environment at Nuiqsut.

Drilling Noise

Drilling activities would occur during Years 2–7 and would generate continuous, 24-hour noise from drill rigs, mud pumps, and associated support equipment. The drill rig planned for CD8 is a modern enclosed North Slope rig, which uses insulated metal acoustic panels and insulated intake and exhaust systems (Wrobel 2026). The drill rig has an estimated source level of 67 dBA at 50 feet, which is derived from measured source levels for conventional land drilling rigs, and is adjusted for the two features (acoustic enclosure and electric power supply) that distinguish the CD8 configuration from conventional unenclosed diesel drilling rigs (BLM 2003; Radtke 2016; SLR Consulting 2011). Drill rig power would be predominantly supplied from the ACF, with on-site diesel generators used only for temporary backup during occasional ACF power interruptions. Because drilling occurs around the clock, this phase represents the highest sustained noise contribution from the Project. Worker transit and periodic helicopter activity would continue throughout the drilling phase.

Under the primary power configuration (ACF-supplied electrical power), drill rig noise at Nuiqsut would range from approximately 26.5 dBA L_{dn} (based on distance alone) up to 29.3 dBA L_{dn} under downwind conditions. If on-site generators need to be used for power, drill rig noise at Nuiqsut would increase slightly to approximately 29.5 dBA L_{dn} (based on distance alone) and up to 32.3 dBA L_{dn} under downwind conditions. These are the highest predicted L_{dn} levels from any sustained Project source, and would remain below the EPA guideline of 55 dBA L_{dn} and the ambient level of 35 dBA L_{eq}. Drilling noise would attenuate to the ambient level at approximately 0.4 to 0.5 mile from the source, depending on the power source. Similar to construction, subsistence harvesters within the attenuation zone for drilling noise (0.4–0.5 mile) could be affected; it is likely that subsistence harvesters would avoid the immediate area near the drillsite where noise would be noticeable, whereas locations beyond 0.5 mile of the drillsite would not be affected by Project noise.

Drilling would continue for approximately 5 years (Years 2–7), overlapping with early production operations. Once drilling is complete, this noise source would cease entirely.

Operational Noise

Operational activities would occur during Years 2–30 and would include routine production, maintenance activities, and periodic vehicle and helicopter traffic. Operational noise sources would include minor tie-in pad equipment (small pumps, metering units), routine vehicle traffic, and pipeline infrastructure. Operational noise is generally lower in intensity and more consistent than construction or drilling noise, and helicopter and vehicle traffic would decrease relative to earlier phases.

Noise levels from individual sources of operational equipment would generally attenuate to levels that are at or below ambient levels at Nuiqsut. Routine truck traffic would attenuate to approximately 36.1 dBA L_{dn} at Nuiqsut, and pipeline systems and tie-in pad equipment would produce negligible operational noise and would not affect sound conditions at Nuiqsut.

When combined logarithmically, all steady-state operational sources would produce an aggregate level of approximately 29.8 dBA L_{eq} or 36.2 dBA L_{dn} (based on distance alone) or up to 39.0 dBA L_{dn} under downwind conditions in Nuiqsut. This combined level would essentially be at or just above existing ambient conditions and well below the EPA's 55-dBA L_{dn} threshold. Operational noise would attenuate to the ambient level at approximately 1.0 mile from the source. Operational noise would persist for the life of the Project but at levels substantially lower than drilling noise.

Operational ground traffic would increase baseline traffic by approximately 2% to 3% (see Table 3.1-5) and thus would be barely perceptible. Helicopter use during operation would be infrequent (approximately 15 trips per year), short lived, and limited to emergency response to the CD8 pad and required monitoring studies; associated noise impacts would be the same as described for construction (59 dBA at Nuiqsut, for a landing at the CD8 drillsite). The estimated number of Project helicopter flights during operations (see Table 3.1-5) would increase baseline helicopter levels at the Alpine airstrip by approximately 3% each year (see Table 3.1-6).

Subsistence users could also be affected by operational noise if they are within the attenuation zones for operational noise (1.0 mile; see Table 3.5-1). It is likely that subsistence users would avoid areas very near to areas of persistent operational noise (such as roads and the drillsite) where Project noise would be highest, whereas locations beyond 1.0 miles of Project facilities would not be affected by Project noise.

Combined Project Noise

The CD8 Project phases would overlap in some years (construction Years 1–2, drilling Years 2–7, and operations Years 2–30), meaning multiple noise sources could contribute to the acoustic environment simultaneously. The most acoustically significant overlaps would occur during Year 2, when construction noise would coincide with early drilling activity, and during Years 2–7, when continuous drill rig noise would coincide with early production equipment and routine traffic.

During Year 2 of construction, the overlap of construction and drilling would generate the most noise if pile installation and drilling occur simultaneously. Though most pile installation would be completed before drilling begins, in the unlikely event that limited pile installation is needed during drilling, the combined noise levels at Nuiqsut from D/S/S pile installation would be approximately 36.9 dBA L_{dn} (based on distance attenuation alone) or up to 39.7 dBA L_{dn} under downwind conditions (see Table 3.5-2). This estimate complies with the EPA guideline of 55 dBA L_{dn} and represents a conservative estimate that assumes continuous 24-hour noise from pile installation. In practice, actual sound levels during any such overlap would be lower than predicted because pile installation would be intermittent.

If vibratory pile driving (secondary method) is needed during Year 2 (also unlikely), the combined noise levels at Nuiqsut would be approximately 53.9 dBA L_{dn} (based on distance attenuation alone) or up to 56.7 dBA L_{dn} under downwind conditions (see Table 3.5-2). Although this level exceeds EPA's 55-dBA L_{dn} threshold under downwind conditions, this scenario, if needed at all, would be rare and infrequent since vibratory pile driving would only be used as a secondary method in limited situations. This estimate also conservatively assumes continuous 24-hour noise from vibratory pile driving, which is unlikely. In practice, actual sound levels during this overlap period would be lower than predicted because pile driving would be

intermittent. Under both overlap scenarios for Year 2, these conditions would be temporary and restricted to the limited period when both construction and drilling are active during Years 2.

During Years 2–6, the combination of drill rig noise (ACF-powered primary scenario) with aggregate steady-state operational equipment would result in combined noise levels at Nuiqsut of approximately 36.6 dBA L_{dn} (based on distance attenuation alone) or up to 39.4 dBA L_{dn} under downwind conditions (see Table 3.5-2). In the rare event on-site generators need to be used for drill rig power, the combined drilling plus operations noise level at Nuiqsut would increase slightly to approximately 37.0 dBA L_{dn} (based on distance attenuation alone). In either case, these combined drilling and operation noise levels would remain well below the EPA threshold of 55 dBA L_{dn} and represent the highest predicted sustained noise condition during any Project phase.

Spills and Inadvertent Releases

Chapter 4 (Spills and Inadvertent Releases) describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. Small spills and inadvertent releases would likely occur under any action alternative. Most spills or inadvertent releases would be contained to the gravel pad. Noise effects related to the cleanup of very small to small spills, if they occur, would be similar to those of construction noise described above and occur mainly near the release. Large spills, though unlikely, could require noise-generating response activities (use of boats, fixed-wing aircraft, helicopters, trucks, and/or heavy equipment) that may be needed over a longer duration, and over a larger area.

Summary

Depending on the types of equipment in use and meteorological conditions (i.e., wind direction), estimated noise levels at Nuiqsut would generally range from 47.2 to 57.5 dBA L_{dn} during combined construction activities, 29.5 to 32.3 dBA L_{dn} during combined drilling activities, and 36.2 to 39.0 L_{dn} during combined operational activities (see Tables 3.5-1 and 3.5-2). In the event that construction and drilling (Year 2) or drilling and operation (Years 2–7) activities overlap, combined noise levels at Nuiqsut could reach up to 56.7 dBA L_{dn} and 39.4 dBA L_{dn}, respectively. Additionally, aircraft noise may occur intermittently and infrequently during construction or operation and could generate noise levels of approximately 39 to 59 dBA in Nuiqsut (see Table 3.5-1). Although Project noise levels would exceed ambient sound levels at Nuiqsut during most phases (primarily during construction, operation, or overlapping phases), all sustained noise levels would remain below EPA's recommended threshold for community areas (55 dBA L_{dn}). The only activities exceeding EPA's threshold would be short-term and infrequent occurrences resulting from vibratory pile driving in downwind conditions (used as a secondary method on a limited basis) and helicopter landings at the CD8 drillsite.

Subsistence harvesters could also be affected by Project noise if they are within the attenuation zones for Project activities, which range from less than 1 to 33.7 miles (see Table 3.5-1). Although smaller, louder areas very near the Project facilities would likely be avoided by subsistence harvesters, most attenuation zones would remain in the mid-30s to 50s dBA (i.e., "very quiet" to "quiet"). Accordingly, chronic or prolonged noise impacts associated with construction, drilling, or operation of the CD8 Project are not expected to exceed EPA guidelines for communities.

Alternative B would produce the loudest noise levels at Nuiqsut due to its proximity (2.1 miles) and close alignment with the prevailing east-northeast wind direction (bearing 66 degrees).

3.5.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C (3.1 miles from Nuiqsut, at a bearing of 37 degrees) would have the same types of impacts as Alternative B, but the magnitude of impacts to sensitive receptors in Nuiqsut would be reduced due to the location of the drillsite being 1 mile further from the community and less aligned with the prevailing wind direction (see Figure 2.3-1). At this increased distance, sound levels from drillsite construction and drilling phases would be reduced by approximately 3.4 dB relative to Alternative B based on distance attenuation alone. Additionally, the Alternative C drillsite would be situated northeast of Nuiqsut and divergent to the prevailing east-northeast wind direction, meaning prevailing winds would be less likely to enhance Project noise at Nuiqsut. Analysis of the meteorological record indicates that the Alternative C drillsite is within the downwind arc approximately 38% of the time, compared to 52% for Alternative B. The combination of greater distance and reduced downwind frequency means that Alternative C would produce lower noise levels at Nuiqsut under both neutral and wind-enhanced conditions, and would be less likely to approach or exceed the EPA guideline of 55 dBA L_{dn}.

The type and magnitude of impacts to subsistence users would generally be the same as Alternative B, except the spatial distribution of attenuation zones would shift based on the modified drillsite location. Similar to Alternative B, subsistence users would likely avoid areas very close to sources of persistent operational noise (such as the drillsite); although the modified location of the drillsite and connected facilities (e.g., roads and pipelines) would shift these avoidance areas slightly further from the Putu Channel, it would not noticeably change the magnitude of noise impacts to subsistence users.

Spills and inadvertent releases under Alternative C would result in the same types of noise impacts as previously described for Alternative B, but the spatial distribution of potential spills and associated noise impacts would change based on the modified layout of Alternative C facilities. Similar to construction noise, noise levels at Nuiqsut during the cleanup of spills or inadvertent releases at the drillsite's gravel pad (which would include most spills) would be reduced compared to Alternative B, due to the location of the drillsite being 1 mile further from the community and less aligned with the prevailing wind direction (see Figure 2.3-1).

3.5.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Like Alternative C, noise levels at Nuiqsut under Alternative D (2.5 miles northeast of Nuiqsut) would be lower than those predicted for Alternative B due to the location of the drillsite being 0.4 mile further from the community, and at a north-northeast bearing, which is less aligned with the prevailing wind direction (see Figure 2.3-1). At this increased distance, sound levels from construction and drilling would be reduced by approximately 1.5 dB relative to Alternative B based on distance attenuation alone. Meteorological analysis shows that the Alternative D drillsite is within the downwind arc approximately 23% of the time, the lowest of the three alternatives and roughly half the frequency of Alternative B. Although Alternative D is only 0.4 mile farther from Nuiqsut than Alternative B, the substantially reduced downwind frequency indicates that wind-enhanced noise propagation would be far less frequent under this alternative.

The type and magnitude of impacts to subsistence users would generally be the same as Alternative B, except the spatial distribution of attenuation zones would shift based on the modified drillsite location. Similar to Alternative B, subsistence users would likely avoid areas very close to sources of persistent operational noise (such as the drillsite); although the modified location of the drillsite and connected facilities (e.g., roads and pipelines) would shift these avoidance areas slightly further from the Putu Channel, it would not noticeably change the magnitude of noise impacts to subsistence users.

Spills and inadvertent releases under Alternative D would result in the same types of noise impacts as previously described for Alternative B, but the spatial distribution of potential spills and associated noise impacts would change based on the modified layout of Alternative D facilities. Similar to construction noise, noise levels at Nuiqsut during the cleanup of spills or inadvertent releases at the drillsite's gravel pad (which would include most spills) would be reduced compared to Alternative B, due to the location of the drillsite being 0.4 mile further from the community and less aligned with the prevailing wind direction (see Figure 2.3-1).

3.5.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

Sound from the Project would create noise in the analysis area and contribute to additive noise in areas where other RFF actions (continued oil and gas exploration and development, mining, transportation and community development projects; see Table 3.1-3, see Figure 3.1-2) would also contribute noise at the same time. The closest and most directly upwind RFF actions would be Alpine upgrades, Pikka NDC, and ASRC Mine Site expansion. Other nearby RFF actions would be construction of the K3 Pad, expansion of the K-Pad, community development in Nuiqsut, and construction of the Colville River access boat ramp. The RFF trend of increased oil and gas exploration in the NPR-A and around Nuiqsut would also seasonally contribute noise, depending on the location. The Project in combination with these actions or trends could cumulatively result in larger attenuation zones where sensitive noise receptors (including Nuiqsut and subsistence users) would be exposed to audible noise from development in the region. Such cumulative effects could increase the amount of the Nuiqsut subsistence use area that is avoided due to human-made noise. The combined noise levels from the Project and other RFF actions may temporarily exceed EPA's recommended threshold for community areas (55 dBA L_{dn}) during Project construction if short-term but high-impact activities such as pile driving, blasting, or more frequent helicopter use are expected to occur at the same time as construction of RFF actions. However, outside of these high-impact activities, noise levels during the Project's drilling and operation phases would be lower and closer to ambient conditions, which would reduce the likelihood for additive noise from RFF actions to result in exceedances of EPA's community threshold at Nuiqsut (see Table 3.5-2).

3.5.1.2.6 SUMMARY OF IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

Because noise is not a Federal resource, there would be no irreversible and irretrievable commitments of Federal resources with regard to noise if a permit were issued.

3.6 PUBLIC HEALTH AND SAFETY

3.6.1 How Would the Project Impact Human Health and Safety?

USACE considers effects on human health and safety as part of its NEPA analysis (33 CFR 333.61(d)(1)) and as part of the PIR (33 CFR 320.4(a)). Moreover, human health impacts are analyzed to determine if a potentially permitted discharge would cause significant adverse effects potentially contributing to significant degradation of WOTUS under the CWA (40 CFR 230.10(c)(1). NSB and Nuiqsut residents have expressed concerns about the potential for public health effects associated with oil and gas development on the North Slope, including impacts from air and noise emissions, water quality changes, and the potential for spills to contaminate the environment and subsistence resources on which Nuiqsut residents rely.

This EIS uses HECs to evaluate health impacts. The HEC framework was developed by the now-defunct Alaska Department of Health and Social Services (ADHSS) and is described in the document *Technical Guidance for Health Impact Analysis in Alaska* (ADHSS 2015). ADHSS developed the document to help stakeholders identify, assess, and mitigate the health effects of projects and policies in Alaska. Though ADHSS was eliminated in 2022 and the use of health impact assessments (HIAs) to support permitting is not mandatory in Alaska, the EIS uses HECs as a general framework for the NEPA analysis because they are representative of the health-related issues and concerns raised during scoping and government-to-government consultation. Additionally, the use of HECs allows for analysis that is consistent with other recent EISs for similar projects in Alaska, thereby facilitating incorporation by reference of relevant information in those EISs.

Two of the eight HECs in ADHSS (2015), infectious disease and healthcare services infrastructure and capacity, are dismissed from detailed analysis because there would be no change to the baseline condition due to the CD8 Project and because they are analyzed in the Willow SEIS (BLM 2023:387) and the Nanushuk EIS (USACE 2018:3-758, 761, and 763), which are hereby incorporated by reference; see HEA-1 and HEA-2 in EIS Appendix D (Issues Dismissed from Detailed Analysis). The remaining six HECs are described below. HECs are considered individually by action alternative and additively in a summary section for each action alternative.

The analysis area for public health and safety is the community of Nuiqsut and its subsistence use area, which is where community residents live, work, and harvest subsistence resources (see Figure 3.8.1). The temporal scale for analysis is the 30-year Project life plus any additional time required for public health and safety conditions affected by the Project to return to baseline conditions.

3.6.1.1 Affected Environment

Nuiqsut is a small, mostly Iñupiat community with an estimated population of approximately 492 to 616 residents, depending on the data source[13] (NSB 2022; USCB 2024a, 2024b). It is 381

[13] Because of the small size of many NSB communities, changes in how the USCB counts nonresident workers on the North Slope, and low participation rates in NSB socioeconomic surveys, demographic data for the NSB and its small communities are limited and inconsistent between data sources. The EIS analysis relied on both USCB data and NSB demographic survey data where available.

miles northwest of Fairbanks, 154 miles southeast of Utqiaġvik, and 57 miles west of Deadhorse. The community is located at the eastern edge of the Federally managed NPR-A. Nuiqsut is the closest community on the North Slope to oil and gas facilities and has been the most directly impacted by oil and gas activities to date. As described in Section 3.8 (Subsistence), residents of Nuiqsut rely on subsistence harvests. The Nuiqsut subsistence use area includes the CRD, Harrison Bay, and part of the NPR-A (see Figure 3.8.1), and there is high use along the local road system and in areas directly west of the community of Nuiqsut. The NSB 2023 *Multi-Jurisdictional Hazard Mitigation Plan* identifies 23 critical facilities in Nuiqsut, including community utility infrastructure, air services, firefighting services, fuel stations, search and rescue, elder apartments living quarters, and health facilities (NSB 2023).

The following information on the existing conditions is summarized from the Willow SEIS (BLM 2023:369–387); Nanushuk EIS (USACE 2018:3-737–3-770); *Final Baseline Human Health Summary, Final, Nanushuk Project* (ADHSS 2016); *CD8 Development Environmental Baseline Document* (CPAI 2025a:97–103); *Baseline Community Health Analysis Report* (McAninch 2012); and *Alaska Native Health Status Report: Third Edition* (Alaska Native Tribal Health Consortium [ANTHC] 2021). Each of these documents is herein incorporated by reference. New data are included where available.

3.6.1.1.1 HEC 1 SOCIAL DETERMINANTS OF HEALTH

Health inequities are preventable differences in health that may occur when groups of people do not have equal access to opportunities and resources that promote optimal health. These non-medical social risk factors are often referred to more broadly as social determinants of health (Alaska Department of Health 2025a). The World Health Organization defines the *social determinants of health* as, "the circumstances in which people are born, grow up, live, work, and age, and the systems put in place to deal with illness" and asserts that "the social determinants of health are mostly responsible for health inequities—the unfair and avoidable differences in health status seen within and between countries" (ADHSS 2016:4).

Disparities exist for the Alaska Native population on a number of measures of socioeconomic status, such as educational attainment, poverty, and household income, as compared with Alaska White populations (ANTHC 2021). Risk factors include stress, social isolation, food or housing insecurity, employment and income, and access to medical care. Adults who experience more social risk factors are more likely to report poorer overall health. The percentage of Alaska adults experiencing four or more risk factors differs considerably among Alaska public health regions, with the northern public health regions having a high percentage (over 30%) of Alaska adults reporting four or more risk factors (Alaska Department of Health 2025a). The HEC 1 components that the Project may affect include employment and economic status, social connections and cultural continuity, mental health, and overall general health.

Employment and Economic Status: Increased employment and improved income as a result of new jobs are generally associated with improved community health (BLM 2023:364). The following economic metrics are summarized from Section 3.4 (Economics):

- Employment opportunities in Nuiqsut are limited and unemployment is high. USCB statistics provide an unemployment rate in Nuiqsut of 24.9%, which is more than three times that of Alaska overall (6%) (USCB 2024a, 2024b). Household incomes in Nuiqsut rely heavily on wage income and dividends from the Permanent Fund Dividend, Alaska

Native Corporation dividends, and public assistance. The median household income of Nuiqsut is $78,438, as compared to the State of Alaska, which is $95,665. Approximately 21% of the community is below the poverty level (USCB 2024a, 2024b). These estimates, which come from the USCB's recent 2020–2024 American Community Survey data, generally align with the NSB's unemployment rate (26%) reported in their 2019 economic profile (NSB 2020).

- The cost of living in Nuiqsut is much higher than in urban Alaska. Local challenges related to the availability or costs (or both) of housing, employment, food products, and health services result in the economic status for Nuiqsut residents being more difficult to place in context using State and national statistics.

Social Connections and Cultural Continuity: Cultural factors are important determinants of health in that people who are involved with their communities and culture tend to be healthier than people who are not. Cultural continuity is strong in Nuiqsut, as it is in much of the NSB. Cultural continuity in Nuiqsut includes continuation of subsistence activities, including harvesting resources and sharing those within the community. Participation in subsistence preserves cultural continuity and ensures cultural survival. On average across available study years, 100% of Nuiqsut households used subsistence resources, at least 95% of households reported attempting to harvest subsistence foods, and 93% and 98% of households, respectively, received or gave subsistence resources to other households each year; see Section 3.8 (Subsistence). Using and teaching the Iñupiaq language also contribute to cultural continuity. NSB census reports confirm that the Iñupiaq language is spoken by fewer people and less often than it has been in the past. As of 2015, the NSB census estimated 5.5% of households spoke mostly Iñupiaq in the home (BLM 2023:370).

Education levels are closely linked to health across an individual's lifespan. Statewide, from 2015 to 2019, 83% of Alaska Native adults aged 25 and older had completed high school or an equivalent, and 37% of Alaska Native adults pursued further education, completing some college, an associate degree, or earning a bachelor's degree or higher (ANTHC 2021). Within Nuiqsut, 29% of residents have a high school diploma, a proportion that is lower than most other NSB communities and the NSB average of 41.4%. Approximately 53% of residents have pursued some further education (Voice of the Arctic Iñupiat 2023).

Past and present oil and gas development in the CRD area has negatively influenced the community of Nuiqsut's cultural continuity by modifying the characteristic landscape (e.g., soundscape and viewshed) that is a part of the community's cultural identity given its ties to subsistence activities and traditional cultural practices (see also Section 3.7.1.1.3).

A changing Arctic climate is affecting the culture and public health of Nuiqsut residents. According to an ANTHC report, Nuiqsut residents are reporting noticeable changes in weather, plants, animals, and the land. These changes are raising concerns about food and water security, transportation safety, and increased stress affecting mental health (Brubaker et al. 2016).

Mental Health: Mental health, or behavioral health, is increasingly considered a critical component of overall health and is linked to physical health and well-being. Mental health was recognized in the U.S. Surgeon General's 1999 report as being fundamental to overall health (U.S. Department of Health and Human Services 2001). Suicide is an important health outcome that can function as an indicator for mental health wellness in a population. Mental illness and

other life stressors are highly associated with suicide. The NSB had the highest suicide rate in the state from 2016 to 2020 with an average of approximately 59 per 100,000 population. From 2016 to 2024, suicide was the leading cause of death among Alaskans aged 25 to 34, the sixth leading cause of death overall in Alaska, and the fifth leading cause of death in the northern region of Alaska. The suicide mortality rate among Alaska Natives is more than double the rate for all Alaskans (Alaska Department of Health 2021, 2025a; EXP Energy Services Inc. 2022). Rapid modernization and development; overall changes to lifestyles; and multiple other stressful conditions, including significant changes in diet, housing, and traditional culture have led to negative health outcomes, including increases in alcohol and substance misuse, suicide, violence, and other social dysfunction (BLM 2018:553). As noted above, changing Arctic conditions are also affecting mental health (Brubaker et al. 2016). Based on the Voice of the Arctic Iñupiat's 2023 *Community Needs Assessment*, 22% of Nuiqsut adults have diagnosed depression, and another 21% report poor mental health (Voice of the Arctic Iñupiat 2023).

General Health: Health disparities exist between Alaska Natives statewide, Arctic Slope Alaska Natives, and Alaska non-Natives on a number of mortality measures, including life expectancy, infant mortality, and leading causes of death (ANTHC 2021).

In 2024, the statewide life expectancy in Alaska was 77.6 years. Alaska Natives had the lowest life expectancy by race at 67.6 years, up from 66.5 in 2023 (Alaska Department of Health 2025a).

From 2020 to 2024, the rate of infant mortality and low birth weights was slightly higher in NSB (7 to 9%) than the statewide rate (7%). These statistics are thought to be related to socioeconomic conditions, including health care, health of the mother, and substance use. A greater percentage of women (30%–36%) in the NSB reported smoking during pregnancy than the statewide rate (7%–11%). Preterm births are more common in NSB (12%–14%) and in Alaska Native women (16%) than the statewide rate (10%) (Alaska Department of Health 2024).

From 2016 to 2019, cancer, heart disease, and unintentional injuries were the leading causes of death for Arctic Slope Alaska Native people. These three causes of death accounted for nearly half (47.2%) of all deaths during this time period. The Alaska Native mortality rates were significantly higher than the Alaska non-Native rates for all 10 leading causes of death (Alaska Department of Health 2025b). Tobacco was a confirmed or probable contributing factor in 16% of the deaths between 2020 and 2024 (Alaska Department of Health 2025a).

From 2022 to 2024, approximately 43% of Arctic Slope Alaska Natives adults reported excellent to very good health. This is higher than Alaska Natives across the state (39%), but lower than all Alaska adults (48%) (Alaska Department of Health 2025b). Within the Arctic Slope Tribal Health Region, 16% of Alaska Natives on the North Slope reported poor to fair health (Alaska Department of Health 2025b)**.** NSB community health data (2020) indicate that approximately 32% of all Nuiqsut adults reported "very good" or "excellent" general health (compared to 49% for NSB Iñupiat adults). This is a decline of 10% over 2010 reported data for these same categories; however, Nuiqsut also reported 4% fewer adults in "poor" health (NSB 2020). In general, the NSB Iñupiat population reported considerably less diabetes, high blood pressure, and high cholesterol when compared to other ethnicities. Iñupiaq individuals also reported slightly higher rates of heart disease and breathing problems when compared to other ethnicities (NSB 2020).

3.6.1.1.2 HEC 2 EXPOSURE TO POTENTIALLY HAZARDOUS MATERIALS

Air Quality and Air Pollutant Emissions: Air pollution has been shown to increase the risk of or exacerbate a number of respiratory and cardiac conditions. The elderly, children, and those with underlying health problems are particularly vulnerable to the effects of air pollution.

Air quality concerns in rural Alaska villages include diesel emissions, indoor air quality, dust (from roads, river deltas, glacial deposits, etc.), solid waste burning, and wood smoke. Studies conducted on home heating practices, indoor activities, and community and outdoor activities in rural Alaska communities over a 2-year period showed that there is an elevated potential for PM_{10} and $PM_{2.5}$ exposures in rural Alaska. Significant indoor air quality concerns included mold, lack of ventilation or fresh air, and dust. Many homes have older wood stoves that can be inefficient and create air pollution. Important outdoor air pollution concerns identified were open burning and smoke, road dust or other outside dust, and vehicle exhaust (e.g., snowmachines, ATVs) (Ware et al. 2013). Many communities resort to burning trash that creates air pollution, and electricity primarily comes from diesel generators that produce particulate and other air pollutants. Dust from unpaved roads may contain pollutants that can be inhaled or deposited on subsistence food sources (EXP Energy Services Inc. 2022).

Air quality in Nuiqsut meets the NAAQS and AAAQS. The closest existing oil and gas production facility to Nuiqsut is CD4 (4.5 miles north), and the closest processing facility is the ACF (8 miles north). Other facilities occur at Pikka (12 miles northeast) and Kuparuk DS2L (15.5 miles east). Prevailing winds blow to the southwest, so most facilities are not in the direct alignment of prevailing winds. Naturally occurring windblown PM (PM_{10} and $PM_{2.5}$) in the analysis area originates from riverbanks, sandbars, dirt and gravel roads, gravel mine sites, and occasional tundra fires (SECOR 2000; AECOM 2011a, 2011b). Windblown dust events tend to occur more frequently in the summer when sandbars along the CRD riverbeds are not covered by snow and ice and dry out due to above-freezing ambient temperatures (SECOR 2000).

In response to concerns about air pollution generated from oil and gas activities, the ANTHC partnered with the NVN to conduct an independent assessment of the air quality in Nuiqsut (ANTHC 2011). The review of 2008–2010 air monitoring data from the CPAI air monitoring station located on the northern edge of Nuiqsut showed criteria pollutant concentrations generally well below the NAAQS. PM_{10} exceeded the 24-hour average NAAQS twice from 2008 to 2010, and both instances were believed to be caused by dust from natural sources (ANTHC 2011). $PM_{2.5}$ exceeded the 24-hour NAAQS once from 2008 to 2010 and may have been due to a large forest fire plume (ANTHC 2011). Annual monitoring efforts from 2021 to 2025 continue to show criteria pollutant concentrations generally well below NAAQS and AAAQS (SLR 2022, 2023, 2024; CPAI 2024a, 2025b, 2026). NAAQS and AAAQS $PM_{2.5}$ levels were exceeded during a smoke event from August 7 to 9, 2023, resulting from Canadian wildfires (CPAI 2024a); four air quality advisories were issued by ADEC for the entire NSB between July 18 and August 10, 2023, as a result of wildfires (ADEC 2023).

EPA's AQI is a tool used to communicate health concerns related to outdoor air quality and is described in detail in Section 3.2.1.1.4 (AQI). The daily AQI values for Nuiqsut from 2023 through 2025 are generally within the "good" category (CPAI 2024a, 2025b, 2026).[14] Each year,

[14] EPA's AQI has six categories that correspond to different levels of health concern. AQI values are calculated from actual observed pollutant concentrations.

there have been a few instances where PM_{10} or $PM_{2.5}$ concentrations were elevated into the "moderate" or "unhealthy for sensitive groups" categories, mainly due to windblown silt from the CRD or smoke from forest fires (see Section 3.2.1.1.4 [AQI] for more details).

Ambient CAP concentrations have been monitored by CPAI in Nuiqsut since 1999 as part of Alpine. Monthly VOC sampling was initiated in 2014, and continuous VOC monitoring was added in 2022 to further address concerns from Nuiqsut residents. The initial 2014 VOC study demonstrated that VOC concentrations were below national toxic screening levels of concern, and the long-term trend has been consistent with those findings (CPAI 2024b). As of September 2025, detected concentrations at Nuiqsut were very low, with less than 48 detections exceeding 10 ppb over the 11-year history of the study; at CD4 and CD1 there have been 58 detections exceeding 10 ppb over the history of the study (SLR 2025). Of the detected compounds at Nuiqsut or CD4 and CD1, benzene and ethylbenzene exceeded ADEC and EPA screening levels in October 2022, and 2-propanol (isopropyl alcohol) exceeded ADEC and EPA screening levels in April 2019 (SLR 2025). See Section 3.2 (Air Quality) for more details.

ADHSS investigated air pollution and respiratory illness in Nuiqsut in response to community concerns in 2003 and 2012. Both investigations concluded that air pollution was not the cause. The 2012 ADHSS investigation, which was conducted after the Repsol blowout event, concluded that the increase in visits to the Nuiqsut clinic related to respiratory conditions was likely due to increased influenza and respiratory syncytial virus activity, which was reported throughout the state during the same time period (ADHSS 2016). A 2022 gas release at Alpine CD1 also raised concerns in Nuiqsut about potential natural gas exposures (methane) for the community from any future project incidents. Methane is not a harmful air pollutant, but it is a precursor to ground-level ozone. However, typical atmospheric conditions in Nuiqsut (i.e., cold, low sun intensity, low levels of nitrous oxides) are not conductive for the chemical reactions that would lead to ozone development. Following the 2022 gas release at Alpine CD1, air quality data confirmed there was no ozone development in Nuiqsut (BLM 2023:386).

Subsistence Contaminant Levels: Studies conducted to date have found that contaminant levels in subsistence resources tested are below levels of concern for human health (NSB 2025); however, during recent discussions with Nuiqsut residents, harvesters expressed concerns about the impact of the Project on their migratory bird and egg harvesting activities as a result of increased human activity and contamination (Stephen R. Braund & Associates [SRB&A] 2025). A 2016 study showed that nearly 50% of Nuiqsut households reported avoiding subsistence foods they believed to be contaminated (SRB&A 2017).

Water Quality: Overall, water quality near Nuiqsut is good. As discussed in Section 3.11 (Water Quality and Hydrology), CPAI annually monitors water quality in the Alpine area. Baseline water quality studies in the Niġliq Channel upstream and downstream of Alpine infrastructure as well as in surrounding lakes indicate no detections of hydrocarbons and no detection of metals (MBI 2022).[15]

Nuiqsut's drinking water supply had detectable levels of xylene in the early 2000s, when a new water storage tank's liner failed to properly cure. Water quality was monitored quarterly as the

[15] The exception was barium, which was found at a level consistent with naturally occurring levels in Arctic waters and well below ADEC cleanup standards (MBI 2022).

levels decreased, and monitoring returned to an annual basis in 2005. The detected xylene levels are below the EPA limits established for drinking water to protect public health (ADEC 2018).

3.6.1.1.3 HEC 3 FOOD, NUTRITION, AND SUBSISTENCE

As discussed in Sections 3.8 (Subsistence) and 3.7 (Sociocultural Systems), subsistence is the cornerstone of the traditional relationship of the Iñupiat people with their environment. Residents rely on subsistence harvests of plant and animal resources for nutrition and their cultural, economic, and social well-being. Subsistence fishing and hunting are important sources of employment and nutrition in almost all rural communities (ADF&G 2018). Subsistence is a source of nutrition for residents in an area of Alaska where food prices are high. Although some people earn income from employment, these and other residents rely on subsistence to supplement their diets throughout the year. Furthermore, subsistence activities support a healthy diet and contribute to residents' overall well-being (EXP Energy Services Inc. 2022).

Among all NSB communities, a higher percentage of Nuiqsut households use subsistence resources for more than half of their diet (NSB 2016a). Between 2003 and 2010, Nuiqsut was the only NSB community that reported an increase in the percentage of households for which subsistence foods accounted for more than half of the household's diet (McAninch 2012). As shown in Table 3.8-1 in Section 3.8 (Subsistence), on average, 100% of Nuiqsut households use subsistence resources during any given year, and 95% attempt harvests of resources. Nuiqsut households harvest an average of 428 pounds of subsistence resources per capita annually, comprising marine mammals, large land mammals, and non-salmon fish in almost equal amounts, with waterfowl, salmon, and vegetation contributing lesser amounts. Based on the most recent subsistence mapping (SRB&A 2024), Nuiqsut harvesters have reported using the area within 2.5 miles of the Project for hunting and harvesting a variety of resources. Caribou hunters also hunt directly west of there, along the road system, in overland areas west of the community, and east of the analysis area along the East Channel of the Colville River. In recent years, use of the road system east of the Niġliq Channel (i.e., roads connecting CD1, CD2, CD3, and CD4) for caribou hunting has increased, with up to 30% of Nuiqsut households reporting use of roads in this area (SRB&A 2025). Nuiqsut subsistence activities occur year-round, with a peak in the spring and summer months of May through August, and lower but steady levels of activity from September through January (see Table 3.8-6 in Section 3.8 [Subsistence]).

Food security means having enough food to fully meet basic needs at all times. Food insecurity is the percentage of the population who did not have access to a reliable source of food during the past year (Gundersen et al. 2015). Lacking constant access to food is related to negative health outcomes such as weight gain and premature mortality (Adams et al. 2003; Brownson et al. 2006; EXP Energy Services Inc. 2022). NSB households, particularly Iñupiat households, reported high levels of food insecurity in the NSB (2020) census. In the 2019 NSB census, 30% of household heads reported having difficulty getting healthy food for meals, and 25% reported that there were times when there was not enough food to feed the household (NSB 2020). Food insecurity varied greatly between communities, with Nuiqsut reporting lowest (22.5%) food insecurity and Atqasuk reporting the highest (49%) food insecurity (NSB 2020). This is slightly lower than 2010 NSB data that reported that 25% of Nuiqsut household heads reported household members who, at times in the previous year, did not have enough to eat, and 38% indicated it was difficult to eat healthful meals both because of a lack of subsistence food and store foods (McAninch 2012).

A changing Arctic climate is one of the main drivers of food insecurity for Iñupiat families on the North Slope by affecting access to and harvest of wildlife resources. Most of the Iñupiat household heads in Nuiqsut reported that a changing Arctic climate affected harvesting in 2019 (City of Nuiqsut 2022).

3.6.1.1.4 HEC 4 WATER AND SANITATION

The lack of clean running water and adequate sewage disposal is a leading cause of preventable disease in rural Alaska. Many rural Alaska communities continue to lack adequate sources of water that are safe to drink and facilities that can safely dispose of their wastewater. Respiratory, gastrointestinal, and skin diseases are common in areas without safe water supplies.

The Nuiqsut water system originates at Tagruk Lake (also known as Freshwater Lake), a tundra lake approximately 1 mile south of Nuiqsut. Freshwater is pumped from the lake in the summer months from a floating intake to the treatment plant. Approximately 93% of Nuiqsut households are connected to the community drinking water system; the remaining 7% has water trucked in (City of Nuiqsut 2022). As discussed in Section 3.6.1.1.2 (HEC 2), Nuiqsut's drinking water supply had detectable levels of xylene in the early 2000s, when a new water storage tank's liner failed to properly cure but since 2005, no samples have exceeded State water quality standards (ADEC 2018).

According to the NSB, in 2010, 90% of Nuiqsut households had sewage facilities, and the remaining 10% used holding tanks (NSB 2016a). Wastewater is generally collected through a buried pipe system. The NSB treats wastewater and transfers it via a pipeline to a small pond north of the community for evaporation. For those homes without wastewater service, the NSB empties the tanks and transports waste to the sewer lagoon at the landfill (City of Nuiqsut 2022).

There are few issues with freezing pipes; however, changing permafrost conditions have impacted some water and sanitation infrastructure. Annual erosion also threatens the sewage outflow line (Brubaker et al. 2016).

3.6.1.1.5 HEC 5 ACCIDENTS AND PERSONAL INJURY

Accidents and injuries are notable causes of mortality and morbidity in Alaska. The term *unintentional injury* refers to causes of injury or death other than suicide and homicide. Accidents (i.e., unintentional injuries) were the third leading cause of death in 2020 to 2024. Poisoning or exposure to noxious substances was the leading cause of unintentional injury deaths followed by motor vehicle accidents (Alaska Department of Health 2024:61). The accident death rate in NSB is much higher than across the state as a whole (94–109 deaths per 100,000 from 2020 to 2024, versus 66–91 deaths per 100,000 for the same time period). The accidental death rate for American Indian/Alaska Native residents had the highest age-adjusted death rate in the State by race (132–220 deaths per 100,000) (Alaska Department of Health 2025a:61). Alcohol use is a powerful risk factor for accidents and injuries (EXP Energy Services Inc. 2022).

Falls, assaults, and suicide attempts are the most common causes of non-fatal injury hospitalizations in the NSB, followed by all-terrain vehicle, snow machine, and motor vehicle traffic accidents (ADHSS 2016:12).

3.6.1.1.6 HEC 6 NON-COMMUNICABLE AND CHRONIC DISEASES

Non-communicable and chronic diseases are leading causes of mortality among Alaska Natives. Cancer and heart disease are the top two leading causes of death among Alaska Natives, and mortality rates are significantly higher than among Alaska non-Natives (ANTHC 2021). Chronic obstructive pulmonary disease—a group of lung diseases that block airflow and make breathing difficult—was the fifth leading cause of death among Alaska Natives from 2016 through 2019, with a mortality rate of 56.0 per 100,000.[16] This is significantly higher than among Alaska non-Natives (31.1 per 100,000) (EXP Energy Services Inc. 2022; BLM 2023:374). Risk factors for chronic obstructive pulmonary disease include tobacco smoking, underlying asthma plus smoking, age, genetics and chronic exposure to chemical fumes, vapors, and dusts.

Tobacco use in the NSB ranks among the highest in the state; research has established smoking as a primary cause of cancer and heart disease (ANTHC 2021; McAninch 2012). The 2010 NSB census health profile data reported that 62% of all Nuiqsut adults were smokers (compared to 49% for NSB and 22% across the state); tobacco smoking among teens (as reported by the household head) was also notably and significantly more common in Nuiqsut than in the rest of the North Slope communities, and this difference remained when looking at Iñupiat teens only (McAninch 2012). Approximately 69% of Nuiqsut Iñupiat household heads reported smoking in 2015 compared to 67% in the NSB overall (NSB 2016b).

Between 2014 and 2018, the prevalence of adult overweight or obesity among NSB residents was 72% as compared to 66.5% for both Alaska Natives statewide and all of Alaska. Nuiqsut rates of overweight and obesity were lower than these averages (61%) (ADHSS 2016:23).

The 2023 *Community Needs Assessment* reports that 16.5% of Nuiqsut adults report poor physical health, 26% report no leisure physical activities, 33% report being regular smokers, and 20% report binge drinking (Voice of the Arctic Iñupiat 2023).

3.6.1.2 Environmental Consequences

3.6.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.1.2) would continue (as would associated traffic and other activities that contribute to the environmental baseline) that affect health and HECs. Existing and RFF trends, such as changing Arctic conditions and increased development around NPR-A, would likely continue. Nuiqsut residents are likely to continue to have limited access to advanced medical care and higher rates of some health issues, as described in the HEC 6 discussion in Section 3.6.1.1.6.

3.6.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

HEC 1 Social Determinants of Health

Employment and Economic Status: Project construction would offer employment opportunities in Nuiqsut, which would reduce unemployment and increase household income and potentially

[16] The third and fourth leading causes of death are not from non-communicable and chronic diseases.

dividends for ASRC and Kuukpik shareholders (see Section 3.4 [Economics]). Increased employment and improved income are generally associated with improved community health (EXP Energy Services Inc. 2022). In Nuiqsut, local resident hire is coordinated through the Kukupa employment coordinator to identify and place qualified individuals interested in working on CPAI projects (CPAI 2018). Nonetheless, most oil industry jobs require specific skillsets and are filled by non-local or out-of-state workers (see Section 3.4 [Economics]).

Social Connections and Cultural Continuity: As discussed in Section 3.8 (Subsistence), Project construction and operation would affect resource availability, thus reducing harvest success near Project infrastructure. Caribou is the most likely subsistence resource to be affected due to the potential for impacts to caribou movement, behavior, or distribution. The development of additional roads may provide some mitigating benefits (see Table 3.8-3); however, some harvesters may avoid using traditional subsistence use areas near Project infrastructure for a variety of reasons. Over time, long-term changes in harvesting patterns may result in a loss of opportunities to pass on traditional knowledge regarding previously used hunting areas and hunting methods, ultimately resulting in a loss of subsistence knowledge and social connections and cultural continuity.

Local hires, although small, may result in the potential for social tensions regarding an uneven distribution of money in the community since not all Nuiqsut residents would find jobs or receive ANCSA dividends (McAninch 2012). Changes to cultural continuity from an influx of non-local workers is not expected as few non-local construction workers would interact with Nuiqsut residents. However, if Nuiqsut residents are hired and stay in Project camps, they would have more interaction with non-local workers, decreased connections with their social support network, potential time conflicts for subsistence activities, and potential effects on health.

Project facilities and lighting would affect visual and scenic quality and noticeably change the characteristic landscape (including night skies) in and around Nuiqsut. Project facilities would also affect visual and scenic quality of subsistence areas, particularly along the Putu Channel and Colville River confluence (see Section 3.10 [Visual Resources]). Project noise would also increase, particularly during construction. These visual and noise impacts would affect the setting in which Nuiqsut residents live and conduct subsistence activities.

Mental Health: As described in Section 3.5 (Noise), maximum noise levels in Nuiqsut during Project construction and from the use of aircraft are expected to reach up to 57.5 dBA L_{dn} from combined construction equipment (under downwind conditions) and up to 59 dBA L_{eq} during helicopter flights. These levels would exceed existing ambient sound levels (35 dBA L_{eq} or 46.8 dBA L_{dn}, and 55–69 dBA when aircraft are overhead) and EPA's recommended guideline of 55 dBA for community noise. Although exceedances of EPA's 55-dBA guideline would occur infrequently and be short lived, these increases could cause irritation, annoyance, or sleep disturbance among residents when they occur (BLM 2012). Long-term visual setting changes, traffic, and ongoing concerns about the proximity of the Project to Nuiqsut and potential for sociocultural changes may increase stress in some Nuiqsut residents and could lead to or exacerbate mental health issues such as anxiety and depression. This, in turn, could lead to a decline in physical health and overall well-being, or result in increases in alcohol and substance misuse, suicide, violence, or other social dysfunction (see Section 3.6.1.1.1 as well as BLM 2018:553). Residents who apply for jobs and are not hired may also experience these conditions (BLM 2023:385).

Residents may also experience increased stress related to the potential for spills or for a reservoir blowout or shallow gas leak. The direct physical impacts to health from such an event are described in the HEC 2 Exposure to Potentially Hazardous Materials section. Members of the community have expressed feeling trapped should an event occur in the summer when there is no ice road for evacuation out of the area and out of the direction of the dominant winds. Once the gravel road to Willow is constructed, evacuation 20 miles to the west would be possible, but evacuating to another oil and gas facility may increase anxiety in an already tense situation. The underlying possibility of an emergency event—when it would be very difficult, if not impossible, for the community (especially elders and small children) to evacuate—could create chronic stress for some individuals. Though there are existing oil and gas facilities near Nuiqsut (CD4 is 4.5 miles from the community), CD8 would be half that distance and immediately in the path of dominant winds.

Evacuation planning for any type of emergency is addressed in City of Nuiqsut and NSB emergency plans. Per NSB Code 2.32.070, the NSB Office of Emergency Management must prepare and maintain a borough-wide emergency plan. The NSB (2023) *Multi-Jurisdictional Hazard Mitigation Plan* Appendix G identifies the development of a 2026 Nuiqsut emergency response plan to address flood, erosion, permafrost degradation, and wildfire risks to the community. The 2023 plan prioritizes emergency shelter and evacuation planning to be accomplished within 6 to 9 years (NSB 2023). In partnership with NSB, ICAS is working with communities across NSB to provide incident command system training for village coordinators, to facilitate local coordination and training, and to conduct emergency alert and warning testing (ICAS and University of Alaska Fairbanks [UAF] 2025).

ICAS has engaged with the Federal Emergency Management Agency who recently funded and hosted a 4-day integrated emergency management course that relevant stakeholders from all eight NSB villages attended. ICAS is the one Alaska Tribal entity who has been given alerting authority for Federal Emergency Management Agency's national Integrated Public Alert and Warming System (IPAWS) (ICAS and UAF 2025). This has allowed ICAS to invoke IPAWS in situations using their understanding of NSB communities, resources, and environments (ICAS and UAF 2025).

ICAS is also working to develop comprehensive emergency management plans for each NSB community. NSB, ICAS, and Nuiqsut community leadership have developed an active local emergency planning committee to manage hazard mitigation planning and preparedness. The committee will also be engaged in the development of the community emergency response plan and evaluate past hazards and responses to adequately prepare for potential future disasters. CPAI is a member of the committee and is helping to support and facilitate community emergency response plan revisions and trainings.

In summary, although some emergency planning has been developed (including the use of IPAWS), and the need for a Nuiqsut emergency evacuation as a result of the Project is not likely, there is no identified community evacuation method in the summer. Thus, existing stress regarding safety and egress in the event of an emergency would be exacerbated by the presence of a drillsite even closer to the community than existing drillsites.

General Health: The Project would not affect general health in Nuiqsut unless there is a decline in mental health, as described above, which could then be related to a potential decline in physical health and well-being.

HEC 2 Exposure to Potentially Hazardous Materials

The Project would use emission-causing equipment, use and store hazardous materials (fuels, lubricants, solvents, etc.), and produce and transport oil and MI/GI products. The pathways for exposure to these materials are described below. Impacts to human health from dust would be mitigated below significance; see HEALTH-3 in EIS Appendix D (Issues Dismissed from Detailed Analysis).

***Air Emissions*:** Tables 3.2-5 and 3.2-6 in Section 3.2 (Air Quality) present total life-of-Project air pollutant emissions for the Project's action alternatives. The air emissions analysis indicates that CAP levels at Nuiqsut would be similar to or below measured background levels and would remain below the NAAQS and AAAQS (see Table 3.2-4), including for PM_{10} and $PM_{2.5}$. Predicted cumulative impacts at Nuiqsut (the Project in combination with NDC source emissions) are expected to be indistinguishable from background throughout the life of the Project (see Table 3.2-7 and accompanying text). Ambient pollutant concentrations resulting from direct and cumulative HAPs emissions would remain below health-based standards (see Table 3.2-9). Consistent with this, a Project-specific cancer risk analysis at Nuiqsut indicates that the risk from carcinogenic pollutants potentially emitted by the Project is approximately two orders of magnitude lower than the threshold that would trigger a more detailed review (i.e., less than 1 in 100 million; see Table 3.2-10).

Spills and Inadvertent Releases: As described in Chapter 4 (Spills and Inadvertent Releases), small spills and releases would likely occur but would be contained to gravel infrastructure and thus would have limited impacts on community health. A large spill or inadvertent release could impact community health if local residents are exposed to spilled materials or vapors of spilled materials when traveling through the spill area or through contamination of subsistence food sources (see the HEC 3 Food, Nutrition, and Subsistence Activities section). Local residents hired to assist in spill response efforts would be trained on specific safety measures and provided with appropriate personal protective equipment for assigned tasks. Although a large spill could have substantial and potentially long-term impacts, the likelihood of a spill of this magnitude would be very low, and thus the likelihood of residents being exposed to the spill would be very low. The likelihood of a spill of any kind or size reaching the Nuiqsut water source lake (which is 2.1 river miles upstream from the Niġliq Channel) would be very low.

In the very unlikely event that a large spill reaches a waterbody when the water is partially frozen, cleanup activities could require in-situ burning (see Section 2.4.11.2 [Spill Response]), which would create smoke. The magnitude of emissions from in-situ burning would depend on the location and extent of the spill. For residents in Nuiqsut, the primary pollutant of concern would be PM, since other pollutants typically fall below levels of concern within a mile or two downwind of burns (ADEC et al. 2008; NOAA 2022). Further, PM matter concentrations at ground level are also typically much lower than concentrations at higher elevations within the smoke plume itself (ADEC et al. 2008; NOAA 2022). If necessary, in-situ burning would be approved and implemented in accordance with ADEC-, USGS-, and EPA- approved guidelines for burning (ADEC et al. 2008, 2022), which include considerations for proximity to populated areas and human health concerns. The ADEC guidelines outline safe distances separating an in-situ burn from downwind populated areas on flat terrain. These guidelines are designed to meet air quality public health regulatory standards in populated areas; outline appropriate methods for public notification, warnings, and shelter-in-place or evacuation under different distances; and

require air monitoring during burn operations whenever there is potential to impact populated areas.

The January 23, 2026, collapse of the Doyon Drilling, Inc. (Doyon) 26 drill rig near Nuiqsut is an example of a medium to large spill that was responded to quickly, contained, and remediated. As of April 29, 2026, approximately 5,565 gallons of spilled product (diesel and hydraulic oil) has been recovered (Doyon 2026). After spring breakup, the spill site will be monitored and sampled throughout the summer. The response effort was managed by the Unified Command Response Team comprising Doyon (the rig owner and operator), EPA, ADEC, NSB, and ICAS.

Although the expected rate of occurrence for a very large spill, such as a reservoir blowout from CD8, would be very low (approaching zero), should it occur, approximately 86% of released oil would reach the ground up to 3,793 feet downwind of the well based on typical prevailing wind patterns at the time of the spill; see Chapter 4 and Figure 4.4.1. The remaining 14% would remain airborne as an aerosol. Although the deposited oil fallout would not reach Nuiqsut or the Nuiqsut water supply, the aerosol plume could reach these locations. The primary dangerous components of aerosolized crude oil include VOCs such as benzene and n-hexane, polycyclic aromatic hydrocarbons, heavy metals, and potentially hydrogen sulfide (CPAI 2022a, 2022b). Based on proximity and wind direction, aerosolized oil could be inhaled by sensitive receptors in Nuiqsut. Breathing aerosolized oil can lead to a range of health impacts, including eyes, nose, throat, and respiratory tract irritation; vision issues; headaches; nausea; dizziness; and signs of nervous system depression, and may cause immediate and long-term health issues (CPAI 2022a, 2022b). Recent literature regarding human exposure to oil mists and vapors (Hadrup et al. 2026) concludes that human health impacts include decreased lung function, lung pathology (including fibrosis and lipid pneumonia), increased asthma risk, and irritation of nose and throat. The severity of effects depend on the concentration and length of exposure. Effects were observed in humans at occupationally relevant exposure levels (Hadrup et al. 2026). Investigations of cleanup workers and residents near oil tanker spills indicate that exposures are associated with a variety of acute, sub-chronic, and chronic symptoms, including upper and lower respiratory, neurological (headache, nausea, vomiting, dizziness), liver function, hematological function, and ocular abnormalities. Some symptoms wane over time, but other impacts such as elevated heart attack risk, reduced lung function, and genetic alterations persist for several years. There is limited information about effects of crude oil vapor at the cellular level in mammalian biological systems. Because it can take 10 years or longer for coronary, respiratory, and other chronic disease diseases to develop following occupational exposure, studies were not able to directly link crude oil to the development of these diseases (Fedan et al. 2024).

In the industrial setting, standard mitigations used to meet air quality standards and prevent oil inhalation include specialized equipment to scrub fumes and use of personal protective equipment such as respirators, gloves, and clothing. If a high-exposure incident occurs, mitigation includes moving to fresh air, administering oxygen, and seeking medical evaluation if symptoms do not quickly resolve. If aerosolized oil were to reach Nuiqsut in the summer, the only effective and practicable mitigation would be evacuation to Willow 20 miles to the west, which would likely be beyond the area affected by the aerosolized oil. If aerosolized oil were to reach Nuiqsut in the winter, evacuation out of the affected area via ice road would be the most effective mitigation.

A reservoir blowout could also reach nearby freshwater lakes and stream channels, including the Niġliq Channel, thereby affecting marine subsistence resources such as fish, waterfowl, or marine mammals (described below in the Contamination of Subsistence Resources section).

Although there are existing oil and gas facilities near Nuiqsut (CD4 is 4.5 miles from the community), CD8 would be half that distance and immediately in the path of dominant winds. The Project would be the closest drillsite to the community, and Alternative B would be closest alternative to the community. Section 2.4.11 (Spill Prevention and Response) describes preventive measures and response planning activities CPAI would implement to minimize potential damage to human health and the environment from oil spills or other incidental releases.

Contamination of Subsistence Resources: Section 3.8 (Subsistence) discusses the effects of the Project on subsistence resources. Should a blowout or pipeline spill occur, subsistence resources could be contaminated depending on the size, extent, location, and timing of the spill. An oil spill or blowout would likely affect the availability of fish, particularly Arctic cisco (*Coregonus autumnalis*) and broad whitefish (*Coregonus nasus*), in the Niġliq and East Channels due to decreased resource abundance, as well as harvester avoidance related to contamination concerns. Both Arctic cisco and broad whitefish are among the top subsistence species harvested in Nuiqsut and, on average, have accounted for one-quarter of the total subsistence harvest during available study years (see Table 3.8-2). A large oil spill or blowout could also affect the availability of birds and eggs within a larger area of the CRD due to contamination concerns. Harvesters may also avoid harvesting caribou and waterfowl that feed near a spill and would likely avoid harvesting berries near a spill. A large oil spill, although unlikely, could have substantial impacts on Nuiqsut subsistence uses for an extended period, resulting in decreased subsistence harvests and associated health impacts. Residents may avoid a large area surrounding and downstream from the spill, which could result in a loss of some traditional use areas over time and impacts to social determinants of health (HEC 1), resulting from decreased opportunities to share subsistence resources, participate in subsistence harvesting activities, and pass on subsistence traditions to the younger generation.

HEC 3 Food, Nutrition, and Subsistence Activities

Decreases in subsistence activities and lifestyle could lead to related adverse health outcomes. Changes in resource availability resulting from the Project, decreased participation in subsistence resources, and changes in subsistence resources distribution could all contribute to decreased food security in affected communities (Fall and Kostick 2018). Section 3.8 (Subsistence) describes Project effects on subsistence, including changes to resource availability, harvester access, and potential harvester avoidance of Project areas. Project construction and operation would affect the availability of resources such as caribou, wolf and wolverine, geese, eggs, and vegetation within 2.5 miles of the Project, thus reducing harvest success near Project infrastructure and activity. Impacts would be greatest during construction due to higher levels of noise and air traffic (see Tables 3.1-5 and 3.1-6); however, impacts related to infrastructure, ground traffic, helicopter traffic, and human activity would continue for the life of the Project. Caribou is the most likely subsistence resource to be affected by the Project due to the potential for impacts to caribou movement, behavior, or distribution. Some harvesters may avoid Project infrastructure due to discomfort in hunting and shooting near industrial infrastructure, lack of knowledge about security protocols, concerns about resource contamination, and an assumed

lack of resource availability near infrastructure. Though new Project roads may provide new access to areas that can be used for subsistence harvesting, they may also deflect caribou during their fall migration toward the community's traditional hunting area west of Nuiqsut (SRB&A 2021). This could result in reduced success for individuals who choose not to use Project roads and continue to hunt west of the community. Although it is unlikely that the community would experience a total loss of harvests, even a small reduction could come with high costs to social, cultural, and economic well-being, particularly to the more vulnerable low-income, unconnected, and low-harvest households (Kofinas et al. 2016). Subsistence roles within a community naturally change over time due to household circumstances, and communities generally adapt to these changes. However, a sudden change in employment levels in the community may cause at least a temporary disruption in social ties and roles within the community of Nuiqsut. This could cause a decline in the distribution of subsistence foods for a period of time and decreased food security for some households. Lacking constant access to food is related to negative health outcomes such as weight gain and premature mortality (Adams et al. 2003; Brownson et al. 2006; EXP Energy Services, Inc. 2022).

Increased incomes for some households would provide funds to support subsistence activities and allow for the purchase of more store-bought foods, potentially offsetting some effects on food insecurity during Project construction. However, as discussed under HEC 1 Social Determinants of Health, additional employment or ANCSA dividends inequities in the community may in turn result in the potential for social tensions.

HEC 4 Water and Sanitation

Given that the Project is downstream and located 3.1 miles from Tagruk Lake, Nuiqsut's drinking water source, it would not affect drinking water quality. The Project is also not expected to change WSEs or cause erosion and thus would not affect sanitation in Nuiqsut.

HEC 5 Accidents and Unintentional Injuries

Construction and operation activities are not expected to result in a direct increase in the increased potential for accidents and injuries for Nuiqsut residents. However, traffic would increase in the Project area, particularly during construction and drilling. Most of the ground traffic would occur during the 2-year construction period and would add up to 25 additional trips per hour in the winter of Year 0/1 (a 224% increase over existing traffic) and up to 18 trips per hour in the spring of Year 2 (a 191% increase over existing traffic; see Table 3.1-7). Summer and fall traffic would be appreciably lighter (1–4 additional trips per hour). Traffic would increase by less than 3% over existing conditions after Year 7 (see Table 3.1-5). Overall, Alternative B would require 387,076 ground traffic trips over the life of the Project. Although use of the new gravel road by Nuiqsut residents for subsistence harvesting could increase the potential for accidents and injuries, no such injuries have been reported due to CPAI construction or operation on the WNS to date. Alpine access guidelines that describe how residents can safely use WNS industry roads would be extended to CD8, including requiring residents to contact Alpine security for specific access to safety sensitive areas. CPAI security monitors traffic throughout the Alpine area and routinely provides roadside assistance to community members when requested. CPAI requires industry drivers to comply with vehicle speed limits, slowing to 5 miles per hour when driving past equipment or people near the road, and slowing or halting traffic to allow caribou and muskox (*Ovibos moschatus*) to cross roads.

HEC 6 Non-communicable and Chronic Diseases

Construction, drilling, and operations would not directly affect non-communicable or chronic disease levels in Nuiqsut, although the Project could increase stress levels for some Nuiqsut residents (described in HEC 1 Social Determinants of Health), which could increase disease susceptibility. If subsistence harvest and sharing activities are disrupted for the long term, residents may experience increased chronic stress that would continue for the life of the Project (30 years) and possibly beyond.

Summary

Alternative B would likely have adverse health outcomes for Nuiqsut residents by affecting the following (see Table 3.6-1):

- Social determinants of health (HEC 1) by increasing stress and degrading social connections and cultural continuity, which would adversely affect mental health
- Food, nutrition, and subsistence (HEC 3) by changing subsistence use, potentially decreasing harvests and thus food security

Mitigation measures 47 through 62 (see EIS Appendix E [Mitigation Measures]) would minimize, but not eliminate, impacts to cultural continuity and subsistence through coordination with Kuukpik Subsistence Oversight Panel, NVN, City of Nuiqsut, and Kuukpik to minimize activities during key subsistence times, subsistence ramps for subsistence harvesters, employee education, and other measures. Local hire practices (mitigation measures 57 and 58) may improve the economic status of some Nuiqsut residents.

The likelihood of exposure to potentially hazardous materials (HEC 2) would be low. Mitigation measures 73 through 90 would reduce the risk of spills and outline procedures for spill response. Emergency events, such as an explosion from a shallow gas blowout or reservoir blowout, have a very low likelihood of occurrence but could substantially impact Nuiqsut residents, especially if an event occurred in the summer when the ice road was not available for emergency evacuation. Increased traffic and new roads may contribute to accident and unintentional injuries (HEC 5); however, safe driving practices, including speed and weight limits (see mitigation measure 26) and development of gravel road turnouts to allow local residences to safely access tundra areas adjacent to roadways (mitigation measure 56), would reduce this risk.

The Project would not impact water and sanitation (HEC 4) or non-communicable and chronic diseases (HEC 6), except to the degree that stress and mental health issues may affect overall health.

Table 3.6-1. Summary of Impacts to Public Health and Safety by Alternative

Health Effect Category	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
HEC 1 Social Determinants of Health	Beneficial economic impacts through increased incomes and dividends (see Section 3.4 [Economics]); however, employment may also limit residents' ability to participate in subsistence activities. Local employment or increased dividends may result in economic disparity and social tensions within Nuiqsut. Loss of traditional knowledge and degradation of social connections and cultural continuity from long-term changes to subsistence. Increased stress due to changes to subsistence and lifestyle combined with concerns about the proximity of the Project to Nuiqsut and the potential for a reservoir blowout or shallow gas leak could lead to or exacerbate mental health issues such as anxiety and depression. This, in turn, could lead to a decline in physical health and overall well-being.	Beneficial and adverse economic impacts would be similar to Alternative B, but lower production values could reduce dividends (see Section 3.4). Impacts to social connections and cultural continuity and mental/general health would be similar to Alternative B; however, subsistence activities would be slightly less affected, and traffic, noise, and visual impacts in Nuiqsut would also be reduced because the drillsite would be 1 mile further from the community. Increased stress would be similar to Alternative B.	Beneficial and adverse economic impacts from jobs would be the same as Alternative B, but lower production values could reduce dividends (see Section 3.4). Impacts to social connections and cultural continuity and mental/general health would be similar to Alternative B. The 0.4-mile increased distance between the drillsite and Nuiqsut would reduce Project noise and visual impacts that may affect mental health; however, there would be more traffic than under Alternative B. Increased stress would be similar to Alternative B.
HEC 2 Exposure to Potentially Hazardous Materials	Predicted maximum concentrations of CAPs within 3.1 miles of the drillsite would be below the NAAQS and AAAQS. Although very unlikely, if a large spill occurred, it could expose Nuiqsut residents to spilled materials. In the very unlikely event of a reservoir blowout, oil could be deposited in the Niġliq Channel upstream of Nuiqsut. Aerosolized material could be carried by prevailing winds to Nuiqsut or the Nuiqsut water supply. If subsistence resources are exposed to spilled material, they could also be a source of exposure for those using subsistence resources.	Predicted maximum CAP concentrations at Nuiqsut would be less than Alternative B due to increased distance, less alignment with the prevailing wind direction and Nuiqsut, lower production rate, and reduced construction emissions during Year 0 and Year 1. Likelihood of a large spill would be the same as Alternative B except that in the very unlikely event of a reservoir blowout, oil would be less likely to reach the Niġliq Channel and the community because the drillsite would be 1 mile further from the community and its water source, and out of the direction of prevailing winds. Additionally, key hunting and fishing areas along the Niġliq and East Channels would be further from the Project.	Similar to Alternative C except oil fallout could be transported to the Niġliq Channel if a spill occurred during high river flows. The drillsite would be 0.4 mile further from the community and out of the direct line of prevailing winds.

Health Effect Category	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
HEC 3 Food, Nutrition, and Subsistence Activities	Decreases in subsistence resource availability, activities, and lifestyle could lead to related adverse health outcomes. Changes in resource availability, increased local employment rates/decreased subsistence participation, and decreased distribution of subsistence resources could all contribute to decreased food security in affected communities. Although it is unlikely that the community would experience a total loss of harvests, even a small reduction could come with high costs to social, cultural, and economic well-being, particularly to the more vulnerable low-income, unconnected, and low-harvest households.	Impacts similar to Alternative B but the reduction in gravel footprint, traffic, miles of pipelines on new VSMs, and fewer miles of gravel roads would reduce impacts to subsistence slightly relative to Alternative B, with commensurate reductions in impacts to food security.	Impacts similar to Alternative B but the increases in traffic and in miles of pipelines on new VSMs could increase impacts to subsistence relative to Alternative B, with commensurate increases in impacts to food security.
HEC 4 Water and Sanitation	No direct impacts to drinking water sources or sanitation services.	Same as Alternative B	Same as Alternative B
HEC 5 Accidents and Unintentional Injuries	No direct increase in the potential for accidents and injuries for Nuiqsut residents.	Same as Alternative B	Same as Alternative B
HEC 6 Non-communicable and Chronic Diseases	No direct impacts. Increased stress for Nuiqsut residents (see Social Determinants of Health) could increase disease susceptibility.	Similar to Alternative B, but potential for lower stress due to reduced subsistence impacts.	Similar to Alternative B, but potential for higher stress due to higher subsistence impacts.

3.6.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

HEC 1 Social Determinants of Health

Impacts to economic status and general health would be the same as Alternative B. Impacts to social connections and cultural continuity and mental health would be similar to Alternative B; however, subsistence activities would be slightly less affected. Alternative C would have the least amount of traffic and the largest distance between Nuiqsut and the drillsite. These actions would reduce noise and activity that may affect mental health. Because the drillsite would be located 1 mile further from Nuiqsut, visual impacts would be slightly lower than Alternative B, but the Project would still be visible from the community. Chronic increased stress related to the potential for a reservoir blowout or shallow gas leak would be similar to Alternative B.

HEC 2 Exposure to Potentially Hazardous Materials

Dust emissions would be slightly reduced relative to Alternative B because there would be fewer miles of gravel road that would be farther from the community. Predicted air pollutant concentrations at Nuiqsut from Alternative C would be less than Alternative B because the drillsite would be 1 mile further from the community; less aligned with the prevailing wind direction (see Figure 4.4-2) and Nuiqsut; and have lower production, less truck traffic (in Year 0 and Year 1), a smaller gravel footprint, and a shorter gravel access road compared to Alternative B (see Section 3.2.1.2.3 [Air Quality, Alternative C]). The potential for these impacts to affect Nuiqsut residents would also be reduced due to the increased distance between the drill pad and the town.

Impacts to water quality and contamination of subsistence resources would be similar to Alternative B, but Nuiqsut's water source would be 1 mile further from the Project.

Impacts from spills and incidental releases would be similar to Alternative B except the modeled fallout would be farther from the community and would not be expected to land directly in the Niġliq Channel (see Chapter 4 and Figure 4.4.2). Because the drillsite would not be directly in the line of prevailing winds, the aerosolized oil remaining aloft after a reservoir blowout would be less likely to reach the community.

HEC 3 Food, Nutrition, and Subsistence Activities

Impacts would be similar in type to Alternative B, but the reduction in gravel footprint, traffic, miles of pipelines on new VSMs, and fewer miles of gravel roads would reduce impacts to subsistence slightly relative to Alternative B (see Section 3.8 [Subsistence]).

HEC 4 Water and Sanitation

Impacts would be the same as Alternative B.

HEC 5 Accidents and Unintentional Injuries

Impacts would be similar in type as Alternative B; however, construction traffic would be slightly reduced, and there would be fewer miles of gravel road constructed. Alternative C would result in 375,597 ground traffic trips over the life of the Project (a 3% decrease from Alternative

B). Hourly traffic would similar to Alternative B, but there would be approximately three fewer trips per hour during the first winter.

HEC 6 Non-communicable and Chronic Diseases

Impacts would be similar in type to Alternative B; however, because impacts on subsistence would be slightly reduced, stress levels related to subsistence access and harvests could also be slightly reduced, reducing the impacts of stress on chronic disease.

Summary

Alternative C would have similar health outcomes to Nuiqsut residents as Alternative B (see Table 3.6-1). Some impacts would be slightly lowered due to a 3% reduction in traffic and a 1-mile increase in the distance between the community and the Project. However, the Project would still result in impacts that could increase mental stress and degrade social connection (HEC 1) and that could change subsistence use, harvest success, and food security (HEC 3). As compared to Alternative B, the likelihood of exposure to potentially hazardous materials (HEC 2) and traffic accidents (HEC 5) would be slightly lower. Alternative C would not impact water and sanitation (HEC 4) or non-communicable and chronic diseases (HEC 6). As with Alternative B, mitigation measures would minimize but not eliminate these impacts.

3.6.1.2.4 ALTERNATIVE D – NORTHWEST ALTERNATIVE

HEC 1 Social Determinants of Health

Impacts to economic status and general health would be the same as Alternative B. Impacts to social connections and cultural continuity and mental health would be similar to Alternative B. The increased distance from the drillsite to Nuiqsut would reduce Project noise that may affect mental health; however, there would more traffic under Alternative D compared to Alternative B.

Because the drillsite would be located 0.4 mile further from Nuiqsut, visual impacts would be slightly lower than Alternative B, but the Project would still be visible from the community. Chronic increased stress related to the potential for a reservoir blowout or shallow gas leak would be the same as Alternative B.

HEC 2 Exposure to Potentially Hazardous Materials

Dust emissions would be slightly reduced relative to Alternative B because there would be fewer miles of gravel road that would be farther from the community. Predicted air pollutant concentrations at Nuiqsut from Alternative D would be less than Alternative B because the drillsite would be 0.4 mile further from the community and less aligned with the prevailing wind direction (see Figure 2.5-1) and Nuiqsut, compared to Alternative B (see Section 3.2.1.2.4 [Air Quality, Alternative D]). The potential for impacts to affect Nuiqsut residents would also be reduced due to the increased distance between the drill pad and the town. Impacts to water quality and contamination of subsistence resources would be similar to Alternative B, but Nuiqsut's water source would be 0.4 mile further from the Project (in a straight line).

Impacts from spills and incidental releases would be similar to Alternative B, except the modeled fallout would be farther from the community and would not land directly in the Niġliq Channel

(see Chapter 4 and Figure 4.4.3). Because the drillsite would not be directly in the line of prevailing winds, the aerosolized oil remaining aloft after a reservoir blowout would be less likely to reach the community.

HEC 3 Food, Nutrition, and Subsistence Activities

Impacts would be similar in type to Alternative B, but the increases in traffic and in miles of pipelines on new VSMs could increase impacts to land-based subsistence resources (from traffic collisions or pipeline-related deflections) relative to Alternative B (see Section 3.8 [Subsistence]).

HEC 4 Water and Sanitation

Impacts would be the same as Alternative B.

HEC 5 Accidents and Unintentional Injuries

Impacts would be similar in type as Alternative B; however, construction traffic would be slightly increased. Alternative D would result in 391,936 total ground traffic trips over the life of the Project (1% increase over Alternative B). Hourly traffic increases would be similar to Alternative B, but there would be approximately one additional trip per hour during the first winter and first spring.

HEC 6. Non-communicable and Chronic Diseases

Impacts would be similar in type to Alternative B; however, because of the potential increase in impacts to land-based subsistence resources from traffic and caribou movement deflection, stress levels related to subsistence could also be increased. Thus, Alternative D could have higher stress-induced impacts on chronic disease.

Summary

Alternative D would have similar health outcomes to Nuiqsut residents as Alternative B (see Table 3.6-1). Some impacts would be slightly lowered due to a 0.4-mile increase in distance between the community and the Project, but other impacts could be increased due to a 1% increase in traffic. The Project would still result in impacts that could increase mental stress and degrade social connection (HEC 1) and that could change subsistence use, harvest success, and food security (HEC 3). As compared to Alternative B, the likelihood of exposure to potentially hazardous materials (HEC 2) would be lower, but the risk of traffic accidents (HEC 5) would be slightly higher. Alternative C would not impact water and sanitation (HEC 4) or non-communicable and chronic diseases (HEC 6). As with Alternative B, mitigation measures would minimize but not eliminate these impacts.

3.6.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions in the analysis area include substantial additional oil and gas exploration and development (see Table 3.1-1). Most RFF oil and gas projects would be between 10 and 60 miles from CD8; CPAI and Kuukpik each have one small expansion project within 3 miles of the Project area. RFF actions also include several community development projects, including

development of additional roads to connect NSB communities to each other and to the Dalton Highway, development of a road connecting a water source lake to the Colville River, as well as grants to support development of a cultural center, teen center, a boat ramp, or other community improvements. Section 3.1.1 describes past, present and RFF actions in more detail.

RFF actions related to oil and gas development would affect public health and safety in ways similar to past and present development. Potential benefits include improvements to economic status that can improve general health. Potential adverse impacts include continued changes to subsistence (potential decreases in harvest) that affect food security, social connections, and cultural continuity; increases in traffic that may affect accident rates; and increases in potential exposure to hazardous materials. In turn, these potential adverse impacts may also result in increased stress, impacts to mental health, and an increase in the potential for stress-related chronic disease.

The RFF trend of increased oil and gas exploration and development around Nuiqsut and in the NPR-A (see Section 3.1.2.2 [Reasonably Foreseeable Future Trends]) in combination with the CD8 Project would add to the growing pattern of industrial activity and development around the community and further exacerbate the health impacts described above. NVN has expressed that this could lead to long-term landscape-level sociocultural changes.

The RFF trend of changing Arctic conditions will continue to contribute to adverse impacts to subsistence that affect food security, social connections, and cultural continuity and cause increased stress and mental health impacts. The CD8 Project would add incrementally to these beneficial and adverse impacts. Importantly, the Project would bring development closer to Nuiqsut than any other present or proposed oil and gas activities. The relative contribution to adverse impacts on public health and safety from oil and gas development would be greater from the Project than from projects that are further away.

RFF actions related to community development will have beneficial impacts on social connections and cultural continuity, and water and sanitation infrastructure that will improve public health and safety. RFF actions related to transportation will enhance communication and transportation between NSB communities in the face of the continuing trend of changing Arctic conditions that may affect existing transportation methods.

3.6.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

The Federal resources that affect public health and safety are air quality and water quality. Impacts to air quality would generally be irretrievable, ceasing after Project completion. Impacts to water quality (should they occur), although generally irretrievable, could remain long after Project completion. Effective implementation of design features to these resources would reduce, but would not eliminate, potential impacts to these resources. Based on distance and location of the Project relative to Nuiqsut and key subsistence resources, Alternative B would have the highest level of irreversible and irretrievable impacts on these Federal resources, and Alternative C would have the least.

3.7 SOCIOCULTURAL SYSTEMS

3.7.1 How would the Project change community characteristics and culture?

The Project has the potential to change community characteristics, culture, and quality of life by changing income and employment; changing subsistence access, resource availability, or resource abundance; increasing noise, traffic, and development within the community viewshed; and potentially having adverse health outcomes for Nuiqsut residents.

Potential changes to community facilities, services, and infrastructure and changes in community characteristics and culture from the presence of nonresident temporary workers were dismissed from detailed analysis (see SOC-1 and SOC-2 in EIS Appendix D).

The analysis area for sociocultural systems is the community of Nuiqsut and the community's subsistence use area, which is the area within which community characteristics and culture may be impacted by the Project. The temporal scale of analysis is the life of the Project (30 years) and beyond because impacts on sociocultural systems may be permanent.

3.7.1.1 Affected Environment

This section includes a general overview of sociocultural systems of Nuiqsut, including history, social organization, economic organization, community institutions, community health and welfare, and population and employment. The sociocultural systems in Nuiqsut have been evaluated in numerous EISs, including the *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project, Final Supplemental Environmental Impact Statement* (BLM 2018:167–177), the Willow SEIS (BLM 2023:369–387), and the Nanushuk EIS (USACE 2018:3-737–3-770). These documents are incorporated by reference and summarized here; new data are included where available.

