S.0 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 (NE) National Petroleum Reserve-Alaska (NPR-A) and the Colville River Delta adjacent to the eastern border of the NPR-A (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 CPAI's 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 NPR-A and three in the NPR-A. 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 for the village of Nuiqsut. CD-5 is on land conveyed to Kuukpik within the NPR-A; CD-6 and CD-7 are on lands administered by the BLM in the NPR-A.

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) for processing. Processed oil would be placed in the existing pipeline system for transport to the Trans-Alaska Pipeline System. The proposal is more fully described at Section 2 of this EIS.

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

Four action alternatives, A through D, describe the applicant's proposed action and three 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. 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, 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 air

strip, 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. 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 NPR-A 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 NPR/EIS would be required to locate oil infrastructure within 500 feet of some waterbodies (Stipulation 41) and to allow roads connecting to a road system outside the NPR-A (Stipulation 48). 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 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 NPR/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, moving proposed permanent oil infrastructure to a distance of at least 500 feet from waterbodies, excepting essential pipeline and road crossings (Stipulation 41). Roads and pipelines would be moved to conform to this provision to the maximum extent possible, eliminating roads to a road network outside BLM-managed lands in NPR-A (Stipulation 48). Road connection between CD-6 and CD-7 is maintained; however, these pads are not connected to the existing Alpine Facilities. 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 would be restricted to industry personnel only.

S.2.2.3 Alternative C

Theme: Alternative Access Routes

Alternative C differs from Alternative A principally by including a more southern bridge location over the Nigliq Channel, 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 contrasts with Alternative A by requiring a minimum pipeline height of 7 feet and placing power lines on separate poles rather than on VSMs. There would be no 2-inch product pipelines to production pads. A. Exceptions to the same Northeast NPR/EIS stipulations as in Alter

native A would be required. Use of roads on BLM lands would be unrestricted. Industry 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 NPR-A 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, or D would not occur. Ongoing activities, and future actions not related to the proposed action alternatives, could occur in the Plan Area.

S.2.3 Full-Field Development

Also included in this EIS, is an analysis of Full-Field Development (FFD) for the approximately 890,000-acre ASDP Area (Figure 1-1). FFD is presented as hypothetical scenarios for oil development that could occur over 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 ASDP Area over 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 alternatives have been developed to follow the same themes as the alternatives for the CPAI's proposed development plan.

Two additional APFs (with production facilities) and 22 additional production pads could be constructed in the Plan Area. Gravel roads and/or airstrips would provide access to the APFs and production pads. Construction and operation strategies described for the applicant's proposed action would apply for the FFD alternatives. Exceptions to the stipulations in the Northeast NPR-A 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), 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 this public scoping 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. Solutions responsive to many of those concerns and questions were integrated into elements of the alternatives developed for consideration in this EIS. The major issues and concerns raised during scoping generally fall into the categories below:

Adherence to Stipulations Identified in the Northeast NPR-A IAP/EIS. Many commenters stated that the restrictions and protections (stipulations) issued with the 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 NPR-A. The development covered in this EIS is the first proposed by industry in the NPR-A. Proponents of oil and gas development note that the NPR-A 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 proposal.

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 proposed action and alternatives (Section 4).

S.4 ENVIRONMENTAL CONSEQUENCES

Environmental consequences that would result from implementation of the proposed action and alternatives and FFD alternatives 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 probability, or risk of occurrence, might affect the environment to varying degrees, and are of concern to all of the stakeholders. 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.

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 roadbed 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 risk of oil and seawater spills from the CPAI Development Plan and FFD alternatives 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 risk of an oil spill.

