Consumables for the first year of milling and processing that will be shipped in 2004 will include:
6 million litres diesel fuel
240 tonnes cyanide in 1 tonne tote bags
48 tonnes caustic in 1 tonne tote bags
25 tonnes copper sulphate in 1 tonne tote bags
21 tonnes frother in drums
4 tonnes 3418A promoter in 1 tonne tote bags
21 tonnes PAX collector in drums
26 tonnes hydrogen peroxide in 1 tonne tote bags
46 tonnes sulphuric acid
262 tonnes grinding medium in barrels
6 tonnes smelting flux in 1 tonne tote bags
1 tonne steel wool cathodes.
Overall transportation costs are an important element of the Project feasibility study. If it is found that shipping two years of consumables (other than diesel fuel) to the site in 2004 is cost effective, that will be done which would double the volumes indicated above.

3.1.13 Construction workforce

Camp assembly and commissioning will be completed with an initial crew of 8 - 10 persons operating from either an on site winter tent camp or from Windy Camp 9 km to the southwest of Doris. Camp assembly and commissioning will be completed in approximately 10 days of Project construction start-up.

Table 1 shows the on site work force during the four month open pit mining and civil construction period in year one. Camp assembly, commissioning and open pit mining and related site and road development will commence with appropriate light and weather condition in February 2004 and be completed by the end of June.

Table 1. Doris Project construction labour force

Job function	site development contractor	subcontractors	owner	
Project superintendent	1			
Site foreman	1			
Site administrator	1			
Truck operators	6			
Loader operators	3			
Dozer operators	4			
Crusher operator	1			
Grader operator	1			
Mechanics	4			
Welders	2			
Helpers and labourers	6			
Surveyor		2		
Drilling contractor		6		
Engineer			1	
Geology			2	
Catering and housekeeping		5		
Health and safety		1		
Total	30	14	3	/ 47

3.2 Project operations

3.2.1 Underground mining

Underground mining for the Doris Hinge, Doris Lakeshore, and Doris Central will start with a portal collared at surface near the pit. It will access the northeast trending ore bodies by way of an approximate 900 m ramp to the –36.5 m level. Underground trucks will haul the ore from the mining areas to a temporary stockpile at surface near the portal for transfer to the ore stockpile by surface equipment. The mining rate will be 600 tonnes per day; 349,700 tonnes of ore from underground will be mined over a 22 month period with mining planned for completion in May or June, 2006. Table 2 shows the required underground labour force.

Table 2. Doris Project on site underground mining labour force.

Job function	Contractor	Owner	
Supervision	2		
Drilling	2		
Miners	8		
Mechanics	4		
Nippers	2		
Surveyors	2		
Engineer		4	
Geologist		3	
Total	20	7	/ 27

3.2.2 Ore processing

Ore will be transferred from the ore pad to the primary crusher by front end loader. The product from the primary crusher will pass directly to a cone crusher by conveyor and material sized at -13 mm goes to a mill feed stockpile in a heated building. Mill feed is transferred to a conveyor feeding the ball mill, again by a loader. The slurry output from the ball mill will pass over jigs and through cyclones to recover free gold. Up to 40% of the gold will be recovered prior to subjecting the slurry to reagents for final gold recovery in the cyanide leach circuit. The slurry retaining gold following the gravity circuit will be concentrated before going to cyanide leach circuit. The concentration circuit reduces the mass of solids in the slurry to 10% of original solids output from the ball mill. In environmental terms this greatly reduces the amount of reagents including cyanide that is required for overall processing. Following an 8 hour leach period, the leachate containing the gold in solution is pumped into a electrolyte storage tank for gold recovery.

The gold is recovered on steel wool cathodes. Loaded cathodes are removed by a hoist, washed, and dried in a calcine oven where the steel wool is oxidized leaving the gold bearing calcine. Prepared flux is added to the calcine and all is placed in the smelting furnace to produce molten dore' which is poured into moulds, allowed to cool, removed and the resultant dore' bars placed in secure storage for shipment.

Gold recovery is expected to be 95% +/-.

See Figures 7 and 8 for flow charts showing ore milling and processing, and water balance respectively.

Table 3 shows the on site mill work force.