3.7.1.1.1 COMMUNITY DESCRIPTION AND LOCAL GOVERNANCE

Nuiqsut is a small, mostly Iñupiat community, with an estimated population of approximately 492 to 616 residents, depending on the data source[17] (NSB 2022; USCB 2024a, 2024b). It is in the CRD 154 miles southeast of Utqiaġvik (see Section 3.1.1 [Past and Present Actions]). The community is not connected to the Alaska road system by gravel road, although the community can use the annual Alpine/WNS multiyear ice road and ice bridge to connect to Kuparuk, Prudhoe Bay, and the Alaska road system in the winter. Nuiqsut was incorporated in 1975. NVN is a Federally recognized Tribe, and the Kuukpik is the Federally recognized local ANCSA village corporation. The NSB is responsible for regional governance of the area; has taxing authority; and provides public services, including planning and zoning, water and wastewater service, trash pickup, road maintenance, power utility services, emergency services, and managing and maintaining the airport (City of Nuiqsut 2022; ICAS 2024). In 2019, approximately 91% of the Nuiqsut population was Iñupiat and 9% was Caucasian (NSB 2020).

[17] Because of the small size of many NSB communities, changes in how the USCB counts nonresident workers on the North Slope, and low participation rates in NSB socioeconomic surveys, demographic data for the NSB and its small communities are limited and inconsistent between different data sources, such as USCB data and NSB data. The EIS analysis relied on both USCB data and NSB demographic survey data where available.

The average length of residency for members of the Iñupiat population was 33 years, and for the non-Iñupiat population, it was 2 years (NSB 2020). Nuiqsut has had a decreasing tenure of non-Iñupiat household heads over the last three surveys. Turnover in teacher positions held by members of the non-Iñupiat population is the primary reason for the decline (NSB 2020).

The *Nuiqsut Comprehensive Plan* (City of Nuiqsut 2022) was developed by the Nuiqsut Tri-lateral (the City of Nuiqsut, NVN, and Kuukpik) and the NSB. The key goals of the plan are to preserve, protect, and maintain Iñupiat traditions, cultural activities, and subsistence harvests; maintain resident health and the natural environment; expand community facilities, housing, and infrastructure; develop a strong local economy; and to seek meaningful participation in decision making (City of Nuiqsut 2022:29–55). The plan (City of Nuiqsut 2022:13–20) identifies community and family unity, subsistence and traditional knowledge, and the commitment to environment protection as key community strengths. Identified weakness and threats to the community include potential loss of subsistence and Iñupiat traditional knowledge and language; environmental impacts from the oil industry; lack of appropriate training and education opportunities and employment that can accommodate subsistence responsibilities; alcohol, drug, and tobacco use; high cost of living; and inadequate public facilities and community services.

The City of Nuiqsut is eligible to receive and has received grants under the NPR-A Impact Grant Program.[18] Through this program, 50% of Federal revenue from NPR-A (including that from CD5, GMT1, and GMT2) goes to the State of Alaska to distribute as community grants. Nuiqsut, along with the other North Slope communities and the NSB itself, is eligible for grants through this program. As of 2026, the State had awarded $318 million in funding through the NPR-A Impact Grant Program (CPAI 2026). Nuiqsut has received grants for several projects, including a natural gas pipeline, graveyard fencing, a playground, gravel for the Colville River access road, a community (Kisik) center renovation, and a new teen center. The community also received annual grant funding for city and teen center operations (CPAI 2026).

Additionally, Nuiqsut is eligible to receive and has received grants and sponsorships from CPAI's local philanthropy program (City of Nuiqsut 2022), including matching of funds for training and scholarships awarded by Kuukpik, contribution of emergency response equipment, sponsorship of high school activities, donations to community projects, and annual grant funding to Iḷisaġvik College (CPAI 2026).

3.7.1.1.2 EMPLOYMENT AND INCOME

The following information regarding employment and income opportunities is summarized from Section 3.4 (Economics).

Nuiqsut has a mixed subsistence-market economy in which residents depend on a mixture of wage employment, dividend income, and subsistence activities. As of 2019, Nuiqsut Iñupiat households received 57% of their income from dividend payments (e.g., Kuukpik and ASRC), 13% from the Alaska Permanent Fund Dividend, 27% from wages, and the rest from other sources such as social security, pension, retirement, and child support (NSB 2020). Overall, Nuiqsut's per capita and household wage income is lower than most other NSB communities, but the dividend income is higher than most (see Section 3.4 and Table 3.4-1). This is likely related

[18] The NPR-A Impact Grant Program was created in the early 1980s to address impacts from oil and gas development in the NPR-A and is managed by the Alaska Department of Commerce, Community, and Economic Development under AS 37.05.530.

to the proximity of recent oil and gas exploration and development on lands in the Nuiqsut vicinity. However, not all residents are ANCSA corporation shareholders, and changes in income and employment levels have contributed to income disparities and tensions within the community and with other communities on the North Slope (BLM 2023:308).

Approximately 30% of residents in Nuiqsut have a high school diploma, and over 50% have pursued some further education. Of the NSB communities, Nuiqsut has the highest number of residents with a bachelor's or graduate degree (Voice of the Arctic Iñupiat 2023). However, employment opportunities in Nuiqsut are limited, and unemployment is high (24.9%, which is more than three times that of the Alaska unemployment rate of 6%) (BLM 2023:291; USCB 2024a, 2024b). Most employed Nuiqsut residents work for the local government, school district, or village corporation (City of Nuiqsut 2022). Although the oil industry is a major private employer in the area, most oil industry jobs require specific skill sets and are filled by workers from outside the North Slope (ADLWD 2026; BLM 2023:292). In Nuiqsut, local resident hire for CPAI projects is coordinated through the Kukupa employment coordinator to identify and place qualified individuals (CPAI 2018).

The cost of living in remote Alaskan communities like Nuiqsut is much higher than the U.S. average (estimated at approximately 45% in 2020) (Fried 2020). Subsistence harvests provide a substantial amount of economic value by providing local sources of food and nutrition (ICAS 2024) (see Section 3.6.1.1.3, HEC 3 Food, Nutrition, and Subsistence). However, cost of living increases have also impacted the ability to participate in subsistence activities. NSB residents report concerns with the high cost of fuel, heating oil, and housing in the region (BLM 2023:308). Since 2008, CPAI has provided up to 1 million cubic feet of natural gas per day to Nuiqsut from the Alpine facility at no cost. Natural gas costs for residents are therefore significantly cheaper than elsewhere in rural Alaska ($25 per month to the Nuiqsut Gas Cooperative for costs associated with the local distribution system) (CPAI 2026).

3.7.1.1.3 SOCIAL ORGANIZATION AND CULTURAL TIES TO THE LAND

The people of Nuiqsut call themselves "Kuukpikmuit," or the "People of the Lower Colville River." The residents of Nuiqsut honor cultural ties to ancestors and the land through traditional Iñupiat values. The Iñupiat highly regard family, work ethic, the Iñupiaq language, drumming and dancing, and sharing food and knowledge of animals with a deep respect for the environment because it provides freshwater, clean air, and subsistence foods (City of Nuiqsut 2022).

Nuiqsut Cultural Landscape

The Nuiqsut Cultural Landscape represents "an approximation of Iñupiat of Nuiqsut core ideas" and is representative of their "geographic and spiritual homeland" (BLM 2018:166). The cultural resources that make up the Nuiqsut Cultural Landscape are primarily located along river corridors (particularly the Colville and Itkillik Rivers and Fish Creek), in overland areas extending west of the community to Fish Creek and beyond to Teshekpuk Lake, and in coastal locations both west and east of the community. Several important components of the Nuiqsut Cultural Landscape include those associated with ongoing multigenerational customary practices that occur in similar locations as past historical or traditional practices. The continuation of these customary practices into current times and at modern sites within the landscape helps maintain Iñupiat cultural identity to the cultural landscape (BLM 2018:166). Many of the cultural resources near and around Nuiqsut that are documented in the cultural resources databases are

contributing elements to the Nuiqsut Cultural Landscape. The NSB IHLC Department maintains the TLUI, a complete historical record of the land, people, and NSB villages containing place names, landmarks, traditional land use sites, trails, travel corridors, hunting, fishing, berry picking, other Iñupiat resource procurement sites, and places of Iñupiat cultural significance. There are eight documented TLUI sites within the non-physical cultural resources impacts analysis area (see Table 3.3-4). These sites refer to the village of Nuiqsut, subsistence areas, and historical camps. The closest sites to the Project area are a reindeer herding camp (Nanuq) and an area containing sod houses and a grave (Putu), and a fishing area and associated trail (Apkuġaruk). There are also 11 documented IPNs within the non-physical impacts analysis area (see Table 3.3-5).[19] These IPNs refer to a stone net quarry, fish camps, hunting camps, a reindeer herding camp, a lake, and streams. The Project area contains the IPN Kuukpik, which has been instrumental in the lifeways of the Iñupiat as both a traditional travel route and harvest area.

Subsistence

Subsistence is the cornerstone of the traditional relationship of the Iñupiat people with their environment. Activities associated with subsistence—processing; sharing; redistribution networks; cooperative and individual hunting, fishing, and gathering; and ceremonial activities—strengthen community and family social ties, reinforce community and individual cultural identity, and provide a link between contemporary Alaska Natives and their ancestors. Today, Nuiqsut residents participate in a mixed, subsistence-market economy, with residents investing their dividends and employment income into their subsistence way of life (Walker and Wolfe 1987, as cited in BLM 2023:303). Subsistence harvests continue to provide a substantial amount of economic value by reducing food costs and providing local sources of food and nutrition (ICAS 2024). Subsistence resources are used by all (100%) Nuiqsut households during any given year, and 95% of households attempt subsistence harvests (see Table 3.8-1). Nuiqsut households harvest an average of 428 pounds of subsistence resources per capita annually, consisting of marine mammals, large land mammals, and non-salmon fish in almost equal amounts, with waterfowl, salmon, and vegetation contributing lesser amounts (see Table 3.8-1). Nuiqsut subsistence activities occur year-round, with a peak in the spring and summer months (see Table 3.8-5 in Section 3.8 [Subsistence]). Though use of the industrial road system east of the Niġliq Channel for caribou hunting has increased in recent years (an average of 20% of households report using the road), use of the road system west of the Niġliq Channel (associated with the CD5, GMT1, GMT2, and Willow developments) is more widely used (73% of households report using) (SRB&A 2025). Recent subsistence use area mapping for caribou indicates a contraction of overland hunting areas, likely due to a combination of factors, including poor snow conditions in recent years, decreased use of snow machines in favor of four-wheelers and trucks, and increased fuel costs (SRB&A 2019). A vast majority of Iñupiat household heads in Nuiqsut reported that a changing Arctic climate affected harvesting in 2019 (City of Nuiqsut 2022).

[19] IPNs, particularly landscape features (e.g., lakes, rivers), have not previously been analyzed as cultural resources in recent SEISs in the region (BLM 2018, 2023). IPNs encode Indigenous knowledge, historical events, spiritual associations, and subsistence practices that may not be visible in the archaeological record. As a result, they can identify culturally significant areas that might otherwise be overlooked in standard cultural resource surveys. See Section 3.3 (Cultural Resources) for more information.

Oral History and Language

The Iñupiaq language is an integral component of the cultural identity of the Iñupiat. North Slope residents and the NSB place great importance on expanding fluency in Iñupiaq to preserve, protect, and maintain traditional culture and values. Of the North Slope communities, Nuiqsut has the third largest percentage of fluent Iñupiaq speakers or those that understand Iñupiaq (City of Nuiqsut 2022). However, NSB census reports confirm that the Iñupiaq language is spoken by fewer people in Nuiqsut and less often than it has been in the past. In 2015, 61% of the Nuiqsut population was reported to speak Iñupiaq (NSB 2015). Of this total, 48% of Nuiqsut residents were fluent speakers, with 41% preferring to use the Iñupiaq language over other languages (NSB 2015). Another 61% of Nuiqsut residents understood but did not speak the language (NSB 2015). Household heads in Nuiqsut reported that 2% of households spoke mostly Iñupiaq at home, whereas 45% of households spoke both Iñupiaq and English at home (NSB 2015). As of 2019, 22% of the Nuiqsut population is reported to speak Iñupiaq. Of this total, 14% of Nuiqsut residents are fluent speakers, with 8% preferring to use the Iñupiaq language over other languages (NSB 2020). Another 35% of Nuiqsut residents understand but do not speak the language (NSB 2020). Household heads in Nuiqsut report that 4% of households speak mostly Iñupiaq at home whereas 46% of households speak both Iñupiaq and English at home (NSB 2020). Because of the dramatic decline in fluent Iñupiaq language speakers, the NSB school district has made efforts to strengthen the Iñupiaq language by offering language classes (City of Nuiqsut 2022).

Non-traditional Influences

Nuiqsut is the closest community on the North Slope to oil and gas facilities and has been the most directly impacted by oil and gas activities to date. Existing and ongoing oil and gas exploration and development (both east and west of the Colville River) have constructed infrastructure and contribute to the environmental baseline level of air and ground traffic in the area. Nuiqsut residents have described a sense of feeling surrounded by industrial infrastructure and development. Since 2000, oil and gas development has expanded around the community into highly used Nuiqsut subsistence use areas in the Colville Delta (Alpine and Alpine Satellite developments CD1 through CD4) and toward Fish Creek (CD5, GMT1 and GMT2, and Willow developments). Some residents perceive the development as changing their general quality of life and community identity. Nuiqsut residents have also expressed concerns over the impacts that aircraft, construction, and oil and gas noise have on wildlife and subsistence activities (USACE 2018). Residents report that helicopter activity, airboats, and vehicle traffic within the subsistence area have altered caribou migration patterns away from Nuiqsut (City of Nuiqsut 2022).

Numerous non-traditional influences contribute to the sense of being surrounded and having a changed quality of life:

- **Viewshed.** Nuiqsut residents are highly sensitive to changes in the visual environment, particularly when residents are engaged in subsistence activities or other traditional uses of the area (USACE 2018:520–521). The existing viewshed for these sensitive viewers is characterized in Section 3.10.1 (Visual Resources, Affected Environment). The landscape character includes relatively flat topography with low-growing vegetation and the sky and water as dominant natural visual features. The viewshed from Nuiqsut and

subsistence areas includes existing development and artificial lighting to the north-northwest.

- **Traffic.** The analysis area currently includes substantial existing ground and air traffic (Table 3.1-1 and 3.1-2). Existing air and ground traffic supports ongoing oil and gas operations at Alpine, GMT 1, and GMT 2, and construction of Willow.
- **Noise.** The primary sources of ambient noise in the analysis area include wind, existing oil and gas developments, the community of Nuiqsut, subsistence activities, and air traffic. The Alpine, Pikka, GMT, and Willow oil fields and the ASRC Mine Site contribute human-made noise (daily air and ground traffic) to the ambient soundscape in the analysis area. Median ambient sound levels around Nuiqsut and the lower Colville River, including the Project area, are 35 dBA. The median sound exposure level of aircraft ranges from 55 to 69 dBA (Stinchcomb 2017). See Section 3.5.1 (Noise, Affected Environment).
- **Industry Work Camps**. Nuiqsut residents report concerns about the influx of seasonal workers at existing industry work camps (e.g., Arctic Wolf Camp and Kuukpik Hotel). Locals state that rotational workers do not respect their community and culture (City of Nuiqsut 2022).

Other Social Determinants of Health

Health inequities are preventable differences in health that may occur when groups of people do not have equal access to opportunities and resources that promote optimal health. Risk factors include stress, social isolation, food or housing insecurity, employment and income, access to medical care and other factors. These non-medical social risk factors, called "social determinants of health" are a key aspect of quality of life (Alaska Department of Health 2025). Adults who experience more social risk factors are more likely to report poorer overall health.

Information related to employment and income, social connections, and cultural continuity are summarized above. The following information on mental and general health is summarized from Section 3.6.1.1.1 (Public Health and Safety, Social Determinants of Health).

Rapid modernization and development, as well as other multiple stressful conditions, including significant changes in diet, housing, and traditional culture, have led to negative health outcomes (BLM 2018). Changing Arctic conditions and related concerns about food and water security, transportation safety, and increased stress are also affecting mental health (Brubaker et al. 2014). The NSB had the highest suicide rate in the state from 2016 to 2020, and the suicide mortality rate among Alaska Natives is more than double the rate for all Alaskans (Alaska Department of Health 2021, 2025; EXP Energy Services Inc. 2022). Approximately 22% of Nuiqsut adults have diagnosed depression, and another 21% report poor mental health (Voice of the Arctic Iñupiat 2023).

Disparities exist also exist between Alaska Native and Alaska non-Native populations on general health metrics such as life expectancy, infant mortality, and leading causes of deaths (ANTHC 2021). The 2024 life expectancy for Alaska Natives (67.6 years) was 10 years lower than the 2024 statewide life expectancy in Alaska (Alaska Department of Health 2025). NSB community health data (2019) indicate that approximately 32% of all Nuiqsut adults reported "very good" or

"excellent" general health. This is a decline of 10% over 2010 reported data for these same categories; however, Nuiqsut also reported 4% fewer adults in "poor" health (NSB 2020).

3.7.1.2 Environmental Consequences

3.7.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Existing and RFF trends, such as a changing Arctic climate and increased development around NPR-A would also likely continue. Construction and operation of existing projects would continue, as would their ongoing impacts to the Nuiqsut Cultural Landscape and subsistence. Non-traditional influences would also continue (including associated traffic, noise, visual disturbances, and interactions with nonresidents). Economic benefits to individuals and the community from existing projects and development would also continue. The effects would be the same as those described in Section 3.7.1.1 (Affected Environment).

3.7.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Many North Slope Iñupiat experience effects of living as Indigenous Americans in a period of rapid change. Determining which social impacts are attributable to nearby oil development is challenging; it requires isolating the impacts of nearby development from the overarching impacts of historical settlement of the state by non-Iñupiat and from technological advances (BLM 2018:382–283).

Although ongoing industrial development has brought benefits to the community of Nuiqsut such as cheaper natural gas, additional search and rescue support, seasonal accessibility to the Alaska road system and Deadhorse Airport for emergency evacuations, larger shareholder dividends (for some residents) and additional employment, there have also been drawbacks, such as reduced access to subsistence areas, the potential for a significant environmental disaster, traffic, and changes to the viewshed (City of Nuiqsut 2016). The Project would incrementally add to both beneficial and adverse impacts and would develop infrastructure closer to Nuiqsut than any previous development. Different Iñupiat entities and individuals would be impacted differently. A 2015 sociocultural study on Nuiqsut concluded that whether such changes are perceived, experienced, or defined as negative impacts or positive benefits is ultimately only something that each citizen of Nuiqsut can decide for themselves (Redmond and Thornsohn 2016:169). Most in the community have come to an understanding that not all development and change can be prevented; therefore, Nuiqsut residents share a common goal—to work together to ensure that the community's interests are put at the forefront and that compromises are reached in the event of inter- and intra-community conflict (SRB&A 2017).

Community and Governance

Under Alternative B, the City of Nuiqsut would receive distributions from NSB related to Project property taxes (see Section 3.4 [Economics]) and may also receive benefits from additional bed tax revenues that would benefit the community of Nuiqsut as a whole. Additional revenues would allow the development of projects to achieve *Nuiqsut Comprehensive Plan* goals (see Section 3.7.1.1.1 [Community Description and Local Governance]), particularly those related to the expansion of community facilities, housing, and community infrastructure. Through the

Project, CPAI would also extend the life of its local philanthropy program from local oil fields to provide support to the community and grants and sponsorships to residents, which could also result in funding for improvements to public facilities and community services identified in the plan (City of Nuiqsut 2022). Such funding opportunities would also provide benefits to all Nuiqsut residents and benefit the community.

Despite the understanding that not all development and change can be prevented, some social tensions may result when Nuiqsut residents feel conflicted about the cost of development for their community and cultural identity and the potential benefits that development may bring. NVN has opposed much of the recent oil and gas exploration over concerns about its effect on its residents' health, community safety, economic security, and the traditional way of life. There is a sense in the community that development is occurring too quickly and that the ramifications cannot be assessed given the speed of development (City of Nuiqsut 2022).

Employment and Income

The Project would provide opportunities for employment and ANCSA dividends for some Nuiqsut residents. The potential availability of jobs for Nuiqsut residents would be greatest during construction and decrease during operations; however, income through increased Kuukpik dividends would continue throughout drilling and operations. Because not all Nuiqsut residents are Kuukpik shareholders, benefits associated with increased dividends would not be equally shared among residents. Increased dividends and local hires may result in the potential for social tensions regarding an uneven distribution of money in the community because not all Nuiqsut residents would find jobs or receive ANCSA dividends.

Increased income and employment levels could affect sociocultural systems by changing the socioeconomic status of certain community members and reducing the time spent by certain individuals on harvesting subsistence resources. Although subsistence roles within a community naturally change over time due to household circumstances (e.g., age and number of household members, employment levels), and communities generally adapt to these changes, a sudden change in employment levels in the community may cause at least a temporary disruption in social ties and roles within the community of Nuiqsut. These changes could cause a decline in the distribution of subsistence foods for a period of time and decreased food security for some households (see Section 5.8 [Subsistence]). In comparison, higher employment levels could increase the amount of cash available to engage in subsistence activities and support subsistence-related equipment and infrastructure that helps community members access more subsistence harvest areas and increases subsistence harvest efficiency. Because most construction activities would occur in the winter (a time when fewer community members are participating in subsistence activities, see Section 3.8.2.1.3), subsistence/work conflicts may be fewer for local residents with shorter-term, seasonal construction jobs versus longer-term, year-round drilling or operations jobs.

Social Organization and Cultural Ties to the Land

Nuiqsut Cultural Landscape

The Project would incrementally add to ongoing impacts to Iñupiat traditions and cultural activities due to its proximity to the community and cultural sites, and impacts on subsistence resources and activities.

Alternative B would have both direct and indirect impacts to the Nuiqsut Cultural Landscape. Potential direct impacts to the Nuiqsut Cultural Landscape include physical destruction or damage to the landscape through Project activity; restricted access to multigenerational camps, hunting areas, and travel routes used by Nuiqsut residents due to physical barriers and user avoidance of industrial areas; and the destruction or degradation of any, including unknown or unrecorded, cultural sites or areas through construction activities or incidents associated with Project activities. Indirect impacts to the Nuiqsut Cultural Landscape include changes to ambient noise levels, changes to area viewshed and the introduction of new landmarks associated with industrial infrastructure in culturally sensitive areas; alteration of access method or routes to subsistence hunting and fishing areas (e.g., a shift from overland travel by snow machine or four-wheeler to the use of roads and trucks); alteration of routes used to travel between villages, cabins, and camps; decreased use of the landscape in the vicinity of the Project due to decreased availability of subsistence resources (and the accompanying loss of cultural association with those areas). See Section 5.8 [Subsistence] for more information.

As discussed in Section 3.3 (Cultural Resources), there are 15 unique cultural resources sites within 2.5 miles of Alternative B (Table 3.3-7). Under Alternative B, the closest sites to the Project would be a reindeer herding camp (Nanuq), an area containing sod houses and a grave (Putu), and a fishing area and associated trail (Apkuġaruk). Though Alternative B is unlikely to impact the physical integrity of these cultural resources, Apkuġaruk (300 feet from ice infrastructure and 450 feet from gravel infrastructure) and Putu (0.6 mile from permanent infrastructure) would experience non-physical impacts, particularly from light and noise, that could alter the site's feeling and setting. The Kuukpik IPN would be within the Project area but is unlikely to be negatively impacted by Alternative B due to the nature of the resource (a river channel used for traditional travel and harvesting) and the short-term and seasonal nature of the associated Project activity (an ice road).

Subsistence

Decreased harvester access or subsistence resource availability resulting from the Project would affect sociocultural systems due to the importance of subsistence in Iñupiat cultural identity, social organization, social cohesion, transmission of cultural values, and community and individual well-being. Harvesting, processing, consuming, and sharing subsistence resources allows cultural values and traditions to be taught to new generations; sharing in particular reinforces social bonds throughout the local community and the region, while participation in subsistence activities allows for the transmission of knowledge about culturally important hunting and harvesting areas, Iñupiaq place names, harvest methods, and cultural values. Sharing extends beyond directly providing harvested resources to include households with more income who may help subsidize relatives and others to harvest traditional foods. Reduced participation or success in subsistence harvests affects social health by weakening social bonds. Over time, decreases in harvests and opportunities for engaging in subsistence activities may also potentially increase social problems associated with drugs and alcohol (SRB&A 2009).

As discussed in Section 3.8 (Subsistence), the Project would affect the resource availability and change access to resources such as caribou, wolf and wolverine, geese, eggs, fish, and vegetation for Nuiqsut harvesters, thus reducing harvest success in the vicinity of Project infrastructure and activity. Design features would reduce but not eliminate impacts. Although it is unlikely that the community would experience a total loss of caribou or other harvests, even a small reduction

could come with high costs to social, cultural, and economic well-being, particularly to the more vulnerable low-income, unconnected, and low-harvest households (Kofinas et al. 2016). Given the interconnected nature of North Slope communities, which are strongly linked through kinship, social, and cultural ties, a reduction in the availability of subsistence resources to the community of Nuiqsut could also affect the amount or frequency with which they share subsistence resources with other communities.

Changes in resource availability can also result in harvesters having to spend greater amounts of time and effort, spending more on fuel and other supplies, and taking greater safety risks to harvest subsistence resources, causing stress to themselves and others in the community. Under Alternative B, use of the new 6.2-mile gravel road for subsistence harvesting by truck may result in economic benefits for some Nuiqsut residents. A recent economic study on subsistence impacts found that increased use of trucks and roads could result in decreased harvest costs (Northern Economics, Inc. 2019). However, the use of the road for subsistence harvesting may also deflect caribou during their fall migration away from the community's traditional hunting area to the west of Nuiqsut (see Section 3.8.2.2.2). Thus, hunters who embrace the use of trucks and roads for caribou hunting may benefit economically from these changes, while those who choose not to use the Project roads for subsistence activities could experience economic impacts or decrease their hunting altogether.

Alternative B would result in adverse impacts associated with the loss of traditional hunting areas, changes to the traditional hunting experience due to the proximity of development, and a gradual loss of traditional knowledge due to a change in hunting methods. Alternative B would place infrastructure closest to key fishing and hunting areas along the Niġliq and East Channels. Some harvesters may avoid infrastructure due to discomfort with hunting and shooting near industrial infrastructure, lack of knowledge about security protocols, concerns about resource contamination, and an assumed lack of resource availability near infrastructure (BLM 2023:333–336). Residents have also expressed discomfort conducting subsistence activities when nonresidents are around for fear that their traditions would be policed, misinterpreted, misunderstood, or exploited for political or other purposes (BLM 2023:338). The presence of new infrastructure and human activity and associated safety considerations further would further reduce the area in which residents would be able to hunt.

A decrease in subsistence activity by certain households could have larger impacts on the community if these households are particularly active and distribute subsistence foods to less active households. A shifting of subsistence roles may occur in certain cases, where particularly active harvesters (e.g., super-harvester households) may no longer have time to provide subsistence foods and may rely on others to fill the subsistence roles they once held. The role of super-harvester households has been documented in a number of studies (Kofinas et al. 2016; Wolfe 2004). Wolfe (2004) found that in most rural communities, approximately 30% of households (super-harvester households) harvest 70% of a community's total harvest. Kofinas et al. (2016) found that many super-harvester households are often also high-earning households. However, more recent research shows an inverse relationship between household income and subsistence harvests, indicating that harvests may decline as household income increases (Guettabi et al. 2016).

The impacts on subsistence would be long term because these changes would affect current residents' use of and relationship to the area, and these changes would be transmitted to the next generation.

Oral History and Language

The Project could reduce opportunities for residents to speak the Iñupiaq language, which is an integral component of cultural identity. Participation in subsistence activities allows for the transmission of knowledge about language (including Iñupiaq place names), culturally important hunting and harvesting areas, and cultural values. If subsistence activities are disrupted, then opportunities for language use and transmission may also be disrupted. In addition, if Nuiqsut residents are hired and stay in Project camps, they would have more interaction with non-local workers, decreased connections with their social support network, less time in which to speak the Iñupiaq language, and potential time conflicts for subsistence activities and potential effects on health.

Non-traditional Influences

Non-physical impacts stemming from development may seem minor on a project-by-project basis, but comments from local community members indicate a feeling of being boxed in by development, which is also a consideration for cultural resources as they lose their connection with the wider physical landscape that they rely on for their feeling, setting, and association. The Project would be approximately 6 miles closer to Nuiqsut than existing oil and gas development. Given this, construction noise would be more easily heard by residents in the community as well as subsistence users.

The Project would contribute to ongoing non-traditional influences in the following ways:

- **Viewshed.** Project facilities and lighting would affect visual and scenic quality and noticeably change the characteristic landscape (including night skies) in and around Nuiqsut. There would be increased visual contrast, lighting, and shapes on the landscape. Project facilities would also affect visual and scenic quality of subsistence areas, particularly along the Putu Channel and Colville River confluence (see Section 3.10 [Visual Resources]). These visual impacts would affect the setting in which Nuiqsut residents live and conduct subsistence activities.
- **Noise.** Noise levels in Nuiqsut during construction would be approximately 48.2 to 50 dBA L_{dn}, which is 2 to 3 dBA above the median ambient noise level (approximately 35 dBA L_{eq} or 46.8 dBA L_{dn}). However, during the infrequent and short-lived use of helicopters and vibratory hammers for pile installation, construction noise levels would be much higher (up to 24 dBA and 10.7 dBA above the median ambient noise level, respectively). Noise levels during drilling and operations would not exceed ambient noise levels. Subsistence users would avoid areas very near to areas of persistent construction operational noise (such as the drillsite) where Project noise would be highest and where noise may be intrusive or uncomfortable. More details regarding noise impacts are in Section 3.5 (Noise).
- **Traffic.** Alternative B would result in 387,076 ground traffic trips over the life of the Project (see Table 2.5-2). Most of the ground traffic would occur during the 2-year construction period and would add up to 25 additional trips per hour in the winter of Year

0/1 (a 224% increase over existing traffic) and up to 18 trips per hour in the spring of Year 2 (a 191% increase over existing traffic) (see Table 3.1-5, Table 3.1-7). Summer and fall traffic would be appreciably lighter (1–4 additional trips per hour). Traffic would increase by less than 3% over existing conditions after Year 7 (see Table 3.1-5). Development of construction phase ice roads or the permanent 6.1-mile gravel road would not appreciably change or augment area transportation options for Nuiqsut residents, although the gravel road may be used for subsistence activities.

- **Industry Work Camps.** The Project would not change the capacity or use of work camps in Nuiqsut. Thus, there would be no change to the existing condition of the presence of nonresidents at the camps.

The CD8 Project would contribute to the Nuiqsut residents' sense that they are surrounded by industrial infrastructure and development. Adding another drillsite closer to the community would exacerbate feelings of a degraded quality of life and community identity.

Other Social Determinants of Health

Impacts of Alternative B on employment and economic status, social connections, and cultural continuity are described above. Mental health may be affected by a number of different stressors, including ongoing concerns about the close proximity of the Project to Nuiqsut, a long-term sense of being surrounded by industry and feeling trapped in the event of an industry-related emergency; increases in noise and traffic; long-term changes to visual setting and cultural landscape (viewshed and landscape degradation); and changes to subsistence resources and access. These factors could lead to chronic stress or exacerbate mental health issues such as anxiety and depression that could lead to a decline in physical health and overall well-being. Additional information on impacts to mental and general health from Alternative B is in Section 3.6.1.2.2 (HEC 1 Social Determinants of Health).

Spills and Inadvertent Releases

The Project would also amplify concerns about spills and inadvertent releases affecting the landscape and the community. Chapter 4 (Spills and Inadvertent Releases) describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. Though the likelihood of a large spill is very small (approaching zero), if one were to occur, the quality of life in Nuiqsut would be substantially degraded. The spill response effort would include heightened levels of activity, noise, ground and air traffic, and emissions. The sense of being surrounded by industry would be solidified, and fears of having no egress (especially in the summer) would be realized. Even after the spill is contained and stranded material is recovered, the impacts of the spill on the community and the perceived potential for such an event to occur again would elevate stress levels for many residents. A large spill would likely strengthen divisions and social tensions in the community regarding development.

In the event of an oil spill or blowout, residents may avoid a large area surrounding the spill as well as downstream and downwind from the spill, which could result in a loss of some subsistence and traditional use areas over time and impacts to sociocultural systems resulting from decreased opportunities to share subsistence resources, participate in subsistence harvesting activities, and pass on subsistence traditions to the younger generation. This reduced subsistence

activity could have sociocultural effects by reducing food security and reducing opportunities to engage in the distribution (sharing), processing, and consumption of subsistence foods. A reservoir blowout under Alternative B would have the most pronounced impacts on sociocultural systems because the drillsite would be the closest to the community and oil fallout could reach the Niġliq Channel upstream from key subsistence harvesting grounds and the community. See Section 3.8 (Subsistence) for additional information on the impact of potential spills on subsistence and Section 3.6.1.2.2 for additional information on the impact of potential spills on social determinants of health and general health.

Avoidance and Minimization Measures

CPAI would apply the following mitigation measures (see EIS Appendix E) to minimize impacts to subsistence and the Nuiqsut Cultural Landscape:

- Avoid conflict with subsistence resources and users (mitigation measures 47–63); work with Kuukpikmiut Subsistence Oversight Panel to coordinate panel activities and continue to hire local subsistence representatives and ice road monitors to monitor activities (mitigation measure 53); and train personnel on the protection of environmental, social, and cultural resources (mitigation measure 47).
- Site facilities to avoid cultural sites based on surveys (mitigation measure 49) and establish a 500-foot avoidance buffer around cultural resource sites (mitigation measure 62).
- Provide a subsistence tundra access road turnout located according to community input to assist local residents in accessing tundra areas adjacent to roadways (mitigation measure 56).
- Minimize pipeline glare (mitigation measure 41) and lighting (mitigation measure 35).

These measures would reduce adverse impacts to subsistence and the Nuiqsut Cultural Landscape, but not all impacts would be avoided. Construction-related noise, long-term visual setting changes, and increased traffic would decrease the quality of life for Nuiqsut residents, particularly during the 2-year construction period. Although CPAI would apply mitigation measures to reduce surface disturbance, not all noise and visual impacts would be avoided. Most visual impacts would be permanent.

Summary

Alternative B would change sociocultural systems by changing employment and income opportunities, changing subsistence resources and access, changing the overall quality of life in Nuiqsut. Impacts are summarized in Table 3.7-1.

The Project would adversely impact traditional Iñupiat cultural practices, cultural continuity and identity, and community and family social ties primarily through changes to subsistence access, potential decreases in subsistence resource availability, and changes in subsistence practices, technology, and resource location. Though some of these changes are already happening due to existing development and changing Arctic conditions, the Project would develop infrastructure closer to Nuiqsut than any previous development.

Changes to overall quality of life in Nuiqsut (increased noise and traffic, changes to the visual setting, a sense of being surrounded by industry, and feeling trapped in the event of an industry emergency) could increase stress in some Nuiqsut residents and lead to or exacerbate mental health issues such as anxiety and depression that could lead to a decline in physical health and overall well-being.

Local hire practices and increased dividends may improve the economic status of some Nuiqsut residents. The city would also receive additional funds through bed taxes, and CPAI would continue its philanthropy program to provide grants and sponsorships to local residents. These actions could result in improvements to public facilities and community services identified in the *Nuiqsut Comprehensive Plan* (City of Nuiqsut 2022) that would benefit all Nuiqsut residents.

In summary, Alternative B would provide the most economic benefits to Nuiqsut of any action alternative through employment, labor income, and government revenues but would also result in the most impacts to social organization, cultural ties to the land, and the quality of life for Nuiqsut residents.

Table 3.7-1. Summary of Impacts to Sociocultural Systems by Action Alternative

Sociocultural Impact Metric	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Community and governance	Beneficial economic impacts to Nuiqsut through NSB property tax income distributions, bed tax revenues, and continued CPAI contributions to the NPR-A Impact Grant Program, other mitigation funds, and local philanthropy programs. Potential for social tension may result from differences in opinion about the social benefits and costs of development.	Beneficial impacts similar to Alternative B, but production would be 28% lower, so community income may be lower as well. Potential for social tensions may be reduced from Alternative B due to further distance of Project to Nuiqsut and reduced impacts.	Beneficial impacts similar to Alternative B, but production would be 12% lower, so community income may be lower as well. Similar to Alternative C, but less potential for reduction of social tensions as related to Project distance from Nuiqsut.
Employment and income	Beneficial economic impacts to residents through opportunities for employment and ANCSA dividends for some Nuiqsut residents. Increased dividends and local hires may result in the potential for social tensions regarding an uneven distribution of money in the community.	Similar to Alternative B, but dividends may be reduced.	Similar to Alternative B, but dividends may be reduced.
Social organization and cultural ties to the land			
Distance of Project to Nuiqsut	2.1 miles east-northeast.	3.1 miles northeast.	2.5 miles northeast.
Nuiqsut Cultural Landscape	15 unique cultural resources within 2.5 miles of Project footprint.	13 unique cultural resources within 2.5 miles of Project footprint.	14 unique cultural resources within 2.5 miles of Project footprint.
Subsistence resource availability	Reduced resource availability for Nuiqsut harvesters.	Similar to Alternative B, but fewer acres of habitat would be removed or disturbed, and areas of disturbance would be further away from main resource harvesting areas.	Similar to Alternative C, but with potential for more impacts to caribou migration patterns through increase in traffic and pipelines.

Sociocultural Impact Metric	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Subsistence harvester access	Avoidance of some areas near the Project; increased road access to some areas. The Project would be near key fishing and hunting areas along the Niġliq and East Channels.	Similar to Alternative B, but would be further away from key fishing and hunting areas along the Niġliq and East Channels and from Nuiqsut. Road access would be reduced.	Similar to Alternative C, but not as far away from Nuiqsut or key fishing and hunting areas.
Subsistence traditions and knowledge	Changes to traditional hunting experience due to the proximity of development and a gradual loss of traditional knowledge.	Same as Alternative B.	Same as Alternative B.
Subsistence resource contamination	In the event of a reservoir blowout, oil fallout could reach the Niġliq Channel upstream from key subsistence harvesting grounds.	In the event of a reservoir blowout, oil fallout would be unlikely to reach the Niġliq Channel.	In the event of a reservoir blowout, oil fallout would not reach the Niġliq Channel but could be transported to the Niġliq Channel if a spill occurred during high river flows.
Opportunities to speak Iñupiaq	Reduced due to disrupted subsistence activities or lack of time due to employment.	Same as Alternative B.	Same as Alternative B.
Increased noise	General construction noise in Nuiqsut: 2–3 dBA above the median ambient noise level of 35 dBA under typical conditions, or up to 10.7 dBA above ambient during infrequent pile driving. Helicopter use (loudest activity): up to 24 dBA above ambient noise level. Drilling and operation noise levels in Nuiqsut: would not exceed median ambient sound level, unless pile driving overlaps with drilling (limited). Subsistence users: likely to avoid areas very near to construction areas or persistent noise (drillsite) where Project noise would be highest.	Construction and operations noise in Nuiqsut: slightly lower than Alternative B due to attenuation. Subsistence users: same as Alternative B, except that avoided areas would be further from the Putu Channel.	Similar to Alternative C.
Changes to the viewshed	Noticeable changes to characteristic landscape (including night skies) for Nuiqsut residents and for subsistence users along the Putu Channel and its confluence with the Colville River.	Similar to Alternative B, but Project visibility would be slightly reduced due to greater distance from Nuiqsut and smaller Project footprint.	Similar to Alternative C.
Increased traffic	387,076 ground traffic trips total. Years 1 and 2 (construction) would require up to 25 additional trips/hour in winter, up to 18 additional trips/hour in the spring, and 1–4 additional trips/hour in summer and fall. Years 3 through 6 (drilling and operations) would require approximately 4 additional trips/hour year-round. Year 7 to Year 30 (operations) traffic would increase by less than 1 additional trip/hour.	9% decrease in ground traffic in the first winter, 18% decrease in ground traffic in the first spring. After Year 1, same as Alternative B.	5% increase in ground traffic in the first winter, 8% increase in ground traffic in first spring. After Year 1, same as Alternative B.
Sense of being surrounded by industry	Exacerbated from existing condition.	Slightly less than Alternative B due to further distance of Project to Nuiqsut.	Same as Alternative C.
Feeling trapped in the event of an industry-related emergency	Exacerbated from existing condition.	Same as Alternative B.	Same as Alternative B.

Sociocultural Impact Metric	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Increased or exacerbated stress	Exacerbated from existing condition.	Same as Alternative B.	Same as Alternative B.
Sense of having a degraded quality of life	Exacerbated from existing condition.	Slightly less than Alternative B due to further distance of Project to Nuiqsut.	Same as Alternative C.
Other social determinants of health	Chronic stress and potential impacts to mental or general health due to ongoing concerns about the close proximity of the Project to Nuiqsut, a long-term sense of being surrounded by industry and feeling trapped in the event of an industry-related emergency; long-term changes to physical and cultural landscape; changes to subsistence resources and access.	Similar to Alternative B, possibly slightly reduced because the Project would be farther from Nuiqsut.	Similar to Alternative B, possibly slightly reduced because the Project would be farther from Nuiqsut.

3.7.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Community and Governance

Alternative C would have the same potential benefits to the community as Alternative B: additional bed tax revenues for City of Nuiqsut, additional employment opportunities, and the continuation of CPAI's philanthropy program.

Social tensions or conflict about the cost of development on the community and cultural identity and the potential benefits that development may bring would be similar to Alternative B, but potentially lower due to the Project being an increased distance from the community.

Employment and Income

Under Alternative C, the number of direct construction and operation jobs would be the same as Alternative B, but production volumes would be 28% lower. The estimated revenues accrued to State and Federal governments, as well as ANCSA corporations, would be reduced by a proportionate amount. Reduced revenues would result in reduced ANCSA dividends to shareholders relative to Alternative B. The potential for social tensions regarding an uneven distribution of dividends (between those who are shareholders and those who are not) would likely be similar to Alternative B.

Property taxes to NSB would be marginally higher than Alternative B.

Because local hire employment rates would not change, the risk of decreased participation in subsistence activities due to employment would be the same as Alternative B.

Social Organization and Cultural Ties to the Land

Nuiqsut Cultural Landscape

Under Alternative C, the Project would incrementally add to ongoing impacts to Iñupiat traditions and cultural activities due to its proximity to the community and cultural sites and impacts on subsistence resources and activities.

Alternative C would have direct and indirect impacts to the Nuiqsut Cultural Landscape similar in type to Alternative B. However, Alternative C would have less potential to impact previously

undocumented cultural resources and would reduce direct impacts to the physical elements of the Nuiqsut Cultural Landscape due to a 30% smaller footprint, shorter access road, and greater distance from known cultural resources such as Putu and other areas with higher archaeological potential. Impacts to Apkuġaruk and Kuukpik would be the same as Alternative B. The indirect impacts to the Nuiqsut Cultural Landscape described under Alternative B would also occur under Alternative C, but they would be further away from Nuiqsut and key hunting and fishing areas.

Subsistence

Alternative C would have the same types of impacts to subsistence activities and resources as Alternative B but to a lesser extent because fewer acres of habitat would be removed or disturbed, and areas of disturbance would be further away from main resource harvesting areas close to the community. The drillsite and permanent roads under Alternative C would be farther removed from key hunting and fishing areas along the Niġliq and East Channels, thus reducing the likelihood of fish mortalities and reduced abundance within harvesting areas. In the event of a spill under Alternative C, oil fallout would be unlikely to reach the Niġliq Channel; however, oil could still reach waterbodies surrounding the drillsite. Alternative C would have less ground traffic overall and, therefore, resource mortalities from traffic collisions may be slightly less under this alternative. The 3.6-mile permanent gravel road, which could be used for subsistence activities, would be shorter than under Alternative B, potentially reducing the beneficial economic impacts for some subsistence users.

As with Alternative B, the impacts on subsistence would be long term, affecting both the current and future generation's use of and relationship to the area.

Oral History and Language

Impacts to opportunities for residents to speak the Iñupiaq language would be the same as Alternative B.

Non-traditional Influences

Under Alternative C, impacts to sociocultural systems from non-traditional influences would be less than under Alternative B because the Project would be approximately 1 mile further from Nuiqsut, and the Project footprint would be smaller.

Alternative C would contribute to ongoing non-traditional influences in the following ways:

- **Viewshed.** The visibility of built features in Nuiqsut would be less under Alternative C. The level of visual contrast would still be strong for foreground viewers around Nuiqsut and the Putu Channel. Project facilities and lighting would affect visual and scenic quality and noticeably change the characteristic landscape (including night skies) in and around Nuiqsut.
- **Noise.** Noise levels within Nuiqsut would be slightly lower (3.4 dB) than Alternative B because the drillsite would be 1 mile further from Nuiqsut and less aligned with the prevailing wind direction. Noise levels for subsistence users would generally be similar to Alternative B, except that areas likely avoided by subsistence users due to persistent operational noise would shift slightly further from the Putu Channel.

- **Traffic.** Alternative C would increase ground traffic by 202% compared to 224% for Alternative B during peak construction in the winter of Year 0/1 (Table 3.1-5), which would equate to three fewer trips per hour than Alternative B, respectively (Table 3.1-7). After Year 1, impacts would be the same as Alternative B.
- **Industry Work Camps.** Impacts would be the same as Alternative B.

As with Alternative B, Alternative C would contribute to the sense by Nuiqsut residents that they are surrounded by industrial infrastructure and development and would exacerbate feelings of a degraded quality of life and community identity as they lose their connection with the wider landscape that they rely on for their feeling, setting, and association.

Other Social Determinants of Health

Impacts of Alternative C on employment and economic status, social connections, and cultural continuity are described above. As with Alternative B, the long-term sense of being surrounded by industry and trapped in the event of an industry-related emergency combined with increases in noise and traffic, degradations of viewshed, cultural landscape, subsistence resources, and access could lead to chronic stress or exacerbate mental health issues such as anxiety and depression that could lead to a decline in physical health and overall well-being. Under Alternative C, stress and concern is likely to be similar to Alternative B but could be slightly reduced due to a decrease in the proximity of the Project to Nuiqsut.

Spills and Inadvertent Releases

The types of impacts to sociocultural systems from spills under Alternative C would be similar to Alternative B, but to a lesser extent and magnitude because the drillsite would be further from the community and key subsistence harvesting areas. Under Alternative C, oil fallout from a large spill or reservoir blowout would be unlikely to reach the Niġliq Channel (see Chapter 4 [Spills and Inadvertent Releases], Figure 4.4-2). Regardless of this lowered risk, community concern is likely to remain high.

Summary

Alternative C impacts would be similar in type to Alternative B, adversely impacting traditional Iñupiat cultural practices, cultural continuity and identity, and community and family social ties primarily through changes to the Nuiqsut Cultural Landscape; quality of life in Nuiqsut (including increased noise and traffic, changes to the visual setting, a sense of being surrounded by industry, and feeling trapped in the event of an industry emergency); and subsistence access, resource availability/location, and harvest practices and technologies. Though these impacts may be less under Alternative C than Alternative B, Alternative C would provide less economic benefit to Nuiqsut.

Although reduced from Alternative B, the changes to sociocultural systems could still increase stress in some Nuiqsut residents and lead to or exacerbate mental health issues such as anxiety and depression that could lead to a decline in physical health and overall well-being.

3.7.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Community and Governance

Alternative D would have the same potential benefits to the community as Alternatives B and C: additional bed tax revenues for City of Nuiqsut, additional employment opportunities, and the continuation of CPAI's philanthropy program.

Social tensions or conflict about the cost of development on their community and cultural identity and the potential benefits that development may bring are expected to be similar to Alternative B, but potentially lower due to a slightly increased distance from the community.

Employment and Income

Under Alternative D, the number of direct construction and operation jobs would be the same as Alternative B, but production volumes would be 12% lower. The estimated revenues accrued to State and Federal governments, as well as ANCSA corporations, would be reduced by a proportionate amount. Reduced revenues would result in reduced ANCSA dividends to shareholders relative to Alternative B. The potential for social tensions regarding an uneven distribution of dividends (between those who are shareholders and those who are not) would likely be similar to Alternative B.

Because employment rates would not change, the risk of decreased participation in subsistence activities due to employment would be the same as Alternative B.

Social Organization and Cultural Ties to the Land

Nuiqsut Cultural Landscape

Under Alternative D, the Project would incrementally add to ongoing impacts to Iñupiat traditions and cultural activities due to its proximity to the community and cultural sites and impacts on subsistence resources and activities.

Alternative D would have direct and indirect impacts to the Nuiqsut Cultural Landscape similar in type to Alternative B but with slightly less potential to impact previously undocumented cultural resources due to a 7% smaller footprint, slightly shorter access road, and increased distance from known cultural resources such as Putu and other areas with higher archaeological potential. Impacts to Apkuġaruk and Kuukpik would be the same as Alternative B.

Subsistence

Alternative D would have similar types of impacts to subsistence activities and resources as Alternative B. As compared to Alternative B, fewer acres of habitat would be removed or disturbed, and areas of disturbance would be further away from main resource harvesting areas close to the community. The drillsite and permanent roads under Alternative D would be farther removed from key fishing areas along the Niġliq and East Channels, thus reducing the likelihood of fish mortalities and reduced abundance within harvesting areas. In the event of a spill under Alternative D, oil fallout would not reach the Niġliq Channel, although oil fallout could be transported to the Niġliq Channel if the spill occurred during high river flows. If this occurred, the oil would likely enter the channel downstream from the community and affect downstream

subsistence fishing and other activities and potentially marine subsistence harvesting activities (e.g., seal hunting) in Harrison Bay.

Alternative D would have slightly more ground traffic than Alternative B; therefore, resource wildlife mortalities from traffic collisions may be slightly higher under this alternative. Alternative D would also have the longest length of pipeline on new VSMs, increasing the likelihood of pipeline-related caribou deflections. The 5.1-mile permanent gravel road, which could be used for subsistence activities, would be slightly shorter than under Alternative B, potentially reducing the beneficial economic impacts for some subsistence users.

As with Alternative B, the impacts on subsistence would be long term, affecting both the current and future generation's use of and relationship to the area.

Oral History and Language

Impacts to opportunities for residents to speak the Iñupiaq language would be the same as Alternative B.

Non-traditional Influences

Under Alternative D, impacts to sociocultural systems from non-traditional influences would be less than under Alternative B because the Project would be 0.4 mile further from Nuiqsut and the Project footprint would be smaller.

Alternative D would contribute to ongoing non-traditional influences in the following ways:

- **Viewshed.** The visibility of built features in Nuiqsut would be less under Alternative D then Alternative B. The level of visual contrast would still be strong for foreground viewers around Nuiqsut and the Putu Channel. Project facilities and lighting would affect visual and scenic quality and noticeably change the characteristic landscape (including night skies) in and around Nuiqsut.
- **Noise.** Noise levels within Nuiqsut would be slightly lower (1.5 dB) than Alternative B (but higher than Alternative C) because the drillsite would be 0.4 mile further from Nuiqsut and less aligned with the prevailing wind direction. Noise levels for subsistence users would be similar to Alternative B, except that areas likely avoided by subsistence users due to persistent operational noise would shift slightly further from the Putu Channel.
- **Traffic.** Alternative D would increase ground traffic by 234% compared to 224% for Alternative B during peak construction in the winter of Year 0/1 (Table 3.1-5), which would equate to one trip per hour more than Alternative B, respectively (Table 3.1-7). After Year 1, impacts would be the same as Alternative B.
- **Industry Work Camps.** Impacts would be the same as Alternative B.

Similar to Alternative B, Alternative D would contribute to the sense by Nuiqsut residents that they are surrounded by industrial infrastructure and development and would exacerbate feelings of a degraded quality of life and community identity as they lose their connection with the wider landscape that they rely on for their feeling, setting, and association.

Other Social Determinants of Health

Impacts of Alternative D on employment and economic status, social connections, and cultural continuity are described above. As with Alternative B, the long-term sense of being surrounded by industry, feeling trapped should there be an industry-related emergency, combined with increases in noise and traffic, degradations of viewshed, cultural landscape, subsistence resources and access could lead to chronic stress or exacerbate mental health issues such as anxiety and depression that could lead to a decline in physical health and overall well-being. Under Alternative D, stress and concern is likely to be similar to Alternative B despite a slight decrease in the proximity of the Project to Nuiqsut.

Spills and Inadvertent Releases

The types of impacts to sociocultural systems from spills under Alternative D would be similar to Alternative B, but to a lesser extent and magnitude because the drillsite would be further from the community and key subsistence harvesting areas. Under Alternative D, oil fallout from a large spill or reservoir blowout would not reach the Niġliq Channel; however, oil fallout could be transported to the Niġliq Channel if a spill occurred during high river flows (see Chapter 4 [Spills and Inadvertent Releases] and Figure 4.4-2). As a result, community concern is likely to remain high.

Summary

Alternative D impacts would be similar in type to Alternative B, adversely impacting traditional Iñupiat cultural practices, cultural continuity and identity, and community and family social ties primarily through changes to the Nuiqsut Cultural Landscape; quality of life in Nuiqsut (including increased noise and traffic, changes to the visual setting, a sense of being surrounded by industry, and feeling trapped in the event of an industry emergency); and subsistence access, resource availability/location, and harvest practices and technologies. Though these impacts may be slightly less under Alternative D than Alternative B, Alternative D would provide less economic benefit to Nuiqsut.

The changes to sociocultural systems may increase stress in some Nuiqsut residents and lead to or exacerbate mental health issues such as anxiety and depression that could lead to a decline in physical health and overall well-being.

3.7.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions include substantial additional oil and gas development (see Table 3.1-2). Most future oil and gas projects would be between 10 and 60 miles of the CD8 Project area; CPAI and Kuukpik each have one small expansion project within 3 miles of the Project area. RFF actions include several community development projects, including development of additional roads to connect NSB communities to each other and to the Dalton Highway, development of a road connecting a water source lake to the Colville River, as well as grants to support development of a cultural center, teen center, a boat ramp, or other community improvements. Past and present actions and RFF actions are described in more detail in Section 3.1.1 and 3.1.2, respectively.

RFF actions related to oil and gas development would continue to affect sociocultural systems in ways similar to past and present development. Potential benefits includes improvements to

economic status through individual employment and ANCSA dividends to some residents, as well as increased revenue for City of Nuiqsut that can benefit the community of Nuiqsut as a whole. Potential adverse impacts include direct and indirect impacts to the Nuiqsut Cultural Landscape and subsistence that in turn affect Iñupiat cultural identity, social connections and cultural continuity, and social well-being.

The Project, in addition to other RFF actions, would contribute to the cumulative effects of development on sociocultural systems because it would represent a net increase in the amount of land used for oil and gas and other development, in addition to a related increase in industrial activity, including air and ground traffic. Although residents are allowed access to development-related roads and facilities, many view the increasing expansion of development infrastructure as a loss of traditional lands. Additional future development may have additive impacts to the Project impacts on subsistence harvest and subsistence use patterns (including disruption of community activities and traditional practices for harvesting, sharing, and processing subsistence resources), social bonds, and cultural values. Increased noise levels, visual contrast, lighting, and traffic may result in increased stress, impacts to mental health, and a decreased quality of life for Nuiqsut visitors. Importantly, under all action alternatives, the Project would bring development closer to Nuiqsut than any other present or proposed oil and gas activities. Nuiqsut residents have reported feeling surrounded by infrastructure (as one resident put it, living in a "human corral"), and the Project, when combined with the RFF actions, would contribute to these concerns by further surrounding the community with infrastructure (SRB&A 2018). The relative contribution to adverse impacts to sociocultural systems from oil and gas development would be greater from the Project than from projects that are further away. In BLM's GMT1 ROD (2015), BLM noted the cumulative effects associated with the loss of traditional land and a sense of being surrounded by infrastructure. As BLM (2015) states, "This context has substantially elevated the consequences of each subsequent development project."

Community development RFF actions would have beneficial impacts to social connections and cultural continuity and water and sanitation infrastructure that would improve public health and safety. Transportation RFF actions would enhance communication and transportation between NSB communities in the face of a changing Arctic climate that may affect existing transportation methods.

The RFF trend of increased oil and gas exploration and development around Nuiqsut and in the NPR-A (see Section 3.1.2.2 [Reasonably Foreseeable Future Trends]) in combination with the CD8 Project would add to the growing pattern of industrial activity and development around the community and further exacerbate the sociocultural impacts described above. NVN has expressed that this could lead to long-term landscape-level sociocultural changes.

3.7.1.2.6 SUMMARY OF IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

The Federal resources that affect sociocultural systems are air quality, water quality, and historic properties. Impacts to air quality would generally be irretrievable, ceasing after Project completion. Impacts to water quality (should they occur), while generally irretrievable, could remain long after Project completion. Impacts to historic properties would generally be irreversible. Effective implementation of design features would reduce but not eliminate the potential impacts to these resources. Alternative B would have the highest level of irreversible and irretrievable impacts on these Federal resources, and Alternative C would have the least.

3.8 SUBSISTENCE

Subsistence is the cornerstone of the traditional relationship of the Iñupiat people with their environment. Residents of Nuiqsut rely on subsistence harvests of plant and animal resources for nutrition and their cultural, economic, and social well-being. Activities associated with subsistence—processing; sharing; redistribution networks; cooperative and individual hunting, fishing, and gathering; and ceremonial activities—strengthen community and family social ties, reinforce community and individual cultural identity, and provide a link between contemporary Alaska Natives and their ancestors. These activities are guided by traditional knowledge based on a long-standing relationship with the environment.

Federal and State regulations both define subsistence uses to include the customary and traditional uses of wild renewable resources for food, shelter, fuel, clothing, and other uses (ANILCA Title VIII, Section 903, and AS 16.05.940[33]). A USACE study (ResourceEcon et al. 2011) provides a proposed definition of *subsistence* based on a literature review of existing subsistence definitions. In part, this definition reads,

> Subsistence refers to a way of life in which wild renewable resources are obtained, processed, and distributed for household and communal consumption according to prescribed social and cultural systems and values…
>
> …The subsistence way of life satisfies to various degrees and in various contexts, the economic, social, cultural, and nutritional needs of subsistence-based communities (ResourceEcon et al. 2011)

Subsistence activities on lands in Alaska, including private lands, are subject to State and/or Federal regulations. The Project would be located on State and Kuukpik lands. A more detailed definition of subsistence and a discussion of subsistence regulations are available in the Willow SEIS (BLM 2023:301–303).

The EIS analysis includes consideration of mitigation measures. Many of these measures have been implemented for Alpine, Willow, or other existing or prior permits for actions undertaken by CPAI. The effectiveness of subsistence mitigation measures is evaluated through ongoing permitting agency–required monitoring and through ongoing local and agency review of CPAI operations. These review mechanisms include the Kuukpikmiut Subsistence Oversight Panel, a Nuiqsut-based panel funded by CPAI and composed of representatives from the City of Nuiqsut, NVN, and Kuukpik. The panel meets formally with CPAI twice each year to review operations, plans, activities, and mitigations. CPAI also meets annually with the NSB Department of Wildlife Management and Department of Planning and Community Services, as required by several NSB rezone ordinances, to review ongoing subsistence harvest monitoring studies, including the under-ice qaaktaq (i.e., Arctic cisco) fishery and caribou harvest studies. In addition, CPAI has completed annual subsistence monitoring through the Nuiqsut Caribou Monitoring Project for the last 17 years (as required by CD4 permits) and will continue to do so for the life of Willow. As part of the Nuiqsut Caribou Monitoring Project, annual subsistence harvest interviews are held with Nuiqsut residents and annual Nuiqsut household surveys to document community-level harvests, baseline caribou subsistence harvesting data, and harvester observations regarding development-related impacts on caribou harvesting activities.

3.8.1 How would the Project impact abundance of subsistence resources?

Changes in the overall abundance of subsistence resources could affect subsistence activities outside and downstream from the Project area; therefore, the analysis area for subsistence resource abundance is all Nuiqsut subsistence use areas (see Figure 3.8-1; use areas are detailed in Section 3.8.2 regarding subsistence resource availability). The temporal scale of the analysis includes the approximately 30 years of CD8 Project construction and operations, in addition to ongoing effects on abundance related to habitat loss, which may extend beyond the Project life.

3.8.1.1 Affected Environment

The following section provides a summary of subsistence data for Nuiqsut relevant to subsistence resource abundance. Data on harvest amounts, including resource importance, are most relevant to describing and analyzing impacts to resource abundance.

3.8.1.1.1 HARVEST AMOUNTS

The community of Nuiqsut harvests a diversity of subsistence species from the marine, riverine, and terrestrial environment. Large land mammals, non-salmon fish, and marine mammals make up the majority of subsistence harvests (96.8%, on average), with caribou, bowhead whale (*Balaena mysticetus*), broad whitefish, Arctic cisco, and moose among the top individual species harvested (Tables 3.8-1 and 3.8-2). On average across available study years, the community of Nuiqsut harvests 428 pounds of subsistence foods per capita annually. Participation in subsistence activities is high, with over 50% of households participating (see "Percentage of HHs Trying to Harvest" in Table 3.8-1) in harvests of non-salmon fish, large land mammals, migratory birds, vegetation, and marine mammals. Sharing is central to Iñupiat cultural identity, and in Nuiqsut, over 90% of households receive and give subsistence resources to other households each year (see Table 3.8-1).

Table 3.8-1. Selected Nuiqsut Harvest and Participation Data, Resource Category, Average across Available Study Years

Resource Category	Estimated Pounds Per Capita	Percentage of Total Harvest	Percentage of HHs Using	Percentage of HHs Trying to Harvest	Percentage of HHs Giving	Percentage of HHs Receiving
All resources*	428	100.0%	100%	95%	93%	98%
Salmon	3	0.4%	65%	43%	31%	35%
Non-salmon fish	131	30.7%	97%	83%	81%	79%
Large land mammals	175	45.7%	96%	77%	77%	78%
Small land mammals	<1	0.0%	45%	41%	17%	12%
Marine mammals	120	20.4%	97%	54%	60%	97%
Migratory birds	9	2.4%	85%	78%	58%	52%
Upland game birds	1	0.2%	54%	48%	36%	15%
Bird eggs	0	<.1%	24%	16%	8%	11%

Resource Category	Estimated Pounds Per Capita	Percentage of Total Harvest	Percentage of HHs Using	Percentage of HHs Trying to Harvest	Percentage of HHs Giving	Percentage of HHs Receiving
Vegetation	0	0.1%	61%	59%	19%	33%

Sources (year for which data are available): ADF&G (2026 [data from 1985]); Bacon et al. (2011 [data from 1995–1996 and 2000–2001]); Brower and Hepa (1998 [data from 1994–1995]); Brown et al. (2016 [data from 2014]); Fuller and George (1999 [data from 1992]); and Pedersen (1995 [data from 1993]).
Note: HH = households.
* Averages are based on available harvest data for each resource category. Some studies address only certain resource categories and therefore do not include data for "All Resources." Therefore, averages for individual resource categories do not necessarily add up to the averages for "All Resources."

Table 3.8-2. Selected Nuiqsut Harvest and Participation Data, Top Species Harvested, Average across Available Study Years

Resource Category	Estimated Pounds Per Capita	Percentage of Total Harvest	Percentage of HHs Using	Percentage of HHs Trying to Harvest	Percentage of HHs Giving	Percentage of HHs Receiving
Caribou	151	42.5%	96%	76%	74%	76%
Bowhead whale	118	17.6%	97%	30%	47%	96%
Broad whitefish	57	12.8%	86%	69%	62%	49%
Arctic cisco	49	11.6%	90%	65%	68%	58%
Moose	9	3.1%	51%	40%	19%	41%
Ringed seal	11	2.9%	56%	36%	34%	43%
Bearded seal	11	2.3%	57%	32%	29%	50%
White-fronted geese	7	1.6%	71%	62%	42%	36%
Humpback whitefish	4	1.4%	29%	26%	16%	9%
Least cisco	7	1.2%	48%	40%	27%	17%
Arctic grayling	5	1.2%	60%	50%	33%	24%
Burbot	5	1.2%	64%	51%	38%	35%
Arctic char	4	1.1%	49%	38%	23%	22%

Sources (year for which data are available): ADF&G (2026 [1985]); Bacon et al. (2011 [1995–1996 and 2000–2001]); Braem et al. (2011); Brower and Hepa (1998 [1994–1995]); Brown et al. (2016 [2014]); Fuller and George (1999 [1992]); Pedersen (1995 [1993]); SRB&A (2025a [2008–2023 caribou]).
Note: HH = households.

Table E.16.9 in the Willow SEIS (BLM 2023:Appendix E.16) provides an analysis of resource importance based on harvest (average percentage of total harvest), harvest effort (average percentage of households attempting to harvest), and sharing (average percentage of households receiving) variables. Based on this analysis, resources of major importance for Nuiqsut are caribou, bowhead whale, broad whitefish, Arctic cisco, white-fronted goose (*Anser albifrons*), burbot (*Lota lota*), cloudberry (*Rubus chamaemorus*), bearded seal (*Erignathus barbatus*), Arctic grayling (*Thymallus arcticus*), and wood.

A more detailed description of existing conditions in Nuiqsut as they pertain to subsistence is provided in the Willow SEIS (BLM 2023:307–308) and is incorporated by reference and summarized here. Based on available subsistence harvest data, Nuiqsut per capita subsistence harvests have ranged from 399 pounds (in 1985, 1 of 2 years when the community did not successfully harvest a bowhead whale) to 896 pounds (in 2014) (see Table E.16.9 in BLM 2023:Appendix E.16). Several factors affect harvest levels and participation from year to year. Impacts of the existing oil and gas development on harvest levels include changes in resource

availability and harvest success as a result of oil and gas related disturbances (e.g., air, ground, and barge traffic, human presence) and infrastructure (e.g., roads, pipelines). In addition to development, harvest regulations such as bag limits for caribou and restrictions on hunting seasons also affect harvest amounts. Changing Arctic conditions also have the potential to affect Nuiqsut harvest success through changes in the timing and location of resource migrations and effects on resource populations.

3.8.1.2 Environmental Consequences

The Project could affect subsistence resource abundance if Project infrastructure and activities result in a reduction in resource populations. The Project could impact subsistence resource abundance from the presence of infrastructure such as gravel pads and roads, pipelines, culverts, and ice roads and pads; and through other Project activities such as ground, barge, and air traffic; installation of sheet pile and riprap banks; water withdrawals; potential spills; use of hazardous materials; and fugitive dust. Impacts to resource abundance are informed by the conclusions of Section 3.9 (Terrestrial Mammals), BIO-1 through BIO-14 in EIS Appendix D (Issues Dismissed from Detailed Analysis), Indigenous knowledge regarding impacts of development on resource populations, and subsistence resource importance.

3.8.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Nuiqsut would continue to experience impacts to subsistence resource abundance resulting from existing oil and gas development, ongoing exploration, and other activities in the region through direct mortalities and habitat loss or degradation. Construction and operation of existing oil and gas projects (see Section 3.1.1 [Past and Present Actions]) would continue to impact subsistence through gravel mining, traffic, noise and human activity, dust, water withdrawal, and other activities that contribute to the environmental baseline). Existing and RFF trends, such as changing Arctic conditions and increased development around NPR-A, would likely continue.

3.8.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

The types of potential impacts to subsistence resource abundance under Alternative B are similar to those discussed in the Willow SEIS (BLM 2023:326); that analysis is incorporated by reference and summarized here. The types of potential impacts to subsistence resource abundance would be similar to those discussed in the Willow SEIS, although impacts related to habitat loss would be less extensive due to the smaller footprint of the CD8 Project. Loss of habitat as a result of the CD8 Project would be minimal due to the availability of similar habitats throughout the region (see BIO-1, BIO-4, BIO-12 in EIS Appendix D).

According to Nuiqsut residents, the Project is located in a migratory and feeding area for caribou and a nesting ground for geese, and residents express particular concern about the impacts of the Project on the health and abundance of these resources. Residents also have expressed concerns about impacts to fishing activities adjacent to or downstream from the Project, in addition to the availability of vegetation (e.g., cloudberries) in these areas (SRB&A 2025b). According to the Willow SEIS (BLM 2023), resources of major importance to the community of Nuiqsut include caribou, geese (white-fronted geese), fish (Arctic cisco, Arctic grayling, broad whitefish, and burbot), and vegetation (cloudberry) (see Table E.16.9 in BLM 2023:Appendix E.16). Thus,

impacts to the overall populations of these resources resulting from Project infrastructure and activities could negatively affect resource abundance for the community.

Placement of gravel infrastructure would remove or disturb habitat for resources such as caribou, geese, vegetation, and fish. In addition, these resources may experience indirect habitat loss through changes in hydrologic function, permafrost thaw, fugitive dust along roads, spread of invasive species, and spills (see BIO-1 through BIO-13 in EIS Appendix D). The presence of new infrastructure could cause deflection of caribou away from existing habitat areas, which may result in caribou choosing suboptimal habitats (see Section 3.9.1.2.2 [Installation of New Infrastructure]). Habitat loss has the potential to reduce feeding, calving, and nesting rates for resources (e.g., caribou, waterfowl) near the Project. These changes can reduce body condition and decrease reproductive success. Alterations to waterbodies resulting from dust deposition, sedimentation, water withdrawals, and temporary blockages (e.g., from ice roads or pads) could also affect access to suitable habitat for fish and food chain organisms, although most impacts would be localized and temporary and would not result in population-level effects (see BIO-4 and BIO-5 in EIS Appendix D).

Finally, gravel placement would directly reduce the abundance of berry harvesting areas within the Project area. Alternative B has the largest gravel footprint of the three action alternatives, at 65.9 acres, and therefore would be most likely to affect resource habitats (Section 2.5 [Comparison of Action Alternatives]). In addition, Alternative B places infrastructure closest to key fishing and hunting areas along the Niġliq and East Channels, increasing the likelihood of reduced abundance within harvesting areas compared to the other alternatives.

In addition to potential effects on resource abundance through a loss of habitat, the Project could also result in direct mortalities of caribou, birds, marine mammals, and small land mammals from vehicle or aircraft collisions (see BIO-3, BIO-10, BIO-13 in EIS Appendix D) or to marine mammals from the Project's single barge trip (see BIO-8 in EIS Appendix D). Alternative B would increase ground traffic by up to 224% during peak construction (winter of Year 0/1) compared to existing conditions and would increase helicopter and fixed-wing aircraft traffic by up to 23% and 6%, respectively, during Year 2 compared to existing conditions (see Table 3.1-5). Installation of culverts could also cause individual mortalities of fish (see BIO-4 in EIS Appendix D), though it would be unlikely given that fish would likely move to other locations without increased human activity around a waterbody. Although there would be habitat loss and some individual mortalities from the Project, the Project would unlikely have population-level effects on subsistence resources for the community of Nuiqsut.

Ultimately, a decrease in resource abundance would not just affect harvest amounts but could have other interconnected subsistence and sociocultural impacts. These are discussed in detail in the Willow SEIS (BLM 2023:337-339) and include the following:

- Decreased sharing of subsistence resources, which could affect social and kinship ties (see Section 3.7.1.1.3 [Social Organization and Cultural Ties to the Land] and Section 3.6.1.2.2 [Alternative B])
- Reduced opportunities to engage in subsistence activities and pass knowledge about subsistence and cultural values on to future generations (see Section 3.7.1.1.3 and Section 3.6.1.2.2)

- Effects on cultural identity, social organization, and social cohesion (see Section 3.7.1.1.3 and Section 3.6.1.2.2)
- Increased costs and time associated with harvesting subsistence resources (see Section 3.7.1.1.3, Section 3.6.1.2.2, and 3.4.1.2.2 [Alternative B])

Spills and Inadvertent Releases

Chapter 4 describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. An oil spill or blowout could affect the abundance of fish, particularly Arctic cisco and broad whitefish, in the Niġliq and East Channels. Both Arctic cisco and broad whitefish are among the top subsistence species harvested in Nuiqsut and, on average, have accounted for one-quarter of the total subsistence harvest during available study years (see Table 3.8-2). They are both considered resources of major importance for the community of Nuiqsut (see Table E.16.9 in BLM 2023:Appendix E.16). A decline in the abundance of these resources would have substantial impacts to Nuiqsut subsistence through a reduction in harvest amounts and opportunities for culturally important activities such as processing and sharing subsistence foods. In the event of a reservoir blowout, Alternative B would be most likely to affect fishing because oil fallout could reach the Niġliq Channel upstream from key subsistence fishing grounds (see Section 4.4.1.2 [Reservoir Blowout] and Figure 4.4-1). Such an event under Alternative B would likely reduce the abundance of fish and other resources and potentially cause widespread avoidance of the channel for numerous subsistence activities.

Contamination concerns are generally more widespread for marine or riverine resources (e.g., fish) due to the greater potential for contaminants to spread outside of the immediate Project area. However, in the analysis area, a spill or blowout could also directly affect the abundance of vegetation (cloudberries) and eggs, if the blowout results in fewer migratory birds nesting in the area. A large oil spill, although unlikely, could have substantial impacts on Nuiqsut subsistence uses for an extended period, resulting in decreased subsistence harvests.

Large spill cleanup activities could require in-situ burning, which in turn may result in localized effects to the abundance of subsistence resources (e.g., from the burning of vegetation or wildlife mortalities). Although spill occurrences requiring this method of cleanup would be unlikely (see Chapter 4), these effects from in-situ burning would be possible and the magnitude would depend on the extent of the spill. Under the right circumstances (e.g., when mechanical cleanup is not feasible) in-situ burning may be the quickest and most effective method for cleanup that would remove the oil from water prior to shoreline impacts and would minimize downstream transport and associated effects on aquatic species (ADEC et al. 2008; NOAA 2022). In-situ burning would be approved and implemented in accordance with ADEC-, USGS-, and EPA-approved guidelines for burning which include considerations for vegetation and wildlife (ADEC et al. 2008, ADEC 2022).

Summary

Alternative B would have the greatest gravel footprint of the three action alternatives and would therefore be the most likely to affect subsistence resource abundance through the removal of habitat. Alternative B has the longest gravel road, which would increase the probability of deflection of caribou away from habitat areas, although it only has the second-longest length of

pipeline on new VSMs, which would reduce pipeline-related deflections compared to Alternative D. Reduced access to feeding and nesting grounds, particularly for caribou and migratory birds, may occur but would be unlikely to reduce overall wildlife populations. Individual mortalities may occur under Alternative B as a result of construction activities and road and air traffic but would not contribute to overall changes in resource abundance. Table 3.8-3 summarizes the impacts to subsistence resource abundance.

Table 3.8-3. Summary of Impacts to Subsistence by Action Alternative

Subsistence Issue	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Resource abundance	Reduced resource abundance within the analysis area due to habitat loss from gravel infrastructure, changes in habitat quality or deflection of caribou along roads and pipelines, and mortality from collisions with vehicles. Population-level effects on subsistence resources unlikely.	Same as Alternative B, but lesser magnitude due to smaller footprint of infrastructure, reduced ground traffic volumes, and further distance from the drillsite to key fishing areas.	Same as Alternative C, except magnitude of impacts from ground traffic collisions and caribou deflections around pipelines slightly higher.
Resource availability	Reduced availability and hunting success for subsistence users due to Project activities and infrastructure that may affect the movement, behavior, or distribution of caribou, furbearers, and birds. No change to availability of fish and marine mammals (subsistence use areas for these resources do not overlap with Project infrastructure). Possible avoidance of fish or vegetation resources near Project infrastructure that have a perceived or confirmed risk of contamination.	Same as Alternative B, but reduced magnitude due to smaller footprint of infrastructure, reduced ground traffic volumes, and further distance of the drillsite to key subsistence harvesting areas.	Same as Alternative C, except magnitude of impacts resulting from ground traffic collisions would be slightly higher.
Harvester access	Decreased access due to physical barriers and direct removal of land from community harvesting areas, security restrictions, and harvester avoidance. Impacts would be greatest in the immediate vicinity of Project infrastructure. The presence of infrastructure so close to Putu may further reduce the community's use of this area. Increased truck or ATV access to areas only accessible by river, boat, or snow machine for Nuiqsut harvesters that choose to use Project roads for hunting and harvesting.	Same as Alternative B, but reduced magnitude due to less overlap with moderate to high subsistence use areas, and further distance of the drillsite and roads from key harvesting areas along the Niġliq and East Channels.	Same as Alternative C.

3.8.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of impacts as Alternative B, but to a lesser extent because the Project footprint would be smaller (46.9 acres compared to 67.3 acres) and therefore fewer acres of resource habitat would be removed or disturbed. Alternative C would increase ground traffic by 202% compared to 224% under Alternative B (see Table 3.1-5), and therefore resource mortalities from ground traffic collisions may be slightly less under this alternative. The gravel infrastructure under Alternative C would be farther removed from key fishing areas along

the Niġliq and East Channels (1.5 miles and 0.2 mile further respectively), thus reducing the likelihood of reduced abundance within harvesting areas.

In the event of a spill under Alternative C, oil fallout would be unlikely to reach the Niġliq Channel (see Chapter 4 and Figure 4.4-2). Oil could reach waterbodies surrounding the drillsite. Thus, impacts to subsistence resource abundance would be similar to Alternative B, but to a lesser extent since the drillsite and road are farther from key harvesting areas on the Niġliq and East Channels.

3.8.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of impacts as Alternative B, but to a lesser extent because the Project footprint would be smaller (62.3 acres compared to 67.3 acres) and therefore fewer acres of resource habitat would be removed or disturbed. Alternative D would have slightly more ground traffic than Alternatives B and C (an increase of 234% compared to 224% under Alternative B [see Table 3.1-5]), and therefore wildlife mortalities from traffic collisions may be slightly higher under this alternative. Alternative D would have the longest length of pipeline on new VSMs (3.1 miles compared to 2.5 miles under Alternative B), increasing the likelihood of pipeline-related caribou deflections. The drillsite and permanent roads under Alternative D would be farther removed from key fishing areas along the Niġliq and East Channels, thus reducing the likelihood of fish mortalities and reduced abundance within harvesting areas.

