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SUMMARY

S.1 BACKGROUND

The Bureau of Land Management (BLM) and four cooperating agencies — U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (USEPA), U.S. Coast Guard (USCG), and the State of Alaska — have prepared the Alpine Satellite Development Plan (ASDP) Environmental Impact Statement (EIS) to examine ConocoPhillips Alaska, Inc.'s (CPAI, the applicant's) proposed action to develop five satellite oil accumulations in the Northeast National Petroleum Reserve-Alaska and the Colville River Delta adjacent to the eastern border of the National Petroleum Reserve-Alaska (the Plan Area). This EIS examines the potential impacts of CPAI's proposed Development Plan and evaluates a range of alternatives, consistent with applicable law, by which to accomplish the purpose and need of the proposed action while mitigating adverse impacts. This EIS provides National Environmental Policy Act (NEPA) analysis of CPAI's proposal for five new production well pads and their associated transportation systems.

The purpose of the proposed action is to allow CPAI to develop five satellite oil accumulations in the Plan Area. The need for oil production from the Plan Area, from the perspective of CPAI, is to generate financial return on its investment in oil and gas leases. From a broader perspective, the need for oil production from the Plan Area is to help satisfy the demand for a continued supply of domestic oil, to decrease dependence of the United States on foreign oil imports, and to contribute to employment and economic vitality in the region and nation.

S.2 PROPOSED ACTION AND ALTERNATIVES

S.2.1 The Applicant's Proposed Development Plan

CPAI proposes to develop five satellite drilling pads — two in the Colville River Delta adjacent to the National Petroleum Reserve-Alaska and three in the National Petroleum Reserve-Alaska. The pads are termed CD-3, CD-4, CD-5, CD-6, and CD-7. In the Colville River Delta, CD-3 is on State of Alaska land and CD-4 is on land owned by Kuukpik Corporation, a Native-owned corporation created under the authority of the Alaska Native Claims Settlement Act (ANCSA) for the village of Nuiqsut. CD-5 is on land conveyed to Kuukpik within the National Petroleum Reserve-Alaska; CD-6 and CD-7 are on lands administered by the BLM in the National Petroleum Reserve-Alaska.

The company proposes to place 20 to 30 wells on each pad and to transport the unprocessed, three-phase (oil, gas, and water) drilling product to the Alpine Central Processing Facility (APF-1) for processing. Processed oil would be placed in the existing pipeline system for transport to the Trans-Alaska Pipeline System (TAPS). The applicant's proposed development plan is more fully described at Section 2 of this EIS.

S.2.2 Alternatives to the Applicant's Proposed Development Plan

Five action alternatives, A through D and F, describe the applicant's proposed action and four alternatives to fulfill the purpose and need of the proposed action. Alternative E, the No Action Alternative, will serve as a benchmark, enabling the public and decision makers to compare the magnitude of environmental effects of the action alternatives. Alternative F, the agency preferred alternative, was developed in consideration of Draft EIS public and agency comments. The alternatives introduced below cover the full range of reasonable development scenarios.

Alternatives to CPAI's proposed action (other than the No-Action Alternative) were developed by the BLM by considering public comments at scoping and Draft Environmental Impact Statement (DEIS) review, tribal consultation, and the purpose and need of the proposed action, including options for accomplishing the production objectives of CPAI's proposed five-pad development. These alternatives address specific concerns associated with the individual components of the proposed development. This "component approach" addresses a range of

alternatives for individual project elements, such as access to production pads by gravel road or gravel airstrip, power lines on power poles or vertical support member (VSM)-mounted cable trays, and specific roadway routing and river crossing locations. These components were combined into complete project concepts based on unifying themes.

S.2.2.1 Alternative A

THEME: APPLICANT'S PROPOSED ACTION

The CPAI Development Plan includes five production pads, CD-3 through CD-7. Produced fluids would be transported by pipeline to be processed at APF-1. Gravel roads would connect CD-4 through CD-7 to existing Alpine Facilities. CD-3 would be accessed by ice road or by air. Gravel used for construction of roads, pads, and airstrips would be obtained from the existing Arctic Slope Regional Corporation (ASRC) Mine Site and the Clover Potential Gravel Source (Clover). A bridge across Nigliq Channel near CD-2 would accommodate road traffic and the pipelines. CD-3 would be the only new pad with an airstrip. CD-6 would be within a 3-mile setback from Fish Creek in which the BLM's Record of Decision (ROD) for the Northeast National Petroleum Reserve-Alaska Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) (BLM, 1998b) (Stipulation 39[d]) prohibits permanent oil facilities. This alternative would provide for an exception to this provision to allow location of CD-6 and its associated road and pipeline within the setback. Additional exceptions or modifications of the Northeast National Petroleum Reserve-Alaska IAP/EIS would be required to locate oil infrastructure within 500 feet of some water bodies (Stipulation 41) and to allow roads between separate oilfields (Stipulation 48). The USACE would have to determine compliance with Special Condition 10 of the 1998 permit for the Alpine Development Project that requires roadless development in the Colville River Delta unless an environmentally preferable alternative is available or roadless development is infeasible. Aboveground pipelines would be supported on VSMS and would be at elevations of at least 5 feet above the tundra. Power lines would be supported by cable trays placed on the pipeline VSM, except for a power line suspended from poles between CD-6 and CD-7. Use of roads would be by industry, government, and local residents.

S.2.2.2 Alternative B

THEME: CONFORMANCE WITH STIPULATIONS

Except for those aspects specifically discussed below, the components of Alternative B are the same as those for Alternative A. Differences between the two alternatives provide for conformance to Northeast National Petroleum Reserve-Alaska IAP/EIS development stipulations and include moving proposed permanent oil infrastructure to a distance at least 3 miles from Fish Creek (Stipulation 39[d]). This requires that CD-6 and associated roads and pipelines be moved from within the setback. Proposed permanent oil infrastructure would be moved to a distance of at least 500 feet from water bodies, with the exception of essential pipeline and road crossings (Stipulation 41). The road connection between CD-6 and CD-7 would be maintained; however, these pads would not connect to the existing Alpine Field (Stipulation 48). Power lines would be buried in or near roads, or near VSMS, where there are no roads. Although not specifically prohibited by the development stipulations, access to roads in the development area would not be allowed for local residents under this alternative. Access to roads on federal and state lands would be restricted to industry and government personnel. Local residents would be allowed on roads on Kuukpik lands.

S.2.2.3 Alternative C

THEME: ALTERNATIVE ACCESS ROUTES

Alternative C differs from Alternative A principally by including alternative bridge locations, a road connection to Nuiqsut, a southerly road and pipeline route to CD-6 and CD-7, and road connections to all production pads, including those in the lower Colville River Delta. This alternative also differs from Alternative A by requiring a minimum pipeline height of 7 feet and placing power lines on separate poles rather than on VSMS. Roads to CD-3 and CD-4 would connect to APF-1. Roads to CD-5, CD-6, and CD-7 would connect to either APF-1

(Sub-Alternative C-1) via a road and pipeline bridge near CD-4 or to existing oilfields east of the Colville River using the State's proposed Colville River Road (Sub-Alternative C-2). To address interest by some local residents, both sub-alternatives would provide road access from Nuiqsut to the oilfields. To take better advantage of the state road under Sub-Alternative C-2, a bypass of Nuiqsut would be constructed from the state road to the satellite project road and a 2-acre pad would be added along the bypass primarily for vehicle storage. There would be no 2-inch product pipelines to production pads in Sub-Alternative C-1. A 2-inch products pipeline would extend from CD-2 to CD-6 in Sub-Alternative C-2. Exceptions to the same Northeast National Petroleum Reserve-Alaska IAP/EIS stipulations as in Alternative A would be required. However, Sub-Alternative C-2 would also require that BLM modify Stipulation 48 to allow connection of roads on BLM-managed lands with the state's proposed road. Use of roads on BLM lands would be unrestricted. Industry, government, and local residents would have access to other roads.

S.2.2.4 Alternative D

THEME: ROADLESS DEVELOPMENT

Alternative D excludes the construction of roads for access to production pads. Access to production pads CD-3 through CD-7 would be by fixed-wing aircraft, helicopter, ice roads or low ground pressure vehicle tundra travel. The pipeline crossing of the Nigliq Channel would be accomplished using horizontal directional drilling (HDD) rather than a pipeline bridge. Pipelines would be built with a minimum height of 7 feet (measured at the VSMs). Power cables would be located on VSM mounted cable trays. Exceptions to the same Northeast National Petroleum Reserve-Alaska stipulations as in Alternative A would be required. For the purpose of analysis, Alternative D is presented as two sub-alternatives. Sub-Alternative 1 (D-1) includes gravel airstrips and access by fixed wing aircraft and ice roads. Sub-Alternative 2 (D-2) includes gravel helipads and access by helicopters, ice airstrips, and ice roads. All other project elements are common to both sub-alternatives.

S.2.2.5 Alternative E

THEME: NO ACTION

Under the No-Action Alternative, the proposed CPAI Development Plan or Alternatives B, C, D, or F would not occur. No oil in the Plan Area, except that extracted from the existing CD-1 and CD-2 production pads would be produced in the near future. Ongoing activities, and future actions not related to the proposed action alternatives, could occur in the Plan Area.

S.2.2.6 Alternative F

THEME: AGENCY PREFERRED ALTERNATIVE

Alternative F, the Agency Preferred Alternative, modifies key components of CPAI's proposed development plan to minimize, mitigate, or avoid certain potential environmental impacts identified by the BLM or the cooperating agencies or the public through the NEPA process, while achieving the purpose and need described in Section 1 of this EIS. The modified elements of the Preferred Alternative have either been adopted directly from alternatives analyzed in detail in the DEIS, or reflect measures identified through the DEIS comment process or additional agency review of the applicant's proposal.

The Preferred Alternative modifies CPAI's proposed plan (Alternative A) by:

- Requiring that the road and pipeline bridge across the Nigliq Channel extend from bank to bank
- Requiring that the road and pipeline bridge across the Ublutuoch River extend from bank to bank
- Requiring that approaches to both the Nigliq Channel and Ublutuoch River bridges provide for natural waterflow

- Requiring that the road to CD-4 be either relocated around Lake 9323 or engineered to provide for natural waterflow and fish passage
- Removing substantial infrastructure from the Fish Creek 3-mile setback, while allowing CD-6 to be located as requested by CPAI
- Requiring powerlines between CD-6 and CD-7 to be placed on cable trays
- Increasing the minimum elevation of pipelines to 7 feet at the VSMs
- Requiring lighting of higher structures to address bird strike issues

All other elements of the plan are the same as in Alternative A. Exceptions to the same Northeast National Petroleum Reserve-Alaska stipulations as in Alternative A would be required, and the USACE would have to determine that the intent of Special Condition 10 of the 1998 permit would be met.

