TABLE 11-1
COMPARISON OF PROJECT ALTERNATIVES

Environment/ Resource	Alternative 1 No Action	Alternative 2 Point Storkersen/BPXA Proposal	Alternative 3 Point Storkersen/WDSP	Alternative 4 Point McIntyre/WDSP	Alternative 5 West Dock Causeway
Physical Environment					
Geology and Hydrology - Permafrost	No impact.	Alternatives 2, 3, and 4 all involve comparable impacts associated with potential thaw bulb creation and related subsidence caused within the shoreline permafrost transition zone.			Landfall on causeway and crossing the permafrost transition zone on fill avoids potential thaw bulb creation and related subsidence.
Coastal Erosion	No impact.	Alternatives 2, 3, and 4 all involve comparable impacts associated with potential shoreline erosion and pipe damage hazard caused by construction across a natural shoreline. Potential repeated maintenance of these landfalls could add recurring shoreline impacts.			Landfall on causeway avoids potential shoreline erosion and pipe damage hazard. Maintenance activity is expected to be minimal, and would be comparable to existing maintenance of the causeway.
Spill-related Impacts to Soils and Coastal Erosion	No impact.	Alternatives 2, 3, 4, and 5 could all result in significant oil spill contamination of onshore soils and/or seafloor sediments.			
Biological Environment					
Coastal Vegetation and Invertebrates - Vegetation Impacts	No impact.	Impacts to coastal vegetation at the Point Storkersen and Point McIntyre landfalls would be the same for Alternatives 2, 3, and 4 (impacts would be minor). Periodic maintenance of shoreline landfall may be required.			Coastal vegetation would not be impacted. Periodic maintenance of the landfall would not affect coastal vegetation.
Spill-related Impacts to Invertebrates	No impact.	Alternatives 2, 3, 4, and 5 could all result in significant oil spill mortality of freshwater invertebrates.			
Biological Environment (Cont.)					
Birds - Noise-related Impact	No impact.	Minor disturbance impacts to nesting birds from helicopter inspection overflights would be greater for Alternative 2 than those of Alternative 3 because the Alternative 2 crosses more undisturbed nesting habitat. Approximately 310 and 275 nesting birds (black brant, common eiders, oldsquaw, and surf scoters) would be within a 0.25-mile (0.4 km) corridor along Alternative 2 and 3 pipelines, respectively.		Minor disturbance impacts to nesting birds from helicopter inspection overflights would be similar for Alternatives 4 and 5, but less than Alternatives 2 and 3 because most of the corridors parallel existing pipeline and vehicle corridors. Approximately 140 and 127 nesting birds (black brant, common eiders, oldsquaw, and surf scoters) would be within a 0.25-mile (0.4 km) corridor along Alternative 4 and 5 pipelines, respectively.	