A Very Large Volume Spill (VLVS) (greater than 100,000 gallons) 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, there is a high likelihood that the oil and/or seawater would affect the tundra, possibly relatively remote from the road or pads in pipeline spills. 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, these landforms can adversely affect thermal stability of the tundra and hydrology through thermokarsting and increased ponding. The total area of land intrusive activities would be 335 acres for CPAI and approximately 1,750 acres for FFD.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Physiography

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
CPAI Development: Same types of impacts as Alternative A. Lesser magnitude of land-intrusive actions than Alternative A resulting from fewer roads and shorter road lengths. Total area of land-intrusive actions = 232 acres. **FFD:** Same as CPAI except total area of land-intrusive actions = approximately 1,440 acres.	**CPAI Development:** Same types of impacts as Alternative A. Greater magnitude of land-intrusive actions than Alternative A resulting from additional roads and longer road lengths. Total area of land intrusive actions = 465 acres. **FFD:** Same as CPAI, except total area of land-intrusive actions = approximately 1,900 acres.	**CPAI Development:** Same types of impacts as Alternative A. Lesser magnitude of land-intrusive actions than Alternative A, resulting from roadless design and reliance on airstrips or helipads. Total area of land-intrusive actions = 223 acres for Alternative D-1, and 89 acres for Alternative D-2. **FFD:** Same as CPAI, except total area of land-intrusive actions = approximately 1,070 acres for Alternative D-1, and approximately 535 acres for Alternative D-2.

Geology

Alternative A – Summary of Impacts (CPAI and FFD) on Geology

Reduction of petroleum resources in the ASDP Area would occur. Because these resources are essentially non-renewable, effects would be permanent. Impacts to lithified resources in the ASDP Area under the Alternative A - CPAI Development Plan and Alternative A - FFD would produce no measurable effect.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Geology

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
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.

Soils and Permafrost

Alternative A – Summary of Impacts (CPAI and FFD) on Soils and Permafrost

Most impacts to soil and permafrost would be sustained during construction. Effects on the environment are unavoidable and semi-permanent, but less than one percent of the total soil and permafrost system surface area within the Plan Area would be affected.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Soils and Permafrost

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
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.

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. Removal of gravel fill is not currently a scheduled phase of abandonment.

For CPAI, 2.26 M cy of gravel fill is required; and for FFD, 14.4 M cy is required.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Sand and Gravel

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
CPAI Development: Requires 1,845,000 cy 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. Removal of gravel fill is not currently a scheduled phase of abandonment. **FFD:** Requires 11,857,000 cy 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. Removal of gravel fill is not currently a scheduled phase of abandonment.	**CPAI Development:** Requires 2,991,000 cy 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. Removal of gravel fill is not currently a scheduled phase of abandonment. **FFD:** Requires 15,767,000 cy 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. Removal of gravel fill is not currently a scheduled phase of abandonment.	**CPAI Development:** Requires 1,769,000 cy of sand and gravel for Alternative D-1, and 756,000 cy 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. Removal of gravel fill is not currently a scheduled phase of abandonment. **FFD:** Requires 10,709,000 cy of sand and gravel for Alternative D-1, and 5,248,000 cy 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. Removal of gravel fill is not currently a scheduled phase of abandonment.

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 production well drilling, sand and gravel mining, and installation of VSMs, power poles, and bridge piles.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Paleontological Resources

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

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 proposed plan.

Small lakes suitable to support fish and wildlife habitats may be created as a result of gravel extraction activities. In general, any new surface water bodies created by mine pit excavation would be left to recharge naturally during high flows in natural streams and manmade channels during annual spring break-up floods.

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.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Water Resources

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
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. **FFD:** Same as CPAI except that APF-2, CD-8, CD-23, and CD-24 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 CD-29, reducing impacts to water resources in the vicinity of the Kogru River. Ice road construction would require up to approximately 400 acre-feet of water to be withdrawn from lakes. The lengths of ice roads to be constructed would be greater than in Alternative A.	**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. **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 less because the lengths of ice roads that would need to be constructed would be lower for this alternative than for Alternative A.	**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. **FFD:** Same as CPAI except the lengths of ice roads to be constructed would be approximately 63 percent greater than with Alternative A. Ice road construction would require up to approximately 490 acre-feet of water to be withdrawn from lakes.