In the event of a spill under Alternative D, oil fallout would not reach the Niġliq Channel, although oil fallout could be transported to the Niġliq Channel if the spill occurred during high river flows (see Chapter 4 and Figure 4.4-3). If this occurred, the oil would likely enter the channel downstream from the community and affect downstream subsistence fishing and other activities, and potentially affect marine subsistence harvesting activities (e.g., seal hunting) in Harrison Bay. Thus, impacts to subsistence resource abundance would be similar to Alternative B, but to a lesser extent since the drillsite and road are farther from key harvesting areas on the Niġliq and East Channels.

3.8.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions and trends combined with the CD8 Project would impact subsistence resource abundance through removal, alteration, and degradation of habitat, and reduced wildlife access to key habitat such as calving, nesting, and feeding grounds. RFF actions that could affect subsistence resource abundance include infrastructure, traffic, human activity, and contamination related to existing and future oil and gas development projects (see Table 3.1-3; see Figure 3.1-2), and changing Arctic conditions. A detailed discussion of RFF actions and trends combined with Project impacts is provided in the Willow SEIS (BLM 2023:400–424) and is incorporated here by reference. Though some RFF actions have changed since the Willow EIS, the types and magnitude of RFF actions are similar as are the types of impacts that would result from them.

Increased infrastructure on the North Slope associated with RFF actions, including oil and gas exploration and development (e.g., Horseshoe, Quokka, Greater Willow projects), mining, transportation projects, and community development projects, would continue to cause alteration and degradation of habitats for key resources such as caribou, migratory birds, and fish.

Construction of additional roads and infrastructure would contribute to fragmentation of habitat for resources such as caribou, furbearers, and migratory birds. Habitat fragmentation could affect resource access to key feeding, nesting, calving, and insect-relief areas. In addition to development and infrastructure projects, changing Arctic conditions, including warmer temperatures and changes in weather conditions, could affect resource abundance by reducing food quality and increasing susceptibility to disease (BLM 2023:422).

3.8.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

There would be no irreversible and irretrievable commitments of Federal resources with regard to subsistence if a permit were issued.

3.8.2 How would the Project impact availability of subsistence resources?

Changes in the availability of subsistence resources could affect subsistence activities outside and downstream from the Project area, thus the analysis area for subsistence resource availability is all Nuiqsut subsistence use areas (see Figure 3.8-1). The direct effects analysis area is the area within 2.5 miles of the action alternatives. The temporal scale of the analysis is the 30-year Project life or as long as the infrastructure remains in place.

3.8.2.1 Affected Environment

The following sections provide a summary of subsistence data for Nuiqsut relevant to subsistence resource availability. Data on subsistence use areas, harvest amounts, and harvest timing are relevant to describing and analyzing impacts to resource availability.

3.8.2.1.1 SUBSISTENCE USE AREAS

Figures 3.8-1 through 3.8-18 provide Nuiqsut subsistence use areas from 2010 through 2022 (2008 to 2023 for caribou). The Willow SEIS provides subsistence use areas for previous time periods including historical or lifetime use areas and use areas from 1995 through 2006. Nuiqsut harvesting activities occur over a large marine, terrestrial, and riverine area (see Figure 3.8-1). Marine hunting extends from Cape Halkett in the west to Camden Bay in the east, with a majority of use areas occurring in Harrison Bay and near Cross Island (bowhead whale hunting). River hunting occurs throughout the Colville River drainage (including the Niġliq and East Channels and the Itkillik, Chandler, and Anaktuvuk Rivers) and along Fish Creek. Some riverine travel also occurs along channels within the CRD, including Tamayayak Channel. Overland travel occurs within the CRD and both east and west of the Colville River as far as Meade River in the west and Dalton Highway in the east. High overlapping use for overland areas occurs along the road system and in areas directly west of the community of Nuiqsut.

Based on the most recent comprehensive all-resources subsistence mapping study (SRB&A 2024), Nuiqsut harvesters have reported using the direct effects analysis area for a number of resource harvesting activities, with direct overland use of the CD8 infrastructure area for caribou hunting, furbearer and small land mammal hunting/trapping, wildfowl (geese/duck/upland bird) hunting, and egg gathering (see Figures 3.8-2 through 3.8-18; Table 3.8-4). In addition, harvesters use the waterways and areas of existing infrastructure within the Project area for other

resource harvesting activities, including fishing, vegetation harvesting, and some limited marine mammal and moose hunting. The direct effects analysis area includes Putu, a historic site and traditional harvesting area located along the Putu Channel (Figure 3.8-19). Although use of the Putu Channel and the area surrounding Putu has declined in recent years due to shallow conditions reducing access, residents continue to use the Putu area when water levels allow, or when traveling overland. Key uses of the Putu area include hunting of migratory birds and caribou.

Table 3.8-4. Nuiqsut Subsistence Harvesters Using Direct Effects Analysis Area by Resource, 2010 through 2022

Resource	Number of Harvester Respondents Using Direct Effects Analysis Area	Percentage of Harvester Respondents Using Direct Effects Analysis Area
Caribou	38	95%
Moose	11	50%
Other large land mammals	2	67%
Furbearers and small land mammals	8	50%
Bowhead whale	0	0%
Bearded seal	0	0%
Ringed seal	1	4%
Other marine mammals	1	7%
Geese	30	86%
Ducks	13	46%
Upland birds	13	93%
Eggs	18	78%
Arctic cisco	21	64%
Broad whitefish	19	56%
Other non-salmon fish	19	58%
Salmon	13	57%
Marine invertebrates	0	0%
Vegetation	9	29%
All Resources	**40**	**98%**

Source: SRB&A (2024).

When compared to previously documented subsistence use areas (e.g., for the 1995–2006 and lifetime time periods), primary harvesting areas have remained similar over time. Key changes are a reduction in the use of the Prudhoe Bay complex, a smaller extent of overland travel, and an increase in road use. In addition, a decline in overlapping use for caribou hunting is apparent within the CRD, although more recent years have seen an increase in use as residents access the area via the road system (SRB&A 2019). Nuiqsut subsistence use areas have changed over time as a result of past and present actions, including the expansion of oil and gas infrastructure and associated activities, harvest regulations, and changing Arctic conditions. Impacts of the existing oil and gas development on subsistence use areas include physical obstructions and security restrictions, which affect subsistence user access, harvester avoidance of oil and gas development areas, and changes in harvesting patterns as a result of an increase in road-based hunting. Changing Arctic conditions have also affected subsistence use areas for Nuiqsut. Changes in the

timing of freeze-up and breakup; reduced snow, ice, and water levels; and coastal and river erosion all affect hunters' ability to safely access traditional harvesting areas at traditional times. A more detailed description of how past and present actions have contributed to existing conditions is provided in the Willow SEIS (BLM 2023:307–308) and incorporated here by reference.

3.8.2.1.2 HARVEST AMOUNTS

Data on overall harvest and participation levels for the community of Nuiqsut are presented under Section 3.8.1.1.1 (Harvest Amounts). In addition to community-level harvest data, locational caribou harvest data are available for the direct effects analysis area (Table 3.8-5). Between 2013 and 2023, the direct effects analysis area accounted for between 3% and 15% of the total caribou harvest (9% on average across all study years). This includes harvests along the Niġliq Channel, portions of the East Channel, and the lower CRD, in addition to overland areas east of the Spur Road and surrounding the Niġliq Channel bridge.

Table 3.8-5. Nuiqsut Caribou Harvest Amounts, 2013 through 2023, Direct Effects Analysis Area

Study Year	Number of Reported Caribou Harvests in Direct Effects Analysis Area	Percentage of Reported Caribou Harvests in Direct Effects Analysis Area
2013	41	15%
2014	16	3%
2015	41	10%
2016	23	7%
2017	32	10%
2018	26	10%
2019	7	4%
2020	31	8%
2021	32	11%
2022	28	13%
2023	24	10%
All Years (2008–2023)	**501**	**9%**

Source: SRB&A (2025a).

3.8.2.1.3 TIMING

A detailed description of the overall seasonal round of Nuiqsut subsistence activities is provided in the Willow SEIS (BLM 2023:303–306) and is incorporated by reference and summarized here. In general, Nuiqsut subsistence activities occur year-round, but with periods of higher and lower activity. After a period of relatively low subsistence activity in the winter months, many community residents engage in migratory bird hunting in the spring months (April through June). The summer months are spent fishing (primarily for whitefish and grayling); hunting for seals and other marine mammals in the ocean; and hunting for caribou along waterways, in overland areas, and along the local road system. Residents also harvest vegetation (plants and berries) in the summer months. Later in the summer and in early fall, residents hunt for moose upstream from the community, and whaling crews prepare to travel to Cross Island for the annual bowhead whale hunt. Residents continue to hunt caribou and fish during these months, and fishing

increases again in the fall months of October and November when Arctic cisco migrate into the CRD. In the winter months, hunting and trapping of furbearers and small land mammals are primary activities among certain residents, and hunting of caribou and ice fishing also continues through the winter months.

Within the direct effects analysis area, subsistence activities peak in the spring and summer months of May through August, with lower but steady levels of activity from September through January (Table 3.8-6). Caribou hunting in the analysis area occurs year-round but peaks from June through August, whereas waterfowl hunting (geese and ducks) occurs primarily from April through June with a peak in May, and egg harvesting peaks in May and June. In waterways of the direct effects analysis area, fishing primarily occurs from summer (July) into early winter (December).

Table 3.8-6. Number of Subsistence Use Areas by Month of Use, 2010 through 2022, Direct Effects Analysis Area

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Caribou	12	6	16	11	8	52	82	92	58	18	12	5
Moose								13	13			
Other large land mammals				3	1				2	1	1	
Furbearers and small land mammals	6	6	8	4	2	3	1	1			1	2
Ringed seal						1	1	1	1			
Other marine mammals								1				
Geese			3	35	69	32		1	1			
Ducks					10	17	6	1	2			
Upland birds	3	3	6	8	19	7	5	4	3	4	3	3
Eggs				1	36	37		2				
Arctic cisco	31	1	1			3			5	53	51	44
Broad whitefish	26					7	40	23	3	31	29	26
Other non-salmon fish	25	1				2	36	18	9	33	34	31
Salmon						5	27	26	13			
Marine invertebrates												
Vegetation	1	1	1	1	1	2	6	11	7	1	1	1
All Resources	**104**	**18**	**35**	**63**	**146**	**168**	**204**	**194**	**117**	**141**	**132**	**112**

Source: SRB&A (2024).

3.8.2.2 Environmental Consequences

The Project could affect subsistence resource availability if Project infrastructure and activities alter the distribution, migration, or behavior of subsistence resources such that they become less available to subsistence harvesters. The Project could affect subsistence resource availability from the presence of infrastructure such as gravel pads and roads, pipelines, culverts, and ice roads and pads and through Project activities such as ground and air traffic, construction activity and noise, pile driving and driving of sheet piles, drilling, storage and use of chemicals, potential spills, Project lighting, and fugitive dust. Impacts to resource availability are informed by the conclusions of the Section 3.9 (Terrestrial Mammals); BIO-1 through BIO-13 in EIS Appendix

D; Indigenous knowledge regarding impacts of development on resource migration, distribution, and behavior; and data on subsistence use areas, harvest amounts, harvest timing, and harvest success. Impacts of development activity and infrastructure on subsistence resource availability are described in detail in the Willow SEIS (BLM 2023:327–333) and are incorporated by reference and summarized here.

3.8.2.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Nuiqsut would continue to experience impacts to subsistence resource availability resulting from existing oil and gas development, ongoing exploration, and other activities in the region which would affect resource migration, distribution, and behavior. Existing and RFF trends, such as a changing Arctic climate and increased development in the region, would likely continue.

3.8.2.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Under Alternative B, construction and operation activities and infrastructure may affect the availability of subsistence resources through displacement, deflection, or skittish behavioral responses. Even small, localized changes in resource distribution and behavior may affect subsistence harvester success, even if the changes are considered minimal from a biological perspective. Impacts would be similar to those described in the Willow SEIS (BLM 2023:327–333), but to a lesser extent and magnitude due to the smaller footprint of the CD8 Project, including less gravel infrastructure, fewer bridges, no stream crossings, and less ground and air traffic. As shown in Table 3.8-7, the primary resources harvested within 2.5 miles of Alternative B are caribou, upland birds, geese, eggs, and fish. During discussions with Nuiqsut active harvesters, residents have reported concerns about the potential impact of the Project on the availability of caribou, birds, eggs, fish, and vegetation (SRB&A 2025b). A discussion of potential impacts to resource availability for individual resources is provided below.

Table 3.8-7. Percentage of Subsistence Harvesters Reporting Use Areas within the Direct Effects Analysis Area

Resource	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Caribou (n = 40)	95%	95%	95%
Moose (n = 22)	50%	50%	50%
Other large land mammals (n = 3)	67%	67%	67%
Furbearers and small land mammals (n = 16)	44%	25%	44%
Bowhead whale (n = 17)	0%	0%	0%
Bearded seal (n = 31)	0%	0%	0%
Ringed seal (n = 24)	4%	4%	4%
Other marine mammals (n = 15)	7%	0%	7%
Geese (n = 35)	86%	77%	86%
Ducks (n = 28)	43%	43%	43%
Upland birds (n = 14)	93%	50%	79%
Eggs (n = 23)	70%	61%	78%

Resource	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Arctic cisco (n = 33)	64%	61%	64%
Broad whitefish (n = 34)	56%	53%	56%
Other non-salmon fish (n = 33)	58%	52%	52%
Salmon (n = 23)	57%	57%	57%
Marine invertebrates (n = 1)	0%	0%	0%
Vegetation (n = 31)	29%	23%	23%
All resources (n = 41)	98%	98%	98%

Source: SRB&A (2024).

Although this discussion focuses on impacts to the resource availability of individual resources, changes in resource availability could have other interconnected subsistence and sociocultural impacts. These are discussed in detail in the Willow SEIS (BLM 2023:337-339) and include the following:

- Decreased sharing of subsistence resources, which could affect social and kinship ties (see Section 3.7.1.1.3 [Social Organization and Cultural Ties to the Land] and Section 3.6.1.2.2 [Alternative B])
- Reduced opportunities to engage in subsistence activities and pass knowledge about subsistence and cultural values on to future generations (see Section 3.7.1.1.3)
- Effects on cultural identity, social organization, and social cohesion (see Section 3.7.1.1.3 and Section 3.6.1.2.2)
- Increased costs and time associated with harvesting subsistence resources (see Section 3.7.1.1.3, Section 3.6.1.2.2, and 3.4.1.2.2 [Alternative B])

Subsistence harvesters rely on subsistence resources being present in traditional areas at expected times. If the Project results in changes in the timing or location of resource migrations or movements, or if resource movements and distribution become less predictable, then residents may experience reduced harvest success, or they may travel farther, at greater cost, or at times when conditions pose greater risks to safety (e.g., thin ice).

Large Land Mammals

As shown in Table 3.8-7, from 2010 to 2022, 95% of Nuiqsut caribou harvester respondents reported using the Alternative B direct effects analysis area. Though 50% of moose harvesters and 67% of other large land mammal (e.g., bear) harvesters also reported using the direct effects analysis area for subsistence, these uses are either limited (e.g., other large land mammal hunting was reported by only three respondents) or peripheral (e.g., moose hunting primarily occurs farther upstream from the community, but residents begin "looking" as soon as they leave the community [see Figures 3.8-3 and 3.8-22]). Thus, this section focuses on potential impacts to caribou. According to data from the Nuiqsut Subsistence Caribou Monitoring Project, between 2013 and 2023, the Alternative B direct effects analysis area accounted for between 3% and 14% of total reported harvests during individual study years (SRB&A 2025a) (Table 3.8-8). In addition to harvesting caribou within the direct effects analysis area, caribou hunters also hunt directly west of the direct effects analysis area along the road system and in overland areas west

of the community, and east of the direct effects analysis area along the East Channel. If Project activities or infrastructure affect caribou movement, behavior, or distribution, then subsistence users in these areas could experience a decline in harvesting success.

Table 3.8-8. Percentage of Nuiqsut Caribou Harvests by Alternative

Year	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative	Total Numbers Harvested
2013	14%	2%	15%	272
2014	3%	2%	3%	552
2015	9%	8%	10%	398
2016	4%	3%	7%	309
2017	8%	8%	10%	310
2018	8%	8%	10%	256
2019	3%	3%	4%	165
2020	7%	7%	8%	380
2021	10%	10%	11%	299
2022	13%	12%	13%	209
2023	10%	10%	10%	230
All Study Years (2008–2023)	**8%**	**7%**	**9%**	**5,380**

Source: SRB&A (2025a).
Notes: Based on reported harvests by a sample of active harvester respondents.

Within the Alternative B direct effects analysis area, residents hunt caribou along the road system (e.g., along the Niġliq Bridge and the road system connecting CD1 through CD4) and along the river (Niġliq and East Channels) system by boat. Some overland hunting also occurs from the roads or by snow machine in the winter months. Under Alternative B, the drillsite and road just north of the drillsite are located in areas of high overlapping use for caribou, due to their proximity to the Niġliq and East Channels (Figure 3.8-20). Areas of moderate to high harvest density within the Alternative B direct effects analysis area occur near the community of Nuiqsut, along the Niġliq Channel downstream from CD4, near Putu, and on the East Channel near the ASRC Mine Site (Figure 3.8-21).

Impacts of development activity and infrastructure on caribou resource availability are described in detail in the Willow SEIS (BLM 2023:327–330) and are incorporated by reference and summarized here. Construction activities, including use of machinery, pile driving, gravel placement, pipeline installation, and ice road traffic, may cause skittish behavior in caribou, resulting in caribou avoiding and deflecting around ice roads and construction areas. Most construction would occur in the winter months when caribou hunting levels are on the low end (Section 3.8.2.1.3 [Timing]) and when the direct effects analysis area sees some limited use by the Teshekpuk Caribou Herd (TCH) (Section 3.9.1.1 [Affected Environment]). However, if residents are hunting along the road system or by snow machine during these times, they may experience temporary declines in hunting success. Alternative B would increase ground traffic by up to 224% during peak construction (winter of Year 0/1) compared to existing conditions (see Table 3.1-5).

During drilling and operation, primary sources of impacts on caribou availability would include infrastructure such as gravel roads and pipelines, and activities such as human presence, air and ground traffic, drilling noise, and visual disturbances (e.g., Project lighting). Harvesters note that air traffic causes caribou to act skittish or to run away, resulting in reduced harvest success for hunters on the ground. Scientific studies have also documented caribou reacting (fleeing, acting restless or skittish) to low-flying aircraft, particularly helicopters (BLM 2023:328). Air traffic would be highest during the first 2 years of the Project, with approximately 100 helicopter trips per summer and over 50 fixed-wing aircraft trips in the winter and spring (see Table 2.5-3). Helicopter and fixed-wing aircraft traffic would increase by up to 23% and 6%, respectively, during Year 2 compared to existing conditions (see Table 3.1-5).

Helicopter traffic has been reported by Nuiqsut residents as a primary impact on caribou hunting, although in recent years, air traffic impact reports have declined as a result of improved communication and an overall decline in the need for air traffic due to roads (SRB&A 2025a). CPAI would continue to ensure that current communication protocols related to air and vessel traffic are adequate to address the community's concerns about impacts to subsistence (see Mitigation Measure 59 EIS Appendix E). During construction, Nuiqsut harvesters would likely experience an increase in air traffic–related impacts during their summer caribou hunting activities, which generally peak in July and August. Traffic associated with Project construction and operation would be relatively limited in the fall months (Table 3.1-5), when residents often target caribou to the west of the community during their fall migration.

Nuiqsut respondents have expressed concerns about the impacts of the Project on caribou migration routes and hunting areas (SRB&A 2025b). Residents report that caribou migration routes from the east have already been affected by existing development projects, and express concerns that the CD8 Project would further contribute to these changes by introducing roads and pipelines into previously open areas in the CRD (SRB&A 2025b). Alternative B would introduce new infrastructure, including gravel roads and pads, into much of the lower CRD, and Nuiqsut residents have expressed concern that these roads may deflect caribou migrating from the east through the CRD, thus reducing their availability to local hunters (SRB&A 2025b). Roads and associated road traffic have the potential to cause deflections or delays in caribou movement. Although effects on caribou movement are most likely to occur when linear structures are placed parallel to a herd's primary movement, perpendicular infrastructure may also cause delayed crossing. The orientation of the proposed gravel road and pipeline under Alternative B may limit deflections of caribou as they move from insect-relief areas in the north to inland foraging areas in the south. However, caribou moving from east to west would encounter infrastructure during these migrations and may experience deflection. CPAI implements policies to avoid disturbing caribou, such as prohibiting chasing of wildlife with vehicles and maintaining space between roads and pipelines (see mitigation measures 39 and 50 in EIS Appendix E).

The road and pipeline under Alternative B would extend linear infrastructure from CD4 to the lower portion of the CRD, just east of Nuiqsut and north of the Putu and the Putu Channel, thus bisecting the entire lower half of the CRD. Alternative B has the longest gravel road and the second-longest length of pipeline on new VSMs. The CD8 Project is within an area of high herd density for the Central Arctic Caribou Herd (CAH) and medium herd density for the TCH (see Section 3.9 [Terrestrial Mammals]). CAH caribou cross into the CRD from the east in some

years, primarily during the mosquito and oestrid fly seasons. TCH caribou also move into the area from the west in some years, although less frequently than the CAH (see Section 3.9.1.1).

The increased presence of infrastructure and activity may result in deflections or delays in CAH movement toward the community, resulting in caribou crossing farther south or farther north of the community, or not crossing at all. In addition, the lower portion of the road under Alternative B follows the East Channel of the Colville River closely. Residents have reported that caribou commonly congregate and cross along areas of the East Channel where infrastructure is proposed (SRB&A 2025b). The presence of the road and associated traffic and noise along the river channel could affect caribou behavior in that area, affecting residents hunting along the East Channel by boat. In recent years, some residents have already reported impacts on their caribou hunting along the East Channel due to presence of oil and gas development east of the channel (e.g., Pikka Project) (SRB&A 2025c). The likelihood of deflection depends on a number of factors including season, sex, associated traffic levels, and the herd's habituation to infrastructure (see the Increases in Vehicle and Air Traffic section in Section 3.9.1.2.2). Traffic levels along roads is a major indicator of potential deflection. Ground traffic levels would be second highest under Alternative B and would be highest in the winter, when hunting levels are lower but some TCH caribou may be in the area. After the construction period, ground traffic levels would be the same across all alternatives.

The road system west of Nuiqsut has become a highly used hunting corridor, and roads northeast of Nuiqsut could also see increasing use as the road system expands. Although the road system provides easy access to traditional harvesting areas, it also increases competition between hunters and increases hunting activity, which in turn can contribute to deflection of resources away from community harvesting areas. This could result in reduced resource availability for community residents who choose not to use Project roads for subsistence activities.

Furbearers and Small Land Mammals

As shown in Table 3.8-7, for the 2010–2022 time period, 44% of Nuiqsut furbearer and small land mammal harvester respondents reported using the area within 2.5 miles of the action alternatives. Though reported use areas overlap only with the lower portion of the Project (Figure 3.8-24), previously documented use areas (e.g., 1995–2006) show use of the entire CRD for furbearer and small land mammal hunting although at lower levels than other areas (BLM 2023:Figures 3.16.13 and 3.16.14). During recent discussions in the community, one Nuiqsut resident characterized the proposed development area as a major denning area for foxes (SRB&A 2025b). In recent years, some individuals have reported decreased availability of furbearers near development areas as a result of furbearers being sensitive to noise and human activity and exhibiting avoidance behaviors in these areas (BLM 2023:330).

Furbearers such as wolf and wolverine would likely avoid construction areas and areas with high levels of human activity and noise. The majority of construction would occur in the winter, when furbearer and small land mammal hunting activities are at their highest. Thus, furbearer hunters may experience decreased hunting success in areas near the Project, particularly during construction.

Marine Mammals

As shown in Table 3.8-7, limited marine mammal hunting occurs within the Alternative B direct effects analysis area, with 4% of harvesters reporting hunting of ringed seal (*Phoca hispida*) and 7% reporting hunting of other marine mammals, e.g., polar bear (*Ursus maritimus*). Although most marine mammal hunting occurs in Harrison Bay and near Cross Island, a small number of harvesters report hunting ringed seal along the Niġliq Channel and polar bear near the community of Nuiqsut. It is unlikely that development infrastructure and activity would affect marine mammal resource availability in these areas. The Project would require one barge to deliver bulk materials to Oliktok Point. Barge traffic may cause disturbances to seals and other marine mammals when residents are hunting in Harrison Bay; however, these disturbances are expected to be temporary and localized and should not affect overall harvester success.

Migratory Birds

As shown in Table 3.8-7, between 2010 and 2022, 86% of Nuiqsut geese harvester respondents reported using the Alternative B direct effects analysis area, in addition to 43% of duck harvesters. In addition, 70% of egg harvesters reported using the Alternative B direct effects analysis area. As shown in Figure 3.8-27, the Alternative B drillsite and roads overlap with areas of moderate to high overlapping use for geese. Duck hunting activities are more focused along river channels, particularly an area just north of the ASRC Mine Site along the East Channel (Figure 3.8-28). In recent years, residents have reported heavy use of the road system to gather eggs (Figure 3.8-30). Within the Alternative B direct effects analysis area, egg gathering areas are focused along the Niġliq Channel and the road system east of the Niġliq Channel between CD1 and CD4. During recent discussions with Nuiqsut residents, harvesters expressed concerns about the impact of the Project on their migratory bird and egg harvesting activities as a result of increased human activity and contamination (SRB&A 2025b).

Removal of migratory bird habitat through gravel placement, in addition to fugitive dust, would result in displacement of migratory birds in and around those areas, thus reducing the availability of birds and eggs to harvesters. Noise associated with construction may cause migratory birds to avoid construction areas or to act skittish; if these activities extend into the early spring (e.g., April) when residents typically begin hunting geese (Section 3.8.2.1.3 [Timing]), there could be impacts to migratory bird availability, particularly during the 2 years of construction. During operation, noise from ground and air traffic as well as human presence could cause temporary disturbances and displacement of migratory birds. Impacts to migratory bird hunting have been reported by harvesters along the existing road system in recent years as a result of noise and human activity (SRB&A 2025a).

Upland Birds

As shown in Table 3.8-7, between 2010 and 2022, 93% of Nuiqsut upland bird (rock ptarmigan [*Lagopus muta*]) harvester respondents reported using the Alternative B direct effects analysis area. Alternative B infrastructure occurs in areas of moderate to high overlap for ptarmigan hunting, particularly in the area directly east of Nuiqsut near Putu, where the Alternative B drillsite is located, and along the road system east of the Niġliq Channel (Figure 3.8-29). Ptarmigan hunters may experience reduced harvest success in these areas particularly during construction, as some hunting occurs in the winter and spring months.

Fish

As shown in Table 3.8-7, between 2010 and 2022, over 50% of Arctic cisco, broad whitefish, other non-salmon fish, and salmon harvesters reported using the Alternative B direct effects analysis area to harvest these resources. A majority of fishing within the Alternative B direct effects analysis area (Figures 3.8-31 through 3.8-34) occurs in the Niġliq Channel, particularly the portion of the Niġliq Channel between the Niġliq River bridge and the mouth of the Putu Channel. Some fishing also occurs in the East Channel downstream from the ASRC Mine Site.

Noise and disturbance related to in-water work (e.g., culvert installation) could temporarily displace fish in the lakes where construction activities may occur (see BIO-6 in EIS Appendix D); however, fish are harvested at a substantial distance from these activities. Installation of bridge piles at Lake L9324 would occur in the winter when there would be few to no fish present (see BIO-6 in EIS Appendix D).

Freshwater withdrawal from nearby lakes could affect fish availability in those lakes if the lake did not recharge in the spring. Effects on individual fish would be limited to years of extreme drought and would be temporary (see BIO-5 in EIS Appendix D). In addition, dust deposition from truck traffic could alter lake habitat for sensitive fish species. Because subsistence fishing has not been reported in the lakes of the direct effects analysis area, impacts from water withdrawal would be unlikely.

Project use and storage of hazardous materials throughout the life of the Project could reduce the use of fish resources if fish or the waters they inhabit are perceived or confirmed to be contaminated, causing some individuals to avoid harvesting fish resources near Project infrastructure. This may be more likely upstream from the community toward the Alternative B drillsite near Putu.

Vegetation

As shown in Table 3.8-7, between 2010 and 2022, 29% of Nuiqsut vegetation harvester respondents reported using the Alternative B direct effects analysis area (Figure 3.8-35). Within the direct effects analysis area, vegetation harvesting occurs along the Niġliq Channel, including moderate overlapping use areas near and across from the Alternative B drillsite and along the East Channel, including areas near the ASRC Mine Site. Gravel placement would directly remove vegetation harvesting areas for Nuiqsut residents. In addition, a larger area surrounding the road may be considered no longer suitable for harvesting due to concerns about contamination from fugitive dust, spills, and other emissions.

Spills and Inadvertent Releases

In the unlikely event of a large oil spill or blowout, the availability of fish would likely be reduced, particularly Arctic cisco and broad whitefish, in the Niġliq and East Channels due to changes in local distribution resulting from injury, mortality, or oiling of fish habitat (see BIO-7 in EIS Appendix D), as well as harvester avoidance related to contamination concerns. Both Arctic cisco and broad whitefish are among the top subsistence species harvested in Nuiqsut and, on average, have accounted for one-quarter of the total subsistence harvest during available study years (see Table 3.8-2). A large oil spill or blowout could also affect the availability of birds and eggs within a larger area of the CRD due to contamination concerns. Nearly 50% of Nuiqsut

households reported avoiding subsistence foods they believed to be contaminated during a 2016 study (SRB&A 2017). Contamination concerns are generally more widespread for marine or riverine resources (e.g., broad whitefish) due to the greater potential for contaminants to spread outside of the immediate Project area; however, harvesters may also avoid harvesting caribou and waterfowl that feed near a spill, and will likely avoid harvesting berries near a spill. A large oil spill, although unlikely, could have substantial impacts on Nuiqsut subsistence uses for an extended period, resulting in decreased subsistence harvests and associated sociocultural impacts. As discussed in Section 3.8.1.2.2 (Alternative B), in the event of a reservoir blowout, Alternative B would be most likely to affect subsistence because oil fallout could reach the Niġliq Channel upstream from key subsistence harvesting grounds (Section 4.4.1.2 [Reservoir Blowout]). The potential use of in-situ burning clean up methods would have similar effects on subsistence resource availability, as previously described in Section 3.8.1.2.2 (Alternative B), but in certain circumstances may also offer advantages over mechanical cleanup methods that would minimize potential oil-related effects on aquatic species and habitats.

Smaller to medium-sized spills resulting from pipeline ruptures (particularly if they go undetected for a period of time, or associated with development infrastructure (e.g., wellheads) or non-infrastructure activities (e.g., equipment maintenance, vehicle refueling and maintenance) could cause general avoidance of certain species by subsistence harvesters thus reducing their availability the community. This would be most likely to occur within the direct vicinity of the infrastructure or activity but could also affect uses of species in adjacent waterways. As described in Section 4.4.3, the expected rate of occurrence of spills and leaks would range from very low (pipeline ruptures, wellhead leaks) to very high (small to medium spills from equipment and vehicle maintenance, repair, and refueling).

Summary

Project construction and operation would affect the resource availability of resources such as caribou, furbearers, geese, eggs, and vegetation for Nuiqsut harvesters, thus reducing harvest success near Project infrastructure and activity. Impacts would be greatest during construction due to higher levels of noise and air traffic; however, impacts related to infrastructure, ground traffic, and human activity would continue for the life of the Project. Table 3.8-3 summarizes the impacts to subsistence resource availability.

3.8.2.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of impacts as Alternative B, but to a lesser extent because Alternative C infrastructure, particularly the CD8 drillsite and the road north of the drillsite, are located farther from key subsistence harvesting areas. Compared to Alternative B, the Alternative C direct effects analysis area is used by a smaller percentage of furbearer, geese, upland bird, egg, Arctic cisco, broad whitefish, other-non-salmon fish, and vegetation harvesters. The drillsite and permanent roads under Alternative C would be farther removed from key harvesting areas along the Niġliq and East Channels thus reducing the likelihood of disturbances to subsistence harvesters traveling along these river channels to fish and hunt caribou and migratory birds. The roads and drillsite would also be farther removed from key migratory bird, upland bird, and vegetation harvesting areas near Putu. Alternative C would have similar levels of air traffic to Alternative B, but less ground traffic (ground traffic would increase by 202% compared to 224% under Alternative B [see Table 3.1-5]), which would reduce the likelihood of

disturbances and deflections along the road. Finally, the road and pipeline under Alternative C would not extend as far south, thus reducing the likelihood of caribou delays and deflections when migrating toward community harvesting areas. Alternative C would have the lowest impacts of all action alternatives (lower than Alternative B and D) due to the smaller footprint (46.9 acres compared to 67.3 acres for Alternative B), location of the gravel road and drillsite (e.g., farther from key harvesting areas), and lower levels of ground traffic.

In the event of a spill, impacts to subsistence resource availability would be similar to Alternative B but to a lesser extent since the drillsite and road are farther from key harvesting areas on the Niġliq and East Channels.

3.8.2.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of impacts as Alternative B, but to a lesser extent because Alternative D infrastructure, particularly the CD8 drillsite and the road north of the drillsite, are located farther from key subsistence harvesting areas. Compared to Alternative B, the Alternative D direct effects analysis area is used by a smaller percentage of upland bird, other-non-salmon fish, and vegetation harvesters; Alternative D would affect a slightly higher percentage of egg harvesters. Alternative D would have a slightly higher amount of ground traffic compared to Alternative B (an increase of 234% compared to 224% under Alternative B [see Table 3.1-5]), which could increase the potential for disturbances along the road system. Under Alternative D, the area of the CRD directly east and northeast from Nuiqsut would remain free of permanent infrastructure, thus reducing the likelihood of caribou being deflected away from community harvesting areas during westward migrations.

In the event of a spill, impacts to subsistence resource availability would be similar to Alternative B but to a lesser extent since the drillsite and road are farther from key harvesting areas on the Niġliq and East Channels.

3.8.2.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions and trends combined with the CD8 Project would impact subsistence resource availability by altering resource distribution, migration, and behavior. RFF actions that could affect subsistence resource availability include infrastructure, traffic, human activity, and contamination related to existing and future oil and gas development projects, activities associated with scientific research and recreation (see Table 3.1-3; see Figure 3.1-2), and changing Arctic conditions. A detailed discussion of RFF actions and trends combined with Project impacts is provided in the Willow SEIS (BLM 2023:400–424), which is incorporated by reference and summarized here. Though some RFF actions have changed since the Willow EIS, the types and magnitude of RFF actions are similar as are the types of impacts that would result from them.

The Project, in addition to other oil and gas exploration and development, would contribute to the cumulative effects of development on subsistence resource availability as it would result in a net increase in industrial infrastructure and activity, including seismic activity, construction noise, mining, air and ground traffic, and human activity. In addition to the additive effects of increasing oil and gas infrastructure and activity in the region, increased activity associated with

scientific research, recreation, and sport hunting and fishing activities would also contribute to subsistence impacts by increasing the frequency of noise and air traffic disturbances.

Human activity, ground and air traffic, noise, and infrastructure would affect the availability of subsistence resources by disturbing or displacing subsistence resources or making them more difficult to harvest. In particular, the Project in combination with the RFF actions could further affect the availability of caribou to Nuiqsut subsistence users. In recent years, biological studies have shown deflection of caribou along the GMT1 and GMT2 access roads (Welch, Prichard, and Macander 2025), avoidance of areas near gravel and ice roads during certain time periods, and strong reactions (i.e., running) in response to aircraft. In addition, individual Nuiqsut hunters have reported decreased success rates for geese, caribou, and furbearers due to development-related noise and traffic (SRB&A 2025a). An increase in gravel road infrastructure and traffic throughout the community's hunting area would likely increase disturbances during hunting activities and result in decreased harvest success in some circumstances. Access to the road system helps to mitigate the impacts of roads on caribou movement into the community's traditional harvesting areas. However, if the road system continues to expand farther from the community, effects to caribou movement could require residents to travel farther than time and funds allow.

Nuiqsut residents have long expressed concern about the impacts of sport hunters along the Dalton Highway on the availability of CAH and TCH caribou within Nuiqsut hunting grounds. Competition with non-local hunters may contribute to impacts on local subsistence users if there is a decrease in the abundance of caribou or if caribou are deflected from traditional hunting grounds. The Project, located directly east of the community, could contribute to perceptions that CAH migrations are being affected by activities to the east of the community. CPAI prohibits Project employees from hunting and trapping activities while on active work status, minimizing the impacts of the Project on competition (see Mitigation Measure 48 in EIS Appendix E).

In addition to effects on resource migration and distribution, continued expansion of oil and gas development on the North Slope would exacerbate existing concerns about contamination among subsistence harvesters, and avoidance of certain subsistence foods would likely grow.

Changing Arctic conditions will continue to affect subsistence resource availability for Nuiqsut harvesters due to warmer temperatures, changes in the timing of freeze-up and breakup, changing snow ice and conditions, lower water levels in rivers and lakes, and increased erosion and sedimentation (Arctic Monitoring and Assessment Programme 2017; Richter-Menge et al. 2019). These changes could affect the timing of resource migrations into Nuiqsut harvesting areas, the distribution of feeding and other habitat areas, and the health of the resources. Changes in the migration, distribution, and behavior of subsistence resources due to changing Arctic conditions, in combination with the effects of the CD8 Project, could result in reduced harvesting success for Nuiqsut harvesters.

If the Project, in combination with other RFF actions and trends, reduces resource availability for Nuiqsut harvesters, then residents may have to spend greater amounts of time, effort, and money to locate and procure these resources. Impacts to the availability of resources such as caribou, migratory birds, and furbearers resulting from development infrastructure and activities would be compounded by ongoing impacts from changing Arctic conditions, including shifts in the timing and location of resource migrations, changes in the availability of suitable habitat and resulting changes in resource distribution, and increasing instances of extreme weather events (Brinkman

2016; Mason and Craver 2023). Although some hunters respond to changes in resource availability by taking more trips and increasing costs to harvest what they need, others may choose to take fewer trips because of lack of funds or reduced success.

Reduced overall harvests of subsistence resources could result in reduced sharing of subsistence foods, thus affecting social and kinship ties, which are key to maintaining social cohesion within the community of Nuiqsut and across the North Slope. Reduced harvests of subsistence foods would reduce access to nutritional foods, potentially increasing food insecurity, and would also decrease opportunities to engage in subsistence activities such as harvesting and processing of subsistence foods. Reduced engagement in subsistence activities could increase social problems (BLM 2023:337; SRB&A 2009) and affect cultural and community identity. See also Section 3.7.1.1.3 (Social Organization and Cultural Ties to the Land) and Section 3.6.1.2.2 (Alternative B).

3.8.2.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

There would be no irreversible and irretrievable commitments of Federal resources with regard to subsistence if a permit were issued.

3.8.3 How would the Project impact harvester access to subsistence resources?

Changes in subsistence harvester access could affect subsistence activities within and outside the Project area, thus the analysis area for subsistence harvester access is all Nuiqsut subsistence use areas (Figure 3.8-1). The direct effects analysis area is the area within 2.5 miles of all action alternatives. The temporal scale of the analysis is the 30-year Project life in addition to ongoing effects on access related to long-term changes in harvesting patterns as a result of roads.

3.8.3.1 Affected Environment

The following sections provide a summary of subsistence data for Nuiqsut relevant to subsistence harvester access. Data on subsistence use areas, timing, and travel methods are relevant to describing and analyzing impacts to harvester access.

3.8.3.1.1 SUBSISTENCE USE AREAS

Nuiqsut subsistence use areas are described in Section 3.8.2.1.1 (Subsistence Use Areas). Nuiqsut subsistence use areas extend over a large area with high overlapping use along the Colville River system, Fish Creek, overland areas west of the community and surrounding the road system, and in offshores areas of Harrison Bay and near Cross Island (Figure 3.8-1). Uses of the direct effects analysis area include hunting of caribou, other large land mammals, birds (geese, upland birds), and furbearers and small land mammals; fishing for salmon and non-salmon fish; and harvesting of vegetation. The direct effects analysis area includes Putu, a historic site and traditional harvesting area located along the Putu Channel (see Section 3.8.2.1.1). Key uses of the Putu area are hunting of migratory birds and caribou.

3.8.3.1.2 TIMING AND TRAVEL METHODS

Data on the timing of Nuiqsut subsistence activities are described in Section 3.8.2.1.3 (Timing). These data show that Nuiqsut harvesters report using the direct effects analysis area year-round, but with the highest levels of use in the spring and summer months of May through August.

Nuiqsut subsistence harvesters use a variety of travel methods to access subsistence harvesting areas within the direct effects analysis area (Table 3.8-9). The primary travel methods are truck, boat, snow machine, and ATV. Boats are used to access the waterways (e.g., Niġliq and East Channels) adjacent to the infrastructure area. Trucks and snow machines are also used to access fishing sites along the Niġliq and East Channels during fall fishery and winter ice fishing. Harvesters use trucks and ATVs to access roads within the direct effects analysis area. In recent years, use of the road system to the east of Niġliq Channel (i.e., roads connecting CD1, CD2, CD3, and CD4) for caribou hunting has increased, with up to 30% of Nuiqsut households reporting use of roads in this area (SRB&A 2025a). Overland use of the direct effects analysis area occurs by snow machine and ATV and includes caribou hunting, geese/duck hunting, and egg and vegetation gathering. In some cases, residents reported traveling within the direct effects analysis area by foot for activities such as geese hunting and egg and vegetation gathering.

Table 3.8-9. Number of Subsistence Use Areas by Month of Use, 2010 through 2022, Direct Effects Analysis Area

Use Area	Boat	Snow Machine	ATV	Truck	Foot
Caribou	68	16	25	35	
Moose	15				
Other large land mammals	2	3			
Furbearers and small land mammals	1	9			2
Bowhead whale					
Bearded seal					
Ringed seal	1				
Other marine mammals			1		
Geese		37	28	39	6
Ducks	10	8			
Upland birds		6	4	16	7
Eggs	1	3	18	35	6
Arctic cisco		46	37	31	2
Broad whitefish	38	31	26	26	2
Other non-salmon fish	37	34	33	32	2
Salmon	35			3	1
Marine invertebrates					
Vegetation	5		1	5	5
All Resources	**213**	**193**	**173**	**222**	**33**

Source: SRB&A (2024).

The Project is located just north of Putu, which is a historical site, traditional harvesting area, and the name of the channel (Putu Channel) that connects the Niġliq Channel to the main East

Channel of the Colville River. The Putu Channel has traditionally been a key waterway for accessing subsistence use areas for the community of Nuiqsut. In recent years, residents more frequently use the Napasulu Channel to access the East Channel of the Colville River, as a result of the Putu Channel often being too shallow to traverse by boat (SRB&A 2024). However, despite the shallow conditions, residents continue to use the Putu Channel when river conditions allow.

Changing Arctic conditions are affecting subsistence harvester access through changes in the predictability of weather conditions, the timing of freeze-up and breakup, snow conditions, ice conditions, water depth in lakes and rivers, and the frequency of storms. Changes in these conditions affect harvester access by reducing residents' ability to travel safely to and from subsistence harvesting areas at the times when resources are available.

3.8.3.2 Environmental Consequences

The Project could affect subsistence harvester access through physical obstructions, security restrictions, and harvester avoidance. The Project could affect subsistence harvester access through 1) the presence of infrastructure such as gravel and ice roads and pads, tundra access ramps, bridges, pipelines; 2) security/access restrictions; and 3) Project activities such as ground, barge, and air traffic; construction activity and noise; pile driving and driving of sheet piles; drilling; and storage and use of chemicals. The analysis of impacts to harvester access is informed by Indigenous knowledge regarding impacts of development on user access; and data on subsistence use areas, harvest timing, and travel methods. Impacts of development activity and infrastructure on subsistence harvester access are described in detail in the Willow SEIS (BLM 2023:327–333) and are incorporated by reference and summarized here.

3.8.3.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Nuiqsut would continue to experience impacts to subsistence harvester access resulting from existing oil and gas development, ongoing exploration, and other activities in the region (see Section 3.1.1 [Past and Present Actions]). Existing activities would continue to impact harvester access as a result of associated infrastructure, traffic, dust, security restrictions, and other activities that contribute to the environmental baseline. Existing and RFF trends, such as changing Arctic conditions and increased development around NPR-A, would likely continue.

3.8.3.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Alternative B infrastructure and activities could affect subsistence harvester access for multiple subsistence activities. Table 3.8-7 shows the percentage of harvesters using the Alternative B direct effects analysis area. The primary resources harvested in the area include caribou, birds, bird eggs, and fish. Impacts to harvester access would be greatest in the direct vicinity of Project infrastructure, although harvest avoidance behaviors would likely occur at a greater distance from infrastructure. Based on data for 2010 through 2022, Alternative B infrastructure (Figures 3.8-20 through 3.8-34) directly overlaps with areas of moderate to high use for harvests of caribou, furbearers, geese, ducks/eiders, upland birds, eggs, and vegetation. Overlaps occur primarily around the northern portion of the Project where it intersects with existing roads and infrastructure, and near the CD8 drillsite, which is directly east of the community and north of

Putu. In addition, high numbers of overlaps occur around the ice bridge on East Channel; however, most these uses occur in the summer when the ice bridge is not in place.

Project construction and operation could pose physical barriers to subsistence users due to construction areas and infrastructure. Harvesters traveling overland to access use areas for caribou, furbearers, birds, and vegetation may have to divert around construction areas (e.g., laydown areas, construction camps) or operational infrastructure (e.g., roads, pads, and pipelines). Primary travel methods in the infrastructure area include truck, ATV, and snow machines. Boats are used along adjacent waterways in the summer and fall months. Residents travel along local roads primarily by truck, but also ATV and sometimes snow machine; some residents haul ATVs and snow machines behind their trucks for more extensive off-road hunting. Although Nuiqsut hunters have reported issues with crossing over roads and under pipelines by snow machine or ATV in the past, improvements to pipeline and road designs (e.g., minimum pipeline elevation of 7 feet, installation of tundra access ramps) have reduced these impacts in recent years. The Project would include tundra access road turnouts with ramps that would be designed and located using community input (see Mitigation Measure 56 in EIS Appendix E). Still, residents may periodically encounter difficulties crossing under certain areas of pipeline due to snowdrifts or crossing over roads due to steep grades or heavy loads.

In addition to physical obstructions, Project infrastructure could also affect harvester access by affecting residents' ability to safely shoot in certain directions. In recent years, residents note that the increasing presence of development infrastructure poses new challenges when hunting in those areas. For example, when caribou are located between a hunter and a nearby pipeline, or when they are located on the other side of a pipeline from a hunter, that hunter may have to hike or travel off-road in order to access the resource from a different direction due to safety concerns (SRB&A 2025a).

CPAI would allow Nuiqsut residents reasonable use of roads for subsistence access throughout the life of the Project (see Mitigation Measure 60 in EIS Appendix E). Roads (primarily gravel roads but also ice roads to a lesser extent) are increasingly being used by Nuiqsut harvesters for activities such as caribou hunting, bird hunting, egg harvesting, and vegetation harvesting (SRB&A 2024, 2025a). Roads are particularly beneficial to residents who do not have access to nonroad modes of transportation (e.g., boats, ATVs, and snow machines) (BLM 2023:334–335). As shown in Table 3.8-10, use of the road system, including the road system east of the Niġliq Channel (i.e., roads "East of Spur Road toward Alpine"), for caribou hunting has increased in recent years (see Figure 3.8-2). The Alternative B direct effects analysis area primarily includes roads east of the Niġliq Channel. Use of the road system east of the Niġliq Channel is less common than other road areas (i.e., road segments to the west of Niġliq Channel associated with CD5, GMT1, GMT2, and Willow). An average of 20% of households report using the road system east of Niġliq Channel, versus 73% of households who use any roads), with residents citing the high concentration of infrastructure in that area as a primary reason for avoiding the area. A longer road section extending south of existing oil and gas infrastructure toward areas that already see high levels of use for subsistence may make this area more attractive for hunting by local residents. Thus, it is likely that once gravel roads under Alternative B are constructed, some Nuiqsut harvesters would use these roads for hunting and harvesting purposes. The ability to use the roads is viewed by many as a benefit to local harvesters, particularly in mitigating the impacts of the road system on resource availability, as the road itself causes caribou deflection.

Based on recent discussions with Nuiqsut harvesters, many residents expressed that they would likely use Project roads to access subsistence harvesting areas (SRB&A 2025b). Some harvesting areas near the Project, particularly caribou, bird, egg harvesting, and vegetation harvesting areas directly east of Nuiqsut in the area of the proposed drillsite, are primarily accessible from the river by boat, or by snow machine in the winter months. Access to Project roads would allow hunters to travel to these harvesting areas by truck or ATV, or at times when they cannot use the river for travel (e.g., spring breakup).

Table 3.8-10. Percentage of Households Using Roads by Road Section, 2018 through 2023

Road Area	2018	2019	2020	2021	2022	2023	All Years (2018–2023)
Spur road	51%	53%	62%	70%	67%	72%	63%
East of spur road toward Alpine	9%	11%	20%	30%	26%	25%	20%
West of spur road to CD5	39%	29%	43%	45%	47%	59%	44%
Between CD5 and GMT1	34%	44%	49%	52%	56%	61%	49%
Between GMT1 and GMT2	–	31%	43%	56%	50%	58%	48%
Colville access road	–	–	–	41%	53%	42%	45%
Any roads	54%	64%	72%	84%	77%	88%	73%

Source: SRB&A (2025a).
Notes: The data in this table reflect use of all roads permanently connected to the community of Nuiqsut and are not limited to roads within the direct effects analysis area (see Figure 3.8-1). Roads "East of Spur Road toward Alpine" are the primary roads within the direct effects analysis area.

In addition to the potential physical obstructions to access and increased access along the road system, the Project could also affect access through security restrictions and harvester avoidance. Project infrastructure would directly remove land from the community's traditional harvesting area, and security restrictions around drillsites and buildings would increase the overall area no longer accessible to residents. Access restrictions would likely be most common during the construction phase of the Project and could include closure of ice roads during mobilization. Even in areas open to public access, harvesters may be dissuaded from hunting due to the presence of oil company personnel. Negative interactions with oil field employees, including security personnel, have been reported by Nuiqsut residents and may result in some harvesters avoiding hunting in certain areas (SRB&A 2025a). CPAI conducts training for Project personnel, which includes training on social and cultural regulatory requirements, to avoid conflicts with subsistence activities (see Mitigation Measure 47 in EIS Appendix E).

Although many residents use area roads for subsistence harvesting, some individuals prefer not to use roads or avoid certain development areas altogether. Between 2013 and 2023, between 38% and 76% of harvester respondents report avoiding certain areas for caribou subsistence activities, and between 20% and 47% did so for development reasons. In addition, between 12% and 46% of households report not using roads between 2018 and 2023, with personal preferences and avoidance of industry cited as the primary reasons for not using roads.

Some harvesters may avoid Project infrastructure due to discomfort hunting and shooting near industrial infrastructure, lack of knowledge about security protocols, concerns about resource contamination, and an assumed lack of resource availability near infrastructure. In particular, harvesters would likely avoid the road and drillsite during construction due to safety concerns, noise, and assumptions that resources will be less available in these areas. Under Alternative B, the drillsite would likely be visible to hunters traveling by boat upstream from the community,

particularly when river levels allow for travel through the Putu Channel. In addition, the gravel road under Alternative B would be relatively close to and visible from boat hunting areas along the East Channel. Although residents would likely continue using these river areas, some residents may avoid actively hunting in these areas for the reasons listed above.

The Putu area is traditionally important to the community of Nuiqsut as it is the site of a historical trading post, harvesting area, and Native allotment. The Putu Channel was historically the community's primary access to the Main Channel of the Colville River, and although the channel is rarely accessible in recent years due to shallow conditions, residents continue to travel through the channel when water levels allow. Similar to the camp at Nanuq, which saw a decline in use after construction of the CD4 development, the presence of oil and gas infrastructure so close to Putu may further reduce the community's use of this area. A more detailed discussion of harvester avoidance is provided in the Willow SEIS (BLM 2023:336–337).

Although this discussion focuses on direct impacts on harvester access resulting from the Project, the Project could cause additional indirect subsistence and sociocultural impacts stemming from changes in harvester access. These are discussed in detail in the Willow SEIS (BLM 2023:337-339) and include the following:

- Loss of traditional use areas and associated declines in transmission of knowledge about these areas and associated activities (see Section 3.7.1.1.3 [Social Organization and Cultural Ties to the Land] and Section 3.6.1.2.2 [Alternative B])
- Reduced participation in subsistence activities and associated effects on social cohesion and social organization (see Section 3.7.1.1.3 and Section 3.6.1.2.2)
- Increased distances traveled from the community and associated financial strain and risks to safety (see Section 3.7.1.1.3, Section 3.6.1.2.2, and 3.4.1.2.2 [Alternative B])
- Changes in overall subsistence hunting patterns due to increased road use, which could affect cultural identity and connection to the land (see Section 3.7.1.1.3)

As discussed above, although use of some parts of the Project area may increase due to road access, other areas, such as the Putu Channel and the Native allotment south of the Project, may see decreased use due to the presence of infrastructure and activity and associated harvester avoidance. Over the long term, avoidance of certain areas may result in a reduction in cultural knowledge about those areas, increased distances traveled to avoid those areas (e.g., use of Napasalu Channel even when water levels allow for travel through Putu Channel), and associated increases in costs (e.g., more fuel) and time.

An economic study on subsistence impacts (Northern Economics Inc. 2019) quantified the potential economic impacts on Nuiqsut households under three different scenarios of possible caribou harvest changes resulting from GMT1: 1) traveling 20 miles further, 2) increasing the use of trucks, and 3) use of a hypothetical road to access a new site. The study found that if residents traveled 20 miles farther to harvest caribou (as a result of harvester avoidance or changes in resource availability), it would result in up to $45,000 in additional annual community-wide harvest costs for Nuiqsut residents. Whereas the economic impacts of residents using the road system to hunt caribou (and therefore not traveling farther to harvest caribou) would equal a decrease in annual community-wide harvests costs of approximately $13,000. The economic impacts from increased use of trucks was about the same as existing conditions with

little change (annual community-side harvest costs decreased by $900). Therefore, although not directly comparable, increased harvester avoidance associated with the Project could have negative economic consequences for certain subsistence harvesters, particularly if they choose not to use the road system. A more detailed discussion of the indirect and long-term effects of harvester avoidance is provided in the Willow SEIS (BLM 2023:333–337).

Spills and Inadvertent Releases

An oil spill or blowout would affect harvester access by causing degradation of traditional use areas and harvester avoidance related to contamination concerns. Residents would likely avoid harvesting resources from the lower CRD in addition to adjacent waterways (Niġliq and East Channels) for a period of time. A large oil spill, although unlikely, could have substantial impacts on Nuiqsut subsistence uses areas for an extended period, resulting in decreased subsistence harvests, reduced participation in subsistence activities, and associated sociocultural impacts. As discussed in Section 3.8.1.2.2 (Alternative B), in the event of a reservoir blowout, Alternative B would be most likely to affect subsistence because oil fallout could reach the Niġliq Channel upstream from key subsistence harvesting grounds (Section 4.4.1.2 [Reservoir Blowout]). Residents may avoid a large area surrounding and downstream from the spill (or downwind from the spill, in the event of in-situ burning), which could result in a loss of some traditional use areas over time and decreased opportunities to share subsistence resources, participate in subsistence harvesting activities, and pass on subsistence traditions to the younger generation.

Summary

Project construction and operation would affect harvester access for resources such as caribou, birds, bird eggs, and vegetation. Impacts would be greatest during construction due to higher levels of noise and air traffic; however, impacts related to infrastructure, ground traffic, and human activity would continue for the life of the Project. Table 3.8-3 summarizes the impacts to subsistence harvester access.

3.8.3.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of impacts as Alternative B, but to a lesser extent because Alternative C infrastructure, particularly the CD8 drillsite and the road north of the drillsite, are located farther from key subsistence harvesting areas. Compared to Alternative B and Alternative D, Alternative C infrastructure has less direct overlap with moderate to high use areas for harvests of caribou, furbearers, and birds and is farther from key harvesting areas along the Niġliq Channel. Thus, Alternative C would have fewer direct impacts to subsistence harvester access within existing harvesting areas but would also be less likely to provide access to key harvesting areas via the road system. The drillsite and permanent roads under Alternative C would be farther removed from key harvesting areas along the Niġliq and East Channels, thus reducing the likelihood of avoidance behaviors in these areas.

In the event of a spill, impacts to subsistence harvester access would be similar to Alternative B but to a lesser extent since the drillsite and road are farther from key harvesting areas along the Niġliq and East Channels.

3.8.3.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of impacts as Alternative B, but to a lesser extent because Alternative D infrastructure, particularly the CD8 drillsite and the road north of the drillsite, are located farther from key subsistence harvesting areas. Compared to Alternative B, Alternative D infrastructure has less direct overlap with moderate to high use areas for harvesting of caribou, furbearers, and birds. Thus, Alternative D would have fewer direct impacts to subsistence harvester access within existing harvesting areas but would also be less likely to provide access to key harvesting areas along the road system. The drillsite and permanent roads under Alternative D would be farther removed from key harvesting areas along the Niġliq and East Channels, thus reducing the likelihood of avoidance behaviors in these areas.

In the event of a spill, impacts to subsistence harvester access would be similar to Alternative B but to a lesser extent since the drillsite and road are farther from key harvesting areas along the Niġliq and East Channels.

3.8.3.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions and trends combined with the CD8 Project would impact subsistence harvester access through loss of traditional use areas, increased physical obstructions, security restrictions, and harvester avoidance. RFF actions that could affect subsistence harvester access include infrastructure, traffic, human activity, and contamination related to existing and future oil and gas development projects (see Table 3.1-3; see Figure 3.1-2); activities associated with scientific research and recreation; and changing Arctic conditions. A detailed discussion of RFF actions and trends combined with Project impacts is provided in the Willow SEIS (BLM 2023:400–424) and incorporated by reference and summarized here. Though some RFF actions have changed since the Willow EIS, the types and magnitude of RFF actions are similar as are the types of impacts that would result from them.

Development of the CD8 Project, in combination with other future oil and gas development projects, would exacerbate the sense by Nuiqsut residents that they are surrounded by industrial infrastructure and development. Since 2000, oil and gas development has expanded into highly used Nuiqsut subsistence use areas in the CRD (Alpine and Alpine Satellite developments CD1 through CD4) and toward Fish Creek (CD5, GMT1 and GMT2, and Willow developments). Exploration continues to occur to the north, west, east, and south of the community, effectively surrounding Nuiqsut with industrial infrastructure and activity. Development of the Pikka Project recently introduced infrastructure directly east of the CRD in an area used for subsistence harvests, essentially leaving only the southerly direction untouched by oil and gas infrastructure. The CD8 Project, located just 2 miles from Nuiqsut, would move development infrastructure closer to the community than ever before. In addition, future ongoing and potential oil and gas exploration and development projects in the region, including the Horseshoe Unit south of Nuiqsut and the Pikka and Quokka developments east of the Colville River, would contribute further to community's concerns about industrial expansion into their traditional subsistence lands.

Even with residents being allowed access to development-related roads and facilities, many view the increasing expansion of development infrastructure as a loss of traditional lands. For example, once considered part of the community's traditional subsistence use area (SRB&A

2018), the areas surrounding Prudhoe Bay and Kuparuk are now considered off-limits to subsistence uses. Although use of development areas close to the community continues, residents have reported abandoning or avoiding active hunting in specific areas such as a fish camp at Nanuq Lake, as a result of the nearby presence of infrastructure (SRB&A 2018).

There could be additive access restrictions to subsistence harvesting in some areas, particularly if construction of the Project and RFF actions overlapped. However, new gravel roads and tundra access ramps associated with the Project and RFF actions would also increase harvester access for those who choose to use roads for subsistence purposes. Some hunters indicate that their use of the road system offsets decreased harvests closer to the community, which they believe are a result of deflection from the road itself (SRB&A 2025a). Thus, facilitated access to hunting areas via roads is a countervailing effect that partially mitigates the impacts of roads and associated development on subsistence resource availability. Subsistence harvesters may be less likely to use roads in areas with a high density of development infrastructure (BLM 2023:421). In addition, use of roads generally decreases with distance from the community.

As development infrastructure and activities grow on the North Slope, Nuiqsut subsistence users may adapt to changes in harvester access and resource availability by shifting their subsistence activities away from certain areas. Long-term changes in harvesting patterns, such as a shift toward road-based hunting versus boat or snow machine hunting, may result in a loss of opportunities to pass on traditional knowledge regarding previously used hunting areas and hunting methods, ultimately resulting in a loss of subsistence knowledge and connections.

3.8.3.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

There would be no irreversible and irretrievable commitments of Federal resources with regard to subsistence if a permit were issued.

3.9 TERRESTRIAL MAMMALS

Impacts on some mammal species were dismissed from detailed analysis because they are analyzed in other NEPA documents and mitigation measures are in place that would reduce impacts below significance; see BIO-14 in EIS Appendix D (Issues Dismissed from Detailed Analysis).

3.9.1 How would the proposed infrastructure impact caribou habitat use and distribution?

The CD8 Project area is in an area with known caribou use. Caribou use the Project area during migration, calving, and post-calving, and as an insect-relief area (to avoid mosquito and oestrid fly harassment) (Figure 3.9-1). Impacts specifically to caribou habitat availability and mortality risk were dismissed from detailed analysis because they are analyzed in other NEPA documents and mitigation measures are in place that would reduce impacts below significance; see issues BIO-12 and BIO-13 (see EIS Appendix D).

The analysis area for impacts on caribou from the CD8 Project is the area within 3.7 miles of proposed infrastructure and activities (Figure 3.9-2). This is based on research that documented decreased maternal caribou density during the calving period within 3.7 miles of roads and increased caribou density between 2.5 and 3.7 miles of roads (Cameron et al. 1992; Cronin et al. 1994; Dau and Cameron 1986; Johnson et al. 2020; Lawhead 1988; Lawhead et al. 2004; Prichard et al. 2020; Prichard, Welch et al. 2022). Temporary impacts would occur during a discrete point in time, whereas permanent impacts would last beyond the life of the Project because the gravel infrastructure would likely be in place longer than the life of the Project (30 years).

3.9.1.1 Affected Environment

The analysis area is in the seasonal ranges of two caribou herds: the TCH and the CAH (Figure 3.9-1). The TCH has had large cyclical changes in population size since herd size estimates began in the 1970s (ABR, Inc.—Environmental Research & Services [ABR] 2025a; Parrett 2021). The TCH has increased in population from a few thousand in the 1970s to a peak of over 68,932 caribou in 2008 (Parrett 2021). The TCH experienced a subsequent decline through the mid-2000s followed by another increase to an estimated 61,593 caribou in 2022 (ABR 2025a).

The population of the CAH has generally followed similar trends as the TCH, including large cyclical changes in population size. The CAH had a population peak of an estimated 68,442 caribou in 2010, up from an estimated 5,000 individuals in the 1970s (Lenart 2021). The CAH experienced a subsequent decline through the mid-2000s to an estimated low of 22,630 caribou in 2016. This decline may have been driven by increased adult mortality as well as emigration of individuals to other caribou herds (Porcupine Herd or TCH). Since 2016, the CAH population had steadily grown to 34,652 individuals (ABR 2025b). However, a photocensus in 2025 estimated that the herd had dropped to an estimated 26,600 animals, likely due to decreases in adult survival, calf survival, and parturition rates (ABR 2025b). Given that the TCH and CAH have followed the same general trends since the 1970s (ABR 2025b), it is likely the TCH has also experienced a decline in population since 2022.

The Willow SEIS provides a comprehensive overview of the importance of seasonal ranges for caribou and typical movement of the TCH and CAH by season and is hereby incorporated by reference and summarized below (BLM 2023a:225–226).

Typically, the CRD is used by a small portion of the TCH and CAH and in low densities (ABR 2025a, 2025b) (Table 3.9-1). The TCH uses the analysis area less frequently than the CAH, but there is overlap between the herd use areas (see Figure 3.9-1). The primary use of the area by both herds occurs during the mosquito and oestrid fly seasons, but some caribou could be present year-round (see Table 3.9-1). The CAH is unlikely to use the analysis area in the winter; however, most of the TCH winters on the ACP, so some use of the area could occur in the winter (Figures 3.9-3 and Figure 3.9-4). A small number of caribou were observed on the CRD during the calving season during aerial surveys conducted in 1993 and from 1995 to 2017 (Prichard et al. 2018); however, CAH calving has primarily occurred south of the oil fields in recent years (ABR 2025b; Prichard et al. 2020). Caribou seasonal use of the analysis area is also low, as recorded from collared caribou. Less than 0.5% of each herd typically uses the analysis area during any month (Figure 3.9-5). Use by both TCH and CAH of both sexes peaks in July. In recent years, large numbers of caribou from the CAH were observed north of CD3 during the mosquito and oestrid fly seasons (ABR 2025b).

Table 3.9-1. Estimated Caribou Density and Percentage of Collared Caribou from each Herd Present in the Colville River Delta by Season

Season	Number of Surveys	Caribou Density* Mean and Standard Deviation (2002–2024)†	Percentage of the Herd Present (2000–2024)‡
Winter	7	0.061 (0.132)	CAH: 0.1%
			TCH: 0.2%
Spring migration	7	0.033 (0.043)	CAH: 0.1%
			TCH: 0.1%
Calving	12	0.016 (0.022)	CAH: 0.1%
			TCH: 0.4%
Post-calving	20	0.284 (0.542)	CAH: 0.0%
			TCH: 0.4%
Mosquito	7	0.403 (0.480)	CAH: 22.2%
			TCH: 0.7%
Oestrid fly	17	0.345 (0.921)	CAH: 28.2%
			TCH: 4.6%
Late summer	25	0.024 (0.024)	CAH: 0.5%
			TCH: 0.3%
Fall migration	14	0.034 (0.040)	CAH: 0.2%
			TCH: 0.2%

* Caribou per square kilometer.
† Data from ABR (2025a).
‡ Data from ABR (2025b).

Caribou herds typically exhibit high site fidelity to seasonal ranges, meaning they are likely to return to the same area year after year. Fidelity is highest for calving grounds, and in contrast, there can be high annual variability in winter range. Although the annual range for a caribou herd

can be large, caribou often choose specific areas within the herd range to address specific needs for each season, which can include areas with high seasonal forage availability, areas with preferred calving habitat, and areas that provide relief from high insect activity. The largest seasonal ranges for TCH and CAH are fall migration (September 16–November 30), winter (December 1–April 30), and spring migration (May 1–May 29) (see Figures 3.9-3 and 3.9-4). Winter distribution varies annually and requires a tradeoff between snow depth and condition, forage availability, and predation risk (Pedersen et al. 2021). The TCH is partially migratory, with approximately one-third of the herd migrating to the Brooks Range and the rest remaining on the ACP (ABR 2025a; Fullman et al. 2021; Person et al. 2007). Smaller areas are chosen for calving (May 30–June 15), post-calving (June 16–June 24), mosquito season (June 25–July 15), oestrid fly season (July 16–August 7), and late summer (August 8–September 15) (see Figures 3.9-3 and 3.9-4). These areas provide habitat conditions that are more limited across the North Slope (Wilson et al. 2012), which results in smaller seasonal use areas (see Figures 3.9-3 and 3.9-4). Within each seasonal range, caribou from both herds exhibit high rates of daily movement, with the highest daily movements occurring during the midsummer insect seasons when caribou travel repeatedly between inland foraging areas and areas closer to the coast that have lower temperatures and higher winds (BLM 2023a:226; Prichard et al. 2014; Yokel et al. 2009). Caribou daily movement rates are lowest in the winter (Prichard et al. 2014).

Past and present actions in the analysis area have likely contributed to changes in caribou habitat use and distribution (see Section 3.1.1 [Past and Present Actions]). Gravel and ice roads, pipelines, pads, and ground and air traffic have additively increased human activity and noise, which are likely to disturb and displace caribou and thus change their habitat use (BLM 2023a:237), although the degree of disturbance can vary among seasons (Murphy and Lawhead 2000; Prichard et al. 2020). Johnson et al. (2020) found that CAH caribou used areas within 2.5 miles, 1.24 miles, and 0.62 mile of roads—less than expected—during the calving, post-calving, and mosquito seasons, respectively, but during the oestrid fly season, CAH caribou used roads and pads as oestrid fly relief habitat (Noel et al. 1998; Prichard et al. 2020). Increased human activity and noise are greatest in areas with infrastructure and traffic. Linear features, like roads and pipelines, can interrupt caribou movement, especially when pipelines are within 300 feet of roads or where traffic rates exceed 15 vehicles per hour (Curatolo and Murphy 1986; Lawhead et al. 1993; Cronin et al. 1994). Severson et al. (2023) found that when insect harassment was not occurring, CAH caribou had a decreasing probability of crossing roads with higher levels of traffic; however, when insect harassment was occurring, CAH caribou crossed roads with moderate levels of traffic more frequently than roads with lower levels of traffic. The CAH has been exposed to oil field infrastructure for more than 50 years, and caribou often cross roads and pads multiple times per day in the summer (Prichard et al. 2020; Severson et al. 2023; Prichard et al. 2025). The TCH has had less exposure to oil fields than the CAH and, as a result, may have higher levels of displacement and lower crossing success (ABR 2025a). There are up to 25.3 miles of existing gravel road, 31.8 miles of the Alpine/WNS multiyear ice road, and 66.8 acres of gravel infrastructure within the analysis area. There is also existing ground traffic that uses the gravel infrastructure (see Table 3.1-1). Traffic varies by season, with most of the ground traffic occurring in the winter (see Table 3.1-5).

Existing air traffic in the analysis area is also substantial (see Table 3.1-2). In addition to the regularly scheduled commercial passenger flights and non-industry flights to Nuiqsut Airport, there are typically annual industry flights traveling between the Alpine airstrip, Kuparuk airfield,

and Deadhorse Airport (see Table 3.1-2). Air traffic includes helicopters and fixed-wing aircraft (see Section 3.1.1.1.3 [Air and Ground Traffic]). The number of flights varies by season, with most of the helicopter flights occurring in the summer and fixed-wing aircraft flights occurring in the summer and winter (see Table 3.1-2).

Changing Arctic conditions have also likely contributed to a change in caribou habitat use and distribution in the analysis area through changes in vegetation and forage (see Section 3.1.1.3 [Changing Arctic Conditions]). Due to changes in precipitation, increased temperatures, increased rate of permafrost thaw, changes in the growing season, and an increase in the frequency of rain-on-snow and other extreme weather events (see Section 3.1.1.3), vegetation communities are shifting to taller deciduous shrubs (Naito and Cairns 2014) and experiencing changes in species composition (Osterkamp et al. 2009). These are leading to changes in forage quality and quantity for caribou. Additionally, warmer temperatures are associated with increased insect activity, including parasitic flies and mosquitos, which can decrease reproductive success and calf survival in caribou (Johnson et al. 2022). Caribou may seasonally change their habitat use and distribution to reduce insect harassment, including increased use of gravel infrastructure during the oestrid fly season.

3.9.1.2 Environmental Consequences

3.9.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.1.1 [Past and Present Actions]) would continue (as would associated traffic and other activities that contribute to the environmental baseline). Existing and RFF trends, such as changing Arctic conditions and increased development around NPR-A, would likely continue.

During the oestrid fly season, caribou use gravel infrastructure (including roads and pads) and shaded areas (such as below pipelines) to reduce insect harassment. Caribou are known to gather in large numbers on gravel roads and pads during high oestrid fly activity periods (Noel et al. 1998; Prichard et al. 2020). The No Action Alternative would not provide any additional infrastructure that could provide insect relief during the oestrid fly period.

3.9.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Alternative B would impact caribou habitat use and distribution through the installation of new infrastructure and increases in ground and air traffic.

Installation of New Infrastructure

Caribou can be hesitant to cross linear features like gravel roads or pipelines during their daily and migratory movements across the ACP. This can result in changes to caribou habitat use and distribution within their seasonal ranges, which may result in caribou choosing suboptimal habitats. These changes can reduce body condition and decrease reproductive success, which in turn may influence population dynamics (Cameron 2005).

The presence of new infrastructure, particularly linear features, can result in the deflection of caribou and subsequent changes in their habitat use and distribution. Alternative B proposes the

longest gravel road (6.1 miles compared to 3.6 and 5.0 miles for Alternative C and Alternative D, respectively; see Table 2.5-1 in Chapter 2 [Alternatives]), which would result in the greatest probability of caribou deflection and displacement in the analysis area. An additional 6.1 miles of road would be a 14% increase in gravel roads in the caribou analysis area.

Alternative B has the second-longest length of pipeline on new VSMs at 2.5 miles compared to 1.8 miles and 3.1 miles for Alternative C and Alternative D, respectively (see Table 2.5-1) and would therefore have a lower probability of deflection of caribou due to new pipeline compared to Alternative D. An additional 2.5 miles of pipeline would be a 14% increase in pipeline in the caribou analysis area.

The probability of caribou being deflected by linear features can vary by sex, season, and the caribou's habituation to the infrastructure (Prichard et al. 2020; Smith et al. 1994). The orientation of the proposed gravel road and pipeline, generally north-northeast to south-southeast, may limit deflections of caribou as they move from more coastal insect-relief areas to more inland foraging areas. Caribou in the analysis area would not need to cross the new infrastructure during any north-south movement along the banks of the western Colville River. However, caribou would need to cross the new linear infrastructure to move east-west.

Mitigation measures 33, 39, and 40 (see EIS Appendix E [Mitigation Measures]) address road and pipeline design to minimize impacts on caribou movement. Pipelines would be built a minimum of 7 feet aboveground (except at gravel pad and road crossings; mitigation measure 33) to encourage caribou to cross below the pipelines. Caribou are more likely to cross below pipelines that are at least 5 feet off the ground in the summer with a higher elevation required in the winter to allow for snow accumulation without blocking the route below the pipeline (BLM 2006). As noted in Section 3.9.1.1 (Affected Environment), caribou are less likely to cross roads and pipelines that are spaced fewer than 300 feet apart (BLM 2006). Space would be maintained between roads and pipelines wherever possible (mitigation measure 39) to reduce impacts on caribou movement by reducing the additive impact of pipeline and road infrastructure and to reduce the possibility of snow drifts forming below pipelines (BLM 2006). Alternative B would have the longest length of road within 300 feet of a pipeline at 3.12 miles compared to 2.79 miles and 3.10 miles under Alternatives C and D, respectively (Table 3.9-2; Figure 3.9-6).

Table 3.9-2. Length and Percentage of Road and Pipeline Closer Than 300 Feet Apart

Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Length of new gravel road spaced less than 300 feet apart from pipeline (miles)	3.12	2.79	3.10
Percentage of new gravel road spaced less than 300 feet apart from pipeline	52%	79%	61%

Finally, existing infrastructure, including existing pipe racks and pipeline alignments, would be used to the greatest extent possible to minimize the amount of new infrastructure that could impact caribou movement (mitigation measure 40).

Non-linear infrastructure, such as gravel pads, can cause some disturbance to caribou movement, but this is likely more related to the level of human activity at the location rather than the infrastructure itself (Lawhead et al. 2004; Prichard et al. 2022). However, long-term

displacement from areas with infrastructure and human activity is not common (Johnson et al. 2020; Prichard et al. 2022).

Alternative B would have the second-highest amount of gravel infrastructure and the second-longest pipeline (see Table 2.5-1) and would therefore provide the second-highest value for caribou for oestrid fly relief.

Increases in Vehicle and Aircraft Traffic

The most important factor contributing to the probability of caribou crossing roads is vehicle traffic (BLM 2006). Project vehicle traffic would differ by season and alternative. Across all alternatives, vehicle traffic would be highest in the winter when caribou from the TCH are likely to be present in the analysis area, and lowest in the fall and spring when caribou from both herds may be moving through the analysis area (see Figures 3.9-3 and 3.9-4 and Table 2.5-2). Alternative B would have the second-highest amount of ground traffic over the life of the Project (387,076) compared to 375,597 and 391,936 under Alternative C and Alternative D, respectively (Table 2.5-1). The alternatives differ during the construction period (2027 and 2028), but traffic levels would be identical across all alternatives through the remainder of the Project (30 years) (see Table 3.1-5).

Consequently, Alternative B would also have the second-highest ground traffic rate per hour through Year 1, with an estimated increase of 224% from existing levels in the first winter compared to 202% and 234% for Alternative C and Alternative D, respectively (Table 3.1-7). Traffic would be the same across all alternatives after Year 1 (see Table 3.1-5).

CPAI would implement the Alpine *Wildlife Avoidance and Interaction Plan*, which establishes speed limits of no more than 15 miles per hour when caribou are within 0.5 mile of a road (CPAI 2023). Additionally, vehicle traffic must halt when caribou are crossing or attempting to cross a road, providing caribou the right-of-way. Further, personnel are prohibited from honking horns, revving engines, yelling, chasing, or following caribou at a road or pad (CPAI 2023). These measures would help prevent Project traffic from disturbing caribou near roads and pads or deflecting their movement.

