4C.3 BIOLOGICAL RESOURCES

4C.3.1 Terrestrial Vegetation and Wetlands

4C.3.1.1 Alternative C – CPAI Development Plan Impacts on Terrestrial Vegetation and Wetlands

Figures 4C.3.1.1-1 and 4C.3.1.1-2 show the vegetation and habitats affected, and Tables 4C.3.1-1 and 4C.3.1-2 summarize the area of vegetation and habitat types affected under CPAI Development Plan Alternative C. Oil spills, should they occur, would also directly or indirectly affect vegetation and wetlands in the Plan Area. Impacts of oil and chemical spills and the potential for spills in the Plan Area are described in Section 4.3.

Construction Period

The construction period includes gravel placement, grading of the gravel surface, placement of all facilities, and initial drilling.

Gravel Pads, Roads, and Airstrips

Under Alternative C, a total of approximately 379 acres of vegetation would be covered with gravel fill for the construction of well pads, connecting roads, and airstrips. The access road to CD-3 would result in a loss of 1.4 acres of Upland Dry *Dryas* Dwarf Shrub; all other impacts would be to wetlands. See Tables 4A.3.1-1, 4B.3.1-1, 4C.3.1-1, and 4D.3.1-1 for a comparison of impacts to vegetation classes and Tables 4A.3.1-2, 4B.3.1-2, 4C.3.1-2, and 4D.3.1-2 for a comparison of impacts to habitat types in the Plan Area. Abandonment of roads, pads, and airstrips is discussed in Section 2.3.

The types of impacts of vegetation loss and alteration from gravel pads, roads, and airstrips would be the same as described under CPAI Development Plan Alternative A. In addition to impacts from roads, pads, and an airstrip, some vegetation would be lost for the construction of a boat launch ramp at either CD-2 or CD-4 and the associated access road and a floating dock and an access road at CD-3. The vegetation and habitat types affected by construction of a boat ramp and floating dock are described under CPAI Development Plan Alternative A. Mitigation measures identified for impacts from gravel pads, roads, and airstrips would also be the same as those described for CPAI Development Plan Alternative A.

Proposed gravel sources, associated impacts, and mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

Dust Fallout from Roads

Under Alternative C, potential impacts from dust would result in alteration of about 373 acres of tundra vegetation, assuming that these impacts occur only within 35 feet of gravel pads and roads. Tables 4C.3.1-1 and 4C.3.1-2 summarize the surface area of vegetation and habitat types affected by dust. See Tables 4A.3.1-1, 4B.3.1-1, and 4D.3.1-1 for a comparison of dust impacts to vegetation classes and Tables 4A.3.1-2, 4B.3.1-2, and 4D.3.1-2 for a comparison of dust impacts to habitat types in the Plan Area. Because Alternative C proposes the highest number of road miles to be constructed, vegetation impacts from dust fallout would be increased compared to all other CPAI development alternatives. The type of impacts from dust and associated mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

TABLE 4C.3.1-1 ALTERNATIVE C – SUMMARY OF SURFACE AREA (ACRES) OF VEGETATION CLASSES AFFECTED

Vegetation Classes	Colville River Delta				NPR-A (Western Beaufort Coastal Plain)			
	Loss		Alteration		Loss		Alteration	
	Roads	Pads[a]	Dust[b]	Powerline Trenching[c]	Roads	Pads[a]	Dust[b]	Powerline Trenching[c]
Water	26.470	0.000	26.110	0.000	2.710	0.000	2.857	0.000
Riverine Complex	0.000	0.000	0.000	0.000	0.361	0.000	0.445	0.000
Fresh Grass Marsh	4.528	0.000	4.571	0.000	0.000	0.000	0.000	0.000
Fresh Sedge Marsh	0.000	0.000	0.000	0.000	2.808	0.000	3.030	0.000
Deep Polygon Complex	0.949	0.000	0.777	0.000	0.000	0.000	0.000	0.000
Young Basin Wetland Complex	0.000	0.000	0.000	0.000	3.338	1.682	4.280	0.000
Old Basin Wetland Complex	0.000	0.000	0.000	0.000	15.690	0.000	17.710	0.000
Wet Sedge Meadow Tundra	59.960	20.720	59.932	0.000	21.020	12.070	28.553	0.000
Salt-killed Wet Meadow	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Halophytic Sedge Wet Meadow	1.527	0.000	1.267	0.000	0.000	0.000	0.000	0.000
Halophytic Grass Wet Meadow	1.061	0.000	0.878	0.000	0.000	0.000	0.000	0.000
Moist Sedge Shrub Tundra	12.430	0.000	16.090	0.000	63.950	0.000	75.033	0.000
Tussock Tundra	0.000	0.000	0.000	0.000	98.010	11.370	116.616	0.000
Dryas Dwarf Shrub Tundra	1.327	0.000	1.037	0.000	0.000	0.000	0.000	0.000
Cassiope Dwarf Shrub Tundra	0.000	0.000	0.000	0.000	0.194	0.000	0.226	0.000
Halophytic Willow Dwarf Shrub Tundra	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Open and Closed Low Willow Shrub	6.751	0.000	6.907	0.000	1.431	2.237	2.171	0.000
Open and Closed Tall Willow Shrub	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dune Complex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Partially Vegetated	4.256	0.000	1.943	0.000	0.000	0.000	0.000	0.000
Barrens	2.633	0.000	2.155	0.000	0.076	0.000	0.086	0.000
Total Area	121.892	20.720	121.667	0.000	209.588	27.359	251.007	0.000

Notes:

[a] Total includes gravel for pads and airstrips

[b] Dust impacts were calculated using a 36-foot buffer on roads, pads, and airstrips

[c] No power line trenching is proposed for this alternative

TABLE 4C.3.1-2 ALTERNATIVE C – SUMMARY OF SURFACE AREA (ACRES) OF HABITAT TYPES AFFECTED

Habitat Types	Colville River Delta				NPR-A			
	Loss		Alteration		Loss		Alteration	
	Roads	Pads[a]	Dust[b]	Powerline Trenching[c]	Roads	Pads[a]	Dust[b]	Powerline Trenching[c]
Open Nearshore Water	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Brackish Water	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tapped Lake with Low-water Connection	11.480	0.000	9.096	0.000	0.000	0.000	0.000	0.000
Tapped Lake with High-water Connection	4.977	0.000	6.705	0.000	0.000	0.000	0.000	0.000
Salt Marsh	2.588	0.000	2.145	0.000	0.000	0.000	0.000	0.000
Tidal Flat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Salt-killed Tundra	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deep Open Water without Islands	0.496	0.000	0.537	0.000	1.574	0.000	1.544	0.000
Deep Open Water with Islands or Polygonized Margins	5.192	0.000	5.592	0.000	0.000	0.000	0.000	0.000
Shallow Open Water without Islands	0.442	0.000	0.343	0.000	0.785	0.000	0.835	0.000
Shallow Open Water with Island or Polygonized Margins	0.000	0.000	0.000	0.000	0.301	0.000	0.426	0.000
River or Stream	3.882	0.000	3.839	0.000	0.051	0.000	0.052	0.000
Aquatic Sedge Marsh	0.000	0.000	0.000	0.000	2.808	0.000	3.030	0.000
Aquatic Sedge with Deep Polygons	0.949	0.000	0.777	0.000	0.000	0.000	0.000	0.000
Aquatic Grass Marsh	4.528	0.000	4.571	0.000	0.000	0.000	0.000	0.000
Young Basin Wetland Complex	0.000	0.000	0.000	0.000	3.338	1.682	4.280	0.000
Old Basin Wetland Complex	0.000	0.000	0.000	0.000	15.690	0.000	17.710	0.000
Riverine Complex	0.000	0.000	0.000	0.000	0.361	0.000	0.445	0.000
Dune Complex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nonpatterned Wet Meadow	6.793	6.646	8.113	0.000	3.021	5.749	5.943	0.000
Patterned Wet Meadow	53.170	14.070	51.815	0.000	18.000	6.318	22.615	0.000
Moist Sedge-Shrub Meadow	12.430	0.000	16.090	0.000	65.090	2.237	76.850	0.000
Moist Tussock Tundra	0.000	0.000	0.000	0.000	98.010	11.370	116.616	0.000
Riverine Low and Tall Shrub	1.299	0.000	1.646	0.000	0.136	0.000	0.170	0.000
Upland Low and Tall Shrub	0.000	0.000	0.000	0.000	0.155	0.000	0.181	0.000

TABLE 4C.3.1-2 ALTERNATIVE C – SUMMARY OF SURFACE AREA (ACRES) OF HABITAT TYPES AFFECTED

Habitat Types	Colville River Delta				NPR-A			
	Loss		Alteration		Loss		Alteration	
	Roads	Pads[a]	Dust[b]	Powerline Trenching[c]	Roads	Pads[a]	Dust[b]	Powerline Trenching[c]
Upland and Riverine Dwarf Shrub[d]	0.000	0.000	0.000	0.000	0.194	0.000	0.226	0.000
Riverine or Upland Shrub[e]	6.779	0.000	6.298	0.000	0.000	0.000	0.000	0.000
Barrens (riverine, eolian, or lacustrine)	6.889	0.000	4.099	0.000	0.000	0.000	0.000	0.000
Artificial (water, fill, peat road)	0.000	0.000	0.000	0.000	0.076	0.000	0.086	0.000
Total Area	**121.894**	**20.716**	**121.666**	**0.000**	**209.590**	**27.356**	**251.009**	**0.000**

Notes:

[a] Total includes gravel for pads and airstrips

[b] Dust impacts were calculated using a 36-foot buffer on roads, pads, and airstrips

[c] Mapped for NPR-A area only

[d] Mapped for Colville River Delta area only

Ice Roads, Ice Pads, and Snow Stockpiles

Under Alternative C, a total of about 255 miles of ice roads would be constructed (during the construction period) over the life of the project, resulting in a maximum of approximately 1,236 acres of vegetation disturbed. This is a maximum-case scenario that assumes the ice roads would be built in a different location each year. The maximum area covered by ice roads in a single year would be 296 acres, with an average of 208 acres per year. The actual surface area disturbed would likely be much less, especially if ice roads are overlapped in subsequent years to minimize the areal extent of impacts. Ice roads placed for the construction of gravel roads and pipeline would follow adjacent to the road/pipeline routes and would tend to affect the same habitat and vegetation types (see Tables 4C.3.1-1 and 4C.3.1-2). Mitigation measures for ice roads would be the same as those described under CPAI Development Plan Alternative A.

In addition to ice roads, insulated ice pads would be used as staging areas during pipeline construction. Approximately 86 acres of vegetation would be disturbed by ice pad staging areas for the construction of the pipeline. Ice pads may also be used to stockpile overburden material associated with the ASRC Mine Site and Clover Potential Gravel Source. Impacts from these ice pads would be the same as those described under CPAI Development Plan Alternative A. Ice pads also would be constructed at each end of each proposed bridge to stage equipment. These ice pads used as staging areas would vary with the size of the bridge installation and equipment needs. Given the number of bridges proposed under CPAI Development Plan Alternative B and assuming the maximum pad size would be 800 feet by 800 feet surrounding the abutment structure at each end of a bridge (Section 2.3), then a maximum of 208 acres of vegetation would be affected by ice pads. Ice pads could also be built for storage of drill rigs and other equipment at remote production pads. The effects of ice pads on vegetation would be similar in type to ice roads. Mitigation measures for ice pads would be the same as those described under CPAI Development Plan Alternative A.

Less snow would need to be plowed under Alternative B than in Alternatives A and C because fewer miles of road would be built. This would result in decreased alteration of vegetation by snow stockpiles. However, Alternative B would require slightly more snow plowing than Alternative D.

Off-Road Tundra Travel

Development and operation of oil facilities in the Plan Area may require access across tundra. Such access could be necessary to respond to spills or other emergencies, conduct pipeline maintenance and repair, and facilitate ice road construction. The types of impacts to vegetation from off-road travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A; however, impacts from off-road travel would presumably be the lowest under Alternative C because all pads and most of the pipeline would be accessible by road. Impacts of off-road travel impacts would be slightly less in Alternative A than in Alternative C. Alternatives B and D would likely require more off-road travel because of the mostly roadless designs.

Impoundments and Thermokarst

The types of impacts from impoundments and thermokarst and associated mitigation measures are described under CPAI Development Plan Alternative A. Alternative C would potentially affect the greatest area of vegetation because it proposes the highest number of road miles. The potential of Alternative A for impoundment and thermokarst impacts would be slightly less than Alternative C. Habitat alteration resulting from impoundments and thermokarst would be less extensive under Alternatives B and D because of their mostly roadless designs.

Cross-Drainage and Water Flow

The types of cross-drainage and water flow impacts and associated mitigation measures are described under CPAI Development Plan Alternative A. The largest area of vegetation would potentially be affected by Alternative C because it proposes the most miles of road. The potential for cross-drainage and water flow impacts in Alternative C would be slightly greater than in Alternative A. Habitat alteration resulting from interception of natural water flow by gravel roads and pads would be less extensive under Alternatives B and D because of their mostly roadless designs.

Air Pollution

Project construction would cause a localized and temporary impact on air quality. The sources of air pollution during the construction period are described under CPAI Development Plan Alternative A. These sources are not expected to produce sufficient levels of pollutants to affect vegetation. Air quality mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

Pipelines

Given the maximum diameter of VSM borings and the projected number to be constructed under Alternative C, about 0.4 acre of vegetation would be lost to VSM installation. The vegetation and habitat types affected would depend on the exact location of the VSM. The elevated pipeline design would reduce impacts to vegetation and habitat types.

Power Lines

Under Alternative C, approximately 15 square feet of tundra vegetation would be affected by pole placement for suspended power lines. See Tables 4A.3.1-1, 4B.3.1-1, 4C.3.1-1, and 4D.3.1-1 for a comparison of impacts to vegetation classes and Tables 4A.3.1-2, 4B.3.1-2, 4C.3.1-2, and 4D.3.1-2 for a comparison of impacts to habitat types in the Plan Area.

Operation Period

The operation period includes continued drilling and day-to-day operations and maintenance once production has begun.

Gravel Pads, Roads, and Airstrips

Most loss and alteration of vegetation communities would occur during the construction period and would be related to gravel placement. Additional vegetation losses could occur during the operational period during maintenance of gravel roads (such as snow removal) or if flood events wash out portions of roads or pads and deposit gravel downstream. The impacts of these activities/events are described under CPAI Development Plan Alternative A.

The largest area of vegetation would potentially be affected by maintenance of gravel roads and washouts under Alternative C because it proposes the greatest number of road miles. The impacts of Alternative C impacts would likely be slightly greater than those of Alternative A. Impacts to vegetation resulting from maintenance of gravel roads and washouts would be less extensive under Alternatives B and D because of their mostly roadless designs.

Dust Fallout from Roads

Although traffic is expected to be higher during the construction season, over the life of the project dust impacts from roads are expected to be greater during the operational period. The effects of dust on vegetation were described above in the Construction Period section.