Surface Water Quality

Alternative A – Summary of Impacts (CPAI and FFD) on Surface Water Quality

Potential surface water quality impacts for the CPAI Development Project generally 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
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 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, resulting in lower levels of turbidity. **FFD:** Same as CPAI, also includes a reduction in facilities to accommodate stipulations.	**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. Decreased miles of ice roads compared to Alternative A, lowering the chance that ice roads would be routed across lakes, and potentially affecting dissolved oxygen concentrations. Increased area potentially affected by thermokarst erosion compared to Alternative A, leading to increased impacts to water quality from increased turbidity caused by erosion and sedimentation. Increased potential for dust fallout and upslope impoundments compared to Alternative A, resulting in a potential for greater levels of turbidity. **FFD:** Same as CPAI.	**CPAI Development:** Would have fewer sources of potential impacts to surface water quality than Alternative A because of the decreased gravel placement. Additional ground disturbance would occur during power line burial. 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. Decreased area potentially affected by thermokarst erosion compared to Alternative A, lowering potential for turbidity caused by erosion and sedimentation. Minimal potential for dust fallout and upslope impoundments compared to Alternative A, resulting in less potential for turbidity. **FFD:** Same as CPAI.

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, and D – Summary of Impacts (CPAI and FFD) on Climate and Meteorology

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
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.

Air Quality

Alternative A – Summary of Impacts (CPAI and FFD) on Air Quality

Construction impacts would contribute air emissions to the regions but are short-term and transient in nature and will not have a lasting impact to air quality. Aircraft landings and takeoffs will 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 APFs.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Air Quality

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

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 proposed close to Nuiqsut.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Noise

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

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 270 acres of vegetation would be covered with gravel fill approximately 5 to 6 feet thick for the construction of CPAI's proposed well pads, connecting roads, and an airstrip. In addition to impacts from roads, pads, and an airstrip, some vegetation would be lost at gravel extraction sites (approximately 65 acres), for the construction of a boat launch ramp at either CD-2 or CD-4 and the associated access road, and for a floating dock and access road at CD-3. Potential impacts from dust would result in alteration of approximately 250 acres of tundra vegetation. The impacts from dust would be minimized by scheduling construction and associated traffic in the winter when dust from the road would be less, minimizing traffic flow, and watering roads during the summer (a standard North Slope practice) to keep dust down and maintain road bed integrity.

Construction of ice roads and subsequent use may temporarily 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, insulated ice pads would be used as staging areas during pipeline construction. Ice pads may also be used to stockpile overburden material associated with the ASRC Mine Site and Clover Potential Gravel Source. Under FFD, approximately 1,210 acres would be covered by fill and 510 acres would be impacted by dust. In addition, approximately 346 acres may be excavated for gravel.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) n Terrestrial Vegetation and Wetlands

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
CPAI Development: 188 acres covered by fill, 139 acres altered by indirect impacts, and 37 acres lost to gravel extraction. **FFD:** Approximately 1,150 acres would be covered by fill and 550 acres would be impacted by dust. In addition, approximately 287 acres would be lost to gravel extraction.	**CPAI Development:** 380 acres covered by fill, 373 acres altered by indirect impacts, and 86 acres lost to gravel extraction. Additionally, 86 acres would be directly impacted by gravel mining. **FFD:** Approximately 1,540 acres would be covered by fill and 1,190 acres would be impacted by dust. In addition, approximately 365 acres would be lost to gravel extraction.	**CPAI Development:** For Alternative D-1: 183 acres covered by fill, 94 acres altered by indirect impacts. For Alternative D-2: 92 acres covered by fill, 94 acres altered by indirect impacts. Gravel mining would directly impact 51 acres for D-1 and 22 acres for D-2. **FFD:** Approximately 816 (D-1)/408 (D-2) acres would be covered by fill and 0 acres would be impacted by dust In addition, approximately 255 or 129 acres would be lost to gravel extraction for Alternatives D-1 and D-2, respectively.

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 over-crowding 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. Low dissolved oxygen could also result from suspension of oxygen-demanding materials during construction of the Nigliq Channel bridge. Pad, road, and pipeline construction are likely to have no measurable adverse effect on arctic fish populations. Construction of ice roads or airstrips on fish overwintering areas may cause freezing to the bottom and block fish movement. The new road system could facilitate increased human access to fishing areas, potentially increasing subsistence fishing pressures. Gravel mining would most likely have direct impacts 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.