S.2.3 Full-Field Development

Also included in this EIS, is an analysis of Full-Field Development (FFD) scenarios for the approximately 890,000-acre Plan Area (Figure 1.1.1-1). FFD is presented as hypothetical scenarios for oil development that could occur during the next 20 years. The Plan Area includes the Colville River Delta west of its easternmost channel and extends west to the vicinity of the mouth of the Kogru River on the west side of Harrison Bay and south from the Kogru River mouth for approximately 45 miles. Though FFD is not proposed at this time, BLM considers it likely that development besides that currently proposed by CPAI will occur in the Plan Area during the next 20 years. As a result, this EIS directly evaluates and analyzes alternative development options for not just the pads, pipeline, and other facilities proposed by CPAI, but also for potential future development. This approach gives the public and decision makers a comprehensive overview of proposed and potential future development in the Plan Area. In this EIS, FFD scenarios have been developed to follow the same themes as the alternatives for the CPAI's proposed development plan.

Two additional hypothetical production facilities (HPFs) and 22 additional hypothetical production pads (HPs) could be constructed in the Plan Area. Gravel roads and/or airstrips would provide access to the HPFs and production pads. Construction and operation strategies described for the applicant's proposed action would apply for the FFD scenarios. Exceptions to the stipulations in the Northeast National Petroleum Reserve-Alaska IAP/EIS and ROD would be necessary to allow placement of facilities in certain areas. It is important to note, however, that the pad locations described in Section 4 of this EIS for FFD are hypothetical and do not reflect any actual proposals, applications, or project plans. The scenarios presented for FFD in Section 4 are presented for purposes of analysis and represent hypothetical potential future development.

S.3 SCOPE OF ANALYSIS

The BLM and the cooperating agencies have sought to define the issues in the Plan Area through public participation and discussions with tribes (the Native village of Nuiqsut, the Native village of Barrow, and the Inupiat Community of the Arctic Slope [ICAS]), the North Slope Borough (NSB), the local government of Nuiqsut, and other federal agencies. (The BLM's consultation and coordination efforts are further described in Section 5 of this EIS.) In the public scoping process, DEIS review, and comment process, input was received from residents of the North Slope, Anchorage, and Fairbanks; interested individuals from throughout the nation; businesses with an interest in oil and gas development; and individuals and groups with an interest in the environment.

The BLM and cooperating agencies have reviewed concerns and questions raised during the scoping process and DEIS review and comment process. Solutions responsive to many of those concerns and questions were integrated into elements of the alternatives developed for consideration in this Final Environmental Impact Statement (FEIS). The major issues and concerns raised during scoping and by DEIS comments generally fall into the categories below:

Adherence to Stipulations Identified in the Northeast National Petroleum Reserve-Alaska IAP/EIS. Many commenters stated that the restrictions and protections (stipulations) issued with the Northeast National Petroleum Reserve-Alaska IAP/EIS were necessary for protecting the environment and urged that the proposed and future developments in the Plan Area adhere to the stipulations without exception.

Oil and Gas Development in the National Petroleum Reserve-Alaska. The development covered in this EIS is the first proposed by industry in the National Petroleum Reserve-Alaska. Proponents of oil and gas development note that the National Petroleum Reserve-Alaska was set aside for oil and gas development. They cite the need for new reserves on the North Slope and increased U.S. production. Many proponents support site-specific exceptions to stipulations to allow development of additional oil reserves.

Impacts to Local Residents and Traditional Subsistence-Use Areas. CPAI's proposed action and the broader FFD would represent the westernmost oil and gas development on the North Slope. Development in this area would be close to the community of Nuiqsut and within traditional subsistence-use areas. There is a concern that a "balance between the benefits of development and the costs to the environment and people" be maintained. Nuiqsut residents, in particular, expressed concern that traditional lifestyles may be changed by impacts to traditional subsistence-use areas and lifestyle changes brought about by employment opportunities within and outside of the community.

Colville River Delta Resources. The Colville River Delta is the largest river delta on Alaska's North Slope and is largely covered by wetlands. It is important to North Slope residents for subsistence hunting and fishing and is recognized for its significance during critical life stages of waterbirds. The area is considered to have high potential for oil and gas resources and requires special consideration during design, construction, operation, and maintenance of oil and gas facilities.

Full-Field Development Analysis within the Plan Area. Issues about expanding oil and gas development in the Plan Area ranged from appreciation that the BLM was looking at the impacts throughout the Plan Area, to caution when looking at foreseeable future development outside of the applicant's proposed plan.

Environmental Quality. Concerns include air and water quality, oil-spill prevention and response, effects of activities and development structures on fish and wildlife and their habitat, and the effects of contaminants on fish, wildlife, and people. It is also a concern that impacts on environmental quality may have subsequent long-term impacts to local residents.

In consideration of these issues, this EIS provides analysis of existing conditions of the affected environment (Section 3) and the potential environmental consequences that would result from implementation of the applicant's proposed plan and alternatives (Section 4).

S.4 ENVIRONMENTAL CONSEQUENCES

Environmental consequences and cumulative effects that would result from implementation of the proposed action and alternatives and FFD scenarios are summarized below:

S.4.1 Spills

Spills of produced fluids, crude or refined oil, seawater, and other chemicals from the proposed five-satellite CPAI Development Plan or from the FFD have a finite rate of occurrence, might affect the environment to varying degrees, and are of concern to all of the stakeholders.

Small spills (e.g., less than 100 gallons) will occur (i.e., probability of a spill equals 1.0) during the construction, drilling, and/or operation of the CPAI Development Plan and FFD. As the spill size increases, the rate and probability of occurrence decreases. A Very Large Volume Spill (VLVS) (i.e., greater than 100,000 gallons) is a highly unlikely event.

The majority of construction spills tend to be relatively small, and most result from vehicle and construction equipment fueling and maintenance. A tanker truck accident or a fuel storage tank failure is the most likely source of the largest construction spills. Spills from pipelines, well blowouts, uncontrolled releases, or facility accidents would not occur during construction. These latter spills could occur during drilling and operation phases and have the potential to result in larger-volume spills. Construction, drilling, and operation phases may all occur simultaneously for the first few years of the CPAI Development plan and longer in FFD, though they will usually, but not always, be in separate locations.

Spills could occur from pipelines, production pads (and APF pads in the FFD), airstrips, and roads and bridges. Spills that leave the gravel pads and gravel roadbeds could reach one or more of several habitat types including wet and/or dry tundra, tundra ponds and lakes, flowing creeks and rivers, Harrison Bay, and potentially the adjacent nearshore Beaufort Sea. Spills could occur anytime in the year. The rate of oil and seawater spills from the CPAI Development Plan, its alternatives, and FFD Scenarios is likely to be lower than the history of the past 30 years of oil exploration, development, production, and transportation on the North Slope. The combination of more stringent agency regulations, continually improving industry operating practices, and advancements in Best Available Control Technology (BACT) all serve to reduce the rate and impacts of spills.

A VLVS is most likely to result from a major pipeline break, well blowout, or uncontrolled release. In the latter two cases, some or much of the spilled material could be contained on the pad or on the tundra in the immediate vicinity. However, in all three cases, oil and/or seawater would probably affect the tundra adjacent to the spill source and this may be relatively remote from the road or pads in pipeline spills. A spill from a pressurized pipeline could spray into the air as a mist and be carried a substantial distance downwind and affect tundra and adjacent water bodies. Depending upon proximity and season, the oil and/or seawater could also reach wet tundra, tundra ponds and lakes, creeks, larger rivers, estuaries, Harrison Bay, and the nearshore Beaufort Sea.

S.4.2 Physical Environment

S.4.2.1 Terrestrial Environment

PHYSIOGRAPHY

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON PHYSIOGRAPHY

Impacts to physiography would occur primarily during the construction phase and result from changes to landforms by construction of roads, pads, airstrips, and mine sites. If not properly designed and constructed, gravel fill can adversely affect thermal stability of the tundra and hydrology through thermokarsting and increased ponding. The total land area affected by construction of gravel facilities and mine sites would be 306 acres for CPAI and approximately 1,608 acres for FFD.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON PHYSIOGRAPHY

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same types of impacts as Alternative A. Lesser magnitude of gravel construction and mining actions than Alternative A due to fewer roads and shorter road lengths. Total area of land affected by gravel construction and mining actions = 241 acres.</p> <p>FFD: Same as CPAI except total area of gravel construction and mining actions = approximately 1,336 acres.</p>	<p>CPAI Development: Same types of impacts as Alternative A. Greater magnitude of gravel construction and mining actions than Alternative A due to additional roads and longer road lengths. Total area of land affected by gravel construction and mining actions for Alternative C-1 = 409 acres, and Alternative C-2 = 410 acres.</p> <p>FFD: Same as CPAI, except total area of gravel construction and mining actions = approximately 1,590 acres.</p>	<p>CPAI Development: Same types of impacts as Alternative A. Lesser magnitude of gravel construction and mining actions than Alternative A, due to roadless design and reliance on airstrips or helipads. Total area of gravel construction and mining actions = 272 acres for Sub-Alternative D-1, and 93 acres for Sub-Alternative D-2.</p> <p>FFD: Same as CPAI, except total area of gravel construction and mining actions = approximately 1,356 acres for Sub-Alternative D-1, and approximately 674 acres for Sub-Alternative D-2.</p>	<p>CPAI Development: Same types of impacts as Alternative A. Similar magnitude of gravel construction and mining actions as Alternative A. Total area of land affected by gravel construction and mining actions = 316 acres.</p>

GEOLOGY
ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON GEOLOGY

Under either development scenario, the irreversible and irretrievable commitment of petroleum hydrocarbon resources constitutes a major impact, however petroleum hydrocarbon production is the purpose of the project. Impacts to bedrock under either the Alternative A – CPAI Development Plan or Alternative A – FFD would be negligible.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON GEOLOGY

ALTERNATIVE B	ALTERNATIVE C (INCLUDES C-1 AND C-2)	ALTERNATIVE D (INCLUDES D-1 AND D-2)	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A - FFD.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A - FFD.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A - FFD.</p>	<p>CPAI Development: Same as Alternative A.</p>

SOILS AND PERMAFROST
ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON SOILS AND PERMAFROST

Placement of fill on the tundra and construction and operation of roads represent the greatest impacts on Plan Area soils and permafrost, respectively. Impacts that increase heat flux to ice-rich permafrost can initiate thermokarst and compromise the integrity of overlying or adjacent infrastructure. Impacts to Plan Area soil and permafrost resources would be unavoidable and semipermanent.

Alternative A would place gravel or ice over 1,757 acres of soil, disturb 2.0 million cubic yards of soil through gravel excavation and placement of infrastructure, and thermally impact 1,152 acres of tundra. The surface area of soil affected both directly and indirectly under Alternative A represents 0.2 percent of the total Plan Area.

FFD would place gravel or ice over 4,195 acres of soil and disturb 8.8 million cubic yards of soil through gravel excavation and placement of infrastructure. The surface area of soil affected both directly and indirectly under Alternative A FFD represents 0.5 percent of the total Plan Area.