Caribou are also disturbed by aircraft use, including helicopters and fixed-wing airplanes. Project air traffic rates would be the same across all action alternatives, but would differ by season (see Table 2.5-3). Helicopter traffic would be highest in the summer, when caribou from both herds may be present. Fixed-wing air traffic is only proposed through Year 2, during construction, and would peak in the winter, when caribou from the TCH may be present in the analysis area (see Figure 3.9-4; see Table 2.5-3). Helicopters would be used once per day in the summer of Year 1 and Year 2 but would remain below one flight per day for the remainder of the Project (see Tables 2.5-3 and 3.1-8). Fixed-wing aircraft would be used less than once per day in Year 1 and 2 during construction, and then would not be used for the remainder of the Project (30 years; see Table 3.1-8).

There are no mitigation measures proposed that would limit the flight path or minimum flight heights for the CD8 Project. Flights that originate from Willow and are within the NPR-A are required to follow the requirements outlined in the Willow ROD (BLM 2023b), which includes minimum flight heights over sensitive caribou habitat. However, those requirements would not extend to flights outside the NPR-A. Caribou have exhibited extreme responses to helicopters

flying at low altitudes (<656 feet aboveground level), with the level of response increasing when helicopters fly in tight circles (Miller and Gunn 1979). However, caribou have shown a habituation response to low-flying aircraft, which can result in reduced levels of response (Valkenberg and Davis 1985). This would reduce the level of energy caribou expend in response to aircraft, thereby reducing impacts on reproductive fitness (Webster and Young 1997). The analysis area has existing fixed-wing and helicopter traffic (see Table 2.5-3). This would likely result in a lower level of response to helicopter and fixed-wing aircraft on caribou in the analysis area from the addition of air traffic from the CD8 Project.

Spills and Inadvertent Releases

Chapter 4 (Spills and Inadvertent Releases) describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. The impact of spills on caribou is detailed in the Willow SEIS (BLM 2023a:249) and Nanushuk EIS (USACE 2018:3-408-410).

Under Alternative B, spills and inadvertent releases could occur. Spills associated with the discharge of oil from leaking wellheads, process piping, or ASTs would likely be contained to, and cleaned up on, gravel pads or their immediate fringes. These types of spills would be unlikely to affect tundra vegetation adjacent to facilities or structures. However, since caribou use gravel pads and infrastructure during the oestrid fly season, caribou could be present during a spill and subsequently displaced due to the spill and cleanup activities.

In the very unlikely event of a reservoir blowout (likelihood approaching zero, as described in Chapter 4), the extent of the inadvertent release could be much larger, and fallout could distribute oil over tundra vegetation or nearby waterbodies. This could impact foraging habitat over a larger area and potentially result in the temporary displacement of caribou until the vegetation recovered.

Spills originating along pipelines would be detected and responded to quickly. However, they could have a larger geographic extent than spills on pads. Cleanup activities associated with the spill could temporarily displace caribou. A spill in this area could alter habitat used by caribou for foraging, and the magnitude of impacts would depend on the location, size of the spill, and time of year.

Summary

Alternative B would have the longest gravel road of any action alternative. It would have the second-longest pipeline on new VSMs (Alternative D would have the longest) but would have the longest length of road and pipeline that are fewer than 300 feet apart. Alternative B would therefore have the largest potential to change caribou habitat use and distribution through the installation of new infrastructure. Alternative B would have the second-highest increase in total ground traffic and ground traffic per hour of the action alternatives (Alternative D would have the most). All action alternatives would have the same increase in total air traffic and air traffic per hour. Therefore, Alternative B would have the second-largest potential to change caribou habitat use and distribution through increases in ground and air traffic. Mitigation measures (see EIS Appendix E [Mitigation Measures]) would minimize impacts to caribou habitat use and distribution through design and operation considerations. Although impacts would be reduced, they would not be avoided.

3.9.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same type of impacts as Alternative B, but to a lesser extent because there would be fewer miles of roads and pipelines on new VSMs (see Table 2.5-1) and less traffic per hour in Year 1 (see Table 3.1-7). Air traffic and spill radii would be the same as Alternative B. Therefore, Alternative C would have a lower probability of changing caribou habitat use and distribution. However, given the limited difference in impacts between Alternative B and Alternative C, it is not likely that there would be a meaningful difference between the two alternatives regarding caribou habitat use and distribution.

3.9.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same type of impacts as Alternative B, but to a greater extent because there would be more miles of roads and pipelines on new VSMs (see Table 2.5-1) and additional ground traffic per hour in Year 1 (see Table 3.1-7). Air traffic and spill radii would be the same as Alternative B. Therefore, Alternative D would have a higher probability of changing caribou habitat use and distribution. However, given the limited difference in impacts between Alternative B and Alternative D, it is not likely that there would be a meaningful difference between the two alternatives regarding caribou habitat use and distribution.

3.9.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF infrastructure in the analysis area (Colville River access boat ramp, Nuiqsut community upgrades, miscellaneous mine site expansions, Alpine upgrades, and the K-pad expansion, see Table 3.1-3, see Figure 3.1-2) combined with the CD8 Project would impact caribou in similar ways as past and present development by causing changes in habitat use and distribution. The additive combination of new roads and increased traffic levels from the RFF projects combined would have a greater disturbance to caribou and a higher likelihood of displacement and deflection of caribou movement. Although the Project is not expected to result in measurable changes to regional caribou herd population trends, it may contribute to localized effects on wildlife movement and habitat use near Nuiqsut and within areas used by Nuiqsut residents for subsistence activities (see Section 3.8 [Subsistence]).

The CD8 Project could exacerbate the impacts of changing Arctic conditions (described in Section 3.9.1.1 [Affected Environment]) on caribou. Vegetation communities would continue to shift, potentially leading to changes in caribou habitat use and distribution. Increasing temperatures could lead to additional insect harassment, which could change caribou habitat use. This would be an additive effect to shifts in habitat use and distribution from the CD8 Project.

3.9.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

Caribou are not a Federal resource; therefore, there would be no irreversible and irretrievable commitments of Federal resources related to caribou.

3.10 VISUAL RESOURCES

3.10.1 How would the Project affect levels of visual contrast and scenic quality for sensitive viewer groups?

The analysis area for visual resources (also known as the viewshed) is the area within 15 miles of CD8 Project components, or where Project components would be visible based on anticipated infrastructure heights, topographic obstruction, and distance. The analysis area includes sensitive areas such as Putu, a traditional harvesting area located along the Putu Channel, and the community of Nuiqsut. The analysis area is further described by three distance zones: the 0- to 2.5-mile foreground, 2.5- to 5-mile middleground, and 5- to 15-mile background (Figure 3.10-1). Short-term impacts would be present during a discrete point in time, whereas permanent impacts would last beyond the life of the Project because the gravel infrastructure would likely be in place longer than the life of the Project (30 years).

Effects on visual resources are typically evaluated by identifying the existing visual character and scenic quality[20] of the area, the types of sensitive viewers who use or visit the area, the distance of Project features from sensitive viewers, and the level of change or contrast created by the built features or activities that would occur during Project construction and operation. Several analytical methods exist and are commonly used in whole, or adapted in part, by agencies to analyze effects on visual resources. The methods used for this analysis were informed by USACE's V*isual Resources Assessment Procedure for U.S. Army Corps of Engineers* (Smardon et al. 1988), BLM's Visual Resource Management System (BLM 1986a, 1986b), and the U.S. Forest Service's *Landscape Aesthetics, Handbook for Scenery Management* (U.S. Forest Service 1995). Although these methods use a variety of terms and specific procedures, they have common elements that are focused on identifying the existing visual or scenic quality of the area, sensitive viewers, and the level of change from the existing conditions created by Project features.

This section evaluates Project-related changes to visual contrast and scenic quality for sensitive viewer groups. However, these changes can also impact other resources or aspects of the human environment, such as cultural values and community sense of place. Section 3.3.2 (Cultural Resources) addresses how changes to visual character effect cultural resources' non-physical attributes (i.e., setting and feeling). Section 3.6.1 (Public Health and Safety; specifically, HEC-1, Social Determinants of Health) addresses impacts of noise on human health. Section 3.7.1 (Sociocultural Systems) addresses impacts of viewshed changes and other non-traditional influences on community members' cultural ties to the land. Section 3.8.2 (Subsistence) addresses impacts of visual disturbances (i.e., lighting) on resource availability.

3.10.1.1 Affected Environment

3.10.1.1.1 VISUAL AND SCENIC QUALITY

The analysis area encompasses multiple other oil and gas developments on the ACP, primarily including Pikka, Alpine, and Willow, which were previously analyzed for visual impacts. A

[20] Scenic quality is the relative worth of the landscape from a visual perception (BLM 2023:109). Scenic quality can be influenced by many factors, including landform, vegetation, water, color, adjacent scenery, scarcity, and the presence of cultural modifications (USACE 2018).

description of the ACP's visual characteristics, visual (landscape) character and scenic quality, sensitive viewer groups and use areas, and existing infrastructure is available in the Willow SEIS (BLM 2023:108–117) and Nanushuk EIS (USACE 2018:3-511–538) and is hereby incorporated by reference. Information from these analyses that is relevant to the CD8 analysis area is summarized below.

The term *landscape character* refers to the overall visual and cultural impression of the landscape based on the distinct landscape attributes that exist throughout an area. Landscape character is a product of both natural and human influences on the landscape. The analysis area is characterized by relatively flat topography, with small pingos and thermokarst ponds providing slight topographic relief (HDR 2010). Vegetation is low growing and is dominated by tundra grasses and shrub willows. The flat topography makes the sky a dominant feature, with colors that vary according to cloud cover and seasonal daylight levels (USACE 2018:3-516).

Water is a dominant visual feature of the analysis area (see Figure 3.10-1). Primary water features include Harrison Bay (of the Beaufort Sea), the East Channel of the Colville River, Putu Channel, the Niġliq Channel of the Colville River, and numerous tributaries and ponds. The CRD's broad alluvial fan divides the East Channel from the Niġliq Channel. Areas with the highest scenic quality in the analysis area are along and adjacent to the rivers, streams, and waterbodies (USACE 2018:3-520).

Existing infrastructure within the analysis area includes buildings, pipelines, gravel and ice roads, gravel and ice pads, processing facilities, and other structures associated with the existing Alpine, GMT 1, GMT 2, and Pikka oil and gas developments and Willow development, which is currently under construction. Existing infrastructure within the foreground is primarily associated with the Alpine development, which the Project would be co-located with, whereas infrastructure in the middleground is primarily associated Alpine and Pikka, and infrastructure in the background is primarily associated with Pikka, GMT1, GMT2, and Willow (see Figure 3.10-1). In addition, the ASRC Mine Site is within the foreground of the analysis area. Estimated annual air and ground traffic from the operation of existing oil and gas developments and construction and operation of Willow contribute to the visual character of the analysis area (see Tables 3.1-1 and 3.1-2).

The portion of the analysis area that falls within the NPR-A (west of the Niġliq Channel) is managed in accordance with BLM's Visual Resource Management classification system (BLM 1986a, 1986b). Since the Project occurs east of the Niġliq Channel and outside of the NPR-A, no BLM-managed lands would be impacted by the Project.

Areas east of the Colville River have moderate scenic quality overall, because their characteristic landscape and built features lack distinction in their variety or scarcity, and because the existing roads, buildings, and infrastructure are present but not dominant. Additionally, moderate scenic quality is defined where landforms, vegetation, color, and water elements provide visual interest but are common within the surrounding physiographic region. Although the overall landscape east of the Colville River is of moderate scenic quality, localized areas near the rivers and larger waterbodies have a higher scenic quality, whereas areas more proximate to existing oil and gas infrastructure (e.g., ASRC Mine Site and Pikka drillsite) have a lower scenic quality (USACE 2018:3-520). Table 3.10-1 summarizes the factors affecting scenic quality within each distance zone of the analysis area.

Table 3.10-1. Summary of Existing Visual Resource Conditions in the Analysis Area

Distance Zone	Existing Scenic Quality	Sensitive Viewer Groups within Zone (distance to nearest CD8 infrastructure)
Foreground (0–2.5 miles)	Moderate scenic quality on average, with higher scenic quality near the Colville River's Putu Channel, East Channel, and Niġliq Channel, and other rivers and large waterbodies, and lower scenic quality near existing Alpine facilities and mine sites.	Community of Nuiqsut (2.1 miles from drillsite): High sensitivity Subsistence harvesters near Putu Channel (overlaps drillsite and other Project components): High sensitivity Subsistence harvesters in other parts of the subsistence use area at varying distances from Project infrastructure (0–5 miles): High sensitivity
Middleground (2.5–5 miles)	Moderate scenic quality on average, with higher scenic quality near the Colville River, and other rivers and large waterbodies, and lower scenic quality near existing oil and gas facilities (e.g., Alpine and Pikka).	Subsistence harvesters throughout the subsistence use area at varying distances from Project infrastructure (2.5–5 miles): High sensitivity
Background (5–15 miles)	Moderate scenic quality on average, with higher scenic quality near the East Channel of the Colville River and larger waterbodies, and lower scenic quality near existing oil and gas infrastructure in the NPR-A and east of the East Channel of the Colville River.	Subsistence harvesters throughout the subsistence use area at varying distances from Project infrastructure (5–15 miles): High sensitivity

3.10.1.1.2 SENSITIVE VIEWER GROUPS AND AREAS

Sensitive viewer groups in the analysis area include 1) the community of Nuiqsut, located in the foreground zone of the analysis area, and 2) subsistence harvesters who use areas in the foreground, middleground, and background zones (see Section 3.8 [Subsistence] for a description of the Nuiqsut subsistence use area). The primary inhabitants and users of the analysis area are Nuiqsut residents. Although subsistence use areas occur throughout the entire analysis area, some of the highest use areas and most visually sensitive areas are associated with the Putu Channel, near the confluence of the Niġliq and East Channels of the Colville River, and other areas along the East Channel and Niġliq Channels of the Colville River (USACE 2018:3-520). The Putu Channel occurs within the foreground zone and where the drillsite is proposed, and the Niġliq and East Channels of the Colville River occur within both the foreground–middleground and background zones (see Figure 3.10-1).

The community of Nuiqsut contains gravel roads, single-story buildings, an airstrip, a power plant, and other community infrastructure. Some existing oil and gas infrastructure (including facilities at Alpine) is visible from Nuiqsut and the Nuiqsut subsistence use area nearby (including the Putu Channel and East Channel of the Colville River) (USACE 2018:3-519). The closest and most visible infrastructure for these viewer groups includes pipelines for the Alpine development and the Alpine/WNS multiyear ice road and pads. The ASRC Mine Site is also visible from Nuiqsut subsistence use areas along the Putu Channel (see Figure 3.10-1). Other oil and gas facilities from the Alpine or NPR-A developments are further removed from Nuiqsut but are still intermittently visible. Artificial lighting is visible at night and can therefore impact night skies. Seasonal changes in daylight levels also affect what is visible for sensitive viewer groups; for example, in winter (late November to mid-January) when there is little to no daylight, infrastructure becomes less visible, but artificial light sources become more visible (USACE 2018). In Nuiqsut, artificial lighting at more distant drillsites (e.g., CD4 and CD5) becomes more visible in winter.

Both Nuiqsut residents and subsistence users are highly sensitive to changes in the visual environment, particularly when engaged in subsistence activities or other traditional uses of the area (USACE 2018:3-520). Table 3.10-1 summarizes the sensitive viewers groups and areas within each distance zone and their distance to the nearest CD8 Project components.

3.10.1.1.3 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Past and present actions in the analysis area, such as the Alpine development, the ASRC Mine Site, and seasonal exploration activity, have introduced visible human infrastructure to the landscape resulting in greater visual contrast, sources of artificial light (which is most visible at night and in winter), and lowered scenic quality for the community of Nuiqsut and dispersed subsistence users. Collectively, the visual impacts of past and present actions have resulted in noticeable changes to the characteristic landscape (including night skies). Some RFF actions would expand or add new human infrastructure to the landscape and would increase traffic during construction phases, although not all would be visible for the community of Nuiqsut or subsistence users due to their distance from sensitive use areas (many are within the background zone), or because proposed facility expansions would be minor enough to not noticeably change the level of contrast with the landscape.

Changing Arctic conditions have, and would continue to, cause reduced snow cover extent and duration, increased vegetation growth, permafrost thawing, and increased frequency of extreme wildfires and precipitation events (see Section 3.1.1.3 [Changing Arctic Conditions]), which collectively change aspects of the natural environment related to lighting, colors, and textures.

3.10.1.2 Environmental Consequences

The potential effects of the Project on visual and scenic quality and sensitive viewer groups are described using the following:

- Distance of Project infrastructure and construction or operation activities to sensitive viewer groups and their associated sensitive use areas
- Degree of visual change created by Project infrastructure and construction or operation activities based on proximity, scenic quality, and expected contrast levels relative to existing conditions

3.10.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. Although the Project would not be constructed, the Applicant could continue oil and gas exploration in the area. Construction and operation of existing and RFF projects (see Section 3.1.1 [Past and Present Actions]) would continue, as would associated visual impacts resulting from new infrastructure and traffic. Changing Arctic conditions would continue to influence visual conditions through changes to the natural landscape (e.g., lighting, colors, and textures).

3.10.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Alternative B would temporarily impact visual resources during construction through the presence of heavy equipment, ice roads and ice pads, artificial lighting, increased dust, and

temporary work camps and personnel. Alternative B would permanently impact visual resources through the presence of new infrastructure during operations (and beyond, since gravel infrastructure is likely to remain in place), including gravel roads and pads, bridges, culverts, riprap, communication towers, pipelines, drills rigs, chemical storage tanks, and snow management equipment; use of artificial lighting at the drillsite pad; and operational ground, air, and barge traffic. A detailed description of how individual types of Project components (e.g., drillsites, roads, lighting, and pipelines) affect viewers based on scenic quality and proximity is provided in the Willow SEIS (see Tables 3.7.2 and 3.7.3 in BLM 2023:114) and the Nanushuk EIS (USACE 2018:3-522-3-531), which are incorporated by reference and summarized below. The levels of visual impact analyzed in the Willow SEIS and the Nanushuk EIS have been applied in this analysis while accounting for any changed or unique Project-specific conditions, including the current level of existing development within the analysis area, and the proximity of Project infrastructure to sensitive viewer groups.

Where visible, Project facilities and lighting would affect visual and scenic quality by creating visual contrast that noticeably changes the characteristic landscape (including night skies). The levels of contrast created by individual Project components would largely depend on their proximity to existing Alpine infrastructure and consistency with those existing built features. Although most of the proposed CD8 pipeline and gravel road would be co-located with some existing Alpine facilities (i.e., the Alpine sales oil pipeline and Alpine/WNS multiyear ice road), making them somewhat visually consistent with the existing landscape, these components would still create moderate contrasts relative to existing conditions from the conversion of the existing ice road to a gravel road (i.e., different colors, textures, and seasonality), and from increased levels of traffic and lighting during construction and dust during operation. Portions of the CD8 pipeline and gravel roads that are new and are not co-located with existing Alpine facilities would introduce new linear elements to the landscape resulting in stronger visual contrasts relative to existing conditions. Although the flat landscape would limit the view of these linear elements to the foreground (USACE 2018:3-527), these features would likely be visible from Nuiqsut and nearby subsistence use areas along the Putu Channel. Other Project components, including the drillsite (and associated operational lighting) and supporting infrastructure, and the bridge over Lake L9324, would create the strongest visual contrasts since they are proposed in currently undeveloped or lesser-developed areas where built features are less dominant and viewer sensitivity is high. These feature would also create the strongest visual contrasts due to their heights and use of artificial lighting. The bridge over Lake L9234 would be a 400-foot multispan bridge constructed on steel piles, with a height of approximately 21 feet aboveground elevation. Although the bridge would generally follow the horizontal line of the landform, it would create a slight contrast with the landform's horizon when viewed from the foreground, and would introduce contrasting colors with the surrounding landscape.

For the community of Nuiqsut, nearly all of the Project facilities (except for the portion of the pipeline extending from the tie-in to the ACF) would occur within 5 miles or less, with the CD8 drillsite being the closest at approximately 2.1 miles away (see Figure 3.10-1). For subsistence users along the Putu Channel, the CD8 drillsite and connected facilities (i.e., gravel road and pipeline) would be situated within the immediate area and would therefore be highly visible and dominant. For other parts of the subsistence use area further removed from the drillsite, along the Colville River's Niġliq and East Channels, all of the Project facilities would occur within 5 miles

or less and may be visible, with the CD8 drillsite (and associated operational lighting) being the most visually impactful element.

The presence of new equipment, infrastructure, and traffic would create moderate to strong contrasts within the foreground–middleground zone, depending on viewers' proximity to the drillsite. For the community of Nuiqsut and subsistence users at Putu and the Colville River confluence, the presence of the CD8 drillsite and connected facilities (i.e., gravel road and pipeline) within close proximity (2.1 miles or less) would create strong contrasts, as built features would become more visually dominant and the characteristic landscape in these areas would noticeably change relative to existing conditions. The drill rigs, specifically, would introduce new vertical lines and contrasting colors, which would create a noticeable change in the landscape. Remaining Project components further removed from Nuiqsut and Putu, including roads and pipelines that are co-located with existing Alpine facilities, would create moderate contrast since they would slightly increase the footprint of built features, but would do so within an existing developed area and would not substantially change the visual dominance of built features.

For subsistence users further removed from Putu and the drillsite, but still within the middleground zone (approximately 2.5–5 miles), the presence of new equipment, infrastructure, and traffic would create moderate contrasts, since roads and pipelines co-located with Alpine facilities would not substantially change the visual dominance of built features in those areas, and the new drillsite would increase the number of locations where built features are visible, but those features would not be overtly dominant when viewed from the middleground zone.

For subsistence users in the background zone, the presence of new equipment, infrastructure, and traffic would create weak to moderate contrasts, depending on proximity to the drillsite (i.e., moderate contrasts would occur closer to drillsite).

Visual contrasts created by new equipment, infrastructure, and traffic have the potential to modify landscape character and reduce the scenic quality within the analysis area. For sensitive viewer groups in the foreground, including the community of Nuiqsut and subsistence users at Putu and the Colville River confluence, landscape character would noticeably change relative to existing conditions since built features would become more visually dominant. For remaining portions of the analysis area (middleground and background), the overall landscape character would remain similar to existing conditions since contrasts created by new infrastructure would be less dominant from further away.

Table 3.10-2 summarizes the Project's visual impacts on sensitive viewer groups based on their proximity and expected contrast levels relative to existing conditions. Table 3.10-3 summarizes the Project elements that would influence the degree of visual impacts under the action alternatives.

Table 3.10-2. Visual Impacts by Action Alternative

Sensitive Viewer Groups (distance zone)	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Community of Nuiqsut (foreground zone)	The drillsite and connected facilities (located 2.1 miles from Nuiqsut) would create strong contrasts, whereas facilities further removed (e.g., gravel road and pipeline) would create moderate contrasts. Built features would become more visually dominant, resulting in noticeable changes to landscape character.	Relative to Alternative B, the drillsite would be located 1 mile further from the community of Nuiqsut, resulting in a slightly lower visibility of built features and lighting for this community. However, levels of visual contrast would still be strong, and changes to landscape character would still be noticeable.	Relative to Alternatives B and C, the drillsite would be located 0.4 mile further than Alternative B and 0.6 mile closer than Alternative C to the community of Nuiqsut, resulting in slightly lower or higher visibility of built features for the community, respectively. However, levels of visual contrast would still be strong, and changes to landscape character would still be noticeable.
Subsistence harvesters (foreground zone)	The drillsite and connected facilities (located within the Putu area) would create strong contrasts, whereas facilities further removed (e.g., gravel road and pipeline) would create moderate contrasts. Built features would become more visually dominant, resulting in noticeable changes to landscape character.	Impacts would be the same as Alternative B.	Impacts would be the same as Alternative B.
Subsistence harvesters (middleground zone)	There would be moderate contrasts from new equipment, infrastructure, and traffic. Overall, the landscape character would remain similar to existing conditions.	Impacts would be the same as Alternative B.	Impacts would be the same as Alternative B.
Subsistence harvesters (background zone)	There would be weak to moderate contrasts from new equipment, infrastructure, and traffic. Overall, the landscape character would remain similar to existing conditions.	Impacts would be the same as Alternative B.	Impacts would be the same as Alternative B.

Table 3.10-3. Summary of Factors Influencing Visual Impacts for All Action Alternatives

Factors Affecting Visual Impacts	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Distance of drillsite to Nuiqsut (miles)	2.1	3.1	2.5
Gravel road (miles)	6.1	3.6	5.0
Pipeline on new VSMs (miles)	2.5	1.8	3.1

Mitigation measures 1, 9, 16, 25, 35, 41, 49, 55, and 62 (see EIS Appendix E) would minimize impacts to visual resources through facility siting and design considerations and implementation of a lighting plan and dust control measures. Specifically, the Project would avoid placement of facilities in or near rivers, streams, wetlands, unique or valuable wildlife habitat, and cultural sites or features (mitigation measures 1, 9, 16, 49, 55, and 62), and facilities would be designed and operated to minimize sight and to minimize sound impacts in areas of high residential, recreational, and subsistence use and important wildlife habitat (mitigation measure 55).

Spills and Inadvertent Releases

Chapter 4 (Spills and Inadvertent Releases) describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. The impacts of spills on visual resources is detailed in the Willow SEIS (BLM 2023:116–117) and Nanushuk EIS (USACE 2018:3-529–530) and summarized here.

Under Alternative B, localized visual impacts could occur from spills themselves, or from the use of preventive measures (e.g., booms) or cleanup activities. The presence of pooled oil or sheens in waterbodies, the presence of personnel and equipment during cleanup, and potential damage to vegetation can all contribute to visual contrasts with existing conditions. Depending on the severity of the release, the magnitude and duration of impacts would range from temporary and minor (i.e., affecting a small area) to long term and major (i.e., affecting a larger area). Large spill cleanup activities could require burning crude residues in place, which would cause smoke releases and local and regional haze impacts. In-situ burning would be performed in accordance with ADEC-, USGS-, and EPA-approved guidelines for burning (ADEC et al. 2008) which include considerations for proximity to populated areas.

In the unlikely event that a reservoir blowout occurred at the drillsite (likelihood approaching zero, as described in Chapter 4), the extent of the inadvertent release could be much larger and could distribute oil over tundra vegetation as described in Chapter 4. A blowout could reach nearby freshwater lakes and stream channels, including the Niġliq Channel. The visual impacts of a blowout would include long-term visual contrasts from changes in the color or texture of vegetation as well as contrast with light-colored snow and ice in the winter, resulting in a change in landscape character until snow and ice have melted and vegetation is able to recover and mimic pre-existing conditions, which may require an extended period of time.

Summary

Under Alternative B, new equipment, infrastructure, and traffic would cause moderate to strong visual contrasts in the foreground–middleground zone and weak to moderate contrasts in the background zone, with levels of contrast generally increasing as viewers get closer to the drillsite. Alternative B's drillsite would be the closest to Nuiqsut and the Putu Channel, which would slightly increase the visibility of features for sensitive viewer groups in these areas relative to other action alternatives.

3.10.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Under Alternative C, the overall type and duration of impacts would be the same as Alternative B, but the magnitude of impacts would be slightly reduced, primarily within the foreground–middleground zone, due to a smaller footprint of infrastructure (30% smaller by acreage) and from locating the drillsite further away from the community of Nuiqsut (1 mile further) and the Putu Channel. The visibility of built features would be slightly reduced for sensitive viewers around Nuiqsut and the Putu Channel based on their greater distance from the drillsite and the reduced Project footprint (e.g., reduced mileage of gravel roads and pipeline within foreground; see Table 3.10-3). Although the visibility of the drillsite would be reduced, the level of visual contrast would still be strong for foreground viewers around Nuiqsut and the Putu Channel based on proximity, viewer sensitivity, and baseline conditions. Therefore, similar to Alternative B, Alternative C would still result in moderate to strong visual contrasts in the foreground zone,

weak to moderate contrasts in the middleground and background zone, and noticeable changes to landscape character in the foreground zone (i.e., for Nuiqsut and Putu).

Under Alternative C, visual impacts resulting from potential spills and inadvertent releases would be the same as Alternative B (see Section 3.10.1.2.2), except the spatial distribution would be different based on the modified location of the drillsite and other facilities. In the event of a reservoir blowout, the area affected by oil fallout and cleanup activities would be further away from the community of Nuiqsut and the Putu Channel and would therefore result in reduced visual impacts to those sensitive viewer groups, relative to Alternative B.

3.10.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Under Alternative D, the overall type and duration of visual impacts would be the same as Alternative B, but the magnitude of impacts for the community of Nuiqsut would be slightly less than Alternative B and slightly higher than Alternative C. This is due to the drillsite location being 0.4 mile further than Alternative B and 0.6 mile closer than Alternative C to the community of Nuiqsut. The magnitude of impacts to the area around the Putu Channel would also be slightly reduced relative to Alternative B, but would be the same as Alternative C, based on drillsite proximity to the Putu Channel. Relative to Alternative B, the footprint of new gravel roads would be slightly reduced, but the mileage of new pipeline would be slightly increased, therefore the net amount of new road and pipeline infrastructure visible from the foreground would be similar to Alternative B. Although the visibility of the drillsite would be slightly reduced relative to Alternative B, the level of visual contrast would still be strong for foreground viewers around Nuiqsut and the Putu Channel based on proximity, viewer sensitivity, and baseline conditions. Therefore, similar to Alternatives B and C, this alternative would still result in moderate to strong visual contrasts in the foreground zone, weak to moderate contrasts in the middleground and background zone, and noticeable changes to landscape character in the foreground zone (i.e., for Nuiqsut and Putu).

Under Alternative D, visual impacts resulting from potential spills and inadvertent releases would be the same as Alternative B (see Section 3.10.1.2.2), except the spatial distribution would be different based on the modified location of the drillsite and other facilities. In the event of a reservoir blowout, the area affected by oil fallout and cleanup activities would be further away from the community of Nuiqsut and the Putu Channel and would therefore result in reduced visual impacts to those sensitive viewer groups, relative to Alternative B.

3.10.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

Combined with the CD8 Project, RFF actions within the analysis area (Alpine upgrades, Pikka permitted but not-yet-constructed NDC, Quokka project, Nuiqsut community development, and mine site expansion) and the RFF trend of increased oil and gas exploration around Nuiqsut (see Table 3.1-3, see Figure 3.1-2) would impact visual resources in similar ways as past and present development. These combined actions and trends would increase the presence of built features, artificial lighting, and levels of traffic and dust, which in turn would create visual contrasts and modify landscape character (including night skies) or reduce scenic quality depending on their proximity to sensitive viewers. The Project in combination with RFF actions and trends would additively contribute to a changing landscape character in the area. Changing Arctic conditions would continue to influence natural elements of the visual landscape through changes in snow

cover, vegetation, hydrology, and weather events (see Section 3.1.1.3). The visual impacts of the action alternatives, when combined with the impacts of past, present, and RFF actions, would cumulatively result in a moderate degradation of visual and scenic quality in the area.

3.10.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

There would be no irreversible and irretrievable commitments of Federal resources with regard to visual resources if a permit were issued.

3.11 WATER QUALITY AND HYDROLOGY

This section addresses three water quality and hydrology issues:

- How would Project infrastructure affect erosion and scour potential in waterbodies or areas adjacent to gravel fill?
- How would Project infrastructure impact the potential for ice jams and flooding?
- How would Project infrastructure impact freshwater water quality?

Specific functions of WOTUS, such as nutrient exchange, are addressed in Section 3.12 (Wetlands and Waters). Impacts on marine water quality were dismissed from detailed analysis because they are analyzed in other NEPA documents (see WAT-1 in EIS Appendix D). Impacts on water availability were dismissed because the impact context is so low that a detailed analysis was not needed to understand significance (see WAT-2 in EIS Appendix D). Impacts on water quality from infrastructure crossings and wastewater disposal were dismissed because they are analyzed in other NEPA documents, and the impact context is so low that a detailed analysis is not needed to understand significance, respectively (see WAT-3 and WAT-4 in EIS Appendix D). Impacts to water quality and hydrology can also affect fish; these impacts are described in BIO-4 through BIO-7 in EIS Appendix D.

The analysis area for the three water resource issues retained for detailed analysis is the 10-digit USGS hydrologic unit code (HUC) watershed where all action alternatives are proposed: Colville River Delta-Frontal Harrison Bay (HUC 1906030413) (Figure 3.11-1). The temporal scale of analysis would be the life of the Project and beyond for all three issues since the new gravel road and waterbody crossings would be permanent.

3.11.1 How would Project infrastructure affect erosion and scour potential in waterbodies or areas adjacent to gravel fill?

3.11.1.1 Affected Environment

The water resource analysis area encompasses the CRD on the ACP, which drains to the Beaufort Sea. It is characterized by low relief, continuous permafrost, and numerous lakes and distributary channels of the Colville River.

3.11.1.1.1 RIVERS

The CRD is the largest and most complex river delta in northern Alaska (USACE 2018), and the Colville River is the longest river on the ACP, draining approximately 30% of it. In the upper Colville River Delta-Frontal Harrison Bay watershed, the Colville River splits into two main channels: the Niġliq Channel and the East Channel (Figure 3.11-1). The primary water features in the watershed are thaw lakes and distributary channels of the Colville River. The Niġliq Channel and East Channel carry approximately 90% of total flow during spring melt and approximately 99% of total flow during the rest of the year (Walker 1983).

River channels, especially in river deltas, naturally migrate over time due to bank erosion, scour, and deposition. Slumping occurs in spring and summer when frozen riverbanks thaw and erode (Walker 1983). Channel scour and bank erosion also occur during peak flows in the spring and

early summer or from rainfall-driven peak flows during summer or fall. NVN documented such erosion in the Niġliq Channel in 2025 (NVN 2026). The most significant hydrological event in the analysis area is the spring ice breakup of the Colville River, which typically occurs from late May to early June (MBI 2020, 2021, 2022, 2023, 2024). This is characterized by rapid melting of winter snowpack and fragmentation and movement of river ice cover resulting in the formation and release of ice jams. These create dramatic flood pulses with sharp rises and falls in river stage varying by approximately 5 meters between low winter levels and peak spring flood (see Figure 3.11-2) (Walker and Hudson 2003). In the winter months (November through April), discharge drastically decreases, with flows at or near 0 cubic feet per second (cfs) (USGS 2026), and ice develops in the channels to an average thickness of 6 feet (USACE 2018).

During spring breakup, ice jams regularly occur in the main and distributary channels of the Colville River (MBI 2025) (Figure 3.11-3). The combination of peak discharge and ice jamming causes widespread overbank flooding (MBI 2021). This annual flood pulse is the primary mechanism driving overbank flow, floodplain inundation, sediment transport to the delta plain, and recharge of delta lakes (MBI 2021). The highest recorded peak discharge was 590,000 cfs in 2011, and the average historical peak discharge is 296,600 cfs (MBI 2024). In 2015, simultaneous ice jams in the Niġliq Channel and East Channel resulted in the highest water levels on record at existing Alpine facilities. These ice jams also caused inundation around the CD8 Project area. Additional details on annual discharge and hydrologic characteristics of the CRD are found in MBI (2025) and in USACE (2018).

Most of the CRD is in the floodplain (Figure 3.11-4). CPAI modeled the extent of 50-year and 200-year open-water flood events and ice-affected flood events. The extent of ice-affected events is typically more pronounced during lower magnitude flood events (50-year versus 200-year events) because ice jams would release between the 50- and 200-year flood condition. As a result, the extent of the 50-year ice-affected flood may approach, and in some locations exceed, the 200-year open-water flood extent (MBI 2025). Just upstream of the split of the Niġliq Channel and East Channel, ice jams raise WSEs and direct much of the floodwater to the eastern floodplain, where WSEs are higher than in the western floodplain (MBI 2026a).

Existing infrastructure occurs in the CRD floodplain. Much of Alpine is in the floodplain, including the ACF, airstrip, CD1, CD2, CD3, and CD4 (approximately 747 acres of gravel infrastructure; see Figure 3.11-4). Additionally, approximately 5 miles of existing gravel road, one existing bridge over the Niġliq Channel, 23 miles of pipeline, and several HDD pipeline crossings of the Colville River (Alpine's sales oil, seawater, and diesel pipelines) are in the floodplain.

As the operator of Alpine, CPAI is required to complete annual hydrological assessments (like spring breakup monitoring) in the CRD, and thus a substantial amount of hydrological data are available for the CD8 area.

Changing Arctic conditions have led to both increased and decreased precipitation in Alaska (Markon et al. 2012) (see Section 3.1.1.3 [Changing Arctic Conditions]). Changes in precipitation and sea ice cover are expected to lead to more extreme storm events and potentially greater fluctuations in annual peak runoff, which, in turn, would lead to increased bank erosion.

3.11.1.1.2 LAKES AND PONDS

Numerous lakes and ponds ranging from 1 to 600 acres (Walker 1983) occur in the analysis area (Figure 3.11-5). These range from shallow ephemeral ponds in tundra depressions to deeper permanent lakes created by subsidence from permafrost thaws. The hydrological connection between these lakes and the river channels is dynamic and primarily occurs during periods of high water, notably the spring flood (MBI 2024). These high-flow events are the main mechanism for recharging lake water levels and sediment and nutrient exchange between the river and the lakes (Hall 2024).

Shallow lakes (less than 6 feet) typically freeze to the bottom in the winter. Lakes deeper than 7 feet maintain unfrozen water below the ice throughout the winter. The average depth of the lakes in the CRD is 15 feet (Alaska MJM Research 2003), and some are deeper than 25 feet. The maximum depths of lakes surveyed in 2022 ranged from 2.4 to 21.6 feet (Owl Ridge 2023). Most of the deeper lakes are along the Niġliq Channel within the Coleville River floodplain. Lake L9324 has a depth of 7 feet (MBI 2022); Lake M9606 has a depth of 10.1 feet (Moulton 1998).

Some lakes in the analysis area are sources for potable or industrial water and construction of ice roads and pads. Lakes L9312 and L9313 near the Alpine facility are used by CPAI as water source lakes. Lake use is permitted by ADNR and requires an analysis of water depth and fish presence to ensure sufficient water quantity remains for overwintering fish. Lakes are recharged by spring breakup flooding from the Coleville River as well as spring snowmelt and spring and summer precipitation. Accordingly, lake recharge is variable and dependent on levels of river flooding (Walker and McGraw 2015). See WAT-2 in EIS Appendix D.

Changing Arctic conditions (see Section 3.1.1.3), including changes in precipitation rates and storm frequency and intensity, combined with permafrost thaw, have led to changes in freshwater availability and lake recharge across the Arctic. Continued permafrost thaw may also lead to lake-tapping events where lakes would be drained as degrading ice wedges integrate into drainage channels at a lower elevation. This could impact water availability in the analysis area; see Section 3.1.2.2 (Reasonably Foreseeable Future Trends).

3.11.1.2 Environmental Consequences

3.11.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.1.1 [Past and Present Actions]) would continue (as would associated oil drilling and production, water withdrawal, and other activities that contribute to the environmental baseline for water resources). Existing and RFF trends, such as a changing Arctic climate and increased development around the NPR-A, would also continue (see Section 3.1.2.2).

3.11.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Alternative B could contribute to erosion or scour by constructing ice and gravel infrastructure and placing structures below the OHWM (culverts, bridge piers and piles).

Alternative B would construct a total of 398.9 acres of ice infrastructure that would be in use for two winters during construction (Table 3.11-1). Ice infrastructure can block or restrict the flow of water during spring breakup if located on or near natural drainage paths, diminishing their capacity to convey water, and potentially lead to impoundment of flow, changes in channel stability and alignment, and erosion.

Table 3.11-1. Comparison of Gravel and Ice Infrastructure and In-Water Structures for Action Alternatives

Project Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Total permanent footprint	67.3 acres	46.9 acres	62.3 acres
Drillsite (gravel pad)	15.3 acres 2.1 miles from Nuiqsut east-northeast 1.0 miles west of the East Channel of the Colville River	15.0 acres 3.1 miles from Nuiqsut northeast 1.2 miles west of the East Channel of the Colville River	15.6 acres 2.5 miles from Nuiqsut northeast 2.5 miles west of the East Channel of the Colville River 1.1 mile east of the Niġliq Channel of the Colville River
Pipeline tie-in (gravel pad)	0.5 acre	0.5 acre	0.5 acre
Gravel access road	6.1 miles 51.1 acres	3.6 miles 30.9 acres	5.0 miles 45.8 acres
Waterbody crossings	400-foot multispan bridge at Lake L9324 5 piers below the OHWM 20 piles below the OHWM Pile diameter: 48 to 66 inches Total area below the OHWM: 475 square feet 4 culvert or culvert battery water track crossings	400-foot bridge at Lake L9324 same as Alternative B 5 culvert or culvert battery water track crossings	400-foot bridge at Lake L9324 same as Alternative B 60-foot bridge at Lake M9606 drainage 0 piers below the OHWM 5 culvert or culvert battery water track crossings
Ice infrastructure (Project-specific)	201.9 acres of ice pads 27.2 miles ice road (197.0 acres)	196.1 acres of ice pads 22.5 miles ice road (159.3 acres)	211.7 acres of ice pads 24.4 miles ice road (179.4 acres)

Alternative B would also construct 67.3 acres of gravel infrastructure (see Table 3.11-1). Gravel infrastructure could result in upslope water impoundment and thermokarst erosion next to areas covered by gravel fill (Walker, Webber et al. 1987). Both the disturbance of tundra and the thermal effect of dust blown off the gravel onto the tundra can cause thermokarst erosion and sedimentation in surrounding waters.

Gravel infrastructure would be permanently located in the 50-year ice-affected and 200-year open-water floodplains (Figure 3.11-6). The drillsite pad and the south end of the gravel road (approximately 6,000 linear feet of gravel infrastructure) would be placed roughly perpendicular to flood flow conditions between the Colville River and the Niġliq Channel; this infrastructure would be subject to impinging flow during both open-water and ice-affected flood conditions. If gravel roads or pads block or restrict the flow of water during spring breakup, they may 1) increase the depth and duration of water impoundment; 2) increase thermokarsting; 3) cause a change in flow direction; 4) cause channel or water track instability or a change in alignment; 5) result in erosion of the tundra, waterbody, or water track; or 6) result in deposition of sediment on the tundra or in a waterbody. Effects 1 through 3 would occur on the upstream side of the road or pad; effects 4 through 6 could occur on either the upstream or the downstream side of the

road or pad. If the blockages are fixed within the year in which they were first observed, did not overtop the road or pad, and did not drain along the upstream side of the road, the resulting impact of the blockage would be measurable but would not require rehabilitation. However, thermokarsting due to water impoundments resulting from blockages would create a depression that would last indefinitely. If the blockage caused a change in flow direction, channel or water track instability, or erosion of the tundra or waterbody, or resulted in deposition of sediment on the tundra or in the waterbody, the impact would be measurable and require rehabilitation. The impact could be visible for many years, even with rehabilitation.

The only documented occurrence of infrastructure washouts at Alpine, which is also in the 50- and 200-year floodplains, occurred at the CD4 road during a historically high flood event in 2015. During spring ice breakup in 2015, high WSEs occurred near CD2 and CD4 facilities as a result of coincident ice jams in the East Channel and the Niġliq Channel. This breakup diverted floodwater overland through the lake system south of CD4 (see Figure 1.0-1 and Figure 3.11-4), and floodwater overtopped and breached the CD4 road (between the CD4 pad and the intersection to CD5). Gravel was reclaimed and the road was reconstructed immediately following the event (see Figure 3.11-7). Lesser scour and deposition of road material were also observed at CD2 and CD5 bridge abutments, and this was also reclaimed post-breakup.

Pier (or piling) scour is monitored annually at the bridges across the Niġliq and Niġliagvik Channels. Scour is monitored during breakup, and piers are surveyed again in late summer to evaluate post-breakup fill-in of the scour. Scour elevations are compared to design criteria and bridge loads to determine the need for bridge maintenance. Pier 3 and Pier 4 of the Niġliq Channel bridge have scour elevations that are near the 50-year design scour elevation and are being monitored; scour repair was completed (POA-2005-01575).

Project gravel pads and pipelines would be designed to withstand the 200-year open-water flood event plus 3 feet, or the 50-year ice-affected event plus 1 foot, whichever is greater (see Section 2.4.1 [Design Criteria]). Gravel roads would be designed to withstand the 200-year open-water flood event, or the 50-year ice-affected event, whichever is greater. Culverts would be designed to withstand the 50-year open-water event with a headwater-to-diameter ratio of 1 or less. These design criteria are chosen so that infrastructure would not be overtopped.

Hydrologic changes to waters could result from the installation and use of culverts and bridges. Alternative B would have one bridge over Lake L9324 and up to four culverts or culvert battery water track crossings. During the life of a bridge or culvert, possible impacts to the waterbody that is crossed include increased backwater on the upstream side of the structure likely leading to sediment deposition; increased riverbed erosion within the bridge opening; increased riverbed and bank erosion downstream of the structure; increased sediment transport downstream from the structure; increased sediment deposition downstream from the structure; and a change in channel morphology downstream from the bridge.

Maintaining culverts in an Arctic floodplain has challenges. Cross-drainage culverts would be installed approximately every 1,000 feet to maintain surface drainage to minimize the risk of sheet flow interruption and thermokarsting. CPAI would walk road alignments prior to construction to optimize final culvert locations, noting low areas where culverts would be needed; data would be reviewed the with regulatory agencies for culvert placement concurrence (see mitigation measure 20 in EIS Appendix E [Mitigation Measures]).

Mitigation measures would minimize erosion and scour as detailed in EIS Appendix E. This includes minimization of bridge piers and pilings below the OHWM, and avoidance of ponds, lakes, and streams to the extent practicable (mitigation measure 9). The gravel road and pipeline would be placed perpendicular or near perpendicular to the general flow direction when crossing natural drainages to maintain the existing flow patterns and characteristics (mitigation measure 17). Ice road waterway crossings would be slotted, breached, or weakened upon abandonment to facilitate breakup and to minimize potential adverse impacts to stream banks (mitigation measure 12). Snow/ice used for ramps would be removed from the banks in a manner that does not disturb the natural stream bank.

Spills and Inadvertent Releases

The very unlikely event of a reservoir blowout or pipeline rupture would not result in changes to the physical hydrology of the area, but the containment and cleanup response to such a spill may result in damage to the tundra, stream banks and channels, or lakeshores and lake bottoms. This could contribute to erosion or scour of these waterbodies. The extent of the impact would be from the area where the spill occurs downstream along flow paths to a place where the spill is contained or sufficiently dissipated.

Because a reservoir blowout under Alternative B could reach the Niġliq Channel (see Figure 4.4-1), the likelihood of the fallout being transported downstream is greater, and thus the potential for erosion or scour from spill cleanup could occur over a larger area.

3.11.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of impacts as Alternative B, but to a slightly lesser extent because it would have a smaller gravel footprint (46.9 acres compared to 67.3 acres) and fewer miles of gravel road (3.6 miles compared to 6.1 miles) and ice infrastructure (355.4 acres compared to 398.9 acres) (see Table 3.11-1). The drillsite pad and the south end of the gravel road (approximately 3,000 linear feet of gravel infrastructure) would be placed roughly perpendicular to flood flow conditions and would be subject to impinging flow under open-water and ice-affected flood conditions, a decrease of 50% compared to Alternative B. However, Alternative C would have one more culvert battery than Alternative B (five compared to four). Overall, Alternative C would have the least potential for impacts from erosion and scour of the action alternatives.

Spill impacts under Alternative C would be similar to those under Alternative B. However, the oil fallout radius would be less likely to reach the Niġliq Channel (Figure 4.4-2) but would reach waterbodies surrounding the drillsite, where cleanup could cause erosion or scour.

3.11.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same impacts as Alternative B, but to a larger extent and magnitude because it would have one more bridge crossing at Lake M9606 and one more culvert or culvert battery water track crossing (see Table 3.11-1). The drillsite pad and the south end of the gravel road (approximately 9,000 linear feet of gravel infrastructure) would be placed roughly perpendicular to flood flow conditions and would be subject to impinging flow under open-water and ice-affected flood conditions, an increase of 50% compared to Alternative B. Some of the increase in potential impacts may be offset by having a slightly smaller gravel

footprint than Alternative B (62.3 acres compared to 67.3 acres) and slightly fewer miles of gravel roads (5.0 miles compared to 6.1 miles). Alternative D would likely have the most potential impacts from erosion and scour of the action alternatives.

Spill impacts under Alternative D would be similar to those under Alternative B. However, the oil fallout radius would be unlikely reach the Niġliq Channel during non-flood flows (Figure 4.4-2) but would reach waterbodies surrounding the drillsite, where cleanup could cause erosion or scour. During flooding, the oil fallout from Alternative D that reaches the lake immediately north of the drillsite (see Figure 4.3-3) could be transported to the Niġliq Channel and be distributed over a larger area.

3.11.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions in the analysis area (Colville River access boat ramp, Nuiqsut community upgrades, miscellaneous mine site expansions, Alpine upgrades, K-pad expansion, and Kuparuk projects; see Table 3.1-3, see Figure 3.1-2) would add more gravel infrastructure in the CRD floodplain. None of the RFF actions are expected to additively contribute to erosion at CD8, and CD8 is not expected to exacerbate potential erosion or scour from the RFF actions. Hydraulic modeling shows that increases in WSE and velocity, which can be correlated directly to potential increases in erosion and scour potential, are localized around proposed project infrastructure—typically bridges—and are not expected to contribute to cumulative impacts with RFF actions in the analysis area.

3.11.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

Project design criteria (see Section 2.4.1) and mitigation measures (see EIS Appendix E) would reduce but not eliminate the possibility of erosion or scour in waterbodies. If erosion or scour occurs, it would be addressed through repairs or restoration and is not expected to be irreversible.

3.11.2 How would Project infrastructure impact the potential for or extent of ice jams and flooding?

3.11.2.1 Affected Environment

The affected environment is described in Section 3.11.1.1 (Affected Environment).

3.11.2.2 Environmental Consequences

3.11.2.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Impacts under the No Action Alternative would be the same as described in Section 3.11.1.2.1 (Alternative A – No Action Alternative).

3.11.2.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

The Project could change the potential for or extent of ice jams and flooding by placing infrastructure in the floodplain of the Colville River. These projected changes in WSEs and channel velocities were modeled for the 50-year and 200-year open-water and ice-affected events

(MBI 2025). Under ice-affected conditions, ice jams would release between the 50- and 200-year flood condition, and thus 1) a 200-year ice-affected event is unlikely to be physically possible, and 2) the extent of the 50-year ice-affected flood may approach, and in some locations exceed, the 200-year open-water flood extent (MBI 2025). Thus, the 50-year ice-affected and 200-year open-water events (i.e., the events with the highest extent of flooding) are described here and are the basis for Project design.

Model results indicate that during open-water conditions, CD8 facilities would either block or reduce the westward conveyance of floodwater from the East Channel to the Niġliq Channel via the Sakoonang Channel or the northeastern conveyance of floodwater from Lake L9324 along the east side of the CD4 access road. In general, the influence on this primary conveyance path results in a larger increase in WSEs and stream flow velocities over existing conditions for the 50-year flood event than for the 200-year flood event (Figures 3.11-8 and 3.11-9).

Where proposed facilities impact peak floods, a rise in WSE would typically occur upstream of the facility, whereas a decrease in WSE would occur downstream of the facility relative to existing conditions. Tables 3.11-2 through 3.11-5 summarize the largest increases in WSE and water velocity for Alternative B at various locations during both the 50-year ice-affected flood event than for the 200-year open-water flood event.

During ice-affected conditions, model results indicate that changes in WSE due to CD8 infrastructure are most pronounced along the southern portion of the alignment and near the proposed pad (Figure 3.11-10). The greatest increase in WSE (3.2 feet during the 50-year flood event) would be along the east side of the CD8 access road. On the west side of the CD8 access road, there would be a widespread WSE increase (0.1–0.8 feet during the 200-year flood event and 0.1–1.2 feet during the 50-year event) in response to floodwater impounding behind the CD8 road. This floodwater would be relieved through conveyance around the west end of the CD4 pad. At the south end of the CD8 pad, proposed conditions result in an increase of WSE of approximately 1.4 feet as floodwater impounds behind the proposed pad.

At Lake L9324, flow velocities would more than double through the bridge during the 50-year ice-affected scenario. Average velocities would increase from 4.5 to 10.7 feet per second (fps). Maximum velocities would increase from 5.9 to 12.4 fps. Roadway and pad overtoppings would not occur during the 50-year ice-affected flood event using the proposed design criteria for the infrastructure.

Table 3.11-2. Largest Estimated Increase in Water Surface Elevation Due to Facilities During 50-Year Ice-Affected Flood Event (feet)

Location	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
East side of CD8 access road	+3.2	+1.4	+2.6
Along existing Alpine Pipeline	+1.2	+0.3	+0.7
Along CD2 access road and CD1 facilities	+0.3	+0.2	+0.1
CD4 access road and pad	+0.8	+0.6	+0.5
CD5 access road	+0.2	+0.3	+0.2

Sources: MBI (2025, 2026b, 2026c).

Table 3.11-3. Largest Estimated Increase in Water Surface Elevation Due to Facilities During 200-Year Open-Water Flood Event (feet)

Location	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
East side of CD8 access road	+1.4	+0.6	+2.4
Along existing Alpine Pipeline	+0.2	+0.3	+0.2
Along CD2 access road and CD1 facilities	+0.2	+0.2	+0.1
CD4 access road and pad	+0.2	+0.2	+0.1
CD5 access road	+0.2	+0.3	+0.2

Sources: MBI (2025, 2026b, 2026c).

Table 3.11-4. Largest Estimated Increase in Water Velocity Due to Facilities During 50-Year Ice-Affected Flood Event (feet per second)

Location	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
East side of CD8 access road	+7.1	+3.8	+6.2
Along existing Alpine Pipeline	+0.5	+2.6	+4.5
Along CD2 access road and CD1 facilities	+0.2	+0.6	+0.4
CD4 access road and pad	+0.8	+1.3	+1.0
CD5 access road	+0.9	+0.8	+0.6

Sources: MBI (2025, 2026b, 2026c).

Table 3.11-5. Largest Estimated Increase in Water Velocity Due to Facilities During 200-Year Open-Water Flood Event (feet per second)

Location	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
East side of CD8 access road	+0.7	+0.6	+6.2
Along existing Alpine Pipeline	+0.4	+0.3	+4.5
Along CD2 access road and CD1 facilities	+0.2	+0.7	+0.4
CD4 access road and pad	+0.1	+0.3	+1.0
CD5 access road	+0.2	+0.2	+0.6

Sources: MBI (2025, 2026b, 2026c).

The increases in WSE and velocity described in Tables 3.11-2 through 3.11-5 would have a corresponding potential to increase erosion and sedimentation in the analysis area. The largest increases in predicted water velocity would occur along the CD8 access road, where water velocities would more than double. However, road and pad overtopping would not occur during a 50-year ice-affected flood event due to facility design criteria (MBI 2025).

Spills and Inadvertent Releases

Spills and inadvertent releases would not result in changes to ice jams or flooding.

3.11.2.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have similar impacts as Alternative B, but to a different extent because the gravel road and pad configuration would be different. Because the length of gravel infrastructure (south end of road and pad) roughly perpendicular to northward flood flows for Alternative C is roughly one-half the comparable length for Alternative B and roughly one-third the comparable length for Alternative D, overall impacts on the potential for ice jams and flooding are expected to be less for Alternative C than other action alternatives. Figures 3.11-11 through 3.11-11 depict the modeled change in WSE for the 50-year and 200-year open-water flood events and 50-year ice-affected flood event.

Hydraulic modeling for Alternative C (MBI 2026b) shows the greatest increases in WSE (1.4 feet) and water velocity (3.8 fps) along the east side of the CD8 access road during the 50-year ice-affected flood event (Figure 3.11-13, Tables 3.11-2 and 3.11-4). However, the WSE increas in this location would be the least of the action alternatives.

The CD4 access road and pad would also have increased WSE under Alternative C during the 50-year ice-affected flood event (similar to Alternatives B and D), but the increase in water velocity would be higher under Alternative C. Also, water velocity increases along the existing Alpine Pipeline during the 50-year ice-affected event under Alternative C would be greater than Alternative B (2.6 fps compared to 0.5 fps) and less than Alternative D (2.6 fps compared to 4.5 fps).

Under Alternative C, a 50-year open-water flood event would increase maximum flow velocity at the Lake L9324 bridge from 1.5 to 2.0 fps and increase average flow velocity from 1.4 to 1.5 fps. For the 50-year ice-affected flood event, the velocity increases would be more pronounced, with maximum velocity increasing from 5.3 to 10.7 fps and average velocity increasing from 5.2 to 8.9 fps. This is driven by ice jams that force water eastward from the Niġliq Channel to the East Channel.

Alternative C would have similar increases in water velocity as Alternative B during a 200-year open-water flood event in all areas. The exception would be along the CD2 access road and CD1 facilities, where there would be a greater increase in water velocity then either Alternative B or D (0.7 cfs compared with 0.2 cfs and 0.4 cfs, respectively). Overall, the change in WSE due to open-water flood events along the east side of the CD8 access road would be less under Alternative C than the other action alternatives (Figures 3.11-11 and 3.11-11). However, open-water flood events in the rest of the facility areas would be similar to Alternatives B and D. Similarly, ice-affected flood events under Alternative C would also result in smaller maximum changes in WSE than Alternatives B and D along the east side of the CD8 access road and the existing Alpine Pipeline. Impacts of ice-related flooding from Alternative C in other facility areas would be similar to Alternatives B and D. Neither open-water or ice-affected changes to WSE under Alternative C would increase the likelihood of flooding to the community of Nuiqsut.

3.11.2.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of impacts as Alternative B, but to a greater extent and magnitude because the gravel road and pad configuration would be different. The most pronounced impact of Alternative D gravel infrastructure on open-water hydraulics is that the

south end of the access road would stop northward overbank flooding from the Niġliq Channel (Figures 3.11-14 and 3.11-15) (MBI 2026c). WSEs would increase as flow is directed westward back toward the Niġliq Channel. This diversion would reduce floodwater conveyance and WSE across the floodplain between CD4 and the Alternative D pad. The resulting increase in WSE differential across the road at the southern side of the Lake M9606 Drainage Bridge would substantially increase velocities in the water track as flow is directed through the bridge. The relative impact on WSE and velocity would increase with flood magnitude, with the greatest impact occurring during the 200-year open-water flood event (see Tables 3.11-2 through 3.11-5).

In ice-affected conditions, changes in WSE in response to the Alternative D gravel infrastructure would be most pronounced along the southern portion of the road alignment where it would be perpendicular to surface flows (Figure 3.11-16) (MBI 2026c). The proposed gravel infrastructure would result in a maximum WSE increase of approximately 2.6 feet on the south side of the Alternative D access road. Flow velocities would more than double through the Lake L9324 bridge: average velocities would increase from 5.0 to 10.0 fps, and maximum velocities would increase from 5.2 to 12.6 fps. For the Lake M9606 drainage bridge, the velocities under the bridge would increase substantially, with maximum velocities increasing from 1.9 to 12.5 fps and average velocities increasing from 1.8 to 9.8 fps. Road and pad overtopping would not occur during a 50-year ice-affected flood event due to facility design criteria; see Section 2.4.1 (Design Criteria).

Overall, the change in WSE during open-water flood events would be greater under Alternative D than Alternative B. The backup of water on the south side of the CD8 access road would result in the greatest WSE increases near the road, although smaller WSE increases could occur in the floodplain south of the Project and south of Nuiqsut (Figures 3.11-14 and 3.11-15). The community itself is outside the floodplain, and the Project would not change the likelihood of flooding in the community.

3.11.2.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions in the analysis area (Colville River access boat ramp, Nuiqsut community upgrades, miscellaneous mine site expansions, Alpine upgrades, K-pad expansion, and Kuparuk projects; see Table 3.1-3, see Figure 3.1-2) would add more gravel infrastructure in the CRD floodplain. Of the RFF actions, the two in the floodplain that are closest to Alpine and CD8 could contribute cumulatively to flooding and ice jams. These include the Alpine upgrades at CD4 (approximately 1.2 acres of gravel infrastructure) and the Colville River access boat ramp (no more than 20 feet wide and 50 cubic yards of fill assuming use of a Nationwide Permit 36). This infrastructure in combination with CD8 infrastructure could further back up water upstream of the structures, particularly during ice-affected flood events when ice jams downstream could cause elevated WSEs and slower water velocities around CD8 infrastructure that may increase the likelihood of additional ice jam formation near CD8.

3.11.2.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

The Project would be designed to avoid increased flooding and ice jams to the extent possible, thus no irreversible or irretrievable impacts associated with flooding and ice jams are expected.

3.11.3 How would Project infrastructure impact freshwater water quality?

3.11.3.1 Affected Environment

Waterbodies in the analysis area are described in Section 3.11.1.1 (Affected Environment).

3.11.3.1.1 WATER QUALITY

Numerous water quality monitoring and assessment efforts have occurred in the CRD, including CPAI's annual water quality sampling. Thus, a robust water quality dataset for the CD8 area is available. Baseline water quality studies in the Niġliq Channel were conducted from 2009 to 2014, specifically targeting locations upstream and downstream of Alpine infrastructure (ABR 2015). These studies tested for a suite of metals, nitrates/nitrites, and petroleum hydrocarbons. Additionally, Lakes L9323 (near the existing MI/GI pad), L9324 (immediately south of CD4), and B8530 (west of the existing HDD crossing of the Colville River) were recently sampled and tested for water quality parameters and potential contaminants including metals and petroleum hydrocarbons (MBI 2022). Results reflect water quality conditions that are typical of lakes in the region. No detections of hydrocarbons and metals were observed with the exception of barium, which was found at a level consistent with naturally occurring levels in Arctic waters and well below ADEC cleanup standards (MBI 2022). Similarly, water quality of Lake M9606 is consistent with other lakes in the region (Moulton 1998).

In flowing water, such as streams and rivers, the annual high flood volume combined with ice breakup results in naturally occurring seasonal erosion and subsequent high suspended sediment and turbidity**.** Most of this sediment load is carried between May and October, with that bulk of that occurring during spring breakup in May and June. Overall, water quality in the analysis area meets Alaska water quality standards, and no waterbodies in the analysis area are listed as impaired under 303(d) of CWA (ADEC 2026).

Existing infrastructure in the CRD described above and in Section 3.11.1.1 (Affected Environment) has likely contributed to temporary localized increases in sediment in waterbodies during infrastructure construction; however, no long-term impacts to water quality have been recorded.

Changing Arctic conditions have decreased the extent and duration of snow cover and resulted in earlier thawing and later refreezing of the tundra active layer as well as increases in permafrost loss (BLM 2023). RFF climate trends that would continue to contribute to baseline water quality in the analysis area include continued increases in average annual temperatures and either increased or decreased precipitation; see Section 3.1.1.3 (Changing Arctic Conditions). Continued thawing of the near-surface permafrost (16%–24% loss of permafrost by the end of this century) and the potential for progressive deep thawing of the permafrost within 30 to 40 years are also expected (BLM 2023). Changes in precipitation and more extreme storm events could lead to greater fluctuations in annual runoff peaks, which, in turn, would lead to increased bank erosion and increases in suspended sediment and turbidity. Continued permafrost thaw could cause slumping, which would increase nutrient loading and suspended sediment in lakes the river channels in the analysis area, which would also impact water quality.

3.11.3.1.2 GROUNDWATER

Groundwater in permafrost regions occurs in distinct zones with limited hydraulic connectivity (Jin et al. 2022). The groundwater is confined to shallow zones near large waterbodies such as lakes, streams, and rivers. The areas that contain groundwater, predominantly taliks (i.e., layers of unfrozen ground occurring in permafrost), are primarily recharged with snowmelt.

Deep groundwater, although present, generally is not connected to the water system on the surface because permafrost acts as a barrier (National Research Council 2003). Some sub-lake taliks extend through permafrost, but no connection between sub-permafrost groundwater and water above the permafrost has been demonstrated (Hinkel, Arp et al. 2017). Deep groundwater on the North Slope is saline (Kharaka and Carothers 1988; Sloan 1987) and is not a source of potable water.

3.11.3.2 Environmental Consequences

3.11.3.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Impacts under the No Action Alternative would be the same as described in Section 3.11.1.2.1 (Alternative A – No Action Alternative).

3.11.3.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Suspended Sediment and Turbidity

The Project could contribute sediment and increasing turbidity to waterbodies adjacent to the Project through construction of in-water structures, erosion or scour of those structures, stormwater runoff from gravel roads and pads, and generation of dust.

The installation of culverts and bridges may cause temporary increases in suspended sediment and turbidity during construction. These increases would be indistinguishable from background conditions during high-flow events when sediment loads in waterbodies are naturally high. Piles would be driven in winter through bottom-fast ice, thus minimizing the potential for water quality impacts.

Erosion or scour of in-water structures is discussed in Section 3.11.1.1, and the Project's influence on the extent of flooding and ice jams (which could further contribute to erosion and scour) is discussed in Section 3.11.2.2. Erosion or scour is most likely to occur during flood events when ambient suspended sediment and turbidity levels are high, and thus would likely be indistinguishable from background conditions.

Gravel infrastructure could increase turbidity and suspended sediment in waterbodies surrounding the gravel fill during the spring thaw and summer rainfall events when runoff may entrain fine-grained fill material. Runoff would be localized and would minimally increase the quantity of runoff and sediment to any single receiving drainage (may not be noticeable compared to background turbidity during breakup or rainfall events). Runoff would be sporadic and would occur over the life of the Project (30 years and beyond).

Use of the gravel infrastructure would create dust, most of which would settle within 328 feet of roads and pads. Dust from vehicle traffic would increase turbidity in waterbodies directly

adjacent to gravel roads and pads. Dust would also settle onto surrounding vegetation, snow, and ground. This could decrease albedo, increase thermal conductivity, promote earlier spring thaw than in surrounding areas, and lead to ground subsidence from the melting of ice-rich sediments (Everett 1980; Myers-Smith, Arnesenm et al. 2006; Walker and Everett 1987). The dust shadow is detailed in Section 3.12 (Wetlands) and would occur throughout the life of the Project.

Table 3.11-6 summarizes gravel infrastructure for the action alternatives that could contribute to stormwater runoff, potential scour and erosion, and dust that could impact water quality. To minimize impacts from erosion, CPAI would update the *Alpine Facilities Erosion Control Plan* (CPAI 2021) and Alpine SWPPP (CPAI 2024) to include CD8 (CPAI 2025a). These plans include 1) procedures to manage surface drainage from Alpine facilities and 2) requirements for snow removal equipment to minimize gravel carryover to the tundra and for placement of cleared snow to designated area and select snow push areas to avoid proximity to waterbodies.

The mitigation and minimization measures described above would minimize substantial increases in sedimentation and turbidity. Any remaining increases in sedimentation related to CD8 facilities would be well within the natural variability of the CRD, which has regular ice jam events and a flow range that can vary over 400,000 cfs or more on any given year (CPAI 2025b).

Table 3.11-6. Summary of Infrastructure Contributing to Potential Suspended Sediment and Turbidity

Project Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Total gravel footprint	67.3 acres	46.9 acres	62.3 acres
Dust shadow in waterbodies	25.8 acres	23.5 acres	31.1 acres
Waterbody crossings	400-foot multispan bridge at Lake L9324 5 piers below the OHWM 20 piles below the OHWM Pile diameter: 48 to 66 inches Total area below the OHWM: 475 square feet 4 culvert or culvert battery water track crossings	400-foot multispan bridge at Lake L9324 same as Alternative B 5 culvert or culvert battery water track crossings	400-foot multispan bridge at Lake L9324 same as Alternative B 60-foot bridge at Lake M9606 drainage 0 piers below the OHWM 5 culvert or culvert battery water track crossings

Note: Dust shadow does not include acres of waterbodies already in the dust shadow of existing gravel infrastructure.

Spills and Inadvertent Releases

Chapter 4 (Spills and Inadvertent Releases) describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the ACP. The impact of spills on water quality is detailed in the Willow SEIS (BLM 2023:145–147) and Nanushuk EIS (USACE 2018:3-237–3-240).

Water quality impacts from spills and inadvertent releases have the potential to have large long-term localized impacts on water quality depending on the season, duration, and location of the spill and the proximity to waterbodies. In general, small spills are highly likely but would be rapidly contained on gravel infrastructure. Larger spills are less likely but take longer to contain and therefore would have a greater impact on water quality in adjacent waterbodies (see Chapter 4). In general, inadvertent leaks would be contained through implementation of CPAI's design features and spill response plan; see Section 2.4.11 (Spill Prevention and Response). However,

should a guillotine rupture of the CD8 pipeline occur, the estimated spill volume would be large and could have significant impacts (depending on the timing, volume, and location of the spill) on surrounding waterbodies since the pipeline is adjacent to lakes and channels of the Colville River. Similarly, a reservoir blowout at the drillsite could have significant impacts on water quality near and downstream of the drillsite. Although the likelihood of a reservoir blowout is very low (approaching zero), if it were to occur under Alternative B, oil fallout could reach the Niġliq Channel (see Figure 4.4-1 in Chapter 4). At low river flow, oil that enters the Niġliq Channel could strand along the shoreline and potentially be recovered. At high river flows, the oil could be transported to Harrison Bay (21 river miles via the Niġliq Channel). Because the modeled fallout would enter the Niġliq Channel upstream of Nuiqsut, it could be transported to the shoreline at Nuiqsut (1.8 river miles) and beyond. A blowout would be unlikely to impact the Nuiqsut water supply lake, which is approximately 2 miles upstream of the farthest extent of oil fallout under Alternative B (see Figure 4.4-1).

The primary effect of an oil spill on water quality would be the toxicity of petroleum hydrocarbons on and reduced dissolved oxygen for aquatic organisms; even small spills of oil into waterbodies could make water toxic for some aquatic life. Spills into small streams, tundra waters, and ponds would have a greater toxic effect on aquatic plants and animals than spills into larger waterbodies due to the lower relative volume of water and/or flow rate and would have direct toxic impacts in the water column and the sediments. Long-term toxicity (up to a decade) can result from a small spill (Hobbie 1982) and would be more likely to occur in smaller waterbodies.

Tundra ponds and small slow-moving waterbodies could have decreases in dissolved oxygen concentrations due to the impermeable nature of the oil slick, which decreases the influx of oxygen from the air, coupled with the high rate of oxygen use by the sediments. These effects are not as likely in flowing water, where dilution of the oil and dispersion of oil slicks would occur before there could be effects on dissolved oxygen concentrations.

If a large spill occurs during breakup and freeze-up conditions when mechanical cleanup equipment cannot be deployed, cleanup could require burning crude residues in place, which could locally increase water temperature at the water surface and deposit burn residue in the waterbody. In-situ burning would be performed in accordance with ADEC-, USGS-, and EPA-approved guidelines for burning, which include considerations for aquatic species and habitats (ADEC 2022; ADEC et al. 2008). However, under the right circumstances (e.g., when mechanical cleanup is not feasible), in-situ burning may be the quickest and most effective method for cleanup that would remove the oil from water prior to shoreline impacts and would minimize downstream transport (ADEC et al. 2008; NOAA 2022).

Due to the design criteria for pipelines and storage tanks, the limited number of opportunities for spills to reach waterbodies, and the monitoring, leak detection, and spill response provisions incorporated into the action alternatives through a Project-specific ODPCP, large spills into water would be unlikely.

Table 3.11-7 summarizes the number of miles of pipeline by alternative, the distance of the drillsite from major waterbodies, and the distance of the modeled oil fallout to waterbodies.

Table 3.11-7. Summary of Factors Contributing to Impacts to Water Quality From Spills

Project Feature	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Drillsite distance from Nuiqsut water source and Colville River channels	3.0 miles from Tagruk Lake (in a straight line) (Tagruk Lake is 2.1 river miles upstream from Niġliq Channel) 1.0 mile west of East Channel 0.5 mile east of Niġliq Channel	4.4 miles from Tagruk Lake (in a straight line) 1 mile west of the East Channel 2.0 miles east of Niġliq Channel	3.8 miles from Tagruk Lake (in a straight line) 2.3 miles west of the East Channel 1.0 mile east of the Niġliq Channel
Distance of modeled oil fallout to waterbodies	Lands in lakes surrounding the drillsite Lands in the Niġliq Channel 1.8 river miles upstream of Nuiqsut	Lands in lakes surrounding the drillsite	Reaches the lake immediately north of the drillsite (see Figure 4.4-3); could be transported to the Niġliq Channel approximately 4.5 river miles downstream of Nuiqsut
Pipelines	21.5 total miles of pipeline: 7.6 miles produced oil pipeline (CD8 to pipeline tie-in pad) 6.8 miles injection water pipeline (CD8 to CD4) 7.1 miles MI/GI pipeline (CD8 to Alpine)	14.1 total miles of pipeline: 5.1 miles produced oil pipeline (CD8 to pipeline tie-in pad) 4.4 miles injection water pipeline (CD8 to CD4) 4.6 miles MI/GI pipeline (CD8 to Alpine)	18.0 total miles of pipeline: 6.4 miles produced oil pipeline (CD8 to pipeline tie-in pad) 5.7 miles injection water pipeline (CD8 to CD4) 5.9 miles MI/GI pipeline (CD8 to Alpine)

The likelihood of these types of events occurring during the life of the Project is extremely low. A guillotine rupture of a pipeline has never been documented on the ACP (see Section 4.4.2 [Pipeline Rupture]), and a reservoir blowout has not occurred on the ACP since drilling began there in the 1960s (See Section 4.4.1.2 [Pipeline Rupture]).

3.11.3.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of impacts as Alternative B, but to a slightly lesser extent and magnitude because of the following (see Tables 3.11-6 and 3.11-7):

- Alternative C would have a smaller dust shadow in waterbodies (23.5 acres compared to 25.8 acres).
- In the event of a reservoir blowout, an oil fallout would land in lakes surrounding the drillsite and not in the Niġliq Channel. At non-flood river flow, oil that enters waterbodies could strand along the shoreline and be recovered.
- Alternative C would have fewer miles of pipeline (14.1 miles compared to 21.5 miles).
- The drillsite would be further from Tagruk Lake (Nuiqsut's water source).

However, Alternative C would have one more culvert battery than Alternative B (five compared to four).

3.11.3.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of impacts as Alternative B, but contributions to suspended sediment and turbidity would be of a larger extent and magnitude because there would be one more bridge crossing at Lake M9606, one more culvert or culvert battery water track crossing, and 5.3 more acres of dust shadow in waterbodies (Table 3.11-6). However, Alternative D would have a slightly smaller gravel footprint (62.3 compared to 67.3 acres) than Alternative B.

Impacts from spills and inadvertent releases under Alternative D could be less than under Alternative B. Alternative D would have fewer miles of pipeline (18.0 miles compared to 21.5 miles). Should the unlikely event of a reservoir blowout occur, the oil fallout radius would not directly reach the Niġliq Channel (see Figure 4.4-3), but would reach waterbodies surrounding the drillsite. At non-flood river flows, oil that enters waterbodies could strand along the shoreline and be recovered. During times of flooding, the oil fallout from Alternative D that reaches the lake immediately north of the drillsite (see Figure 4.4-3) could be transported to the Niġliq Channel approximately 4.5 river miles downstream of Nuiqsut; it would then likely be transported to Harrison Bay (15.5 river miles downstream).

3.11.3.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF actions in the analysis area (Colville River access boat ramp, Nuiqsut community upgrades, miscellaneous mine site expansions, Alpine upgrades, K-pad expansion, and Kuparuk projects; see Table 3.1-3, see Figure 3.1-2) could contribute to water quality impacts. Of the RFF actions, only three are located close enough to CD8 to contribute cumulatively to water quality impacts: the Alpine upgrades at CD4 (approximately 1.2 acres of gravel infrastructure), the K-Pad expansion near the Nuiqsut Spur Road (approximately 5 acres of gravel infrastructure), and the Colville River access boat ramp (no more than 20 feet wide and 50 cubic yards of fill assuming use of a Nationwide Permit 36). This would contribute approximately 20 more acres of gravel infrastructure to the proposed alternatives' 46.9 to 67.3 acres of gravel infrastructure for a cumulative total of 66.9 to 87.3 cumulative acres of infrastructure that could serve as a source for potential erosion and sedimentation. This cumulative level of additional infrastructure would not have significant impacts on water quality due to the relatively small disturbance footprint and its relatively small contribution to suspended sediment given the seasonally high ambient levels of sediment in the CRD channels.

3.11.3.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

Implementation of the proposed design features and mitigation measures (see EIS Appendix E) would reduce but not eliminate impacts to water quality. Because the gravel infrastructure is expected to remain in place after the life of the Project, some of the sources of sediment would be irreversible. However, those impacts would not impact the long-term sustainability of water resources in the analysis area due to their low relative contribution of suspended sediment on water quality.

3.12 WETLANDS AND WATERS

3.12.1 How would new Project infrastructure impact the functions of wetlands and waters?

Changes to wetland functions can have indirect downstream impacts, thus the analysis area for wetlands is the 10-digit USGS hydrologic unit code (HUC) 224,413-acre watershed where all action alternatives are proposed: CRD (HUC 1906030413) (USGS 2021; Figure 3.11-1). Short-term impacts would occur during a discrete point in time, whereas permanent impacts would last beyond the life of the Project because the gravel infrastructure would likely be in place longer than the life of the Project (30 years).