If a bridge were to approach the Nigliq Channel, other major Colville River channels, or Ublutuoch River extend into the floodplain terrace(s), altering flow and blocking fish passage during flood stage, there would likely be effects on floodplain vegetation, thus ultimately impacting fish. The long net-work of roads could result in alteration of regional surface hydrology, including interruption of fish movements. If culverts (proposed in five locations) fail, water may be impounded; this would create a new pond or lake upstream of the culvert and diminish flow downstream, interrupting fish movement. Stream morphology changes may occur downstream of culverts as a result of altered flow.

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

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Fish

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
CPAI Development: Because the road system of Alternative B would be shorter than that of Alternative A, impacts would be on a smaller scale. Vehicle bridges across the Nigliq Channel and Ublutuoch River would not be constructed. **FFD:** Similar to CPAI but on a larger scale.	**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 than in Alternative A, and power lines in Alternative C do not parallel roads. The road to CD-3 could divert floodwaters to the east across the Delta, subjecting fish to altered hydrological conditions. **FFD:** Similar to CPAI but on a larger scale.	**CPAI Development:** Construction impacts would be less than Alternative A because no roads are proposed, and the pipeline crossing of the Nigliq Channel would be accomplished by HDD. Impacts to fish from ice roads would be greater than Alternative A. **FFD:** Similar to CPAI but on a larger scale.

S.4.3.3 Birds

Alternatives A through D – Summary of Impacts (CPAI and FFD) on Birds

Potential 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. In most cases, effects would involve a few individuals and would be localized, and no adverse effects to populations would be expected. Habitat loss does not involve the direct loss of active nests because winter gravel placement, ice-road construction, snow dumping, and snow drifting occur when nests are not active. Most impacts would be initiated during the construction period.

Potential bird nests displaced by habitat loss or alteration and disturbance are summarized for Alternatives A through D in the following table.

Summary of Potential Bird Nests Displaced by Habitat Loss or Alteration and Disturbance (by Alternative)					
	CPAI Alternative Totals				
Bird Group	**Alt A**	**Alt B**	**Alt C**	**Alt D-1**	**Alt D-2**
Waterfowl	23	35	21	49	30
Loons	3	4	3	6	4
Ptarmigan	2	4	2	5	3
Seabirds	3	5	3	7	4
Shorebirds	132	113	169	115	87
Passerines	65	57	85	57	44
Total Nests	229	218	283	239	172
	FFD Alternative Totals				
Bird Group	**Alt A**	**Alt B**	**Alt C**	**Alt D-1**	**Alt D-2**
Waterfowl	87	91	63	198	124
Loons	11	12	7	27	17
Ptarmigan	9	9	6	21	14
Seabirds	13	12	8	30	18
Shorebirds	443	415	516	273	239
Passerines	227	214	264	140	123
Total Nests	790	753	864	689	535

S.4.3.4 Terrestrial Mammals

Alternative A – Summary of Impacts (CPAI and FFD) on Terrestrial Mammals

Habitats used by terrestrial mammals would be affected in several ways. Approximately 270 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 in the vicinity of 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. Pipelines elevated 5 feet and separated from roads by more than 300 feet 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 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.

It is unlikely the impacts described would have a negative impact at the population level. 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 TLH in the northwestern part of the Plan Area.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Terrestrial Mammals

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
CPAI Development: Approximately 195 acres of undeveloped lands that provide habitat for terrestrial mammals will be covered with gravel fill and 37 acres 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 will not occur since roads would be restricted to industry use. **FFD:** Similar to CPAI, over a larger area.	**CPAI Development:** Approximately 379 acres of undeveloped lands that provide habitat for terrestrial mammals would be covered with gravel fill and 86 acres excavated to obtain gravel. 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. **FFD:** Similar to CPAI, over a larger area.	**CPAI Development:** Approximately 172 acres (D-1)/67 acres (D-2) acres of undeveloped lands that provide habitat for terrestrial mammals would be covered with gravel fill and 51/22 acres 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 seven 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. **FFD:** Similar to CPAI, over a larger area.

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 to 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 defense of life and property.

The impacts described above are relevant to individual animals. It is unlikely these impacts would have a negative impact at the population level. Impacts from Alternative B – FFD would have the same impacts described for the CPAI Development Plan but over a larger area.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Marine Mammals

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
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. **FFD:** Same as CPAI, over a larger area.	**CPAI Development:** Impacts to marine mammals under Alternative C 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 defense of life and property kills. **FFD:** Same as CPAI, over a larger area.	**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. **FFD:** Same as CPAI, over a larger area.