ALTERNATIVES B, C, D, AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON SOILS AND PERMAFROST

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Direct and indirect impact types similar to Alternative A. Lesser magnitude of road construction impacts.</p> <p>Surface area of soil disturbed = 1,556 acres.</p> <p>Volume of soil disturbed = 1.6 Mcy</p> <p>Percent of Plan Area disturbed = 0.2%</p> <p>FFD: – Direct and indirect impact types similar to Alternative A – FFD. Lesser magnitude of road construction impacts.</p> <p>Surface area of soil disturbed = 4,085 acres</p> <p>Volume of soil disturbed = 7.6 Mcy</p> <p>Percent of Plan Area disturbed = 0.5%</p>	<p>CPAI Development: Direct and indirect impact types similar to Alternative A. Greater magnitude of gravel excavation and road construction impacts.</p> <p>Surface area of soil disturbed = 1,993 acres (C-1) and 1,979 acres (C-2)</p> <p>Volume of soil disturbed = 2.2 Mcy (C-1) and 2.2 Mcy (C-2)</p> <p>Percent of Plan Area disturbed = 0.2% (C-1) and 0.2% (C-2)</p> <p>FFD: Direct and indirect impact types similar to Alternative A – FFD. Greater magnitude of gravel excavation and road construction impacts.</p> <p>Surface area of soil disturbed = 4,638 acres</p> <p>Volume of soil disturbed = 8.8 Mcy</p> <p>Percent of Plan Area disturbed = 0.5%</p>	<p>CPAI Development: Direct and indirect impact types similar to Alternative A. Minimal gravel road construction impacts, greater ice road construction impacts.</p> <p>Surface area of soil disturbed = 2,145 acres (D-1) and 602 acres (D-2)</p> <p>Volume of soil disturbed = 1.8 Mcy (D-1) and 0.7 Mcy (D-2)</p> <p>Percent of Plan Area disturbed = 0.2% (D-1) and <0.1% (D-2)</p> <p>FFD: Direct and indirect impact types similar to Alternative A – FFD. Minimal gravel road construction impacts, greater ice road construction impacts.</p> <p>Surface area of soil disturbed = 13,457 acres (D-1) and 4,141 acres (D-2 construction would not be completed within the 25 year summary period)</p> <p>Volume of soil disturbed = 8.9 Mcy (D-1) and 4.5 Mcy (D-2)</p> <p>Percent of Plan Area disturbed = 0.2% (D-1) and 0.5% (D-2; does not account for the area of ice roads and pads)</p>	<p>CPAI Development: Direct and indirect impact types similar to Alternative A. Similar magnitude of road construction impacts.</p> <p>Surface area of soil disturbed = 1,845 acres.</p> <p>Volume of soil disturbed = 2.0 Mcy</p> <p>Percent of Plan Area disturbed = 0.2%</p>

SAND AND GRAVEL

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON SAND AND GRAVEL

Sand and gravel resources used for construction of roads, pads, or airstrips would only be available for reuse upon abandonment.

For Alternative A – CPAI, 2.0 million cubic yards of gravel fill is required; for FFD, 8.8 million cubic yards (cy) is required.

ALTERNATIVES B, C, D, AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON SAND AND GRAVEL

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Requires 1.6 Mcy of sand and gravel for use as fill for construction of roads, pads, or airstrips. Once used, sand and gravel resources could be available for reuse upon abandonment.</p> <p>FFD: Requires 7.6 Mcy of sand and gravel for use as fill for construction of roads, pads, or airstrips. Once used, sand and gravel resources could be available for reuse upon abandonment.</p>	<p>CPAI Development: Requires 2.2 Mcy of sand and gravel for Alternative C-1, and 2.2 Mcy of sand and gravel for Alternative C-2 for use as fill for construction of roads, pads, or airstrips. Once used, sand and gravel resources could be available for reuse upon abandonment.</p> <p>FFD: Requires 8.8 Mcy of sand and gravel for use as fill for construction of roads, pads, or airstrips. Once used, sand and gravel resources could be available for reuse upon abandonment.</p>	<p>CPAI Development: Requires 1.8 Mcy of sand and gravel for Alternative D-1, and 0.7 Mcy of sand and gravel for Alternative D-2 for use as fill for construction of roads, pads, or airstrips. Once used, sand and gravel resources could be available for reuse upon abandonment.</p> <p>FFD: Requires 8.9 Mcy of sand and gravel for Alternative D-1, and 4.5 Mcy of sand and gravel for Alternative D-2 for use as fill for construction of roads, pads, or airstrips. Once used, sand and gravel resources could be available for reuse upon abandonment.</p>	<p>CPAI Development: Requires 2.0 Mcy of sand and gravel for Alternative F for use as fill for construction of roads, pads, or airstrips. Once used, sand and gravel resources could be available for reuse upon abandonment.</p>

PALEONTOLOGICAL RESOURCES

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON PALEONTOLOGICAL RESOURCES

Surface activities such as construction of pad, road, and airfield embankments are not likely to affect paleontological resources. Impacts could result from those activities involving subsurface disturbance such as sand and gravel mining. Gravel mining would cover 65 acres for Alternative A – CPAI, and 346 acres for Alternative A – FFD.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON PALEONTOLOGICAL RESOURCES

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Less chance for subsurface disturbance due to 28 fewer acres of gravel mining than Alternative A.</p> <p>FFD: 59 fewer acres affected than Alternative A – FFD.</p>	<p>CPAI Development: More chance for subsurface disturbance due to 21 (C-1 and C-2) more acres of gravel mining than Alternative A.</p> <p>FFD: 19 more acres affected than Alternative A – FFD.</p>	<p>CPAI Development: Less chance for subsurface disturbance due to 14 (D-1) and 43 (D-2) fewer acres of gravel mining than Alternative A.</p> <p>FFD: 91 (D-1) and 217 (D-2) fewer acres affected than Alternative A – FFD.</p>	<p>CPAI Development: Same as Alternative A. No FFD proposed.</p>

S.4.2.2 Aquatic Environment**WATER RESOURCES****ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON WATER RESOURCES**

Specific localized deep groundwater zones would be affected by the practice of disposing of drilling wastes and wastewater into development or disposal wells; however, because groundwater below permafrost is typically saline, impacts to potable water sources are not expected. Although very local in extent, shallow thawed water-bearing zones may be enlarged or eliminated during the construction, operation, and rehabilitation of any gravel mine. Although rehabilitation would include allowing natural flows to fill the mine site excavation, the subsurface water-bearing zone would be permanently eliminated.

Adequate monitoring and adherence to pumping regulations would limit lake-water level impacts to short-term duration. In general, impacts on lake-water levels are not expected because natural annual recharge processes are sufficient to fully recharge the lakes each year. Demands of FFD on the water supply would be approximately four to five times that associated with the applicant's proposed development plan.

The potential exists to create fish habitat by reclaiming gravel mines used for this project if the mines are sufficiently near waterways. However, the existing ASRC Mine Site was not designed with post-operational fish habitat creation in mind; converting the pits into fish habitat was deemed not feasible during the site's original permitting and thus is not part of its multi-agency/industry-approved rehabilitation plan. The proposed mining and rehabilitation plan for Clover focuses on the creation of waterbird resting, feeding, and nesting habitat.

Rivers and creeks could be affected if construction and operation activities associated with roads, pads, and pipelines block, divert, impede, or constrict flows. Blockage or diversions to areas with insufficient flow capacity can result in seasonal or permanent impoundments. Constricting flows can result in increased stream velocities and a higher potential for ice jams, ice impacts, scour, and streambank erosion. Impeding flows can result in a higher potential for bank overflows and floodplain inundation. Because the pad, road, and pipeline locations are not near the coast, no impacts to the physical conditions or processes within the estuarine and nearshore environment are expected.

For both the CPAI Development Plan and the FFD scenarios, the likelihood of failure of pipeline, road, and facility structures associated with ice conditions is possible but minimized considerably by conservative designs. The total freshwater requirement is 713 million gallons for CPAI and 1,471 million gallons for FFD.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON WATER RESOURCES

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A, except that CD-6 and gravel roads associated with CD-2, CD-5, and CD-6 would be eliminated, minimizing (when compared to Alternative A) the potential impacts to water resources along these segments. Total freshwater requirement = 691 million gallons.</p> <p>FFD: Same as CPAI except that HPF-1, HP-1, HP-16, and HP-17 and associated road would be moved away from the Fish-Judy Creek 3-mile setback. Conformance with the Teshekpuk Lake Surface Protection Area would eliminate HP-22, reducing impacts to water resources near the Kogru River. Ice road construction would require up to approximately 195 acre-feet of water to be withdrawn from lakes. The lengths of ice roads to be constructed would be greater than in Alternative A. Total freshwater requirement = 1,671 million gallons.</p>	<p>CPAI Development: Same as Alternative A, except the road to CD-3 could have adverse effects on the peak water surface elevations. In addition, the road could be affected by storm surges related to elevated sea levels offshore. Elimination of the road-bridge over the Nigliq Channel would reduce impacts in Alternative C-2. Total freshwater requirement for C-1 and C-2 = 736 million gallons.</p> <p>FFD: Same as CPAI except overall impacts to water resources would be more extensive to streams and creeks for road and pipeline crossings because of the proposed expansion of the gravel road system. Overall impacts to lakes (i.e. from water supply) would be similar to Alternative A. Total freshwater requirement = 1,436 million gallons.</p>	<p>CPAI Development: Same as Alternative A, except elimination of gravel roads would reduce the overall impacts to water resources (e.g., fewer impacts to streams and rivers resulting from reduced road and pipeline crossings, fewer impacts to shallow subsurface waters from reduced gravel supply requirements), ice road construction would increase, creating an increased demand for water. The ability to spread out water extraction to other permitted lakes, and natural annual recharge volumes, would result in negligible impacts to lakes. Total freshwater requirement D-1 = 866 million gallons, D-2 = 905 million gallons.</p> <p>FFD: Same as CPAI except the lengths of ice roads to be constructed would be approximately 79% greater than with Alternative A. Ice road construction would require up to approximately 670 ac-ft of water to be withdrawn from lakes. Total freshwater requirement for D-1 = 5,324 million gallons, D-2 = less than D-1; total estimated.</p>	<p>CPAI Development: Same as Alternative A. Rerouting of the CD-4 road would minimize impacts to a nearby lake. Provisions for culvert criteria would reduce impoundment of waters as compared to Alternative A. Longer bridge spans could reduce flow restriction and related erosion and shoaling. Total freshwater requirement = 661 million gallons.</p>

SURFACE WATER QUALITY
ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON SURFACE WATER QUALITY

Potential surface water quality impacts for the CPAI Development Plan fall into three general source categories: accidental release of fuels and other substances (including oil spills), which could occur during both the construction and operation periods; reductions in dissolved oxygen and changes in ion concentrations in lakes used for water supply, which would occur mainly during construction but could also happen during operations; and increases in terrestrial erosion and sedimentation causing higher turbidity and suspended solids concentrations, which could occur during both the construction and operational periods.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON SURFACE WATER QUALITY