Ice Roads, Ice Pads, and Snow Stockpiles

Ice roads and pads would not likely be needed during the operational period under Alternative C because all pads would be accessible by roads. As during the construction period, snowdrifts or plowed snow would accumulate on tundra adjacent to roads, well pads, and airstrips. Impacts would be similar to those discussed above in the Construction Period section.

Off-Road Tundra Travel

Some off-road tundra travel would continue during the operational period to respond to spills or other emergencies, to conduct pipeline maintenance and repair, and to facilitate ice road construction. See the Construction Period discussion above for potential impacts.

Impoundments and Thermokarst

Some habitat loss and alteration would continue to occur from thermokarst and impoundments during the project operation. These impacts are more likely to be initiated during construction.

Cross-Drainage and Water Flow

Cross-drainage and water flow impacts are not expected to occur during the operational phase of this project.

Air Pollution

Air pollution levels would increase during operations with the upgrade of the existing Alpine CPF and increased emissions from traffic, drilling equipment, and well servicing equipment; however, this increase is not expected to generate levels of pollutants that would affect vegetation. Air quality impacts from emissions from well servicing and drilling equipment would be intermittent and localized. Air quality mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

Pipelines

Pipeline operation would not cause additional vegetation losses or alteration.

Power Lines

No additional impacts to vegetation would occur from power lines during the operational period.

4C.3.1.2 Alternative C – FFD Plan Impacts on Terrestrial Vegetation and Wetlands

Under the Alternative C scenario for FFD, direct and indirect impacts to vegetation related to gravel fill; dust fallout from roads; ice roads and snow stockpiles; off-road tundra travel; impoundments and thermokarst; cross-drainage and water flow; air pollution; pipelines; and power lines in the Colville River Delta, Fish-Judy Creeks, and Kalikpik-Kogru Rivers Facility Groups would be the same types as those described under CPAI Development Plan Alternative A. In addition to the impacts of CPAI Development Plan Alternative C, under the FFD scenario for Alternative C approximately 1,540 acres of vegetation would be covered with gravel fill. Table 4C.3.2-3 summarizes the area of vegetation types affected under FFD Alternative C. The effects of FFD on terrestrial vegetation and wetlands would depend on the location and extent of development in specific locations within each area.

Colville River Delta Facility Group

Gravel Pads, Roads, and Airstrips

In addition to habitat loss described under CPAI Development Plan Alternative C, there would be additional vegetation loss in the Colville River Delta Facility Group from future production pads such as hypothetical production pads CD-11, CD-12, CD-14, CD-15, CD-19, CD-20, and CD-21 and their associated roads, pads, and airstrips. The dominant vegetation class in the vicinity of Colville River Delta is Wet Sedge Meadow Tundra. Under the Alternative C FFD scenario, approximately 357 acres of vegetation would be covered with gravel fill for the construction of well pads, connecting roads, and airstrips in the Colville River Delta area. The types of disturbances and impacts to vegetation associated with gravel fill would be the same as those described previously for CPAI Development Plan Alternative A.

Gravel extraction for the hypothetical FFD would result in the destruction of some vegetation. Specific gravel sources for the hypothetical FFD scenario have not been identified. The development process of any future gravel source would include planning, design, permitting, temporary staging areas, removal of overburden, blasting and excavation of gravel, and an approved rehabilitation plan. Analysis of impacts and appropriate mitigation measures would be examined before approval of future mine sites.

Dust Fallout from Roads

Impacts from dust under FFD Alternative C would be similar in type to those described for the CPAI Development Plan Alternative A. Dust fallout would alter vegetation types on about 232 acres in the Colville River Delta Facility Group, assuming that these impacts occur only within 35 feet of gravel pads and roads.

Ice Roads, Ice Pads, and Snow Stockpiles

Under Alternative C for FFD in the Colville River Delta Facility Group, approximately 82 miles of ice roads would be constructed over the life of the project, affecting approximately 397 acres of vegetation. The maximum area covered by ice roads in a single year would be 90 acres, with an average of 67 acres per year. As with CPAI Development Plan Alternative C, insulated ice pads would be used as staging areas during pipeline construction, to stockpile overburden material associated with gravel mine sites, for equipment staging areas for bridge installation, and for storage of drill rigs and other equipment at remote production pads. The

types of impacts to vegetation associated with snow stockpiles would be the same as those described previously for CPAI Development Plan Alternative A, although the construction of more roads, pads, and airstrips would result in potential increased impacts to vegetation.

TABLE 4C.3.1-3 SUMMARY OF VEGETATION IMPACTS FOR FFD ALTERNATIVE C

VEGETATION CLASSES	COLVILLE RIVER DELTA				FISH-JUDY CREEKS				KALIKPIK-KOGRU RIVERS			
	ACRES (%) IN COLVILLE RIVER DELTA		GRAVEL (ACRES)	DUST (ACRES)	ACRES (%) IN FISH-JUDY CREEKS		GRAVEL (ACRES)	DUST (ACRES)	ACRES (%) IN KALIKPIK-KOGRU		GRAVEL (ACRES)	DUST (ACRES)
Riverine Complex	0	(0.0%)	0	0	30	(0.1%)	0	0	0	(0.0%)	0	0
Fresh Grass Marsh	56	(0.3%)	1	1	278	(0.6%)	4	4	49	(0.3%)	1	1
Fresh Sedge Marsh	3	(0.0%)	0	0	3,343	(7.5%)	53	48	1483	(8.8%)	37	37
Deep Polygon Complex	550	(2.6%)	9	6	4,833	(10.9%)	76	69	1493	(8.9%)	38	37
Young Basin Wetland Complex	0	(0.0%)	0	0	2,013	(4.5%)	32	29	721	(4.3%)	18	18
Old Basin Wetland Complex	0	(0.0%)	0	0	1,261	(2.8%)	20	18	0	(0.0%)	0	0
Wet Sedge Meadow Tundra	9,494	(44.1%)	157	102	9,856	(22.1%)	156	141	6533	(39.0%)	165	164
Salt-killed Wet Meadow	1,633	(7.6%)	27	18	0	(0.0%)	0	0	0	(0.0%)	0	0
Halophytic Sedge Wet Meadow	1,210	(5.6%)	20	13	0	(0.0%)	0	0	0	(0.0%)	0	0
Halophytic Grass Wet Meadow	32	(0.1%)	1	0	0	(0.0%)	0	0	0	(0.0%)	0	0
Moist Sedge Shrub Tundra	782	(3.6%)	13	8	4,318	(9.7%)	68	62	0	(0.0%)	0	0
Tussock Tundra	139	(0.6%)	2	1	14,936	(33.5%)	236	213	5452	(32.5%)	138	137
Dryas Dwarf Shrub Tundra	29	(0.1%)	0	0	238	(0.5%)	4	3	0	(0.0%)	0	0
Cassiope Dwarf Shrub Tundra	0	(0.0%)	0	0	395	(0.9%)	6	6	284	(1.7%)	7	7
Halophytic Willow Dwarf Shrub Tundra	8	(0.0%)	0	0	0	(0.0%)	0	0	0	(0.0%)	0	0
Open and Closed Low Willow Shrub	1,929	(9.0%)	32	21	520	(1.2%)	8	7	1	(0.0%)	0	0
Open and Closed Tall Willow Shrub	0	(0.0%)	0	0	172	(0.4%)	3	2	0	(0.0%)	0	0
Dune Complex	0	(0.0%)	0	0	902	(2.0%)	14	13	185	(1.1%)	5	5
Partially Vegetated	1,183	(5.5%)	20	13	412	(0.9%)	7	6	154	(0.9%)	4	4
Barrens	4,487	(20.8%)	74	48	1,030	(2.3%)	16	15	411	(2.5%)	10	10
Totals	**21,536**	**(100.0%)**	**357**	**232**	**44,537**	**(100.0%)**	**704**	**636**	**16768**	**(100.0%)**	**423**	**421**

Notes: The proportion of vegetation types within the hypothetical circles in each facility group and the approximate acres of vegetation disturbed by gravel fill and dust were used to distribute the number of acres affected across vegetation types (assuming the vegetation types in the hypothetical circles are the distribution of habitats to be affected by the FFD Alternative C scenario).

Off-Road Tundra Travel

The types of impacts from off-road tundra travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A. Under FFD Alternative C, the surface area affected would increase because of the increased length of pipeline, roads, and number of remote facilities that may require off-road tundra travel for emergencies, pipeline maintenance and repair, ice road construction, or supply transport.

Impoundments and Thermokarst

The types of impacts to vegetation associated with thermokarst and ponding and the proposed mitigation measures for these impacts would be the same as those described previously for CPAI Development Plan Alternative A. Under FFD Alternative C, the construction of more roads and pads would result in increased impacts and alteration of vegetation communities from thermokarst and ponding.

Cross-Drainage and Water Flow

Impacts from cross-drainage and water flow would be greatest in the vicinity of the Colville River Delta because of unstable flow regimes and ocean-induced storm surges. In addition, roads would likely cross many ephemeral streams in the Colville River Delta area, and culverts would need to be installed. Culvert placement could potentially disturb sheet flow in the spring and could impact local moisture regimes. Culverts allow surface water flow, but they tend to ice up and increase flow in a small area relative to typical sheet flow.

Air Pollution

No additional processing facilities would be built in the Colville River Delta area under FFD Alternative C; however, the increased number of vehicles and equipment associated with the well pads and roads would increase air pollution. This increase is not expected to generate levels of pollutants that would harm vegetation.

Pipelines

In addition to the impacts from CPAI Development Plan Alternative C, a total of approximately 0.3 acre of vegetation would be lost to VSM installation under the FFD scenario for Alternative B. The vegetation and habitat types affected would depend on the exact location of the VSM, which would be determined in the field. The types of impacts to vegetation associated with snow drifting or shading from the aboveground pipelines would be the same as those described previously for Alternative A.

Power Lines

Under FFD Alternative C, power lines would be suspended from poles. Less than 1 acre of vegetation would be affected by pole placement.

Fish-Judy Creeks Facility Group

Gravel Pads, Roads, and Airstrips

In addition to habitat loss described under CPAI Development Plan Alternative C, there would be additional vegetation loss in the Fish-Judy Creeks Facility Group for the construction of a processing facility; production pads CD-8, CD-9, CD-10, CD-13, CD-16, CD-17, CD-18, CD-22, CD-23, CD-24, and CD-26; and their associated roads and airstrips. Dominant vegetation classes in the Fish-Judy Creeks Facility Group are *Dryas* Tundra and Wet Sedge Meadow Tundra (Table 4A.3.1-1). Under the FFD scenario, approximately 704 acres of vegetation would be covered with gravel fill in the Fish-Judy Creeks Facility Group (Table 4A.3.1-1). The

types of disturbances and impacts to vegetation associated with gravel fill placement would be the same as those described previously for CPAI Development Plan Alternative A.

Dust Fallout from Roads

In the Fish-Judy Creeks area, dust fallout would disturb about 636 acres of vegetation. The types of impacts to vegetation and mitigation measures associated with dust fallout would be the same as those described previously for CPAI Development Plan Alternative A.

Ice Roads, Ice Pads, and Snow Stockpiles

Under Alternative C for FFD in the Fish-Judy Creek area, approximately 113 miles of ice roads would be constructed over the life of the project, affecting about 548 acres of vegetation. The maximum area covered by ice roads in a single year would be 97 acres, with an average of 55 acres per year. The types of impacts to vegetation associated with ice roads and snow stockpiles would be the same as those described previously for Alternative A, although the construction of more roads, pads, and airstrips would result in increased impacts to vegetation.

Off-Road Tundra Travel

The types of impacts from off-road tundra travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A. Under FFD Alternative C, the surface area affected would be increased because of the increased length of pipeline, roads, and number of remote facilities that may require off-road tundra travel for emergencies, pipeline maintenance and repair, ice road construction, or supply transport.

Impoundments and Thermokarst

The types of impacts to vegetation associated with thermokarst and ponding and the proposed mitigation measures for these impacts would be the same as those described previously for CPAI Development Plan Alternative A. The construction of more roads and pads under FFD Alternative C would potentially increase impacts and alteration of vegetation communities from thermokarst and ponding.

Cross-Drainage and Water Flow

The types of impacts to vegetation associated with cross-drainage and water flow would be the same as those described previously for CPAI Development Plan Alternative A, although the construction of more roads with culverts would potentially cause increased impacts to vegetation communities from disturbance of local water flow.

Air Pollution

The construction of an additional processing facility would result in increased levels of air pollution that could affect vegetation in the vicinity of the Fish-Judy Creeks Facility Group, as described in CPAI Development Plan Alternative A.

Pipelines

In the FFD scenario for Alternative B, approximately 0.8 acre of vegetation would be lost in the vicinity of Fish-Judy Creeks as a result of VSM placement.

Power Lines

Under FFD Alternative C, power lines would be suspended from poles. Less than 1 acre of vegetation would be affected by pole placement.

Kalikpik-Kogru Rivers Facility Group

Gravel Pads, Roads, and Airstrips

In addition to habitat loss described under CPAI Development Plan Alternative C, approximately 423 acres of vegetation would be affected in the Kalikpik-Kogru Rivers Facility Group for the construction of a hypothetical processing facility; production pads CD-25, CD-27, CD-28, and CD-29; and their associated roads and airstrips. The dominant vegetation classes in the Kalikpik-Kogru Rivers Facility Group are Tussock Tundra and Sedge/Grass Meadow (BLM and DU 2002) (Table 4A.3.1-1). The types of disturbances and impacts to vegetation associated with gravel fill placement would be the same as those described previously for CPAI Development Plan Alternative A.

Dust Fallout from Roads

In the Kalikpik-Kogru Rivers Facility Group, dust fallout would disturb about 421 acres of vegetation. The types of impacts to vegetation and mitigation measures associated with dust fallout would be the same as those described previously for CPAI Development Plan Alternative A.

Ice Roads, Ice Pads, and Snow Stockpiles

Under Alternative C for FFD in the Kalikpik-Kogru Rivers Facility Group, approximately 50 miles of ice roads would be constructed during construction and over the life of the project, affecting about 243 acres of vegetation. The maximum area covered by ice roads in a single year would be 92 acres, with an average of 61 acres per year. The types of impacts to vegetation associated with ice roads and snow stockpiles would be the same as those described previously for CPAI Development Plan Alternative A, although the construction of more roads, pads, and airstrips would result in potentially increased impacts to vegetation.

Off-Road Tundra Travel

The types of impacts from off-road tundra travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A. Under FFD Alternative C, the surface area affected would be increased because of the increased length of pipeline, roads, and number of remote facilities that could require off-road tundra travel for emergencies, pipeline maintenance and repair, ice road construction, or supply transport.

Impoundments and Thermokarst

The types of impacts to vegetation associated with thermokarst and ponding and the proposed mitigation measures for these impacts would be the same as those described previously for CPAI Development Plan Alternative A. Under FFD Alternative C, the construction of more roads and pads would result in increased impacts and alteration of vegetation communities from thermokarst and ponding.

Cross-Drainage and Water Flow

The types of impacts to vegetation associated with cross-drainage and water flow would be the same as those described previously for CPAI Development Plan Alternative A, although the construction of more roads and culverts under FFD Alternative C would cause increased impacts to vegetation communities from disturbance of local water flow.