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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. 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. Other activities that would occur in the Plan Area under all 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 the 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.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Bowhead Whale

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

Most impacts to spectacled eiders due to Alternative A – CPAI would occur in the Colville River Delta and would be limited to a few individuals. Spectacled eiders occur in greater numbers near proposed developments in the Colville River Delta than in the NPR-A portion of the Plan Area. Alternative A – CPAI would potentially displace less than one pre-nesting spectacled eider and one spectacled eider nest. For the FFD alternative, four potential nests would be displaced by habitat loss, alteration or disturbance. More displacement would be due to habitat loss and alteration than to disturbance. Less than 0.5 percent of available habitats in the Colville River Delta used by spectacled eiders (Aquatic Sedge with Deep Polygons and Patterned Wet Meadow) would be affected. Less than 1 percent of available habitats in the NPR-A used by spectacled eiders (Aquatic Sedge Marsh and Moist Tussock Tundra) would be affected. More potential nests would be affected at CD-3 than at the other four sites.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Spectacled Eider

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
CPAI Development: One potential nest displaced by habitat loss, alteration, or disturbance. More displacement due to disturbance than to habitat loss and alteration. <0.5% of available habitats in the Colville River Delta used by spectacled eiders would be affected. Less than 0.5% of available Shallow Open Water with Island habitat in the NPR-A used by spectacled eiders and <0.5% of available Aquatic Sedge Marsh and Moist Tussock Tundra used by spectacled eiders would be affected. More potential nests affected at CD-3 than other 4 sites. **FFD:** Four potential nests displaced by habitat loss, alteration, or disturbance. Most displacement due to disturbance in the Colville River Delta. Local access to Fish Creek Delta and south of Nuiqsut could affect amount of hunting mortality.	**CPAI Development:** One potential nest displaced by habitat loss, alteration, or disturbance. More displacement due to habitat loss and alteration than to disturbance. Less than 1% of available habitats in the Colville River Delta used by spectacled eiders would be affected. Less than 0.5% of available Shallow Open Water with Island habitat in the NPR-A used by spectacled eiders and <1% of available Aquatic Sedge Marsh and Moist Tussock Tundra used by spectacled eiders would be affected. More potential nests affected at CD-3 and CD-5 than other 3 sites. Local access could affect amount of hunting mortality. **FFD:** two potential nests displaced by habitat loss, alteration, or disturbance. Most displacement due to habitat loss or alteration in the Colville River Delta. Local access to Colville River Delta and NPR-A could affect amount of hunting mortality.	**CPAI Development:** For Alternative D-1; 2 potential nests displaced by habitat loss, alteration, or disturbance. For Alternative D-2; 2 potential nests displaced by habitat loss, alteration or disturbance. Most displacement due to disturbance (70%) than to habitat loss and alteration. Less than 0.5% of available habitats in the Colville River Delta used spectacled eiders would be affected. Less than 0.5% of available Aquatic Sedge Marsh habitat in the NPR-A used by spectacled eiders would be affected. More potential disturbance at CD-3 than other 4 sites. **FFD:** For Alternative D-1; 7 potential nests displaced by habitat loss, alteration, or disturbance. For Alternative D-2; 4 potential nests displaced by habitat loss, alteration or disturbance. Most displacement due to disturbance in the Colville River Delta.

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, and D – Summary of Impacts (CPAI and FFD) on Steller's Eider

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

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 in

creased under FFD. No direct incremental impacts to community health and welfare are expected as a result of the proposed project 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 impact 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 are expected as a result of the proposed project or the 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
CPAI Development: Same as Alternative A with the exception of a potential for reduced economic benefits. **FFD:** Same as Alternative A with the exception of a potential for reduced economic benefits.	**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). **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).	**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. **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.