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE D
<p>CPAI Development: Would have fewer sources of potential impacts to surface water quality than Alternative A, due to the movement of several production facilities outside sensitive resource areas and reduction in total miles of roads to be constructed. Facilities would be located farther from water bodies compared to Alternative A, reducing the chance of accidental releases migrating into a nearby water body. Reduced potential for dust fallout and upslope impoundments compared to Alternative A would result in fewer incidences of turbidity impacts.</p> <p>FFD: Same as CPAI. Also includes a reduction in facilities to accommodate stipulations.</p>	<p>CPAI Development: Would have more sources of potential impacts to surface water quality than Alternative A because of the increased roads, requiring more gravel placement. Increased miles of ice roads compared to Alternative A, would raise the chance that ice roads would be routed across lakes, potentially affecting dissolved oxygen concentrations. More area potentially affected by thermokarst erosion, dust fallout, and upslope impoundments compared to Alternative A, leading to more impacts to water quality from increased turbidity.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Would have fewer sources of potential impacts to surface water quality than Alternative A because of the decreased gravel placement. Increased miles of ice roads compared to Alternative A, resulting in increased water withdrawal and increased potential that ice roads would be routed across lakes, potentially affecting dissolved oxygen concentrations. Less area potentially affected by thermokarst erosion compared to Alternative A, reducing the potential for turbidity impacts caused by erosion and sedimentation. Minimal potential for dust fallout and upslope impoundments compared to Alternative A, resulting in less potential for turbidity impacts.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Would have more sources of potential impacts to surface water quality than Alternative A because of the increased roads. Increased miles of ice roads compared to Alternative A would raise the chance that ice roads would be routed across lakes, potentially affecting dissolved oxygen concentrations. More area potentially affected by thermokarst erosion, dust fallout, and upslope impoundments compared to Alternative A, leading to increased turbidity impacts.</p>

S.4.2.3 Atmospheric Environment

CLIMATE AND METEOROLOGY

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON CLIMATE AND METEOROLOGY

Greenhouse gas (GHG) emissions would occur during construction and drilling activities from operation of fossil fuel combustion equipment. Because construction would not occur at a single location for any significant length of time, the impact of these GHG emissions at any single location would be minor and short term. GHG emissions would also occur over a longer period from operation of the CPAI and FFD. However, GHG generated from construction, drilling, and operational activities should have a minimal effect upon the air quality of the region.

ALTERNATIVES B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON CLIMATE AND METEOROLOGY

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A – FFD.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A – FFD.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A – FFD.</p>	<p>CPAI Development: Same as Alternative A.</p>

AIR QUALITY

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON AIR QUALITY

Construction impacts would contribute air emissions to the regions but would be short-term and transient in nature and would not have a lasting impact to air quality. Aircraft landings and takeoffs would occur in all phases of CPAI and FFD, predominately during construction. Air impacts from aircraft trips, which would also be short-term and transient, would have a negligible impact on air resources. The project would not emit consequential air pollutants under normal drilling and operating conditions. Impacts from FFD would be more substantial because of the addition of two HPFs.

ALTERNATIVES B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON AIR QUALITY

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
CPAI Development: Same as Alternative A. FFD: Same as Alternative A – FFD.	CPAI Development: Same as Alternative A. FFD: Same as Alternative A – FFD.	CPAI Development: Same as Alternative A. FFD: Same as Alternative A – FFD.	CPAI Development: Same as Alternative A.

NOISE

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON NOISE

During peak periods of construction and drilling, noise levels would be considerably higher than during operations, but would be short-term and would not occur for all proposed production pads at the same time. There are no residences within several miles of any production pad proposed by CPAI. Noise impacts would be minor, unless future development was close to Nuiqsut.

ALTERNATIVES B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON NOISE

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
CPAI Development: Same as Alternative A. FFD: Same as Alternative A – FFD.	CPAI Development: Same as Alternative A. FFD: Same as Alternative A – FFD.	CPAI Development: Same as Alternative A. FFD: Same as Alternative A – FFD.	CPAI Development: Same as Alternative A.

S.4.3 Biological Environment

S.4.3.1 Terrestrial Vegetation and Wetlands

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON TERRESTRIAL VEGETATION AND WETLANDS

Under Alternative A, a total of approximately 306 acres of vegetation would be covered with gravel fill or removed for mining for the construction of CPAI's proposed well pads, connecting roads, an airstrip, a floating dock and access road, and a boat ramp and access road. Gravel extraction for Alternative A would result in a permanent loss of tundra habitat while the mine sites are active and an alteration from tundra to aquatic habitat when the gravel sites are reclaimed. Potential indirect impacts from dust, gravel spray, snow accumulation, impoundments, and thermokarst would result in alteration of approximately 1,152 acres of tundra vegetation.

Construction of temporary ice roads and subsequent use may disturb underlying vegetation. Shrubs, forbs, and tussocks may be damaged and occasionally killed. Compaction of tundra vegetation by ice roads and associated gravel hauling and other construction activities can affect tundra habitats for several years by crushing tussocks. In addition to ice roads, ice pads would be used as staging areas during pipeline and bridge construction. Ice pads may also be used to stockpile overburden material associated with the ASRC Mine Site. Approximately 1,816 acres of vegetation would be disturbed by temporary ice roads and pads under Alternative A.

In the Colville River Delta portion of the Plan Area, the highest surface area impacts would be to Wet Sedge Meadow vegetation (211 acres lost or altered; 0.5 percent of available in the area) and Patterned Wet Meadow habitat (150 acres lost or altered; 0.5 percent of available in the area). In the National Petroleum Reserve-Alaska portion of the Plan Area, the highest surface area impacts are to Tussock Tundra vegetation (581 acres lost or altered; 0.3 percent of available in the area) and Moist Tussock Tundra habitat (581 acres lost or altered; 1.2 percent of available mapped habitat in the area) (Tables 4A.3.1-1 and 4A.3.1-2).

Under Alternative A – FFD, approximately 1,608 acres of tundra vegetation would be lost by gravel fill and extraction associated with roads, pads, airstrips, and gravel mines; and 8,237 acres would be altered or disturbed by ice roads, dust, gravel spray, snow accumulation, impoundments, and thermokarst.

ALTERNATIVES B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON TERRESTRIAL VEGETATION AND WETLANDS

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: 241 acres covered by gravel fill and mining, 2,116 acres altered by indirect impacts.</p> <p>In the Colville River Delta, the highest surface area impacts would be to Wet Sedge Meadow Tundra vegetation (0.4%) In the National Petroleum Reserve-Alaska portion of the Plan Area, the highest surface area impacts are to Tussock Tundra vegetation (0.1%).</p> <p>FFD: Approximately 1,336 acres would be covered by gravel fill and mining, 9,031 acres altered by indirect impacts</p>	<p>CPAI Development: For Alternative C-1: 409 acres covered by fill and mining, 3,647 acres altered by indirect impacts.</p> <p>In the Colville River Delta, the highest surface area impacts would be to Wet Sedge Meadow Tundra vegetation (1.1%). In the National Petroleum Reserve-Alaska portion of the Plan Area, the highest surface area impacts are to Tussock Tundra vegetation (0.4%).</p> <p>For Alternative C-2: 410 acres covered by gravel fill and mining, 3,695 altered by indirect impacts. The highest surface area impacts would be to Tussock Tundra vegetation (0.5%).</p> <p>FFD: Approximately 1,590 acres would be covered by gravel fill and mining, and 9,725 acres would be altered by indirect impacts.</p>	<p>CPAI Development: For Alternative D-1: 272 acres covered by gravel fill and mining, and 2,501 acres altered by indirect impacts.</p> <p>In the Colville River Delta, the highest surface area impacts would be to Wet Sedge Meadow Tundra vegetation (0.7%). In the National Petroleum Reserve-Alaska portion of the Plan Area, the highest surface area impacts are to Tussock Tundra vegetation (0.1%).</p> <p>For Alternative D-2: 93 acres covered by gravel fill and mining, and 784 acres altered by indirect impacts.</p> <p>FFD: Approximately 1,356 (D-1) and 674 (D-2) acres would be covered by gravel fill and mining, and 13,829 (D-1) and 3,921 (D-2) would be altered by indirect impacts;</p>	<p>CPAI Development: 316 acres covered by gravel fill and mining, 3,150 acres altered by indirect impacts.</p> <p>In the Colville River Delta, the highest surface area impacts would be to Wet Sedge Meadow Tundra vegetation (0.6%). In the National Petroleum Reserve-Alaska portion of the Plan Area, the highest surface area impacts would be to Tussock Tundra vegetation (0.3%).</p>

S.4.3.2 Fish

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON FISH

Primary impacts of concern are those that affect winter habitat, as well as those affecting feeding and spawning areas and access to these areas. Water withdrawal for winter construction may create overcrowding and reduce the available pool of dissolved oxygen in a water body, possibly resulting in fish mortality. Permit limits on amounts of water withdrawn are set to avoid such impacts. Gravel mining could have adverse effects on fish if located within the floodplains of rivers. Sedimentation from erosion could affect fish and other aquatic organisms by interfering with respiration and vision and by smothering benthic habitat. Proper siting to avoid natural over-wintering and spawning areas and major river channels could easily minimize this problem.

As designed, the bridge approaches at the Nigliq Channel, other major Colville River channels, and the Ubluoch River extend into the floodplain terraces, and thus would alter flow during flood stages. Funneling and the accompanying increased flow rates in years of unusually high flooding could affect fish movement. The effect on fish movements and migrations would be temporary and intermittent and not likely to have a long-term impact. Scouring around bridge piers may cause sedimentation and alteration of salinity regimes, in turn displacing fish to other habitats. Low dissolved oxygen may also result from suspension of oxygen-demanding materials during construction of the Nigliq Channel bridge.

The long network of roads could result in alteration of regional surface hydrology, including interruption of fish movements. If culverts fail, water may be impounded during periods of high flow upstream of the passage, thereby increasing flow velocity within and downstream of the structure. Stream morphology changes may occur downstream of culverts as a result of altered flow.

Construction of ice roads or airstrips on fish over-wintering areas may cause freezing to the bottom and block fish movement if state requirements to maintain fish passage are not met. The new road system —ice roads in the winter and gravel roads in the summer — may facilitate increased human access to fishing areas, potentially increasing subsistence fishing pressures.

The potential impacts described above, should they occur, are likely to be localized and temporary and thus would have negligible effects on fish populations within and adjacent to the Plan Area. Careful planning, appropriate engineering specification and design, and rigorous safety measures should minimize impacts and ensure the reproductive sustainability of stocks overall. Localized impacts could pose a more serious threat to localized (e.g., within a single drainage) stocks if they were to occur in or near prime spawning, nursery, or over-wintering sites.

Types of impacts of future FFD in the Plan Area generally would be similar to those described for the five-pad CPAI proposed development. However, development on the scale postulated could, depending on precise siting, destroy or alter fish habitat substantially more than CPAI's proposed plan. Over-wintering, rearing, migration, and spawning habitats would be affected.