Air Pollution

The construction of an additional processing facility in the Kalikpik-Kogru Rivers Facility Group would result in increased levels of air pollution that could affect vegetation, as described in CPAI Development Plan Alternative A.

Pipelines

In the FFD scenario for Alternative C, approximately 0.4 acre of vegetation would be lost in the Kalikpik-Kogru area by VSM placement. The types of impacts to vegetation associated with snowdrifting or shading from pipeline placement would be the same as those described previously for Alternative A for the ASDP Area.

Power Lines

Under FFD Alternative C, power lines would be suspended from poles. Less than 1 acre of vegetation would be affected by pole placement.

4C.3.1.3 Alternative C – Summary of Impacts (CPAI and FFD) on Terrestrial Vegetation and Wetlands

Impacts of CPAI Development Plan Alternatives A through D to vegetation and habitat types are summarized in Tables 4A.3.1-3 and 4A.3.1-3, respectively. Impacts from FFD Alternative C are summarized in Table 4C.3.1-3.

4C.3.1.4 Alternative C – Potential Mitigation Measures (CPAI and FFD) for Terrestrial Vegetation and Wetlands

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.1).

4C.3.2 Fish

Alternative C (Figure 2.4.3.1-1) provides an alternative road configuration. The principal differences from Alternative A are that Alternative C includes a more southerly road/pipeline bridge location over the Nigliq Channel near CD-4; a road from CD-1 to CD-3; a more southerly road system to CD5, CD-6, and CD-7 that includes a link to Nuiqsut; and power lines on poles routed on relatively straight alignments between production pads. The locations of the production pads are the same, and airstrips would be constructed only at hypothetical processing facilities.

As in Alternative A, the primary concern in the Plan Area is maintaining winter habitat. Also of concern are maintaining suitable feeding and spawning areas and access to these areas, because those areas are often in different geographic locations; water withdrawal; alteration of flow patterns; release of contaminants during the life of the project; and the impacts of oil spills.

Impacts of and measures to prevent, control, and mitigate spills are not addressed in this section, but can be found in Section 4.3. Further, that section includes an assessment of the project effects on marine fish and habitats. Normal construction and operation impacts for this alternative would not be expected to have measurable impacts on Harrison Bay and nearshore Beaufort Sea environments and biota.

4C.3.2.1 Alternative C – CPAI Development Plan Impacts on Fish

The impacts of Alternative C are largely the same as those of Alternative A, discussed in Section 4A.3.2. Major differences from Alternative A are addressed in the following text.

Construction Period

Water Withdrawal

The main potential impacts of Alternative C would be related to winter water withdrawal (for example, for ice roads) from fish-bearing lakes, as described in Section 4A.3.2. Impacts are not expected if withdrawals are conducted in compliance with permit requirements. The necessary water withdrawals would be monitored to ensure that the volume of water removed from any lake does not exceed permitted amounts.

Potential water sources would be the same as those for Alternative A (Table 4A.3.2-1), plus additional lakes along the more southerly Alternative C road route (Table 4C.3.2-1). Water sources for ice roads to construct the power lines from CD-4 to CD-7 would be those listed for Alternative A (Table 4A.3.2.1). 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 total length of ice roads and thus the water demands of Alternative C will be far greater than for Alternative A.

Gravel Mining

The effects of gravel mining in Alternative C are expected to be similar to those in Alternative A (Section 4A.3.2).

Pipelines

Impacts of pipeline installation would be generally the same as those for Alternative A (Section 4A.3.2).

Pads and Airstrips

The effects of constructing the pads under Alternative C would be generally the same as described for Alternative A (Section 4A.3.2). Because no airstrip would be constructed at CD-3, loss of fish habitat at that facility would potentially be less than for Alternative A.

Bridges and Roads

The dynamic hydrological environment of the Colville River Delta would make construction and maintenance of the road to CD-3 highly problematic. Bridges would be required at the three major channels of the Colville River in the lower Delta:

- A 450-foot bridge across the Sakoonang Channel
- A 750-foot bridge across the Tamayagiaq Channel
- A 500-foot bridge across the Ulamnigiaq Channel

Although these channels are large enough to freeze (and thus do not overwinter fish) in a typical winter (Morris 2003, pers. comm.), in mild winters it is possible that there might be unfrozen waters in these channels that could hold fish. In such circumstances, impacts of construction of these bridges are expected to be generally similar to those of constructing the Nigliq Channel bridge in Alternative A (Section 4A.3.2). See Section 4C.3.2 for additional details on the severe hydrological conditions in the Colville River Delta.

Alternative C includes construction of a 1,200-foot bridge across the Nigliq Channel near the proposed CD-4 location. Impacts from this bridge would be similar to those described for the Nigliq Channel bridge in Alternative A, which would be installed near CD-2 (Section 4A.3.2). Dissolved oxygen levels could be reduced to levels that are stressful or lethal to fish.

Similar to Alternative A, if a pool of low dissolved oxygen develops around any of the four aforementioned bridges in the river channel at the bottom and middle depths following construction, this anomaly could create a barrier to fish movements. If dissolved oxygen levels were depleted in the vicinity of the bridge and fish movement were restricted, the fish and the fishery might be displaced into other areas. Loss of fishery resources might result, decreasing human use of the area to harvest these resources.

A 40-foot bridge would be installed across the narrow portion of Lake 9323 just north of CD-4. In Alternative A, this crossing would be accomplished by a culvert battery. A bridge at this crossing would eliminate the loss of fish habitat resulting from the gravel base of the culvert/roadway and the disturbance of bottom sediments during construction (Section 4A.3.2).

Once it has crossed the Nigliq Channel, the proposed road and pipeline corridor must cross some meandering, relatively large side channels in the floodplain west of the Nigliq Channel bridge crossing area. These channels do not appear to be deep enough to support overwintering by fish. Once out of the immediate floodplain, the road and pipeline corridors have been situated to avoid major water bodies, but another bridge would be required at the Ublutuoch River crossing. In all cases, none of the habitats that would be crossed appear to be deep enough to constitute winter fish habitat or winter movement corridors. Therefore, little or no winter fish habitat would be affected.

A 40-foot bridge is proposed at the Ublutuoch River. Because no instream construction activities are planned at this site, construction impacts to fish are not anticipated.

At both the Nigliq Channel and Ublutuoch River, if the bridge spans only the main channel and gravel approaches are in the floodplain terrace(s), fish habitat will be altered and fish movements disrupted (see discussions of Bridges in Section 4A.3.2).

Culverts

Impacts of culverts, if installed, would be as described in Section 4A.3.2.

Boat Ramps and Docks

Construction of boat ramps and docks, should any be needed for spill response purposes, may have instream impacts similar to those of bridge construction.

Power Lines

Because power lines would be installed in winter, no adverse direct impacts to fish populations would be expected. See Water Withdrawal (above) for a discussion of potential impacts of ice roads that would be needed for winter installation of power poles.

Human Access

The availability of the ice roads during winter construction would increase human access to the Ublutuoch River, the Fish Creek drainage, and the Colville River Delta. There would be a direct connection to Nuiqsut, local residents would use these roads, and increased fishing pressure could result.

Operation Period

Roads and Pipelines

The Alternative C road to CD-3 would cause the redistribution of floodwater during large events. The proposed road would force flow to the east, increase velocities across portions of the floodplain, and cause scouring and sedimentation in numerous places where it would not normally occur. Despite armoring and

stabilization, the potential for continual erosional degradation of the road as well as transport of sediment into the river would be high. Degradation of the road periodically could force its closing and subsequent increased maintenance activity; alternative means of access (for example, aircraft) to CD-3 could be necessary when the road is closed. The combination of these factors could change the physiography of the Delta and severely degrade overwintering potential and summer habitats. Because the hydrology of the lower Colville River is so dynamic, the severity of changes to stream morphology is naturally high. The natural changes are so severe that some of the aforementioned added effects from road-caused flooding would not necessarily have any additional impacts on fish.

The connection of the road network to Nuiqsut would increase human use of the Colville River Delta in summer. Road use under Alternative C would be unrestricted on BLM-administered lands, and both industry personnel and local residents would be permitted to use the other segments of the road. A policy prohibiting fishing and hunting would, however, be applied to industry personnel. Overall, this could increase fishing pressures throughout the Plan Area when waters are not frozen, as well as in overwintering areas such as the lower Delta, the Nigliq Channel, and the Ublutuoch River.

The more southerly alignment of the road and pipeline is farther from the Fish Creek drainage than the alignment in Alternative A. This reduces the potential for contaminant releases from accidents to enter these important fish habitats.

The roads to CD-5 and CD-6 are perpendicular to the primary drainage pattern. Without adequate culverts or bridges over low-lying areas, the roads might function as dams over much of their length, potentially disrupting natural hydrology and fish movement, with a subsequent loss of fish resources in the Fish Creek drainage.

Pads

The effects from the five production pads in Alternative C would be the same as described under Alternative A.

Bridges

The bridges at the Nigliq Channel and the Ublutuoch River should be designed to accommodate 200-year return flood events plus 1 foot of freeboard. Other design considerations such as scour protection, ice jams, and storm surges should prevent bridge or road failure. However, if the bridge or road in this area did fail, the primary impacts would be related to oil spills; potential impacts from spills are addressed in Section 4.3. Also, debris resulting from a bridge failure potentially could be an additionally disrupt flow and obstruct fish movements in the main channel.

If a bridge does not span the Nigliq Channel floodplain, but rather includes in its design gravel bridge approaches across the floodplain terrace(s), the normal flood stage hydrology of the watercourse would be altered. This could also be a concern at the Ublutuoch River. The potential impacts at these two rivers would be similar to those expected for Alternative A (Section 4A.3.2) and could affect substantial numbers of fish. Building the Nigliq Channel and Ublutuoch River bridges so that they span the floodplain terrace(s) in addition to the main channel would eliminate the potential for these impacts.

Flow around the instream piers at the Nigliq Channel bridge would be altered; however, the effects would be minimal and would not result in an impact on fish or on fish habitat. Features such as these piers often attract and hold fish.

The three lower Colville River Delta road bridges are in frequently flooded areas. Ice jams might occur at these locations with effects similar to those described for Alternative A (Section 4A.3.2).

Culverts

Culverts, should they be installed, would be designed to maintain adequate water flow and fish passage. The nature of the potential impacts of installed culverts would be as described in Section 4A.3.2. Because of the greater length of roads proposed for Alternative C, there potentially would be more culverts, and thus a higher potential for impacts, compared with Alternative A.

Human Access

Human access to the Ublutuoch River, the Fish Creek drainage, and the Colville River Delta would be increased by the extension of the road system into Nuiqsut. The use of the road would be unrestricted in BLM-administered lands, and both industry and local residents could use the other segments of the road system. This could result in increased fishing pressure. CPAI's no-fishing policy would restrict use of fish resources by non-resident employees.

4C.3.2.2 Alternative C – Full-Field Development Impacts on Fish

Types of impacts of future development in the Plan Area generally will be similar to those described above for the applicant's five-pad proposed project (Section 4A.3.2). However, development on the scale postulated will, depending on precise siting, destroy or alter fish habitat substantially more than CPAI Development Plan. Overwintering, rearing, migration, and spawning habitats would be affected.

The road and pipeline network would create subtle alteration of flows of waterways on a landscape scale that could lead to unexpected shifts in drainage and loss of fish resources. Impacts to fish passage would be minimized by installation of culverts or bridges as determined during future permitting efforts. However, culvert failure (see Section 4A.3.2) could cause widespread habitat alteration and obstruction of fish movement.

The extent of road development under this scenario suggests that there would be increased potential for human access to fish resources throughout the Plan Area, thus creating greater pressure on fish populations. This is especially true given the road connection to Nuiqsut that would be built under the Alternative C five-pad CPAI Development Plan. However, road access would be limited to industry, and some traditional users of the area might chose other locations to avoid industrial activity altogether.

State-of-the-science construction and operation approaches would be used to minimize impacts, and human access to resources could be controlled as described in Section 4A.3.2. Withdrawal of fresh water necessary to support this scale of infrastructure development plus well drilling should not affect fish if withdrawals are done in compliance with permit restrictions. However, total water withdrawal for construction, given the need for separate ice roads for road construction and power pole installation, would be far greater than that envisioned for the Alternative A FFD scenario. The cumulative effects of this FFD scenario are expected to be similar to effects from current developments. Future mitigation measures are expected to be successful based on previous projects impacts to fish habitat passage.

The following subsections summarize concerns specific to facility groups.

Colville River Delta Facility Group

In the Colville River Delta, seven new production pads are hypothesized. Of particular note are production pads CD-19 and CD-21 on the eastern side of the outer Delta, which are in vicinity of the commercial (Helmericks) fishery as well as subsistence fisheries. Spills, addressed in Section 4.3, would be of major concern with these two hypothetical facilities.

The following bridges in the Colville River Delta have been identified for Alternative C:

- A 1,100-foot bridge across the Tamayayak Channel between CD-1 and CD-14
- A 400-foot bridge across an unnamed channel between CD-14 and CD-19
- A 1,000-foot bridge across the Elaktoveach Channel between CD-14 and CD-19
- A 3,500-foot bridge across the Iaktoveach Channel between CD-14 and CD-19
- A 150-foot bridge across an unnamed channel between CD-19 and CD-20
- An 800-foot bridge across an unnamed channel between CD-19 and CD-20
- A 400-foot bridge across an unnamed channel between CD-19 and CD-21
- A 4,800-foot bridge across the channel between CD-19 and CD-21

Construction of these bridges and the roads to CD-14, CD-19, CD-20, and CD-21 would be in the same problematic environment as described for the road to CD-3 (Section 4C.3.2). Once installed, these roads would face the same severe, dynamic hydrology as described for CD-3 (Section 4C.3.2). The roads would divert floodwaters to the east across almost the entire breadth of the Delta. Widespread physiographic changes could result that would severely degrade overwintering and summer habitats across the Delta. As noted above for CD-3, the naturally severe and dynamic hydrology of the lower Colville River might mean that added effects from road-caused flooding would not necessarily cause any additional impacts to fish. These channels are expected to freeze in typical winters, thus no impacts to fish would be expected. In mild winters, these waters might not freeze, and thus there is potential for impacts to fish as described above .

Fish-Judy Creeks Facility Group

Several facilities would be situated in sensitive areas as designated by BLM and MMS (1998a): CD-8, CD-23, CD-24, and APF-2 in the Fish and Judy creek drainages and CD-18 near the Colville River. Fish habitats in these drainages are important for spawning, migration, rearing, and overwintering for anadromous and resident species. This may affect subsistence users who do not like to fish near development, especially industrial structures.

The road network of this hypothetical development is extensive. If roads are not routed along high ground to the extent possible, relatively large areas of fish habitat could be affected during road construction. The roads from CD-7 to CD-25 and from CD-6 to CD-22 would be perpendicular to the primary drainage flow and thus could function as dams on a landscape scale, disrupting natural hydrology and obstructing fish movement over a wide area.. Bridges or culverts installed in low-lying areas may mitigate this effect.