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 North Slope Borough (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 NPR-A Impact Mitigation Program, and from direct employment of local residents. As a result of this program, oil lease sale fees and royalties from the NPR-A 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
CPAI Development: Same as Alternative A except that potential reduction of between 10 and 30 percent in production from CD-6 caused by moving the drill pad outside the three-mile setback for Fish Creek, results in an overall reduction of 4.15 percent of the total production from the Alpine Satellites production units CD-3 through CD-7. The economic benefits from the Alternative B CPAI Development Plan would be reduced by this factor. **FFD:** Same as Alternative A except the production scenario must be adjusted to eliminate production from CD-17, CD-26, and CD-29 to comply with stipulations. Applying this change to FFD production estimates would result in an overall production over the period from 2008 through 2055 that is 16 percent lower than the production estimate for Alternative A.	**CPAI Development:** Same as Alternative A, although a road connection to Nuiqsut could facilitate greater employment for local residents **FFD:** Same as Alternative A, although a road connection to Nuiqsut could facilitate greater employment for local residents.	**CPAI Development:** Same as Alternative A. **FFD:** Same as Alternative A.

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 proposed action and are expected to be primarily local in extent for the CPAI Development Plan and regional in extent for the FFD Plan. 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 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 the FFD on Barrow and Atqasuk hunters include increased competition for furbearers as Nuiqsut people 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 other hunters from other communities. Nuiqsut has development east and north of the community. The primary areas for expansion are south (Anaktuvuk Pass) and west (Bar

row and Atqasuk). Barrow hunters are already encountering 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 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
CPAI Development: Moving CD-6 and associated roads outside the Fish Creek 3 mile buffer 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 in Alternative A. **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.	**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 hunters are focused to the roads. At the same time, vehicular traffic on the roads would result in local deflection/disturbance of terrestrial mammals in the vicinity of the roads, and thus reduce subsistence availability of resources. Unrestricted road access to BLM lands would eventually provide increased access to people who do not live in the area and increase competition for resources. **FFD:** Same as CPAI, plus the road network connecting Nuiqsut to 17 of the 24 new locations and 4 of the 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.	**CPAI Development:** Less impact than Alternative A resulting from less road traffic to affect resource availability by associated disturbances. A pipeline clearance of 7 feet would be less restrictive to movement by subsistence users. Other impacts would be similar to Alternative A. **FFD:** Same as CPAI.

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 reduces 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 propen

sity 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 stands 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
CPAI Development: Same as Alternative A. **FFD:** Same as CPAI.	**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. **FFD:** Same as CPAI.	**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. **FFD:** Same as CPAI.

S.4.4.5 Cultural Resources

Alternative A – Summary of Impacts (CPAI and FFD) on Cultural Resources

Under 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 Development Plan, 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 D, cultural resources are within the affected areas of production pads (CD-12, CD-15, CD-20, and CD-21) and ROWs (CD-15 to CD-13) in the Colville River Delta Facility Group; production pads (CD-8, CD-9, CD-10 and CD-18) and APF-2 in the Fish-Judy Creeks Facility Group; and CD-29 and ROWs (CD-28 to CD-29 and CD-27 to APF-3) in the Kalikpik-Kogru Rivers Facility Group. The CD-15 to CD-13 ROW extends through the village of Nuiqsut, and one cultural resource is less than 1/4 mile from the CD-28 to CD-29 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 construction 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
CPAI Development: Same as Alternative A, though less risk of impacts to unknown resources because less gravel would be excavated. **FFD:** Same as Alternative A - FFD, except that CD-29 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.	**CPAI Development:** Same as Alternative A, though more risk of impacts to unknown resources because more gravel will be excavated **FFD:** Same as Alternative A - FFD, though more risk of impacts to unknown resources because more gravel will be excavated	**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 will be excavated. **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 will be excavated.

S.4.4.6 Land Use and Coastal Zone

Alternative A – Summary of Impacts (CPAI and FFD) on Land Use and Coastal Zone

Construction and operation of Alternative A is not anticipated to result in adverse effects to existing land use and ownership. A direct impact, however, will be the 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, however, the rezoning of non-federal land from Conservation to Resource Development would be required for implementation of CPAI's proposed plan.