3.12.1.1 Affected Environment

Wetland functions refers to the properties and services that a wetland provides to sustain a wetland ecosystem. USACE considers the following wetland functions in the CWA Section 404 permit process:

- Groundwater recharge/discharge
- Flood flow alteration
- Fish and shellfish habitat
- Sediment/toxicant/pathogen retention
- Nutrient removal/retention/transformation
- Production export
- Sediment/shoreline stabilization
- Wildlife habitat

As part of its PIR, USACE also considers wetlands that

- perform functions important to the public interest, including wetlands that serve significant natural biological functions;
- are set aside for study of the aquatic environment or as sanctuaries or refuges;
- would detrimentally affect natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics if destroyed;
- are significant for shielding other areas from wave action, erosion, or storm damage;
- are valuable storage areas;
- are groundwater discharge areas that maintain minimum baseflows important to aquatic resources and are prime natural recharge areas;
- serve significant water purification functions; and
- are unique in nature or scarce in quantity to the region or local area (33 CFR 320.4(b)).

A comprehensive description of the importance of wetlands and wetland functions on the ACP is available in the Willow SEIS (BLM 2023) and is hereby incorporated by reference.

The largest expanse of Arctic fens and thaw lakes in the world is in the ACP (National Research Council 2003). Uplands are uncommon because of the high degree of surface inundation (ADF&G 2006). Wetlands and waterbodies make up 96% of the HUC 10 watershed (Table 3.12-1).

Table 3.12-1. Extent of Wetlands in the Analysis Area (acres)

Saltwater Waterbodies	Freshwater Waterbodies	Wetlands	Upland/Other	Total
42,899	58,040	119,814	3,660	224,413

Wetlands and associated vegetation in the analysis area were evaluated as part of the broader Willow SEIS wetland analysis (BLM 2023:Appendix E.9). The Willow SEIS assessed wetlands across 20 HUC 10 watersheds extending from Teshekpuk Lake to Deadhorse and encompassing approximately 2,903,709 acres, including the 224,413-acre CD8 wetland analysis area (see Figure 3.8.1 in BLM 2023:Appendix E.9). No unique or rare wetland types were identified within the CD8 analysis area. All wetland types in the analysis area (Table 3.12-2) also occur elsewhere within the larger Willow wetlands analysis area (see Table E.9.1 in BLM 2023:Appendix E.9). Accordingly, no unique or rare wetlands are present within the CD8 wetland analysis area.

The Alaska Department of Transportation and Public Facilities (ADOT&PF) defines *high functioning wetlands* as those meeting specific criteria such as providing habitat for special status species, and wetlands that are rare, undisturbed, or difficult to replace (ADOT&PF 2010). These are shown as Category 1 and Category 2 wetlands in Table 3.12-3. High functioning wetlands are present in the analysis area (see Tables 3.12-2 and 3.12-3).

In 2025, CPAI field-verified 4,927 acres within the HUC 10 watershed, providing more accurate water and wetland data where direct impacts could occur under any action alternative (Figure 3.12-1). Field-verified data are more accurate than publicly available data from the National Wetland Inventory (NWI) (USFWS 2025). Therefore, when calculating the total acres of each wetland type within the HUC 10 watershed, field-verified data were used where available (see Table 3.12-3). There are 220,429 acres of high functioning waterbodies and wetlands and 315 acres of low functioning waterbodies and wetlands in the analysis area (see Table 3.12-3). The remaining 3,669 acres is upland or upland fill.

Table 3.12-2. Wetland and Waterbody Types in the Hydrologic Unit Code 10 Watershed and Analysis Area

Cowardin Code	Wetland or Waterbody Type	Field-Verified Acres (high functioning)	Field-Verified Acres (low functioning)	NWI Acres (high functioning)	NWI Acres (low functioning)	Total
Waterbodies						
R1	Riverine Tidal	28	<1	0	0	28
L1UBH	Lacustrine Permanently Flooded Limnetic Unconsolidated Bottom Lake	1,248	<1	21,756	9	23,013
L2EM2H	Lacustrine Permanently Flooded Littoral Nonpersistent Emergent Marsh	13	0	263	<1	276
L2USC	Lacustrine Permanently Flooded Littoral Nonpersistent Emergent Marsh	24	0	687	9	720
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom	80	<1	5,090	2	5,172
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore	3	0	28	0	31
Wetlands						
E1UBL	Estuarine Subtidal Unconsolidated Bottom Subtidal	0	0	13,068	3	13,071
E2EM1/USP	Estuarine Irregularly Flooded Intertidal Persistent Emergent/Unconsolidated Shore	0	0	2,212	3	2,215
E2EM1N	Estuarine Regularly Flooded Intertidal Persistent Emergent	0	0	9	0	9
E2EM1P	Estuarine Irregularly Flooded Intertidal Emergent Persistent	0	0	3,443	0	3,443
E2EM2/USP	Estuarine Irregularly Flooded Intertidal Nonpersistent Emergent/Unconsolidated Shore	0	0	1,124	<1	1,124
E2US/EM1P	Estuarine Irregularly Flooded Intertidal Unconsolidated Shore/Emergent Persistent	0	0	5,369	5	5,374
E2USN	Estuarine Regularly Flooded Intertidal Unconsolidated Shore	0	0	23	0	23
E2USP	Estuarine Irregularly Flooded Intertidal Unconsolidated Shore	0	0	17,188	3	17,191
L2EM2/UBF	Lacustrine Semipermanently Flooded Littoral Nonpersistent Emergent/Unconsolidated Bottom	0	0	153	0	153

Cowardin Code	Wetland or Waterbody Type	Field-Verified Acres (high functioning)	Field-Verified Acres (low functioning)	NWI Acres (high functioning)	NWI Acres (low functioning)	Total
L2EM2/UBH	Lacustrine Permanently Flooded Littoral Nonpersistent Emergent/Unconsolidated Bottom	0	0	56	0	56
L2EM2F	Lacustrine Semipermanently Flooded Littoral Emergent Nonpersistent	0	0	88	0	88
L2UBF	Lacustrine Semipermanently Flooded Littoral Unconsolidated Bottom	0	0	35	0	35
L2UBH	Lacustrine Permanently Flooded Littoral Unconsolidated Bottom	0	0	872	7	879
L2USA	Lacustrine Temporarily Flooded Littoral Unconsolidated Shore	0	0	34	0	34
M1UBL	Marine Subtidal Unconsolidated Bottom Subtidal	0	0	420	0	420
PEM1C	Palustrine Seasonally Flooded Persistent Emergent	14	0	0	0	14
PEM1E	Palustrine Seasonally Flooded-Saturated Persistent Emergent	0	0	22,353	34	22,387
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent	2,009	31	3,490	6	5,536
PEM1Fh	Palustrine Semipermanently Flooded Diked-Impounded Emergent Persistent	0	0	7	0	7
PEM1/SS1A	Palustrine Temporarily Flooded Persistent Emergent/Broad-Leaved Deciduous Scrub-Shrub	0	0	47	0	47
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub	678	1	33,330	51	34,060
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub	200	3	0	0	203
PEM1/SS1E	Palustrine Seasonally Flooded-Saturated Persistent Emergent/Scrub-Shrub	0	0	31,463	68	31,531
PEM1/SS1F	Palustrine Semipermanently Flooded Persistent Emergent/Scrub-Shrub Broad-Leaved Deciduous	0	0	10,260	6	10,266

Cowardin Code	Wetland or Waterbody Type	Field-Verified Acres (high functioning)	Field-Verified Acres (low functioning)	NWI Acres (high functioning)	NWI Acres (low functioning)	Total
PEM1/UBF	Palustrine Semipermanently Flooded Persistent Emergent/Unconsolidated Bottom	0	0	7,829	9	7,838
PEM1/USA	Palustrine Temporarily Flooded Persistent Emergent/Unconsolidated Shore	0	0	1,087	0	1,087
PEM1/USC	Palustrine Seasonally Flooded Persistent Emergent/Unconsolidated Shore	0	0	636	5	641
PEM1/USE	Palustrine Seasonally Flooded-Saturated Persistent Emergent/Unconsolidated Shore	0	0	474	0	474
PEM1B	Palustrine Seasonally Saturated Persistent Emergent	0	0	1,643	15	1,658
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent	17	<1	238	<1	255
PSS1/EM1A	Palustrine Temporarily Flooded Broad-Leaved Deciduous Scrub-Shrub/Persistent Emergent	0	0	1,346	2	1,348
PSS1/EM1B	Palustrine Seasonally Saturated Broad-Leaved Deciduous Scrub-Shrub/Persistent Emergent	0	0	346	0	346
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub/Persistent Emergent Scrub (brackish)	6	<1	0	0	6
PSS1/EM1C	Palustrine Seasonally Flooded Broad-Leaved Deciduous/Scrub-Shrub Persistent Emergent	0	0	55	0	55
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Scrub-Shrub/Persistent Emergent	9	0	326	<1	335
PSS1/EM1F	Palustrine Semipermanently Flooded Broad-Leaved Deciduous Scrub-Shrub/Persistent Emergent	0	0	23	0	23
PSS1/USA	Palustrine Temporarily Flooded Broad-Leaved Deciduous Scrub-Shrub/Unconsolidated Shore	0	0	718	0	718
PSS1/USC	Palustrine Seasonally Flooded Broad-Leaved Deciduous Scrub-Shrub/Unconsolidated Shore	0	0	14	<1	14
PSS1A	Palustrine Temporarily Flooded Broad-Leaved Deciduous Scrub-Shrub	0	0	103	0	103
PSS1B	Palustrine Seasonally Saturated Broad-Leaved Deciduous Scrub-Shrub	417	2	41	0	460

Cowardin Code	Wetland or Waterbody Type	Field-Verified Acres (high functioning)	Field-Verified Acres (low functioning)	NWI Acres (high functioning)	NWI Acres (low functioning)	Total
PSS1C	Palustrine Seasonally Flooded Broad-Leaved Deciduous Scrub-Shrub	80	<1	8	0	88
PUBFh	Palustrine Semipermanently Flooded Diked-Impounded Unconsolidated Bottom	0	0	4	0	4
PUS/EM1A	Palustrine Temporarily Flooded Unconsolidated Shore/Persistent Emergent	0	0	50	0	50
PUS/EM1C	Palustrine Seasonally Flooded Unconsolidated Shore/Persistent Emergent	0	0	65	0	65
PUS/EM1E	Palustrine Seasonally Flooded-Saturated Unconsolidated Shore/Persistent Emergent	0	0	140	0	140
PUS/SS1A	Palustrine Temporarily Flooded Unconsolidated Shore/Broad-Leaved Deciduous Scrub-Shrub	0	0	54	0	54
R2EM2/UBH	Riverine Permanently Flooded Lower Perennial Nonpersistent Emergent/Unconsolidated Bottom	0	0	31	0	31
R2UB/EM2H	Riverine Permanently Flooded Lower Perennial Unconsolidated Bottom/Nonpersistent Emergent	0	0	11	<1	11
R2UBH	Riverine Permanently Flooded Lower Perennial Unconsolidated Bottom	<1	0	10,656	13	10,669
R2USA	Riverine Temporarily Flooded Lower Perennial Unconsolidated Shore	0	0	1,058	<1	1,058
R2USC	Riverine Seasonally Flooded Lower Perennial Unconsolidated Shore	0	0	9,765	28	9,793
R3UBH	Riverine Permanently Flooded Upper Perennial Unconsolidated Bottom	0	0	6,008	0	6,008
R5UBH	Riverine Permanently Flooded Unconsolidated Bottom	0	0	6	<1	6
Total	–	4,826	37	215,603	278	220,744*

Note: Cowardin Code is based on the Cowardin system (1979), a national classification system based on wetland and waterbody characteristics.
Sources: ABR (2025); USFWS (2025).
* The remainder of the analysis area is upland or upland fill.

Table 3.12-3. Criteria for High Functioning Wetlands and Presence in the Analysis Area

Category	Criteria	Do Wetlands in the Analysis Area Meet this Criteria?	Rationale
Category 1	Provide habitat for threatened or endangered species	Yes	Polar bear terrestrial denning critical habitat is present in the analysis area (see Figure 3.13.1 in BLM 2023:Appendix A).
Category 1	High-quality examples of rare wetland types	No	No wetlands in the analysis area are rare.
Category 1	Rare within a given region	No	No wetlands in the analysis area are rare.
Category 1	Undisturbed	Yes	All wetlands in the analysis area that are not within the footprint of the Alpine/WNS multiyear ice road are considered undisturbed. Wetlands within the Alpine/WNS multiyear ice road footprint are considered disturbed and may have experienced soil compaction and changes in vegetation type.
Category 1	Contain ecological attributes that are impossible or difficult to replace within a human lifetime	Yes	The wetlands in the analysis area provide ecological functions that are difficult to replace, especially if the permafrost underlaying them is altered.
Category 2	Provide habitat for very sensitive or important wildlife or plants	Yes	The wetlands provide habitat for sensitive or important wildlife or plants.
Category 2	Difficult to replace	Yes	The wetlands in the analysis area are difficult to replace.
Category 2	Provide very high functions, particularly for wildlife habitat	Yes	The wetlands in the analysis area provide high functions, particularly for wildlife habitat.

Past and present actions in the analysis area have contributed to a loss of wetland functions (see Section 3.1.1 [Past and Present Actions]). Gravel roads, gravel pads, and pipeline VSMs from previous projects have led to a direct loss of wetland through the placement of gravel fill, which impacts wetland functions (e.g., nutrient filtration, sedimentation, water storage, and hydrological function). Gravel infrastructure has also restricted sediment and nutrient exchange in waterbodies adjacent to the fill. Approximately 1,208 acres of gravel fill occurs within the analysis area. Given that the analysis area is 96% wetlands and waterbodies, the gravel fill was likely placed mostly in wetlands. In all, 38.1 miles of the annual Alpine/WNS multiyear ice road is constructed in the same location each year in the analysis area. Ice roads and pads that are constructed in the same place for consecutive years can impact vegetation by damaging plant tissues or reducing the growing season (BLM 2007; Guyer and Keating 2005).

Past and present actions in the analysis area have also contributed to indirect impacts on wetland functions through the generation of dust within 328 feet of gravel infrastructure, hereafter referred to as the dust shadow (see Section 3.12.1.1 [Affected Environment]). Construction and ground traffic on gravel infrastructure produce dust that settles on vegetation, limiting its ability to photosynthesize, or on snow, which can cause premature melting. A comprehensive discussion on the impacts of dust on wetland functions is provided in the Willow SEIS and is hereby incorporated by reference (BLM 2023:159–160). In all, 3,438 acres of the analysis area is in the dust shadow of existing infrastructure.

Changing Arctic conditions have also led to changes in wetland functions in the analysis area (see Section 3.1.1.3 [Changing Arctic Conditions]). Changes in precipitation, increased temperatures, increased rate of permafrost thaw, changes in the growing season, and an increase

in the frequency of extreme weather events have altered wetland function. As a result of changing Arctic conditions, vegetation communities are experiencing an increase in taller deciduous shrubs, and wetlands are drying because of thawing permafrost and a change in the hydrologic cycle (Naito and Cairns 2014). Wetland functions are generally decreasing because less hydrophytic vegetation can be supported by a drier environment. Species composition is also changing, leading to changes in processes within the wetland ecosystem (McGuire 2013). The deeper annual thawing and melting of ice wedges are likely to lead to the drainage of wetlands and ponds in some areas, but in other areas, thawing ice may lead to the expansion of ponded areas.

3.12.1.2 Environmental Consequences

3.12.1.2.1 ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the No Action Alternative, no Project permits would be issued by USACE. The Applicant could continue oil and gas exploration in the area. Construction and operation of existing projects (see Section 3.1.1) would continue (as would associated traffic, dust, water withdrawal, and other activities that contribute to the environmental baseline). Existing and RFF trends, such as changing Arctic conditions and increased development around NPR-A, would likely continue.

3.12.1.2.2 ALTERNATIVE B – APPLICANT'S PREFERRED ALTERNATIVE

Alternative B would permanently remove or alter wetlands through the installation of gravel infrastructure (and associated dust, gravel spray, thermokarsting, impoundments, changes in surface flow, and increased vectors for invasive species introduction) and temporarily change wetland functions by the construction of ice infrastructure and withdrawal of freshwater from lakes (already permitted for water withdrawal). These Project activities would change hydrologic regimes and wetland composition, compact soils, and damage vegetation.

Loss and Alteration of Wetlands or Waters

Alternative B would permanently remove 67 acres of high functioning wetlands, the most of the action alternatives (Table 3.12-4; Figure 3.12-2). Placing gravel fill in wetlands reduces wetland functions by disrupting a wetland's ability to filter nutrients, reduce sedimentation, store water, and slow hydrological inputs.

High functioning wetlands support a variety of vegetation types, which reduce erosion and trap nutrients and sediments. Disturbance to wetlands can increase nutrient and sediment inputs, thus reducing water quality, which can decrease habitat suitability for species that rely on aquatic habitats. A loss of wetland functions can also result in a decreased capacity for water storage and flow attenuation, which can result in increased instances of flooding. As described in Section 3.1.1.3 (Changing Arctic Conditions) and 3.1.2.2 (Reasonably Foreseeable Future Trends), increases in temperature could result in increased precipitation and extreme weather events, which can lead to earlier and more extreme flooding events. Loss of wetlands can have downstream effects, which can impact the watershed beyond the immediate area of impact. More details about the impacts of loss of wetlands are in the Willow SEIS (BLM 2023:157–158) and are incorporated by reference.

Gravel fill can also block or restrict the flow of water during spring breakup, which could slow or restrict sediment and nutrient exchange between waterbodies (the river, lakes, and ponds) or between wetlands and waterbodies.

Table 3.12-4. Impacts to Wetlands and Waterbodies by Action Alternative

Impact	Alternative B – Applicant's Preferred Alternative	Alternative C – Northern Alternative	Alternative D – Northwestern Alternative
Acres of permanent wetland and waterbody fill (high functioning wetlands)	67	47	62
Acres of permanent wetland and waterbody fill (low functioning wetlands)	<1	<1	<1
Acres of short-term wetland and waterbody impacts (ice infrastructure† in high functioning wetlands)	392	351	386
Acres of short-term wetland and waterbody impacts (ice infrastructure in low functioning wetlands)	<1	<1	<1
Acres of dust shadow (high functioning wetlands and waterbodies)*	498	299	411
Acres of dust shadow (low functioning wetlands and waterbodies)*	2	1	7

* The area within 328 feet (100 m) of new gravel infrastructure.
† Ice pad locations would be determined during construction. For analysis purposes, it was assumed all ice pads would be placed in high functioning wetlands.

Change in Wetland Composition

Use of the new gravel infrastructure would generate dust that would deposit on adjacent wetlands and could change soil and wetland composition within 328 feet of the new gravel infrastructure. Road dust has the greatest effect within 35 feet of a road, but deposition may occur over a broader area. Roughly 95% of dust settles within 328 feet from a road surface (Myers-Smith, Arnesenm et al. 2006; Walker and Everett 1987). Dust deposited on snowdrifts decreases their albedo, leading to earlier melting (Auerbach, Walker et al. 1997; Klinger, Walker et al. 1983) and increased local soil moisture levels in the spring (Brown, Brockett et al. 1984), which can result in early green-up (Walker and Everett 1987).

Alternative B would create a dust shadow over 498 acres of high functioning wetlands and waterbodies, the largest dust shadow of the action alternatives (see Table 3.12-4). Dust control measures would be implemented to reduce dust deposition on vegetation or snow and to minimize impacts to waterbodies; see mitigation measures 1 through 39 in EIS Appendix E (Mitigation Measures). Although these measures would reduce changes to wetland function, they would not eliminate them, and residual effects would remain.

In addition to dust changing soil composition, several other factors could contribute to changes in wetland composition: changes in vegetation patterns, changes in local hydrologic systems, and increased mechanisms for introduction or dispersal of invasive species. Each of these effects is discussed in detail in the Willow SEIS (BLM 2023:159–161) and are incorporated by reference and summarized here.

Snow accumulations downwind of raised roads and pads would insulate soil, lessening changes in winter soil temperature, and could increase standing water as the snow melts in late spring or early summer. This could cause subsidence adjacent to gravel fill.

Gravel infrastructure and culverts could alter surface flow and result in ponded water upgradient of the structure (Section 3.11 [Water Quality and Hydrology]); this could induce subsidence, particularly as permafrost temperatures increase with a changing Arctic climate. An increase in water impoundments could delay plant growth or contribute to conversion of vegetated tundra to lakes if the impoundments become permanent (Jorgenson and Joyce 1994).

Water withdrawals from lakes may also indirectly affect adjacent wetlands by reducing the amount of water available to the wetland community. However, if sufficient recharge occurs in the spring, there would be no effects to wetlands and waterbodies. State permitting for water withdrawal requires analysis of lake water quantity and recharge. The lakes from which water would be withdrawn for the CD8 Project are already permitted for water withdrawal, thus no effects to waterbodies are expected (see Issue WAT-2 in Appendix D).

Vegetation and Soil Compaction

Alternative B proposes 27.2 miles of ice roads (197 acres) and 202 acres of ice pads for construction, resulting in 392 acres of short-term wetland impacts in high value habitat (see Table 3.12-4), the highest of the action alternatives.

The installation of ice infrastructure could compact soils and damage vegetation in the immediate footprint of the ice infrastructure, as described in the Willow SEIS (BLM 2023:158–159). Ice infrastructure could damage vegetation by freezing plant tissues, physically damaging plant structures, and causing stress that delays plant development. Delayed plant development can modify vegetation (decrease plant size and cover) in the long term and lead to visible traces on the tundra surface (Guyer and Keating 2005). Ice infrastructure would be required during construction only (Years 1 and 2), and therefore, impacts would be short term.

Spills and Inadvertent Releases

Chapter 4 (Spills and Inadvertent Releases) describes the likelihood, types, and sizes of spills that could occur and provides context for spills that have occurred on the North Slope. The impact of spills on wetlands is detailed in the Willow SEIS (BLM 2023:164) and Nanushuk EIS (USACE 2018:3-291–292). The impact of spills on waterbodies is detailed in the Willow SEIS (BLM 2023:145–147).

Under Alternative B, spills and inadvertent releases could occur. Spills associated with the discharge of oil from leaking wellheads, facility piping, process piping, or ASTs would likely be contained to, and cleaned up on, gravel pads or their immediate fringes. These types of spills would be unlikely to affect the tundra or waterbodies adjacent to facilities or structures.

Large spill cleanup activities could require in-situ burning, which in turn could result in the burning of vegetation. In-situ burning would be approved and implemented in accordance with ADEC-, USGS-, and EPA-approved guidelines for burning, which include considerations for vegetation, such as fire risk, post-burn recovery potential, and soil saturation (ADEC et al. 2008, 2022).

In the very unlikely event of a reservoir blowout (likelihood approaching zero, as described in Chapter 4), the extent of the inadvertent release could be much larger, and fallout could distribute over tundra vegetation or to nearby waterbodies, including the Niġliq Channel (see Figures 4.4-1 through 4.4-3). More details regarding impacts of spills to waterbodies are provided in the Spills and Inadvertent Releases section in Section 3.11.3.2.2.

Spills originating along pipelines would be detected and responded to quickly. However, they could have a larger geographic extent than spills on pads. In the unlikely event that a pipeline spill occurs at a river crossing during high water flow, the extent of the inadvertent release could be much larger and may reach the channels of the Colville River, particularly during periods of flooding.

Summary

Alternative B would remove the most wetlands and have the highest acreage of short-term impacts on wetlands (from ice infrastructure) of any action alternative. It would also have the largest dust shadow and thus have the largest potential to change wetland composition near the gravel infrastructure. Mitigation measures 1 through 39 (see EIS Appendix E [Mitigation Measures]) would minimize impacts to wetlands and wetland vegetation through the reduction of gravel fill and design and operation considerations. Although impacts to wetlands and vegetation would be reduced, they would not be avoided (and could not be avoided due to the dominance of wetlands on the ACP). None of the wetland types that would be removed are unique, though 67 acres are considered high functioning wetlands. In the event of a blowout, oil could reach the Niġliq Channel.

3.12.1.2.3 ALTERNATIVE C – NORTHERN ALTERNATIVE

Alternative C would have the same types of impacts as Alternative B, but to a lesser extent because a smaller area of high functioning wetlands would be impacted by permanent fill, short-term ice infrastructure impacts, and the dust shadow (see Table 3.12-4; Figure 3.12-2). The overall magnitude and duration of impacts would be the same as Alternative B. A potential blowout under Alternative C would not reach the Niġliq Channel but could be transported to the Niġliq Channel during high-flow events (see Section 4.4.1.2 [Reservoir Blowout]).

Alternative C would have the smallest gravel footprint, shortest access road, and smallest waterbody crossing; therefore, it would remove the fewest wetlands, impact the least amount of vegetation, and indirectly change the composition of wetlands over the smallest area.

3.12.1.2.4 ALTERNATIVE D – NORTHWESTERN ALTERNATIVE

Alternative D would have the same types of impacts as Alternative B, but to a lesser extent because a smaller area of high functioning wetlands would be impacted by permanent fill, short-term ice infrastructure impacts, and the dust shadow (see Table 3.12-4; Figure 3.12-2). The overall magnitude and duration of impacts would be the same as Alternative B. A potential blowout under Alternative C would not reach the Niġliq Channel, but could be transported to the Niġliq Channel during high-flow events (see Section 4.4.1.2 [Reservoir Blowout]).

Alternative D would have the second-smallest gravel footprint and second-shortest access road; however, it would have an additional waterbody crossing. Thus, it would remove the second-

fewest wetlands, impact the second-least amount of vegetation, and indirectly change the composition of wetlands over the second-smallest area.

3.12.1.2.5 PROJECT IMPACTS IN COMBINATION WITH REASONABLY FORESEEABLE FUTURE ACTIONS AND TRENDS

RFF gravel infrastructure in the wetlands analysis area (Colville River access boat ramp, Nuiqsut community upgrades, miscellaneous mine site expansions, Alpine upgrades, K-pad expansion, and Kuparuk projects; see Table 3.1-3, see Figure 3.1-2) combined with the CD8 Project would impact wetlands and vegetation in similar ways as past and present development by removing and altering wetlands and disturbing vegetation. Although most direct effects constitute an additive permanent loss of wetlands or waterbodies in the analysis area, wetlands are abundant on the ACP and are not likely to be imperiled.

The action alternatives would further lengthen the growing season in areas adjacent to roads and pads (Walker and Everett 1987) where dust would melt snow sooner. This could exacerbate the effects of the changing Arctic climate by further decreasing soil moisture, increasing thaw depth, and altering the active layer in areas adjacent (within 35 feet) of roads and pads due to the dust shadow.

The changing Arctic climate may increase the potential for nonnative plant species to establish in response to warming temperatures (Markon, Trainor et al. 2012). As the climate warms, some plant species that do not presently thrive north of the Brooks Range are likely to extend their ranges into the ACP.

3.12.1.2.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF FEDERAL RESOURCES

Some loss of wetlands and vegetation would be unavoidable. The functions associated with those wetlands would be irreversibly and irretrievably lost, assuming the gravel infrastructure is permanent. Alternative B would have the most irreversible wetland loss, and Alternative C would have the least.

CHAPTER 4. SPILLS AND INADVERTENT RELEASES

This chapter assesses potential Project spills; the types of Project spills that may occur; and their likelihood of occurrence, potential size (volume), duration, and geographic extent based on historical data and CPAI's design features. It provides a quantitative assessment that tiers off the 2020 NPR-A IAP EIS (BLM 2020) spill analysis, which was developed to provide a quantified analysis estimating the number and size of potential spills that may result from various oil and gas development and production scenarios. These are discussed by Project phase below. Section 2.4.11 (Spill Prevention and Response) describes preventive measures and response planning activities CPAI would implement to minimize potential damage to human health and the environment from oil spills or other incidental releases. Potential impacts from spills on specific resources are discussed in Chapter 3 (Affected Environment and Environmental Consequences).

As part of the permitting process with the State, CPAI would be required to provide more detail regarding potential spills, design features and measures to prevent spills, and its spill response and planning measures by updating their WNS ODPCP to include the CD8 Project.

4.1 SPILL RISK ASSESSMENT APPROACH

4.1.1 Types of Spills

The types of spills identified in this spill risk assessment are described by Project phase and the activities, machinery, and fuels associated with them. During construction, potential spill locations could include the barge route and ice and gravel infrastructure. During drilling and operations, potential spill locations could include gravel infrastructure as well as tundra and waterbodies adjacent to or crossed by pipelines. The type of fluids evaluated in this assessment include produced fluids taken directly from the well and are composed primarily of crude oil, water, natural gas, gas condensates (if present), and formation sand; processed sales-quality crude oil; refined products such as diesel and gasoline; produced water; and seawater.

4.1.2 Spill Likelihood and Size

The likelihood or the expected relative rate of spill occurrence during all phases of the Project is described in six categories (Table 4.1-1). These spill size categories are similar to those used by ADEC when it responds to and evaluates oil spills and are consistent with those used in its 2013 North Slope spill analysis (ADEC 2013).

Table 4.1-1. Spill Size Categories and Spill Volume Ranges

Spill Size Category	Spill Volume (gallons)	Spill Volume (barrels)
Very small	<10	<0.24
Small	10–99.9	0.24 to 2.4
Medium	100–999.9	2.4 to 24
Medium to large	1,000–9,999.9	24 to 240
Large	10,000–100,000	240 to 2,400
Very large	Over 100,000	Over 2,400

4.1.3 Geographic Extent

The geographic extent of potential spills considers the spill's location, size, and estimated duration and assumes spill response actions would be consistent with the requirements outlined in CPAI's spill response plans (the 2023 Alpine/WNS ODPCP), which would be updated and approved for the Project. The assessment assumed typical environmental conditions during a spill event; if a spill occurred during atypical environmental conditions (e.g., periods of high flows or flooding), the geographic extent could be much larger.

4.1.4 Duration

Durations noted in the assessment describe the duration of the potential release; the duration of the spill response or potential impacts of the release on resources could be much longer.

4.2 SPILL HISTORY

Oil and gas exploration and production have occurred on the North Slope for six decades. The history of oil spills on the North Slope (e.g., location, type, volume) is evaluated and analyzed in numerous technical studies and EISs, including those by BLM (1998, 2004, 2012, 2014, 2023), USACE (2012, 2018), Bureau of Ocean Energy Management [BOEM] (2013), ADEC (2010, 2013), and CPAI (2025a), and this spill risk assessment incorporates information from those sources. A review of the ADEC Statewide Oil and Hazardous Substance Spills Database for more recent data since the publication of USACE (2018) indicates the following spills have occurred from November 2018 through February 2026: 169 crude oil spills ranging in volume from less than 1 gallon up to 6,804 gallons, and 183 process water spills ranging in volume from less than 1 gallon up to 243,180 gallons have occurred (ADEC 2026a). None of these spills changed the results or conclusions presented in prior analyses, though one spill that occurred close to Nuiqsut in January 2026 is described further below.

The January 23, 2026, collapse of the Doyon 26 drill rig near Nuiqsut was a unique incident in that the drill rig, which was being moved at the time of the incident, tipped over onto the tundra next to the road (Doyon 2026).[21] Though some of the circumstances related to the incident are uncommon, the overall incident is an example of a medium to large spill adjacent to gravel infrastructure that was responded to quickly, contained, and remediated. As of April 30, 2026, approximately 5,435 gallons of spilled product (diesel and hydraulic oil) has been recovered. To date, no spilled material entered waterbodies. After spring breakup, the spill site will be monitored and sampled throughout the summer. The response effort was managed by the Unified Command Response Team comprising Doyon (the rig owner and operator), EPA, ADEC, NSB, and ICAS.

4.2.1 Alpine Spill History

There have been 481 spills reported within the Alpine oil field during the operating period of 1998 through January 2025 (Table 4.2-1), with a total volume of 34,030 gallons spilled in 27 years (ADEC 2025). Spills of diesel added up to the largest volume of spilled product (7,929

[21] The Doyon incident reports are available at: https://www.doyon.com/2026-western-north-slope-rig-move-incident-information-hub/.

gallons or 23%), followed closely by spills of seawater (6,595 gallons or 19%). Substances classified as "other" made up the third largest volume of spills at 4,964 gallons (or 14%) from the Alpine oil field.

Table 4.2-1. Summary of Spills at the Alpine Oil Field, 1998 through 2025

Spill Size Category	Spill Volume (gallons)	Number of Spills
Very small	<10	317
Small	10–99.9	119
Medium	100–999.9	35
Medium–large	1,000–9,999.9	10
Large	10,000–100,000	0
Very large	Over 100,000	0
Total	**–**	**481**

Source: ADEC (2025).

The causes of these spills are summarized in Table 4.2-2. The highest occurrence of oil spills 55 gallons or greater were from tanks (19%) and wells (18%). The highest oil spill volumes were from wells (25%), drilling releases (17%), and pipes (12%).

Table 4.2-2. Causes of Spills at the Alpine Oil Field, 1998 through 2025

Cumulative Volume (gallons)	Cause
8,177	Leaks (oil, saltwater, or other hazardous substances)
7,999	Equipment failure
7,603	Human error
4,546	Overfill
3,692	Other causes (including causes such as seal or line failures, collisions, corrosion, vehicle leaks, etc.)
1,168	Unknown cause
842	Containment overflow

Source: ADEC (2025).

Most spills at Alpine have been small events that were contained on gravel pads and rarely reached the tundra or waterbodies (CPAI 2025c). The median spill size was 4 gallons (ADEC 2025). Between 1999 and June 1, 2026, there were 64 spills that resulted in discharge to tundra or waterbodies, with a mean volume of spills to tundra of 6 gallons and a mean volume of spills to waterbodies of less than 1 gallon (CPAI 2025c, 2026). Most of these spills occurred in the winter and were addressed through recovery of affected snow or ice.

As indicated above, equipment difficulties accounted for most spills at Alpine, and most years show a seasonal increase in the number of spills during December through April (ADEC 2025). This could be the result of increased winter activity related to resupply, increased drilling, and new development construction and project work. A seasonal increase in the number of spills in the winter is also consistent with the spills analysis and trends reported for spills occurring in the North Slope area (Alaska Regional Response Team 2012).

4.3 POTENTIAL SPILLS DURING CONSTRUCTION

Most spills to the marine environment would be expected to be very small to small, limited to refined products (e.g., diesel, lubricating oil), localized to the immediate area of the barge route, and short in duration (less than 4 hours). The expected spill occurrence rates for these spill types would be low to very low, and the spills would be expected to originate from smaller watercraft (e.g., tugboats that handle the barges, or support vessels). It would be possible, although of very low likelihood, that a medium to very large spill could occur along existing marine waterways leading to Oliktok Dock. This would only occur if a tugboat or barge transporting materials runs aground, sinks, or has its containment compartment(s) breached and the contents released (USACE 2012). The duration of these spill types would vary from approximately 1 day to up to several days, depending on the spill's location and the proximity of the shore-based response. Similarly, the geographic extent of these spills would vary and may or may not reach land, depending upon the location of the spill and prevailing meteorological and oceanographic conditions at the time of the spill. Because the duration and frequency of marine vessel use for the CD8 Project would be limited, the likelihood of a spill of this nature would be very low.

Spills occurring on ice and gravel roads could result from construction vehicles capable of hauling gravel, bulk fuels, equipment, and other supplies. The likelihood of occurrence for very small to small spills of fuel or refined products is medium to low, and spills could occur in the event of vehicle accidents. Spills of this nature would happen at the time of the accident, last less than 1 hour, and be limited to the road or to tundra immediately adjacent to the road. It is expected that these spills would be quickly contained in the immediate area of the spill and would not move far from the accident site to tundra or other sensitive habitats. The likelihood of occurrence for medium to medium–large spills of diesel or other refined product is very low, but spills could occur if a large truck accident results in the breaching of its fuel tanks. Spills of this nature would also occur at the time of the accident, last less than 1 hour, and be limited to the road and area immediately adjacent to the road. It is possible this type of spill could reach small areas of tundra or waterbodies immediately adjacent to roads.

The volume of potential spills from a large bulk-fuel tanker truck accident could range from very small to large. A large spill could occur if the entire capacity of the truck's bulk-fuel tank emptied. Spills of this nature would be expected to be of short duration (less than 0.5 day). The likelihood of an event of this nature occurring is considered medium for very small to small spills, low for medium-sized spills, and low to very low for medium–large and large spills because large tanker trucks consist of multiple smaller, segregated tanks, and it is very unlikely that all tanks would be ruptured in a single accident. In the event of a large spill, the geographic extent would likely include roads and adjacent roadside habitats and possibly waterbodies. The geographic extent of a spill of this size would vary, depending on the season; however, the spill would be localized and likely affect an area up to 0.5 acre. Very large spills would not be expected to occur from bulk-fuel tanker truck accidents.

Spills occurring on ice or gravel pads could occur at vehicle and equipment storage areas, equipment maintenance and repair facilities, designated refueling areas, and at temporary AST locations. These spills could involve a variety of refined products such as diesel, gasoline, hydraulic fluid, lubricating oil, grease, waste oil, mineral oil, and other products. Spills could occur on gravel pads, inside buildings, or inside secondary containment areas. 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. 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. Very large spills of refined products along ice or gravel pads would not be expected to occur during construction because construction equipment would not carry 100,000 gallons or more of refined products.

4.4 POTENTIAL SPILLS DURING DRILLING AND OPERATIONS

4.4.1 Blowout

Spills could occur as a result of blowouts during well drilling activities. A blowout (the uncontrolled release of produced fluids or natural gas or both) after pressure control systems have failed can occur when shallow, high-pressure gas deposits are unexpectedly encountered beneath the surface and above the target oil reservoir depth (shallow gas blowout) or when target oil reservoir pressures are much higher than anticipated and planned for (reservoir blowout or well blowout).

4.4.1.1 Shallow Gas Blowout

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.

Drilling operations have the potential to result in low-pressure gas releases that are not blowouts, as occurred at CD1 in March 2022 (CPAI 2022). This event occurred during the drilling of a underground injection control well (WD-03) when natural gas was detected on the CD1 pad. CPAI's subsequent investigation revealed the natural gas leak was a result of exceeding well pressure limitations during routine well testing and freeze-protection operations.[22] A permafrost thaw bulb exists under the CD1 pad, and it provided vertical and horizontal pathways for gas to migrate to the surface. This deviation was not recognized or addressed at the time. The event did not result in harm or damage to wildlife or the surrounding tundra; natural gas was not detected anywhere off the CD1 pad or in Nuiqsut (approximately 9 miles to the south). The source of the gas leak was identified as coming from the C10-Halo interval,[23] which had not previously been identified as an interval with a significant hydrocarbon zone or with abnormal geo-pressured strata, and consequently cement isolation of the zone was not required or completed as part of well construction. The well has since been cemented and abandoned.

The CD8 drillsite would be from 5.5 to more than 7 miles from the CD1 pad (depending on the alternative). Results from drilling eight wells into the Narwhal reservoir from CD4 validated that the C10-Halo interval that was responsible for the gas leak at CD1 is not a significant hydrocarbon-bearing zone in the CD4 area. The two exploration well penetrations in the CD8

[22] The CPAI incident report to AOGCC is available at: https://alaska.conocophillips.com/alpinecd1event/.

[23] An interval is a specific section of rock or wellbore; intervals are categorized based on their geology, rock properties, fluid content, and how they interact with the well. Defining intervals allows geologists to identify productive zones and to isolate or avoid water or gas.

area, Putu 2 and Putu 2A, show that the C10 interval at CD8 is not hydrocarbon bearing. The C10 interval is planned to be encountered in the intermediate section of the CD8 wells. If the Halo zone within the C10 is found during drilling to be a significant hydrocarbon-bearing zone (which would be contrary to current data, analysis, and expectations), the hydrocarbon-bearing zone would be isolated by cement.

4.4.1.2 Reservoir Blowout

There have been no reservoir blowouts on the North Slope since drilling began in the late 1960s (approximately 7,000 wells). The expected rate of occurrence for a reservoir blowout to occur from CD8 would be very low (approaching zero). For response planning purposes, CPAI calculated the potential discharge from a reservoir blowout from the drillsite during drilling (in accordance with 18 AAC 75.434(e)) that resulted in a spill volume of 4,400 barrels per day for 15 days (66,000 barrels [2.7 million gallons] total release) (CPAI 2025d). The modeling results suggest that up to 14% of the discharged oil would remain airborne as an aerosol and 86% would be expected to reach the ground surface downwind of the well based on typical prevailing wind patterns at the time of the spill. Figures 4.4-1 through 4.4-3 (all EIS figures are in EIS Appendix A) illustrate the modeled reservoir blowout scenario at the CD8 drillsite under winter and summer conditions. Table 4.4-1 summarizes the approximate extent and volume of oil to reach the ground surface in the event of a reservoir blowout.

Table 4.4-1. Approximate Distance and Width of Oil Fallout from a Reservoir Blowout, Based on Percentage Discharged

Spill Volume in Barrels (percentage of total spill volume)	Distance from Wellhead (feet)	Width of Fallout (feet)
550 (12.5%)	41	10
1,100 (25%)	49	12
1,650 (37.5%)	61	15
2,200 (50%)	81	20
2,838 (64.5%)	132	31
3,155 (71.7%)	195	44
3,472 (78.9%)	388	84
3,665 (83.3%)	952	192
3,793 (86.2%)*	3,864	693

Source: CPAI (2025d).
* The remaining approximately 14% would remain airborne and would not reach the ground.

The radii in Figures 4.4-1 through 4.4-3 demonstrate the 71.7%, 83.3%, and 86.2% extent limits for oil fallout (i.e., oil that would reach the ground) in this scenario; the oil plume trajectories represent prevailing wind conditions and indicate the most likely areas for oil to reach the ground in the event of a reservoir blowout. Approximately 14% of the discharged oil would be in aerosol droplets so small (50 micrometers or less) that they would not reach the ground. If a reservoir blowout were to occur, there is potential for oil that reaches the ground to enter nearby freshwater lakes and stream channels.

Under Alternative B, oil fallout could reach the Niġliq Channel (see Figure 4.4-1). At low river flow, oil that enters the Niġliq Channel could strand along the shoreline and potentially be recovered. At high river flows (a scenario where oil could be transported further), the oil could be transported to Harrison Bay (21 river miles via the Niġliq Channel). Because the modeled

fallout would enter the Niġliq Channel upstream of Nuiqsut, it could be transported to the shoreline at Nuiqsut (1.8 river miles) and beyond. The remaining 14% of the discharged oil that would be in aerosolized droplets could be carried by prevailing winds into Nuiqsut. Over time and distance, this aerosolized emission would become more dilute.

Under Alternatives C and D, the oil fallout radius would not reach the Niġliq Channel (see Figures 4.4-2 and 4.4-3) but would reach waterbodies surrounding the drillsite. At low river flow, oil that enters waterbodies could strand along the shoreline and potentially be recovered. During flooding, the oil fallout from Alternative D that reaches the lake immediately north of the drillsite (see Figure 4.3-3) could be transported to the Niġliq Channel approximately 4.5 river miles downstream of Nuiqsut; it would likely be transported to Harrison Bay (15.5 river miles) and not back up to reach the shore near the community. Because the Alternatives C and D drillsites are further away from Nuiqsut and out of the direct line of prevailing winds, it is less likely that the remaining 14% of the discharged oil that would be in aerosolized droplets could be carried by prevailing winds into Nuiqsut. Nuiqsut would be downwind of the Alternative C drillsite approximately 38% of the time, compared to 52% for Alternative B, and 23% of the time for Alternative D (SWCA 2026).

4.4.2 Pipeline Rupture

Pipeline spills could occur along the 20-inch pipeline that transports produced fluids (composed of oil, water, and natural gas, with a general split of 70% oil and 30% water/gas mixture) from CD8 to the CD8 pipeline tie-in pad. Leaks from the produced fluids pipeline could result in spill 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. The expected occurrence rate of these spills would be very low to low (BOEM 2013). Very small spills would be expected to be contained within a small area in the immediate vicinity of the spill; however, large spills that go undetected for a period of time could affect an area a few acres in size before the spill is contained. Estimated discharges from guillotine ruptures of the produced fluids pipeline are shown in Table 4.4-2. There have been no documented cases of guillotine failures occurring on the North Slope, mainly because the conditions most likely to cause this type of failure are not present in the region (e.g., active geological faults, landslide-prone topography). The spill's location and time of year would also influence the spill area extent. A larger spill during a period of flooding could affect waterbodies and shoreline habitat several miles downstream from the leak source. Such a spill could reach Harrison Bay.

Table 4.4-2. CD8 Pipeline Estimated Spill Volumes

CD8 Pipeline	Length	Total Spilled Volume (gallons)	Volume of Oil Spilled (gallons)	Volume of Oil Spilled (barrels)
Produced fluids	7.6 miles (40,128 feet)	612,000	428,820 (70% of total)*	10,210 (70% of total)*
Injection water	6.8 miles (55,440 feet)	125,185	6,259 (5% of total)†	149 (5% of total)†

Source: CPAI (2025d).

Note: Volume spilled is based on crude oil pipeline discharge calculations presented in 18 AAC 75.436 and 49 CFR 194.105(b)(1), where the discharge volume equals the capacity of the pipeline section plus the potential volume of oil discharged during time to detect and time to shut down (5 minutes to detect and 1 minute to shut down were used in this table), multiplied by the flow rate based on 34,000 barrels per day or 992 gallon per minute.

* Produced fluids are composed of oil, water, and natural gas, with a general mixture ratio of 70% oil and 30% water/gas.

† Injection water is composed of water and residual crude oil and has a variable ratio of oil to water over the life of the field; for planning purposes, a ratio of 5% oil and 95% water was used.

Pipeline spills could also occur along the 8-inch injection water pipeline from CD4 to CD8. Estimated discharges from potential guillotine ruptures of the injection water pipeline are summarized in Table 4.4-2. Injection (or produced) water is composed of water and residual crude oil, the ratio of which varies over the life of the field; for planning purposes, a ratio of 5% oil and 95% water was used. The location and time of year of the spill would also influence the spill area extent. A larger spill during a period of flooding could affect waterbodies and shoreline several miles downstream from the leak source. The effects of injection water spills on tundra or waterbodies are addressed in appropriate resource sections in Chapter 3 (Affected Environment and Environmental Consequences).

The MI/GI pipeline would transport MI and/or lean gas from the existing MI/GI Pad to CD8. Although MI is a petroleum hydrocarbon mixture, in the event of a pipeline rupture or release, the mixture would exit the pipe primarily in the gas phase, and minimal amounts of liquid would reach land or water surfaces, even at low temperatures in winter. Any liquids that reach the surface would quickly volatilize and would be unlikely to form a definable surface slick or sheen. Lean gas would also exit the pipe in the gas phase. Therefore, the MI/GI pipeline is not included in this analysis.

4.4.3 Other Spills and Leaks

Spills on gravel pads directly associated with petroleum development infrastructure could originate from wellheads (leaks from the wellhead or the well casing during normal operations), facility piping, process piping, or from ASTs. Facility piping includes pipelines that connect wells to pipeline manifolds that then connect to produced fluids pipelines (i.e., infield flowlines) and on-pad piping that connects ASTs to on-pad equipment (e.g., drilling rigs, generators). Process piping includes pipes inside pipeline manifold buildings and crude oil processing modules.

Based on historical spills data, the expected rate of occurrence of wellhead spills would be very low to low; they would range in size from very small to large, typically last from a few hours to a few days, and be contained within the immediate vicinity of the well itself and not be expected to reach areas beyond the gravel pad.

Based on historical North Slope spills data, the expected occurrence rate for spills from facility piping and process piping would range from very high for very small spills to very low for very large spills. The expected duration of these spills could range from very short (less than 4 hours) for very small spills to a few days for large spills; these spills would be expected to be contained inside buildings or on gravel pads.

BLM (2023:429) analyzed the frequency of AST spills associated with petroleum development infrastructure from 1995 through 2011 and determined they have the second lowest frequency of loss of integrity spills: only 10 spill cases were recorded from July 1995 through 2011, an average of approximately 0.6 spills per year. There is no indication that any of these spills escaped secondary containment. An updated search of AST spills found 31 spill cases were recorded from January 2018 through 2025, an average of approximately 3.9 spills per year (ADEC 2026c). These spills ranged in volume from 0.75 gallon to 2,520 gallons, averaging 217.8 gallons. For this reason, the expected frequency of spill occurrences from ASTs is expected to be very low to low. Spill volumes from ASTs would be dependent on the size and location of the leak (on the tank) and the overall capacity of the tank itself. Leaks from a large

AST would likely be noticed within 1 day of the leak forming, but securing the leak could take a few days, depending on the leak's location on the tank. Spilled material from an AST would be captured within secondary containment. In the unlikely event that a spill escapes secondary containment, it is expected the spill would be limited to the gravel pad where the tank is located.

Pinhole leaks could occur in the injection water pipeline and would be expected to result in spills ranging in size from very small to medium–large depending on the time it would take to detect the spill and secure the leak. Leaks could occur on gravel pads or tundra and waterbodies between pads or both. The effects of seawater spills on tundra or waterbodies are addressed in the appropriate resource sections in Chapter 3.

During drilling and operations, spills that are not specifically associated with petroleum development infrastructure (as discussed above) could also occur. These spills include those associated with warehouse and storage facilities, equipment maintenance and repair activities, and vehicle and equipment refueling activities. These spills would involve a variety of refined products such as diesel, gasoline, hydraulic fluid, lubricating oil, grease, waste oil, mineral oil, and other products. Spills would occur on gravel pads, inside buildings, or inside secondary containment areas. The likelihood of very small to medium spills is high to very high. On-pad spills of this nature would be detected and responded to quickly, 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.

Spills along roadways associated with accidents involving vehicles transporting personnel, equipment, and supplies could also occur during drilling and operations. It is expected that spill events associated with vehicle accidents would be similar to those previously described and discussed in Section 4.3 (Potential Spills during Construction).

4.4.4 Spills Summary

Table 4.4-3 summarizes drilling and operations spill types, spill volumes, spill likelihood, spill duration, and estimated geographic extent of spill for the action alternatives.

Table 4.4-3. Potential Spill Types, Spill Volumes, Spill Likelihood, Spill Duration, and Estimated Geographic Extent of Spill during Drilling and Operations for Action Alternatives

Origin	Spill Event	Type of Spill	Very Small Spill (<10 gallons)	Small Spill (10 to 99.9 gallons)	Medium Spill (100 to 999.9 gallons)	Medium–Large Spill (1,000 to 9,999.9 gallons)	Large Spill (10,000 to 100,000 gallons)	Very Large Spill (>100,000 gallons)	Likely Duration	Likely Geographic Extent of Spill
Oil wells	Shallow gas blowout	Drilling fluids (no produced fluids)	VLL	VLL	VLL	VLL	VLL	VLL	1 to 2 days	No crude oil would be spilled, but drilling muds and other drilling fluids could impact an area up to 20 to 25 acres adjacent to the well pad.
Oil wells	Reservoir blowout	Produced fluids and drilling fluids	VLL	VLL	VLL	VLL	VLL	VLL	A few days to a week or two	Modeling results suggest that up to 14% of the discharged oil would remain airborne as an aerosol and 86% would reach the ground surface in a swath up to 693 feet wide and up to 3,864 feet downwind of the well based on typical prevailing wind patterns at the time of the spill. (Details are in Section 4.4.1.2 [Reservoir Blowout].)
Oil wells	Wellhead and well-casing leaks	Produced fluids	LL	LL	LL	VLL	VLL	VLL	A few hours for very small spills to a few days for large spills	Spills would be expected to be contained within the immediate vicinity of the well itself and would not be expected to reach areas off the gravel pad.
Pipelines	Facility piping	Produced fluids and various refined products	VHL	VHL	HL	ML	LL	VLL	Very short (less than 1 hour) for very small spills to a few days for large spills	Spills would be expected to be contained to the gravel pad and its immediate margin.
Pipelines	Infield flowlines (produced oil, injection water)	Multiphase produced fluids and produced water	LL	LL	LL	VLL	VLL	VLL	Very short (less than 4 hours) or could continue for days to weeks depending on the size and location of the leak along the flowline	Leaks could occur on the gravel pads or on tundra and adjacent waterbodies between pads. Large spills that go undetected for a period of time could spread to an area a few acres in size before the spill is stopped. The area reached by materials from large spills would be influenced by the location and time of year of the spill. If a large spill occurs near a river channel or in the spring when water flows are high, the geographic extent of such a spill could be larger.
ASTs	Large aboveground storage tanks	Various refined products and processed (sales-quality) oil	LL	LL	LL	LL	VLL	VLL	Would likely be noticed within a day of the start of the leak, but securing the leak could take a few days depending on where the leak occurred on the tank.	Spilled material would be captured within secondary containment. In the unlikely event that a spill escape the secondary containment, it is expected that the spill would be contained to the pad itself and would not reach the tundra, adjacent waterbodies, or other sensitive habitats.
Spills not specifically associated with petroleum development infrastructure	Spills associated with warehouse activities; storage facilities; equipment maintenance and repair activities; vehicle accidents; and vehicle and equipment refueling activities	Typically, a variety of refined products	VHL	VHL	HL	LL	VLL	VLL	On-pad spills would be observed and responded to quickly and be of short duration (less than 0.5 day). Spills from vehicle accidents would happen at the time of the accident and last less than an hour.	Spills would remain on the pad or within secondary containment; damage to areas adjacent to pads would not be anticipated. If a spill occurs due to a large bulk-fuel tanker truck accident and the tanker volume is released, the geographic extent would likely include the road, adjacent roadside habitats, and possibly waterbodies. The geographic extent of a spill of this size would vary depending location of the accident and the season in which it occurred; however, the spill would be localized and likely affect an area up to 0.5 acre.

Note: HL = high likelihood; LL = low likelihood; ML = medium likelihood; VHL = very high likelihood; VLL = very low likelihood.

4.5 HAZARDOUS MATERIALS

In addition to the potential for spills of oil or injection water to occur, a number of hazardous materials would also be used by the Project under all action alternatives. These include the use of biocides (used in the injection water pipeline in order to kill microorganisms which cause internal corrosion in the pipeline network), corrosion inhibitors, methanol, antifreeze, other glycols, acids, lubrication oils, used oil, and hydraulic fluids. These materials would be used in small quantities by construction equipment, and in larger quantities during drilling and operations when they are typically stored inside buildings or in ASTs with necessary secondary containment, both of which are located on gravel pads.

The history of hazardous material spills on the North Slope was described in the Willow SEIS (BLM 2023) and in the Nanushuk EIS (USACE 2018). Using the ADEC Statewide Oil and Hazardous Substance Spills Database, USACE (2012) identified a total of 9,106 spills that occurred on the North Slope between 1995 and 2009. BLM (2023:432) identified another 980 spills that occurred on the North Slope between 2010 and June 2019. Average spill volumes for the combined 1995–2009 and 2010–2019 time periods ranged from small (0.1 gallon) to medium (133 gallons) depending on the material, though a few spills were medium–large to large; the largest spill was over 12,800 gallons. USACE reviewed data from July 2019 through December 2025: a total of 1,983 spills were recorded (ADEC 2026b) and are summarized in Table 4.5-1.

Table 4.5-1. Summary of Selected Hazardous Material Spills on the North Slope, July 2019 through December 2025

Hazardous Material	Number of Spill Records	Average Number of Spills per Year	Largest Spill (gallons)	Total Volume Spilled (gallons)	Average Volume Spilled (gallons)	Percentage of all Spill Records*
Hydraulic oil	454	69.8	700	5,066	11.2	22.9%
Methanol	76	11.7	410	1,565	20.6	3.8%
Corrosion inhibitors	95	14.6	200	724	7.6	4.8%
Engine lube oils	115	17.7	400	2,034	17.7	5.8%
Antifreeze (ethylene glycol)	67	10.3	1,700	5,379	80.3	3.4%
Other glycols	91†	14	1,055	6,994	76.9	4.6%
Acids	10	1.5	265	276	27.6	0.5%
Used oil	29†	4.5	50	165	5.7	1.5%

Source: ADEC (2026b).
* Percentage of 1,983 total spill records.
† Other glycol and used oil both included one record of a spill event with 0 gallons spilled.

Based on these historical data, the likelihood of a hazardous material spill occurring over the CD8 Project's lifetime is very high. The duration of potential hazardous materials spills is expected to be short (typically less than 4 hours) and identified and responded to quickly, as consistent with required spill plans (SPCCP, ODPCP, and facility response plan). It is expected that hazardous materials 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.

A nonhazardous water-based mud system would be used for production and injection wells in the surface and intermediate hole sections. The lateral hole sections would use nonhazardous mineral oil-based mud system. The mineral oil-based mud intended for select lateral sections is needed due to the extended nature of the wells.

4.6 QUANTITATIVE SPILL ANALYSIS

Similar to BLM (2023), this quantitative spill analysis uses estimated spill rates from the 2020 NPR-A IAP EIS (BLM 2020), which was developed to quantify an estimated number of potential spills that may result from different oil and gas development and production scenarios. Estimating the number of potential spills is an exercise in probability based on Alaska North Slope historical oil spill data. There is uncertainty in the location, number, and size of any potential spill. The NPR-A IAP EIS (BLM 2020) spill analysis assumes the rate and volume of spills would be consistent with recent history; however, the spill rate could decrease in the future due to technological advances and prevention preparedness, or it could increase due to a changing Arctic climate or increased oil and gas activity.

The NPR-A IAP EIS (BLM 2020) spill analysis (Volume II, Appendix I) used ADEC data from 2000 through 2018 and defined spill sizes in three size classifications consistent with EPA regulations (40 CFR 112) (Table 4.6-1 and Table 4.6-2). By comparison, the CD8 Project EIS uses six spill size categories (see Table 4.1-1). The spill size classifications used in the NPR-A IAP EIS would be too broad to adequately evaluate potential spill impacts to Chapter 3 environmental resources because most spills on the North Slope are less than 1 barrel (42 gallons) (BLM 2012). This analysis uses the NPR-A IAP EIS methodology and applies it to the estimated CD8 oil production volumes.

Table 4.6-1. 2020 NPR-A IAP Spill Rates on the North Slope per Billion Barrels of Oil Produced, 2000 through 2018

Substance	Small (0–2,100 gallons)	Medium (2,101–36,036 gallons)	Large (>36,036 gallons
Crude oil	129.53	2.63	0.20
Seawater and injection water	94.57	8.08	1.41
Refined oil	563.37	1.41	0.00
Other hazardous materials	386.16	3.23	0.20
Total	**1,173.63**	**15.35**	**1.81**

Source: BLM (2020).

Table 4.6-2. Average North Slope Spill Size, 2000 through 2018

Substance	Small (0–2,100 gallons)	Medium (2,101–36,036 gallons)	Large (>36,036 gallons)
Crude oil	60	9,893	212,252
Seawater and injection water	207	6,854	88,981
Refined oil	24	3,269	0
Other hazardous materials	63	5,341	42,000

Source: BLM (2020).

Analysis of spills in this section focuses on the risks of spills from construction activities, shallow gas and reservoir blowouts, well head and well-casing leaks, facility piping, new pipelines lines, as well as leaks from ASTs. These categories include a variety of spill types, such as crude oil, seawater and injection water, and other hazardous materials. Tables 4.6-3 through 4.6-5 provide the projected number of spills for the CD8 Project, using the BLM (2020) estimated spill rates for oil production using the Project's estimated production volume. As spill sizes become larger, the probability of occurrence reduces.

Table 4.6-3. Alternative B Projected Number of Spills by Size Classification Based on Projected Oil Production (93 million barrels)

Substance	Small (0–2,100 gallons)	Medium (2,101–36,036 gallons)	Large (>36,036 gallons)
Crude oil	12.05	0.24	0.02
Seawater and injection water	8.80	0.75	0.13
Refined oil	52.39	0.13	0.00
Other hazardous materials	35.91	0.30	0.02
Total	**109.15**	**1.42**	**0.17**

Source: BLM (2020).

Table 4.6-4. Alternative C Projected Number of Spills by Size Classification Based on Projected Oil Production (67 million barrels)

Substance	Small (0 to 2,100 gallons)	Medium (2,101 to 36,036 gallons)	Large (>36,036 gallons
Crude oil	8.68	0.18	0.01
Seawater and injection water	6.34	0.54	0.09
Refined oil	37.75	0.09	0.00
Other hazardous materials	25.87	0.22	0.01
Total	78.63	1.03	0.12

Source: BLM (2020).

Table 4.6-5. Alternative D Projected Number of Spills by Size Classification Based on Projected Oil Production (83 million barrels)

Substance	Small (0–2,100 gallons)	Medium (2,101–36,036 gallons)	Large (>36,036 gallons)
Crude oil	10.75	0.22	0.02
Seawater and injection water	7.85	0.67	0.12
Refined oil	46.76	0.12	0.00
Other hazardous materials	32.05	0.27	0.02
Total	97.41	1.27	0.15

Source: BLM (2020).

4.7 SUMMARY

Any North Slope oil and gas development, including the CD8 Project, would likely incur spills despite continued improvements in engineering design; a greater emphasis on clean and safe operations; use of avoidance and minimization measures; continued improvements in, and

awareness of, spill prevention; and improvements in spill response capabilities. Very small to large spills of refined oils could occur during construction; however, these incidental releases would occur on gravel or ice infrastructure or into secondary containment structures. These types of spills occurring on gravel or ice infrastructure would be expected to have very limited to no impact to tundra or waterbodies adjacent to these facilities.

Spills along roadways would be limited to the road or tundra immediately adjacent to the road. It is expected that these spills would be quickly contained in the immediate area of the spill and would not move far from the accident site. If a spill occurs from a large bulk-fuel tanker truck accident and the tanker volume is released, the geographic extent would likely include the road and the area adjacent to the road, including waterbodies. The geographic extent of a spill of this size would vary, depending on the location of the accident and the season in which it occurred; however, the spill would be localized and most likely affect an area up to 0.5 acre.

Very small to small spills of refined products to the marine environment could occur during barging of materials (tugboats, support vessels, etc.). It would be possible, although of very low likelihood, that a medium to very large spill could occur along the barge or support vessel route in marine waters leading to Oliktok Dock.

During drilling and operations, very small to medium-sized spills may occur. Incidental releases could also occur from leaking wellheads, facility piping, or process piping. Spills of this type would be expected to be contained to and cleaned up on gravel pads and would not be expected to result in damage to adjacent tundra or waterbodies. Spills that originate along produced fluids pipelines would be expected to be detected and responded to quickly and would have a limited geographic extent. In the very unlikely event of a large or very large pipeline spill occurring at creek crossings or during periods of high flow, the extent of the incidental release could be much larger. Table 4.4-3 provides a summary of spill types, volumes, likelihood, duration, and estimated geographic extent for the action alternatives. Section 2.4.11 (Spill Prevention and Response) also describes numerous oil spill prevention and response planning measures that CPAI would implement. The results of this spill risk assessment suggest that the CD8 Project would not present a unique or an unusually high likelihood of a large or very large spill event occurring from petroleum development infrastructure. It would have similar likelihood of spills as other petroleum development infrastructure on the North Slope.

GLOSSARY

air quality related values: Resources at Federally managed Class I areas that may be adversely affected by a change in air quality; this may include visibility or a specific scenic, cultural, physical, biological, ecological, or recreational resource.

Class I areas: Areas established by Congress as areas of special national or regional natural, scenic, recreational, or historic value, such as national parks greater than 6,000 acres that were in existence before 1977.

drill stadium: The area within reach of the drillsite using extended reach drilling.

dust shadow: The area within 328 feet of a gravel road's surface where dust may be deposited.

infield traffic*:* Vehicle trips within a development or oil field (e.g., between the Alpine Central Facility (ACF) and a drillsite) used during operations and drilling.

in-situ burning: The burning of oil in place on the surface where it was spilled.

insect-relief areas: Specific habitats that caribou move to in the summer to escape harassment from mosquitos and oestrid flies.

interval: A specific section of rock or wellbore; intervals are categorized based on their geology, rock properties, fluid content, and how they interact with the well. Defining intervals allows geologists to identify productive zones and to isolate or avoid water or gas.

irretrievable: Irretrievable resource commitments involve the loss in value of an affected resource as a result of the action that cannot be restored (e.g., extinction of a threatened or endangered species or the disturbance of a cultural resource).

irreversible: Irreversible effects result primarily from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame.

multiphase: Multiphase fluids associated with oil and gas extraction are the raw, unprocessed material extracted from wells; multiphase fluids typically carry mixtures of oil, gas, water, and solids.

pingos: A dome-shaped mound consisting of a layer of soil over a large core of ice that is found in permafrost environments.

practicable: Per 40 Code of Federal Regulations (CFR) 230.10(a)(2), an alternative is considered practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the Applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered."

project purpose, basic: Determines *water dependency* of a project and if it must be located in a special aquatic site.

project purpose, overall: Defines the geographic boundaries of an applicant's specific project; it is the basis for the alternatives analysis under the CWA and is used to determine if the applicant's proposed project is the least environmentally damaging practicable alternative (LEDPA).

reasonable: Per 33 CFR 333.23(b)(3)(i), a reasonable alternative must be technically, legally, and economically feasible while still meeting the applicant's purpose and need.

target reservoir: The target reservoir is the area of the Narwhal reservoir targeted by ConocoPhillips Alaska, Inc. (CPAI) based on oil and gas leaseholds.

thermokarst: A land surface with karst-like features and hollows produced by melting of ice-rich soil permafrost.

water track: A feature in wetland complexes that is stream-like, narrow, and often curving. Soils remain wetter in a water track than in surrounding areas, and water typically moves along the surface or below the soil but above permafrost during periods of thaw.

LITERATURE CITED

Chapter 1

Kuukpik Corporation (Kuukpik). 2026. Kuukpik Corporation Lands & Permitting: Energy Development and Economic Partnerships. Available at: https://www.kuukpik.com/about-us/permitting/. Accessed January 12, 2026.

Chapter 2

AECOM. 2017. Ambient demonstration for the North Slope portable oil and gas operation simulation. Prepared for the Workgroup for Global Air Permit Policy Development for Temporary Oil and Gas Drill Rigs, Technical Subgroup, Anchorage, Alaska.

Alaska Clean Seas (ACS). 2024. *Alaska Clean Seas Technical Manual*. Vols. 1 and 2. Available at: https://www.alaskacleanseas.org/wp-content/uploads/2025/01/Volume-1-Technical-Manual_Rev16_Electronic.pdf. Accessed May 2026.

Alaska Department of Environmental Conservation (ADEC). 2022. *Alaska Inland Area On-Scene Coordinator* In Situ *Burning Checklist.* Prepared by the Alaska Inland Area Committee, *In Situ* Burning Working Group. Available at: https://dec.alaska.gov/media/fd2bmd1v/inland-sosc-insitu-burn-checklists.pdf. Accessed May 2026.

Alaska Department of Fish and Game (ADF&G). 2006. *Our Wealth Maintained: A Strategy for Conserving Alaska's Diverse Wildlife and Fish Resources*. Anchorage: Alaska Department of Fish and Game.

Alyeska Pipeline Service Company. 2011. *Trans Alaska Pipeline System (TAPS) Low Flow Impact Study – Final Report.* June 15, 2011. Available at: https://northerngaspipelines.com/wp-content/uploads/Alyeska%20Study%206-15-11_ExSum.pdf. Accessed August 2026.

Arctic Slope Regional Corporation (ASRC). 2019. *Colville River Crossing Route Study Arctic Strategic Transportation and Resources Project, North Close, Alaska*. Prepared for the Office of Project Management and Permitting Alaska Department of Natural Resources. Anchorage, Alaska: Arctic Slope Regional Corporation Energy Services.

Association for Materials Protection and Performance. 2022. *Multiphase Flow Internal Corrosion Direct Assessment (MP-ICDA) Methodology for Pipelines.* NACE SP0116-2022.

ConocoPhillips Alaska, Inc. (CPAI). 2021. *Alpine Facilities Erosion Control Plan*. Revised June 2021. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2023. *Wildlife Avoidance and Interaction Plan.* Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2024. *Storm Water Pollution Prevention Plan & Best Management Practices Plan.* APDES Permit No. AKG332000. Alpine Development, Greater Mooses Tooth Unit, and ASRC Gravel Mine Site. Revision 3.0. November 2024. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025a. *Oil Discharge Prevention and Contingency Plan*. Western North Slope. Alpine and Willow Production and Pipeline Facilities. ADEC Plan No. 22-CP-4140. EPA FRP R10-AK-0231. DOT Sequence No. 1476. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025b. *Spill Prevention, Control, and Countermeasure Plan*. Alpine Field and Satellites. Western North Slope, Alaska. Prepared October 2010. Amended July 2025. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025c. *Emergency Stakeholder Outreach Plan Western North Slope, Alaska*. Anchorage, Alaska.

ConocoPhillips Alaska, Inc. (CPAI) and Hilcorp North Slope, LLC. 2021. *Alaska Waste Disposal and Reuse Guide*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

Michael Baker International (MBI). 2020. *2020 Colville River Delta Spring Breakup Monitoring & Hydrological Assessment - North Slope Science Initiative*. Available at: https://northslopescience.org/wp-content/uploads/2020-CRD-Spring-Breakup-Monitoring-and-Hydrological-Assessment_1.pdf. Accessed March 2026.

———. 2025. *Colville River Delta Spring Breakup Monitoring and Hydrological Assessment 2025 Report*. 206892-MBI-HH-RPT-005. Prepared for ConocoPhillips Alaska, Inc. Available at: https://catalog.northslopescience.org/dataset/2378/resource/6c41f222-9041-4c37-a467-ac77a52e18d4. Accessed December 30, 2025.

———. 2026. 2020 Colville River Delta 2D Surface Water Model Update 177261-MBI-HH-RPT-001. Prepared for ConocoPhillips Alaska, Inc. by Michael Baker International. Anchorage, Alaska.

Nesic, S. 2007. Key issues related to modelling of internal corrosion of oil and gas pipelines – A review. *Corrosion Science* 49:4308–4338.

———. 2012. Effects of Multiphase Flow on Internal CO_2 Corrosion of Mild Steel Pipelines. American Chemical Society. *Energy & Fuels* 4098–4111.

Thomas Industrial Coatings. 2026. What corrosion does to oil and gas pipelines. Available at: https://thomasindcoatings.com/what-corrosion-does-to-oil-and-gas-pipelines/. Accessed June 2026.

Chapter 3

3.1 Analysis Methods

88 Energy. 2026. Project Phoenix Matured New Discovery with a Production Test Planned mid-2026. Available at: https://88energy.com/phoenix/./https://88energy.com/project-phoenix/. Accessed March 2026.

Alaska Beacon. 2026. Arctic Alaska oil and gas lease sale draws record bidding, despite legal clouds. Dated March 19, 2026. Available at: https://alaskapublic.org/news/economy/energy/2026-03-19/arctic-alaska-oil-and-gas-lease-sale-draws-record-bidding-despite-legal-clouds.

Alaska Department of Commerce, Community, and Economic Development. 2025. *National Petroleum Reserve - Alaska (NPR-A) Impact Mitigation Grant Program Report to the First Session of the Thirty-Fourth Alaska Legislature*. Available at: https://www.commerce.alaska.gov/web/Portals/4/pub/NPR-A%20Grant/2026%20NPR-A%20Report%20to%20the%20Legislature.pdf. Accessed February 10, 2026.

Alaska Department of Natural Resources (ADNR). 2000. *Colville River Unit Agreement*. Findings and Decision of the Commissioner. Available at: https://dog.dnr.alaska.gov/Documents/Units/2000/20001109_CR_1stUnitExpansion_Approved.pdf. Accessed March 2026.

———. 2022. *Notice: Formation of the Quokka Unit (QKU), Termination of the Placer Unit (PLU), and Leases Committed Entirely to the Quokka Unit (QKU)*. Available at: https://dog.dnr.alaska.gov/Document/Download/2165A4101BC44C8D87B9284EE34BE200/Formation%20of%20the%20Quokka%20Unit%20and%20Termination%20of%20the%20Placer%20Unit%20Leasing%20Action%20Notice.pdf. Accessed March 2026.

———. 2026a. Summary of State Competitive Oil and Gas Lease Sales -- 1959 to Present Current to 1/22/2026. Anchorage, Alaska: Division of Oil and Gas. Available at: https://dog.dnr.alaska.gov/Documents/Leasing/SaleResults/Summary_of_All_Lease_Sale_Results.pdf. Accessed June 2026.

———. 2026b. Response to CD8 Project Request for Information G: Lease Sale Statistics.

———. 2026c. Active Oil and Gas Lease Inventory. As of 6/7/2026. Anchorage, Alaska: Division of Oil and Gas. Available at: https://dog.dnr.alaska.gov/Documents/Leasing/PeriodicReports/Lease_LASActiveLeaseInventory.pdf. Accessed June 2026.

Bailey, A. 2025. A positive situation: Pantheon anticipates active development of its field in the near future. Available at: https://www.petroleumnews.com/pntruncate/989845659.shtml. Accessed March 2026.

Bureau of Land Management (BLM). 2004a. *Alpine Satellite Development Plan Final Environmental Impact Statement.* Available at: https://eplanning.blm.gov/Documents/?id=46109c99-a7f2-f011-8407-001dd80c29f3&spid=1ff24f4e-a8f2-f011-8407-001dd803d067. Accessed November 2025.

———. 2004b. *Alpine Satellite Development Plan Record of Decision*. Available at: https://eplanning.blm.gov/Documents/?id=46109c99-a7f2-f011-8407-001dd80c29f3&spid=1ff24f4e-a8f2-f011-8407-001dd803d067. Accessed November 2025.

———. 2015. *Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project.* Available at: https://eplanning.blm.gov/Documents/?id=c5c53188-a7f2-f011-8407-001dd80bcf93&spid=cf2c9f43-a8f2-f011-8406-001dd802fdea. Accessed November 2025.

———. 2018. *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project, Final Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/Documents/?id=f268a393-a7f2-f011-8407-001dd80c29f3&spid=f7f04f4e-a8f2-f011-8407-001dd803d067. Accessed March 2026.

———. 2020. *National Petroleum Reserve in Alaska. Integrated Activity Plan and Environmental Impact Statement*. U. S. Department of the Interior. Available at: https://eplanning.blm.gov/Project-Home/?id=9a371ca7-a7f2-f011-8407-001dd806295a. Accessed April 2026.

———. 2022. *National Petroleum Reserve in Alaska Integrated Activity Plan Record of Decision*. Available at: https://eplanning.blm.gov/Documents/?id=9a371ca7-a7f2-f011-8407-001dd806295a&spid=53b0b361-a8f2-f011-8406-001dd802fdea. Accessed March 2026.

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/Project-Home/?id=f07b7ab1-a7f2-f011-8407-001dd80b1f5f. Accessed December 9, 2025.

———. 2025a. *National Petroleum Reserve in Alaska Integrated Activity Plan Environmental Assessment. DOI-BLM-AK-0000-2025-0005-EA*. Available at: https://eplanning.blm.gov/public_projects/?doc=%2F2038893%2F200654572%2F20148806%2F251048786%2F20251222_2025%20NPRA%20IAP_FINAL%20EA_508.pdf. Accessed December 9, 2025.

———. 2025b. *National Petroleum Reserve in Alaska Integrated Activity Plan Record of Decision.* Available at: https://eplanning.blm.gov/Documents/?id=9a371ca7-a7f2-f011-8407-001dd806295a&spid=53b0b361-a8f2-f011-8406-001dd802fdea. Accessed April 2026.

Bureau of Transportation Statistics. 2025. Air Carrier Statistics (Form 41 Traffic) – T – 100 Segment (All Carriers). *Data Library: Aviation*. Available at: https://www.transtats.bts.gov/databases.asp?Z1qr_VQ=E&Z1qr_Qr5p=N8vn6v10&f7owrp6_VQF=D. Accessed April 2026.

Cao, Y., W. Ma, G. Li, K. Gao, C. Li, D. Chen, Y. Shang, X. Wei, Z. Chen, G. Wu, P. Chen, L. Bai, L. Tang, H. Jia, and J. Yue. 2024. Rapid permafrost thaw under buried oil pipeline and effective solution using a novel mitigative technique based on field and laboratory results. *Cold Regions Science and Technology* 219.

Cao, Y., G. Li, W. Ma, G. Wu, Z. Chen, B. Wang, K. Gao, D. Chen. Q. Du, H. Jing, and Z. Zhang. 2024. Thaw bulb formation surrounding warm-oil pipelines and evaluation of the cooling performance of a new air convection pipeline embankment structure. *Energy* 293.

Cashman, K. 2025. New NPR-A explorer: IPB Petroleum acquires Umiat leases; Dougal Ferguson, Paul Craig key players. *Petroleum News* 30(14, December):49. Available at: https://www.petroleumnews.com/pntruncate/305108244.shtml. Accessed March 2026.

Congressional Research Service. 2024. National Petroleum Reserve in Alaska (NPR-A): A Summary. Available at: https://www.congress.gov/crs_external_products/IF/PDF/IF13119/IF13119.1.pdf. Accessed April 2026.

ConocoPhillips Alaska, Inc. (CPAI). 2022. *Incident Investigation Report. Alpine CD1 Gas Release*. Dated May 3, 2022. Available at: https://static.conocophillips.com/files/resources/attachment-a-incident-investigation-report.pdf. Accessed December 22, 2025.

Creel, R., J. Guimond, B.M. Jones, D.M. Nielsen, E. Bristol, C.E. Tweedie, and P.P. Overduin 2024. Permafrost thaw subsidence, sea-level rise, and erosion are transforming Alaska's Arctic coastal zone. *Proceedings of the National Academy of Sciences of the United States of America* 121(50).

Denali Commission. 2019. *Statewide Threat Assessment: Identification of Threats from Erosion, Flooding, and Thawing Permafrost in Remote Alaska Communities*. INE 19.03. Prepared for Denali Commission. University of Alaska Fairbanks Institute of Northern Engineering; U. S. Army Corps of Engineers Alaska District; U. S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory.