Kalikpik-Kogru Rivers Facility Group

As with the Fish-Judy Creeks Facility Group, the road network of this hypothetical development is extensive. Thus relatively large areas of fish habitat might be affected during road construction if roads are not routed along high ground to the extent possible. The road from CD-25 to APF-3 would be perpendicular to the primary drainage flow and thus could function as a dam on a landscape scale, disrupting natural hydrology and obstructing fish movement over a wide area. Bridges or culverts installed in low-lying areas might mitigate this effect.

4C.3.2.3 Alternative C – Summary of Impacts (CPAI and FFD) on Fish

Within the Plan Area, the 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 could create overcrowding and reduce the available pool of dissolved oxygen in a water body, with fish mortality a possible result. Low dissolved oxygen could also result from suspension of oxygen-demanding

materials during construction of the Nigliq Channel bridge. Total water demands for Alternative C ice roads, and thus the potential for impact to 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. Impacts are not expected if withdrawals are conducted in compliance with permit requirements.

Pad, road, and pipeline construction is likely to have no measurable adverse effect on arctic fish populations. However, the severe and dynamic hydrology in the lower Colville River Delta would make construction and maintenance of roads problematic in that area. These lower Delta roads would divert floodwaters to the east across the entire breadth of the Delta, although the incremental effects may not have any added impacts on fish that are already exposed to these highly erosive conditions.. Construction of ice roads or airstrips on fish overwintering areas may cause freezing to the bottom and block fish movement. The new road system might facilitate increased human access to fishing areas, potentially increasing subsistence fishing pressures.

Gravel mining would most likely have direct impacts if it were done 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.

Bridge approaches at the Nigliq Channel and Ublutuoch River would extend into the floodplain terrace(s), altering flow during and blocking fish passage during flood stage, and likely adversely affecting the floodplain vegetation. The roads to CD-5 and CD-6 and the long network of roads in the FFD scenario could result in alteration of regional surface hydrology, including interruption of fish movements. Low dissolved oxygen could be caused by sediment suspension during bridge construction

If culverts are installed, failures could impound water ; this would create a new pond or lake upstream of the culvert and diminish flow downstream, interrupting fish movement. Stream morphology changes could occur downstream of culverts as a result of altered flow.

Release of contaminants over the project duration and the impacts of oil spills are important concerns for fish resources; these issues are addressed in Section 4.3.

Essential Fish Habitat

The primary impacts of this alternative on salmon EFH would result from the proposed road in the lower Colville River. If a large flood event occurred, this road would redistribute floodwaters and cause scouring and sedimentation in salmon EFH. Ongoing erosion of a road in this dynamic hydrologic environment would also be expected. However, because the hydrology of the lower Colville River is so dynamic, the severity of changes to stream morphology is naturally so severe that added effects from road-caused flooding would not necessarily have any effects on salmon EFH. The potential impacts from Alternative C to fish in general are described in Section 4C.3.2.

Furthermore, because essentially all of the Plan Area is north of 70° N latitude (Section 3.3.2), and there is marginal habitat to sustain populations, EFH is unlikely to be affected by either CPAI Development Plan Alternative C or FFD Alternative C.

4C.3.2.4 Alternative C – Potential Mitigation Measures (CPAI and FFD) for Fish

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.2).

TABLE 4C.3.2-1 SUMMARY OF FISH PRESENCE AND ESTIMATED AVAILABLE WINTER WATER IN ADDITIONAL PERMITTED LAKES IN THE ALTERNATIVE C AREA

Lake	GIS Est. Acreage	Max. Depth (feet)	Calculated Volume (mil gals)	15% Vol. >7 feet (mil gals)	Specific Conductance (µS/cm)	TDS (mg/L)	Volume Available (mil gals)	Fish Confirmed
For Alternative C, the following permitted lakes are in addition to those listed in Table 4A.3.3-1.								
CD-5, CD-6, and CD-7 Areas								
L9306	64.0	10.2	70.9	0.33	--	70.0	0.33	ns
L9307	650.0	6.1	430.7	--	--	--		ns
L9801	40.1	5.0	21.8	--	179.6	--	21.80	No
L9802	221.9	6.0	144.6	--	172.2	--	144.60	No
L9803	160.9	6.0	104.9	--	--	--		ns
L9804	244.2	4.0	106.1	--	--	--		ns
L9805	435.1	4.0	189.0	--	--	--		ns
L9806	392.0	6.0	255.5	--	--	--		ns
L9807	140.6	10.1	223.8	--	151.9	--		Yes
L9809	22.7	9	22.2	0.04	--	--	0.04	ns

Source: L. L. Moulton, unpublished data.

Notes:

Water Chemistry: some lakes have multiple years of measurements – most recent year is included

mil gals = million gallons

µS/cm = microsiemens per centimeter

TDS = total dissolved solids

mg/L = milligrams per liter

-- = not calculated or no measurement taken

ns = not sampled

4C.3.3 Birds

4C.3.3.1 Alternative C – CPAI Development Plan Impacts on Birds

Table 4A.3.3-1 shows the number of potential nests displaced as a result of habitat loss or alteration and disturbance for CPAI Development Plan Alternative C by bird species and species group.

Waterfowl and Loons

Construction Period

Habitat Loss, Alteration, or Enhancement

Additional gravel placement for the construction of connecting roads would cause greater loss of nesting habitat than either Alternative A or B (Table 4A.3.3-1), leading to the displacement of an additional three to five waterfowl nests and no additional loon nests. Impacts caused by dust from the road system would also be greater than in either Alternative A or B, affecting an additional waterfowl and loon nest. Requirements for ice roads would be similar among alternatives during construction, but would be reduced in Alternative C

compared to Alternatives A and B during project operations. The types of effects on waterfowl and loons associated with gravel placement in Alternative C would be the same as those described under Alternative A.

Colville River Delta nesting habitats used by waterfowl and loons in Alternative C that have additional gravel cover compared to Alternatives A or B are Tapped Lake with High–water Connections, Salt Marsh, Patterned Wet Meadow, and Moist Sedge-Shrub Meadow (Table 4A.3.3-2). Tapped Lake with Low-water Connection habitat used by brood-rearing or staging waterfowl and loons would undergo additional impacts from gravel fill in Alternative C compared to Alternatives A or B. Deep Open Water Without Islands, used by nesting and brood-rearing waterfowl and loons, would be less affected in Alternative C compared to Alternatives A or B. In all instances, except for Aquatic Grass Marsh, habitat impacts would affect less than 1 percent of habitats available in the Colville River Delta (Table 4A.3.3-2).

Nesting habitats used by waterfowl and loons in the NPR-A in Alternative C that have additional gravel cover compared to Alternatives A or B are Old Basin Wetland Complex, Moist Sedge-Shrub Meadow, and Moist Tussock Tundra. Deep Open Water Without Islands, used by brood-rearing and staging waterfowl and loons, would have additional impacts in Alternative C compared to Alternatives A or B. In all cases, less than 1 percent of habitats used by waterfowl and loons available in the NPR-A area would be affected by gravel fill (Table 4A.3.3-2).

Disturbance and Displacement

Disturbances from vehicle traffic would be increased in Alternative C compared to Alternative A or B by the addition of the road connecting CD-3 to CD-1 in the Colville River Delta and the more extensive road system with a connection to Nuiqsut in the NPR-A. Connection to Nuiqsut could lead to additional traffic from local residents. Disturbance from air traffic would be reduced in Alternative C compared to Alternatives A or B by the elimination of the airstrip at CD-3 and would be reduced in Alternative C compared to Alternative B by the elimination of the airstrips at CD-5 and CD-6.

Obstructions to Movement.

The additional road system in Alternative C compared to Alternative A or B would potentially obstruct some movements of waterfowl and loon broods, especially if traffic levels are increased as a result of access to local traffic.

TABLE 4C.3.3-1 CPAI DEVELOPMENT PLAN ALTERNATIVE C – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE

	Nests Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Waterfowl and Waterbirds										
Greater white-fronted goose	2.5	0.6	2.0	1.3	0.7	7.1	2.3	2.4	0.0	11.8
Snow goose	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada goose	0.0	0.0	0.6	0.4	0.2	1.3	0.6	0.6	0.0	2.5
Brant	0.4	0.0	0.3	0.2	0.1	1.0	0.3	0.3	0.0	1.7
Tundra swan	0.1	0.0	0.1	0.0	0.0	0.3	0.1	0.1	0.0	0.5
Mallard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern shoveler	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.2

TABLE 4C.3.3-1 CPAI DEVELOPMENT PLAN ALTERNATIVE C – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE (CONT'D)

	Nests Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Waterfowl and Waterbirds cont'd										
Northern pintail	0.1	0.1	0.3	0.3	0.2	1.0	0.4	0.5	0.0	1.9
Green-winged teal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Greater scaup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Lesser scaup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
King eider	0.0	0.0	0.1	0.1	0.1	0.3	0.2	0.2	0.0	0.7
Long-tailed duck	0.3	0.0	0.1	0.2	0.1	0.8	0.3	0.4	0.0	1.5
Waterfowl Total	**3.5**	**0.9**	**3.6**	**2.6**	**1.4**	**11.9**	**4.4**	**4.6**	**0.0**	**20.9**
Loons										
Red-throated loon	0.1	0.0	0.1	0.0	0.0	0.3	0.1	0.1	0.0	0.4
Pacific loon	0.2	0.1	0.3	0.3	0.2	1.0	0.4	0.5	0.0	1.9
Yellow-billed loon	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.2
Loon Total	**0.4**	**0.1**	**0.4**	**0.3**	**0.2**	**1.4**	**0.6**	**0.6**	**0.0**	**2.6**
Ptarmigan										
Willow ptarmigan	0.2	0.2	0.3	0.3	0.1	1.1	0.4	0.5	0.0	2.0
Rock ptarmigan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ptarmigan Total	**0.2**	**0.2**	**0.4**	**0.3**	**0.1**	**1.1**	**0.5**	**0.5**	**0.0**	**2.0**
Seabirds										
Parasitic jaeger	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.2
Long-tailed jaeger	0.1	0.0	0.1	0.0	0.0	0.2	0.1	0.1	0.0	0.3
Glaucous gull	0.1	0.0	0.2	0.1	0.1	0.5	0.2	0.2	0.0	0.8
Sabine's gull	0.1	0.0	0.0	0.1	0.1	0.3	0.1	0.1	0.0	0.5
Arctic tern	0.1	0.1	0.2	0.1	0.1	0.6	0.3	0.3	0.0	1.1
Seabird Total	**0.5**	**0.1**	**0.4**	**0.4**	**0.2**	**1.6**	**0.6**	**0.7**	**0.0**	**2.9**
Shorebirds										
Black-bellied plover	0.6	0.2	0.7	0.9	0.5	2.9	1.5	1.5	0.0	5.9
American golden-plover	0.7	0.3	0.5	0.7	0.3	2.4	1.1	1.1	0.0	4.6
Bar-tailed godwit	0.1	0.1	0.2	0.3	0.1	0.9	0.4	0.4	0.0	1.6
Semipalmated sandpiper	6.6	2.8	3.8	4.4	2.4	20.0	10.0	10.1	0.0	40.1
Baird's sandpiper	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.0	0.4
Pectoral sandpiper	12.4	5.4	3.9	4.4	2.8	28.9	14.0	13.5	0.0	56.4
Dunlin	0.4	0.2	0.6	0.7	0.3	2.3	1.1	1.2	0.0	4.5
Stilt sandpiper	0.6	0.2	0.9	0.7	0.4	2.8	1.3	1.3	0.0	5.4
Buff-breasted sandpiper	0.0	0.0	0.4	0.5	0.3	1.1	0.6	0.7	0.0	2.4
Long-billed dowitcher	1.0	0.4	2.2	2.5	1.3	7.4	3.5	3.7	0.0	14.7

TABLE 4C.3.3-1 CPAI DEVELOPMENT PLAN ALTERNATIVE C – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE

	Nests Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Shorebirds										
Red-necked phalarope	3.1	1.3	2.4	2.8	1.9	11.5	5.4	5.4	0.0	22.3
Red phalarope	2.1	0.9	0.9	0.9	0.5	5.3	2.6	2.6	0.0	10.5
Shorebird Total	**27.5**	**11.9**	**16.5**	**18.9**	**10.9**	**85.7**	**41.6**	**41.6**	**0.0**	**168.8**
Passerines										
Yellow wagtail	0.1	0.1	0.1	0.1	0.0	0.4	0.2	0.2	0.0	0.7
Savannah sparrow	0.7	0.3	0.4	0.5	0.4	2.3	1.1	1.1	0.0	4.5
Lapland longspur	12.5	5.4	7.3	9.1	5.1	39.5	19.2	19.3	0.0	78.0
Common redpoll	0.1	0.1	0.3	0.4	0.2	1.1	0.5	0.5	0.0	2.1
Passerine Total	**13.5**	**5.8**	**8.0**	**10.1**	**5.8**	**43.2**	**21.0**	**21.1**	**0.0**	**85.4**

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 500 meters of airstrip for waterfowl, loons, and seabirds. No disturbance was evident for shorebirds and passerines (Johnson et al. 2003b).

TABLE 4C.3.3-2 ALTERNATIVE C – SUMMARY OF AFFECTED HABITAT TYPES USED BY WATERFOWL AND LOONS[A]

Habitat Type	Colville River Delta						NPR-A					
	Acres in Colville River Delta[b]	Loss or Alteration[c] (Acres and %)		Waterfowl (10 species)			Acres in NPR-A[d]	Loss or Alteration[c] (Acres and %)		Waterfowl (9 species)		
				Nesting (10)	Brood-rearing (10)	Staging (3)				Nesting	Brood-rearing (6)	Staging (1)
Open Nearshore Water	2,476					1	840					
Brackish Water	1,614			2	6	2	331					
Tapped Lake with Low-water Connection	5,342	21	(0.4%)		3	1	420					
Tapped Lake with High-water Connection	5,132	12	(0.2%)	1	4		17					
Salt Marsh	4,090	5	(0.1%)	1	1	1	902					
Tidal Flat	13,841					1	2,021					
Salt-killed Tundra	6,336			5		1	35					
Deep Open Water without Islands	5,132	1	(0.0%)	2	7		12,343	3	(0.0%)		5	1
Deep Open Water with Islands or Polygonized Margins	191,756	11	(0.0%)	5	6	1	8,950			3	3	1
Shallow Open Water without Islands	499	1	(0.2%)		1		1,737	2	(0.1%)	1		
Shallow Open Water with Island or Polygonized Margins	133			1	2		2,824	1	(0.0%)	4	1	
River or Stream	20,280	8	(0.0%)			1	1,525					
Aquatic Sedge Marsh	32						2,854	6	(0.2%)	3	2	

TABLE 4C.3.3-2 ALTERNATIVE C – SUMMARY OF AFFECTED HABITAT TYPES USED BY WATERFOWL AND LOONS[a] (cont'd)

Habitat Type	Colville River Delta						NPR-A					
	Acres in Colville River Delta[b]	Loss or Alteration[c] (Acres and %)		Waterfowl (10 species)			Acres in NPR-A[d]	Loss or Alteration[c] (Acres and %)		Waterfowl (9 species)		
				Nesting (10)	Brood-rearing (10)	Staging (3)				Nesting	Brood-rearing (6)	Staging (1)
Aquatic Sedge with Deep Polygons	3,267	2	(0.1%)	8	3		74					
Aquatic Grass Marsh	358	9	(2.5%)		1		487			1	1	
Young Basin Wetland Complex							623	9	(1.5%)			
Old Basin Wetland Complex	2						15,118	33	(0.2%)	2	1	1
Riverine Complex							687	1	(0.1%)			
Dune Complex							1,876					
Nonpatterned Wet Meadow	10,265	22	(0.2%)	4			5,305	15	(0.3%)	1	1	
Patterned Wet Meadow	25,361	119	(0.5%)	8			19,487	47	(0.2%)			1
Moist Sedge-Shrub Meadow	3,262	29	(0.9%)	2			39,920	144	(0.4%)	1		1
Moist Tussock Tundra	630						47,101	226	(0.5%)	3		
Riverine Low and Tall Shrub		3		1			1,794					
Upland Low and Tall Shrub							692					
Upland and Riverine Dwarf Shrub[b]							2,217					
Riverine or Upland Shrub[c]	6,815	13	(0.2%)				0					
Barrens (riverine, eolian, or lacustrine)	19,440	11	(0.1%)				1,690					
Artificial (water, fill, peat road)	96						0					
Total Area	**136,323**	**264**	**(0.2%)**				**171,869**	**488**	**(0.3%)**			

Notes:

[a] Numbers of species using habitats by life history stage.