The primary Essential Fish Habitat (EFH) concerns include potential effects on salmon associated with water withdrawal, alteration of flow patterns (for example, by bridge approaches in floodplains), release of contaminants, project-induced erosion, and oil spills. Salmon would not be expected to be present in the Nigliq Channel in the winter; therefore, construction of the Nigliq Channel bridge would not be expected to affect EFH. Winter construction of the bridge across the Ubluoch River could impact chum or pink salmon if they use the immediate area for over-wintering or spawning.

ALTERNATIVES B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON FISH

ALTERNATIVE B	ALTERNATIVES C-1 AND C-2	ALTERNATIVES D-1 AND D-2	ALTERNATIVE F
<p>CPAI Development: No facilities would be within the 3-mile sensitive area around Fish Creek, thereby reducing the potential for impacts to this stream. Because the road system for Alternative B would be shorter than that for Alternative A, impacts would be on a smaller scale. Vehicle bridges across the Nigliq Channel and Ublutuoch River would not be constructed, thus eliminating concern for suspension of oxygen-demanding materials.</p> <p>FFD: Similar to CPAI but on a larger scale.</p>	<p>CPAI Development: Total water demands for Alternative C ice roads, and thus the potential for impact on fish, would be far greater than for Alternative A because the length of roads in Alternative C is greater and power lines in Alternative C do not parallel roads. The road to CD-3 could divert floodwaters to the east across the Colville River Delta, subjecting fish to altered hydrological conditions. For Alternative C2: impacts of the pipeline-only bridge over the Nigliq Channel would be far less severe than those of the road and pipeline bridge for Alternative C1; and ice road water demands would be greater than for Alternative C1.</p> <p>FFD: Similar to CPAI but on a larger scale.</p>	<p>CPAI Development: Construction impacts would be less than for Alternative A because no roads are proposed, and the pipeline crossing of the Nigliq Channel would be accomplished by HDD. Length of ice roads, and thus potential impacts to fish, would be greater than for Alternative A.</p> <p>FFD: Similar to CPAI but on a larger scale.</p>	<p>CPAI Development: Similar to Alternative A except that bridges at the Nigliq Channel and Ublutuoch River would span main channels and floodplains to the secondary terraces and therefore have little effect on river flow during normal flood stages; potential impacts to Fish Creek drainage are reduced by substantially reducing lengths of road and pipeline within the 3-mile Fish Creek buffer zone; and potential fish passage impacts at Lake L9323 in Alternative A are mitigated by relocating the road to the east of the lake and crossing water bodies with bridges.</p>

S.4.3.3 Birds

ALTERNATIVES A, B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON BIRDS

Impacts to birds associated with construction and operation of the proposed development include habitat loss, alteration or enhancement; disturbance and displacement; obstructions to movement; and mortality. Additional impacts due to lost productivity are considered but not quantified by this analysis, including impacts due to increased nest depredation caused by increased predator populations. The estimated number of nests effected by habitat loss, alteration or disturbance for each alternative, was based on site specific nesting densities for bird species and species groups to compare alternative development scenarios. In most cases, effects would be localized, and no adverse effects to North Slope populations would be expected. CPAI Alternatives would reduce nesting by 2 percent or less for Plan Area waterfowl, loon, and seabird populations, and 1 percent or less for Plan Area shorebird and passerine populations. FFD Alternatives would reduce nesting by 2 to 8 percent for Plan Area waterfowl, loon and seabird populations and 2 percent or less for Plan Area shorebird and passerine populations. Habitat loss does not involve the direct loss of active nests because winter gravel placement, ice road construction, snow dumping, and snow drifting occurs when nests are not active. Most impacts would be initiated during the construction period, including gravel placement, grading of the gravel surface, placement of all facilities, and initial drilling. The results of effects of these activities on estimated bird production due to loss, alteration, or disturbance of nesting habitat are summarized in the following table.

Summary of Estimated Bird Nests Displaced by Habitat Loss or Alteration and Disturbance (by Alternative)

CPAI Alternative Totals							
Bird Group	Alt A	Alt B	Alt C-1	Alt C-2	Alt D-1	Alt D-2	Alt F
Waterfowl	77	91	78	81	102	38	79
Loons	10	9	10	10	12	5	10
Ptarmigan	3	5	5	5	9	3	4
Seabirds	13	11	14	15	14	5	13
Shorebirds	346	232	525	506	219	68	360
Passerines	206	132	305	298	121	38	215
Total Nests	655	480	937	915	477	157	681
FFD Alternative Totals							
Bird Group	Alt A	Alt B	Alt C	Alt D-1	Alt D-2		
Waterfowl	344	305	317	470	173		
Loons	43	39	40	59	22		
Ptarmigan	19	18	17	28	10		
Seabirds	69	60	64	93	33		
Shorebirds	1,514	1,258	1,717	1,061	357		
Passerines	941	772	1,050	627	211		
Total Nests	2,930	2,452	3,205	2,338	806		

S.4.3.4 Terrestrial Mammals

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON TERRESTRIAL MAMMALS

The Alternative A – CPAI Development Plan would change the habitats used by terrestrial mammals in several ways. Approximately 241 acres of undeveloped land would be covered with gravel fill and approximately 65 acres excavated to obtain the gravel. This is a small percentage of the land in the Plan Area. The amount of habitat types preferred by caribou, muskoxen, and moose that would be affected by this fill is a small proportion (less than 0.1 percent) of that available in the Plan Area. Alternative A would result in a small direct loss of terrestrial mammal habitat.

Construction and operations would cause some disturbance of terrestrial mammals. Disturbance could in turn displace mammals from preferred habitats. Noise and human activity associated with construction, industry vehicle traffic, aircraft traffic, and activity on facilities and pipeline routes during operations could disturb caribou, moose, muskoxen, and grizzly bears near infrastructure. This could cause animals to move away (be displaced) from infrastructure. Displacement is most likely early in the life of the project, because some habituation is likely over time. Disturbance of caribou (and probably also moose and muskoxen) is most likely for 2 to 3 weeks around the calving period in late May to early June. Because the CPAI Development Plan does not extend westward enough to include the primary calving areas of the Teshekpuk Lake Herd (TLH), as long as the calving range remains west of the development area, Alternative A would have little or no disturbance impact on calving caribou. During the summer post-calving period and winter, caribou are less sensitive to disturbance and would probably habituate to industry infrastructure and activity. However, access to the developed

area by local residents may considerably increase the amount of disturbance to caribou, moose, muskoxen, and grizzly bears during summer and winter if hunting is allowed.

There would be 26 miles of road/pipeline and an additional 10 miles of pipeline without a road under the Alternative A – CPAI Development Plan. Pipelines would be elevated 5 feet and separated from roads by more than 300 feet. This should allow passage of caribou and other terrestrial mammals. The road/pipeline combination may delay or deflect caribou crossing, especially if traffic levels are more than 15 vehicles per hour. If local hunting occurs on the roads, crossing may be impeded because of increased avoidance of human activity.

Mortality of terrestrial mammals directly caused by the Alternative A development would probably be limited to occasional road kills and defense of life and property (DLP) killing of bears. Hunting by local residents on the oilfield roads would increase the mortality of caribou and possibly of moose, muskoxen, and grizzly bears.

All of the impacts described above are relevant to individual animals. It is unlikely these impacts would have a negative impact at the population level. Past experience in existing North Slope oilfields shows that populations of terrestrial mammals (most notably caribou) have grown or remained stable since initiation of development. The inclusion of local access to, and possibly hunting in, the Alternative A development could cause disturbance and mortality that affects the population. However, the past harvest levels of caribou, muskoxen, and moose by the local community are a small enough proportion of the populations that negative impacts are unlikely if proper mitigation and regulations are enforced. In fact, harvest is a primary tool of wildlife managers, for example, to keep a population at a level compatible with available habitat. A positive aspect of increased hunter access is that it could allow more control over hunting harvest if managers would have more ability to increase harvest when necessary. However, the local residents typically choose not to hunt around developed areas.

Impacts from the Alternative A – FFD would have the same effects described for the CPAI Development Plan, but over a larger area. An exception is the potential for increased disturbance of calving caribou of the TCH in the northwestern part of the Plan Area.

ALTERNATIVES B, C, D, AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON TERRESTRIAL MAMMALS

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Approximately 204 acres of undeveloped lands that provide habitat for terrestrial mammals would be covered with gravel fill and 37 acres would be excavated to obtain gravel. Disturbance, obstruction of movements, and mortality impacts will be of less magnitude than in Alternative A because of the smaller amount of road/pipeline combinations, and associated lower levels of vehicle traffic. Disturbance and hunting mortality from local resident access would not occur since roads would be restricted to industry use.</p> <p>FFD: Similar to CPAI, but over a larger area.</p>	<p>CPAI Development: Approximately 323 acres for C-1 and 324 acres for C-2 of undeveloped lands that provide habitat for terrestrial mammals would be covered with gravel fill and 86 acres would be excavated to obtain gravel (C-1 and C-2). Disturbance, obstruction of movements, and mortality impacts would be of greater magnitude than in Alternative A because of the larger amount of road/pipeline combinations, and associated higher levels of vehicle traffic. Pipelines elevated to 7 feet would mitigate obstruction of movements. Disturbance and hunting mortality from local resident and other public access would occur. The potential impacts of hunting mortality described for Alternative A would occur to a greater extent in Alternative C because of the unrestricted public access.</p> <p>FFD: Similar to CPAI, but over a larger area.</p>	<p>CPAI Development: Approximately 221 acres for D-1 and 71 acres for D-2 of undeveloped lands that provide habitat for terrestrial mammals would be covered with gravel fill and 51 acres for D-1 and 22 acres for D-2 would be excavated to obtain gravel. Disturbance, obstruction of movements, and mortality impacts would be of lesser magnitude than Alternative A because of the lack of road/pipeline combinations, associated vehicle traffic, and elevation of pipelines to 7 feet. Disturbance and obstruction of movement at airstrips or helipads would occur. Disturbance and hunting mortality from local resident access via roads would not occur due to the absence of roads.</p> <p>FFD: Similar to CPAI, but over a larger area.</p>	<p>Approximately 251 acres of undeveloped lands that provide habitat for terrestrial mammals would be covered with gravel fill and 65 acres would be excavated to obtain gravel. Disturbance, obstruction of movements, and mortality impacts would be comparable to Alternative A. Pipelines elevated to 7 feet would mitigate obstruction of movements.</p>

S.4.3.5 Marine Mammals

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON MARINE MAMMALS

There would be limited impacts on marine mammals from the CPAI Development Plan because the project is onshore. Construction of, and traffic on, a bridge over the Nigliq Channel and other rivers could cause some disturbance of spotted seals and beluga whales. Aircraft traffic to and from the Plan Area could also disturb some marine mammals. Construction and operational noise in winter could disturb some denning polar bears.

Access by local residents could increase harvest of marine mammals, including seals in the rivers and nearshore Beaufort Sea. Hunting by local residents on the oilfield roads could increase the mortality of polar bears that are onshore. Mortality of polar bears directly caused by the Alternative A development could include occasional road kills and killing of bears in DLP.