DeSantis, M.K., and L. Ryan. 2025. National Petroleum Reserve in Alaska (NPR-A): A Summary. Energy and Natural Resources. *Focus* IF13119. Available at: https://www.congress.gov/crs-product/IF13119. Accessed December 26, 2025.

Druckenmiller, M.L., R.L. Thoman, and T.A. Moon (eds.). 2025. *Arctic Report Card 2025*, edited by M.B. Armstrong and C. Garcia. Available at: https://arctic.noaa.gov/wp-content/uploads/2025/12/ArcticReportCard_full_report2025.pdf. Accessed December 22, 2025.

Erickson, N. 2024. The Community Winter Access Trail. In Alaska Business. Available at: https://www.akbizmag.com/industry/transportation/cwat/. Accessed March 2026.

Intergovernmental Panel on Climate Change (IPCC) 2019. Polar Regions. In *The Ocean and Cryosphere in a Changing Climate: Special Report of the Intergovernmental Panel on Climate Change*, edited by Change Intergovernmental Panel on Climate, pp. 203-320. Cambridge: Cambridge University Press.

———. 2021. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/report/ar6/wg1/. Accessed December 22, 2025.

———. 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability. IPC Sixth Assessment Report. Available at: https://www.ipcc.ch/report/ar6/wg2/. Accessed December 22, 2025.

Jones, B.M., A.M. Irrgang, L.M. Farquharson, H. Lantuit, D. Whalen, S. Ogorodov, M. Grigoriev, C. Tweedie, A.E. Gibbs, M.C. Strzelecki, A. Baranskaya, N. Belova, A. Sinitsyn, A. Kroon, A. Maslakov, G. Vieira, G. Grosse, P. Overduin, I. Nitze, C. Maio, J. Overbeck, M. Bendixen, P. Zagórski, and V.E. Romanovsky. 2020. *NOAA Arctic Report Card 2020: Coastal Permafrost Erosion*. National Oceanic and Atmospheric Administration.

Kim, I.W., A. Timmermann, J.E. Kim, K.B. Rodgers, S.S. Lee, H. Lee, and W.R. Wieder. 2024. Abrupt increase in Arctic-Subarctic wildfires caused by future permafrost thaw. *Nature Communications* 15. Available at: https://doi.org/10.1038/s41467-024-51471-x. Accessed December 9, 2025.

Kim, T., G. Villarini, J.M. Done, A.F. Prein, D.R. Johnson, and C. Wang. 2025. Ensemble downscaled climate dataset for Alaska and Hawaii under historical and future conditions. *Scientific Data* 12. Available at: https://doi.org/10.1038/s41597-025-05366-1. Accessed December 9, 2025.

Kornbrath, R.W. 1995. *Analysis of Historical Oil and Gas Lease Sale and Exploration Data for Alaska*. Division of Geological and Geophysical Surveys.

Manos, E., C. Witharana, and A.K. Liljedahl. 2025. Permafrost thaw-related infrastructure damage costs in Alaska are projected to double under medium and high emission scenarios. *Communications Earth and Environment* 6. Available at: https://doi.org/10.1038/s43247-025-02191-7. Accessed December 9, 2025.

Markon, C.J., S.F. Trainor, and F.S. Chapin, III. 2012. *The United States National Climate Assessment—Alaska Technical Regional Report*. Circular 1379. Reston, Virginia: U.S. Geological Survey.

Melillo, J.M., T.T. Richmond, and G. Yohe (eds.). 2014. *Climate Change Impacts in the United States: Third National Climate Assessment*. Edited by U.S. Global Change Research Program. Washington, D.C.: U.S. Government Printing Office.

Michalek, A.T., G. Villarini, A.F. Prein, J.M. Done, D.R. Johnson, and C. Wang. 2025. Precipitation- and temperature-driven future changes to flooding in Alaska. *Geophysical Research Letters* 3(52). Available at: https://doi.org/10.1029/2024GL112004. Accessed December 9, 2025.

North Slope Borough (NSB). 2018. *North Slope Borough Comprehensive Plan 2019 –2039*. North Slope Borough Assembly Ordinance #75-06-73. North Slope Borough Planning Commission Resolution #2019-01.

———. 2023. *2023 Multi-jurisdictional Hazard Mitigation Plan*. Available at: https://north-slope.org/wp-content/uploads/2023/10/NSB-Multi-Jurisdictional-Hazard-Mitigation-Plan.pdf. Accessed December 22, 2025.

National Park Service (NPS). 2019. Wildfire in the Arctic. Available at: https://www.nps.gov/subjects/arctic/wildfire.htm. Accessed December 9, 2025.

Pantheon Resources, PLC. 2026. Kodiak – A World Class Oil and Gas Field. Available at: https://mail.pantheonresources.com/index.php/projects/kodiak. Accessed March 2026.

Santos. 2025. Annual update to Horseshoe Unit, BLM Agreement Number AA-098664. Email communication, M. Ireland, Senior Vice President Subsurface and Exploration, Santos, to D. Nottingham, Director, Alaska Department of Natural Resources, Anchorage, Alaska, and W. Svejnoha, Alaska Energy and Minerals Branch Chief, Bureau of Land Management, Anchorage, Alaska. June 27. Available at: https://dog.dnr.alaska.gov/Document/Download/40FCF6C8575341159C400038B7005CDC/Horseshoe%20Unit%20Plan%20of%20Exploration%20-%20Update.pdf. Accessed March 2026.

Scenarios Network for Alaska + Arctic Planning (SNAP). 2025. Community Climate Charts. Available at: https://snap.uaf.edu/tools/community-charts. Accessed December 2025.

United Nations Environment Programme (UNEP). 2022. *Spreading Like Wildfire, The Rising Threat of Extraordinary Landscape Fires*. A UNEP Rapid Response Assessment Available at: https://wedocs.unep.org/items/5d3e5267-17bd-4b06-9964-494dd01f7791.

U.S. Army Corps of Engineers (USACE). 2012. *Point Thomson Project EIS Final Environmental Impact Statement.* JBER, Alaska: U. S. Army Corps of Engineers, Alaska District, Alaska Regulator Division CEPOA-RD.

———. 2018. *Nanushuk Project Final Environmental Impact Statement*. JBER, Alaska: U. S. Army Corps of Engineers, Alaska District. Prepared by DOWL.

U.S. Global Change Research Program (USGCRP). 2018. *2018 Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Washington, D.C.: U.S. Global Change Research Program. Available at: https://repository.library.noaa.gov/view/noaa/19487. Accessed December 9, 2025.

———. 2023. *Fifth National Climate Assessment*. Washington, D.C.: U.S. Global Change Research Program. Available at: https://toolkit.climate.gov/sites/default/files/2025-07/NCA5_2023_FullReport.pdf. Accessed December 9, 2025

U.S. Geological Survey (USGS). 2025. Climate Change and Future Water Availability in the United States. In Chapter E of *U. S. Geological Survey Integrated Water Availability Assessment – 2010 – 2020*. Professional Paper 1894-E. U. S. Department of the Interior.

Voigt, C., M.E. Marushchak, R.E. Lamprecht, M. Jackowicz-Korczyński, A. Lindgren, M. Mastepanov, L. Granlund, T.R. Christensen, T. Tahvanainen, P.J. Martikainen, and C. Biasi. 2017. Increased Nitrous Oxide Emissions from Arctic Peatlands After Permafrost Thaw. *Proceedings of the National Academy of Sciences* 114(24):6238–6243.

3.2 Air Quality

AirNow. 2026. Interactive Map of Air Quality. Available at: https://gispub.epa.gov/airnow/. Accessed March 2026.

Alaska Department of Environmental Conservation. (ADEC). 2017. *Vapor Intrusion Guidance for Contaminated Sites. Division of Spill Prevention and Response, Contaminated Sites Program*. November 2017. Available at: https://dec.alaska.gov/media/12131/2017-vi-guidance-final-without-appendix-i.pdf. Accessed May 2026.

———. 2026. State Implementation Plan (SIP). Available at: https://dec.alaska.gov/air/anpms/sip/. Accessed May 22, 2026.

Alaska Department of Environmental Conservation (ADEC), U.S. Environmental Protection Agency (EPA), and U.S. Coast Guard (USCG). 2008. In Situ Burning Guidelines for Alaska. Anchorage. Available at: https://dec.alaska.gov/media/7769/in-situ-burning-rev1.pdf. Accessed May 2026.

AECOM. 2011a. Nuiqsut Ambient Air Quality Monitoring Program 2009 Monitoring Year Data Summary, January 1, 2009 through December 31, 2009, Final. February 2011. Report prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

———. 2011b. Nuiqsut Ambient Air Quality Monitoring Program 2010 Monitoring Year Data Summary, January 1, 2010 through December 31, 2010, Final. March 2011. Report prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

Bureau of Land Management (BLM). 2014. *Final Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project, Volume 1*. Anchorage, Alaska.

———. 2018. *Final Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth 2 Development Project, Volumes 1 and 3*. Anchorage, Alaska.

———. 2020. *Final Integrated Activity Plan and Environmental Impact Statement for the National Petroleum Reserve in Alaska*. Anchorage, Alaska.

———. 2023. *Final Supplemental Environmental Impact Statement for the Willow Master Development Plan, Volumes 1, 11b, and 11c*. Anchorage, Alaska.

ConocoPhillips Alaska, Inc (CPAI). 2024. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2023 through December 31, 2023*. February 2024. Available at: https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/1b4126c9-f79a-441a-b3e3-637d088692da/download/202402-cpai-nuiqsut-air-quality-trends-report-2023.pdf. Accessed April 2026.

———. 2025. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2024 through December 31, 2024*. February 2025. Available at: https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/7e6b9449-d478-49c5-9b7d-8d53e129ebef/download/202502-cpai-nuiqsut-air-quality-trends-report-2024.pdf. Accessed March 2026.

———. 2026. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2025 through December 31, 2025*. February 2026. Available at : https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/993af4e7-badb-4fc4-91d5-8df6bc066848/download/202602-cpai-nuiqsut-air-quality-trends-report-2025.pdf. Accessed March 2026.

Forster, P., T. Storelvmo, K. Armour, W. Collins, J.-L. Dufresne, D. Frame, D.J. Lunt, T. Mauritsen, M.D. Palmer, M. Watanabe, M. Wild, and H. Zhang. 2021. The Earth's Energy Budget, Climate Feedbacks, and Climate Sensitivity. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change,* V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou, pp. 923–1054. Cambridge, United Kingdom and New York, New York, USA: Cambridge University Press. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07.pdf. Accessed May 2026.

SECOR International Incorporated (SECOR). 2000. Nuiqsut Ambient Air Quality Monitoring Program Annual Data Report, April 1999 through March 2000. Anchorage, Alaska: Phillips Alaska, Inc.

SLR International Corporation (SLR). 2021. *Volatile Organic Compounds (VOCs) Near the Village of Nuiqsut, Alaska. November 2021*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation. Available at: https://catalog.northslopescience.org/dataset/6dc69afe-9424-455a-aca2-c80769e878ff/resource/74833dc6-6e68-4de4-9c42-f2004bbd5036/download/semiannual-voc-monitoring-report-apr-sept-2021.pdf. Accessed May 2026.

———. 2024. *Nuiqsut Ambient Air Quality and Meteorological Monitoring Program, March 2024,* pp. 158. Nuiqsut 2023 Annual Report. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation. Available at: https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/0dcbef86-eda0-40f6-9ae0-92b3142dde4a/download/nuiqsut-air-and-meteorological-monitoring-program-2023.pdf. Accessed April 2026.

———. 2025a. *Nuiqsut Ambient Air Quality and Meteorological Monitoring Program, February 2025*, pp. 159. Nuiqsut 2024 Annual Report. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation. Available at: https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/a88bd7ca-3e82-4096-8a55-6266b1e21ab3/download/202502xx-slr-nuiqsut-air-and-meteorological-monitoring-program-2024.pdf. Accessed April 2026.

———. 2025b. *Volatile Organic Compounds (VOCs) Near Nuiqsut Alaska*. October 2025. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation. Available at: https://catalog.northslopescience.org/dataset/6dc69afe-9424-455a-aca2-c80769e878ff/resource/a48310fb-ae2c-417f-9669-9acef4031821/download/semiannual_voc_report_oct25.pdf. Accessed April 2026.

———. 2026a. *Nuiqsut Ambient Air Quality and Meteorological Monitoring Program, February 2026*, pp. 153. Nuiqsut 2025 Annual Report. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation. Available at: https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/c0f49020-6b9f-40cf-b0c6-1e1a16032c00/download/20260225-slr-2025-nuiqsut-air-monitoring-report.pdf. Accessed April 2026.

———. 2026b. *CD8 Emissions Inventory Technical Supporting Document*. CD8 Project Emissions Inventory Rev01_00 Technical Supporting Document (TSD). September 30, 2025; EI Workbook updated March 1, 2026. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation.

———. 2026c. *CD8 Project. Air Quality Impact Analysis Report - Rev 02*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation.

———. 2026d. *CD8 Project Cumulative Ambient Air Quality Impact Assessment Supplemental Modeling at Nuiqsut*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation.

Turner, D.B. 1970. Workbook of Atmospheric Dispersion Estimates. Revised 1970. Public Health Service Publication No. 999-AP-26. Cincinnati, Ohio: U.S. Department of Health, Education, and Welfare, Public Health Service. Environmental Health Service, and National Air Pollution Control Administration.

United Nations Environment Programme (UNEP). 2022. *Spreading Like Wildfire, The Rising Threat of Extraordinary Landscape Fires*. A UNEP Rapid Response Assessment. Available at: https://wedocs.unep.org/items/5d3e5267-17bd-4b06-9964-494dd01f7791. Accessed May 2026.

U.S. Army Corps of Engineers (USACE). 2018. Final Environmental Impact Statement for the Nanushuk Project. November 2018. Anchorage, Alaska.

U.S. Environmental Protection Agency (EPA). 2006. *Air Toxics Risk Assessment Reference Library*. Volume 3, Community-Scale Assessment, EPA-452/K-06-001C. April 2006. Available at: https://www.epa.gov/sites/default/files/2013-08/documents/volume_3_communityassess.pdf. Accessed May 2026.

———. 2021. Prioritized Chronic Dose-Response Values. Table 1 and Table 2. Last updated February 25, 2026. Available at: https://www.epa.gov/fera/prioritization-data-sources-chronic-exposure. Accessed May 2026.

———. 2023. Regional Screening Level (RSL) Summary Table. Last updated March 13, 2026. Available at: https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables. Accessed May 2026.

———. 2025a. Technical Overview of Volatile Organic Compounds. Last updated September 8, 2025. Available at: https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds. Accessed May 2026.

———. 2025b. Health Effects Notebook Glossary. EPA Health Effects Notebook Glossary, Environmental Protection Agency. Last updated November 6, 2025. https://www.epa.gov/haps/health-effects-notebook-glossary. Accessed May 2026.

———. 2025c. Section 3.4 Large Stationary Diesel and All Stationary Dual-fuel Engines in *AP-42: Compilation of Air Pollutant Emissions Factors from Stationary Sources*. Available at: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors-stationary-sources. Accessed May 2026.

———. 2026. Nonattainment Areas for Criteria Pollutants (Green Book). Available at: https://www3.epa.gov/airquality/greenbook/anayo_ak.html. Accessed April 2026.

U.S. Global Change Research Program (USGCRP). 2018. *2018 Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Washington, D.C.: U.S. Global Change Research Program. Available at: https://repository.library.noaa.gov/view/noaa/19487. Accessed May 2026.

3.3 Cultural Resources

Alaska Department of Environmental Conservation (ADEC). 2022. *Alaska Inland Area On-Scene Coordinator* In Situ *Burning Checklist.* Prepared by the Alaska Inland Area Committee, *In Situ* Burning Working Group. Available at: https://dec.alaska.gov/media/fd2bmd1v/inland-sosc-insitu-burn-checklists.pdf. Accessed May 2026.

Alaska Department of Natural Resources (ADNR). 2026. Alaska Heritage Resources Survey (AHRS). Anchorage, Alaska: Office of History and Archaeology.

Brown, W.E. 1979. *Nuiqsut Paisanich: Nuiqsut Heritage, a Cultural Plan*. Anchorage, Alaska: Arctic Environmental Information and Data Center.

Bureau of Land Management (BLM). 2004. *Alpine Satellite Development Plan: Final Environmental Impact Statement*. U.S. Department of the Interior. Available at: https://purl.fdlp.gov/GPO/gpo84294. Accessed March 27, 2026.

———. 2018. *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project - Final Supplemental Environmental Impact Statement*. Edited by U. S. Department of the Interior. Available at: https://eplanning.blm.gov/Documents/?id=f268a393-a7f2-f011-8407-001dd80c29f3&spid=f7f04f4e-a8f2-f011-8407-001dd803d067.

———. 2023. *Willow Master Development Plan Final Supplemental Environmental Impact Statement*. Anchorage, Alaska: Bureau of Land Management, 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, and State of Alaska.

Dekin, A.A., Jr., M.S. Cassell, J.I. Ebert, E. Camili, J. Kerley, M.R. Yarborough, P. Stahl, and B. Turcy. 1993. *Exxon Valdez Oil Spill Archaeological Damage Assessment*. Albany: Binghamton University, The Research Foundation of the State University of New York.

Haggarty, J.C., C.B. Wooley, J.M. Erlandson, and A. Crowell. 1990. *The 1990 Exxon Cultural Resource Program: Site Protection and Maritime Cultural Ecology in Prince William Sound and the Gulf of Alaska*. Submitted to the Alaska Office of History and Archaeology, U.S. Forest Service, National Park Service, and the US Fish and Wildlife Service. Anchorage, Alaska.

Iñupiat History, Language, and Cultural Department (IHLC). 2026. *Traditional Land Use Inventory Sites*. Utqiaġvik, Alaska.

Lobdell, J.E. 1995. *1996 Colville Delta Exploration Wells Archaeological and Cultural Resources Reconnaissance, North Slope, Alaska*. Record ID 1025. Anchorage, Alaska: ARCO Alaska, Inc.

———. 1997. *1997 Nuiqsut Exploration Wells Archaeological and Cultural Resources Reconnaissance, North Slope, Alaska*. MSH2046. Anchorage, Alaska: ARCO Alaska, Inc.

———. 2000. *Nanuk Exploration Well Archaeological and Cultural Resources Reconnaissance, North Slope, Alaska*. MSH2039. Anchorage, Alaska: ARCO Alaska, Inc.

Northern Land Use Research. 2004. *Cultural Resources Survey in Npr-a and Colville Delta, Alaska, Supplement: 2004*. 00000906. Fairbanks, Alaska: ConocoPhillips Alaska, Inc.

Ramsey, D. 2017. *Supplemental Cultural Resource Investigations for Armstrong Energy, LLC's Pikka Ice Pads and Ice Road*. FA1382. Anchorage, Alaska: Armstrong Energy, LLC.

Reanier, R. 2001. *Proposal to Develop Two Prospects, CD-North and CD-South, within the Colville River Delta.* Seattle, Washington: Phillips Alaska, Inc., Office of History and Archaeology.

———. 2004. *Archaeological and Cultural Resources Reconnaissance for the CD-3 and CD-4 Development Project, Colville River Delta, Alaska, for the Years 2000-2003*. 00000904. Seattle, Washington: ConocoPhillips Alaska, Inc.

———. 2009. *Cultural Resources Reconnaissance for the Alpine Satellite and Fiord West Development Projects, National Petroleum Reserve, Alaska for the Year 2008*. ConocoPhillips Alaska, Inc.

———. 2010. *Alpine Resupply Ice Road System*. ALN014. Seattle, Washington: ConocoPhillips Alaska, Inc.

———. 2012. *Request for Cultural Resources Clearance, Tofkat Unit*. MSH1641. Seattle, Washington: Brooks Range Petroleum Corporation.

———. 2016. *Cultural Resources Reconnaissance Letter Report for the ConocoPhillips Putu Exploration Drilling Project, North Slope, Alaska, for the Year 2016*. FA1107. Seattle, Washington and Anchorage, Alaska: ConocoPhillips Alaska, Inc. and Department of Natural Resources.

———. 2025. *Cultural Resources Reconnaissance for the CD8 Development Project*. Anchorage, Alaska and Seattle, Washington: ConocoPhillips Alaska, Inc.

Smith, G., and J. Kari. 2025. Alaska Native Place Names: A Comprehensive Geodatabase of Alaska Native Place Names. Updated February 17, 2025. Available at: https://www.arcgis.com/home/search.html?restrict=false&sortField=relevance&sortOrder=desc&searchTerm=owner%3A%2230980587%40alaska.edu_uaa_geomatics%22#content.

Stephen R. Braund & Associates (SRB&A). 2018. *Nuiqsut Paisaŋich: A 2018 Addendum*. Prepared for the City of Nuiqsut. Anchorage, Alaska.

3.4 Economics

Alaska Department of Labor and Workforce Development (ADLWD). 2025a. *Revised Annual Employment and Wages, January-December 2024*. Available at: https://live.laborstats.alaska.gov/sites/default/files/2025-08/Annual%20January%20to%20December%202024.pdf. Accessed February 2026.

———. 2025b. Quarterly Census of Employment and Wages (QCEW) 2024 data. Available at: http://live.laborstats.alaska.gov/qcew/.

———. 2026. *Nonresidents Working in Alaska, 2024*. Dated February 2026. Available at: https://live.laborstats.alaska.gov/reshire/nonres.pdf. Accessed February 2026.

Alaska Department of Revenue (ADOR). 2025a. *Fall 2025 Revenue Forecast Summary Tables*. Department of Revenue, Tax Division. Available at: https://tax.alaska.gov/programs/documentviewer/viewer.aspx?1980r. Accessed February 2026.

———. 2025b. *Spring 2025 Revenue Forecast*. Available at: https://tax.alaska.gov/programs/programs/reports/RSB.aspx?Year=2025&Type=. Accessed March 2026.

Bureau of Land Management (BLM). 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed November 2025.

Energy Information Administration (EIA). 2025. Annual Energy Outlook 2025. Available at: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=1-AEO2025&cases=ref2025&sourcekey=0. Accessed February 2026.

Fried, N. 2020. The Cost of Living in Alaska. *Alaska Economic Trends* (July):4-12. Available at: https://labor.alaska.gov/trends/jul20.pdf. Accessed February 2026.

Iñupiat Community of the Arctic Slope (ICAS). 2024. *Regional Comprehensive Economic Development Strategy, 2025-2030*. Version 1.0.Dated November 2024. Available at: https://icas-nsn.gov/wp-content/uploads/2025/04/ICAS-CEDS-2025-2030.pdf. Accessed February 2026.

McDowell Group. 2020. *The Role of the Oil and Gas Industry in Alaska's Economy*. Prepared for Alaska Oil and Gas Association. Anchorage, Alaska. Available at: https://www.aoga.org/wp-content/uploads/2021/01/Reports-2020.1.23-Economic-Impact-Report-McDowell-Group-CORRECTED-2020.12.3.pdf. Accessed February 2026.

North Slope Borough (NSB). 2020. *North Slope Borough 2019 Economic Profile & Census Report*. Dated September 2020. Available at: https://www.north-slope.org/wp-content/uploads/2022/03/2019_NSB-EconomicProfileAndCensusReport_Final.pdf. Accessed February 2026.

———. 2022. *Nuiqsut Comprehensive Plan*. North Slope Borough Department of Planning & Community Services. Available at: https://www.north-slope.org/wp-content/uploads/2023/01/NUI-Comp-Plan-Final-reduced.pdf. Accessed February 2026.

———. 2025. *North Slope Borough Final Budget Document, Ordinance 2025-3, Fiscal Year 2025-2026*. Available at: https://www.north-slope.org/wp-content/uploads/2025/07/NSB-Budget-Book-FY25-26-FINAL-updated.pdf. Accessed February 2026.

Northern Economics, Inc. 2026. *Economic Analysis of Proposed Colville Delta 8 (CD9) Development Project*. February 27, 2026.

Teel, S. 2022. The Oil Industry's Recent Wild Ride. *Alaska Economic Trends* (June):9–13. Available at: https://labor.alaska.gov/trends/jun22.pdf. Accessed February 2026.

U.S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/detils?eisId=260614. Accessed November 2025.

U.S. Census Bureau (USCB). 2024a. *American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP05, Demographic and Housing Estimates*. Available at: https://data.census.gov/table/ACSDP5Y2023.DP05?q=DP05&d=ACS+5-Year+Estimates+Data+Profiles. Accessed February 2026.

———. 2024b. *American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP03, Selected Economic Characteristics*. Available at: https://data.census.gov/table/ACSDP5Y2022.DP03. Accessed February 2026.

3.5 Noise

American National Standards Institute, Inc. 2013. *Quantities and Procedures for Description and Measurements with an Observer Present – Part 3: Short-term Measurements with an Observer Present*. ANSI/ASA S12.9-2013/Part 3. Melville, New York: Acoustical Society of America.

Bureau of Land Management (BLM). 2000. *Draft Resource Management Plan Amendment / Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties.* Las Cruces, New Mexico: Bureau of Land Management, Las Cruces District Office.

———. 2004. *Alpine Satellite Development Plan: Final Environmental Impact Statement*. Anchorage, Alaska. Available at: https://eplanning.blm.gov/Documents/?id=46109c99-a7f2-f011-8407-001dd80c29f3&spid=1ff24f4e-a8f2-f011-8407-001dd803d067.

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed November 2025.

Doyon Drilling, Inc. (Doyon) 2024. *Rig 25 Specifications*. Anchorage, Alaska: Doyon Drilling, Inc. Available at: https://www.doyondrilling.com/our-rigs/rig-25/. Accessed April 2026.

Federal Highway Administration (FHWA). 2011. Roadway Construction Noise Model. Software Version 1.1. Available at: https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/. Accessed February 2026.

Manning, C.J. 1981. *The Propagation of Noise from Petroleum and Petrochemical Complexes to Neighbouring Communities.* CONCAWE Report No. 4/81. The Hague, Netherlands: Conservation of Clean Air and Water in Europe.

Piercy, J.E., T.F.W. Embleton, and L.C. Sutherland. 1977. Review of Noise Propagation in the Atmosphere. *Journal of the Acoustical Society of America* 61(6):1403–1418.

Radtke, C. 2016. Noise Characterization of Oil and Gas Operations. M.S. thesis, Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins, Colorado. Available at: https://hdl.handle.net/10217/173508. Accessed September 2026.

SLR Consulting. 2011. *Santos Drill Rig 103, Glasserton 2, 3 & 4 Drill Sites, Consideration of Noise Emissions*. Report Number 620.02014.10001-R4, Revision 1, June 1, 2011. Prepared for Santos QNT Pty Ltd, Brisbane, Queensland, Australia. Available at: https://narrabrigasproject.com.au/uploads/2015/06/NSW_CSG_REF_Georges_Island_Glasserton_Appendix_C_Noise_Emissions_Report.pdf. Accessed June 2026.

Stinchcomb, T.R. 2017. Social-Ecological Soundscapes: Examining Aircraft-Harvester-Caribou Conflict in Arctic Alaska. M.A. thesis, University of Alaska, Fairbanks.

SWCA Environmental Consultants (SWCA). 2026. *Noise Technical Report for the Colville Delta 8 Project, North Slope Borough, Alaska*. On file, SWCA Environmental Consultants, Salt Lake City, Utah. April 2026.

U.S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=260614. Accessed November 2018.

U.S. Environmental Protection Act (EPA). 1974. *EPA Identifies Noise Levels Affecting Health and Welfare*. EPA press release - April 2, 1974. Available at: https://www.epa.gov/archive/epa/aboutepa/epa-identifies-noise-levels-affecting-health-and-welfare.html. Accessed February 2025.

Wrobel, C.P. 2026. Environmental Advisor, ConocoPhillips Alaska, Inc., Anchorage, Alaska. Written communication to L. Arsan, SWCA Environmental Consultants, regarding CD8 Project engineering and construction assumptions, drill rig configuration and power supply, and pile installation methods. April 15 and April 22, 2026.

3.6 Public Health and Safety

Adams, E.J., L. Grummer-Strawn, and G. Chavez. 2003. Food Insecurity Is Associated with Increased Risk of Obesity in California Women. *The Journal of nutrition* (133.4):1070–1074. Available at: https://doi.org/10.1093/jn/133.4.1070. Accessed March 2026.

Alaska Department of Environmental Concern (ADEC). 2018. *Occurrence of Xylene in Nuiqsut's Drinking Water Supply: Memorandum to U.S. Army Corps of Engineers, February 2, 2018*. Juneau, Alaska.

———. 2022. *Alaska Inland Area On-Scene Coordinator In Situ Burning Checklist.* Prepared by the Alaska Inland Area Committee, In Situ Burning Working Group. Available at: https://dec.alaska.gov/media/fd2bmd1v/inland-sosc-insitu-burn-checklists.pdf. Accessed May 2026.

———. 2023. Air Quality Advisories. Available at: https://dec.alaska.gov/Applications/Air/airtoolsweb/advisories/. Accessed March 2026.

Alaska Department of Environmental Concern (ADEC), U.S. Environmental Protection Agency (EPA), and U.S. Coast Guard (USCG). 2008. In Situ Burning Guidelines for Alaska. Anchorage, Alaska. Available at: https://dec.alaska.gov/media/7769/in-situ-burning-rev1.pdf. Accessed May 2026.

Alaska Department of Fish and Game (ADF&G). 2018. *Subsistence in Alaska: A Year 2017 Update*. Division of Subsistence. Available at: https://www.adfg.alaska.gov/static/home/subsistence/pdfs/subsistence_update_2017.pdf. Accessed March 2026.

Alaska Department of Health and Social Services (ADHSS). 2015. *Technical Guidance for Health Impact Analysis in Alaska.* State of Alaska Health Impact Assessment Program. Available at: https://www.aideaaeaprocurement.org/Home/File/2445. Accessed November 2025.

———. 2016. *Final Baseline Human Health Summary, Final, Nanushuk Project*. Environmental Public Health Program. Available at: https://www.arlis.org/docs/vol1/USACE/2018/1061151785/FEIS_Nanushuk-app11.pdf. Accessed November 2025.

Alaska Department of Health. 2021. *Alaska Vital Statistics 2021 Annual Report*. Division of Public Health, Health Analytics and Vital Records. Available at: https://health.alaska.gov/media/epbdg2aa/vitalstatistics_annualreport_2021.pdf. Accessed March 2026.

———. 2024. *BRIEF REPORT: Social Risk Factors and Health Inequities Among Alaska Adults*. Available at: https://health.alaska.gov/media/drhegvp4/akbrfss_briefreport_aksdoh.pdf. Accessed November 2025.

———. 2025a. *Alaska Vital Statistics 2024 Annual Report*. Updated October 16, 2025. Available at: https://health.alaska.gov/media/wrbjik3l/2024-alaska-vital-statistics-annual-report.pdf. Accessed December 2025.

———. 2025b. Alaska Behavioral Risk Factor Surveillance System, General Health Dataset. Available at: https://alaska-dph.shinyapps.io/BRFSS/. Accessed March 2026.

Alaska Native Tribal Health Consortium (ANTHC). 2011. Independent Evaluation of Ambient Air Quality in the Village of Nuiqsut, Alaska. Anchorage, Alaska: Alaska Native Tribal Health Consortium, Division of Environmental Health and Engineering.

———. 2021. *Alaska Native Health Status Report: Third Edition*. Anchorage, Alaska: Alaska Native Tribal Health Consortium, Epidemiology Center.

Brownson, R.C., D. Haire-Joshu, and D.A. Luke. 2006. Shaping the context of health: A review of environmental and policy approaches in the prevention of chronic diseases. *Annual Review of Public Health* (27):341–370. Available at: https://doi.org/10.1146/annurev.publhealth.27.021405.102137. Accessed March 2026.

Brubaker, M., J. Bell, H. Dingman, S. Evans, K. Kasak, M. Itta, and R. Drake. 2016. *Climate Change in Nuiqsut, Alaska Strategies for Community Health*. Anchorage, Alaska: Alaska Native Tribal Health Consortium, Center for Climate and Health. Available at: https://www.cakex.org/documents/climate-change-nuiqsut-alaska-strategies-community-health. Accessed March 2026.

Bureau of Land Management (BLM). 2012. *National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement*. Anchorage, Alaska. Available at: https://www.pew.org/-/media/assets/external-sites/health-impact-project/2023/2/national-petroleum-reserve-alaska-integrated-activity-plan-final-eis.pdf. Accessed March 2026.

———. 2018. *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project – Final Supplemental Environmental Impact Statement*. Anchorage, Alaska. Available at: https://upload.wikimedia.org/wikipedia/commons/7/7f/Alpine_satellite_development_plan_for_the_proposed_Greater_Mooses_Tooth_2_development_project_-_final_supplemental_environmental_impact_statement_%28IA_alpinesatellited02unit_0%29.pdf. Accessed March 2026.

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed November 2025.

City of Nuiqsut. 2022. *Nuiqsut Comprehensive Plan 2022-2042*. North Slope Borough Assembly Ordinance #75-06-76, North Slope Borough Planning Commission Resolution #2022-12, City of Nuiqsut Resolution #22-15, Kuukpik Corporation Resolution #2022-2. Available at: https://www.north-slope.org/wp-content/uploads/2023/01/NUI-Comp-Plan-Final-reduced.pdf. Accessed February 2026.

ConocoPhillips Alaska, Inc. (CPAI). 2018. *Alpine Development Master Plan Update*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2022a. Alaska North Slope Crude Oil Safety Data Sheet. Product 791002. Revised 7/22/2022. Available at: https://apps.spheracloud.net/msds/viewfetch.aspx?Value=2JF94oW4r/BwqBpBkDqXPZqtNU4jvnaOJAVqu1GcNta73IC8MyCQ5jrFKwSjGTBPmIcYXjAbqtYA. Accessed April 2026.

———. 2022b. Alpine Crude Oil Safety Data Sheet. Product 780950. Revised 7/22/2022. Available at: https://apps.spheracloud.net/msds/viewfetch.aspx?Value=2JF94oW4r/BwqBpBkDqXPZqtNU4jvnaO8N4++A+J2rWyxy70ce9cNDxHJafyJiwwFa1BxK2NOpkA. Accessed April 2026.

———. 2024a. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2023, through December 31, 2023.*

———. 2024b. *ConocoPhillips Summaries of Environmental Field Studies. February 2025 Revision*. Available at: https://catalog.northslopescience.org/dataset/a97d1e29-b5b9-42a3-ab72-7694cd575bf4/resource/2ae6bc08-46a9-445b-b68b-1ce2b67e106e/download/2024-cpai-environmental-studies-one-pagers_rev-6.pdf. Accessed March 2026.

———. 2025a. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2024, through December 31, 2024.*

———. 2025b. *CD8 Development Environmental Baseline Document*. Anchorage, Alaska.

———. 2026. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2025, through December 31, 2025.*

Doyon Drilling, Inc. (Doyon). 2026. 2026 Western North Slope Rig Move Incident Information Hub. Available at: https://www.doyon.com/2026-western-north-slope-rig-move-incident-information-hub/. Accessed May 11, 2026.

EXP Energy Services Inc. 2022. *Public Health Information for the Willow Master Development Plan*. Anchorage, Alaska.

Fall, J.A., and M.L. Kostick. 2018. *Food Security and Wild Resource Harvests in Alaska*. Anchorage, Alaska: Alaska Department of Fish and Game, Division of Subsistence.

Fedan, J.S., J.A. Thompson. T.M. Sager, J.R. Roberts, P. Joseph, K. Krajnak, H. Kan, K. Sriram, L.M. Weatherly, and S.E. Anderson. 2024. Toxicological Effects of Inhaled Crude Oil Vapor. *Current Environmental Health Reports* 11(1): 18–29. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC10907427/pdf/40572_2024_Article_429.pdf. Accessed April 2026.

Gundersen, C., A. Satoh, A. Dewey, M. Kato, and E. Engelhard. 2015. Map the Meal Gap 2015: Food Insecurity and Child Food Insecurity Estimates at the County Level. *Feeding America*.

Hadrup, N., J.B. Sørli, M. Frederiksen, A.K. Sharma, S. Kafert-Kasting, S. Schuchardt, A. Bitsch, P.A. Clausen, A.T. Saber, U. Vogel, and K.S. Hougaard. 2026. Oil mists and vapours: A review of exposure and toxicity, with dose descriptors from inhalation studies. *Toxicology*. 2026 Jan(519):154314. doi: 10.1016/j.tox.2025.154314. Epub 2025 Oct 16. PMID: 41109551. Available at: https://curis.ku.dk/ws/portalfiles/portal/522827495/1-s2.0-S0300483X25002732-main.pdf. Accessed April 2026.

Kofinas, G., S.B. Burn, Silver, J. Magdanz, R. Stotts, and M. Okada. 2016. *Subsistence Sharing Networks and Cooperation: Kaktovik, Wainwright, and Venetie, Alaska*. BOEM Report 2015-023, AFES Report MP 2015-02. Fairbanks: University of Alaska Fairbanks, School of Natural Resources and Extension. Available at: https://www.*boem*.gov/sites/default/files/boem-newsroom/Library/Publications/2015/BOEM-2015-23.pdf. Accessed March 2026.

Iñupiat Community of the Arctic Slope (ICAS) and University of Alaska at Fairbanks (UAF) Center for Arctic Security & Resilience. 2025. Tribal Emergency Management: Preparing Remote and Geographically Isolated Communities. Prepared for the Alaska Climate Adaptation Science Center's Alaska Tribal Resilience Learning Network Resource Page. Available at: https://akcasc.org/info-session/26_tribalemergencymanagement/. Accessed April 2026.

McAninch, J.M.D. 2012. *Baseline Community Health Analysis Report*. Barrow, Alaska: North Slope Borough, Department of Health and Social Services. Available at: https://www.north-slope.org/wp-content/uploads/2022/01/Baseline-Community-Health-Analysis-Report.pdf. Accessed March 2026.

Michael Baker International (MBI). 2022. *2021 Alpine Satellite Development Project Water Quality Monitoring*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: Michael Baker International.

———. 2016a. *NSB 2015 Economic Profile & Census*. Barrow, Alaska. Available at: https://www.north-slope.org/wp-content/uploads/2022/03/NSB_Economic_Profile_and_Census_Report_2015_FINAL.pdf. Accessed March 2026.

———. 2016b. *Nuiqsut Comprehensive Development Plan 2015-2035. Department of Planning and Community Services*. Available at: https://www.north-slope.org/wp-content/uploads/2022/02/NUI_Final_Draft_Jan2016.pdf. Accessed March 2026.

———. 2020. *North Slope Borough 2019 Economic Profile & Census Report*. Available at: https://www.north-slope.org/wp-content/uploads/2022/03/2019_NSB-EconomicProfileAndCensusReport_Final.pdf. Accessed February 2025.

———. 2022. *Nuiqsut Comprehensive Plan*. North Slope Borough Department of Planning & Community Services. Available at: https://www.north-slope.org/wp-content/uploads/2023/01/NUI-Comp-Plan-Final-reduced.pdf. Accessed February 2026.

———. 2023. *Multi-Jurisdictional Hazard Mitigation Plan*. Available at: https://north-slope.org/wp-content/uploads/2023/10/NSB-Multi-Jurisdictional-Hazard-Mitigation-Plan.pdf. Accessed January 2026.

———. 2025. Department of Wildlife Contaminant and Nutrition Studies. Utqiaġvik, Alaska: North Slope Borough, Department of Wildlife Management. Available at: https://www.north-slope.org/departments/wildlife-management/studies-research-projects/health-assessment-of-subsistence-resources/contaminants-nutrition-studies/traditional-foods/. Accessed March 2026.

National Oceanic and Atmospheric Association (NOAA). 2022. Health and Safety Aspects of In-situ Burning of Oil. Available at: https://response.restoration.noaa.gov/sites/default/files/health-safety-ISB.pdf. Accessed May 2026.

SECOR International Incorporated (SECOR). 2000. Phillips Alaska, Inc. Nuiqsut Ambient Air Quality Monitoring Program Annual Data Report, April 1999 through March 2000. Prepared for Phillips Alaska, Inc. Anchorage, Alaska.

SLR International Corporation (SLR). 2022. *Nuiqsut Ambient Air And Meteorological Monitoring Program Nuiqsut 2021 Annual Report*. Available at: nuiqsut-air-and-meteorological-monitoring-program-2021.pdf. Accessed March 2026.

———. 2023. *Nuiqsut Ambient Air And Meteorological Monitoring Program Nuiqsut 2022 Annual Report*. Available at: nuiqsut-air-and-meteorological-monitoring-program-2022.pdf. Accessed March 2026.

———. 2024. *Nuiqsut Ambient Air And Meteorological Monitoring Program Nuiqsut 2023 Annual Report*. Available at: nuiqsut-air-and-meteorological-monitoring-program-2023.pdf. Accessed March 2026.

———. 2025 *Volatile Organic Compounds (VOCs) Near Nuiqsut Alaska*. Prepared for ConocoPhillips Alaska, Inc. Available at https://catalog.northslopescience.org/dataset/6dc69afe-9424-455a-aca2-c80769e878ff/resource/a48310fb-ae2c-417f-9669-9acef4031821/download/semiannual_voc_report_oct25.pdf. Accessed March 2025.

Stephen R. Braund & Associates (SRB&A). 2017. *Social Indicators in Coastal Alaska, Arctic Communities.* Final Report. Alaska OCS Technical Report BOEM 2017-035. Prepared for Bureau of Ocean Energy Management. Anchorage, Alaska.

———. 2021. *Nuiqsut Caribou Subsistence Monitoring Project: 2019 (Year 12) Report*. Anchorage, Alaska: Prepared for ConocoPhillips Alaska, Inc. and North Slope Borough Department of Wildlife Management. Available at: https://northslopescience.org/wp-content/uploads/Nuiqsut-Caribou-Subsistence-Monitoring-Y12-Report.pdf. Accessed March 2026.

———. 2024. Nuiqsut All Resources 10-Year Subsistence Mapping Study. Submitted to ConocoPhillips Alaska, Inc. and North Slope Borough Department of Wildlife Management.

———. 2025. Nuiqsut Caribou Subsistence Monitoring Project: 2023 (Year 16) Report. Final Report. Submitted to ConocoPhillips Alaska, Inc. And North Slope Borough Department of Wildlife Management. Anchorage, Alaska.

U.S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=260614. Accessed November 2025.

U.S. Environmental Protection Act (EPA). 2014. HIA Factsheet. Available at: https://www.epa.gov/sites/default/files/2013-12/documents/health-impact-assessment-factsheet_0.pdf. Accessed 4/30/26.

U.S. Census Bureau (USCB). 2024a. *American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP05, Demographic and Housing Estimates*. Available at: https://data.census.gov/table/ACSDP5Y2023.DP05?q=DP05&d=ACS+5-Year+Estimates+Data+Profiles. Accessed February 2026.

———. 2024b. *American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP03, Selected Economic Characteristics*. Available at: https://data.census.gov/table/ACSDP5Y2022.DP03. Accessed February 2026.

U.S. Department of Health and Human Services. 2001. *Mental Health: Culture, Race, and Ethnicity—A Supplement to Mental Health: A Report of the Surgeon General*. Rockville, Maryland: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services. Available at: https://www.ncbi.nlm.nih.gov/books/NBK44243/pdf/Bookshelf_NBK44243.pdf. Accessed March 2026.

Voice of the Arctic Iñupiat. 2023. *Community Needs Assessment.* Final Report. September 22, 2023.

Ware, D., J. Lewis, S. Hopkins, B. Boyer, C. Noonan, and T. Ward. 2013. Sources and Perceptions of Indoor and Ambient Air Pollution in Rural Alaska. *Journal of Community Health* 38(4):773–780. Available at: https://doi.org/10.1007/s10900-013-9678-9. Accessed March 2026.

3.7 Sociocultural Systems

Alaska Department of Health. 2021. *Alaska Vital Statistics 2021 Annual Report*. Division of Public Health, Health Analytics and Vital Records. Available at: https://health.alaska.gov/media/epbdg2aa/vitalstatistics_annualreport_2021.pdf. Accessed March 2026.

———. 2025. *Alaska Vital Statistics 2024 Annual Report*. Updated October 16, 2025. Available at: https://health.alaska.gov/media/wrbjik3l/2024-alaska-vital-statistics-annual-report.pdf. Accessed December 2025.

Alaska Native Tribal Health Consortium (ANTHC). 2021. *Alaska Native Health Status Report: Third Edition*. Anchorage, Alaska: Alaska Native Tribal Health Consortium, Epidemiology Center.

Alaska Department of Labor and Workforce Development (ADLWD). 2026. Nonresidents Working in Alaska, 2024. Published Feb. 2026. Available at: https://live.laborstats.alaska.gov/reshire/nonres.pdf. Accessed March 2026.

Brubaker, M., J. Bell, H. Dingman, S. Evans, K. Kasak, M. Itta, and R. Drake. 2014. Climate Change in Nuiqsut, Alaska Strategies for Community Health. Anchorage, Alaska: Alaska Native Tribal Health Consortium, Center for Climate and Health.

Bureau of Land Management (BLM). 2004. *Alpine Satellite Development Plan: Final Environmental Impact Statement*. Anchorage, Alaska. Available at: https://eplanning.blm.gov/Documents/?id=46109c99-a7f2-f011-8407-001dd80c29f3&spid=1ff24f4e-a8f2-f011-8407-001dd803d067.

———. 2015. *Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project Record of Decision*. Available at: https://eplanning.blm.gov/Documents/?id=c5c53188-a7f2-f011-8407-001dd80bcf93&spid=cf2c9f43-a8f2-f011-8406-001dd802fdea.

———. 2018. *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project – Final Supplemental Environmental Impact Statement*. Anchorage, Alaska. Available at: https://upload.wikimedia.org/wikipedia/commons/7/7f/Alpine_satellite_development_plan_for_the_proposed_Greater_Mooses_Tooth_2_development_project_-_final_supplemental_environmental_impact_statement_%28IA_alpinesatellited02unit_0%29.pdf. Accessed March 2026.

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed November 2025.

City of Nuiqsut. 2016. *Nuiqsut Comprehensive Development Plan 2015 - 2035.*

———. 2022. *Nuiqsut Comprehensive Plan*. North Slope Borough Department of Planning & Community Services. Available at: https://www.north-slope.org/wp-content/uploads/2023/01/NUI-Comp-Plan-Final-reduced.pdf. Accessed February 2026.

ConocoPhillips Alaska, Inc. (CPAI). 2018. *Alpine Development Master Plan Update*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025. *CD8 Development Environmental Baseline Document*. Anchorage, Alaska.

———. 2026. ConocoPhillips Alaska community support programs on the Western North Slope. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

EXP Energy Services Inc. 2022. *Public Health Information for the Willow Master Development Plan*. Anchorage, Alaska.

Fried, N. 2020. The Cost of Living in Alaska. *Alaska Economic Trends* (July):4-12. Available at: https://labor.alaska.gov/trends/jul20.pdf. Accessed February 2026.

Guettabi, M., J. Greenberg, J. Little, and K. Joly. 2016. *Evaluating Differences in Household Subsistence Harvest Patterns between the Ambler Project and Non-Project Zones*. Natural Resource Report NPS/GAAR/NRR 2016/1280. Anchorage, Alaska: National Park Service. Available at: https://depts.washington.edu/pnwcesu/reports/P14AC01653_Final_Report.pdf. Accessed March 2025.

Iñupiat Community of the Arctic Slope (ICAS). 2024. *Regional Comprehensive Economic Development Strategy, 2025-2030*. Version 1.0. Available at: https://icas-nsn.gov/wp-content/uploads/2025/04/ICAS-CEDS-2025-2030.pdf. Accessed February 2026.

Kofinas, G., S.B. Burn, Silver, J. Magdanz, R. Stotts, and M. Okada. 2016. *Subsistence Sharing Networks and Cooperation: Kaktovik, Wainwright, and Venetie, Alaska*. BOEM Report 2015-023, AFES Report MP 2015-02. Fairbanks, Alaska: School of Natural Resources and Extension, University of Alaska Fairbanks.

North Slope Borough (NSB). 2015. *North Slope Borough 2015 Economic Profile & Census Report*. Available at: https://www.north-slope.org/wp-content/uploads/2022/03/NSB_Economic_Profile_and_Census_Report_2015_FINAL.pdf. Accessed March 2026.

———. 2020. *North Slope Borough 2019 Economic Profile & Census Report*. Available at: https://www.north-slope.org/wp-content/uploads/2022/03/2019_NSB-EconomicProfileAndCensusReport_Final.pdf. Accessed March 2026. Accessed September 2020.

———. 2022. *Nuiqsut Comprehensive Plan*. North Slope Borough Department of Planning & Community Services. Available at: https://www.north-slope.org/wp-content/uploads/2023/01/NUI-Comp-Plan-Final-reduced.pdf. Accessed February 2026.

Northern Economics, Inc. 2019. Economic Study of Subsistence Impacts. Prepared for ConocoPhillips Alaska, Inc.

Redmond, A., and S. Thornsohn. 2016. *The Next Horizon: A sociocultural study of the impact of oil development on the Native community of Nuiqsut, Alaska*. ConocoPhillips Alaska Inc. and Village Outreach Liaison for Kuukpik Corporation. Available at: https://northslopescience.org/wp-content/uploads/2016_The_Next_Horizon_socio-cultural_study_of_oil_development_and_Nuiqsut.pdf. Accessed March 2016,

Stephen R. Braund & Associates (SRB&A). 2009. *Impacts and Benefits of Oil and Gas Development to Barrow, Nuiqsut, Wainwright, and Atqasuk Harvesters*. Prepared for North Slope Borough, Department of Wildlife Management. Barrow, Alaska.

———. 2017. *Social Indicators in Coastal Alaska, Arctic Communities*. Final Report, Technical Report No. BOEM 2017-035. Anchorage, Alaska: Bureau of Ocean Energy Management, Alaska OCS Region. https://srbak.squarespace.com/s/Social-Indicators-in-Coastal-Alaska_Arctic_May17_sm.pdf.

———. 2018. *Nuiqsut Paisaŋich: A 2018 Addendum*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska

———. 2019. *Nuiqsut Caribou Subsistence Monitoring Project: Years 1 through 10 (2008-2017).* Final Report. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

———. 2025. *Nuiqsut Caribou Subsistence Monitoring Project: 2023 (Year 16) Report*. Final Report. Anchorage, Alaska: ConocoPhillips Alaska, Inc. and North Slope Borough Department of Wildlife Management.

Stinchcomb, T.R. 2017. Social-Ecological Soundscapes: Examining Aircraft-Harvester-Caribou Conflict in Arctic Alaska. M.A. thesis, University of Alaska, Fairbanks.

U.S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=260614. Accessed November 2025.

U.S. Census Bureau (USCB). 2024a. *American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP05, Demographic and Housing Estimates*. Available at: https://data.census.gov/table/ACSDP5Y2023.DP05?q=DP05&d=ACS+5-Year+Estimates+Data+Profiles. Accessed March 2026.

———. 2024b. *American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP03, Selected Economic Characteristics*. Available at: https://data.census.gov/table/ACSDP5Y2022.DP03. Accessed March 2026.

Voice of the Arctic Iñupiat. 2023. *Community Needs Assessment*. Final Report. September 22, 2023.

Walker, R.J., and R.J. Wolfe. 1987. Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. *Arctic Anthropology* 24 (2):56–81.

Wolfe, R.J. 2004. *Local Traditions and Subsistence: A Synopsis from Twenty-Five Years of Research by the State of Alaska*. Technical Paper No. 284. Anchorage, Alaska: Alaska Department of Fish and Game, Division of Subsistence. Available at: https://www.adfg.alaska.gov/techpap/tp284Twentyfiveyears.pdf. Accessed March 2025.

3.8 Subsistence

Alaska Department of Environmental Conservation (ADEC). 2022. *Alaska Inland Area On-Scene Coordinator* In Situ *Burning Checklist.* Prepared by the Alaska Inland Area Committee, *In Situ* Burning Working Group. Available at: https://dec.alaska.gov/media/fd2bmd1v/inland-sosc-insitu-burn-checklists.pdf. Accessed May 2026.

Alaska Department of Environmental Conservation (ADEC), U.S. Environmental Protection Agency (EPA), and U.S. Coast Guard (USCG). 2008. *In Situ Burning Guidelines for Alaska*. Anchorage. Available at: https://dec.alaska.gov/media/7769/in-situ-burning-rev1.pdf. Accessed May 2026.

Alaska Department of Fish and Game (ADF&G). 2026. Community Subsistence Information System: CSIS. Harvest by Community. Available at: https://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=harvInfo.harvestCommSelComm. Accessed February 2026.

Arctic Monitoring and Assessment Programme. 2017. *Snow, Water, Ice and Permafrost in the Arctic (Swipa) 2017: Temporal Trends in Persistent Organic Pollutants in the Arctic*. Oslo, Norway.

Bacon, J., T. Hepa, H. Brower, Jr., M. Pederson, T. Olemaun, J. George, and B. Corrigan. 2011. *Estimates of Subsistence Harvest for Villages on the North Slope of Alaska, 1994-2003*. Barrow, Alaska: Department of Wildlife Management, North Slope Borough.

Braem, N.M., T. Kaleak, D. Koster, P. Leavitt, P. Neakok, J. Patkotak, S. Pedersen, and J. Simon. 2011. Monitoring of Annual Caribou Harvests in the National Petroleum Reserve in Alaska: Atqasuk, Barrow, and Nuiqsut, 2003-2007. Fairbanks, Alaska: Alaska Department of Fish and Game, Division of Subsistence. Available at: http://library.state.ak.us/asp/edocs/2011/06/ocn739704678.pdf. Accessed May 2026.

Brinkman, T.J., W.D. Hansen, F. S. Chapin III, G. Kofinas, S. Burn, Silver, T.S. Rupp. 2016. Arctic Communities Perceive Climate Impacts on Access as a Critical Challenge to Availability of Subsistence Resources. *Climatic Change* (139): 413–427.

Brower, H.K., and T. Hepa. 1998. *North Slope Borough Subsistence Harvest Documentation Project: Data for Nuiqsut, Alaska for the Period July 1, 1994, to June 30, 1995*. Barrow, Alaska: Department of Wildlife Management, North Slope Borough.

Brown, C.L., N.M. Braem, E.H. Mikow, A. Trainor, L.J. Slayton, D.M. Runfola, H. Ikuta, M.L. Kostick, C.R. McDevitt, J. Park, and J.J. Simon. 2016. *Harvests and Uses of Wild Resources in 4 Interior Alaska Communities and 3 Arctic Alaska Communities, 2014*. Fairbanks, Alaska: Alaska Department of Fish and Game, Division of Subsistence. Available at: http://www.adfg.alaska.gov/techpap/TP426.pdf. Accessed May 2026.

Bureau of Land Management (BLM). 2023. *Willow Master Development Plan Final Supplemental Environmental Impact Statement*. Anchorage, Alaska: Bureau of Land Management, 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, and State of Alaska.

Fuller, A.S., and J.C. George. 1999. *Evaluation of Subsistence Harvest Data from the North Slope Borough 1993 Census for Eight North Slope Villages for the Calendar Year 1992*. Barrow, Alaska: Department of Wildlife Management, North Slope Borough.

Mason, R., and A. Craver. 2023. Responding to the Effects of Climate Change on Subsistence in Alaska. Available at: https://www.nps.gov/articles/000/aps-22-1-6.htm. Accessed March 23, 2026.

National Oceanic and Atmospheric Association (NOAA). 2022. Health and Safety Aspects of In-situ Burning of Oil. Available at: https://response.restoration.noaa.gov/sites/default/files/health-safety-ISB.pdf. Accessed May 2026.

Northern Economics, Inc. 2019. Economic Study of Subsistence Impacts. Prepared for ConocoPhillips Alaska, Inc.

Pedersen, S. 1995. Nuiqsut. In *An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska. Alaska Peninsula and Arctic*, edited by J.A. Fall and C.J. Utermohle. Anchorage, Alaska: U.S. Department of the Interior, Minerals Management Service, Alaska Outer Continental Shelf Region.

ResourceEcon, SRB&A, S. Langdon, and Tetra Tech Inc. (TTI). 2011. *Economic Value of Subsistence Activity, Little Diomede, Alaska*. Main Report. Prepared for U.S. Army Corps of Engineers, Alaska District. Seattle, Washington.

Richter-Menge, J., M.L. Druckenmiller, and M. Jeffries. 2019. Arctic Report Card 2019. Available at: https://www.arctic.noaa.gov/Report-Card. Accessed May 2026.

Stephen R. Braund & Associates (SRB&A). 2017. *Social Indicators in Coastal Alaska, Arctic Communities*. Final Report. Technical Report No. BOEM 2017-035. Anchorage, Alaska: U.S. Department of the Interior, Bureau of Ocean Energy Management, Alaska OCS Region. Available at: https://srbak.squarespace.com/s/Social-Indicators-in-Coastal-Alaska_Arctic_May17_sm.pdf. Accessed May 2026.

———. 2018. *Nuiqsut Paisaŋich: A 2018 Addendum. Prepared for the City of Nuiqsut*. Anchorage, Alaska.

———. 2019. *Nuiqsut Caribou Subsistence Monitoring Project: Years 1 through 10*. Final Report. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

———. 2024. *Nuiqsut All Resources 10-Year Subsistence Mapping Study*. Submitted to ConocoPhillips Alaska, Inc. and North Slope Borough Department of Wildlife Management.

———. 2025a. *Nuiqsut Caribou Subsistence Monitoring Project: 2023 (Year 16) Report*. Final Report. Submitted to ConocoPhillips Alaska, Inc. and North Slope Borough Department of Wildlife Management. Anchorage, Alaska.

———. 2025b. Memorandum. CD8 EIS Comments by Nuiqsut Subsistence Hunters. On file, Braund, Stephen R. & Associates, Anchorage, Alaska.

———. 2025c. November 3, 2025, Meeting Summary. Nuiqsut Caribou (Tuttu) Panel. On file, Braund, Stephen R. & Associates, Nuiqsut, Alaska.

Welch, J.H., A.K. Prichard, and M.J. Macander. 2025. *Caribou Monitoring Study for the Alpine Oilfield and Greater Mooses Tooth Unit, Alaska, 2024*. Prepared for ConocoPhillips Alaska, Inc. Fairbanks, Alaska: ABR, Inc.

3.9 Terrestrial Mammals

ABR, Inc.—Environmental Research & Services (ABR). 2025a. *Caribou Monitoring Study for the Alpine Oilfield and Greater Mooses Tooth Unit, Alaska, 2024*. Prepared for ConocoPhillips Alaska, Inc.

———. 2025b. *Caribou Use of the Greater Kuparuk Area, Northern Alaska, 2025*. Prepared for ConocoPhillips Alaska, Inc.

Bureau of Land Management (BLM). 2006. *A Literature Review and Synthesis on the Effect of Pipeline Height on Caribou Crossing Success.* BLM Alaska Open File Report 106. U. S. Department of the Interior.

———. 2023a. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed December 9, 2025.

———. 2023b. *Willow Master Development Plan Supplemental Environmental Impact Statement, Record of Decision.* Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed March 2026.

Cameron, R.D., D.J. Reed, J.R. Dau, and W.T. Smith. 1992. Redistribution of Calving Caribou in Response to Oil Field Development on the Arctic Slope of Alaska. *Arctic* 45(4):338–342.

Cameron, R.D., W.T. Smith, R.G. White, and B. Griffith. 2005. Central Arctic Caribou and Petroleum Development: Distributional, Nutritional, and Reproductive Implications. *Arctic* 58(1):1–9.

ConocoPhillips Alaska, Inc. (CPAI). 2023. *Wildlife Avoidance and Interaction Plan.* Anchorage, Alaska: ConocoPhillips Alaska, Inc.

Cronin, M.A., W.B. Ballard, J. Truett, and R. Pollard. 1994. *Mitigation of the Effects of oil Field Development and Transportation Corridors on Caribou*. Final Report to the Alaska Caribou Steering Committee. LGL Alaska Research Associates, Inc.

Curatolo, J.A., and S.M. Murphy. 1986. The Effects of Pipelines, Roads, and Traffic on the Movements of Caribou. *Rangifer tarandus*. *Canadian Field-Naturalist* 100(2):218–224.

Dau, J.R., and R.D. Cameron. 1986. Effects of a Road System on Caribou Distribution During Calving. *Rangifer* 6(2):95–101.

Fullman, T.J., B.T. Person, A.K. Prichard, and L.S. Parrett. 2021. Variation in winter site fidelity within and among individuals influences movement behavior in a partially migratory ungulate. PLoS ONE 16: e0258128.

Johnson, H.E., T. Golden, L.G. Adams, D. Gustine, and E.A. Lenart. 2020. Caribou Use of Habitat near Energy Development in Arctic Alaska. *Journal of Wildlife Management* 58(1):1–9.

Johnson, H.E., E.A. Lenart, D.D. Gustine, L.G. Adams, and P.S. Barboza. 2022. Survival and reproduction in Arctic caribou are associated with summer forage and insect harassment. *Frontiers in Ecology and Evolution* 10:899585.

Lawhead, B.E. 1988. Distribution and Movements of Central Arctic Caribou Herd During the Calving and Insect Seasons. In *Reproduction and Calf Survival: Proceedings of the 3rd North American Caribou Workshop, Chena Hot Springs, Alaska, 4–6 November 1987*, Wildlife Technical Bulletin No. 8, edited by R.D. Cameron, J.L. Davis, and L.M. McManus, pp. 8–13. Juneau: Alaska Department of Fish and Game.

Lawhead, B.E., L.C. Byrne, and C.B. Johnson. 1993. Caribou Synthesis, 1987–1990. In *1990 Endicott Environmental Monitoring Program Final Report*, Vol. V. Anchorage, Alaska: U.S. Army Corps of Engineers, Alaska District.

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

Lenart, E. 2021. *Central Arctic caribou management report and plan, Game Management Unit 26B: Report period 1 July 2012–30 June 2017, and Plan Period 1 July 2017–30 June 2022*. Alaska Department of Fish and Game, Species Management Report and Plan ADF&G/DWC/SMR&P-2021-2. Juneau, Alaska.

Miller, F.L., and A. Gunn. 1979. *Responses of Peary Caribou and Muskoxen to Helicopter Harassment*. Ottawa, Ontario: Environment Canada, Canadian Wildlife Service.

Murphy, S.M., and B.E. Lawhead. 2000. Chapter 4 – Caribou. In *The natural history of an Arctic oil field: Development and the Biota*, edited by J. Truett and S.R. Johnson, pp. 59–84. San Diego, California: Academic Press.

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.

Noel, L.E., R.H. Pollard, W.B. Ballard, and M.A. Cronin. 1998. Activity and use of active gravel pads and tundra by caribou, Rangifer tarandus granti, within the Prudhoe Bay oil field, Alaska. *Canadian Field-Naturalist* 112:400–409.

Osterkamp, T.E., M.T. Jorgenson, E.A.G. Schuur, Y.L. Shur, M.Z. Kanevskiy, J.G. Vogel, and V.E. Tumskoy. 2009. Physical and Ecological Changes Associated with Warming Permafrost and Thermokarst in Interior Alaska. *Permafrost and Periglacial Processes* 20:235-256.

Parrett, L.S. 2021. *Teshekpuk caribou herd management report and plan, Game Management Units 23, 24, and 26: Report period 1 July 2012–30 June 2017, and Plan Period 1 July 2017–30 June 2022*. Alaska Department of Fish and Game, Species Management Report and Plan ADF&G/DWC/SMR&P-2021-43. Juneau, Alaska.

Pedersen, S.H., T.W. Bentzen, A.K. Reinking, G.E. Liston, K. Elder, E.A. Lenart, A.K. Prichard, and J.M. Welker. 2021. Quantifying effects of snow depth on caribou winter range selection and movement in Arctic Alaska. *Movement Ecology* 9:48.

Person, B.T., A.K. Prichard, G.M. Carroll, D.A. Yokel, R.S. Suydam, and J.C. George. 2007. Distribution and Movements of the Teshekpuk Caribou Herd, 1990–2005: Prior to Oil and Gas Development. *Arctic* 60:238–250.

Prichard, A.K., B.E. Lawhead, E.A. Lenart, and J.H. Welch. 2020. Caribou distribution and movements in a northern Alaska oilfield. *Journal of Wildlife Management* 84:1483–1499.

Prichard, A.K., J.H. Welch, and B.E. Lawhead. 2018. *Mammal surveys in the Greater Kuparuk Area, northern Alaska, 2017*. Prepared by ABR, Inc. for ConocoPhillips Alaska, Inc. Anchorage. Fairbanks, Alaska.

Prichard, A.K., J.H. Welch, and B.E. Lawhead. 2022. The effect of traffic levels on the distribution and behavior of calving caribou in an Arctic oilfield. *Arctic* 75:1-19.

Prichard, A.K., D.A. Yokel, C.L. Rea, B.T. Person, and L.S. Parrett. 2014. The effect of frequency of telemetry locations on movement-rate calculations in arctic caribou. *Wildlife Society Bulletin* 38(1):78–88.

Severson, J.P., T.C. Vosburgh, and H.E. Johnson. 2023. Effects of vehicle traffic on space use and road crossings of caribou in the Arctic. *Ecological applications* 8(33).

Smith, L.N., L.C. Byrne, C.B. Johnson, and A.A. Stickney. 1994. *Wildlife Studies on the Colville River Delta, Alaska, 1993*. Prepared by ABR, Inc. for ARCO Alaska, Inc. Fairbanks, Alaska.

U. S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Prepared by DOWL. JBER, Alaska: U.S. Army Corps of Engineers, Alaska District.

Valkenburg, P., and J. Davis. 1985. The Reaction of Caribou to Aircraft: A Comparison of Two Herds. In *Caribou and Human Activity: Proceedings of the 1st North American Caribou Workshop*, edited by A.M. Martell and D.E. Russell, pp. 7–9. Whitehorse, Yukon.

Wilson, R.R., L.S. Prichard, L.S. Parrett, B.T. Person, G.M. Carroll, M.A. Smith, C.L. Rea, and D.A. Yokel. 2012. Summer Resource Selection and Identification of Important Habitat Prior to Industrial Development for the Teshekpuk Caribou Herd in Northern Alaska. PLOS ONE 7(11):e48697.

Webster, L., and J. Young. 1997. *The Effects of Human Related Harassment on Caribou (Rangifer tarandus)*. Williams Lake, British Columbia: Unpublished report prepared for Canadian Ministry of Environment.

Yokel, D.A., A.K. Prichard, G. Carroll, L. Parrett, B. Person, and C. Rea. 2009. Teshekpuk Caribou Herd Movement through Narrow Corridors around Teshekpuk Lake, Alaska. *Proceedings of Park Science in the Arctic Symposium* 2(8). Fairbanks, Alaska.

3.10 Visual Resources

Alaska Department of Environmental Conservation (ADEC), U.S. Environmental Protection Agency (EPA), and U.S. Coast Guard (USCG). 2008. In Situ Burning Guidelines for Alaska. Anchorage. Available at: https://dec.alaska.gov/media/7769/in-situ-burning-rev1.pdf. Accessed May 2026.

Bureau of Land Management (BLM). 1986a. *Visual resource contrast rating*. BLM Handbook H-8431-1. Washington, D.C.: U.S. Department of the Interior

———. 1986b. *Visual resource inventory*. BLM Handbook H- 8410-1. Washington, D.C.: U.S. Department of the Interior

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed November 2025.

HDR. 2010. *Point Thomson Project EIS: Visual Resource Assessment*. Prepared for U.S. Army Corps of Engineers. Anchorage, Alaska.

Smardon, R.C., J.F. Palmer, A. Knopf, K. Grinde, J.E. Henderson, and L.D. Peyman-Dove. 1988. *Visual Resources Assessment Procedure for the U.S. Army Corps of Engineers*. Instruction Report EL-88-1, Vicksburg, Mississippi: U.S. Army Corps of Engineers.

U.S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=260614. Accessed November 2025.

U.S. Forest Service. 1995. *Landscape Aesthetics: A Handbook for Scenery Management*. Agriculture handbook 701. Washington, D.C.: U.S. Dept. of Agriculture, Forest Service.

3.11 Hydrology and Water Quality

ABR, Inc. – Environmental Research & Services (ABR) 2015. *A Summary of Water Quality Analyses from the Colville River and Other High Latitude Alaskan and Canadian Rivers*. Prepared for North Slope Borough. Available at: https://www.north-slope.org/wp-content/uploads/2022/04/NSB_ABR_Water_Quality_Report_ABR_fish_mold_nuiqsut.pdf. Accessed March 2026.

Alaska Department of Environmental Conservation (ADEC), U.S. Environmental Protection Agency (EPA), and U.S. Coast Guard (USCG). 2008. In Situ Burning Guidelines for Alaska. Anchorage. Available at: https://dec.alaska.gov/media/7769/in-situ-burning-rev1.pdf. Accessed May 2026.

Alaska Department of Environmental Conservation (ADEC). 2022. *Alaska Inland Area On-Scene Coordinator* In Situ *Burning Checklist.* Prepared by the Alaska Inland Area Committee, *In Situ* Burning Working Group. Available at: https://dec.alaska.gov/media/fd2bmd1v/inland-sosc-insitu-burn-checklists.pdf. Accessed May 2026.

———. 2026. *Draft 2026 Integrated Water Quality Monitoring and Assessment Report: Fact Sheet*. Available at: https://dec.alaska.gov/media/a3lfrdgx/draft-26ir-fact-sheet-2-19-2026-aac.pdf. Accessed March 2026.

Alaska MJM Research. 2003. *Harvest Estimate and Associated Information for the 2002 Colville River Fall Fishery*. Report for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

Bureau of Land Management (BLM). 2023. *Willow Master Development Plan Final Supplemental Environmental Impact Statement*. DOI-BLM-AK-0000-2018-0004-EIS.

ConocoPhillips Alaska, Inc. (CPAI). 2021. *Alpine Facilities Erosion Control Plan*. Revised June 2021. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2024. *Storm Water Pollution Prevention Plan & Best Management Practices Plan.* APDES Permit No. AKG332000. Alpine Development, Greater Mooses Tooth Unit, and ASRC Gravel Mine Site. Revision 3.0. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025a. *Department of the Army Permit Application*. CD8 Development. North Slope, Alaska.

———. 2025b. *CD8 Development Environmental Baseline Document*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

Everett, K.R. 1980. Distribution and Properties of Road Dust Along the Northern Portion of the Haul Road. In *Environmental Engineering and Ecological Baseline Investigations Along the Yukon River-Prudhoe Bay Haul Road*, edited by J. Brown, pp. 101–128. Hanover, New Hampshire: U.S. Army Cold Regions Research and Engineering Laboratory.

Hall, B.M. 2024. *Water-quality comparisons in the Greater Mooses Tooth unit of the National Petroleum Reserve in Alaska, 2010 and 2023*. U.S. Geological Survey Scientific Investigations Report 2024–5098. Available at: https://pubs.usgs.gov/publication/sir20245098. Accessed May 2026.

Hinkel, K.M., C.D. Arp, A. Townsend-Small, and K.E. Frey. 2017. Can Deep Groundwater Influx be Detected from the Geochemistry of Thermokarst Lakes in Arctic Alaska? *Permafrost and Periglacial Processes* 28(3):552–557.

Hobbie, J.E. 1982. *Effects of Oil on Tundra Ponds and Streams: Final Report for Period October 1, 1978, to September 30, 1980*. Washington, D.C.: U.S. Department of Energy, Energy Research and Development Administration.

Jin, H., Y. Huang, V. F. Bense, Q. Ma, S.S. Marchenko, V.V. Shepelev, Y. Hu, S. Liang, V.V. Spektor, X. Jin, X. Li, and X. Li. 2022. Permafrost Degradation and Its Hydrogeological Impacts. *Water* 14(3):372. Available at: https://doi.org/10.3390/w14030372.

Kharaka, Y.K., and W.W. Carothers. 1988. Geochemistry of Oil-Field Water from the North Slope. In *Geology and Exploration of the National Petroleum Reserve in Alaska, 1974 to 1982*, edited by G. Gryc, pp. 551–561. U.S. Geological Survey Paper 1399. Washington, D.C.: U.S. Geological Survey.

Markon, C.J., S.F. Trainor, and F.S. Chapin, III. 2012. *The United States National Climate Assessment—Alaska Technical Regional Report*. Circular 1379. Reston, Virginia: U.S. Geological Survey.

Michael Baker International (MBI). 2020. *2020 Colville River Delta Spring Breakup Monitoring & Hydrological Assessment - North Slope Science Initiative*. Available at: https://northslopescience.org/wp-content/uploads/2020-CRD-Spring-Breakup-Monitoring-and-Hydrological-Assessment_1.pdf. Accessed March 2026.

———. 2021. *2021 Colville River Delta Spring Breakup Monitoring & Hydrological Assessment - North Slope Science Initiative*. Available at: https://northslopescience.org/wp-content/uploads/2021-CRD-Spring-Breakup-Monitoring-and-Hydrological-Assessment.pdf. Accessed March 2026.

———. 2022. *2022 Alpine Satellite Development Project Water Quality Monitoring*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: Michael Baker International.

———. 2023. *2023 Colville River Delta Spring Breakup Monitoring & Hydrological Assessment, Final Report*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: Michael Baker International.

———. 2024. *2024 Colville River Delta Spring Breakup Monitoring & Hydrological Assessment, Final Report*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: Michael Baker International.

———. 2025. *2025 CD8 Hydraulic Analysis*. 182819-MBI-HH-RPT-001. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

———. 2026a. *Project Memo: CD8 Area Colville River Eastern Floodplain Hydraulics*. Prepared for ConocoPhillips Alaska, Inc.

———. 2026b. *CD8 North Alternative Hydraulic Analysis*. April 8, 2026. 211087-MBI-HH-RPT-001

———. 2026c. *2026 CD8-Alt Northwest Hydraulic Analysis*. 206892-MBI-HH-RPT-004. Prepared for ConocoPhillips Alaska, Inc. Anchorage,

Moulton, L.L. 1998. *Lakes sampled for fish within and near the Colville River Delta, Alaska 1979–1998*. Report by MJM Research to ARCO Alaska Inc. Bainbridge Island, Washington.

Myers-Smith, I.H., B.K. Arnesenm, R.M. Thompson, and F.S. Chapin, III. 2006. Cumulative Impacts on Alaskan Arctic Tundra of a Quarter Century of Road Dust. *Ecoscience* 13(4):503–510.

National Oceanic and Atmospheric Association (NOAA). 2022. Health and Safety Aspects of In-situ Burning of Oil. Available at: https://response.restoration.noaa.gov/sites/default/files/health-safety-ISB.pdf. Accessed May 2026.

National Research Council. 2003. *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*. Washington, D.C.: National Academies Press.

Owl Ridge. 2023. *Survey of Lakes in ConocoPhillips Alaska, Inc. Activity Areas - 2022 Final Report*. Prepared for ConocoPhillips Alaska. Anchorage, Alaska: Owl Ridge Natural Resource Consultants, Inc.

Sloan, C.E. 1987. *Water Resources of the North Slope, Alaska, Alaska North Slope Geology, Volumes I and II*. Anchorage, Alaska: Alaska Geological Society.

U.S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=260614. Accessed March 2026.

U. S. Geological Survey (USGS). 2026. *Monitoring Location: Colville River at Umiat, AK – USGS-1587500*. Available at: https://waterdata.usgs.gov/monitoring-location/USGS-15875000/. Accessed May 2026.

Walker, D.A. and K.R. Everett. 1987. Road Dust and Its Environmental Impact on Alaska Taiga and Tundra. *Arctic and Alpine Research* 19(4):479–489.

Walker, D.A., P.J. Webber, E.F. Binnian, K.R. Everett, N.D. Lederer, E.A. Nordstrand, and M.D. Walker. 1987. Cumulative Impacts of Oil Fields on Northern Alaskan Landscapes. *Science* 238(4828):757–761.

Walker, H.J. 1983. Guidebook to Permafrost and Related Features of the Colville River Delta, Alaska. In *Fourth Internation Conference on Permafrost*. July 18-22, 1983. Fairbanks, Alaska: University of Alaska. Available at: https://dggs.alaska.gov/webpubs/dggs/gb/text/gb002.pdf.

Walker, H.J., and P.F. Hudson. 2003. Hydrologic and geomorphic processes in the Colville River Delta, Alaska – ResearchGate. Available at: https://www.researchgate.net/publication/222072036_Hydrologic_and_geomorphic_processes_in_the_Colville_River_Delta_Alaska. Accessed March 2026.

Walker, H.J, and M. McGraw. 2015. Tapped lakes as sediment traps in an Arctic delta. *Proceedings of IAHS* (367):407–412. Available at: https://doi.org/10.5194/piahs-367-407-2015.

3.12 Wetlands and Waters

ABR, Inc.—Environmental Research & Services (ABR). 2025. *CD8 Wetland Delineation for Proposed Alternative Development Options within the CD8 Development Plan Area, Colville River Delta, Alaska, 2024*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: ABR, Inc.—Environmental Research & Services.

Alaska Department of Environmental Conservation (ADEC), U.S. Environmental Protection Agency (EPA), and U.S. Coast Guard (USCG). 2008. In Situ Burning Guidelines for Alaska. Anchorage. Available at: https://dec.alaska.gov/media/7769/in-situ-burning-rev1.pdf. Accessed May 2026.