[b] Mapped for NPR-A area only.

[c] Total includes gravel for pads and airstrips and area affected by dust.

[d] Mapped for Colville River Delta area only.

Mortality

Potential mortality resulting from collisions with vehicles would be higher in Alternative C than in Alternatives A or B, with the development of the more extensive road system. The potential mortality from collisions with aircraft would be lower in Alternative C than in Alternatives A or B, with the elimination of the airstrip at CD-3 from Alternatives A and B and airstrips from CD-5 and CD-6 in Alternative B. The potential for increased nest and gosling or duckling depredation from raptors and ravens would be increased in Alternative C over Alternatives A or B by the placement of all power lines on poles instead of VSMs.

Operation Period

Habitat Loss, Alteration, and Enhancement

Some habitat loss or alteration from snowdrifts, gravel spray, dust fallout, thermokarst, and ponding would continue during project operation. Dust fallout would be expected to be less than during the construction because of reduced traffic. Habitat alterations from dust fallout would be higher in Alternative C than in

Alternatives A or B because of the more extensive road system and potentially higher traffic levels because of local access from Nuiqsut. Habitat alterations from low-ground-pressure vehicles during summer or winter would be reduced in Alternative C compared to Alternative A or B because of the road access to all facilities.

Disturbance and Displacement

Disturbance from vehicle traffic would be increased in Alternative C compared to Alternatives A or B at CD-3 and potentially at CD-4, CD-5, CD-6, and CD-7 because of local access from Nuiqsut. Potential disturbance from air traffic would be reduced in Alternative C compared to Alternatives A or B by the elimination of the airstrip at CD-3 from Alternatives A and B and the elimination of airstrips at CD-5 and CD-6 from Alternative B.

Obstructions to Movement

Potential obstructions to movements of waterfowl and loon broods across roads would continue during project operation. This potential obstruction would be higher than in Alternatives A or B because of the more extensive road system and local access from Nuiqsut, which may lead to increased traffic levels.

Mortality

Potential mortality from collisions with vehicles would be higher in Alternative C compared to Alternatives A or B because of the more extensive road system. Increased traffic resulting from local access from Nuiqsut would also potentially increase mortality from collisions with vehicles. Mortality from harvest may also increase because increased access to local traffic. Mortality from collisions with aircraft would be reduced in Alternative C compared to Alternatives A or B because of the elimination of the airstrip at CD-3 from Alternatives A and B and the elimination of airstrips at CD-5 and CD-6 from Alternative B.

Potential mortality from collisions with power lines would be increased in Alternative C compared to Alternatives A or B by the placement of all power lines on poles. Potential mortality from depredation by raptors or ravens would be increased for nesting waterfowl and loons by the presence of power line poles used for perching by raptors and ravens. Potential mortality from depredation by seabirds may also be increased in Alternative C compared to Alternatives A or B by the increased vantage from the 7-foot versus the 5-foot elevated pipeline.

Ptarmigan

Construction Period

Habitat Loss, Alteration, or Enhancement

Habitat loss from gravel fill would result in similar numbers of ptarmigan nests displaced across Alternatives A to C because of the low nesting density for this group (Table 4C.3.3-1). More Patterned Wet Meadow and Moist Sedge-Shrub Meadow habitats used by ptarmigan for nesting and brood-rearing would be covered by gravel fill in Alternative C compared to Alternatives A or B (Table 4A.3.3-2).

Disturbance and Displacement

Disturbance from vehicle traffic would be increased in Alternative C compared to Alternatives A or B, while disturbance from air traffic would be decreased. Industry and local use of the access road connecting the Colville River Delta sites with the NPR-A sites and Nuiqsut could result in increased levels of vehicular traffic compared to Alternative A.

Obstruction to Movement

Potential obstructions to ptarmigan movements would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and provisions for local access.

Mortality

Potential mortality resulting from collisions with vehicles would increase in Alternative C compared to Alternatives A or B because of the more extensive road system and access to local traffic. Potential mortality from increased depredation of adults, eggs, and chicks would be higher in Alternative C compared to Alternatives A or B because of the placement of all power lines on poles, which increases predator efficiency by providing perches.

Operation Period

During the operation period under Alternative C, the potential types of impacts to ptarmigan from habitat loss and alteration, disturbance, obstructions to movements, and mortality would be the same as those described previously for the construction period.

Raptors and Owls

Raptors are generally uncommon visitors and occasional nesters in the Plan Area. Habitat loss and disturbance resulting from the proposed development in Alternative C are unlikely to affect raptors because of the low numbers of birds reported in the Plan Area. Gravel roads, buildings, pipelines, and bridges would not obstruct raptor movements. Perches provided by communication towers, power poles, buildings, and pipelines at 7 feet could increase the ability of raptors to prey on other waterfowl, shorebirds, passerines, and ptarmigan. The small numbers of raptors and owls that occur in the Plan Area are unlikely to suffer any mortality from collisions with vehicular traffic, buildings, bridges, or pipelines.

Shorebirds

Construction Period

Habitat Loss, Alteration, or Enhancement

Total habitat loss and alteration would be greater in Alternative C compared to Alternatives A or B because of the greater area of gravel fill and increased dust fallout caused by the more extensive road system (Table 4A.3.3-1). Areas of habitats used by shorebirds that would be affected by increased gravel fill in Alternative C compared to Alternatives A or B are Nonpatterned and Patterned Wet Meadow, Moist Sedge-Shrub Meadow, Moist Tussock Tundra, Riverine or Upland Shrub, and Barrens (Table 4A.3.3-2). In all cases, less than 1 percent of these habitats available in the Colville River Delta and in the NPR-A would be affected by gravel fill and dust deposition (Table 4A.3.3-2). Temporary habitat alteration resulting from ice-road construction would be similar in Alternative C compared to Alternative A and reduced in Alternative C compared to Alternative B (Table 4A.3.3-1). Potential habitat alteration from thermokarsting and ponding also would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system.

Temporary habitat loss and permanent habitat alteration from the removal of gravel from the ASRC Mine Site and Clover Potential Gravel Source would be increased in Alternative C compared to Alternatives A or B because of the amount of gravel removed to construct the additional roads.

Disturbance and Displacement

Disturbance from vehicle traffic would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and potentially increased traffic levels from local access.

Obstructions to Movements

Potential obstructions to movements of shorebird broods would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and potentially increased traffic levels from local access.

Mortality

Potential mortality resulting from collisions with vehicles would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic levels from local access. Potential mortality from depredation of adults, nests, and chicks would be higher in Alternative C than in Alternatives A or B because of the placement of all power lines on poles and the increased pipeline elevation from 5 feet to 7 feet, which would increase perching habitat and improve vantage points for raptors and ravens.

Operation Period

Habitat Loss, Alteration, or Enhancement

Impacts to shorebirds from habitat loss and alteration would continue during project operations and would be higher in Alternative C than in Alternatives A or B because of the increased gravel fill and more extensive road system. Temporary impacts from ice roads and tundra travel would be decreased in Alternative C compared to Alternatives A or B because of road access to all facilities in Alternative C.

Disturbance and Displacement

Disturbance from vehicle traffic would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic levels resulting from local access.

Obstructions to Movements

Obstruction to movements of shorebird broods would continue during project operation and would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and potentially increased traffic levels.

Mortality

Mortality from collisions with vehicles would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic levels. Mortality would be increased by the placement of power lines on poles.

Seabirds

Construction Period

Habitat Loss, Alteration, or Enhancement

Habitat loss resulting from gravel placement would be increased in Alternative C compared to Alternatives A or B, resulting in displacement of an additional seabird nest compared to Alternatives A or B (Table 4A.3.3-1).

Gravel fill would affect fewer acres of Deep Open Water with Islands or Polygonized Margins, and Aquatic Sedge with Deep Polygons, and more acres of Patterned Wet Meadow habitats used by nesting and brood-rearing seabirds in Alternative C than in Alternatives A or B (Table 4A.3.3-2). Placement of power lines on poles and elevation of the pipeline from 5 feet to 7 feet might provide perching habitat that would enhance foraging efficiency of seabirds.

Disturbance and Displacement

Disturbance from vehicle traffic would be increased in Alternative C above that in Alternatives A or B because of the more extensive road system and local access from Nuiqsut. Disturbance from air traffic would be reduced in Alternative C by elimination of the airstrip at CD-3 from Alternatives A and B and the elimination of the airstrips at CD-5 and CD-6 from Alternative B.

Obstructions to Movement

Obstructions to movements of seabird broods would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and potentially increased traffic levels resulting from local access.

Mortality

Mortality from collisions with vehicles would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic levels resulting from local access. Mortality from collisions with aircraft would be decreased in Alternative C compared to Alternatives A or B because of the elimination of one to three airstrips among the alternatives. Mortality from collisions with power lines would be increased by placement of all power lines on poles in Alternative C. Mortality from increased depredation on eggs or young could be increased by the placement of all power lines on poles and increasing the pipeline height from 5 feet to 7 feet, giving predators better perching locations and vantage points.

Operation Period

Habitat Loss, Alteration, or Enhancement

Habitat loss and alteration from gravel placement would continue during project operations and would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system.

Disturbance and Displacement

Under Alternative C, seabirds would be subjected to the same types of disturbances discussed above for Alternative A, including disturbances related to vehicular traffic, noise from equipment on roads or at facilities, and pedestrian traffic. Disturbance related to air traffic at the CD-3 site would be lower in Alternative C compared to Alternatives A or B. Industry and local use of the access road connecting the Colville River Delta sites with the NPR-A sites and Nuiqsut may result in increased levels of vehicular traffic compared to Alternatives A or B.

Obstructions to Movement

Obstructions to movements of seabird broods would continue during project operations and would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic resulting from local access.

Mortality

Mortality from collisions with vehicles would continue during project operation and would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic levels resulting from local access. Mortality from collisions with aircraft would be reduced by the elimination of the airstrip at CD-3 from Alternatives A and B and the elimination of the airstrips at CD-5 and CD-6 from Alternative B. Mortality from collisions with power lines would be increased by the placement of all power lines on poles in Alternative C. Potential for increased depredation from raptors or common ravens perching on power poles would be increased in Alternative C compared to Alternatives A or B.

Passerines

Construction Period

Habitat Loss, Alteration, or Enhancement

Habitat loss or alteration would be increased in Alternative C compared to Alternatives A or B because of increased gravel fill resulting in the loss of an additional 12 to 19 passerine nests, primarily Lapland longspurs (Table 4A.3.3-1). More areas of Riverine or Upland Shrub and Moist Sedge-Shrub Meadow habitats used by nesting passerines would be covered by gravel in Alternative C than in Alternatives A or B. Temporary habitat alteration from ice-road construction would be similar to Alternative A and lower than Alternative B because of road access to all facilities after construction (Table 4A.3.3-1). Habitat alteration resulting from thermokarsting and ponding would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system. Temporary habitat loss and permanent habitat alteration from the removal of gravel from the ASRC Mine Site and Clover Potential Gravel Source would be increased in Alternative C over Alternatives A or B because of the increased amount of gravel required for construction. Power poles, communication towers, and buildings could provide perches for common ravens and possibly structures for nesting. VSMs and buildings would provide nesting structures for snow buntings.

Disturbance and Displacement

Disturbance from vehicle traffic would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic levels resulting from local access.

Obstructions to Movements

As with Alternatives A and B, road systems and structures would not be anticipated to obstruct passerine movements.

Mortality

Mortality from collisions with vehicles would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and potentially increased traffic resulting from local access. Mortality from collisions with power lines would be higher in Alternative C than in Alternatives A or B because of placement of all power lines on poles. Mortality from depredation of adults, nests, and young would be increased by using poles to support power lines, which would provide perching habitats for raptors and ravens.

Operation Period

Habitat Loss, Alteration, or Enhancement

Habitat loss and alteration would continue during project operation and would be greater in Alternative C than in Alternatives A or B because of the more extensive road system and potentially increased traffic resulting from local access.

Disturbance and Displacement

Disturbance from vehicle traffic would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and potentially increased traffic resulting from local access.

Obstructions to Movements

As with Alternatives A and B, operational activities would not be anticipated to obstruct passerine movements.

Mortality

Mortality from collisions with vehicles would continue during project operation and would be higher in Alternative C than in Alternatives A or B because of the more extensive road system and the potentially increased traffic from local access. Mortality would be increased in Alternative C compared to Alternatives A or B by the placement of power lines on poles, which would result in both collisions and increased depredation from raptors and common ravens perching on poles.

4C.3.3.2 Alternative C – Full-Field Development Plan Impacts on Birds

The mechanisms associated with habitat loss and alteration, disturbance and displacement, obstruction to movements, and mortality for birds in the Colville River Delta, Fish-Judy Creeks, and Kalikpik-Kogru Rivers Facility Groups would be the same as those described under Alternative A. Potential impacts are summarized for Alternative C FFD based on nesting densities in the Colville River Delta and the NPR-A in Table 4A.3.3-3. In Alternative C FFD, all facilities would be supported by road access, and most facilities would be moved outside of the 3-mile sensitive area around Fish Creek. Total gravel placement would be increased in Alternative C compared to Alternatives A or B, resulting in the greatest potential displacement of bird nests from gravel fill and dust fallout (Table 4A.3.3-3).

Colville River Delta Facility Group

A summary of the potential numbers of bird nests affected by the hypothetical FFD in the Colville River Delta Facility Group based on nesting densities reported for the Colville River Delta is presented in Table 4A.3.3-3.