The impacts described above are relevant to individual animals. It is unlikely these impacts would have a negative impact at the population level. Past experience in existing North Slope oilfields shows that populations of marine mammals have not been affected by onshore development. The inclusion of local access to, and possibly hunting in, the Alternative A development could cause disturbance and mortality that affects marine mammal populations. However, the past harvest levels of seals and polar bears by the local community are a small enough proportion of the populations that negative impacts are unlikely if proper mitigation and regulations are enforced. In fact, harvest is a primary tool of wildlife managers, for example, to keep a population at a level compatible with available habitat. A positive aspect of increased hunter access is that it could allow more con-

trol over hunting harvest if managers would have more ability to increase harvest when necessary. However, the local residents typically choose not to hunt around developed areas.

Impacts from Alternative A – FFD would have the same impacts described for the CPAI Development Plan but over a larger area.

ALTERNATIVES B, C, D, AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON MARINE MAMMALS

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Limited roads, including no road over the Nigliq Channel, suggest there would be less disturbance from vehicles and more disturbance from aircraft traffic than in Alternative A. There would not be access by local residents, so increased hunting harvest would not occur.</p> <p>FFD: Same as CPAI, but over a larger area.</p>	<p>CPAI Development: Impacts to marine mammals under Alternative C (Sub-Alternatives C-1 and C-2) would be similar to those in Alternative A. The road accompanying the pipeline between CD-1 and CD-3 could increase disturbance in that area. The unrestricted access to BLM lands could result in greater polar bear mortality from road kills and DLP kills. The pipeline only bridge over the Nigliq Channel with Sub-Alternative C-2 would reduce potential impacts (disturbance and hunter access) compared to Sub-Alternative C-1. The lack of road connection to CD1, CD2, CD3, and CD4 with Sub-Alternative C-2 would limit access to the northern Colville River Delta areas compared to Sub-Alternative C-1.</p> <p>FFD: Same as CPAI, but over a larger area.</p>	<p>CPAI Development: Alternative D would have minimal impacts on marine mammals because of the lack of roads and no local or public access. Noise from construction and increased air traffic could cause disturbance of marine mammals as described for Alternative A.</p> <p>FFD: Same as CPAI, but over a larger area.</p>	<p>CPAI Development: Impacts to marine mammals under Alternative F would be similar to those in Alternative A. Potential disturbance and mortality impacts would be comparable to Alternative A.</p>

S.4.3.6 Threatened and Endangered Species

BOWHEAD WHALE

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON BOWHEAD WHALE

Bowhead whales generally do not occur in the nearshore Beaufort Sea, north of the Plan Area. During spring and fall migrations, bowheads are far offshore in the lead system of the Beaufort Sea. Activities that would occur in the Plan Area under all CPAI alternatives would not affect the bowhead whale population, habitat, migration, foraging, breeding, survival and mortality, or critical habitat. In general, impacts from the Alternative A – FFD would be the same as those described for the CPAI Development Plan over a larger area. Under FFD, sealifts may be used to transport drilling or processing facilities. In this case, there is the potential for additional impacts to bowhead whales from vessels. If some whales do come into the nearshore environment, there could be some disturbance of bowheads from air traffic over the Beaufort Sea. However, altitude restrictions will minimize these impacts.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON BOWHEAD WHALE

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
CPAI Development: Same as Alternative A.			
FFD: Same as Alternative A.	FFD: Same as Alternative A.	FFD: Same as Alternative A.	

SPECTACLED EIDER
ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON SPECTACLED EIDER

Impacts to spectacled eiders associated with construction and operation of Alternative A – CPAI include habitat loss, alteration, or enhancement, disturbance and displacement, obstructions to movement, and mortality. Additional impacts due to lost productivity are considered but not quantified by this analysis, including impacts due to increased nest depredation caused by increased predator populations. Spectacled eiders occur in greater numbers near proposed developments in the Colville River Delta than in the National Petroleum Reserve-Alaska portion of the Plan Area. More spectacled eider nests would be affected at CD-3 than at the other four sites. The estimated number of nests effected by habitat loss, alteration and disturbance for each alternative, was based on site specific nesting densities for spectacled eiders to compare alternative development scenarios. In most cases, effects would be localized, and no adverse effects to North Slope populations would be expected. Alternative A – CPAI would affect an estimated 1.7 spectacled eider nests, reducing nesting by 4 percent for Plan Area spectacled eiders. Alternative A – FFD would affect an estimated 9.7 spectacled eider nests, reducing nesting by 22 percent for Plan Area spectacled eiders and less than 1 percent for the North Slope population. Less than 1 percent of available habitats in the Colville River Delta used by spectacled eiders for nesting (Aquatic Sedge with Deep Polygons and Nonpatterned and Patterned Wet Meadow) would be affected by gravel related impacts. Less than 1 percent of available habitats in the National Petroleum Reserve-Alaska used by spectacled eiders for nesting (Deep and Shallow Open Water with Islands, Old Basin Wetland Complex, and Patterned Wet Meadow) would be affected by gravel related impacts. Local road access to the Colville River Delta, the Fish Creek Delta, the Fish-Judy Creek area and the Kalikpik-Kogru River area from Nuiqsut could affect the amount of hunting mortality.

ALTERNATIVES B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON SPECTACLED EIDER

ALTERNATIVE B	ALTERNATIVE C1 AND C2	ALTERNATIVE D1 AND D2	ALTERNATIVE F
<p>CPAI Development: An estimated 1.9 nests would be affected by habitat loss, alteration, and disturbance. More displacement would be due to disturbance than to habitat loss and alteration. Less than 0.6% of available habitats in the Colville River Delta used by spectacled eiders would be affected by gravel fill related impacts. Less than 0.5% of available habitats in the National Petroleum Reserve-Alaska used by spectacled eiders would be affected. More nests would be affected at CD-3 than other four sites.</p> <p>FFD: An estimated 9.4 nests would be affected by habitat loss, alteration, and disturbance. 70% of displacement would be due to habitat loss, alteration, and disturbance in the Colville River Delta. Local road access to Fish Creek Delta from Nuiqsut could affect amount of hunting mortality.</p>	<p>CPAI Development: An estimated 0.9 nests would be affected by habitat loss, alteration, and disturbance for Alternative C1 and C2. More displacement would be due to habitat loss and alteration than to disturbance. Less than 1.5% of available habitats in the Colville River Delta used by spectacled eiders would be affected by gravel fill related impacts. Less than 0.5% of available habitats in the National Petroleum Reserve-Alaska used by spectacled eiders would be affected. More potential nests would be affected at CD-3 than other four sites. Local road access to lower Colville River Delta could affect amount of hunting mortality.</p> <p>FFD: An estimated 7.0 nests would be affected by habitat loss, alteration, and disturbance. 54% of displacement would be due to habitat loss or alteration in the Colville River Delta. Local access to Colville River Delta and National Petroleum Reserve-Alaska could affect amount of hunting mortality.</p>	<p>CPAI Development: For Alternative D-1; an estimated 2.0 nests would be affected by habitat loss, alteration, and disturbance. For Alternative D-2; an estimated 0.7 nests affected by habitat loss, alteration and disturbance. Most displacement would be due to disturbance (70% for D1, 85% for D2) rather than to habitat loss and alteration. Less than 1 % of available habitats in the Colville River Delta used spectacled eiders would be affected by gravel fill related impacts. Less than 0.5% of available habitats in the National Petroleum Reserve-Alaska used by spectacled eiders would be affected. More potential disturbance at CD-3 than other four sites.</p> <p>FFD: For Alternative D-1; an estimated 13.3 nests would be affected by habitat loss, alteration, and disturbance. For Alternative D-2; 4 an estimated 5.5 nests would be affected by habitat loss, alteration, and disturbance. Most displacement would be due to disturbance in the Colville River Delta.</p>	<p>CPAI Development: An estimated 1.7 nests would be affected by habitat loss, alteration and disturbance. More displacement would be due to disturbance (53%) than to habitat loss and alteration. Less than 0.7% of available habitats in the Colville River Delta used by spectacled eiders would be affected by gravel fill related impacts. Less than 0.6% of available habitats in the National Petroleum Reserve-Alaska used by spectacled eiders would be affected. More potential disturbance would occur at CD-3 than other four sites.</p>

STELLER’S EIDER

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON STELLER’S EIDER

In general, impacts to Steller’s eider potentially are the same as those described for the spectacled eider. However, the likelihood of impacts occurring to Steller’s eider is very small, even under FFD scenarios, because they occur very rarely in the Plan Area. There would be a loss of potential Steller’s eider habitat from the ASDP. Given the current distribution of Steller’s eider in the Plan Area, it is unlikely that any of the project alternatives would affect this species.

ALTERNATIVES B, C, D AND F – SUMMARY OF IMPACTS (CPAI AND FFD) ON STELLER’S EIDER

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Same as Alternative A.</p>

S.4.4 Social Systems

S.4.4.1 Socio-Cultural Characteristics

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON SOCIO-CULTURAL CHARACTERISTICS

For Nuiqsut, potential impacts to subsistence harvest and use may cause stress and change in community social organization. To the extent that they occur, these impacts would likely increase under Alternative A – FFD. Economic benefits are expected to occur as a result of Kuukpik and other corporate participation in construction and operations contracting. These economic benefits would likely be increased under FFD. No direct incremental impacts to community health and welfare concerns (crime, drug abuse, etc.) are expected as a result of the CPAI Development Plan or FFD. To the extent that changes in community social organization occur, changes in community health and welfare may also occur. These impacts, to the extent that they occur, are more likely to occur under FFD. Minimal employment of Nuiqsut residents during construction and operation is expected. Employment levels are not expected to increase under the FFD alternative. No change in the population growth rate is expected.

For Barrow, Atqasuk, and Anaktuvuk Pass, to the extent that subsistence hunters rely on subsistence-use areas in the Plan Area, there may be some effect on subsistence harvest. However, the extent of these impacts is likely to be small and not sufficient to affect community social organization. Under FFD, impacts to subsistence harvest and use are expected to be greater, increasing the potential that changes to community social organization could occur. Economic benefits are expected to occur as a result of village corporate participation in construction and operations contracting. The benefits are expected to be greater under FFD. No direct incremental impacts to community health and welfare concerns are expected as a result of the CPAI Development Plan or FFD. To the extent that changes in community social organization occur, changes in community health and welfare may also occur. These impacts, to the extent that they occur, are more likely to occur under FFD. Minimal employment of residents is expected during construction and operation under Alternative A – CPAI Development Plan or FFD. No change in the population growth rate is expected.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON SOCIO-CULTURAL CHARACTERISTICS

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A with the exception of a potential for reduced economic benefits.</p> <p>FFD: Same as Alternative A with the exception of a potential for reduced economic benefits.</p>	<p>CPAI Development: Same as Alternative A. Exceptions are the potential for increased local economic benefits and increased indirect community health and welfare impacts to the extent that they are caused by increased impacts to the subsistence harvest (resulting from connecting Nuiqsut to the project road system).</p> <p>FFD: Same as Alternative A. Exceptions are the potential for increased local economic benefits and increased indirect community health and welfare impacts to the extent that they are caused by increased impacts to the subsistence harvest (resulting from connecting Nuiqsut to the project road system).</p>	<p>CPAI Development: Same as Alternative A. Exceptions are changes in impacts related to subsistence harvest that could result from the general elimination of roads in the Plan Area.</p> <p>FFD: Same as Alternative A. Exceptions are changes in impacts related to subsistence harvest that could result from the general elimination of roads in the Plan Area.</p>	<p>CPAI Development: Same as Alternative A. Exceptions are lesser negative effects on subsistence harvest resulting from pipelines being elevated to 7 ft, and removal of road segments from Fish Creek buffer zone.</p>

S.4.4.2 Regional Economy

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON REGIONAL ECONOMY

An incremental increase in federal, state, and local tax revenues would occur. This increase would be approximately two to four percent (of 2001 revenues) for the NSB. It would be less than one percent of state tax revenues. Increased revenues under Alternative A – FFD could be 4.5 to 10 times the annual benefit estimated for the CPAI Development Plan, depending on production in any given year.