Alaska Department of Environmental Conservation (ADEC). 2022. *Alaska Inland Area On-Scene Coordinator* In Situ *Burning Checklist.* Prepared by the Alaska Inland Area Committee, *In Situ* Burning Working Group. Available at: https://dec.alaska.gov/media/fd2bmd1v/inland-sosc-insitu-burn-checklists.pdf. Accessed May 2026.

Alaska Department of Fish and Game (ADF&G). 2006. *Our Wealth Maintained: A Strategy for Conserving Alaska's Diverse Wildlife and Fish Resources*. Anchorage, Alaska.

Alaska Department of Transportation and Public Facilities (ADOT&PF). 2010. *ADOT&PF Alaska Wetland Assessment Method.* Version 1.0. Fairbanks, Alaska: Alaska Department of Transportation and Public Facilities Research and Technology Transfer Division and Statewide Environmental Office.

Auerbach, N.A., M.D. Walker, and D.A. Walker. 1997. Effects of Roadside Disturbance on Substrate and Vegetation Properties in Arctic Tundra. *Ecological Applications* 7(1):218–235.

Brown, J., B.E. Brockett, and K.E. Howe. 1984. *Interaction of Gravel Fills, Surface Drainage, and Culverts with Permafrost Terrain*. Report No. AK-RD-84-11. Fairbanks, Alaska: Alaska Department of Transportation and Public Facilities.

Bureau of Land Management (BLM). 2007. *Offsetting versus Overlapping Ice Road Routes from Year to Year: Impacts to Tundra Vegetation.* Alaska Open File Report 112.

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed November 2025.

Cowardin, L.M. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. Washington, D.C.: U.S. Fish and Wildlife Service.

Guyer, S., and B. Keating. 2005. *The Impact of Ice Roads and Ice Pads on Tundra Ecosystems, National Petroleum Reserve-Alaska (NPR-A)*. Open File Report 98. Anchorage, Alaska: Bureau of Land Management, Alaska State Office.

Jorgenson, M.T., and M.R. Joyce. 1994. Six Strategies for Rehabilitating Land Disturbed by Oil Development in Arctic Alaska. *Arctic* 47(4):374–390.

Klinger, L.F., D.A. Walker, D.M. Walker, and P.J. Weber. 1983. The Effects of Gravel Roads on Alaskan Arctic Coastal Plain Tundra. In *Permafrost: Fourth International Conference Proceedings*, pp. 628–633. Washington, D.C.: National Academy Press.

Markon, C.J., S.F. Trainor, and F.S. Chapin, III. 2012. *The United States National Climate Assessment—Alaska Technical Regional Report*. Circular 1379. Reston, Virginia: U. S. Geological Survey.

McGuire, A.D. 2013. *Modeling Thermokarst Dynamics in Boreal and Arctic Regions of Alaska and Northwest Canada: A White Paper*. Fairbanks, Alaska: Alaska Climate Adaptation Science Center, Thermokarst Working Group of the Integrated Ecosystem Model for Alaska and Northwest Canada.

Myers-Smith, I.H., B.K. Arnesenm, R.M. Thompson, and F.S. Chapin. 2006. Cumulative impacts on Alaskan Arctic tundra of a quarter century of road dust. *Ecoscience* 13:503–510.

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.

National Research Council. 2003. *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*. Washington, D.C.: National Academies Press.

U.S. Army Corps of Engineers (USACE). 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=260614. Accessed November 2025.

U.S. Fish and Wildlife Service (USFWS). 2025. National Wetlands Inventory. Available at https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper. Accessed February 21, 2025.

U. S. Geological Survey (USGS). 2021. Hydrologic Unit Maps. Available at: https://www.usgs.gov/tools/hydrologic-unit-maps. Accessed December 2025.

Walker, D.A., and K.R. Everett. 1987. Road dust and its environmental impact on Alaskan taiga and tundra. *Arctic and Alpine Research* 19:479–489.

Chapter 4

Alaska Department of Environmental Concern (ADEC). 2010. *Alaska North Slope Spills Analysis: Final Report on North Slope Spills Analysis and Expert Panel Recommendations on Mitigation Measures*. Fairbanks, Alaska: Nuka Research and Planning Group, LLC, and Pearson Consulting

———. 2013. *Alaska North Slope Spills Analysis*. Fairbanks, Alaska: Nuka Research and Planning Group, LLC, and Pearson Consulting.

———. 2025. Statewide Oil and Hazardous Substance Spills Database. Search Spill, queried March 11, 2025. Available at: https://dec.alaska.gov/Applications/SPAR/PublicMVC/PERP/SpillSearch.

———. 2026a. Statewide Oil and Hazardous Substance Spills Database, PPR Spills Database Search. Search Spills between November 2, 2018, through February 26, 2026. Available at: https://dec.alaska.gov/applications/spar/publicmvc/perp/spillsearch. Accessed February 26, 2026.

———. 2026b. Statewide Oil and Hazardous Substance Spills Database, PPR Spills Database Search. Search Spills between July 1, 2019, through December 31, 2025. Available at: https://dec.alaska.gov/applications/spar/publicmvc/perp/spillsearch. Accessed February 16, 2026.

———. 2026c. Statewide Oil and Hazardous Substance Spills Database, PPR Spills Database Search. Search Spills between January 1, 2018, through December 31, 2025. Available at: https://dec.alaska.gov/applications/spar/publicmvc/perp/spillsearch. Accessed February 16, 2026.

Alaska Regional Response Team. 2012. *North Slope Subarea Contingency Plan*. Alaska Department of Environmental Conservation. Available at: https://dec.alaska.gov/media/8217/ns-scp-a-response.pdf. Accessed April 2025.

Bureau of Land Management (BLM). 1998. *Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement*. Anchorage, Alaska.

———. 2004a. *Alpine Satellite Development Plan: Final Environmental Impact Statement*. Anchorage, Alaska.

———. 2012. *National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement*. Anchorage, Alaska.

———. 2014. *Final Supplemental Environmental Impact Statement: Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project*. Anchorage, Alaska.

———. 2020. *National Petroleum Reserve in Alaska Integrated Activity Plan and Environmental Impact Statement*. Available at: https://www.blm.gov/sites/blm.gov/files/NPR-A_Final-IAP-EIS_Volume%201_ExecSummary_Ch1-3_References_Glossary.pdf. Accessed November 2025.

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/eplanning-ui/project/109410/510. Accessed November 2025.

Bureau of Ocean Energy Management (BOEM). 2013. *Oil Spill Occurrence Rates for Alaska North Slope Crude and Refined Oil Spills*. Alaska OCS Study BOEM 2013-205. Seldovia, Alaska: Nuka Research and Planning Group, LLC.

ConocoPhillips Alaska, Inc. (CPAI). 2022. ConocoPhillips Alaska Provides Final Report on Alpine CD1 Natural Gas Release. Available at: https://alaska.conocophillips.com/alpinecd1event/. Accessed May 22, 2026.

———. 2025a. *CD8 Development Environmental Baseline Document*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025b. *Department of the Army Permit Application CD8 Development North Slope, Alaska*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025c. *Oil Discharge Prevention and Contingency Plan - Western North Slope*, *Alpine and Willow Production and Pipeline Facilities*. DEC Plan No. 22-CP-4140. June 2025.

———. 2025d. *Response to Request for Information 26: Spill Modeling Revised Attachment 2*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2026. *Response to Request for Information 26L: Alpine Spill History*. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

Doyon Drilling, Inc. (Doyon). 2026. 2026 Western North Slope Rig Move Incident Information Hub. Available at: https://www.doyon.com/2026-western-north-slope-rig-move-incident-information-hub/. Accessed May 11, 2026.

SWCA Environmental Consultants (SWCA). 2026. *Noise Technical Report for the Colville Delta 8 Project, North Slope Borough, Alaska*. On file, SWCA Environmental Consultants, Salt Lake City, Utah. April 2026.

U.S. Army Corps of Engineers (USACE). 2012. *Point Thomson Project Final Environmental Impact Statement*. Anchorage, Alaska.

———. 2018. *Nanushuk Project Final Environmental Impact Statement*. Available at: https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=260614. Accessed November 2025.

APPENDIX A

Figures

APPENDIX B

Regulatory Authorities and Framework

Oil and gas development on Alaska's North Slope requires dozens of permits, approvals, and other reviews and consultations. Cooperating agencies and permitting authorities for the Colville Delta (CD) 8 Project (CD8 Project or Project) environmental impact statement (EIS) are described in EIS Chapter 1. Table B-1 in this appendix provides a complete list of anticipated permits, approvals, and consultations needed for the Project, as well as a list of applicable Federal laws and executive orders (EOs).

Table B-1. Federal, State, and Local Applicable Laws, Executive Orders, Permits, Approvals, and Consultations

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
Federal laws and EOs common to multiple Federal agencies	National Environmental Policy Act (NEPA) of 1969 (42 United States Code [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.	EIS
Federal laws and EOs common to multiple Federal agencies	National Historic Preservation Act (NHPA) of 1966 (54 USC 300101 et seq.; 36 Code of Federal Regulations [CFR] 800.106–110)	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*, and other parties. Federal agencies must provide the Advisory Council on Historic Preservation (ACHP) with a reasonable opportunity to comment on the CD8 Project (Project).	NHPA Section 106 consultation
Federal laws and EOs 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 EOs 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 non-Federal lands affected by the Federal action).	Consideration of impacts to activities protected under this act
Federal laws and EOs 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 EOs 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 EOs 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 EOs 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 EOs 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

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
Federal laws and EOs common to multiple Federal agencies	EO 12962 (1995) – Recreational Fisheries, as amended by EO 13474 (2008)	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 EOs common to multiple Federal agencies	EO 13045 (1997) – Protection of Children from Environmental Health and Safety Risks, as amended by EO 13296 (2003)	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 EOs common to multiple Federal agencies	EO 13112 (1999) – Invasive Species, as amended by EO 13751 (2016)	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 EOs common to multiple Federal agencies	EO 13175 (2000) – Consultation and Coordination with Indian Tribal Governments	EO 13175 requires Federal departments and agencies to consult with Indian Tribal governments when considering policies that would substantially impact Tribal communities.	Consultation and coordination with Indian Tribal governments
Federal laws and EOs 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
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 (WOTUS), including wetlands.	Section 404 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 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 (33 USC 2701 et seq.)	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
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

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
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)	The Noise Control 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. Fish and Wildlife Service (USFWS)	BGEPA of 1940 (16 USC 668 et seq.)	USFWS directs all applicants to apply under the 2009 eagle incidental take and nest-take permit framework, which applies to both bald and golden eagles. Nest relocation is allowed only in rare, highly limited circumstances.	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)	Marine Mammal Protection Act of 1972 (MMPA) (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 protects migratory birds, their nests, and their eggs by prohibiting unauthorized take, including killing, capturing, wounding, trapping, or collecting protected birds. The USFWS administers and enforces the MBTA through permitting, conservation guidance, and compliance oversight.	USFWS coordination
USFWS and NMFS	Endangered Species Act (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.	Coordination 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

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
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 Alaska Administrative Code [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 WOTUS will comply with the CWA, the Alaska Water Quality Standards, and other applicable State laws.	Section 401 Water Quality Certification
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 Approval for temporary storage of drilling waste
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

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
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
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 Public safety permit (hazing of terrestrial mammals or birds) 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 amendment Unit plan of operations amendment Formation of a new or expansion of an existing participating area under the Colville River Unit Agreement

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
ADNR	Grant of Right-of-Way (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	Grant of easement (AS 38.05.850)	ADNR issues easements for utilities and for erosion control features (bank armoring) on State lands.	Issuance of easement
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) Annular Disposal of Drilling Wastes (20 AAC 25.080)	AOGCC oversees permitting approval for each well to be drilled or redrilled. AOGCC oversees disposal of drilling waste to ensure that the waste will be contained and will not come to the surface or contaminate freshwater sources.	Permit to drill Approval for Annular Disposal of Drilling Wastes
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 AAC 25.025) to drill, produce, and maintain oil, gas, and geothermal wells
AOGCC	Conservation Order (20 AAC 25.520)	AOGCC establishes specific field and pool rules, sets conditions for drilling units and spacing exceptions, addresses waste prevention, and manages underground injections and aquifer exemptions.	Conservation Order
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

Applicability or Entity	Legal Authority	Agency Responsibility	Requirement
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 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)	Zoning (NSB Code 19.60.060 and 19.60.070)	NSB 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.	Resource development district: master plan update
NSB	Administrator Approvals (NSB Code 19.50.010)	NSB 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)
Arctic Slope Regional Corporation (ASRC)	Unit Plan of Development (11 AAC 83)	ADNR approves the Unit Agreement and shares it with ASRC prior to approval.	Unit Agreement approvals (unit Plan Of Development, participating areas)
Kuukpik Corporation	Process for land access approval	Kuukpik Corporation regulates surface use of their lands.	Approval for surface use of Kuukpik lands

* 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 ANCSA (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).

† 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).

APPENDIX C

Scoping Summary

Colville Delta 8 Project
Environmental Impact Statement

Scoping Summary Report

NOVEMBER 2025

PREPARED FOR

U.S. Army Corps of Engineers, Alaska District
2204 3rd Street
Elmendorf Air Force Base, Alaska 99506



PREPARED BY

DOWL
and
SWCA Environmental Consultants

CONTENTS

Public Engagement and Scoping Process C-1
Public Scoping Meetings C-1
Comment Summary C-1

Tables

Table 1. Summary of Public Scoping Meetings C-1
Table 2. Respondent Groups C-1
Table 3. Comment Categories C-2
Table 4. Comments Received C-3
Table 5. Comment Summary C-3

PUBLIC ENGAGEMENT AND SCOPING PROCESS

Public engagement is an integral part of the National Environmental Policy Act (NEPA) process and is required in the preparation and implementation of agencies' NEPA procedures. Scoping is the process of soliciting input on the issues, alternatives, and impacts that will be analyzed in a NEPA document. Information received during the scoping process was used in the development of the Colville Delta 8 Project (Project) environmental impact statement (EIS) and helped define the scope for environmental analysis.

The U.S. Army Corps of Engineers (USACE) published a notice of intent (NOI) to prepare an EIS for the Project on September 22, 2025, via special public notice. The scoping period lasted for 30 days, from September 22 through October 22, 2025.

Public Scoping Meetings

USACE conducted five public scoping meetings: four in person and one held virtually. In-person meetings were held in Nuiqsut, Utqiaġvik, Fairbanks, and Anchorage. Meeting dates and locations were advertised on the Project's website, social media, and through local media (print and radio). Meeting postcards were sent to every post office box in Nuiqsut and to the Project mailing list, and flyers were sent to local organizations to be posted in public locations. Email announcements were sent to the Project mailing list. At the public meetings, USACE presented an introduction to the Project and meeting participants asked Project-related questions and provided verbal comments. Table 1 provides details of the public scoping meetings.

Table 1. Summary of Public Scoping Meetings

Meeting	Date	Location
Public scoping meeting	September 29, 2025	Fairbanks
Public scoping meeting	September 30, 2025	Nuiqsut
Public scoping meeting	October 1, 2025	Utqiaġvik
Virtual public scoping meeting	October 6, 2025	Virtual
Public scoping meeting	October 7, 2025	Anchorage

COMMENT SUMMARY

In total, 22 respondents submitted comments during the scoping period. Public comments were received by email, through the Project's website, by verbal comments provided at public meetings, and by hard-copy fillable forms provided at the public meetings. Most respondents were individuals, with the exception of one Tribe, one Alaska Native corporation, four organizations, and one government agency (Table 2). Three of the organizations submitted a joint comment letter. Individuals who provided their business title or employer information in their letter or comment but did not state that they were an official representative were counted as individuals as opposed to businesses or organizations.

Table 2. Respondent Groups

Respondent Group Type	Respondent Title
Tribes and Tribal entities	Native Village of Nuiqsut Kuukpik Corporation
Government agencies	U.S. Environmental Protection Agency

Respondent Group Type	Respondent Title
Businesses and organizations	Center for Biological Diversity
	Grandmothers Growing Goodness
	Sovereign Inupiat for a Living Arctic
	Native Movement

Within each submittal or meeting 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 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 or NEPA process. Categories are intended to describe the main topic or resource that is discussed in the comment, regardless of whether the comment expresses opposition or support for the Project as it relates to that topic.

Table 3. Comment Categories

Resource Topics	Project Element Topics	EIS or NEPA Process Topics
Air quality	Permitting and regulations – general	Request for comment period extension
Birds	Permitting – USACE	Stakeholder engagement
Climate	Purpose and need	EIS process or timeline
Cultural resources	Project description	
Economics	Alternatives	
Energy and mineral needs	Analysis methods	
Fish	Avoidance, minimization, and mitigation	
Landownership and use	Data	
Marine mammals		
Noise		
Public health		
Sociocultural systems		
Soils and permafrost		
Spills and hazardous materials		
Subsistence		
Terrestrial wildlife		
Visual resources		
Water resources		
Wetlands and vegetation		

In all, 257 individual comments were identified from the various submittals and were categorized (Table 4). Approximately one-third of the comments fall under the following two categories: Alternatives and Public Health.

Table 5 presents a summary of key points expressed during the public scoping period. In the Alternatives category, some comments do not directly suggest alternatives, but express general concern about the proximity of the Project components (e.g., the drill site) to the community of Nuiqsut, which has implications for the alternative selection process.

Table 4. Comments Received

Comment Category	Number of Comments Received	Percentage of Total Comments (%)
Alternatives	43	17
Public health	38	15
Subsistence	23	9
Stakeholder engagement	16	6
Spills and hazardous materials	16	6
Sociocultural systems	13	5
Avoidance, minimization, and mitigation	12	5
Air quality	12	5
Analysis methods	7	3
Cultural resources	7	3
Marine mammals	7	3
Terrestrial wildlife	7	3
Water resources	7	3
Climate	6	2
Economics	6	2
Data	5	2
EIS process or timeline	5	2
Project description	4	2
Fish	3	1
Permitting – USACE	3	1
Purpose and need	3	1
Soils and permafrost	3	1
Noise	2	< 1
Permitting and regulations – general	2	< 1
Request for comment period extension	2	< 1
Visual resources	2	< 1
Birds	1	< 1
Landownership and use	1	< 1
Wetlands and vegetation	1	< 1
Total	**257**	**100**

Table 5. Comment Summary

Comment Category	Summary of Key Points
Air quality	Commenters requested a discussion of air quality impacts in the EIS; specifically, commenters requested information regarding Project emissions and potential impacts on human health, climate and compliance with air quality standards. One commenter recommended that the EIS evaluate current air quality conditions, forecast the impacts of Project activities, and address all relevant pollutants and health risk thresholds for hazardous air pollutants. Additionally, one commenter noted that the EIS should propose mitigation measures such as equipment upgrades, best management practices, dust suppression, and advanced emission controls to reduce adverse impacts. Specific pollutants of concern mentioned include fine particulate matter, nitrogen oxides, volatile organic compounds, and greenhouse gases. Commenters expressed concern for air pollution and the risk of toxic waste from potential blowout events and requested support for a community-led air monitoring program.

Comment Category	Summary of Key Points
Alternatives	Numerous commenters noted that the Project would be too close to the community of Nuiqsut. Some commenters proposed alternative locations such as across the Colville River near existing industrial areas or farther south. Commenters suggested collaborative development with neighboring operators to consolidate impacts or suggested buffer zones where development should not occur. Commenters noted that alternatives should also consider using gas beneficially for local energy needs instead of flaring. One commenter suggested using only ice roads to access the drillsite, similar to Alpine CD3 to minimize habitat fragmentation. One commenter emphasized the importance of not minimizing the size of roads and gravel pads for safety and environmental reasons, noting that proper access can prevent congestion and related issues. Another commenter requested the development of a road into the community and region, which could reduce winter production impacts and erosion caused by ice roads and offer economic and emergency benefits. Commenters suggested drilling from existing sites, reconfiguring pad locations, and ensuring that alternatives maintain long-term viability of subsistence resources and access. One commenter emphasized that alternatives should not be dismissed solely for economic reasons if they still meet the Project's purpose.
Analysis methods	Commenters requested a detailed cumulative impacts analysis in the EIS using both Western science and Indigenous knowledge, with clear acknowledgment of any information gaps and commitments to ongoing monitoring. Commenters also suggested cumulative impacts regarding how multiple projects interact and collectively affect resources like caribou herds, air quality, and public health. Commenters suggested that the EIS analyze how adding the Project would compound habitat loss, traffic, air emissions, noise, and spill risks, considering not only direct effects but also how new infrastructure can induce further industrial expansion and future impacts on the Colville Delta and subsistence areas. Commenters requested that the alternatives analysis provide detailed side-by-side comparisons, including route maps, noise and light estimates, wetlands impact, and spill modeling to help the community understand the differences and implications.
Avoidance, minimization, and mitigation	Commenters requested independent air quality monitoring and a substantial impact fund to the Nuiqsut community and comprehensive emergency response planning coordinated with local government and the Tribal council. One commenter noted that an evacuation plan should include logistics, shelter, transportation, and communication protocols. Commenters requested restrictions on construction during peak caribou migration periods and suggested Tribal involvement in monitoring and enforcement. Commenters expressed concern that previous mitigation measures have been ineffective or not responsive to community needs, particularly regarding blasting, gravel extraction, and infrastructure. One commenter asked if ConocoPhillips Alaska, Inc. (CPAI), would be required to purchase credits at a mitigation bank, and another asked if thresholds would be established for heavy equipment usage during winter. Overall, commenters requested that mitigation efforts be community centered.
Birds	One commenter noted that migration routes for birds is a key issue that should be evaluated in the EIS.
Climate	Commenters noted general concern about a changing Arctic climate, particularly pointing out changing conditions in the Colville River Delta and on the North Slope in general. Commenters noted the Project's contribution to a continuing changing climate.
Cultural resources	Commenters requested an evaluation of traditional uses and requested incorporation of Indigenous knowledge and communication with stakeholders to ensure cultural values are properly evaluated and protected. One commenter expressed concern about whether Federal agencies adequately consider historical and cultural connections when reviewing development proposals. Another commenter requested a stand-alone cultural-landscape study.
Data	Commenters requested health surveys to assess the potential impact of Project-related pollution or disturbances. If these data cannot be obtained, commenters requested that USACE acknowledge the data gaps and develop a monitoring program. Regarding wildlife data, commenters requested that USACE collect and disclose caribou movement data around the Colville River and compare conditions from previous development. Commenters asked how general regulatory reports would be analyzed and included in the EIS. Commenters expressed concern about the incorporation of Indigenous knowledge, stating that this knowledge is mostly oral and may require community outreach. Commenters also questioned the validity of data collected by CPAI and expressed concern about transparency and integrity of data collection. One commenter expressed frustration that studies often focus narrowly on wildlife, neglecting broader impacts on human health and socioeconomic well-being, and called for more comprehensive, unbiased research and reporting throughout the NEPA process.
Economics	One commenter expressed that the Project would increase revenue to the State, and would provide jobs and opportunities for Alaska residents. Other commenters noted that although increased oil production from the Project would boost pipeline throughput and State revenue, supporting services and creating jobs and opportunities, they had concern about true economic and social benefits. Some commenters expressed concern that corporations prioritize profits over local well-being, noting that local workers face fierce competition for limited opportunities. Commenters requested a thorough examination of the economic outcomes and production scenarios. Lastly, one commenter highlighted the need to balance economic benefits with general impacts on the environment and local communities.

Comment Category	Summary of Key Points
EIS process or timeline	One commenter formally requested participation as a cooperating agency for the Project, rather than consulting as a Tribal entity. Another commenter was concerned about the perceived lack of a published NOI noting that the timeframe (5 days) between the NOI and the first public meeting was limited. An additional commenter requested that the EIS process remain efficient and focused on the NEPA timeline.
Fish	One commenter expressed concern that fish are becoming ill from development. One commenter requested the EIS evaluate the Project's potential effects on fish migration, habitats, and water quality, especially at roads and pipeline crossings. Another commenter requested incorporation of Indigenous knowledge from local anglers to understand fish use in the area.
Landownership and use	One commenter asked about joint ownership of the land and about the decision-making process in case of conflict.
Marine mammals	Commenters expressed concern that the Project may affect several species listed under the Endangered Species Act (ESA), such as polar bear, ice seals (ringed and bearded seals), and Steller's eider. Commenters requested application of protections and considerations required under the ESA.
Noise	One commenter expressed concern about noise pollution from the Project, and another commenter asked if Nuiqsut residents would be able to hear drilling from the town.
Permitting – USACE	One commenter asked how USACE's decisions on discharge of fill may affect local water resources. Another commenter noted that USACE should favor alternatives that are less damaging (alternatives in upland or without roads), per 404(b)(1) guidelines.
Permitting and regulations – general	One commenter noted that the process for obtaining Kuukpik Corporation's approval on certain issues is unclear, raising questions about authority and how local input is considered, particularly when some Nuiqsut elders have relocated to urban areas and may no longer be directly impacted. One commenter expressed frustration with the role of Arctic Slope Regional Corporation (ASRC) and its delegates in regulatory and permitting decisions, nothing that authority is perceived as a monopoly, with little accountability from State or Federal agencies. Commenters expressed concern that the permitting system lacks transparency and can be unresponsive to residents' concerns.
Project description	Commenters requested that the EIS disclose the expected volumes and emissions from flaring, including planned temporary flaring during well completion or testing, and noted that the EIS should outline commitments or regulatory requirements related to flaring. One commenter also requested clarity regarding oil production potential and if the Project involves fracking.
Public health	Commenters discussed general health concerns, stating that the community of Nuiqsut faces significant and growing health risks due to its proximity to oil and gas development and those risks would be compounded given the proximity of the Project to community homes, hunting grounds, and travel routes. Commenters expressed general concern about the short-term and long-term health of community members, including respiratory illnesses, neurological disorders, suicide rates, cancer, and mental health crises. Commenters asked for a study of baseline health data for Nuiqsut residents. One commenter asked for independent oversight on public health impacts and an independent body to monitor these impacts, expressing concern about industry-controlled data. Commenters requested the inclusion of community health data, not regional averages, and requested an analysis on both physical and mental health impacts, including cultural losses and sense of place, in the EIS. Another commenter requested strong public health protections and measures. One commenter expressed support of CPAI's Health, Safety & Environment Policy and other CPAI programs. Commenters noted that past incidents have led to inadequate emergency response and left the community vulnerable, thus the Project should include an emergency evacuation plan.
Purpose and need	One commenter requested that the Project's purpose and need are defined in alignment with NEPA requirements and the broader public interest. Commenters noted that the purpose should reflect the public need for additional oil development while balancing mandates to protect wetlands, subsistence resources, and public health. One commenter noted that under the Clean Water Act Section 404(b)(1) Guidelines, USACE may only permit the "least environmentally damaging practicable alternative" (LEDPA) to meet the basic Project purpose, which requires articulating the purpose and need broadly enough to fully examine less-damaging alternatives, including different locations. Commenters noted that the purpose and need statement should recognize USACE's responsibility to protect aquatic resources and subsistence uses, not just the commercial interests of the applicant.
Request for comment period extension	Commenters formally requested an extension of the comment period. Commenters expressed concern that the current comment period coincides with the hunting, fishing, and harvesting season, as well as travel for the Alaska Federation of Natives conference, thus limiting the public's ability to prepare meaningful input.

Comment Category	Summary of Key Points
Sociocultural systems	Commenters noted that the subsistence way of life in Nuiqsut is deeply rooted in cultural continuity and the ability to practice traditions on ancestral lands, not just in the availability of resources. They commented that the increase of development has reduced open land for subsistence use. They commented that infrastructure threatens to fundamentally alter daily life and the community's connection to the land. Commenters expressed concern about the Project changing the quality of life in Nuiqsut and changing traditional ways of life, including the concern of health emergencies and food insecurity to psychological harm caused by the constant presence of industrial activity. Specifically, commenters expressed concern regarding the proximity of drilling sites to homes and Native allotments increased industrial traffic; light pollution; compromised water sources; and the physical impacts of blasting, such as cracks in homes and misaligned buildings. Commenters also expressed that impacts to humans and the community were the most critical issues that the EIS should address. Commenters stated that cumulative effects of development have eroded freedom and a sense of control, whereas social stressors like inadequate housing, lack of community investment from industry, and diminished spaces for children to socialize compound the burden. Commenters requested that the EIS analyze more-than-quantifiable metrics to reflect lived realities, cultural values, and the intangible impacts on "Inupiat life, health, safety, culture, and tradition." Commenters requested agencies to recognize and address the full spectrum of human-scale impacts and to require mitigation measures for them.
Soils and permafrost	Commenters expressed concern about the safety and stability of infrastructure, including well casings, pad foundations, and pipeline supports in areas with permafrost. Commenters recommended that the EIS include up-to-date permafrost maps and ground temperature data to accurately assess these risks. Commenters noted that the necessity for a thorough analysis is underscored by the Alpine 2022 gas leak. Additionally, commenters noted that rapid permafrost thaw driven by rising Arctic temperatures along with increased coastal erosion from the loss of protective sea ice and rising sea levels are compounding concerns for infrastructure integrity.
Spills and hazardous materials	Commenters expressed concern about an increased severity of a potential spill given the proximity of the Project to the community and requested additional planning for evacuation in the case of a blowout or other inadvertent release. Commenters requested that the EIS analyze geological risks, well design, blowout preventer reliability, and worst-case discharge scenarios, including how oil or gas could spread through the Colville River Delta's channels, impacting fish, wildlife, and the community. Commenters requested that the EIS include spill probability analyses, detailed spill response plans, identification and management of hazardous waste, and compliance with all relevant regulations. Commenters also noted that response times and the adequacy of local resources for emergency response are critical issues, particularly as severe weather and remoteness can delay help. Commenters expressed concern regarding exposure to toxic chemicals like hydrogen sulfide; the lack of protective equipment or mitigation in the event of a spill. Commenters requested that public well-being, environmental protection, and transparent responsive spill planning are prioritized in the analysis.
Stakeholder engagement	Commenters emphasized the need for clear, understandable communication throughout the EIS process, including accurate explanations of abbreviations and technical terms, and the consideration of translation to Iñupiaq for public meetings. Commenters expressed concern about insufficient notice of the public meetings. Commenters requested meaningful consultation and the integration of Indigenous knowledge, through regular meetings in Nuiqsut during all stages of the EIS, with special sessions focused on topics like emergency response, caribou, and air quality. Commenters asked if landowners, Tribes, and local governments had been contacted for input on the Project. Commenters also expressed concern that one virtual meeting was not enough of an opportunity for the public to comment and requested an additional scoping meeting in Fairbanks.
Subsistence	Commenters emphasized that subsistence is central to the Iñupiaq way of life, serving as both a food source and a foundation for cultural identity. Commenters generally expressed concern about changes to subsistence resource abundance and the impact of the Project on caribou migration. Commenters reported increasing stress on wildlife and a decline in fish health since development began, with observable pathology in local catches. Commenters requested analysis on gravel road infrastructure and the potential for it to create a barrier to caribou migration, restricting hunting opportunities for Nuiqsut residents who rely on the animals for subsistence and cultural continuity. Commenters noted that existing infrastructure has already disrupted migration routes, and additional development is expected to intensify these impacts. Commenters also noted that infrastructure changes not only affect animal populations but also alter how subsistence users access and use the land. Commenters also stated that the Project would force subsistence users to travel farther from the community to hunt and fish and that it may contaminate their food sources. Commenters noted that the EIS should comply with Section 810 of Alaska National Interest Lands Conservation Act by analyzing direct, indirect, and cumulative effects on subsistence, including modeling caribou movement, assessing impacts on fish and water quality, and evaluating changes to migratory bird habitats. Commenters expressed concerns for the future, as younger generations may lose the opportunity to learn traditional hunting and gathering practices, further eroding cultural connections. Commenters mentioned that mitigation measures, such as subsistence ramps, are often seen as inadequate compared to the reliability of natural migration routes. Commenters concluded that the protection of subsistence resources must be a key benchmark for Project approval.

Comment Category	Summary of Key Points
Terrestrial wildlife	Commenters requested analysis on how the Project would impact wildlife, specifically caribou movement and migration patterns. Commenters noted that changes in caribou behavior could lead to altered migratory routes or delays in movement, making subsistence hunting more challenging. Commenters noted that community observations indicate that caribou presence has changed after increased development in the area. Commenters also stated that separating roads from pipeline racks by at least 500 feet should be considered to reduce visual barriers for wildlife. Commenters requested a review of caribou collar data in the Project area, along with modeling of potential impacts on migration and insect-relief behaviors. Commenters mentioned that it may be difficult to monitor wildlife interactions in the Project area via aerial surveys because of the proximity to Nuiqsut and that these surveys could disturb village residents.
Visual resources	Commenters questioned how intense the lighting from the Project would be and if it would be so bright that it could cause discomfort or harm, or if it would simply be a persistent annoyance. Commenters expressed concern about whether the sights, sounds, and odors associated with the Project would vary between winter and summer, which could affect day-to-day life in different ways depending on the season.
Water resources	Commenters requested an analysis on how the Project infrastructure, such as roads and causeways, might change surface water flow patterns, particularly during spring breakup when freshwater discharge is highest. Commenters noted the importance of analysis on whether the Project could cause ponding or erosion, and requested design solutions such as appropriate bridge spans, culvert capacity, and pier design to maintain natural hydrologic connectivity. Commenters also noted that construction of roads, pads, and pipelines across sensitive waterways could degrade fish habitat, alter water flows, and increase erosion and permafrost thaw. Commenters voiced concerns that the Project could impact Nuiqsut's secondary freshwater lake, which is a backup for the community's drinking water. Commenters recommended that infrastructure fill be placed parallel to local flow paths with adequate cross-drainage, and that embankments follow North Slope best practices, including thermal protection for permafrost for mitigation. Commenters requested an analysis of the effects of fugitive dust, gravel discharge, and the lateral migration of the Colville River channel. Lastly, commenters expressed concern about water quality monitoring and the adequacy of current testing.
Wetlands and vegetation	Commenter asked about identified wetlands and existing baseline wetlands studies.

APPENDIX D

Issues Dismissed from Detailed Analysis

INTRODUCTION

This appendix describes resources and topics that were considered but dismissed from detailed analysis in the Colville Delta (CD) 8 Project (CD8 Project or Project) environmental impact statement (EIS) and the rationale for dismissal. Issues that were identified but did not warrant further detailed analysis are issues

- for which the resource in question is not present in the analysis area,
- for which mitigation measures would reduce impacts below significance,
- that are analyzed in other National Environmental Policy Act (NEPA) documents and tiered to in the CD8 Project EIS, or
- for which the impact context is so low that a detailed analysis was not needed to determine significance.

Table D-1 presents issues dismissed from detailed analysis and the rationale for not analyzing them in detail. For Project reference, these issues have been assigned numbers. Although issues or resources not analyzed in detail may be affected by the Project, effects would be relatively minor in comparison with the issues analyzed in detail. In accordance with 33 Code of Federal Regulations 333.23, the EIS is concise and focused on significant impacts. The EIS discusses impacts in proportion to their significance and has only a brief discussion of other-than-significant issues.

Numerous oil and gas projects on the North Slope with similar types of actions as CD8 have been evaluated in other NEPA documents. This EIS tiers to several of those documents:

- 2004 *Alpine Satellite Development Plan Final Environmental Impact Statement* (Alpine EIS) (Bureau of Land Management [BLM] 2004)
- 2015 *Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project* (GMT1 SEIS) (BLM 2015)
- 2018 *Nanushuk Project Final Environmental Impact Statement* (Nanushuk EIS) (now called the Pikka Project) (U.S. Army Corps of Engineers [USACE] 2018)
- 2018 *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project, Final Supplemental Environmental Impact Statement* (GMT2 SEIS) (BLM 2018)
- 2023 *Willow Master Development Plan Supplemental Environmental Impact Statement* (Willow SEIS) (BLM 2023)

Table D-1. Issues Dismissed From Detailed Analysis

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
AIR-1	How would Project emissions affect air quality–related values (AQRVs), including visibility and regional haze at Class I areas?	Impact context is so low that detailed analysis is not needed to determine significance.	The Clean Air Act gives special air quality and visibility protection to Class I areas. Class I areas are established by Congress as areas of special national or regional natural, scenic, recreational, or historical value, such as national parks greater than 6,000 acres that were in existence before 1977. The closest Class I area to the Project is Denali National Park, which is more than 420 miles (676 kilometers [km]) to the south. Class II areas have fewer protections than Class I areas. Most of Alaska, including the analysis area and the community of Nuiqsut, is designated as Class II. AQRVs are specific resources at Federally managed Class I areas that may be adversely affected by a change in air quality. One example of an AQRV is visibility. The Federal Land Managers' AQRVs Work Group guidance (U.S. Forest Service et al. 2010) provides the recommended methodology and AQRV criteria used to evaluate adverse impacts. This guidance states that any stationary source greater than 31 miles (50 km) from a Federal Class I area is considered to have negligible impacts to all AQRVs if its total sulfur dioxide (SO_2), nitrogen oxides (NO_X), particulate matter less than or equal to 10 microns in diameter (PM_{10}), and sulfuric acid annual emissions (tons per year [tpy]), divided by the distance (in km) from the Class I area, is less than or equal to 10 (this is called the Q/D analysis). There are no Class I areas within 31 miles (50 km) of the Project. The total combined Project emissions of NO_X, PM_{10}, and SO_2 (Q) for a typical production year would be 19.76 tpy (SLR International Corporation 2026a). The Q/D analysis for the nearest Class I area (Denali National Park, more than 420 miles [676 km] to the south) is 19.76 tpy/676 km = 0.029. Since this is less than 10, a detailed AQRV analysis is not required, and far-field dispersion modeling is not warranted. The proposed stationary-source emissions would have negligible impacts with respect to all AQRVs. Thus, further analysis is not needed to determine significance of Project impacts to AQRVs, visibility, or Class I areas.
BIO-1	How would Project infrastructure impact habitat availability for birds, including special status species?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:239–258, 544–550) • Nanushuk EIS (USACE 2018:3-313–3-337, 3-340–3-343) • Willow SEIS (BLM 2023:193–195, 205–207) The CD8 Project would alter and remove habitat for nesting and foraging birds, including two Federally listed threatened species (spectacled eider [*Somateria fischeri*] and Steller's eider [*Polysticta stelleri*]) and three U.S. Fish and Wildlife Service Birds of Conservation Concern (yellow-billed loon [*Gavia adamsii*], bar-tailed godwit [*Limosa lapponica*], and short-eared owl [*Asio flammeus*]) that occur in and/or near the CD8 Project area. The CD8 Project area is estimated to provide suitable habitat for more than 30 bird species (BLM 2023:Volume 4 Appendix A.3, Figure 3.11.1) and is within the Colville River Delta (CRD) Important Bird Area (BLM 2023:Volume 4 Appendix A.3, Figure 3.11.2). Spectacled eider and yellow-billed loon both use the Project area, including during the breeding season (BLM 2023:Volume 4 Appendix A.3, Figures 3.11.3 and 3.11.5). Since predevelopment of CD3 (1993–2004), pre-nesting and nesting spectacled eiders have been concentrated north of the CD3 airstrip and between the Sakoonang and Nechelik Channels of the Colville River in the northern CRD (Johnson et al. 2003a, 2004, 2005, 2006, 2007, 2008; Burgess et al. 2001, 2002; Parrett et al. 2024). Pre-nesting spectacled eiders are not abundant in the CD8 Project area (Parrett et al. 2024). Yellow-billed loons often nest in the same or nearby locations each year (Johnson et al. 2018), and nest and brood locations have been documented in Lakes M9608, B8530, M9607, L9327, L9328, L9329, L9323, MC7911, M9622, MC7911, L9311, L9310, and L9342 surrounding the action alternatives (BLM 2023:Volume 4 Appendix A.3, Figure 3.11-5) (Johnson et al. 2018; Parret et al. 2025). Steller's eider is rare in the CRD and Project area: one bird was recorded in 2001, and a pair was recorded in 2007, both in the northern outer CRD (BLM 2023:Volume 4 Appendix A.3, Figure 3.11.4; Parrett et al. 2024).

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			Ecosystems in Alaska have undergone changes in the past two decades that have impacted habitat availability and survival for birds, including changes in temperature, precipitation, hydrology, permafrost stability, and habitat conditions (Ballinger et al. 2023; Huntington et al. 2023; Thoman and McFarland 2024; Thoman and Walsh 2019). Additionally, development of oil and gas in the Colville River area has directly and indirectly impacted habitat availability through habitat loss and alteration. Multiple EISs have analyzed the impact of habitat loss to birds from oil and gas infrastructure in the Western North Slope (WNS) and CRD area, including direct habitat loss through construction of infrastructure and indirect habitat alteration through changes in hydrologic function and permafrost thaw, changes to habitat quality from dust and gravel spray along gravel roads and pads, the potential introduction and establishment of noxious weeds, and from inadvertent spills. The CD8 Project would be constructed in the same general area and habitat that is used by the same species that were analyzed in the EISs listed above. Prior EISs evaluated impacts from a range of 253 to 2,145 acres of habitat loss, up to 31 times larger than the proposed habitat loss that would occur from the CD8 Project (BLM 2004, 2023; USACE 2018). The CD8 Project would permanently remove between 46.9 and 67.3 acres of habitat depending on the action alternative, and temporarily alter 355.4 to 398.9 acres for ice infrastructure, and between 299 and 498 acres of habitat due to dust deposition from gravel infrastructure. The loss of habitat from the Project would be minor given the widespread availability of similar habitats in the CRD (BLM 2004, 2023; USACE 2018). Multiple best management practices (BMPs) would be applied to further reduce impacts to birds from habitat loss, including several to limit impacts to habitat (mitigation measures 1–31, 34–38) (see EIS Appendix E [Mitigation Measures]). These same BMPs were also analyzed in the previously cited NEPA documents. The types of impacts to birds from the CD8 Project would be the same as described in the previous EIS analyses. Therefore, additional analysis is not needed to understand the impacts to birds from habitat loss. The analysis of reasonably foreseeable future (RFF) trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition of the affected environment. The incremental addition of habitat loss and alteration from the Project in combination with RFF actions, as well as the implementation of BMPs to limit impacts to habitat, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts. Threatened and endangered species are protected by the Endangered Species Act and are, therefore, a Federal resource. Similarly, migratory birds are protected under the Migratory Bird Treaty Act, and bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively) are protected under the Bald and Golden Eagle Protection Act and are, therefore, a Federal resource. The impacts to these species, as described above, would be an irreversible and irretrievable impact to Federal resources.
BIO-2	How would Project equipment, air and ground traffic, infrastructure, and human presence impact bird habitat use and distribution?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:239–258, 550, 553–556) • Nanushuk EIS (USACE 2018:3-313–3-337, 3-348–3-350) • Willow SEIS (BLM 2023:193–195, 211–216) The CD8 Project could alter bird habitat use and distribution, including that of special status species, due to visual and noise disturbance. Multiple EISs have analyzed the impact of disturbance and displacement of birds from oil and gas infrastructure on the WNS and Colville River area, which includes increased energetic costs; interference with resting, feeding, or brood-rearing activities; temporary or long-term changes in habitat use; nest abandonment; and reduced survival of young (BLM 2023:211–212). The CD8 Project would be constructed in the same general area and habitat that is used by the same species that were analyzed in the EISs listed above. The same disturbance vectors (vehicles, air traffic, marine vessels, drilling and machinery, and human presence) analyzed in the other EISs would be required

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			for the CD8 Project but to a lesser magnitude and extent than previously analyzed. The Willow SEIS includes an analysis for up to 4,212,510 ground trips with vehicles compared to 375,597 to 391,936 for the CD8 Project, depending on the action alternative (Table 2.5-2); up to 22,484 fixed-wing and helicopter flights compared to 959 for the CD8 Project; up to 319 marine trips, including 24 barges, compared to 10 marine trips with one barge trip for the CD8 Project; up to 10 drill pads compared to one for the CD8 Project; and up to 1,650 workers on-site compared to up to 525 for the CD8 Project. Therefore, an additional analysis is not needed to understand the impacts of the CD8 Project to habitat use and distribution of birds, including special status species. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition of the affected environment. The incremental addition of habitat loss and alteration from the Project in combination with the RFF actions, as well as the implementation of BMPs to limit impacts to habitat, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts.
BIO-3	How would the Project impact bird injury and mortality?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:239–258, 552–569, 721, 725–735, 822–838, 896–902, 983–994, 1140–1153) • Nanushuk EIS (USACE 2018:3-305–3-337, 3-348–3-353) • Willow SEIS (BLM 2023:193–195, 212–214) The CD8 Project could injure or kill birds, including special status species, through collisions with marine vessels, vehicles, aircraft, and Project infrastructure; increased hunting pressure; increased predation; and inadvertent spills (BLM 2023:213; USACE 2018:3-338). The CD8 Project area is estimated to provide suitable habitat for more than 30 bird species (BLM 2023:Volume 4 Appendix A.3, Figure 3.11.1) and is within the CRD Important Bird Area (BLM 2023:Volume 4 Appendix A.3, Figure 3.11.2). The Project would construct new infrastructure, which would pose a collision risk for birds as they migrate and/or move through the Project area. The Project would also require increased vehicle, aircraft, and marine vessel traffic compared to existing conditions (see EIS Tables 2.5-1, 2.5-2, and 2.5-3), which could also collide with birds. Subsistence access would be increased in the Project area, which could result in increased harvest risk for birds and bird eggs. The transportation and production of materials that could result in spill events could degrade the environment and result in direct mortality of birds. The one barge trip of materials to Oliktok Dock required for CD8 could have the potential to introduce invasive species, including rats, which could have impacts to nesting birds. However, the impact context is minor (one additional barge trip added to an area with regular barge traffic), thus detailed analysis is not needed to determine significance. Multiple EISs have analyzed the impact of oil and gas infrastructure and mining operations to bird injury and mortality on the North Slope and in the Colville River area, including from collisions with vehicles or infrastructure, increased subsistence harvest access, increased predation risk, and hazardous materials and waste disposal (BLM 2023:212–214; USACE 2018:3-351). The CD8 Project would be constructed in the same general area and habitat that is used by the same species that were analyzed in the EISs listed above. These EISs include BMPs to reduce mortality of birds, including design modifications, speed limits, trash and waste management, lighting modifications, and spill prevention plans and response protocols. These same BMPs are applied to this Project (see EIS Appendix E [Mitigation Measures]). Prior NEPA analyses found the impacts from bird injury and mortality to be minor with the implementation of the BMPs. For all ConocoPhillips Alaska, Inc.'s (CPAI's) WNS activities from 2015 to 2024, including traffic for Alpine, Greater Mooses Tooth (GMT) 1, GMT2, National Petroleum Reserve in Alaska (NPR-A) ice roads, and Willow, 11 birds were struck by vehicles and six birds were struck by aircraft (CPAI 2025a). The types of impacts to bird injury and mortality from the Project would be the same as described in the previous EIS analyses, though the extent and magnitude would be less because the CD8 Project would have less traffic and less infrastructure than the projects

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			previously analyzed. To date, rats have not established on the North Slope of Alaska, and the potential for the introduction and spread of rats from barging activities remains unlikely. Therefore, an additional analysis is not needed to understand the impacts to birds from the CD8 Project. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition of the affected environment. The minor incremental addition of elements that may increase bird injury and mortality, as well as the implementation of BMPs to limit those impacts, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts.
BIO-4	How would gravel placement, bridges, and culverts affect aquatic habitat quantity and quality?	Analyzed in other NEPA documents. Impact context is so low that detailed analysis is not needed to determine significance.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-496–3-498) • Willow SEIS (BLM 2023:177–180) The CRD is a complex assemblage of lakes, streams, and water tracks situated between the Main Channel of the Colville River to the east and the Niġliq Channel of the Colville River to the west. Surface water from the Colville River is transported through the delta in a series of perennial distributary channels and smaller streams connecting many lakes directly to these channels. In addition, most waterbodies in the CRD not drained by a perennial channel are connected to main river flows through water track channels that become inundated during high water in some breakup and fall flood events. Not all lakes are flooded annually. This assemblage of lakes and streams connected to the main river by water tracks and high water events is an important mechanism driving fish use of lakes in the CRD by providing for access to and from the lakes for a variety of fish species. As a direct result, most lakes have documented use by anadromous and resident fish species. This unique mechanism for fish distribution, along with extensive fish sampling data, has led to all lakes and streams within the CRD being listed as important for the migration, spawning, and rearing of anadromous fish in the anadromous waters catalog (and being depicted as one contiguous polygon encompassing the CRD). Natural flow pathways and duration of flow during high and low return flood events can be altered by placement of gravel infrastructure and culverts. Loss of habitat could occur due to installation of bridge pilings. Loss of habitat was eliminated from detailed analysis because Project facilities would create an identical type of impact (but much less extensive) to those disclosed in the Willow SEIS and Nanushuk EIS (475 square feet in Lake L9324 for the CD8 Project compared to 1.2 acres in streams and 1.5 acre in lakes for Willow). Loss of habitat could also occur due to placement of fill in waterbodies for culverts. Approximately 0.7 to 0.8 acre of fill in water tracks would be required for CD8, depending on the alternative, compared to 1.4 acres in lakes for Willow. The CD8 Project would be constructed in the same general area and habitat that is used by the same species that were analyzed in the Nanushuk EIS. The NEPA analyses conducted for these two final EISs determined that impacts from similar placement of bridge pilings in fish habitat would be long term and limited to localized areas (BLM 2023:177; USACE 2018:3-497). The CD8 Project would install riprap at culverts. The four larger water track crossings are expected to require culvert batteries; approximately 5,000 square feet of riprap may be used for scour protection at each crossing for a total of 0.6 to 1.0 acre of riprap. The quantity of habitat altered by riprap would constitute a very small proportional change to existing conditions (more than one crossing, as determined in coordination with Alaska Department of Fish and Game). Habitat alteration due to gravel infrastructure, sheet piles, and culverts would be the same as that analyzed for Willow but would be lower in magnitude because less gravel placement, sheet piles, and culverts would be needed. Habitat alternation from culverts would be the same as Willow but lower in magnitude (11 culvert batteries for Willow compared to five to eight culvert batteries for the CD8 Project, depending on the alternative). Dust from vehicle traffic on gravel roads could be deposited in waterbodies within 328 feet (100 meters) of gravel roads and pads, as analyzed in the Willow SEIS (BLM 2023:178) and Nanushuk EIS (USACE 2018:3-496). The effect would

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			be the same for the CD8 Project but of a lower magnitude because the area of deposition would be less (between 299 and 498 acres, depending on alternative, for the CD8 Project compared to 3,326 acres for Willow [BLM 2023:Appendix E.9 Vegetation and Wetlands, Table E.9.6]). The CD8 Project would implement many of the same design features as Willow to minimize in-water habitat alteration and maintain fish passage (see EIS Appendix E [Mitigation Measures]). The design features would provide for season-long fish passage. Inadvertently blocked passage and erosion would be geographically limited and might affect individual fish but would not result in population-level effects (BLM 2023:179). Proper culvert sizing, maintenance, and placement relative to seasonal flows would ensure passage for fish during important migration periods in spring and fall and maintain natural hydrogeomorphic processes and drainage patterns during operations. EIS Chapter 4 (Spills and Inadvertent Releases) summarizes spills that have historically occurred on the North Slope and the likelihood and extent of spills that could occur from the CD8 Project. Impacts to water quality from spills are described in Section 3.11.3 (Water Quality and Hydrology). The likelihood of a small spill occurring over the Project's lifetime is very high. Small spills are expected to be short in duration (typically less than 4 hours), are expected to be identified and rapidly contained on gravel infrastructure and are unlikely to affect fish habitat. Although the likelihood of a reservoir blowout is very low (approaching zero), if it were to occur oil fallout could reach the lakes surrounding the drillsite and, under Alternative B, the Niġliq Channel (see EIS Figure 4.4-1). At low river flow, oil that enters the Niġliq Channel could strand along the shoreline and potentially be recovered. At high river flows, the oil could be transported to Harrison Bay (21 river miles via the Niġliq Channel). The primary effect of an oil spill on water quality would be the toxicity of petroleum hydrocarbons and reduced dissolved oxygen for aquatic organisms; even small spills of oil into water could make water toxic for some aquatic life. The cumulative impacts analysis in the Willow SEIS (BLM 2023:412) remains applicable to the CD8 Project because the same general type, number, and magnitude of RFF trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. River monitoring studies in the Tiŋmiaqsiuġvik River have evaluated fish habitat use, species presence, abundance, length frequency distributions, and population estimates pre- and post-development (Owl Ridge Natural Resource Consultants, Inc. 2024). No differences in fish habitat use or effects on the metrics evaluated were detected post-development. Therefore, additional analysis is not needed to understand how the CD8 Project would affect habitat quantity and quality.
BIO-5	How would ice infrastructure and water withdrawals affect aquatic habitat quantity and quality?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-496–3-498) • Willow SEIS (BLM 2023:177–180) The CRD and associated aquatic habitats are described in BIO-4. Ice roads and pads can alter fish habitat by temporarily blocking passage or eroding streambeds or stream banks, as analyzed in the Willow SEIS (BLM 2023:178). Ice infrastructure for the CD8 Project would have identical impacts to fish habitat as described in the Willow SEIS but would be of a much lower magnitude because the CD8 Project would have substantially less ice infrastructure than Willow (22.5–27.2 miles of ice roads and 196.1–211.7 acres of ice pad for the CD8 Project, depending on the alternative, compared to 495–962 miles of ice road and 966–1,271 acres of ice pads for Willow). Ice infrastructure over defined stream channels would be removed, breached, and/or slotted before spring breakup to allow flow connectivity, minimize blocked passage, and minimize the potential for stream bank or streambed erosion. In years of extreme drought, water withdrawals can lower lake water levels and potentially alter stream network connectivity, as analyzed in the Willow SEIS (BLM 2023:179). Water withdrawal for the CD8 Project would have identical impacts to fish habitat as described in the Willow SEIS but would be of a much lower magnitude because the CD8 Project would withdraw an order of magnitude less water than Willow (184.4–196.3 million gallons [MG] for the

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			CD8 Project, depending on the alternative, compared to 1,662.4–2,286.3 MG for Willow). Monitoring efforts to date indicate that current levels of industrial water use have not impacted habitat connectivity and streamflow levels due to regional increases in fall precipitation (Arp and Whitman 2022). The likelihood of individual fish being affected would be confined to years of extreme drought, and if aquatic habitat connectivity was reduced, it would be temporary and would likely be restored during spring high-flow periods (BLM 2023:179). The overall quantity of freshwater withdrawal would be reduced with construction of the CD8 Project compared to the No Action Alternative and the existing condition because 4.4 to 6.9 miles of the annual Alpine/WNS multiyear ice road would be replaced with a gravel road, depending on the alternative. This would reduce annual freshwater use by 4.4 to 6.9 MG. Cumulative impacts for habitat alteration are the same as described for BIO-4 and have been analyzed by the aforementioned NEPA documents.
BIO-6	How would the Project affect aquatic species behavior and distribution?	Impact context is so low that detailed analysis is not needed to determine significance. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-500–3-501) • Willow SEIS (BLM 2023:183) Disturbance and displacement of fish due to driving piles, use of construction equipment, and barging of materials would be the same as that analyzed for the Willow SEIS but would be lower in magnitude because fewer piles and less barging would be needed for the CD8 Project than for Willow (20 piles below ordinary high water for the CD8 Project compared to 36 piles and 108 vertical support members (VSMs) below ordinary high water for Willow; one barge trip for the CD8 Project [for any action alternative] compared to 24 barge trips for Willow). All sheet piles would be installed above ordinary high water. Methods used for pile driving would be the same as those analyzed in the Willow SEIS and would take place in similar habitats used by the same species. Disturbance and displacement of these fish species from construction of facilities and barging were determined to be temporary and localized (BLM 2023:183). One barge trip would be required in summer but would not create sound pressure levels that would injure or kill fish. Disturbance and displacement of fish species from barge traffic would be limited to established barge routes when the single trip occurs and would displace individual fish but would not affect populations (BLM 2023:183).
BIO-7	How would the Project affect aquatic species health and populations?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-498–3-502) • Willow SEIS (BLM 2023:183–186, 191) Inadvertent oil, chemical, or wastewater spills can kill or injure fish. Potential spills and impacts to aquatic habitat are described in BIO-4. Exposure of aquatic species to contaminants would be unlikely, and likelihood would be minimized through compliance with appropriate local, State, and Federal oil pollution prevention requirements and CPAI BMPs for storage and use of hydrocarbons, hazardous substances, and waste (see EIS Appendix E [Mitigation Measures]). This would include compliance with the *Alpine WNS Oil Discharge Prevention and Contingency Plan* (ODPCP) (CPAI 2025b) and *Alpine Spill Prevention, Control, and Countermeasure Plan* (CPAI 2025c) (mitigation measure 73) (see EIS Appendix E [Mitigation Measures]). Cumulative impacts to fish due to injury and mortality are the same as described in the Willow SEIS (BLM 2023:412). The cumulative impacts analysis in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of RFF trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition.

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
BIO-8	How would barging of construction materials impact marine mammals?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-427–3-448, 3-452–3-471) • Willow SEIS (BLM 2023:249–255, 267–268, Appendix E.13) The CD8 Project proposes using the same barge route as Willow (Dutch Harbor to Oliktok Dock). At least 24 species of marine mammals may use the barge route (BLM 2023:252), and the single barge trip for the Project could impact those species through direct mortality from vessel strike or through disturbance and displacement along the barge route. Multiple EISs have analyzed the impact of barge traffic on marine mammals along the same barge route (BLM 2023:267–268, Appendix E.13; USACE 2018:3-452–3-471), including impacts from underwater noise and inadvertent spills (BLM 2023:Figure 3.13.2, Appendix E.13). Although the impacts would be the same, the magnitude of effect from the CD8 Project would be substantially lower than described in the Willow SEIS (one barge would be required for the CD8 Project under any action alternative compared to up to 24 barges required for Willow). Therefore, additional analysis is not needed to understand the impacts of a single barge trip to marine mammals. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. The incremental addition of one barge trip, as well as the implementation of BMPs to limit impacts to vessel strike and disturbance and displacement, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts. Marine mammals are protected under the Marine Mammal Protection Act and are, therefore, a Federal resource. The impacts to marine mammals, as described above, would be an irreversible and irretrievable impact to Federal resources.
BIO-9	How would the Project impact polar bear (*Ursus maritimus*) habitat?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:275, 594–595) • Nanushuk EIS (USACE 2018:3-427, 3-439–3-441, 3-446–448, 3-450–3-452) • Willow SEIS (BLM 2023:253, 265–266) The Project is within an area known to be used by polar bear (BLM 2023:Figure 3.13.1, 253), and the Project would alter and remove habitat for the species. The Project area contains potential terrestrial denning habitat and a historical maternal den site (2.8 and 4.4 miles from the CD8 drillsite, depending on the alternative), and there have been multiple polar bear sightings in the Project area from 1993 to 2019 (BLM 2023:Figures 3.13.1 and 3.13.3). Depending on the alternative, the CD8 Project would permanently remove between 46.9 and 67.3 acres of habitat, temporarily alter 355.4 to 398.9 acres for ice infrastructure, and alter 299 to 498 acres of habitat adjacent to gravel infrastructure due to dust deposition. Multiple EISs have analyzed the impacts of habitat loss on polar bear from oil and gas infrastructure on the North Slope and in the CRD, including direct loss of habitat through construction of infrastructure and indirect habitat alterations due to changes in hydrologic function and changes to habitat quality from dust and gravel spray along gravel infrastructure (BLM 2023:265–266; USACE 2018:3-450–3-452). Prior EISs evaluated impacts from a range of 253 to 2,145 acres of habitat loss, up to 31 times more than the habitat loss from the CD8 Project. Prior EISs also evaluated loss of up to 1.6 acres of potential terrestrial denning habitat compared to up to 0.04 acre from the CD8 Project. The loss of habitat would be minor given the widespread availability of similar habitat on the WNS and in the CRD (BLM 2004, 2023; USACE 2018). Multiple BMPs would be applied to further reduce impacts on polar bear from habitat loss, including minimizing the risks of spills, maintaining hydrologic flows, minimizing the Project footprint, and limiting impacts from dust (see EIS Appendix E [Mitigation Measures]). These same BMPs were also analyzed in the previously cited NEPA documents (BLM 2023; USACE 2018). The types of impacts on polar

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			bear from the CD8 Project would be the same as described in the previous EIS analyses, but to a lower magnitude. Therefore, additional analysis is not needed to understand the impacts on polar bear from habitat loss. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. The incremental addition of habitat loss and alteration from and the Project in combination with RFF actions, as well as the implementation of BMPs to limit impacts on habitat, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts. Polar bears are protected under the Endangered Species Act and Marine Mammal Protection Act and are, therefore, a Federal resource. The impacts to polar bears, as described above, would be an irreversible and irretrievable impact to Federal resources.
BIO-10	How would the Project impact polar bear and seal injury and mortality?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:271–275, 591–598) • Nanushuk EIS (USACE 2018:3-427–3-448, 3-460–3-463) • Willow SEIS (BLM 2023:249–255, 272–280) The Project is within an area known to be used by polar bear and contains potential terrestrial denning habitat and a historical maternal den site (2.8 to 4.4 miles from the CD8 drillsite, depending on the alternative), and there have been multiple polar bear sightings from 1993 to 2019 (BLM 2023:Figures 3.13.1 and 3.13.3). The Project would increase vehicle traffic (see EIS Table 2.5-2) and the chance of interaction with humans, both of which could injure or kill polar bear. Multiple EISs have analyzed the impact of oil and gas infrastructure, vehicle traffic, human presence, and inadvertent spills as vectors of mortality for polar bear due to collisions with vehicles and increased interaction with humans (BLM 2023; USACE 2018). Spills or inadvertent releases could also injure or kill polar bear. EIS Chapter 4 (Spills and Inadvertent Releases) summarizes spills that have historically occurred on the North Slope and the likelihood and extent of spills that could occur from the CD8 Project. The likelihood of a small spill occurring over the Project's lifetime is very high. Small spills are expected to be short in duration (typically less than 4 hours), are expected to be identified and rapidly contained on gravel infrastructure, and are unlikely to affect polar bear. Although the likelihood of a pipeline rupture or reservoir blowout is very low (approaching zero), if it were to occur during high river flows, oil could be transported to Harison Bay and injure or kill polar bears and seals (bearded [*Erignathus barbatus*], ringed [*Pusa hispida*], and spotted [*Phoca largha*]). Known spotted seals haulouts are located in the outer reaches of the CRD, at and downstream of Pikka in the East Channel of the Colville River (BLM 2023:253–255; USACE 2018:Figure 3.11-4). At low river flow, oil that enters waterbodies could strand along the shoreline and potentially be recovered. The EISs listed above considered BMPs to reduce injury and mortality for polar bear and seals, including design modifications, speed limits, trash and waste management, and spill prevention plans and response protocols, and determined that with the implementation of the BMPs the likelihood of injury or mortality from collisions with vehicles, increased interaction with humans, and inadvertent spills was low. The same BMPs would be applied to the CD8 Project (see EIS Appendix E [Mitigation Measures]) and, thus, the types of impacts to polar bear and seals from the CD8 Project would be the same as described in previous EIS analyses. Further, CPAI wildlife monitoring data from 2009 to 2021 indicate that for all CPAI WNS activities, including Alpine, GMT, NPR-A ice roads, and Willow, 18 polar bears have been observed, but no injuries or mortalities have been recorded (CPAI 2025a). Therefore, additional analysis is not needed to understand the likelihood of injury or mortality of polar bear and seals from the CD8 Project. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. The incremental addition of more traffic and infrastructure, as well as the implementation of BMPs to limit interactions with polar bear, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts. Likewise, the incremental addition of more pipelines and BMPs to prevent spills and prepare for spill response were also analyzed in the Willow SEIS, and further analysis is not needed to understand impacts.
BIO-11	How would equipment, air and ground traffic, infrastructure, and human presence impact polar bear and seal habitat use and distribution?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-427–3-448, 3-460–3-463) • Willow SEIS (BLM 2023:249–255, 272–280) The Project could alter habitat use and distribution of polar bear and seals (bearded, ringed, and spotted) due to visual and noise disturbance. Multiple EISs have analyzed the impact of disturbance and displacement of polar bear and seals from oil and gas development on the WNS and in the CRD, including impacts to foraging, resting, and denning, including for maternal females (USACE 2018). The same disturbance vectors (vehicles, air traffic, drilling and machinery, and human presence) would be required for the CD8 Project but to a lesser magnitude and extent than previously analyzed. The Willow SEIS included an analysis for up to 4,212,510 ground vehicle trips compared to 375,597 to 391,936 (depending on the alternative) (see EIS Table 2.5-2) for the CD8 Project, up to 22,484 fixed-wing and helicopter flights compared to 959 for the CD8 Project (see EIS Table 2.5-3), up to 10 drill pads compared to one for the CD8 Project (see EIS Table 2.5-1), and up to 1,650 workers on-site compared to up to 525 for the CD8 Project (see EIS Table 2.5-1). Therefore, additional analysis is not needed to understand the impacts of the CD8 Project on habitat use and distribution of polar bear and seals. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. The incremental addition of disturbance and displacement from the Project in combination with RFF actions, as well as the implementation of BMPs to limit impacts on polar bears, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts.
BIO-12	How would the Project infrastructure impact caribou (*Rangifer tarandus granti*) habitat availability?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:259–266, 571–573) • Nanushuk EIS (USACE 2018:3-373–3-376, 3-388–3-393) • Willow SEIS (BLM 2023:224–227, 237) The CD8 Project would alter and remove habitat for caribou in the Teshekpuk Lake Caribou Herd (TCH) and Central Arctic Caribou Herd (CAH). Herd density in the CD8 Project area is high for the CAH and medium for the TCH (BLM 2023:Figure 3.12.2). The CD8 Project area is on the edge of the range for TCH and CAH but does support female caribou from both herds throughout the year, including during calving, and supports caribou during the peak oestrid fly period (BLM 2023:Figures 3.12.3, 3.12.6). The Project would permanently remove 46.9 to 67.3 acres of habitat (depending on alternative), temporarily alter 355.4 to 398.9 acres for ice infrastructure, and alter 299 to 498 acres of habitat adjacent to gravel infrastructure due to dust deposition. Multiple EISs have analyzed the impact of habitat loss and alteration on caribou from oil and gas infrastructure on the WNS and in the Colville River area, including direct loss of habitat through construction of infrastructure, and indirect habitat alterations due to changes in hydrologic function and changes to habitat quality from dust and gravel spray along gravel infrastructure (BLM 2023:237; USACE 2018:3-388–3-393). Prior EISs evaluated impacts from a range of 253 to 2,145 acres of habitat, up to 31 times larger than the habitat loss from the CD8 Project. Prior EISs found the loss of habitat minor given the widespread availability of similar habitats in the herds' range (BLM

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			2023:237; USACE 2018:3-3-388, 3-393). Prior analyses also considered multiple BMPs to limit impacts on caribou habitat loss, including minimizing the risks of spills, maintaining hydrologic flows, minimizing the Project footprint, limiting dust generation, and limiting the introduction or spread of invasive species (BLM 2023; USACE 2018). The same BMPs would be applied to the CD8 Project (see EIS Appendix E [Mitigation Measures]); thus, the types of impacts on caribou from the Project would be the same as described in the previous EIS analyses, but of a lesser magnitude since far fewer acres would be lost or altered. Therefore, an additional analysis is not needed to understand the impacts on caribou from habitat loss and alteration. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. The minor incremental addition of habitat loss and alteration, as well as the implementation of BMPs to limit those impacts, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts.
BIO-13	How would the construction and presence of new infrastructure impact caribou injury and mortality?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:259–266, 575, 583–584) • Nanushuk EIS (USACE 2018:3-375–3-376; 3-404–3-408) • Willow SEIS (BLM 2023:224–227, 240–244) The CD8 Project could injure or kill caribou through collisions with vehicles, increased hunting pressure, increased predation, and inadvertent spills (BLM 2023; USACE 2018). Herd density and use of the Project area for CAH and TCH is described in BIO-12. The Project would construct ice and gravel roads, which are a vector for vehicle collision for caribou as they migrate or move through the Project area. Subsistence access would increase in the CD8 Project area due to the new gravel access road to CD8, which could increase harvest and hunting pressure on caribou. An increase in human activity could increase the population of predators, including bears, which are potential predators of caribou calves (USACE 2018:3-407). Inadvertent large spills from the CD8 Project could directly injure or kill caribou. Multiple EISs have analyzed the impact of oil and gas projects on caribou injury and mortality on the North Slope and in the Colville River area, including from collisions with vehicles, increased subsistence access, increased predation risk, and hazardous materials and waste disposal (BLM 2023:240; USACE 2018:3-404–3-408). These EISs considered BMPs to reduce mortality of caribou, including design modifications, speed limits, trash and waste management, and spill prevention plans and response protocols. The same BMPs would be applied to the CD8 Project (see EIS Appendix E [Mitigation Measures]). Prior NEPA analyses found that with the implementation of BMPs, the impacts on caribou injury and mortality would be minor (BLM 2004; USACE 2018). Further, CPAI wildlife monitoring data indicate that for all CPAI WNS activities from 2015 to 2024, including the Alpine, GMT, NPR-A ice roads, and Willow projects, six caribou were struck by vehicles (CPAI 2025a). The types of impacts on caribou from the CD8 Project would be the same as described in the previous EIS analyses. Therefore, additional analysis is not needed to understand caribou injury and mortality from the CD8 Project. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. The incremental addition of more roads, more traffic, and more pipelines from the Project in combination with RFF actions, as well as the implementation of BMPs to limit impacts on caribou injury and mortality, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts.

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
BIO-14	How would construction of Project infrastructure impact other non–special status terrestrial mammals?	Analyzed in other NEPA documents. Mitigation measures would reduce impacts below significance.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:266–271, 571–588) • Nanushuk EIS (USACE 2018:3-376–3-386, 3-388–3-410) • Willow SEIS (BLM 2023:237, Appendix E.12) At least 20 non–special status terrestrial mammal species may use the CD8 Project area, including Arctic fox (*Vulpes lagopus*), red fox (*Vulpes vulpes*), brown bear (*Ursus arctos*), moose (*Alces alces*), muskox (*Ovibos moschatus*), wolf (*Canis lupus*), wolverine (*Gulo gulo*), small mammals, and Canada lynx (*Lynx canadensis*) (BLM 2023:Appendix E.12). The CD8 Project could impact these species through habitat loss and alteration, disturbance and displacement, or injury and mortality. Depending on alternative, the CD8 Project would permanently remove 46.9 to 67.3 acres of habitat, temporarily alter 355.4 to 398.9 acres for ice infrastructure, and alter 299 to 498 acres of habitat adjacent to gravel infrastructure due to dust deposition. Multiple EISs have analyzed the impact of habitat loss and alteration to non–special status terrestrial mammals from oil and gas infrastructure on the WNS and in the Colville River area, including direct loss of habitat through construction of infrastructure, and indirect habitat alteration due to changes in hydrologic function and changes to habitat quality from dust and gravel spray along gravel roads and pads (BLM 2023:237; USACE 2018:3-376–3-386). Prior EISs evaluated 253 to 2,145 acres of habitat loss and alteration and found the magnitude of impacts to be minor given the widespread availability of similar habitats on the WNS and in the Colville River area (BLM 2004, 2023:Appendix E.12; USACE 2018). The potential impacts to non–special status mammal species from disturbance or displacement, as well as the potential for injury or mortality, have also been evaluated in prior EISs. Those analyses also considered BMPs to reduce impacts to non–special status terrestrial mammals, including design modifications, speed limits, trash and waste management, and spill prevention plans and response protocols. The same BMPs would be applied to the CD8 Project. Further, CPAI wildlife monitoring data indicate that for all CPAI WNS activities from 2015 to 2024, including the Alpine, GMT, NPR-A ice roads, and Willow projects, 42 non–special status terrestrial mammals were struck by vehicles (one wolverine, one common muskrat [*Ondatra zibethicus*], and 40 foxes) (CPAI 2025a). Therefore, an additional analysis is not needed to understand the impacts of the CD8 Project on non–special status species from habitat loss or alteration, disturbance or displacement, or mortality and injury. The analysis of RFF trends and actions in the Willow SEIS remains applicable to the CD8 Project because the same general type, number, and magnitude of trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing condition. The incremental addition of habitat loss and alteration, traffic, and human presence from the Project in combination with RFF actions, as well as the implementation of BMPs to limit impacts on terrestrial mammals, would be similar to those analyzed in the Willow SEIS and, therefore, further analysis is not needed to understand impacts.
CON-1	How would the Project interact with known contaminated sites?	Not present in the analysis area.	Five databases were queried in 2025 for the presence of contaminated sites within 2 miles of the CD8 Project. There are no reported contaminated sites within 2 miles of the proposed footprint of the CD8 Project. **Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Database** (2025a) There are two reported contaminated sites at Nuiqsut: • Hazard ID 28022, Kuukpik Stevenson Pad ○ Event year: May 2025. Petroleum contamination from an unknown source was identified during a geotechnical investigation. ○ Status: Active site. Cleanup plan was approved by ADEC in July 2025.

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			○ Distance to CD8 Project: Approximately 2.3 to 3.2 miles (depending on the alternative) southwest of the CD8 Project drillsite on the west side of Niġliq Channel. ○ Likelihood of encountering: Unlikely to encounter during construction or operation of facility. • Hazard ID 25937, North Slope Borough (NSB) Nuiqsut Power Plant (also known as Washeteria Fuel Line) – Active Site ○ Event year: November 2012. Hydrocarbon contamination was reported during trenching for utilities installation. ○ Status: Active site. Since 2012, various contamination investigations have been performed to determine the extent and nature of contaminants. As of March 2025, site characterization was still ongoing. ○ Distance to CD8 Project: Approximately 2.2 miles to 3.0 miles (depending on the alternative) southwest of the CD8 Project drillsite on the west side of the Niġliq Channel. ○ Likelihood of encountering: Unlikely to encounter during construction or operation of facility. **Prevention, Preparedness, and Response Spills Database** (ADEC 2025b) No spills within 0.5 mile of the Project. **U.S. Environmental Protection Agency (EPA) Contaminated Alaska Native Claims Settlement Act (ANCSA) Sites Database** (EPA 2025a) EPA Site ID ANCSA00561 – Nuiqsut Power Plant (same as ADEC Hazard Site 25937 described above). **EPA Superfund Enterprise Management System (SEMS) Database** (EPA 2025b) No Superfund sites within 2 miles of the Project. ***National Petroleum Reserve in Alaska: 2020 Legacy Wells Strategic Plan*** (BLM 2020) No legacy wells within 2 miles of the Project. The CD8 Project would not interact with any known contaminated sites; the nearest sites are more than 2 miles west of the CD8 Project under any action alternatives. There is currently no infrastructure at the CD8 Project drillsite and no reports of contamination. The potential for encountering preexisting contamination at the Project site is extremely low. Additional analysis is not needed to understand how the CD8 Project may interact with contaminated sites.
ECON-1	How would the Project affect the national economy?	Impact context is so low that detailed analysis is not needed to determine significance.	As described in EIS Section 3.4 (Economics), although some economic effects would also flow to individuals and entities out of state, these impacts would be extremely diffuse. Though the Project could employ individuals from out of state, the impact of the Project on a national scale would be insignificant: approximately 380 jobs over 2 years of construction and 390 jobs over 5 years of drilling. This is based on the anticipated direct employment of up to 945 construction workers and up to 975 drilling workers (see EIS Section 3.4, Table 4.3-2) and the percentage of nonresident oil industry workers in Alaska as of 2024 (40%) (Alaska Department of Labor and Workforce Development 2026). Thus, additional analysis is not needed to determine significance. Further, the contribution to the National Economic Development (i.e., the increase in the net value of the national output of goods and services) on a national scale would be insignificant because up to 93 million barrels of oil produced over the life of the Project (see EIS Section 2.3.2) is insignificant compared to the 13.6 million barrels of oil produced per day in the United States in 2025 (U.S. Energy Information Administration 2026).
GEOL-1	How would the Project affect geology, including bedrock formations?	Mitigation measures would reduce impacts below significance.	The geological affected environment (i.e., regional tectonic setting, structural geology, stratigraphy, oil-producing reservoirs, slope stability and seismic setting) and impacts to it from oil and gas projects on the Alaska Coastal Plain (ACP) have been studied for decades and are described in the following EISs: • Alpine EIS (BLM 2004:155–157, 415–416) • Nanushuk EIS (USACE 2018:3-33–3-48)

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
		Analyzed in other NEPA documents. Impact context is so low that detailed analysis is not needed to determine significance.	The CD8 Project is in the same general area (i.e., the CRD) and has similar bedrock stratigraphy beneath it as found in the northeast NPR-A (USACE 2018:3-33, Figure 3.3-1). There have been no changes to these bedrock formations since publication of those documents. The Alpine EIS concluded that the impacts to geology would be localized and that the volume of bedrock pulverized from drilling and cracked from hydraulic fracturing would be insignificant compared to the total volume of bedrock in the CRD (BLM 2004). The Nanushuk EIS describes similar impacts as being localized to the radius of the bore-hole and immediately surrounding bedrock, and impacts would be minor and not constitute an impact to the human environment or loss of the resource (USACE 2018). The CD8 Project would use similar equipment and construction and drilling methods as analyzed in the Alpine EIS and Nanushuk EIS (BLM 2004; USACE 2018). Therefore, the types of impacts on geology from the CD8 Project would be the same as described in the previous EIS analyses, but to a lesser magnitude and extent because the CD8 Project would have fewer production pads and wells, fewer VSMs, and fewer piles and sheet piles; the CD8 Project would have one production pad with up to 40 wells under all alternatives, whereas the Alpine EIS addressed five production pads with 20 to 30 wells each. The CD8 Project would require 275 to 400 VSMs, depending on the alternative, whereas the Nanushuk EIS evaluated up to 600 VSMs (USACE 2018:3-194). The CD8 Project would require 20 piles below ordinary high water, whereas the Nanushuk EIS evaluated up to 88 piles. Therefore, additional analysis is not needed to understand the impacts on geology from drilling, VSM installation, or installation of piles and sheet pile. Project siting would also minimize the need for new VSMs (mitigation measures F and G in EIS Appendix E [Mitigation Measures]). Cumulative impacts to geology are also addressed by previous EISs. Impacts on geology and bedrock formations would be localized and thus not overlap across the North Slope. The CD8 Project would contribute to the disturbance of bedrock, but additive impacts would be insignificant compared to the vast oil-bearing formations in the CRD.
GEOL-2	How would the Project affect availability of gravel resources?	Impact context is so low that detailed analysis is not needed to determine significance.	The CD8 Project would minimize the amount of gravel needed by maximizing use of existing infrastructure to the extent practicable (mitigation measures C, D, and E in EIS Appendix E [Mitigation Measures]), and the Project would not deplete existing gravel sources at the Arctic Slope Regional Corporation (ASRC) Mine Site (Knutson 2025). Gravel would still be available for other local projects.
GEOL-3	How would the Project affect or cause geological hazards? What is the likelihood of earthquake-induced failure or damage of Project infrastructure?	Analyzed in other NEPA documents. Impact context is so low that detailed analysis is not needed to determine significance.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-39) The 2023 U.S. Geological Survey National Seismic Hazard Model provides the most recent probabilities for earthquake ground motion across Alaska (Altekruse et al. 2024). According to this model, peak ground accelerations in the CRD area of up to approximately 0.10 g (where *g* equals the acceleration due to gravity) have a 2% probability of being exceeded in any 50-year period. Therefore, the seismic hazard in the immediate CD8 Project area is relatively low. A more active seismic area is centered approximately 100 miles southeast of the CRD. The most notable earthquake in this area was a magnitude 6.4 earthquake that occurred 52 miles southwest of Kaktovik in the Sadlerochit Mountains on August 12, 2018. It was felt widely across the eastern North Slope and was the largest earthquake ever recorded north of the Brooks Range in Alaska (Dickson 2018). The Alaska Division of Geological and Geophysical Surveys Quaternary fault and fold database (Koehler 2013) contains information on faults and associated folds in the United States that are believed to be sources of earthquakes greater than magnitude 6 during the Quaternary Period (i.e., the past 1,600,000 years). The feature closest to the CRD is a group of several faults, known as the Camden faults or Camden fault zone, more than 80 miles east in the Beaufort Sea.