Habitat Loss, Alteration, or Enhancement

Total habitat loss from gravel placement and dust fallout would be increased in Alternative C FFD compared to Alternatives A or B FFD, resulting in a larger number of potential bird nests affected (Table 4A.3.3-3). Total habitat alteration from ice-road construction and tundra travel would be reduced from FFD Alternatives A and B because of the road access to all facilities. Placement of power lines on poles rather than VSMs would provide perching habitat for raptors, common ravens, and glaucous gulls. The 7-foot pipeline elevation may decrease the amount of snowdrifting and the resulting habitat alteration. The more southern placement of the Nigliq crossing affects more willow habitat than the Alternative A crossing location.

Disturbance and Displacement

The addition of the road system in the outer Colville River Delta under Alternative C FFD would increase the potential for disturbance to birds from vehicular traffic and machinery compared to Alternatives A or B FFD. The road connection with Nuiqsut could allow increased levels of local traffic that would increase disturbance. The elimination of the airstrips at production pads under Alternative C would eliminate disturbance associated with air traffic.

Obstruction to Movement

The more extensive road system and local access would increase obstruction of brood-rearing waterfowl, seabirds, and shorebirds in Alternative C compared to Alternatives A or B.

Mortality

Mortality from collisions with vehicles and power lines would be increased in Alternative C FFD compared to FFD Alternatives A or B because of the more extensive road system, potentially increased traffic, and placement of power lines on poles. Mortality from collisions with aircraft would be reduced by the elimination of airstrips at pad locations. Mortality from hunting may be increased by increased local access resulting from the road system.

Fish-Judy Creeks Facility Group

A summary of the potential numbers of bird nests affected by the hypothetical FFD in the Fish-Judy Creeks Facility Group based on nesting densities reported for the NPR-A is presented in Table 4A.3.3-3.

Habitat Loss, Alteration, or Enhancement

Total habitat loss from gravel placement and dust fallout would be increased in Alternative C FFD compared to Alternatives A or B FFD, resulting in a larger number of potential bird nests affected (Table 4A.3.3-3). Total habitat alteration resulting from ice-road construction and tundra travel would be less than in FFD Alternatives A and B because of the road access to all facilities. Placement of power lines on poles rather than VSMs would provide perching habitat for raptors, common ravens, and glaucous gulls. The 7-foot pipeline elevation may decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

The addition of the road system in the Fish and Judy creeks drainage under Alternative C FFD would increase the potential for disturbance to birds from vehicular traffic and machinery compared to FFD Alternatives A or B. The road connection with Nuiqsut could allow increased levels of local traffic that would increase disturbance. The elimination of the airstrips at production pads under Alternative C FFD would eliminate disturbance associated with air traffic.

Obstruction to Movement

The more extensive road system and local access would increase obstruction of brood-rearing waterfowl, seabirds, and shorebirds in Alternative C FFD compared to FFD Alternatives A or B.

Mortality

Mortality from collisions with vehicles and power lines would be increased in Alternative C FFD compared to FFD Alternatives A or B because of the more extensive road system, potentially increased traffic, and placement of power lines on poles. Mortality from collisions with aircraft would be reduced by the elimination

of airstrips at pad locations. Mortality from hunting could be increased by increased local access over the road system.

Kalikpik-Kogru Rivers Facility Group

A summary of the potential numbers of bird nests affected by the hypothetical FFD in the Kalikpik-Kogru Rivers Facility Group based on nesting densities reported for the NPR-A is presented in Table 4A.3.3-3.

Habitat Loss, Alteration, or Enhancement

Total habitat loss from gravel placement and dust fallout would be increased in Alternative C FFD compared to Alternatives A or B FFD, resulting in a larger number of potential bird nests affected (Table 4A.3.3-3). Total habitat alteration resulting from ice-road construction and tundra travel would be reduced from FFD Alternatives A and B because of the road access to all facilities. Placement of power lines on poles rather than VSMs would provide perching habitat for raptors, common ravens, and glaucous gulls. The 7-foot pipeline elevation may decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

The addition of the road system in the Kalikpik-Kogru Rivers Facility Group under Alternative C FFD would increase the potential for disturbance to birds from vehicular traffic and machinery compared to Alternative A or B FFD. The road connection with Nuiqsut could allow increased levels of local traffic that would increase disturbance. The elimination of the airstrips at production pads under Alternative C FFD would eliminate disturbance associated with air traffic.

Obstruction to Movement

The more extensive road system and local access would increase obstruction of brood-rearing waterfowl, seabirds, and shorebirds in Alternative C FFD compared to FFD Alternatives A or B.

Mortality

Mortality from collisions with vehicles and power lines would be increased in Alternative C FFD compared to FFD Alternatives A or B because of the more extensive road system, potentially increased traffic, and placement of power lines on poles. Mortality from collisions with aircraft would be reduced by the elimination of airstrips at pad locations. Mortality from hunting may be increased by increased local access over the road system.

4C.3.3.3 Alternative C – 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. To determine the level of effect, we evaluated the nesting densities of bird species groups around the area of each proposed development and evaluated the number of nests potentially exposed to the action. In most cases, effects would involve a few individuals, 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 snowdrifting occur 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 and the results of these activities for Alternative C for both the CPAI alternative and the FFD alternative are presented in Table 4C.3.3-4.

4C.3.3.4 Alternative C – Potential Mitigation Measures (CPAI and FFD) for Birds

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.4).

TABLE 4C.3.3-3 SUMMARY OF ALTERNATIVE C FFD IMPACTS TO NESTING BIRDS

Bird Group	Gravel	Dust	Ice Roads	Airstrips[a]	Total
Colville River Delta Facility Group					
Waterfowl	8	3	1	0	12
Loons	1	0	0	0	1
Ptarmigan	1	0	0	0	1
Raptors and Owls	0	0	0	0	0
Seabirds	1	0	0	0	1
Shorebirds[b]	118	38	22	0	178
Passerines[b]	58	19	11	0	88
Total Birds	**187**	**60**	**34**	**0**	**281**
Fish-Judy Creeks Facility Group					
Waterfowl	19	9	2	0	30
Loons	2	1	0	0	3
Ptarmigan	2	1	0	0	3
Raptors and Owls	0	0	0	0	0
Seabirds	3	1	0	0	4
Shorebirds[b]	128	59	10	0	197
Passerines[b]	66	31	5	0	102
Total Birds	**220**	**102**	**17**	**0**	**339**
Kalikpik-Kogru Rivers Facility Group					
Waterfowl	13	6	2	0	21
Loons	2	1	0	0	3
Ptarmigan	1	1	0	0	2
Raptors and Owls	0	0	0	0	0
Seabirds	2	1	0	0	3
Shorebirds[b]	90	40	11	0	141
Passerines[b]	47	21	6	0	74
Total Birds	**155**	**70**	**19**	**0**	**244**

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 1 km of airstrip (Johnson et al. 2003a).

[b] No disturbance effects from airstrips have been shown for these groups (Johnson et al. 2003a).

TABLE 4C.3.3-4 CPAI AND FFD ALTERNATIVE C – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE

	CPAI Development Plan Alternative C Totals				
Bird Group	**Gravel**	**Dust**	**Ice**	**Airstrip[a]**	**Total**
Waterfowl	12	4	5	0	21
Loons	1	1	1	0	3
Ptarmigan	1	1	1	0	2
Seabirds	2	1	1	0	3
Shorebirds	86	42	42	0	169
Passerines	43	21	21	0	85
Total Nests	145	69	69	0	283
	FFD Alternative C Totals				
Bird Group	**Gravel**	**Dust**	**Ice**	**Airstrip[a]**	**Total**
Waterfowl	40	18	5	0	63
Loons	5	2	0	0	7
Ptarmigan	4	2	0	0	6
Seabirds	6	2	0	0	8
Shorebirds	336	137	43	0	516
Passerines	171	71	22	0	264
Total Nests	562	232	70	0	864

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 500 meters of airstrip for waterfowl, loons, and seabirds. No disturbance was evident for shorebirds and passerines (Johnson et al. 2003b).

4C.3.4 Mammals

4C.3.4.1 Terrestrial Mammals

Alternative C – CPAI Development Plan Impacts on Terrestrial Mammals

Important characteristics of Alternative C with regard to effects on terrestrial mammals include the following. Alternative C would include 41 miles of road and 41.1 miles of pipeline (Figure 2.4.3.1-1). This is 15.2 miles more road and 5.6 miles more pipeline than in Alternative A. Essentially all of the pipelines in Alternative C have an adjacent road, including the route to CD-3 in the Colville River Delta. Most pipelines in Alternative A have adjacent roads, except the route to CD-3. The area covered by gravel in Alternative C includes 48.1 acres of gravel pads and 330.9 acres of gravel road. This is 28.1 acres fewer of pads/airstrips than Alternative A and 136.8 acres more of road than Alternative A. There are no airstrips in Alternative C. The total gravel fill (pads, roads, airstrips) for Alternative C is more than 100 acres more than that for Alternative A. The road/pipeline routes in Alternative C are substantially different from those in Alternative A. Alternative C differs from Alternative A in that there is a road connecting Nuiqsut, Alpine CD-1, and all the new facilities (CD-3 through CD-7). Unlike Alternatives A and B, there is a road accompanying the pipeline from CD-1 to CD-3. The route of the road/pipelines connecting CD-2 and CD-4 through CD-7 is several miles to the south of the road/pipeline routes in Alternatives A, B, and D. In Alternative C, pipelines would be elevated to 7 feet, and roads would be by used by industry, local residents, and the public (on BLM lands).

Construction Period

Direct Habitat Loss, Alteration, or Enhancement

In Alternative C, the amount of area to be covered by gravel would increase by more than 100 acres compared to Alternative A. See the Operation Period section under Alternative C for quantification of habitat types lost or altered under gravel fill. The road from the Clover Potential Gravel Source to CD-6 and CD-7 might cover one existing inactive (in summer 2002) arctic fox den (Johnson et al. 2003).

Disturbance and Displacement

In Alternative C, disturbance and displacement effects during winter construction would be similar to those described for Alternative A but in the different Alternative C locations of the road/pipeline corridors. There would be increased construction between CD-1 and CD-3 because of the road included in Alternative C. This might increase the potential for disturbance of denning grizzly bears and polar bears. The road/pipeline routes between CD-4, CD-5, CD-6, and CD-7 would be farther to the south than those in Alternative A. Construction activity could cause some disturbance and displacement of wintering caribou, muskoxen, moose, and denning grizzly bears, as with Alternative A. The potential for disturbance of caribou could be greater in Alternative C than in Alternative A because past winter distributions of caribou have included the southeast part of the Plan Area. The potential for disturbance of moose may be greater in Alternative C than in Alternative A because moose tend to occur farther to the south in the winter.

Obstruction to Movements

The access road to CD-6 and CD-7 under Alternative C would be approximately 5 miles south of that proposed in Alternative A. This could affect the movements of more caribou in winter (BLM 2003). As discussed under Alternative A, there would probably be few moose, muskoxen, wolves, or wolverines near construction areas during the winter. Construction in the riparian zones (for example, along the Ublutuoch River) could obstruct movements of these species. The potential for obstruction of movements to have adverse effects on terrestrial mammals would be greatest if there are energy demands and less forage available because of cold temperatures or heavy snowfall.

Mortality

Mortality associated with winter construction of Alternative C would likely be similar to that described for Alternative A. Because the construction of the Alternative C road from CD-4 to CD-6 and CD-7 would occur in an area that has had more wintering caribou, more vehicle-collisions could occur along this route. The construction activity for Alternative C may disturb some denning grizzly bears, possibly resulting in mortality from human conflict or exposure of cubs or adults to harsh winter conditions.

Operation Period

Direct Habitat Loss, Alteration, or Enhancement

Direct habitat lost for foraging by terrestrial mammals would be the area covered by gravel fill. This would be restricted to the roads and facility pads, because there would be no new airstrips. Alternative C would have more than 100 acres more gravel fill than Alternative A. The additional gravel fill in Alternative C could increase potential insect-relief habitat. The road from CD-1 to CD-3 could provide additional potential insect-relief habitat in the northern part of the Colville River Delta.

The two most important foraging habitat types for caribou in summer are Moist Sedge-Shrub Meadow and Moist Tussock Tundra (Lawhead et al. 2003; Russell et al. 1993; Jorgenson et al. 2003). The Barrens habitat type primarily provides insect relief to caribou in summer (Jorgenson et al. 2003). The most important habitat

types for muskoxen include Riverine, Upland Shrub, and Moist Sedge-Shrub Meadow habitat types (PAI 2002; BLM and MMS 2003 and references therein). These habitat types, as well as Barrens, are the most important habitat types for grizzly bears (Shideler and Hechtel 2000; Jorgenson et al. 2003; PAI 2002 and references therein). The Riverine and Upland Shrub habitat types are also the most important habitat types for moose. These habitat types potentially lost from gravel fill (roads, pad, and airstrips) under Alternative C are quantified below.

A total of 3,261 acres of Moist Sedge-Shrub Meadow are available in the Colville River Delta (PAI 2002). A habitat map is available for 171,861 acres in the NPR-A, but not for the entire area. The total area of Moist Sedge-Shrub Meadow in the habitat-typed area of the NPR-A is 39,920 acres (Jorgenson et al. 2003). A total of 79.76 acres (12.43 acres in the Colville River Delta, 67.33 acres in the NPR-A) of Moist Sedge-Shrub Meadow habitat type would be lost as a result of gravel placement (roads, pads, and airstrips) under Alternative C. The potential loss of Moist Sedge-Shrub Meadow from placement of gravel fill is less than 0.4 percent of that available on the Colville River Delta. The habitat potential loss in the NPR-A cannot be calculated because a habitat map is not available for the entire area. However, the potential loss under gravel fill in the habitat-typed area in the NPR-A is about 0.1 percent of the Moist Sedge-Shrub Meadow habitat type available in that area. In addition to gravel fill, 92.94 acres (16.09 acres in the Colville River Delta, 76.85 acres in the NPR-A) of Moist Sedge-Shrub Meadow habitat type would be altered by dust fallout (Table 4C.3.1-2).

The combined area of Riverine and Upland Shrub habitat types in the Colville River Delta is 6,814 acres (PAI 2002). The combined area of Riverine and Upland Shrub habitat types in the NPR-A is 5,390 acres (Jorgenson et al. 2003). A total of 15.81 acres (14.97 acres in the Colville River Delta, 0.846 acre in the NPR-A) of Riverine and Upland Shrub habitat types would be lost as a result of gravel placement (roads, pads, and airstrips) under Alternative C. In addition, 15.86 acres (12.04 acres in the Colville River Delta, 1.02 acres in the NPR-A) of Riverine and Upland Shrub habitat would be altered by dust fallout (Table 4C.3.1-2).

The potential loss of Riverine and Upland Shrub habitat constitutes about 0.1 percent of the Riverine and Upland Shrub habitats available on the Colville River Delta.