The NSB would benefit from the expanded property tax base that would help fund government services to residents. The NSB and village corporations also would receive benefits from increased economic activity in the region, increased opportunity for grants under the National Petroleum Reserve-Alaska Impact Mitigation Program, and from direct employment of local residents. As a result of this program, oil lease sale fees and royalties from the National Petroleum Reserve-Alaska have a disproportionately large effect on communities in the region.

There may be economic impacts to subsistence harvesting activities from Alternative A resulting from increased travel costs and increased travel times. The more densely developed FFD scenario for Alternative A would likely exacerbate these impacts.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON REGIONAL ECONOMY

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A except for a potential reduction of between 10 and 30 percent in production from CD-6 caused by moving the drill pad outside the 3-mile setback for Fish Creek, which would result in an overall reduction of 4.15 percent of the total production from CD-3 through CD-7. The economic benefits from the Alternative B – CPAI Development Plan would be reduced by this factor.</p> <p>FFD: Same as Alternative A except the production scenario must be adjusted to eliminate production from HP-10, HP-19, and HP-22 to comply with stipulations.</p> <p>Applying this change to FFD production estimates would result in an overall production from 2008 through 2055 that is 16 percent lower than the production estimate for Alternative A.</p>	<p>CPAI Development: Same as Alternative A, although a road connection to Nuiqsut could facilitate greater employment for local residents.</p> <p>FFD: Same as Alternative A, although a road connection to Nuiqsut could facilitate greater employment for local residents.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A.</p>	<p>CPAI Development: Same as Alternative A.</p>

S.4.4.3 Subsistence Harvest and Uses

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON SUBSISTENCE HARVEST AND USES

Effects from construction and operation would be expected to last for the lifetime of the applicant's proposed action and are expected to be primarily local in extent for the CPAI Development Plan and regional in extent for the FFD Scenario. Construction and operation would affect availability of key subsistence resources because of deflection or displacement of these resources from customary harvest locations. Access to subsistence resources would be affected by the perception of regulatory barriers; the reluctance to hunt and shoot firearms near industrial facilities, including pipelines; raised road berms; pipelines with snowdrifts in winter that hinders passage; and a preference for animals not habituated to industrial development. Indirect effects would include hunters who go to another area, which would result in increased effort, cost, and risks associated with traveling farther. If hunters travel to other areas, they would not go to traditional subsistence places as often.

The FFD scenario would affect key subsistence resources (caribou, fish, waterfowl, wolf, wolverine, and geese) and would occur in seasonal and concentrated subsistence-use areas (the Colville River Delta and the Fish and Judy Creeks area) for these key subsistence resources. Nuiqsut residents, as well as residents of other North Slope communities, have harvested and used resources in these specific areas for multiple generations and currently harvest multiple resources during several seasons each year in these areas. Effects from construction and operation would occur in key geographic areas relative to other areas of subsistence availability and would pertain to Nuiqsut individual subsistence users, groups of users, and the overall pattern of community subsistence uses. Competition for key resources among Nuiqsut, Anaktuvuk Pass, Barrow, and Atqasuk would increase if Nuiqsut hunters expand from traditional subsistence-use areas close to Nuiqsut to farther outlying areas. Potential effects of FFD on Barrow and Atqasuk hunters include increased competition for furbearers as Nuiqsut residents move west to avoid industrial development. The location of the FFD approaches areas used regularly by Barrow hunters for furbearers and caribou. If Nuiqsut hunters continue to move west and south, they could conflict with hunters from other communities. Nuiqsut has development east and north of the community. The primary areas for expansion are south (Anaktuvuk Pass) and west (Barrow and Atqasuk). Barrow hunters already encounter Nuiqsut hunters in the current Barrow subsistence-use area. Atqasuk residents harvest most resources near Atqasuk. Furbearer hunters, who also harvest incidental caribou, travel the farthest from Atqasuk. They are most likely to experience any effects of the area in the FFD scenario because of competition between communities if Nuiqsut hunters move farther west.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON SUBSISTENCE HARVEST AND USES

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Moving CD-6 and associated roads outside the Fish Creek 3 mile buffer zone and elimination of the Nigliq Channel road bridge would decrease potential impacts to subsistence uses in the area; other impacts would be the same as those for Alternative A.</p> <p>FFD: FFD facilities would not be placed within 3 miles of Fish-Judy Creek, reducing impacts to a key subsistence-use area. Other impacts would be similar to CPAI.</p>	<p>CPAI Development: In addition to impacts of Alternative A, roads and pipelines would be located closer to Nuiqsut. The road connecting Nuiqsut to the development area would provide increased vehicle access to subsistence resources resulting in increased competition for subsistence resources if more hunting efforts are focused on the road corridor. At the same time, vehicular traffic on the roads would result in local deflection/disturbance of terrestrial mammals near the roads, and thus reduce subsistence availability of resources. Unrestricted road access to BLM lands would eventually provide increased access for people who do not live in the area and increase competition for resources.</p> <p>FFD: Same as CPAI, plus the road network connecting Nuiqsut to 17 of the 24 new locations and all 5 CPAI-proposed drilling and production pads would provide summer access to areas generally reachable only by boat in summer, and would likely change current subsistence use patterns.</p>	<p>CPAI Development: Less impact than Alternative A due to less road traffic that would affect resource availability by associated disturbances. A pipeline clearance of 7 feet would be less restrictive to subsistence users. Other impacts would be similar to Alternative A.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Moving road segments outside the Fish Creek 3 mile buffer zone would decrease potential impacts to subsistence uses in the area. A pipeline clearance of 7 feet would be less restrictive to subsistence users. Other impacts would be similar to Alternative A.</p>

S.4.4.4 Environmental Justice

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON ENVIRONMENTAL JUSTICE

The most prevalent impacts are the potential direct and indirect impacts related to subsistence harvest and use. Other impacts identified as potentially disproportionate include spill impacts, potential water quality, air quality, and aircraft noise impacts.

Impacts to subsistence harvest and use would arise from impacts to the availability of subsistence species in traditional use areas or a decrease in subsistence hunting success. The reduction in subsistence hunting success in turn would reduce the availability of Native foods to the community. Since the Native community is the only community that depends to a significant degree on Native foods, this impact, to the extent that it occurs, falls disproportionately on the Native population. Also, displacement of subsistence hunters from traditional subsistence-use areas by oil industry facilities also would result in greater time spent traveling longer distances to other subsistence use areas. It could also result in local hunters from Nuiqsut competing with hunters from other villages when using the same traditional subsistence-use areas.

The analysis of spill impacts shows that very small and small spills are unlikely to have long-term, extensive impacts that would affect water quality, habitat, or subsistence species. Larger spills that are more likely to have more extensive impacts have a very low probability of occurrence. Spill impacts, to the extent that they occur, would be episodic, not continuous. Local residents have shown a propensity to avoid resources from areas where spills have occurred because of a lack of confidence that subsistence resources have not been contaminated. This lack of confidence may affect subsistence use for a period beyond the time when any resources affected from spills would actually persist. Impacts to water quality can occur as a result of spills or construction-induced erosion.

Air quality in Nuiqsut already meets national ambient air quality standards for all criteria pollutants. Short-term episodes of elevated particulate concentrations have been observed at Nuiqsut and are caused by wind-borne dust. Emissions from natural gas flaring (incidental) and equipment operation are not expected to contribute to the chronic exposure of local residents to particulate.

Low-level aircraft noise is expected to be limited to areas surrounding facility airstrips. However, helicopter operations, which are typically at lower altitudes, can range over a larger area as these aircraft move between different facility locations. Subsistence hunters have reported the interruption of hunts in progress by low-flying aircraft, especially helicopters.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON ENVIRONMENTAL JUSTICE

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Same as Alternative A, except relaxation of access restrictions limitations that would increase public access to BLM lands and may increase competition for subsistence resources.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Same as Alternative A, except reduction in the use of roads between facilities incorporated in Alternative D could reduce the potential for impacts to subsistence harvest in Nuiqsut traditional use areas. However, increased use of aircraft to serve these facilities could have some limited offsetting noise impacts.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: Same as Alternative A.</p>

S.4.4.5 Cultural Resources

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON CULTURAL RESOURCES

Under the Alternative A – CPAI Development Plan, cultural resources are situated in the vicinity of the production pads, the road/pipeline right of way (ROW), and the ASRC Mine Site. Under Alternative A – FFD, cultural resources are located in each of the three facility groups and the ROWs. Any project facility or pad within 1/4 mile of a cultural resource could result in direct effects including damage to or destruction of the resource during construction of the proposed well pad. Under Alternative A – CPAI, one cultural resource is less than 1/4 mile from the CD-4 production pad, and one cultural resource is less than 1/4 mile from the ASRC Mine Site. Under Alternative A – FFD, cultural resources are within the affected areas of production pads HP-5, HP-8, HP-13, and HP-14 and ROWs HP-8 to HP-6 in the Colville River Delta Facility Group; production pads HP-1, HP-2, HP-3, and HP-11 and HPF-1 in the Fish-Judy Creeks Facility Group; and HP-22 and ROWs HP-21 to HP-22 and HP-20 to HPF-2 in the Kalikpik-Kogru Rivers Facility Group. The HP-8 to HP-6 ROW extends through the village of Nuiqsut, and one cultural resource is less than 1/4 mile from the HP-21 to HP-22 ROW. Indirect effects would include damage to the resource caused by inadvertent oil spills, and subsequent cleanup activities. The integrity of subsurface, surface, and aboveground cultural resources could be significantly affected by con-

struction activities. Unknown or undocumented cultural resources may be situated in the proposed ROWs or footprints of Alternative A and FFD components.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON CULTURAL RESOURCES