TABLE 11-1 (Cont.)
COMPARISON OF PROJECT ALTERNATIVES

Environment/ Resource	Alternative 1 No Action	Alternative 2 Point Storkersen/BPXA Proposal	Alternative 3 Point Storkersen/WDSP	Alternative 4 Point McIntyre/WDSP	Alternative 5 West Dock Causeway
		Significant impacts to sea ducks (common eider and oldsquaw) from offshore helicopter overflights during construction only.			
Spill-related Impacts -	No impact.	Because nearshore lagoons could be more easily protected via booms, Alt. 5 would provide more protection to molting, staging, and brood-rearing migratory birds. If a major spill was to occur, direct mortality is expected and could include spectacled and Steller's eiders (threatened species). Reduced populations of several bird species could be evident for several years following the spill.			
Spectacled eiders	No impact.	Minor disturbance impacts from helicopter overflights to spectacled eider nesting pairs within 0.25 miles (0.4 km) of the Alternative 2 and 3 onshore corridor. Total of 6 for each alternative.		Minor disturbance impacts from helicopter overflights to spectacled eider nesting pairs within 0.25 miles (0.4 km) of the Alternative 4 and 5 onshore corridor. Total of 2 for each alternative.	
Terrestrial Mammals Noise-related Impact	No impact.	Minor caribou disturbance from helicopter overflights along 9.55 miles (15.37 km) of pipeline in undeveloped area.	Minor caribou disturbance from helicopter overflights along 6.7 miles (10.8 km) of pipeline in undeveloped area.	Helicopter overflights associated with Alternatives 4 and 5 would occur in an existing industrialized area and would result in minor effects on caribou. Undisturbed habitat is present along 3.4 and 3.1 miles (5.5 and 5 km) of Alternatives 4 and 5, respectively.	
Marine Mammals Noise-related Impacts	No impact.	Alternatives 2, 3, 4, and 5 would have comparable impacts on the bowhead whale, including bowhead whale avoidance of Seal Island and support activity noise, including a 3- to 6-mile (4.8 to 9.6 km) migration path deflection. This behavioral response would not harm individual whales or whale populations, but could affect subsistence harvesting.			
Spill-related Impacts	No impact.	Alternatives 2, 3, 4, and 5 could have comparable spill-related impacts to marine mammals. Depending on the season, size of spill, and response effectiveness, a large oil spill could result in injury and/or mortality of bowhead whales from an oil spill contacting the spring lead system coincident with migration. Other species, such as polar bears, could be adversely affected by ingestion of oil during grooming, consumption of oiled prey, or loss of insulation and subsequent hypothermia.			
Human Environment					
Subsistence - Noise-related Impacts	No impact.	Alternatives 2, 3, 4, and 5 would have comparable impacts on subsistence whaling. This impact is associated with bowhead whale avoidance of noise, which could reduce harvest success or increase safety risk to whalers. If this impact occurs, it would represent a significant adverse effect on subsistence harvest activities by reducing harvest success and increasing whaler safety risk. Decreased harvest could result in changes to IWC harvest quotas.			
Subsistence - Spill-related Impacts	No impact.	Alternatives 2, 3, 4, and 5 would have comparable impacts to subsistence whaling if a major offshore spill was to occur. Depending on the season of spill occurrence and size of spill, a large oil spill could significantly adversely affect whaling vessel operations, response efforts could create noise and activity that could result in whale avoidance behavior and reduced whaling success, and oiling of whales could taint the subsistence harvest. Other subsistence resources also would be significantly affected, including direct mortality and oil tainting of seals, birds, and fish.			
Cumulative Impacts	No contribution to cumulative impacts.	Alternatives 2, 3, 4, and 5 would have comparable contributions to cumulative impacts to subsistence whaling. Increased offshore industrial activity could cause bowhead whale avoidance and result in longer travel distances, increased safety risk, and reduced harvest success of subsistence whaling activity.			
Land and Water Use	No impact or land use conflicts.	Existing Conservation District policies applicable to offshore and onshore project areas are	Existing Conservation District policies applicable to offshore and onshore project areas are	Alternatives 4 and 5 would result in similar land use impacts associated with offshore project elements which are comparable to the offshore impacts	

TABLE 11-1 (Cont.)
COMPARISON OF PROJECT ALTERNATIVES

Environment/ Resource	Alternative 1 No Action	Alternative 2 Point Storkersen/BPXA Proposal	Alternative 3 Point Storkersen/WDSP	Alternative 4 Point McIntyre/WDSP	Alternative 5 West Dock Causeway
		incompatible with the proposed alternative and required rezoning. This affects the island site and 9.55 miles (15.37 km) of onshore pipeline.	incompatible with the proposed alternative and required rezoning. This affects the island site and 3.6 miles (5.8 km) of onshore pipeline.	described for Alternatives 2 and 3. Alternatives 4 and 5 would not result in onshore land use impacts.	
Cumulative Impacts	Alternative 1 does not contribute to cumulative impacts.	Alternative 2 would contribute to the intensification of industrial development by adding a pipeline across a currently undeveloped area and contributing to Gwydyr Bay development.	Alternative 3 would contribute to the intensification of industrial development by extension of a pipeline corridor closer to Gwydyr Bay and contributing to development in that area.	Alternatives 4 and 5 would contribute less to onshore cumulative impacts than would be contributed by Alternatives 2 and 3. Pipeline routing would mostly follow existing development corridors.	
Socioeconomics - Revenue Impact	No beneficial effect of federal, state, and local revenue generation.	Alternatives 2, 3, 4, and 5 would all result in the generation of revenue for the State of Alaska, including $478.9 million gross state revenues, $306.3 million in federal revenues, $64.3 million in NSB revenues, and $3 million in revenue to the Municipality of Anchorage over 15 years.			
Human Environment (Cont.)					
Development Costs	No development cost to the project proponent, and complete loss of investment in offshore leases and project planning and engineering.	$52.8 to $73.48 million pipeline and ice road construction cost. $405 million total construction cost.	$57.44 to $83.52 million pipeline and ice road construction cost. $415 million total construction cost.	$54.37 to $81.30 million pipeline and ice road construction cost. $413 million total construction cost.	$58.07 to $86.58 million pipeline and ice road construction cost. $418 million total construction cost.
Employment Impacts	No new employment opportunities.	Alternatives 2, 3, 4, and 5 would all result in comparable employment including the creation of approximately 730 construction jobs and 100 facility operations jobs, with a total payroll of $307 million.			
Cumulative Impacts	No contribution to currently declining oil production revenues.	Alternatives 2, 3, 4, and 5 would result in comparable contributions of government revenue to partially offset projected declines. This contribution represents 2.4% of the total North Slope oil production (and related revenues) over the 15-year project life.			
Visual/Aesthetic Characteristics	No impacts.	Project-specific and contribution to cumulative impacts associated with visible lighting offshore and a 9.55-mile (15.37 km) long pipeline in an undeveloped area.	Project-specific and contribution to cumulative impacts associated with visible lighting offshore and a 3.6-mile (5.8 km) long pipeline in an undeveloped area.	Alternatives 4 and 5 would result in the same offshore project-specific and contribution to cumulative offshore visual impacts as discussed in connection with Alternatives 2 and 3.	
Oil Spills					
Probability of Spill Occurrence -- Total Project[1]	No project-related risk of spill occurrence.	Any Source - 11% to 24% Pipeline - 4.5% to 19%	Any Source - 12% to 24% Pipeline - 5.6% to 19%	Any Source - 12% to 24% Pipeline - 5.5% to 19%	Any Source - 12% to 24% Pipeline - 5.4% to 19%