Alternatives B, C, and D – Summary of Impacts (CPAI and FFD) on Land Use and Coastal Zone

ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
CPAI Development: Would result in approximately doubling the total number of acres developed for oil production within the ASDP area. All facilities and construction will occur outside the Fish Creek Buffer Zone. Rezoning of non-federal land under the NSB Land Management Regulations from Conservation to Resource Development would be required. **FFD:** Would place structures outside of buffer areas and areas where surface activities are restricted also eliminating possible adverse effects on LUEAs and Special Use Areas. Rezoning of non-federal land under the NSB Land Management Regulations from Conservation to Resource Development would be required.	**CPAI Development:** Same as Alternative A, except that it would nearly quadruple the total number of acres developed for oil production within the ASDP Area. **FFD:** Same as Alternative A - FFD, except for increased number of acres developed for oil production in the ASDP Area.	**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 Land Management Regulations from conservation to resource development would be required. **FFD:** Same as Alternative A - FFD, except for a smaller number of acres developed for oil production in the ASDP Area.

S.4.4.7 Recreation

Alternative A – Summary of Impacts on Recreation

Construction and operation of the facilities proposed under Alternative A and Alternative A – FFD in the Plan Area is 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
CPAI Development: Same as Alternative A. **FFD:** Same as Alternative A.	**CPAI Development:** Same as Alternative A. **FFD:** Same as Alternative A.	**CPAI Development:** Same as Alternative A. **FFD:** Same as Alternative A.

S.4.4.8 Visual Resources

Alternative A – Summary of Impacts (CPAI and FFED) on Visual Resources

Under Alternative A and Alternative A – FFD, construction and operation would result in adverse effects 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 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
CPAI Development: High contrasts, but slightly less than Alternative A due to buried power lines, removing need for power poles, and because facilities associated with CD-6 would be moved away from Fish Creek. **FFD:** Same as CPAI.	**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. **FFD:** Same as CPAI.	**CPAI Development:** High contrasts, would be the same as Alternative A. **FFD:** Same as CPAI.

S.4.4.9 Transportation

Alternative A – Summary of Impacts (CPAI and FFD) on Transportation

Construction and operation of the facilities proposed under Alternative A – CPAI Development Plan and FFD are not expected to result in adverse effects to transportation resources. Existing and proposed roads, airstrips, 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. Alternative A would result in 25.6 miles of new roads in the Plan Area for CPAI, and 150 miles of new roads for 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
CPAI Development: No adverse effects on public roads or transportation system. Adds 11.3 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 **FFD:** No adverse effects on public roads or transportation system. Adds 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	**CPAI Development:** No adverse effects on public roads or transportation system. Adds 44.3 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. Greatest potential secondary effects on wildlife, subsistence, and recreation from increased access. **FFD:** No adverse effects on public roads or transportation system. Adds 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. Greatest potential secondary effects on wildlife, subsistence, and recreation from increased access.	**CPAI Development:** No adverse effects on public roads or transportation system. Adds 3.6 miles of new roads in Plan Area for industry use only. Lowest potential secondary effects on wildlife, subsistence, and recreation from increased access. **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.

S.5 EXISTING AND POTENTIAL ADDITIONAL MITIGATIVE MEASURES

Any oil development in the ASDP Area would incorporate design and operation measures that would protect the environment. These measures would reflect the applicant's proposal, 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 EIS, the State of Alaska Coastal Consistency Review, and any federal, state, and borough permits necessary to authorize development may impose additional mitigation measures.

In their proposal, CPAI included 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.

In order to further mitigate potential impacts, additional mitigation measures have been identified in this EIS. 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 NPR-A IAP/EIS as part of this EIS, activities on BLM-managed lands must be conducted and facilities sited in accordance with the ROD for the Northeast NPR-A 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 NPR-A.

S.6 EIS PROCESS

Notice of Availability for this Draft EIS (DEIS) has been published in the *Federal Register*. Copies of the DEIS are available to interested individuals, parties, and organizations. Comments on the DEIS

will be accepted throughout the public comment period. All comments will be carefully considered, and substantive issues will be addressed and incorporated into the Final EIS (FEIS). An agency preferred alternative will be identified in the FEIS. The agency preferred alternative may be one of the alternatives identified in the EIS, or it may be a combination of components of several alternatives. A Notice of Availability for the Final EIS (FEIS) will also be published in the *Federal Register*. The BLM and cooperating agencies will develop ROD documents based on the FEIS.