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A, although there would be less risk of impacts to unknown resources because less gravel would be excavated.</p> <p>FFD: Same as Alternative A - FFD, except that HP-22 would not be constructed and therefore would not have potential to affect cultural resources and because there would be less risk to unknown resources as less gravel would be excavated.</p>	<p>CPAI Development: Same as Alternative A, although there would be more risk of impacts to unknown resources because more gravel would be excavated</p> <p>FFD: Same as Alternative A - FFD, although there would be more risk of impacts to unknown resources because more gravel would be excavated</p>	<p>CPAI Development: Same as Alternative A, except the absence of roads would eliminate potential impacts to cultural resources associated with road construction and there would be less risk of impacts to unknown resources because less gravel would be excavated.</p> <p>FFD: Same as Alternative A - FFD, except the absence of roads would eliminate potential impacts to cultural resources associated with road construction and there would be less risk of impacts to unknown resources because less gravel would be excavated.</p>	<p>CPAI Development: Same as Alternative A</p>

S.4.4.6 Land Uses and Coastal Zone

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON LAND USES AND COASTAL ZONE

Construction and operation of Alternative A is not anticipated to result in adverse effects to existing land uses and ownership. A direct impact, however, would be a nearly 300 percent increase in the acres developed for oil production within the Plan Area. Additional impacts of concern for Alternative A to special use areas include the construction and operation of facilities within the designated Fish Creek buffer zone. Construction of CD-6 and associated roads and pipeline requires approval of minimal development within Fish Creek buffer zone. CPAI would have to obtain a waiver of the no permanent facilities restriction from BLM. Approval for minimal development within Fish Creek buffer zone would be necessary for CPAI to implement the proposed plan. The FFD of a production pad and associated pipeline in the area near the Kogru River designated for no surface activities would require an exemption from the surface use restrictions for this area. It also would require approval for additional development within the Fish Creek buffer zone, Sensitive Consultation areas, and the special caribou stipulation area. Coastal and land management developments are not anticipated to have adverse effects. Under the NSB Land Management Regulations (LMR), however, the rezoning of non-federal land from “Conservation” to “Resource Development” would be required for implementation of CPAI’s proposed development plan. Application of the NSB’s land management regulations to federal lands is subject to legal constraints and therefore must be evaluated on a case-by-case basis as particular activities.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON LAND USES AND COASTAL ZONE

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Would approximately double the total number of acres developed for oil production within the Plan Area. All facilities and construction would occur outside the Fish Creek buffer zone. Rezoning of non-federal land under the NSB LMR from "Conservation" to "Resource Development" would be required.</p> <p>FFD: Would place structures outside of buffer zones and areas where surface activities are restricted. This would also eliminate possible adverse effects on Special Use Areas. Rezoning of non-federal land under the NSB LMR from "Conservation" to "Resource Development" would be required.</p>	<p>CPAI Development: Same as Alternative A, except that it would nearly quadruple the total number of acres developed for oil production within the Plan Area.</p> <p>FFD: Same as Alternative A – FFD, except for an increased number of acres developed for oil production in the Plan Area.</p>	<p>CPAI Development: The increase in the total number of acre developed would be less than that of other alternatives due to the absence of roads. Construction of CD-6 and associated roads and pipeline requires wavier of BLM stipulation for development within Fish Creek buffer zone. Rezoning of non-federal land under the NSB LMR from "Conservation" to "Resource Development" would be required.</p> <p>FFD: Same as Alternative A - FFD, except for a smaller number of acres developed for oil production in the ASDP Area.</p>	<p>CPAI Development: The total number of acres developed would be nearly the same as Alternative A.</p>

S.4.4.7 Recreation

ALTERNATIVE A – SUMMARY OF IMPACTS ON RECREATION

Construction and operation of the facilities proposed under Alternative A – CPAI and Alternative A – FFD in the Plan Area are not expected to result in adverse effects to recreational resources.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON RECREATION

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A.</p>	<p>CPAI Development: Same as Alternative A.</p> <p>FFD: Same as Alternative A.</p>	<p>CPAI Development: Same as Alternative A.</p>

S.4.4.8 Visual Resources

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON VISUAL RESOURCES

Under Alternative A – CPAI and Alternative A – FFD, construction and operation would result in adverse impacts to visual resources. The presence of drill rigs would be the most noticeable effect of construction. Other activities such as pad and road construction would have negligible impacts because the construction activities would occur in the winter when viewer sensitivity is not an issue. In addition, the facilities and structures associated with operation would introduce contrast with the natural landscape. When viewed from the foreground-middleground zone, these structures would produce a strong contrast with the natural landscape resulting in an adverse impact. The overall adverse effects of Alternative A – CPAI are a result of the high level of contrast between the proposed structures and the natural landscape.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON VISUAL RESOURCES

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: High contrasts, but slightly less than Alternative A due to buried power lines, removing the need for power poles, and because facilities associated with CD-6 would be moved away from Fish Creek.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: High contrasts would be greater than Alternative A due to extensive use of aerial power lines. Additional contrasts would occur from vehicular traffic and fugitive dust along the road that would connect to Nuiqsut.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: High contrasts. Would be the same as Alternative A.</p> <p>FFD: Same as CPAI.</p>	<p>CPAI Development: High contrasts, but slightly less than Alternative A due to removing the need for powerpoles between CD-6 and CD-7, adoption of lighting restrictions, and because additional road segments would be moved away from Fish Creek.</p>

S.4.4.9 Transportation

ALTERNATIVE A – SUMMARY OF IMPACTS (CPAI AND FFD) ON TRANSPORTATION

Construction and operation of the facilities proposed under the Alternative A – CPAI Development Plan and FFD are not expected to result in adverse effects to transportation resources. Existing and proposed roads, air-strips, and pipelines are expected to adequately transport personnel, materials, and product throughout the Plan Area and into statewide transportation systems. Both local and statewide transportation systems are considered to have adequate capacity to accommodate the level of activity anticipated during construction and operation of the facilities. There would be 26.0 miles of new roads in the Plan Area for Alternative A – CPAI, and 150 miles of new roads for Alternative A – FFD. Use of project roads would be restricted to industry and local residents. Potential secondary effects on wildlife, subsistence, and recreation would result from increased access.

ALTERNATIVES B, C, AND D – SUMMARY OF IMPACTS (CPAI AND FFD) ON TRANSPORTATION

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE F
<p>CPAI Development: No adverse effects on public roads or transportation system. Would add 10.1 miles of new roads in Plan Area. Project roads would be accessible to industry only. Lesser potential secondary effects on wildlife, subsistence, and recreation from increased access</p> <p>FFD: No adverse effects on public roads or transportation system. Would add 118 miles of new roads in Plan Area. Project roads would be accessible to industry only. Lesser potential secondary effects on wildlife, subsistence, and recreation from increased access</p>	<p>CPAI Development: No adverse effects on public roads or transportation system. Would add 42.1 (C-1) and 41.6 (C-2) miles of new roads in Plan Area. Unrestricted use of project roads on BLM lands, use by industry and local residents only on state and private lands. Has the greatest potential for secondary effects on wildlife, subsistence, and recreation from increased access.</p> <p>FFD: No adverse effects on public roads or transportation system. Would add 190 miles of new roads in Plan Area. Unrestricted use of project roads on BLM lands, use by industry and local residents only on state and private lands. Has the greatest potential for secondary effects on wildlife, subsistence, and recreation from increased access.</p>	<p>CPAI Development: No adverse effects on public roads or transportation system. Would add 2.1 (D-1) miles of new roads in Plan Area for industry use only. Has the lowest potential of secondary effects on wildlife, subsistence, and recreation from increased access.</p> <p>FFD: No adverse effects on public roads or transportation system. Adds no new roads in Plan Area for industry use only. No potential secondary effects on wildlife, subsistence, and recreation from increased access.</p>	<p>CPAI Development: No adverse effects on public roads or transportation system. Would add 27.5 miles of new roads in Plan Area. Project roads would be accessible to industry, government, and local residents</p>

S.5 EXISTING AND POTENTIAL ADDITIONAL MITIGATIVE MEASURES

Any oil development in the Plan Area would incorporate design and operation measures that would protect the environment. These measures would reflect the applicant's proposed action, applicable federal, state, and NSB laws and regulations, and requirements of the leases that the applicant plans to develop. In addition, the federal RODs issued following completion of this FEIS, the State of Alaska Coastal Consistency Review, and any federal, state, and borough permits necessary to authorize development may impose additional mitigation measures.

CPAI's proposed development plan includes measures to protect the environment. These measures include pipeline valves on either side of larger river channels to minimize potential spill impacts or size in the event of a leak or break, placement of gravel roads downhill from the pipeline to aid in control of potential pipeline leaks, and installation of bridges across major waterways to ensure fish passage and minimize changes to riparian habitat. Additionally, CPAI has proposed to minimize the size of gravel pads at production sites to reduce the project footprint, and has placed a heavy reliance on winter construction and ice road use to minimize tundra damage. The proposed winter-only drilling plan for the lower Colville River Delta drill site would minimize impacts to nesting or molting bird populations. Federal, state, and NSB laws and regulations also mitigate impacts by mandating protections for the environment. In addition, the applicant is bound by the conditions of the leases they purchased. These lease conditions include restrictions designed to provide environmental protection.

To further mitigate potential impacts, additional potential mitigation measures have been identified in this FEIS. The BLM ROD will identify which mitigation measures the BLM will adopt. Cooperating agencies may adopt mitigation measures as part of their RODs.

Unless granted an exception or a modification of the Northeast National Petroleum Reserve-Alaska IAP/EIS as part of this FEIS, activities on BLM-managed lands must be conducted and facilities sited in accordance with the ROD for the Northeast National Petroleum Reserve-Alaska IAP/EIS development stipulations (Appendix D). These stipulations were developed to minimize environmental impacts that could result from oil and gas development activities on federal lands within the Northeast National Petroleum Reserve-Alaska.

S.6 EIS PROCESS

This EIS has been prepared in accordance with regulations and guidance of the Council on Environmental Quality (CEQ) (40 CFR 1500-1508).

The BLM began distribution of the Alpine Satellite Development Plan DEIS on January 9, 2004 and announced its availability via a news release on January 12, 2004. A Notice of Availability (NOA) was published by USEPA in the *Federal Register* on January 16, 2004, announcing the 45-day public comment period of January 16 through March 1, 2004. Subsequently, the close of the comment period was extended to March 8, 2004. Written public comments were received by mail, website, and fax until the end of the extended Public Comment Period of March 8, 2004. Six public hearings were held to provide a forum in which the public could provide oral or written comment for the record. These hearings were held in Anaktuvuk Pass, Anchorage, Atkasuk, Barrow, Fairbanks, and Nuiqsut. All comments have been carefully considered, and substantive issues have been addressed and incorporated into this FEIS. A detailed description of the Public Comment process, the Response to Public Comments process, public comments received, and responses to those comments can be found in Section 6.

A NOA for this FEIS has been published in the *Federal Register*. Copies of the FEIS are available to interested individuals, parties, and organizations. A ROD could be issued 30 days after the USEPA's NOA for the FEIS.