A total of 627 acres of Moist Tussock Tundra habitat type is available in the Colville River Delta (PAI 2002). The total area of Moist Tussock Tundra in the habitat-typed area of the NPR-A is 47,102 acres (Jorgenson et al. 2003). No Moist Tussock Tundra would be lost or altered in the Colville River Delta under Alternative C (Table 4C.3.1-2). A total of 109.38 acres of Moist Tussock Tundra would be lost as a result of gravel placement (roads, pads, and airstrips) in the NPR-A (Table 4C.3.1-2). The potential habitat loss in the NPR-A cannot be calculated because a habitat map is not available for the entire area. However, the potential loss under gravel fill in the habitat-typed area in the NPR-A is about 0.2 percent of that available in that area. In addition to gravel fill, 116.62 acres of Moist Tussock Tundra habitat type would be altered by dust fallout in the NPR-A (Table 4C.3.1-2).

The total area of Barrens habitat type in the Colville River Delta is 19,440 acres (PAI 2002). The total area of Barrens in the habitat-typed area of the NPR-A is 1,698 acres (Jorgenson et al. 2003). A total of 6.98 acres of Barrens habitat type would be lost as a result of gravel placement (roads, pads, and airstrips) in the Colville River Delta, and no Barrens would be lost or altered in the NPR-A, under Alternative C (Table 4C.3.1-2). The potential loss of Barrens habitat is less than 0.1 percent of that available in the Colville River Delta. In addition to gravel fill in the Colville River Delta, 4.1 acres of Barrens habitat type would be altered by dust fallout under Alternative C (Table 4C.3.1-2).

Disturbance and Displacement

There would be 15.2 miles more road in Alternative C than in Alternative A. Traffic on this additional mileage could increase the amount of disturbance to caribou, muskoxen, moose, and grizzly bears compared to Alternative A. The lack of airstrips in Alternative C would result in less disturbance than in Alternative A, which has an airstrip at CD-3. Access by local residents in Alternative C could disturb and displace terrestrial

mammals if hunting is done. The road connection from Nuiqsut to the project roads could allow easier access to local residents and increase the disturbance impacts associated with hunting. A high level of hunting could prevent terrestrial mammals from habituating to industry activities and result in displacement away from the roads and facilities. In the NPR-A portion of the Plan Area, unrestricted public access could substantially increase the amount of vehicle traffic and hunting pressure. This could add a considerable amount of disturbance to terrestrial mammals in the Plan Area.

Obstruction to Movements

Alternative C would include 41.0 miles of road/pipeline combination (including the road from CD-1 to CD-3), compared to 25.8 miles in Alternative A. This is 15.2 miles more road/pipeline than in Alternative A (Figure 2.4.3.1-1 and Figure 2.3.3.1-1). Although roads with elevated pipelines are not barriers to caribou movement, they could deflect or delay crossing (Murphy and Lawhead 2000). It is important to note that the Alternative C pipelines would be elevated to 7 feet (versus 5 feet in Alternative A). Elevating pipelines to at least 5 feet is considered adequate for caribou crossing, although higher elevations might enhance crossing success. Therefore, the potential for obstruction of caribou movement because of the greater amount of road/pipeline combination in Alternative C would be mitigated by the higher elevation of the pipelines. Also, caribou would be in the vicinity of the roads in winter, and snow could accumulate under or around pipelines. The 7-foot pipelines could allow easier winter movements. In Alternative C, the east-west oriented pipeline from CD-6 and CD-7 past the Clover Potential Gravel Source is situated in the lee of the road and generally more parallel to prevailing winds than the pipeline in Alternative A. Thus, this pipeline could cause more snow to accumulate than the pipeline in Alternative A.

Also, separating the roads and pipelines by more than 300 feet can enhance crossing success. The road from CD-1 to CD-3 would probably have a limited effect on caribou movements because it would be separated from the pipeline by 0.5 to 1 mile for much of its 6-mile length.

Access to roads by industry and local residents (and the public on BLM lands) could result in traffic that contributes to obstruction of caribou movements. If hunting were to occur from the roads, caribou, moose, muskoxen, and grizzly bears could associate the roads with danger and avoid, rather than cross, them.

Mortality

In Alternative C, accidental mortalities caused by collisions with vehicles could be greater than in Alternative A because of a longer road system. As with Alternative A, road access by local residents could result in hunting mortality of terrestrial mammals. This impact would potentially occur in the area between CD-1 and CD-3 in Alternative C, but not in Alternative A. In addition, direct access from Nuiqsut to the road system, and the more southerly route to CD-6 and CD-7, could result in increased harvest by hunters. In the BLM portion of the Plan Area, unrestricted public access could substantially increase the amount of non-local hunting pressure. This could add a considerable amount of mortality of terrestrial mammals in the Plan Area.

Alternative C – Full-Field Development Plan Impacts on Terrestrial Mammals

The primary characteristic of the impacts on terrestrial mammals of Alternative C FFD is the effect of the network of roads connecting all of the facilities. The pipeline routes in Alternative C are similar to those of Alternative A, although there is some different routing among the alternatives to the CD-6, CD-8, and CD-22 sites in the Fish-Judy Creeks Facility Group. The pipelines in Alternative C would be elevated to 7 feet, while in Alternative A they are elevated 5 feet. Access to the production sites would be unrestricted on BLM lands and open to industry and local residents elsewhere.

The total amount of gravel fill under Alternative C would be approximately 1,540 acres, versus 1,400 for Alternative A. Because neither detailed site locations nor habitat mapping are available, we cannot quantify specific terrestrial mammal habitat lost under Alternative C. However, Alternative C has the largest acreage

covered with gravel of the four alternatives and the largest direct loss of vegetated habitat. A large proportion (78 percent) of the Alternative C gravel would be roads, with associated impacts.

Colville River Delta Facility Group

The primary differences between the FFD Alternatives A and C in the Colville River Delta is that there would be roads accompanying the pipelines to facilities in the lower Delta and no airstrips at the facilities (CD-3, CD-14, CD-19, CD-20, and CD-21) under Alternative C. In addition, Alternative C would have pipelines elevated to 7 feet, and access would be unrestricted on BLM lands and open to local residents and industry on other lands.

Direct Habitat Loss, Alteration, or Enhancement

The roads to production sites in the lower Delta under Alternative C would result in the maximum amount of habitat covered with gravel fill among the alternatives. This would be somewhat compensated by the lack of airstrips at the Colville River Delta sites under Alternative C. The increased amount of roadway could provide additional insect-relief habitat during the summer. Some bear denning habitat in the Delta could be covered by the gravel fill.

Disturbance and Displacement

The increased roads accompanying pipelines to the lower Delta production sites could result in some disturbance of caribou and other terrestrial mammals. Access to the roads by local residents could result in traffic levels that impose disturbance more than in existing oilfields with only industrial traffic. Caribou, moose, and muskoxen using the Delta during the summer could be most affected.

Obstruction to Movements

The roads accompanying pipelines to the lower Delta production pads could result in some obstruction or deflection of caribou movements. Elevated pipelines adjacent to roads usually allow crossing by caribou. In Alternative C, pipelines would be elevated 7 feet, which could mitigate obstruction impacts further. However, access to the roads by local residents could result in traffic levels that obstruct movements more than in existing oilfields with only industrial traffic.

Mortality

The roads to the lower Delta production sites could result in a higher mortality of caribou and other terrestrial mammals from vehicle collisions than in Alternative A. Access to the roads by local residents could result in traffic levels leading to a higher probability of vehicle-animal collision than in existing oilfields with only industrial traffic. Caribou using the Delta during the summer could be most affected. In addition, access by local residents could increase harvest by hunters.

Fish-Judy Creeks Facility Group

Direct Habitat Loss, Alteration, or Enhancement

All of the production sites in the Judy-Fish Creeks Facility Group would have road access. This would result in an amount of habitat loss similar to that in Alternative A, although the routing to CD-6, CD-8, and CD-22 differs between alternatives.

Disturbance and Displacement

The primary impact of Alternative C compared to Alternative A under FFD in this facility group would result from unrestricted access to BLM lands. Increased vehicle and foot traffic could disturb caribou, muskoxen, moose, and grizzly bears from the road system. Increased access by local and non-local hunters could have considerable disturbance impacts.

Obstruction to Movements

The network of road/pipeline combinations in the Judy-Fish Creeks Facility Group under Alternative C FFD could obstruct the movement of terrestrial mammals. Pipelines would be elevated 7 feet, and roads and pipelines would be separated more than 300 feet, so obstruction would be considerably mitigated. This could be particularly effective in winter when snow may effectively reduce the height of pipelines. In addition, roads with traffic (more than 15 vehicles per hour) and associated pipelines could obstruct caribou movements, so the extent of obstruction would most likely be a function of the traffic level.

Mortality

The primary impact of FFD in Alternative C compared to Alternative A in the Fish-Judy Creeks Facility Group would result from unrestricted access to BLM lands. Increased vehicle traffic could cause more vehicle-animal collisions and mortality of caribou, muskoxen, moose, and grizzly bears. Increased access by local and non-local hunters would also increase mortality.

Kalikpik-Kogru Rivers Facility Group

The primary difference between Alternatives C and A under FFD in this area is the existence of a road accompanying the pipeline from CD-28 to CD-29 on the coast.

Direct Habitat Loss, Alteration, or Enhancement

The road from CD-28 to CD-29 would cover 11.0 miles in Alternative C. Otherwise, the loss of habitat would be the same as in Alternative A.

Disturbance and Displacement

The primary impacts of Alternative C FFD compared to Alternative A FFD in this area would result from the road to CD-29 and unrestricted access to BLM lands. Increased vehicle and foot traffic could disturb caribou, muskoxen, moose, and grizzly bears from the road system. This is particularly true in the northwest part of the area, which is used by considerable numbers of caribou during the calving season. Calving caribou could be displaced from roads with traffic in this area. Otherwise, impacts from FFD under Alternative C would be the same as for Alternative A.

Obstructions to Movement

The location of the road/pipeline combination from APF-3 to CD-28 and CD-29 could cause some obstruction or deflection of movement of caribou during the calving, post-calving, and winter seasons. Roads with pipelines elevated to at least 5 feet are not necessarily barriers to caribou movement, and under Alternative C, pipelines would be elevated to 7 feet. This could mitigate potential obstruction impacts.

Mortality

The primary impact of Alternative C FFD compared to Alternative A FFD would result from unrestricted access to BLM lands and the road to CD-29. Increased animal-vehicle collisions and increased mortality from hunting could result from these characteristics of Alternative C.

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

The Alternative C CPAI Development Plan would cover 379 acres of undeveloped land with gravel fill. This is a small percentage of the land in the Plan Area, and more than 100 acres more than Alternative A. The amount of habitat types preferred by caribou, muskoxen, and moose affected by this fill is a small proportion of that available in the Plan Area. Alternative C would result in the largest loss of habitat of the alternatives considered. However, this is a small loss of terrestrial mammal habitat compared to that available in the Plan Area.

Disturbance, obstruction of movements, and mortality impacts of Alternative C would be similar to those of Alternative A. However, these impacts would be of greater magnitude in Alternative C than in Alternative A because of the larger amount of road/pipeline combinations and associated higher levels of vehicle traffic. The obstruction of movements would be mitigated somewhat by elevation of pipelines to 7 feet. Alternative C includes access by industry and local residents and unrestricted access on NPR-A lands. Access by local residents and other public would result in disturbance and hunting mortality. The potential positive and negative aspects of hunting mortality described for Alternative A would occur to a greater extent in Alternative C because of the unrestricted public access.

Impacts from the Alternative C FFD would be the same as described for the CPAI Development Plan 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.

Alternative C – Potential Mitigation Measures (CPAI and FFD) for Terrestrial Mammals

Potential mitigation measures for Alternative C would be essentially the same as those described for Alternative A. The road access to local residents and the public on BLM lands could make coordination of activities in the Plan Area, including hunting by local residents, especially relevant. Also, the pipeline/road combinations between all production sites might make buried sections of pipeline more important than in the other alternatives. However, the elevation of pipelines to 7 feet in Alternative C could reduce the need for buried sections of pipeline.

4C.3.4.2 Marine Mammals

Alternative C – CPAI Development Plan Impacts on Marine Mammals

A characteristic of Alternative C that could affect marine mammals differently from Alternative A is the location of the road/pipeline crossing of the Nigliq Channel. The crossing site in Alternative C is approximately 3 miles south of the crossing site in Alternative A. This could result in little or no construction activity and operational traffic disturbance impacts to marine mammals in the channel. In addition, Alternative C has no new airstrips, which would remove the potential for aircraft noise disturbance discussed for Alternative A.

Ringed Seal and Bearded Seal

Impacts to ringed seals from Alternative C are not expected to change appreciably compared to Alternative A. During summer, ringed seals are generally not immediately offshore of the Plan Area, and during winter, noise from vehicles and operations is not expected to propagate into ringed seal habitat. However, under Alternative C there would be no aircraft traffic to CD-3, and thus less disturbance than with Alternative A. In addition, direct access from Nuiqsut to the Alternative C road system could enhance access by hunters to coastal areas. This could result in greater harvest and disturbance of seals.

Spotted Seals

Alternative C could have fewer disturbance impacts on spotted seals than Alternative A. The crossing site of the Nigliq Channel in Alternative C is approximately 3 miles south of the crossing site in Alternative A. This could result in little or no disturbance impacts from construction activity and operations on spotted seals in the Nigliq Channel. In addition, Alternative C has no new airstrips, which would remove the potential for aircraft noise disturbance of spotted seals in the rivers and nearshore Beaufort Sea that was discussed for Alternative A. The lack of aircraft traffic to and from CD-3 would reduce the potential for disturbance to spotted seals hauled out in the Nigliq Channel and main channel of the Colville River. However, increased hunting access (and associated harvest and disturbance) could result from the direct connection of Nuiqsut to the ASDP road system.

Polar Bears

The impacts to polar bears expected under Alternative C would not change appreciably from those that would occur under Alternative A. It is possible that the road construction and traffic to CD-3 would result in disturbance and hunter access to polar bears (including dens) in the Colville River Delta. However, the lack of an airstrip at CD-3 would remove the potential noise impacts in this area. Because polar bears tend to occur near the coast, the more southerly route of the road/pipeline from CD-4 to CD-5 and CD-6 could reduce the potential for disturbance of denning bears or hunter harvest of active bears.

Beluga Whales

Potential impacts on beluga whales under Alternative C FFD would be like those for spotted seals. Belugas might come into the channels and rivers to some extent. The more southerly crossing of the Nigliq Channel in Alternative C and the lack of an airstrip at CD-3 could result in less disturbance than with Alternative A. However, the road to CD-3 and direct access from Nuiqsut to the project road system could enhance hunter access, harvest, and disturbance.

Alternative C – Full-Field Development Plan Impacts on Marine Mammals

In general, the impacts to marine mammals under Alternative C FFD would not differ appreciably from those of Alternative A FFD. However, some characteristics of Alternative C might be relevant to marine mammals. These include the different road route crossing the Nigliq Channel from CD-4 to CD-10, the road to CD-29 on the coast, and the unrestricted access on BLM lands. The crossing of the Nigliq Channel in Alternative C is farther upstream and could cause less disturbance than the crossing in Alternative A. The unrestricted access to BLM lands, particularly the road to CD-29 on the coast, could result in more disturbance to, and hunting mortality of, marine mammals than in other alternatives.