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			Additionally, ground accelerations in bedrock tend to be lower than ground accelerations in soft sediments. In soft, saturated sediments, ground accelerations caused by earthquakes have the potential to create liquefaction (the loss of bearing capacity due to the sediment behaving like a liquid). The CD8 Project area is underlain by thick permafrost that behaves more like bedrock than soft sediments due to the more brittle nature of the ice, thus lowering the potential for liquefaction and other earthquake-induced ground-failure phenomena (Pinney and Combellick 2000). Given the low seismic activity of the area and low liquefaction potential of the materials in the area, the risk of earthquake-induced failure or damage of CD8 Project infrastructure is low. Thus, a detailed analysis is not needed to determine significance.
GEOM-1	How would the Project impact geomorphology?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:155–157, 415–416) • Nanushuk EIS (USACE 2018:3-53–3-54) The geomorphic landscape of the Project area consists of a relatively flat plain with thaw lakes, thaw-lake depressions, oxbow lakes, the Colville River, the CRD, and delta deposits (Wahrhaftig 1965). Thaw lakes and thaw-lake depressions are formed during permafrost thaw and drainage cycles that create and drain lakes over time. Oxbow lakes form at the former outer bend of a river and hold water despite a lack of surface connection to the river. The Colville River flows through the Project area and has erosion and deposit cycles that formed the CRD over time (Wahrhaftig 1965). The Project could influence the geomorphology of the area through changes in permafrost thaw and potential thermokarsting from the construction and use of gravel infrastructure, ice infrastructure, and drilling. The construction and use of gravel and ice infrastructure could change the ground temperature (through heat transfer, ponding of water, dust-induced decreased albedo, and soil and vegetation compression), which could result in localized thawing. This thawing can lead to potential thaw bulbs or changes to underlying hydrology that can alter the geomorphology of the Project area. Drilling heat transfer can create thawed areas around the bore-hole (i.e., the thaw chimney) that contribute to permafrost thaw and thermokarsting. These potential impacts (from the same types of Project actions in the same geomorphologic landscape) have been previously analyzed in other NEPA documents, including projects that had a larger magnitude and extent of impacts, including Alpine and Nanushuk (BLM 2015, USACE 2018). The CD8 Project would have similar impacts to the Alpine and Nanushuk projects but to a lesser extent and magnitude because the scope and size of the CD8 Project would be smaller. Therefore, the types of impacts on geomorphology from the CD8 Project would be the same as described in the previous EIS analyses, but to a lesser magnitude and extent because the CD8 Project would have fewer production pads and wells, fewer VSMs, and fewer piles and sheet piles; the CD8 Project would have one production pad with up to 40 wells under all alternatives, whereas the Alpine EIS addressed five production pads each with 20 to 30 wells. The CD8 Project would require 275 to 400 VSMs, depending on alternative, whereas the Nanushuk EIS evaluated up to 600 VSMs (USACE 2018:3-194). Therefore, additional analysis is not needed to determine significance.
HEA-1	How would the Project impact infectious disease?	Impact context is so low that a detailed analysis is not needed to determine significance.	Non-local construction workers would have little contact with Nuiqsut residents. Although up to 100 workers could be housed at the existing camps in Nuiqsut (Kuukpik Hotel and Arctic Wolf Camp), these existing facilities currently provide services to non-locals, and there would be no change to the baseline condition or new vectors of disease transmission due to the CD8 Project. The Willow SEIS (BLM 2023:387) and Nanushuk EIS (USACE 2018:3-758, 3-761, 3-763) also examined the issue of infectious disease and made a similar determination regarding the low context of impact.

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
HEA-2	How would the Project impact healthcare services infrastructure and capacity?	Impact context is so low that a detailed analysis is not needed to determine significance.	The CD8 Project would not result in impacts to healthcare services infrastructure and capacity. This issue was analyzed in the following NEPA documents: • Willow SEIS (BLM 2023:387) • Nanushuk EIS (USACE 2018:3-758, 3-761, 3-763) Project employees would use the existing clinic at the Alpine Central Facility. Nuiqsut healthcare services infrastructure would not be impacted.
HEA-3	How would exposure to Project dust impact human health?	Mitigation measures would reduce impacts below significance. Impact context is so low that a detailed analysis is not needed to determine significance.	The Air Quality Index (see EIS Section 3.2.1.1.4) for the Nuiqsut area is generally good because there are few sources of human-made or naturally occurring emissions and dispersion by prevailing winds. Naturally occurring windblown particulate matter (PM_{10} and particulate matter less than or equal to 2.5 microns in diameter [$PM_{2.5}$]) originates from riverbanks, sandbars, dirt and gravel roads, gravel mine sites, and occasional tundra fires. Windblown dust events tend to occur more frequently in the summer when sandbars along CRD riverbeds are not covered by snow and ice and dry out due to above-freezing ambient temperatures (SECOR International Incorporated 2000). Though the Air Quality Index is typically good, exceedances of $PM_{2.5}$ or PM_{10} have occurred, typically from naturally occurring dust events (common across the NSB) or forest fires (CPAI 2024, 2025d). Modeled Project-only and cumulative concentrations of PM_{10} and $PM_{2.5}$ at Nuiqsut would be very low (near background concentrations) (SLR International Corporation 2026b). CPAI would implement dust control measures for gravel roads and pads to reduce fugitive dust (see EIS Appendix E [Mitigation Measures]). Thus, further analysis is not needed to determine significance of Project impacts, and the design features would be effective in reducing impacts of dust below significance.
LAND-1	How would the Project comply with underlying zoning designations and management plans?	Analyzed in other NEPA documents.	The CD8 Project would not result in substantive changes in existing land use, and any impacts to land use from similar developments have been analyzed in the following NEPA documents: • GMT1 SEIS (BLM 2014:410–414) • GMT2 SEIS (BLM 2018:177–178, 407–410) • Nanushuk EIS (USACE 2018:3-565–3-584) • Willow SEIS (BLM 2023:280–290) Compliance with land zoning and management for the CD8 Project area would be similar to those described in the NEPA documents cited above; the same types of Project actions were analyzed, and all four projects are in the NSB and are subject to compliance with the 2019 *North Slope Borough Comprehensive Plan 2019–2039* (NSB Comprehensive Plan) (NSB 2019) and NSB zoning districts (NSB 19.40). Project surface owners (Kuukpik Corporation and State of Alaska/Alaska Department of Natural Resources [ADNR]) also owned surface or subsurface lands for at least some part of GMT1 and Nanushuk (now called Pikka), and subsurface owners (ADNR/ASRC) also owned subsurface lands for Nanushuk. Therefore, previous analyses addressed Project compliance with the same State/regional management plans, ADNR requirements, Kuukpik Corporation requirements, ADNR/ASRC lease provisions, and settlement agreements as the CD8 Project. As the surface owner, Kuukpik Corporation would negotiate land access agreements; if access is granted, additional stipulations may be added. CPAI would comply with all stipulations in the agreement. Some notable differences exist between the CD8 Project and previous analyses. First, Willow and GMT2 were subject to NPR-A integrated activity plan stipulations and operating procedures that would not apply to the CD8 Project because it is not within the NPR-A. However, the CD8 Project would be subject to the same ADNR/NSB leasing terms, stipulations, and mitigation measures as the previous analyses. Second, all previous projects required some NSB lands to be rezoned from conservation to resource development. Some previous projects also required crossings of designated wildlife protection areas. The CD8 Project would require

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			rezoning under Alternative D only, and there would be no crossings of designated wildlife protection areas under any alternatives. The CD8 Project would, therefore, have similar or fewer zoning-related impacts than previous analyses. Third, some of the previous analyses were completed prior to publication of the 2019 NSB Comprehensive Plan and the 2021 *North Slope Area Plan* (NSAP) (ADNR 2021). The 2019 NSB Comprehensive Plan describes the contribution of oil and gas to the regional economy and describes general trends and challenges associated with oil and gas development, but does not include any new zoning designations or development restrictions. The 2021 NSAP outlines management uses and intents for ADNR lands within the CD8 Project area and describes how oil and gas development is subject to ADNR's existing oil, gas, and geothermal permitting; licensing; and leasing processes. The CD8 Project would comply with ADNR's leasing terms, which the agency would be responsible for ensuring are consistent with the intent of the NSAP. Therefore, nothing in the 2021 NSAP would result in any meaningful changes to the previous analyses conducted. Fourth, the CD8 Project would require an update to the Alpine Development Master Plan (CPAI 2018), which was not part of previous analyses. An update to the Alpine Development Master Plan requires a public hearing process and approval through NSB Planning Department and Planning Commission. However, no changes to local or regional zoning designations would be needed. The cumulative context for compliance with zoning designations for the CD8 Project would be similar to those described in the Willow SEIS, GMT2 SEIS, and Nanushuk EIS because the types of RFF actions analyzed for land use were similar and would have incremental impacts of a similar nature to the CD8 Project. Therefore, additional analysis is not needed to understand the impacts of the CD8 Project on underlying zoning designations and management plans.
LAND-2	How would Project facilities conflict with, or displace, existing land uses?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • GMT2 SEIS (BLM 2018:177–178, 407–410) • Nanushuk EIS (USACE 2018:3-565–3-584) • Willow SEIS (BLM 2023:280–290) These NEPA documents analyzed the same types of project actions and the same types of land use, including industrial uses (e.g., oil, gas, and mining), dispersed subsistence uses, community development (in Nuiqsut), and minimal dispersed recreation. However, all previous analyses considered infrastructure development in previously undeveloped areas, which required a rezone and resulted in localized changes in land use for those areas. The CD8 Project would largely be co-located with existing infrastructure, which would reduce the magnitude of potential land use impacts relative to previous analyses. Therefore, additional analysis is not needed to understand the impacts of the CD8 Project on existing land uses.
PAL-1	How would paleontological resources be impacted by the Project?	Mitigation measures would reduce impacts below significance.	There are two Alaska Heritage Resources Survey paleontological sites within 2.5 miles of the Project footprint (ADNR 2026). HAR-00170 is reported as destroyed in the Alaska Heritage Resources Survey. HAR-00031 is approximately 2,500 feet north of Nuiqsut on a bluff above the Niġliq Channel and contains mammoth remains and would be avoided. The footprint of surface-disturbing activities would be minimal (drilling and installation of culverts, VSMs, piles, and sheet piles), and the CD8 Project would implement measures that would protect known paleontological resources from surface disturbance and vandalism, which would reduce potential impacts to below significance. Mitigation measures include the following (see EIS Appendix E [Mitigation Measures] for all measures): • Project siting has been informed by the results of cultural and paleontological resource surveys (mitigation measure 49). • The Project would avoid known cultural and paleontological resources during ground-disturbing activities, including the construction of ice roads (mitigation measure 49).

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			• Project personnel would be trained to ensure that personnel know and understand the environmental, social, and cultural regulatory requirements within the Project area where they will be working. Training emphasizes protection of cultural and archaeological resources (mitigation measure 47). • Implement spill prevention and response measures (mitigation measures 73–90). The Project was designed to mitigate spills with spill prevention measures and spill response capabilities as described in detail in Chapter 2 and EIS Appendix E (Mitigation Measures). CPAI's design of production facilities includes provisions for secondary containment for oil and hazardous substances, as required by local, State, and Federal regulatory requirements. If a spill occurs on a pad outside facilities, the fluid would remain on the pad, unless the spill is near the pad edge or exceeds the retention capacity of the gravel pad. Fuel transfers near pad edges would be limited to the extent practicable to mitigate this risk. Snow that contains spill residue, drill cuttings, or other contamination would be removed and hauled to a temporary storage area for contaminated material to await further treatment and disposal. Similarly, ice roads and pads constructed during winter would be cleaned of spilled materials and potential remnants of spills or releases to avoid discharging to the wetlands or waterbodies (EIS Appendix E [Mitigation Measures]). Implementation of these measures would reduce potential impacts below significance. Therefore, additional analysis is not needed to understand the impacts on paleontological resources.
REC-1	How would the Project impact public recreation opportunities, access, and experience?	Impact context is so low that detailed analysis is not needed to determine significance.	Limited to no recreational use occurs in the CD8 Project area. In addition, CPAI would prohibit workers from hunting and trapping (mitigation measure 48 in EIS Appendix E [Mitigation Measures]) and facilities would be designed to minimize sight and sound impacts (mitigation measure 55 in EIS Appendix E [Mitigation Measures]). Given the minimal recreational use and the absence of anticipated changes to recreational opportunities under any of the proposed alternatives, a detailed analysis of recreational impacts is not warranted. The context and intensity of recreational activities are so limited that potential impacts would not influence a decision-maker's choice among alternatives. Therefore, recreation is dismissed from detailed analysis.
SOC-1	How would the Project change community facilities, services, and infrastructure?	Impact context is so low that a detailed analysis is not needed to determine significance. Analyzed in other NEPA documents.	Potential impacts to community facilities, services, and infrastructure from oil and gas development in the area were evaluated in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-712) • Willow SEIS (BLM 2023:337–339) Data suggest that people are not moving to the NSB or Nuiqsut for oil industry jobs in sufficient quantities to affect population demographics or to affect the demand for services and infrastructure (City of Nuiqsut 2016, 2022). The proposed new camp would be supplied, serviced, and maintained by CPAI and would not affect existing facilities, services, and infrastructure. Most of the CD8 Project workforce would be housed at existing camps, and there would be no change to the existing condition from use of the existing camps. Additional revenue to the Kuukpik Corporation and NSB could mean more money for facilities, services, or infrastructure, but the impact context is so low, there is no need for detailed analysis.
SOC-2	How would nonresident temporary workers for the Project change community characteristics and culture?	Mitigation measures would reduce impacts below significance. Impact context is so low that a detailed analysis is not	This issue was previously analyzed in the following NEPA documents: • Willow SEIS (BLM 2023:337–339) Most Project workers would be housed at the existing Alpine main camp at CD1, an existing camp at Kuukpik Pad (K-Pad) (near the intersection of the Nuiqsut Spur Road and the CD5 road), a temporary construction camp located at the material source, or a combination of the three depending on availability. Existing worker camps in Nuiqsut already house nonresident workers, and existing conditions would not change. The presence of non-local workers would continue and the potential for conflicts between workers and subsistence harvesters would continue.

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
		needed to determine significance. Analyzed in other NEPA documents.	Because oil and gas workers would be housed on-site or at existing camps in Nuiqsut, interactions between workers and Nuiqsut residents would be minimal outside of the interactions at CD8 Project camps and roads. Camp housing would continue to have prohibitions against drug and alcohol use (see EIS Appendix E [Mitigation Measures]), use of community services or infrastructure, and hunting or fishing in the area.
SOIL-1	How would the Project impact permafrost and soils?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • Alpine EIS (BLM 2004:157–159, 416–424) • GMT1 SEIS (BLM 2014:225–226) • Nanushuk EIS (USACE 2018:3-49–3-74) • Willow SEIS (BLM 2023:83–84, 89–96) In general, impacts to permafrost and soil can be caused by changes in the local alteration of ground temperatures by construction and operation of oil field–related infrastructure. Potential impacts include localized thawing of permafrost, change in the thickness of the active layer, increased potential for soil erosion, and thermokarst in ice-rich areas. It is well-established through previous impact analyses that disturbance of the organic layer and placement of gravel fill for Project infrastructure could locally impact the thermal regime of permafrost and degrade soils. Existing soil and permafrost conditions on the ACP and the potential impacts from projects similar in design, but larger in scope than the CD8 Project, are described in several previous EISs listed above. In addition to impacts from the placement of fill (e.g., for gravel roads, pads, airstrips), other previously analyzed impacts include the following: • Snowdrifts caused by Project roads and pads causing increased soil surface temperatures and resulting increase in thaw depth. • Disturbance to water drainage patterns causing impoundments/ponding or redirection of surface flow. • Local temporary compression of soils from the presence of ice roads and pads. • Installation of VSMs disturbing soil and generating spoils in the immediate vicinity (the GMT1 SEIS [BLM 2014:226] determined this area to be approximately 2 feet in diameter). NEPA impacts disclosed for the Alpine EIS and Willow SEIS included the local, permanent degradation of permafrost and soils caused by gravel placement on tundra, ice infrastructure construction, and VSM installation (BLM 2004:416–418, 2023:89-96). The CD8 Project would have similar infrastructure and components and, thus, similar impacts as the previously cited projects, but impacts would be lesser in extent and magnitude because the scope and size of the CD8 Project would be smaller (i.e., less infrastructure, fewer construction seasons for ice pads and roads [two seasons], and smaller areal extent of the CD8 Project). The CD8 Project would have 45.5 to 65.9 acres of gravel fill, depending on the alternative, compared to 241.0 acres of fill analyzed in the Alpine EIS (Alternative A) and 454.1 acres of fill analyzed in the Willow SEIS. The cumulative impacts analysis in the Willow SEIS (BLM 2023:410) remains applicable to the CD8 Project because the same general type, number, and magnitude of RFF trends and actions analyzed in the Willow SEIS would still be applicable to the CD8 Project. Some of the RFF actions have been constructed (e.g., Pikka, Willow) and are now past and present projects that are part of the existing conditions. Given the smaller scope of the CD8 Project, additional analysis is not needed to understand the impacts of the Project in combination with RFF actions and trends.
TRANS-1	How would the Project impact public transportation networks?	Impact context is so low that detailed analysis is not needed to determine significance.	Project ground traffic, new gravel and ice roads, use of existing gravel roads, and use of the Alpine/WNS multiyear ice bridge would impact private transportation networks (industry roads) by increasing the road network by 3.6 to 6.1 miles, depending on alternative, and by increasing vehicle traffic on gravel and ice roads, including the Alpine/WNS multiyear ice bridge (see EIS Table 2.5-2). No public transportation system would be impacted. The Project would minimize

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			changes to the industry road network by using an existing mine site close to the Project site to minimize vehicle traffic and by siting the Project to use existing infrastructure to the extent possible to minimize new roads. The Project would add a total of 375,597 to 391,936 ground trips (depending on the alternative) over the life of the Project (see EIS Table 2.5-2). Traffic would peak in Year 2 (during construction and drilling) with an estimated 110,972 ground trips for all alternatives (see EIS Table 2.5-2); after drilling is completed in spring of Year 7, traffic would drop substantially to 1,920 ground trips per year during operations. An additional total of 22.5 to 27.2 miles of ice road would be added to the Alpine ice road network for the 2-year construction period, depending on the alternative. In all, depending on the alternative, 3.6 to 6.1 miles of new gravel road would be added to the Alpine road network and would be open to the community to use. The addition of gravel road would result in a permanent reduction of ground trips on the Alpine/WNS multiyear ice road of between 4.4 and 6.9 miles, depending on the alternative. These trips would add to a cumulative use of the existing Alpine/WNS multiyear ice road and Colville River ice bridge and the existing Alpine gravel roads but would not change or widen existing infrastructure. At the highest peak of traffic, traffic would increase by 234% (Year 2 during construction). For most of the Project's 30-year timeline, the increase in traffic would be below 3% (Years 8 through 30). The new gravel road and additional traffic would increase the amount of dust generated on the road network and could increase the need for maintenance activities, which CPAI would complete. However, the context of these impacts is so low that a detailed analysis is not needed to determine significance or make a reasoned choice among alternatives. Therefore, transportation is dismissed from further analysis.
WAT-1	How would Project construction and operations impact marine water quality?	Analyzed in other NEPA documents.	This issue was previously analyzed in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-237–3-240) • Willow SEIS (BLM 2023:123) • CPAI's WNS ODPCP (CPAI 2025b) Though unlikely, the Project's single barge trip could result in a spill or inadvertent release. Very small to small spills to the marine environment would have a low to very low likelihood of occurring and would originate from small support vessels. These spills would be localized to the immediate area of the vessel. A larger spill from a barge would have a very low likelihood and would only occur if the tug or barge transporting CD8 Project materials were to run aground or sink, or if its containment compartment(s) were breached and the contents released (USACE 2012). The geographic extent of such a spill and if it would reach land would depend on the location of the spill and prevailing meteorological and oceanographic conditions at the time of the spill. All non-tank vessels carrying oil of any kind for propulsion must have a vessel response plan (33 Code of Federal Regulations 155(J)). Thus, further analysis is not needed to understand the impacts of the CD8 Project's single barge trip on marine water quality. In the very unlikely event (likelihood approaching zero) of a guillotine pipeline rupture or reservoir blowout, oil could be spilled upstream of the marine environment. If such a low-likelihood event were to occur during high flow, oil could be transported and dispersed to Harrison Bay. As described in USACE (2018), the volume of the spilled fluid, volume of flowing water, magnitude of water currents, and the magnitude and direction of wind would affect the spatial extent of a spill (see EIS Chapter 4 [Spills and Inadvertent Releases]). If a spill were to reach Harrison Bay, fluids could be carried east or west, depending on the prevailing direction of the coastal current. These low-probability, catastrophic events were modeled for CPAI's WNS ODPCP (CPAI 2025b). Approval of the initial Alpine development required a probabilistic risk assessment for spills, a most likely trajectory for various environmental conditions related to a catastrophic spill, and an assessment that included pre-staging equipment across the Niġliq Channel.

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
WAT-2	How would Project water withdrawals change water availability and water quality? How would gravel infrastructure affect lake recharge?	Impact context is so low that detailed analysis is not needed to determine significance.	Freshwater for construction of ice infrastructure and drilling would be withdrawn from lakes that have been previously permitted by ADNR (see EIS Figure 2.4-2). Drinking water for use at CD8 would be withdrawn from previously permitted lakes near the Alpine Central Facility (see EIS Figure 2.4-2) and transported to CD8 by truck. Two lakes are permitted for water withdrawal and have existing intake structures (Lakes L9312 and L9313); their permitted withdrawal volumes are 29.99 and 5.99 MG, respectively. The action alternatives would require 184.8 to 196.7 MG of freshwater over the life of the Project (depending on the alternative) and would save 4.4 to 6.9 MG annually by reducing the length of the Alpine WNS Ice Road and replacing it with a gravel road. Most of the water use for the Project (59%–63%) would be for ice infrastructure during the 2-year construction period. Lakes on the ACP recharge through three mechanisms: snowmelt, overbank flooding from nearby streams, and rainfall. Lakes L9312 and L9313 have been used as water supply lakes for Alpine since 1999. Lake L9312 has recharged to bankfull during breakup 21 of the last 28 years, and Lake L9313 has recharged to bankfull 26 of the last 28 years (Michael Baker International [MBI] 2025). Changing Arctic conditions (see Section 3.1.1.3 [Changing Arctic Conditions]), including changes in precipitation rates, combined with permafrost thaw, have led to changes in freshwater availability and lake recharge across the Arctic. Some areas have experienced increased or decreased freshwater availability and lake area depending on local conditions (U.S. Geological Survey 2025). Though freshwater lakes in the Project area have regularly recharged in the past (MBI 2015, 2025), changing Arctic conditions could result in reduced recharge rates for lakes used for water withdrawals. Most of the water withdrawals are proposed during the first 2 years of the Project for construction of temporary ice roads, which would limit the impacts of future changing Arctic conditions combined with the Project on the probability of lake recharge. Water withdrawals can also temporarily change water quality in two ways. First, water withdrawal in the winter could alter lake water chemistry temporarily (until spring breakup and recharge) by depleting oxygen and changing pH and conductivity. ADNR permits for winter water withdrawal recommend a withdrawal of no more than 15% of the winter water volume (i.e., the unfrozen volume) in fish-bearing lakes (ADNR n.d.) to protect water quality and fish habitat. Second, if a lake does not sufficiently recharge, low water levels can temporarily lower dissolved oxygen, increase salinity, and cause higher concentrations of sediment and nutrients. ADNR temporary water use authorizations set limits on the quantity of water withdrawn to ensure use is in the public interest and does not impact fish and wildlife, other water users, or recreation and subsistence uses. The CD8 Project would withdraw water from lakes permitted by ADNR for a specified withdrawal volume. Therefore, changes in water quality from water withdrawals would be unlikely. Should a lake take more than one season to recharge, water quality impacts would be temporary and localized until lake recharge after spring breakup. New gravel infrastructure could impact lake recharge rates downstream of the infrastructure if substantial portions of recharge occur through surface flows or shallow groundwater flows and gravel infrastructure interrupts these flows. However, the Project would provide adequate culverts to maintain general surface drainage patterns, which is anticipated to mitigate any potential impacts to lake recharge.
WAT-3	How would the Project change dissolved oxygen, conductance, alkalinity, and pH in lakes crossed by or adjacent to ice infrastructure?	Impact context is so low that detailed analysis is not needed to determine significance.	The Project could contribute changes to dissolved oxygen in waterbodies crossed by Project ice roads. Ice road construction over lakes that do not freeze to the bottom could affect dissolved oxygen concentrations. This is mostly an issue for lakes that are 1 foot to a few feet deeper than the minimum 6-foot depth necessary to maintain some unfrozen bottom water in winter (BLM 2004). An ice road across a lake with such an intermediate depth could freeze the entire water column below the road, isolating portions of the lake basin and restricting circulation. As a result, mixing would be reduced and isolated pools with low oxygen could occur. Dissolved oxygen concentrations could be reduced below the 5 milligrams per liter (mg/L) criterion needed to protect resident fish (18 Alaska Administrative Code 70), but concentrations would increase to above that criterion after surface ice thaws in the spring. Ice roads across lakes

Issue Number	Issue Statement	Why Dismissed From Detailed Analysis?	Supporting Rationale
			shallower than 5 feet or deeper than 8 feet would not be expected to have effects because the shallower lakes freeze to the bottom regardless of road presence, and the water under the ice in deeper lakes would remain unfrozen. One lake, Lake L9324, would have an ice road constructed over it for 2 years during winter construction (see EIS Figure 3.11-5) under any action alternative. Lake L9324 has a depth of 7 feet and was documented to have 13.7 mg/L of dissolved oxygen in 2022 (MBI 2022). Lakes L9327 (all action alternatives), M9606 (Alternative D only), and M9607 (Alternative B only) (see EIS Figure 3.11-5) would have ice roads constructed on the edge of the lake, where ice would likely be grounded and thus would not change dissolved oxygen. Meltwater in spring could have a localized effect on specific conductance, alkalinity, and pH in lakes crossed by or near ice infrastructure. This effect would be localized and temporary and would likely return to existing conditions after spring recharge (BLM 2023).
WAT-4	How would Project wastewater disposal impact water quality?	Analyzed in other NEPA documents.	Wastewater disposal from drillsite construction and operation were previously evaluated in the following NEPA documents: • Nanushuk EIS (USACE 2018:3-234–3-235) • Willow SEIS (BLM 2023:138–139) Several types of wastewater would be produced during the Project: domestic wastewater, hydrostatic test water, runoff to secondary containment areas that must be dewatered, and drilling fluids and wastes. Most wastewater would be transported by tanker truck to an existing permitted Class 1 underground injection control disposal well at Alpine. Some hydrostatic test water would be discharged to the tundra; this discharge would meet the Alaska Pollutant Discharge Elimination System North Slope General Permit AKG332000 requirements (e.g., pH, turbidity, visual sheen). The purpose of hydrostatic testing is to test for leaks in the newly constructed pipelines prior to use; thus, test water would be freshwater from clean pipes and would not affect water quality. CPAI may use media additives in hydrostatic test water (e.g., seawater, monoethylene glycol, diesel) depending on the location of the pipeline and time of year. Any hydrostatic test media that uses glycol or non-freshwater sources would not be discharged to the tundra. After hydrotesting, test media with constituents would be either placed in storage for reuse or disposed of in accordance with applicable regulations. Transferring domestic wastewater to and from tanker trucks could result in the accidental release of domestic wastewater, which may impact water quality. Such spills are not likely to have concentrations of pollutants that are toxic or hazardous to the environment, but they could cause exceedances of water quality criteria. Domestic wastewater spills 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. Similarly, accidental releases from trucks transporting drilling fluids and wastes, or runoff to secondary containment areas that must be dewatered, are usually small (less than 20 gallons) and would occur on ice or gravel infrastructure during pumping or transferring or could result from frozen lines rupturing.

LITERATURE CITED

Alaska Department of Environmental Conservation (ADEC). 2025a. Contaminated Sites Database. Available at: https://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/Search/. Accessed October 10, 2025.

———. 2025b. Prevention, Preparedness, & Response (PPR) Spills Database. Available at: https://dec.alaska.gov/Applications/SPAR/PublicMVC/PERP/SpillSearch. Accessed October 10, 2025.

Alaska Department of Labor and Workforce Development. 2026. *Nonresidents Working in Alaska, 2024*. Dated February 2026. Available at: https://live.laborstats.alaska.gov/reshire/nonres.pdf. Accessed February 2026.

Alaska Department of Natural Resources (ADNR). 2021. *North Slope Area Plan*. Available at: https://dnr.alaska.gov/mlw/planning/areaplans/nsap/pdf/nsap-2021-complete-text.pdf. Accessed November 2025.

———. 2026. Alaska Heritage Resources Survey (AHRS). Anchorage, Alaska: Office of History and Archaeology.

———. n.d. North Slope Water Withdrawal Guidelines. Unpublished guidance available from City: Alaska Department of Natural Resources.

Altekruse, J.M., P.M. Powers, A.L. Llenos, and K.L. Haynie. 2024. Data Release for the 2023 Alaska National Seismic Hazard Model. Data release. Reston, Virginia: U.S. Geological Survey. Available at: https://www.sciencebase.gov/catalog/item/64bebcced34e70357a31c624. Accessed November 2025.

Arp, C.D., and M.S. Whitman. 2022. Lake basins drive variation in catchment-scale runoff response over a decade of increasing rainfall in Arctic Alaska. *Hydrological Processes* 36(5):e14583.

Ballinger, T.J., U.S. Bhatt, P.A. Bieniek, B. Brettschneider, R.T. Lader, J.S. Littell, R.L. Thoman, C.F. Waigl, J.E. Walsh, and M.A. Webster. 2023. Alaska Terrestrial and Marine Climate Trends, 1957–2021. *Journal of Climate* 36(13):4375–4391.

Bureau of Land Management (BLM). 2004. *Alpine Satellite Development Plan Final Environmental Impact Statement.* Available at: https://eplanning.blm.gov/Documents/?id=46109c99-a7f2-f011-8407-001dd80c29f3&spid=1ff24f4e-a8f2-f011-8407-001dd803d067. Accessed November 2025.

———. 2015. *Supplemental Environmental Impact Statement for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project.* Available at: https://eplanning.blm.gov/Documents/?id=c5c53188-a7f2-f011-8407-001dd80bcf93&spid=cf2c9f43-a8f2-f011-8406-001dd802fdea. Accessed November 2025.

———. 2018. *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth Two Development Project, Final Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/Documents/?id=f268a393-a7f2-f011-8407-001dd80c29f3&spid=f7f04f4e-a8f2-f011-8407-001dd803d067. Accessed March 2026.

———. 2020. *National Petroleum Reserve in Alaska: 2020 Legacy Wells Strategic Plan.* Dated December 2020. Report to U.S. Congress. Anchorage: U.S. Department of the Interior, Bureau of Land Management Alaska Public Information Center.

———. 2023. *Willow Master Development Plan Supplemental Environmental Impact Statement*. Available at: https://eplanning.blm.gov/Project-Home/?id=f07b7ab1-a7f2-f011-8407-001dd80b1f5f. Accessed December 9, 2025.

Burgess, R.M., C.B. Johnson, B.E. Lawhead, A.M. Wildman, P.E. Seiser, A.A. Stickney, and J.R. Rose. 2002. Wildlife studies in the CD South Study Area, 2001. Report for Phillips Alaska, Inc. Prepared by ABR, Inc. Fairbanks, Alaska.

Burgess, R.M., C.B. Johnson, B.E. Lawhead, A.M. Wildman, P.E. Seiser, A.A. Stickney, and J.R. Rose. 2003. Wildlife studies in the CD South Study Area, 2002. Report for ConocoPhillips Alaska, Inc. Prepared by ABR, Inc. Fairbanks, Alaska

City of Nuiqsut. 2016. *Nuiqsut Comprehensive Development Plan 2015 - 2035.* January 2016. Final Draft. North Slope Borough Department of Planning and Community Services.

———. 2022. *Nuiqsut Comprehensive Plan 2022-2042*. Utqiaġvik, Alaska: North Slope Borough. Available at: https://online.flippingbook.com/view/1021118939/. Accessed February 2026.

ConocoPhillips Alaska, Inc. (CPAI). 2018. Alpine Development Master Plan Update. Submitted to the North Slope Borough. Dated June 2018. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2024. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2023 through December 31, 2023*. February 2024. Available at: https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/1b4126c9-f79a-441a-b3e3-637d088692da/download/202402-cpai-nuiqsut-air-quality-trends-report-2023.pdf. Accessed April 2026.

———. 2025a. Response to Request for Information 21: Wildlife Interaction and Mortality Data. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025b. *Oil Discharge Prevention and Contingency Plan - Western North Slope*: *Alpine and Willow Production and Pipeline Facilities*. DEC Plan No. 22-CP-4140. Dated June 2025. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025c. *Spill Prevention, Control, and Countermeasure Plan*. Alpine Field and Satellites. Western North Slope, Alaska. Prepared October 2010. Amended July 2025. Anchorage, Alaska: ConocoPhillips Alaska, Inc.

———. 2025d. *Nuiqsut Air Quality Monitoring Station Annual Trends Analysis Report January 1, 2024 through December 31, 2024*. Dated February 2025. Available at: https://catalog.northslopescience.org/dataset/af0d09b5-4ce1-40b8-8290-c3838934ad76/resource/7e6b9449-d478-49c5-9b7d-8d53e129ebef/download/202502-cpai-nuiqsut-air-quality-trends-report-2024.pdf. Accessed March 2026.

Dickson, I. 2018. M6.4 Kaktovik Earthquake: The Largest Ever on the North Slope. Alaska Earthquake Information Center. Available at: https://earthquake.alaska.edu/m64-kaktovik-earthquake-largest-ever-north-slope. Accessed November 24, 2025.

Huntington, H.P., C. Strawhacker, J. Falke, E.M. Ward, L. Behnken, T.N. Curry, A.C. Herrmann, C.U. Itchuaqiyaq, J.S. Littell, E.A. Logerwell, D. Meeker, J.R. Overbeck, D.L. Peter, R. Pincus, A.A. Quintyne, S.F. Trainor, and S.A. Yoder. 2023. Chapter 29. Alaska. In *Fifth National Climate Assessment*, edited by A.R. Crimmins, C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, pp. 29-1–29-65. Washington, DC: U.S. Global Change Research Program.

Johnson, C.B., R.M. Burgess, B.E. Lawhead, J.A. Neville, J.P. Parrett, A.K. Prichard, J.R. Rose, A.A. Stickney, A.M. Wildman. 2003a. Alpine Avian Monitoring Program, 2001. Fourth Annual and Synthesis Report. Prepared for ConocoPhillips Alaska, Inc. Prepared by ABR, Inc., Fairbanks, AK. 194 pp.

Johnson, C.B., R. M. Burgess, A. M. Wildman, A. A. Stickney, P. Seiser, B. E. Lawhead, T. J. Mabee, J. R. Rose, and J. E. Shook. 2004. Avian studies for the Alpine Satellite Development Project, 2003. Report for ConocoPhillips Alaska, Inc. and Anadarko Petroleum Corporation, Prepared by ABR, Inc. Fairbanks, Alaska.

Johnson, C.B., R.M. Burgess, A.M. Wildman, A.A. Stickney, P.E. Seiser, B.E. Lawhead, T.J. Mabee, J.R. Rose, and J.K. Shook. 2005. Wildlife Studies for the Alpine Satellite Development Project, 2004. Fairbanks, AK: Prepared by ABR, Inc. for ConocoPhillips Alaska, Inc. and Anadarko Petroleum Corporation.

Johnson, C.B, J.P. Parrett, and P.E. Seiser. 2006. Spectacled Eider Monitoring at the CD-3 Development, 2005. First Annual Report. Prepared for ConocoPhillips Alaska, Inc. and Anadarko Petroleum Corporation. Prepared by ABR, Inc.

Johnson, C.B, J.P. Parrett, and P.E. Seiser. 2007. Spectacled Eider Monitoring at the CD-3 Development, 2006. Final Annual Report. Prepared for ConocoPhillips Alaska, Inc. and Anadarko Petroleum Corporation. Prepared by ABR, Inc.

Johnson, C.B, J.P. Parrett, and P.E. Seiser. 2008. Spectacled Eider Monitoring at the CD-3 Development, 2007. Annual Report. Prepared for ConocoPhillips Alaska, Inc. and Anadarko Petroleum Corporation. Prepared by ABR, Inc.

Johnson, C.B., J.P. Parrett, and P.E. Seiser. 2018. Avian studies for the Alpine Satellite Development Project, 2017. Prepared for ConocoPhillips Alaska, Inc. and Anadarko Petroleum Corporation. Fairbanks, Alaska: ABR, Inc.

Knutson, D. 2025. Gravel resources at the ASRC Mine Site. Written communication, D. Knutson, Senior Director of Lands and Natural Resources, ASRC, Anchorage, Alaska, to L. Arsan, SWCA Environmental Consultants, Anchorage, Alaska. 29 December 2025.

Koehler, R.D. 2013. Quaternary Faults and Folds. Digital Data Series 3. Alaska Division of Geological & Geophysical Surveys. Available at: https://dggs.alaska.gov/pubs/id/24956. Accessed April 2026.

Michael Baker International (MBI). 2015. 2015 Alpine Area Lakes Recharge Studies. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: Michael Baker International.

———. 2022. *Alpine Satellite Development Project Water Quality Monitoring,* 67 pp. Doc. #188952-MBI-HH-RPT-003. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: Michael Baker International.

———. 2025. *Colville River Delta Spring Breakup.* Monitoring & Hydrological Assessment 2025 Report. 206892-MBI-HH-RPT-005. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: Michael Baker International.

North South Borough (NSB). 2019. *North Slope Borough Comprehensive Plan 2019–2039*. Available at: https://www.north-slope.org/wp-content/uploads/2022/02/NSB_Comprehensive_Plan_2019-2039.pdf. Accessed November 2025.

Owl Ridge Natural Resource Consultants, Inc. 2024. *Tiŋmiaqsiuġvik River and Willow Area Fish Sampling 2023 Final Report.* Prepared for ConocoPhillips Alaska, Inc. Available at: https://catalog.northslopescience.org/dataset/98e59f85-055e-4fa3-a27a-011649c332c8/resource/6e6336cd-ea1e-4637-a056-da8cccb9201d/download/202405_-owl-ridge-2023-ti_miaqsiugvik-river-and-willow-area-fish-sampling-report.pdf. Accessed November 2025.

Parrett, J.P., T. Obritschkewitsch, and A.R. Bankert. 2024. *Avian studies on the Colville River Delta, 2023*. Prepared for ConocoPhillips Alaska, Inc. Fairbanks, Alaska: ABR, Inc.

Parrett, J. P., A.R. Bankert, and A.K. Prichard. 2025. *Avian studies on the Colville River delta, 2024*. Prepared for ConocoPhillips Alaska, Inc. Fairbanks, Alaska: ABR, Inc.

Pinney, D.S., and R.A. Combellick. 2000. *Geologic Hazards in and near proposed State of Alaska oil and gas sale, North Slope Foothills*. Miscellaneous Publication No. 39. Fairbanks: Alaska Division of Geological & Geophysical Surveys.

SECOR International Incorporated. 2000. *Nuiqsut Ambient Air Quality Monitoring Program Annual Data Report, April 1999 through March 2000*. Anchorage, Alaska: Phillips Alaska, Inc.

SLR International Corporation. 2026a. *CD8 Emissions Inventory Technical Supporting Document*. CD8 Project Emissions Inventory Rev01_00 Technical Supporting Document (TSD). Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR. September 30, 2025; EI Workbook updated March 1, 2026.

———. 2026b. *CD8 Project Cumulative Ambient Air Quality Impact Assessment Supplemental Modeling at Nuiqsut*. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska: SLR International Corporation.

Thoman, R. and H.R. McFarland (eds.). 2024. *Alaska's Changing Environment 2.0.* Alaska Center for Climate Assessment and Policy, International Arctic Research Center, University of Alaska Fairbanks. Available at: uaf-iarc.org/communicating-change. Accessed April 2026.

Thoman, R., and J.E. Walsh. 2019. *Alaska's Changing Environment: Documenting Alaska's physical and biological changes through observations*, edited by H.R. McFarland. International Arctic Research Center, University of Alaska Fairbanks.

U.S. Army Corps of Engineers (USACE). 2012. *Point Thomson Project Final Environmental Impact Statement*. Anchorage, Alaska: U.S. Army Corps of Engineers.

———. 2018. *Nanushuk Project Final Environmental Impact Statement*. Prepared by DOWL. JBER: U. S. Army Corps of Engineers, Alaska District.

U.S. Energy Information Administration. 2026. *U.S. crude oil production rose in 2025, setting new record*. March 31, 2026. Available at: https://www.eia.gov/todayinenergy/detail.php?id=67404. Accessed May 2026.

U.S. Environmental Protection Agency (EPA). 2025a. Contaminated Alaska Native Claims Settlement Act (ANCSA) Sites database. Available at: https://experience.arcgis.com/experience/51479962643a49368433f43204d493e3. Accessed October 10, 2025.

———. 2025b. Superfund Enterprise Management System (SEMS) database. Available at: https://enviro.epa.gov/envirofacts/sems/search. Accessed October 18, 2025.

U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service. 2010. *Federal Land Managers' Air Quality Related Values Work Group (FLAG) – Phase I Report – Revised (2010).* Available at: https://www.fws.gov/guidance/sites/guidance/files/documents/FLAG%20Air%20Quality%20Phase%201%20report.pdf. Accessed June 2026.

U.S. Geological Survey. 2025. Climate Change and Future Water Availability in the United States. In Chapter E of *U. S. Geological Survey Integrated Water Availability Assessment – 2010 – 2020*. Professional Paper 1894-E. U. S. Department of the Interior.

Wahrhaftig, C. 1965. Physiographic divisions of Alaska: A classification and brief description with a discussion of high-latitude physiographic processes. Geological Survey Professional Paper 482. Washington, D.C.: U.S. Government Printing Office.

APPENDIX E

Mitigation Measures

ABBREVIATIONS

°F	degrees Fahrenheit
ACF	Alpine Central Facility
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
the Applicant or CPAI	ConocoPhillips Alaska, Inc.
CD	Colville Delta
CD8 Project or Project	Colville Delta 8 Project
CRD	Colville River Delta
CRU	Colville River Unit
CWA	Clean Water Act
EM2	wetlands with vegetation subclass 2
HSM	horizontal support member
KSOP	Kuukpikmiut Subsistence Oversight Panel
NSB	North Slope Borough
ODPCP	oil discharge prevention and contingency plan
OHW	ordinary high water
SPCC	spill prevention, control, and countermeasure
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VSM	vertical support member
WNS	Western North Slope
WOTUS	waters of the United States

This appendix describes mitigation measures for the Colville Delta (CD) 8 Project (CD8 Project or Project). These measures are considered in the impacts analysis in Chapter 3 of the Project's environmental impact statement. This appendix also describes compensatory mitigation under the Clean Water Act (CWA) and the Endangered Species Act (ESA).

MITIGATION MEASURES

ConocoPhillips Alaska, Inc. (the Applicant or CPAI), would adhere to the mitigation measures listed in Table E-1. These measures include those required by North Slope Borough (NSB) (NSB 2014, 2024), required by the State of Alaska (Alaska Department of Natural Resources [ADNR] 2018), and those offered by CPAI. Some mitigation measures contain qualifiers such as "to the extent practicable," or "as appropriate." These qualifiers acknowledge that implementation may need to account for site-specific environmental conditions, Arctic operating constraints, engineering requirements, safety considerations, available technologies, and applicable regulatory requirements. The inclusion of these qualifiers does not alter the intent of the measure, which is to avoid, minimize, or mitigate Project impacts. Rather, they recognize that specific implementation methods may require adjustment based on Project conditions. Where a measure cannot be implemented exactly as described, CPAI would employ reasonable alternative methods or practices that preserve the underlying intent of the mitigation measure and achieve the same or a similar protective outcome while remaining consistent with applicable regulations and Project-specific conditions.

Table E-1. CD8 Project Mitigation Measures

Mitigation Measure Number	Primary Resource Affected	Mitigation Measure Source	Mitigation Measure Description
1	Water quality and hydrology Wetlands and waters	ADNR 2018	Avoid placement of drillsite within one-half mile of the banks of the Colville River.
2	Water quality and hydrology	CPAI	The bridged lake crossing was located at a narrow lake section, where practicable, to avoid placement of gravel fill and minimize the number of piers/pilings below the OHW mark of the waterbodies crossed.
3	Wetlands and waters	CPAI	Stockpiling gravel in WOTUS will be avoided.
4	Water quality and hydrology	CPAI	New pipeline VSMs will be installed from ice roads and ice pads. VSM drill cuttings will be temporarily stored on ice and removed to the gravel mine site prior to spring breakup.
5	Wetlands and waters	CPAI	Cable trenches will be dug during winter, and trench materials will be temporarily sidecast onto plywood, plastic sheeting, or an ice pad to avoid discharge of fill in WOTUS associated with sidecasting of trenched materials.
6	Water quality and hydrology	Other Federal, State, or local requirements	CPAI will follow the existing Alpine Facilities Erosion Control Plan. The Plan describes ways in which it will prevent or mitigate erosion that could impact terrestrial and aquatic environments. The Plan includes CPAI's operations, monitoring, and maintenance procedures that detail the actions CPAI will undertake to monitor; maintain; and, if needed, remediate gravel fill impacting surrounding tundra and wetlands.
7	Wetlands and waters	CPAI	CPAI will place cleared snow in designated snow-storage areas and will manage stormwater from all gravel pads to prevent contaminants from being released during spring break-up. CPAI selects snow push areas annually based on avoiding areas of thermokarsting, proximity to waterbodies, and evaluating areas used in the previous year.
8	Water quality and hydrology	CPAI	CPAI does not surface discharge any reserve pit fluids.
9	Wetlands and waters	CPAI	Roads are designed and will be constructed, maintained, and operated in ways to minimize environmental impacts and protect subsistence use areas and access. Gravel road alignments and pad layouts consider topography, maintenance of natural drainage patterns, and the effects of spring breakup and other potential flood events including placement of the pad on higher and more level ground to reduce gravel fill footprint and volume. Road and pad layout also avoid ponds, lakes, and streams to the extent practicable.
10	Water quality and hydrology	CPAI	CPAI minimizes summer vehicle tundra access by restricting use to emergency response personnel or to permitted activities required by statute or regulation.
11	Wetlands and waters	Other Federal, State, or local requirements	CPAI will conduct the removal of water and the collection of ice aggregate from lakes and other water sources consistent with ADNR and ADF&G permits and authorizations.
12	Water quality and hydrology	ADF&G requirement	Ice road waterway crossings will occur at grounded ice portions of each channel crossed and will be slotted, breached, or weakened upon abandonment to facilitate breakup and to minimize potential adverse impacts to stream banks. Snow/ice used for ramps will be removed from the banks in a manner that does not disturb the natural stream bank.
13	Wetlands and waters	ADF&G requirement	Rivers, streams, and lakes will be crossed with ice / snow bridges or ice / snow roads at areas where ice has grounded, when practicable.*
14	Water quality and hydrology	NSB 2014	Snow ramps, snow/ice bridges or cribbing are used to cross frozen waterbodies to avoid cutting, eroding, or degrading their banks. All constructed ramps and bridges will be substantially free of debris.
15	Wetlands and waters	CPAI	Produced water will be re-injected into the reservoir and will not be discharged to surface lands, surface waters, or marine waters.
16	Water quality and hydrology	CPAI	CPAI has and will continue to use wetlands and habitat mapping to assess wetland and wildlife habitat types to inform the design, placement, and development of permanent (i.e., gravel) infrastructure. Gravel road alignments and pad layouts minimize impacts to important wetland types - wetlands with vegetation subclass 2 (EM2) indicating the presence of *Arctophila*, or permanently inundated or semi-permanently inundated wetlands (H and F class water regimes) - to the extent practicable.
17	Wetlands and waters	CPAI, ADNR 2018	The gravel road and pipeline will be placed perpendicular or near perpendicular to the general flow direction when crossing natural drainages to maintain the existing flow patterns and characteristics.
18	Water quality and hydrology	CPAI	CPAI will design and construct waterbody and swale crossings to ensure the free passage of fish, to minimize erosion, to maintain natural drainage characteristics, and to maintain impacts to natural stream flow. Bridges will be used to cross larger waterbodies.
19	Wetlands and waters	Other Federal, State, or local requirements	All culverts will be designed in consultation with ADF&G.
20	Water quality and hydrology	CPAI	Culverts will be installed as needed to maintain natural surface drainage to mitigate the risk of sheet flow interruption and thermokarsting. The estimated spacing of culverts is every 1,000 feet. However, CPAI (or its contractor) will walk road alignments prior to construction to optimize final culvert locations, noting low areas where culverts are needed, and will review the data with regulatory agencies for concurrence. The culverts will be installed per the final design prior to breakup of the first construction season, and additional culverts may be placed after breakup as site-specific needs are further assessed with regulatory agencies.
21	Wetlands and waters	CPAI	Bridge abutments will be constructed from sheet pile to reduce the overall gravel footprint and protect the structures from embankment erosion and stream scour.
22	Water quality and hydrology	CPAI	CPAI will minimize heat transfer and impacts to permafrost from Project infrastructure on gravel pads by filling the gap between well conductors and inner pipes with polyurethane foam; using passive cooling devices (thermosyphons) adjacent to well rows and at-grade structures; and installing insulation below the foundation floors of heated, at-grade structures.
23	Wetlands and waters	CPAI	Heated buildings or structures will be elevated using pilings, to the extent practicable,† to prevent or reduce heat transfer to underlying soils and preserve the thermal integrity of the permafrost.
24	Water quality and hydrology	CPAI	CPAI implements snow removal management measures to reduce the potential for gravel to be pushed off roads and pads during snow removal operations.
25	Wetlands and waters	Other Federal, State, or local requirements	CPAI implements dust control measures for gravel roads and pads to reduce fugitive dust that can settle on vegetation or snow, which could increase thermal conductivity (i.e., reduce albedo), lead to thermokarsting, and promote earlier spring thaw in affected areas.
26	Water quality and hydrology	Other Federal, State, or local requirements	CPAI adheres to strict guidelines for travel on ice roads to avoid tundra damage, including ice road driver's training, establishing speed and weight limits, and installing delineators along both sides of the road.
27	Wetlands and waters	CPAI	Ice roads will be constructed to a minimum thickness of 6 inches to avoid or otherwise minimize impacts to wetlands and tundra.
28	Water quality and hydrology	CPAI	Gravel roads and pads will be a minimum of 5 feet thick to maintain a stable thermal regime by insulating the underlying tundra and offsetting the loss of insulating effect caused by the compression of the vegetated tundra beneath the gravel.
29	Wetlands and waters	CPAI	Ice roads will be routed to avoid shrub areas, including willows, and large areas of tussock tundra to the extent practicable.
30	Water quality and hydrology	CPAI	Pipelines will be constructed above ground, to the extent practicable, to minimize permafrost impacts.
31	Wetlands and waters	CPAI, other Federal, State, or local requirements	Gravel road, pad, pipelines, bridge, and culvert design follows robust hydrological design criteria based on best available data while minimizing overall footprint to the extent practicable. The hydraulic model used accounted for both open water conditions as well as the hydraulic influence of ice jam scenarios, commonly observed in the CRD. See Project description for hydrological design criteria.

Mitigation Measure Number	Primary Resource Affected	Mitigation Measure Source	Mitigation Measure Description
32	Terrestrial mammals	CPAI	CPAI will continue to maintain and implement existing bear-interaction plans to minimize conflicts between bears and humans. These plans will be reviewed, and expanded if needed, to cover the Project.
33	Terrestrial mammals	CPAI, ADNR 2018	Pipeline design and construction will minimize disruption of caribou movement by maintaining a minimum clearance of 7 feet between the bottom of pipelines and the ground surface, except where the pipeline meets gravel pads and at road crossings.
34	Terrestrial mammals	CPAI	Facilities will be designed to minimize nesting, denning, or sheltering opportunities for ravens, raptors, and foxes. Intentional wildlife feeding and/or baiting will be prohibited.
35	Terrestrial mammals	CPAI	CPAI will develop and implement a Project lighting plan that will include measures to minimize the amount of light visible from outside of facilities, including directing artificial exterior lighting inward and downward or be fitted with shields to reduce reflectivity in clouds and fog conditions during all months of the year, which will prevent waterfowl (including species listed under the ESA) from striking facilities during low-light conditions.
36	Terrestrial mammals	CPAI	To minimize the take of species, particularly those listed under the ESA, CPAI will work with resource agencies to ensure that facilities minimize impacts to species, ensure that off-pad utility lines are either buried or suspended from pipe racks to the extent feasible, locate towers on pads near existing buildings to the extent feasible, minimize the use of support wires for towers. If guy wires are used, they will be marked and/or bird deflectors will be seasonally installed to prevent collisions.
37	Terrestrial mammals	CPAI	CPAI provides ESA species training and ESA species identification cards for all workers conducting off-pad activities during the summer season.)
38	Terrestrial mammals	CPAI	Minimize the electrocution hazard for raptors by suspending electrical distribution lines from pipe racks or burying cables (versus the use of overhead power lines) off pad.
39	Terrestrial mammals	CPAI	Maintain space between roads and pipelines where practicable to minimize caribou disturbance and prevent excessive snow accumulation from snowdrifts and snow removal.
40	Terrestrial mammals	CPAI	Pipe racks installed adjacent and parallel to existing pipeline racks will be aligned to match existing VSMs where possible, to reduce obstructions to caribou and subsistence user movements.
41	Terrestrial mammals	CPAI	Pipelines will be designed with a muted (i.e., non-reflective) coating to avoid glare.
42	Terrestrial mammals	CPAI	CPAI implements policies, procedures, and training to prevent wildlife attraction to Project facilities, including use of animal-proof dumpsters for food waste collection, a strict policy prohibiting the feeding or baiting of wildlife, and use of sealing bags or other sealed containers for meals-on-the-go to conceal food odors.
43	Terrestrial mammals	CPAI	CPAI will continue to implement its Wildlife Avoidance and Interaction Plan which includes procedures to eliminate, minimize, and mitigate bear interactions. CPAI has training in place on waste management practices and has project-specific training on waste and attractant management for any new project to provide guidance to employees and contractors for managing predator attractants.
44	Terrestrial mammals	ADNR 2018	Water intake structures in fish bearing or non-fish bearing waters will be designed, operated, and maintained to prevent fish entrapment, entrainment, or injury. All water withdrawal equipment will be equipped and use fish screening devices approved by ADF&G.
45	Terrestrial mammals	ADNR 2018	CPAI designs facilities and organizes the layout of buildings and work areas to minimize potential interactions between humans and bears.
46	Terrestrial mammals	ADNR 2018	CPAI will protect grizzly and polar bear denning sites by avoiding cross-country use of vehicles, equipment, oil and gas activity within0.5 mile of occupied grizzly bear dens and within 1.0 mile of known or observed polar bear dens. Where necessary,‡ CPAI will conduct surveys in known or suspected polar bear denning habitat during the denning season and observe exclusion zones around known polar bear dens in consultation with the USFWS.
47	Cultural resources Subsistence	CPAI	CPAI conducts training for Project personnel to ensure personnel know and understand the environmental, social, and cultural regulatory requirements within the project area where they will be working. Moreover, training emphasizes protection of cultural and archaeological resources, wildlife awareness and interaction, avoiding conflicts with subsistence activities, health and safety measures, and Project mitigation commitments. This training is designed to ensure strict compliance with local and corporate drug and alcohol policies.
48	Cultural resources	CPAI; ADNR 2018	CPAI prohibits Project employees from hunting and trapping activities while employees are on active work status to avoid increased competition for subsistence and recreational wildlife resources.
49	Subsistence	CPAI	Project design and facilities placement has been informed by the results of cultural and paleontological resource surveys. The Project will avoid known cultural and paleontological resources during ground-disturbing activities, including the construction of ice roads.
50	Cultural resources	CPAI	To protect subsistence resources, CPAI avoids disturbing caribou and strictly prohibits chasing wildlife with vehicles.
51	Subsistence	CPAI	CPAI will consult with affected subsistence communities, tribes, Alaska Native Corporations, and the NSB, as well as the KSOP to mitigate potential impacts to subsistence activities.
52	Cultural resources	CPAI	CPAI will consult with the KSOP, Native Village of Nuiqsut, City of Nuiqsut, and Kuukpik Corporation to ensure that Project activities do not adversely affect subsistence activities. CPAI has and will continue to hold frequent public community meetings in advance of future activities.
53	Subsistence	CPAI	CPAI will continue to work with KSOP to coordinate KSOP activities and continue to hire local subsistence representatives and ice road monitors to monitor activities.
54	Cultural resources	CPAI	Construction activities, including gravel and placement, and pipeline and facility construction, will occur primarily during the winter months, when subsistence activity levels are relatively low and disruptions can be minimized.
55	Subsistence	ADNR 2018	Facilities shall be designed and operated to minimize sight and sound impacts in areas of high residential, recreational, and subsistence use and important wildlife habitat.
56	Cultural resources	Project description, USACE public interest review	The gravel road may include a subsistence tundra access road turnout located according to community input. This turnout and access ramps will allow local residents to access tundra areas adjacent to roadways. The turnout and ramps will be designed taking into consideration lessons learned from GMT1 and GMT2.
57	Subsistence	CPAI	CPAI has an internship program (Career Quest) to introduce Nuiqsut high school students to jobs and careers in the oil fields and in their community.
58	Cultural resources	CPAI	CPAI strives to hire qualified Nuiqsut, NSB, and Alaska residents for jobs in the oil fields.
59	Subsistence	CPAI	CPAI will ensure that current communication protocols related to CPAI helicopter, fixed-wing aircraft, and vessel traffic are adequate to address community (Nuiqsut) concerns about traffic-related impacts to subsistence activities.
60	Cultural resources	CPAI	CPAI will allow residents of Nuiqsut reasonable use of roads to access subsistence areas throughout the life of the Project.
61	Subsistence	CPAI	CPAI will continue its philanthropy program from local oil fields to provide grants and sponsorships and other benefits to residents of Nuiqsut.
62	Cultural resources	NSB 2024	Protect cultural resource sites during Project activity by establishing a 500-foot avoidance buffer to the extent practicable.§
63	General	ADNR 2018	CPAI's oil and gas facilities, including pipelines, are designed using industry-accepted engineering codes and standards.
64	General	CPAI	Air pollution will be minimized through air quality monitoring and modeling, as appropriate. An emissions inventory will be developed. Air monitoring reports are generally available to the NSB and local communities.

Mitigation Measure Number	Primary Resource Affected	Mitigation Measure Source	Mitigation Measure Description
65	General	CPAI	CPAI will minimize air emissions from both Project Construction and Operations phases where practicable.¶ Examples of potential solutions are the use of clean fuels such as ultra-low-sulfur diesel, equipment powered by electricity generated at ACF, low emissions-emitting equipment, like Tier 4 engines or similar emissions reduction technology, and closed-vent storage tank systems.
66	General	CPAI	CPAI will use ultra-low-sulfur diesel fuel (as defined by the Alaska Department of Environmental Conservation) in all diesel-fueled vehicles and engines.
67	General	CPAI	During construction, prior to completion of the permanent power supply connection, portable generators fueled by ultra-low-sulfur diesel will provide temporary power at the drillsite. Portable diesel-fired generators will also be available to provide emergency backup power after completion of the permanent power supply connection.
68	General	CPAI	Vehicles and heavy equipment (i.e., rolling stock) used for oil and gas operations will be powered off when not in active use, to the extent practicable#.
69	General	CPAI	Vehicles will be equipped with block heaters. Idling practices are to shut off and plug in vehicles in temperatures of -30°F or above to conserve fuel and reduce emissions.
70	General	Other Federal, State, or local requirements	The Project will use a non-ozone-depleting solution for any required module fire protection.
71	General	ADNR 2018	Waste from operations will be reduced, reused, or recycled to the maximum extent practicable. Garbage and domestic combustibles will be incinerated whenever possible or disposed of at an approved site.
72	General	CPAI, ADNR 2018	Drilling wastes (i.e., muds and cuttings) will be disposed of on-site through annular disposal (i.e., pumped down the well through the space between two casing strings), transported to an approved disposal well such as an ACF Class I disposal well, and/or reused as practical. Reserve pits will not be required or constructed.
73	Spills and inadvertent releases	Other Federal, State, or local requirements	CPAI will follow the WNS ODPCP and Alpine SPCC Plan as applicable based on state and federal regulatory requirements to reduce impacts to human health and safety and to minimize potential effects to subsistence resources, including fish and wildlife. The plan will be amended to cover CD8 and will describe spill prevention measures and on-site cleanup materials for permanent fueling stations, use of proper storage containers and liner materials, proper container identification, and notice of reportable spills. Identification of drip pans (i.e., “duck ponds”) will be addressed through Project operating procedures.
74	Spills and inadvertent releases	Other Federal, State, or local requirements	Pipelines will be built and operated with the best available technology for detecting and preventing corrosion or mechanical defects to minimize impacts related to point source pollution from oil spills or leaks.
75	Spills and inadvertent releases	CPAI	CPAI has an WNS Emergency Stakeholder Outreach Plan in place that outlines the communication and engagement process in the event of an incident in CPAI’s operations
76	Spills and inadvertent releases	CPAI	CPAI will continue to implement spill prevention programs designed to raise awareness around spill prevention and pass on lessons learned.
77	Spills and inadvertent releases	CPAI	CPAI will continue to implement its Fuel Transfer Standard Operating Procedure and will use secondary containment on regulated oil and hazardous materials storage tanks.
78	Spills and inadvertent releases	CPAI	CPAI will maintain a corrosion control program and an inspection program that includes ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared technology. The inspection programs are American Petroleum Institute Standard 570-based programs that focus inspection efforts on areas of greatest potential for spills.
79	Spills and inadvertent releases	CPAI, other Federal, State, or local requirements	CPAI will continue to implement its operating practice to immediately and completely clean up all spills, recovering 100% of spilled material for recycling when possible.
80	Spills and inadvertent releases	CPAI	Pipeline fluids will be periodically treated, as appropriate to product types, with chemicals to limit corrosion potential.
81	Spills and inadvertent releases	CPAI	Oil spill response equipment intended for use in winter conditions will be equipped and maintained for effective use in Arctic conditions. Equipment will be operated and maintained in a manner as to prevent the freezing or icing of the equipment.
82	Spills and inadvertent releases	CPAI	Pipelines will undergo hydrostatic testing prior to operation.
83	Spills and inadvertent releases	CPAI	The Project will be supported by dedicated emergency response resources available at Alpine facilities to serve the CD8 Project including spill response personnel, facilities, and equipment. Gravel road access to the Willow Development will also provide additional response capabilities and minimize response time in the event of a spill or other unintended release or emergency.
84	Spills and inadvertent releases	CPAI, other Federal, State, or local requirements	Spill response equipment will be pre-staged at strategic locations within the Project area as outlined in the ODPCP and SPCC Plan for initial spill response. Staged equipment on site will facilitate rapid deployment of equipment by response personnel and may minimize or reduce the overall impacts associated with a spill or other accidental release.
85	Spills and inadvertent releases	CPAI	CPAI will continue to participate in the Mutual Aid Agreement among North Slope operators to supply labor and equipment for immediate spill response. Spill response drills and exercises will ensure response readiness and awareness; these drills will be scheduled according to the National Preparedness and Response Exercise Program guidelines and typically involve production, drilling, or pipeline spill response scenarios.
86	Spills and inadvertent releases	ADNR 2018	CPAI will not, except as addressed and approved in the CRU plan of operations or a waiver request, refuel vehicles within the annual floodplain. Containers with an aggregate storage capacity of greater than 55 gallons that contain fuel or hazardous substances will not be stored within 100 feet of a waterbody, or within 1,500 feet of a current surface drinking water source. CPAI will ensure that secondary containment is provided for the storage of fuel or hazardous substances and sized as appropriate to container type and according to governing regulatory requirements.
87	Spills and inadvertent releases	CPAI	Well cellars will be designed to contain drips and leaks.
88	Spills and inadvertent releases	ADNR 2018	Pipelines and gravel pads will facilitate the containment and cleanup of spilled fluids.
89	Spills and inadvertent releases	ADNR 2018	During equipment storage or maintenance, the site must be protected from leaking or dripping fuel and hazardous substances by the placement of drip pans or other surface liners designed to catch and hold fluids under the equipment, or by creating an area for storage or maintenance using an impermeable liner or other suitable containment mechanism.
90	Spills and inadvertent releases	CPAI	CPAI will contract with a state-registered Primary Response Action Contractor to assist with quick spill response impacts in the event of a spill.
91	Marine mammals	CPAI	CPAI will continue to consult with affected subsistence communities, tribes, Alaska Native Corporations, and NSB, as well as the Kuukpikmuit Subsistence Oversight Panel, Alaska Eskimo Whaling Commission, Nuiqsut Whaling Captains, and Barrow Whaling Captains as appropriate to mitigate potential impacts to subsistence activities.

Source: CPAI (2025).
* When grounded ice crossings are not feasible, CPAI will work with the appropriate resource agencies, including the Alaska Department of Fish and Game, to cross streams in areas with floating ice, with the overall intent to minimize impacts to overwintering fish.
† Not all buildings can be elevated. Rig structures and wellhouses require floors at grade. Heat transfer can be mitigated through various techniques including insulation and thermosyphons.
‡ Polar bear den surveys will be conducted in accordance with current regulations and the Letters of Authorization issued by the U.S. Fish and Wildlife Service. Exclusion zones will be set with the U.S. Fish and Wildlife Service.
§ A 500-foot avoidance buffer for cultural resource sites is typically sufficient. In the unusual circumstance where a 500-foot buffer cannot be avoided, CPAI will work with the appropriate entities before conducting work within the buffer.
¶ Not all emission reduction measures are suitable or available for every application and the objective is to comply with applicable regulatory requirements rather than reduce emissions to the lowest achievable level regardless of technical or operational constraints. For example, electrical power may not be available at all construction or remote operating locations, and the use of closed-vent tank systems may not be technically necessary or feasible for all storage vessel contents and configurations.
Operating conditions on the North Slope may require equipment to remain running for safety, reliability, or operational reasons. Vehicles may need to idle in cold-weather conditions for proper function. Cold starting a vehicle at -40°F may not be possible and can be detrimental to the service life of the equipment. Rails with electric plug-ins are common at camps but may not be present in construction zones and other areas outside camps.

Table E-2. CD8 Project Wetlands and Waters Avoidance and Minimization Measures

Measure	Measure Description	Project Component	Acreage Avoided	Notes
A	Facility design including use of directional drilling.	Gravel infrastructure	26	Directional drilling allows for access to approximately three times the area of the reservoir from a given surface footprint.
B	Use of 20-foot well spacing avoids additional gravel fill.	Gravel infrastructure	7	Gravel footprint not needed at all drillsite because of smaller wellhead spacing.
C	Use of 2H:1V side slopes avoids additional gravel fill.	Gravel infrastructure	14	6 miles of road with average height of 9.5 feet.
D	Use of shared facilities (e.g., processing facility, power generation, camps, airstrip, tanks, warehouses, maintenance shops, drilling support infrastructure) to reduce the overall Project gravel footprint.	Construction, drilling and operations	58	Based on preliminary estimated footprint for airstrip and support pad, and roads.
E	Use of ice roads and pads for winter construction and staging including mine site access to avoid the need for additional gravel roads and pads for construction.	Construction	230	Based on ice roads needed for gravel haul and pipeline construction and ice pads for mine site staging, bridge construction staging, drillsite and tie-in pad staging, and module mobilization staging.
F	Use of existing VSMs/HSMs to support new CD8 pipelines avoids needs for new VSMs.	Pipelines	<0.1	Use of 5.5 miles of existing VSMs.
G	Tie-in to existing in-field lines near CD4N (produced oil lines at CD4N) avoids fill for VSMs to transport material to/from CD1/ACF.	Pipelines	<0.1	Use of 3.2 miles of existing pipeline between CD4N and ACF.
H	Suspend fiber-optic and power cables via messenger cable attached to HSMs to avoid additional fill associated with utility poles, reduce the potential for bird strikes, and avoid providing perches for predators.	Pipelines	<0.1	Use of VSMs/HSMs to support 10.8 miles of cables.
	Total Avoidance		**334**	

Source: CPAI (2025).

COMPENSATORY MITIGATION

In accordance with 33 Code of Federal Regulations 332.1(c)(3), "compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the Section 404(b)(1) Guidelines." Pursuant to this authority, U.S. Army Corps of Engineers (USACE) has preliminarily determined that compensatory mitigation is appropriate for the proposed placement of fill into waters of the United States (WOTUS) due to the Project's location and proximity to the Colville River Delta. CPAI did propose compensatory mitigation and their proposed compensatory mitigation statement for the placement of fill into wetlands and other WOTUS is included in the permit application available on the Project website: www.cd8eis.com.

Regulatory standards and criteria in 33 Code of Federal Regulations 332 emphasize the sequence to be followed for mitigating impacts to aquatic resources. All practicable steps to avoid and/or minimize impacts to aquatic resources must be taken before proposing compensatory mitigation to offset project impacts. Once all efforts to avoid and minimize impacts have occurred, remaining impacts may be offset by compensatory mitigation, which is the restoration (reestablishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances, preservation of aquatic resources to offset unavoidable detrimental impacts.

Compensatory mitigation requirements must be commensurate with the amount and type of impact that is associated with a particular CWA Section 404 permit and may be achieved by purchasing credits through mitigation banks or in-lieu fee programs, by permittee-responsible mitigation, or by a combination of the three.

There is one wetland mitigation bank on the North Slope located near Utqiaġvik; though it is in a different hydrologic unit code basin than the Project, it is in the same ecoregion (the Alaska Coastal Plain). There are no certified in-lieu fee programs operating on the North Slope. Thus, USACE will evaluate the practicability of permittee-responsible mitigation opportunities identified by the Applicant or USACE during the permit process.

The final decision regarding the appropriateness and practicability of compensatory mitigation, after considering all avoidance and minimization efforts, would be documented in USACE's record of decision and permit decision document if a permit is granted.

ENDANGERED SPECIES ACT MITIGATION

Additional mitigation measures may be added to the Project through ESA consultation, which is ongoing.

LITERATURE CITED

Alaska Department of Natural Resources (ADNR) Division of Oil and Gas (DOG). 2018. Mitigation Measures, North Slope Area Wide. Effective April 18, 2018.

ConocoPhillips Alaska, Inc.(CPAI). 2025. Department of the Army Permit Application. Dated April 2025.CD8 Development. Alaska: North Slope Borough.

North Slope Borough (NSB). 2014. *Oil and Gas Technical Report: Planning for Oil & Gas Activities in the National Petroleum Reserve – Alaska, Appendix G: North Slope Borough Standard Permit Stipulations*.

_____. 2024. Form 500 – Certificate of IHLC/TLUI Clearance Application. Department of Planning and Community Servies. Inupiat History, Language, and Cultural Department. North Slope Borough. Available at: https://www.north-slope.org/departments/planning-community-services/applications-forms/. Accessed December 30, 2025.

APPENDIX F

Iñupiaq and Scientific Names

CONTENTS

Iñupiaq and Scientific Names.....F-1
Literature Cited.....F-3

Tables

Table F-1. Plants.....F-1
Table F-2. Terrestrial and Marine Mammals.....F-1
Table F-3. Fish.....F-1
Table F-4. Birds.....F-1

IÑUPIAQ AND SCIENTIFIC NAMES

Some readers may better recognize common plant and animal names by their Iñupiaq or scientific names. The appendix provides Iñupiaq and scientific names for plants (Table F-1), mammals (Table F-2), fish (Table F-3), and birds (Table F-4). If an Iñupiaq name did not have a known scientific name, it was labeled as unknown, and vice versa.

Table F-1. Plants

Iñupiaq Name	Scientific Name	Common Name
Unknown	*Eriophorum vaginatum*	Tussock cottongrass
Uqpik, Ugpiik, Uqpiich, Uqpiit	*Salix* spp.	Willow

Source: MacLean (2014).

Table F-2. 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
Amaġuq	*Canis lupus*	Wolf
Ugruk	*Erignathus barbatus*	Bearded seal
Qavvik	*Gulo gulo*	Wolverine
Unknown	*Ondatra zibethicus*	Muskrat
Umiŋmak	*Ovibos moschatus*	Muskox
Natchiq, Qayaġulik	*Phoca hispida, Pusa hispida*	Ringed seal
Qasiġiaq	*Phoca largha pallas*	Spotted seal
Tuttu	*Rangifer tarandus*	Caribou
Akłaq	*Ursus arctos*	Grizzly (brown) bear
Nanuq	*Ursus maritimus*	Polar bear
Kayuqtuq, Qianġaq, Qiġñiqtaq	*Vulpes vulpes*	Red fox

Source: MacLean (2014).

Table F-3. Fish

Iñupiaq Name	Scientific Name	Common Name
Qaaktaq	*Coregonus autumnalis*	Arctic cisco
Aanaakłiq	*Coregonus nasus*	Broad whitefish
Pikuktuuq	*Coregonus pidschian*	Humpback whitefish
Iqalusaaq	*Coregonus sardinella*	Least cisco
Tittaaliq	*Lota lota*	Burbot
Iqalukpik, Paikłuk, Aŋayuqaksraq, Qalukpik	*Salvelinus alpinus*	Arctic char
Sulukpaugaq	*Thymallus arcticus*	Arctic grayling
Aqalugruaq	Unknown	Salmon

Source: MacLean (2014).

Table F-4. Birds

Iñupiaq Name	Scientific Name	Common Name
Niġlivik, Niġlivialuk	*Anser albifrons*	Greater white-fronted goose
Tiŋmiaqpak	*Aquila chrysaetos*	Golden eagle

Iñupiaq Name	Scientific Name	Common Name
Nipailuktaq	*Asio flammeus*	Short-eared owl
Tulugaq	*Corvus corax*	Common raven
Tuullik	*Gavia adamsii*	Yellow-billed loon
Tiŋmiaqpak	*Haliaeetus leucocephalus*	Bald eagle
Niksaakturiq	*Lagopus mutus*	Rock ptarmigan
Turraaturaq	*Limosa lapponica*	Bar-tailed godwit
Igniqauqtuq	*Polysticta stelleri*	Steller's eider
Qavaasuk	*Somateria fischeri*	Spectacled eider

Source: MacLean (2014).

Literature Cited

MacLean, E.A. 2014. *Iñupiatun uqaluit taniktun sivunniuġutiŋit (North Slope Iñupiaq to English dictionary).* Fairbanks: University of Alaska Press, Alaska Native Language Center, and North Slope Borough Iñupiat, History, Language, and Culture Commission.