TABLE 11-1 (Cont.)
COMPARISON OF PROJECT ALTERNATIVES

Environment/ Resource	Alternative 1 No Action	Alternative 2 Point Storkersen/BPXA Proposal	Alternative 3 Point Storkersen/WDSP	Alternative 4 Point McIntyre/WDSP	Alternative 5 West Dock Causeway
Pipeline[2]		Offshore - 1.6% Onshore - 3%	Offshore - 1.6% Onshore - 4.1%	Offshore - 2.4% Onshore - 3.2%	Offshore - 2.4% Onshore - 3.1%
Maximum Potential Pipeline Spill Volume -- Onshore[3]	No potential for any project-related oil spillage.	Pipeline Rupture - 6,400 bbls Chronic Leak - 6,600 bbls	Pipeline Rupture - 8,700 bbls Chronic Leak - 8,900 bbls	Pipeline Rupture - 6,800 bbls Chronic Leak - 7,000 bbls	Pipeline Rupture - 6,700 bbls Chronic Leak - 6,900 bbls
Offshore[3]		Pipeline Rupture - 3,600 bbls Chronic Leak[4] - 6,600 bbls	Pipeline Rupture - 3,600 bbls Chronic Leak[4] - 6,600 bbls	Pipeline Rupture - 5,300 bbls Chronic Leak[4] - 8,200 bbls	Pipeline Rupture - 5,200 bbls Chronic Leak[4] - 8,100 bbls
Oil Spills (Cont.)					
Spill Response Actions -- Onshore	No need for spill response and no response-related impacts.	Spill response access damage associated with 9.55 miles (15.37 km) of pipe in undeveloped area without roadway access.	Spill response access damage associated with 3.6 miles (5.8 km) of pipe in undeveloped area without roadway access.	Alternatives 4 and 5 present small risk of onshore spill response access damage because the onshore pipeline route is accessible from or within 1.5 miles (2.4 km) of existing roadways.	
Offshore		Since spill response equipment would be staged at West Dock, offshore spill responses for Alternatives 2 and 3 would not be as rapid as those for Alternatives 4 and 5.			
Contribution to Cumulative Oil Spill Probability	No contribution to cumulative major spill risk, which would be approximately 93.7% considering other North Slope oil and gas operations from 1997 to 2020.	Alternatives 2, 3, 4, and 5 would all result in a comparable contribution to the overall cumulative spill risk associated with North Slope oil development. Because the Northstar Project represents a relatively small component of the total North Slope development (approximately 2.4% of the total North Slope oil production over the project lifetime), each of these alternatives would result in a 1.5% contribution to the total cumulative spill risk of 95.2% from 1997 to 2020.			

Notes: 1 = Total project spill probabilities are based on CONCAWE and MMS OCS spill statistics for spills from any source (Table 8-6).
2 = Pipeline spill probabilities are based on CONCAWE spill statistics (Table 8-7).
3 = Maximum pipeline spill volumes for a rupture or a chronic leak are based on specific calculation assumptions given in Table 8-5. These include: an oil flow rate of 65,000 barrels per day, pipeline lengths between check valves for the different alternatives, and complete drainage of oil from the pipeline. Although drainage of the entire pipeline volume between valves would likely be prevented by seawater intrusion (offshore) and operational measures, it is presented as the worst case spill volume.
4 = Maximum offshore pipeline spill volumes are based on the chronic leak scenario during unstable solid ice conditions, with the detection time assumed to be 35 days.

bbls = Barrels
BPXA = BP Exploration (Alaska)
gals = Gallons
km = Kilometers

TABLE 11-1 (Cont.)
COMPARISON OF PROJECT ALTERNATIVES

MMS = Minerals Management Service
NSB = North Slope Borough
OCS = Outer Continental Shelf
% = Percent
WDSP = West Dock Staging Pad