Alternative C – Summary of Impacts (CPAI and FFD) on Marine Mammals

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 higher mortality of polar bears from road kills and DLP kills.

Impacts from Alternative C FFD would be the same as those described for the CPAI Development Plan over a larger area.

Alternative C – Potential Mitigation Measures (CPAI and FFD) for Marine Mammals

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.4).

4C.3.5 Threatened and Endangered Species

4C.3.5.1 Bowhead Whale

Alternative C – CPAI Development Plan Impacts on Bowhead Whale

Potential impacts of Alternative C on bowhead whales are expected to be as described for Alternative A. One possible difference is that the lack of air traffic at CD-3 would reduce possible aircraft traffic noise disturbance in the nearshore Beaufort Sea. Another possible difference is that the more southerly crossing of the Nigliq Channel could allow more effective response in preventing oil spills that enter that water body from reaching the Beaufort Sea.

Alternative C – FFD Plan Impacts on Bowhead Whale

If, in the event of FFD, sealifts are required to transport drilling or processing facilities, there is the potential for impact to bowhead whales. Impacts to bowheads could result from noise, habitat degradation, displacement from the migration corridor, and vessel strikes. However, the use of docks was determined not to be a practical means of developing the facilities proposed by CPAI or during future development (Section 2.6.5). In addition, the road access to the coast at CD-29 could result in new access to the Kogru River and Beaufort Sea. This could add disturbance and hunter access to bowheads.

Alternative C – Summary of Impacts (CPAI and FFD) on Bowhead Whale

The potential impacts from Alternative C would be the same as those for Alternative A, except there would be less air traffic because there would be no airstrip at the CD3 site. This is the case under the FFD Alternative C as well, in which there would also be fewer airstrips than in Alternative A. Alternative C includes roads to areas near the coast at the CD-20, CD-21, and CD-29 sites. This could result in construction and operational noise that could affect whales that occur in the nearshore area.

Alternative C – Potential Mitigation Measures (CPAI and FFD) for Bowhead Whale

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.5).

4C.3.5.2 Spectacled Eider

Alternative C – CPAI Development Plan Impacts on Spectacled Eider

Construction Period

Habitat Loss and Alteration

Additional gravel placement for the construction of connecting roads would cause greater nesting habitat loss and alteration than either Alternatives A or B, leading to the displacement of one spectacled eider nest. Ice road requirements would be similar among alternatives during construction, but would be reduced in Alternative C compared to Alternatives A and B during project operations. The types of impacts on spectacled eiders associated with gravel placement in Alternative C would be the same as those described under Alternative A.

Colville River Delta pre-nesting and nesting habitats used by spectacled eiders in Alternative C that have additional gravel cover compared to Alternatives A or B are Tapped Lake with High–water Connections, Salt Marsh, and Patterned Wet Meadow (Table 4A.3.5-1). In the NPR-A portion of the Plan Area, pre-nesting and nesting spectacled eider habitats in Alternative C that have additional gravel cover compared to Alternatives A or B are Old Basin Wetland Complex and Patterned Wet Meadow (Table 4A.3.6.5-2). In all instances, habitat

impacts would affect less than 1 percent of habitats available in the Colville River Delta and in the NPR-A portion of the Plan Area (Table 4A.3.5-1 and Table 4A.3.5-2).

Disturbance and Displacement

Disturbances from vehicle traffic would be increased in Alternative C compared to Alternative A or B by the addition of the road connecting CD-3 to CD-1 in the Colville River Delta and the more extensive road system with a connection to Nuiqsut in the NPR-A. Connection to Nuiqsut could lead to additional traffic from local residents. Disturbance from air traffic would be reduced in Alternative C compared to Alternatives A or B by the elimination of the airstrip at CD-3 and would be reduced in Alternative C from Alternative B by the elimination of the airstrips at CD-5 and CD-6. Elimination of these airstrips would result in one fewer spectacled eider nest displaced in Alternative C compared to Alternatives A and B.

Obstructions to Movement.

The additional road system in Alternative C compared to Alternative A or B would potentially obstruct some movements of spectacled eider broods, especially if traffic levels are increased because of access by local traffic.

Mortality

Potential mortality from collisions with vehicles is increased in Alternative C compared to Alternatives A or B with the development of the more extensive road system. The potential mortality from collisions with aircraft is reduced in Alternative C compared to Alternatives A or B with the elimination of the airstrip at CD-3 from Alternatives A and B and airstrips from CD-5 and CD-6 in Alternative B. The potential for increased nest and duckling depredation from raptors and ravens would be increased in Alternative C compared to Alternatives A or B by the placement of all power lines on poles instead of VSMs.

Operation Period

Habitat Loss and Alteration

Some habitat loss or alteration from snowdrifts, gravel spray, dust fallout, thermokarst, and ponding would continue during project operation. Dust fallout would be expected to be less than during the construction because of reduced traffic. Habitat alterations from dust fallout would be increased in Alternative C compared to Alternatives A or B because of the more extensive road system and potentially higher traffic levels resulting from local access from Nuiqsut. Habitat alterations from low-ground-pressure vehicles during summer or winter would be reduced in Alternative C compared to Alternative A or B because of the road access to all facilities.

Disturbance and Displacement

Disturbance from vehicle traffic would be increased in Alternative C compared to Alternatives A or B at CD-3 and potentially at CD-4, CD-5, CD-6, and CD-7 because of local access from Nuiqsut. The greatest potential for vehicular traffic to affect spectacled eiders would be along the route of the CD-3 road, where eider densities are higher. Potential disturbance from air traffic would be reduced in Alternative C compared to Alternatives A or B by the elimination of the airstrip at CD-3 from Alternatives A and B and the elimination of airstrips at CD-5 and CD-6 from Alternative B. Elimination of the airstrip at CD-3 in Alternative C would eliminate displacement by air traffic disturbance for one spectacled eider nest.

Obstructions to Movement

Potential obstructions to waterfowl and loon brood movements across roads would continue during project operation. This potential obstruction would be increased over Alternatives A or B because of the more extensive road system and local access from Nuiqsut, which could lead to increased traffic levels. The greatest potential impact to spectacled eiders would occur along the route of the road connecting CD-3 with CD-1 because of higher spectacled eider densities in this area.

Mortality

Potential mortality from collisions with vehicles would be increased in Alternative C compared to Alternatives A or B because of the increased road system. Increased traffic resulting from local access from Nuiqsut would also potentially increase mortality from collisions with vehicles. Mortality from harvest may also increase as a result of increased access to local traffic. Mortality from collisions with aircraft would be reduced in Alternative C compared to Alternatives A or B by the elimination of the airstrip at CD-3 from Alternatives A and B and the elimination of airstrips at CD-5 and CD-6 from Alternative B.

Potential mortality from collisions with power lines would be increased in Alternative C compared to Alternatives A or B by the placement of all power lines on poles. Potential mortality by depredation from raptors or ravens would be increased for nesting spectacled eiders by the presence of power line poles used for perching by raptors and ravens. Potential mortality by depredation from seabirds may also be increased in Alternative C compared to Alternatives A or B by the increased vantage from the 7-foot versus the 5-foot elevated pipeline.

Alternative C – FFD Plan Impacts on Spectacled Eider

The mechanisms associated with habitat loss and alteration, disturbance and displacement, obstruction to movements, and mortality for birds in the Colville River Delta, Fish-Judy Creeks, and Kalikpik-Kogru Rivers Facility Groups would be the same as those described under Alternative A. Table 4A.3.5-1 summarizes potential impacts for Alternative C Full-Field Development based on pre-nesting and nesting spectacled eider densities in the Colville River Delta and the NPR-A. In Alternative C FFD, all facilities would be supported by road access and most facilities would be moved outside of the 3-mile buffer around Fish Creek. Total gravel placement would be increased in Alternative C compared to Alternatives A or B, resulting in the most potential displacement for bird nests from gravel fill and dust fallout.

Colville River Delta Facility Group

Table 4A.3.5-1 presents a summary of the potential numbers of pre-nesting and nesting spectacled eiders affected by the hypothetical FFD including the Colville River Delta, based on nesting densities reported for the Colville River Delta and in the NPR-A portion of the Plan Area.

Habitat Loss, Alteration, or Enhancement

Total habitat loss from gravel placement and dust fallout would be increased in Alternative C FFD compared to Alternatives A or B FFD, resulting in displacement of one additional spectacled eider nest. Total habitat alteration resulting from ice road construction and tundra travel would be reduced from Alternatives A and B FFD because of the road access to all facilities. Under Alternative C FFD, additional habitat loss would occur from construction of access roads to the production pads in the outer Colville River Delta compared to Alternative A. In the immediate vicinity of each production pad there would be a reduction in loss of spectacled eider habitat compared to Alternative A because of the elimination of airstrips at these sites. Re-routing of the Nigliq Channel bridge and access road would move these facilities into an area of lower spectacled eider density (Figure 3.3.5.2.1-1). The 7-foot pipeline elevation could decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

The addition of the road system in the outer Colville River Delta under Alternative C FFD would increase the potential for disturbance to birds from vehicular traffic and machinery compared to Alternatives A or B FFD. The road connection with Nuiqsut could allow increased levels of local traffic that would increase disturbance. The elimination of the airstrips at production pads under Alternative C would eliminate disturbance associated with air traffic. The greatest effects of disturbance to spectacled eiders likely would be in the CD-3 and CD-12 areas, where spectacled eiders are more abundant (Figure 3.3.5.2-1).

Obstruction to Movement

The increased road system and local access would increase obstruction of brood-rearing spectacled eiders in Alternative C compared to Alternatives A or B.

Mortality

Mortality from collisions with vehicles and power lines would be increased in Alternative C FFD compared to Alternatives A or B FFD because of the increased road system, potentially increased traffic, and placement of power lines on poles. Mortality from collisions with aircraft would be reduced by the elimination of airstrips at pad locations. Mortality from hunting could be increased by greater local access over the road system.

Fish-Judy Creeks Facility Group

Table 4A.3.5-1 presents a summary of the potential numbers of pre-nesting and nesting spectacled eiders affected by the hypothetical FFD, including the Fish-Judy Creeks Facility Group, on nesting densities reported for the Colville River Delta and in the NPR-A portion of the Plan Area. In the Fish-Judy creeks area, the potential effects of Alternative C FFD on spectacled eider habitat loss and alteration, disturbance and displacement, obstruction of movements, and mortality would be the same as those discussed under Alternative A.

Habitat Loss, Alteration, or Enhancement

Total habitat loss from gravel placement and dust fallout would be increased in Alternative C FFD compared to Alternative A or B FFD. This loss would result in displacement of one additional spectacled eider nest. Total habitat alteration from ice road construction and tundra travel would be reduced from Alternatives A and B FFD because of the road access to all facilities. The 7-foot pipeline elevation may decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

The addition of the road system in the Fish-Judy Creeks drainage under Alternative C FFD would increase the potential for disturbance to spectacled eiders from vehicular traffic and machinery compared to Alternatives A or B FFD. The road connection with Nuiqsut could allow increased levels of local traffic that would increase disturbance. The elimination of the airstrips at production pads under Alternative C FFD would eliminate disturbance associated with air traffic. Elimination of the airstrips would eliminate the disturbance of one pre-nesting and three nesting spectacled eiders from Alternatives A and B.

Obstruction to Movement

The increased road system and local access would increase obstruction of brood-rearing spectacled eiders in Alternative C FFD compared to Alternatives A or B FFD.

Mortality

Mortality from collisions with vehicles and power lines would be increased in Alternative C FFD compared to Alternatives A or B FFD as a result of the increased road system, potentially increased traffic, and placement of power lines on poles. Mortality from collisions with aircraft would be reduced by the elimination of airstrips at pad locations. Mortality from hunting could be increased by increased local access over the road system.

Kalikpik-Kogru Rivers Facility Group

Table 4A.3.5-1 presents a summary of the potential numbers of pre-nesting and nesting spectacled eiders affected by the hypothetical FFD, including the Kalikpik-Kogru Rivers Facility Group, on nesting densities reported for the Colville River Delta and in the NPR-A portion of the Plan Area.

Habitat Loss, Alteration, or Enhancement

Total habitat loss from gravel placement and dust fallout would be increased in Alternative C FFD compared to Alternatives A or B FFD and would result in displacement of one additional spectacled eider nest. This additional habitat loss would result from the access road to CD-29. Total habitat alteration from ice road construction and tundra travel would be reduced from Alternatives A and B FFD because of the road access to all facilities. The 7-foot pipeline elevation could decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

The addition of the road system in the Kalikpik-Kogru River area under Alternative C FFD would increase the potential for disturbance to birds from vehicular traffic and machinery compared to Alternatives A or B FFD. The road connection with Nuiqsut could allow increased levels of local traffic that would increase disturbance. The elimination of the airstrips at production pads under Alternative C FFD would eliminate disturbance associated with air traffic. Elimination of the airstrips would eliminate the disturbance of one pre-nesting and three nesting spectacled eiders from Alternatives A and B.

Obstruction to Movement

The increased road system and local access would increase obstruction of brood-rearing spectacled eiders in Alternative C FFD compared to Alternatives A or B FFD.

Mortality

Mortality from collisions with vehicles and power lines would be increased in Alternative C FFD compared to Alternatives A or B FFD because of the increased road system, potentially increased traffic, and placement of power lines on poles. Mortality from collisions with aircraft would be reduced by the elimination of airstrips at pad locations. Mortality from hunting could be increased by increased local access over the road system.

Alternative C – Summary of Impacts (CPAI and FFD) on Spectacled Eider

Most impacts to spectacled eiders resulting from CPAI Development Plan Alternatives A through D would occur in the Colville River Delta area 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.

CPAI Development Plan Alternative C would potentially displace less than one pre-nesting spectacled eider and one spectacled eider nest.

Impacts from FFD Alternatives A through D for spectacled eiders are summarized in Table 4A.3.5-1.

Alternative C – Potential Mitigation Measures (CPAI and FFD) for Spectacled Eider

Obstructions to Movements

- Traffic speeds on roads may be reduced during brood-rearing.
- Traffic levels may be reduced by limiting field access to industry only.

Mortality

- Spectacled eiders may be hazed away from active airstrips to prevent collisions with aircraft.

4C.3.5.3 Steller's Eider

This section describes the potential impacts of the Alpine Satellite development on threatened Steller's eiders. Impacts to other bird groups associated with the proposed development are described in Section 4C.3.4 and can be referred to for more detailed description of the mechanisms of specific impacts. In general, impacts to Steller's eider are potentially the same as those described for spectacled eider under all of the alternatives. However, the likelihood of impacts occurring to Steller's eider are very small, even under FFD scenarios, because Steller's eiders occur very rarely in the Plan Area. The ASDP would result in a loss of potential Steller's eider habitat. Given the current distribution of Steller's eider in the Plan Area, it is unlikely that any of the project alternatives would have impacts on this species.