Table 3. Doris Project on site ore processing labour force

Job function	Owner
Mill superintendent	1
General foreman	2
Metallurgist	1
Chemist	2
Loader operators	4
Crusher operator	4
Mill operator	4
Leach/filtration operator	4
Gold room operator	2
Metallurgical technician	1
Assayers	2
Maintenance mgmt. & trades	8
General labourers	6
Planning	1
Total	42

FIGURE 7.

SIMPLIFIED DIAGRAM OF PROPOSED PROCESS FLOWSHEET

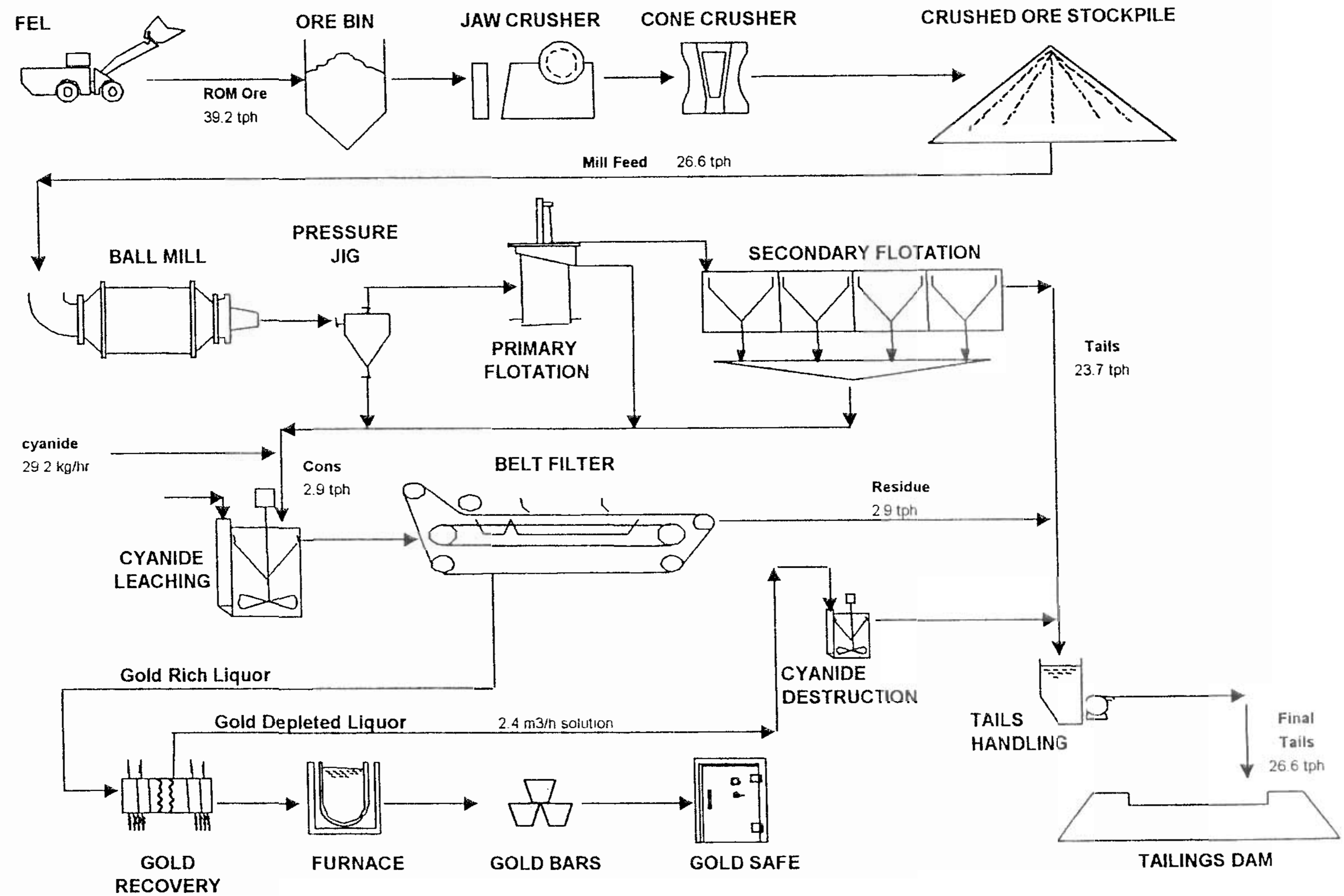
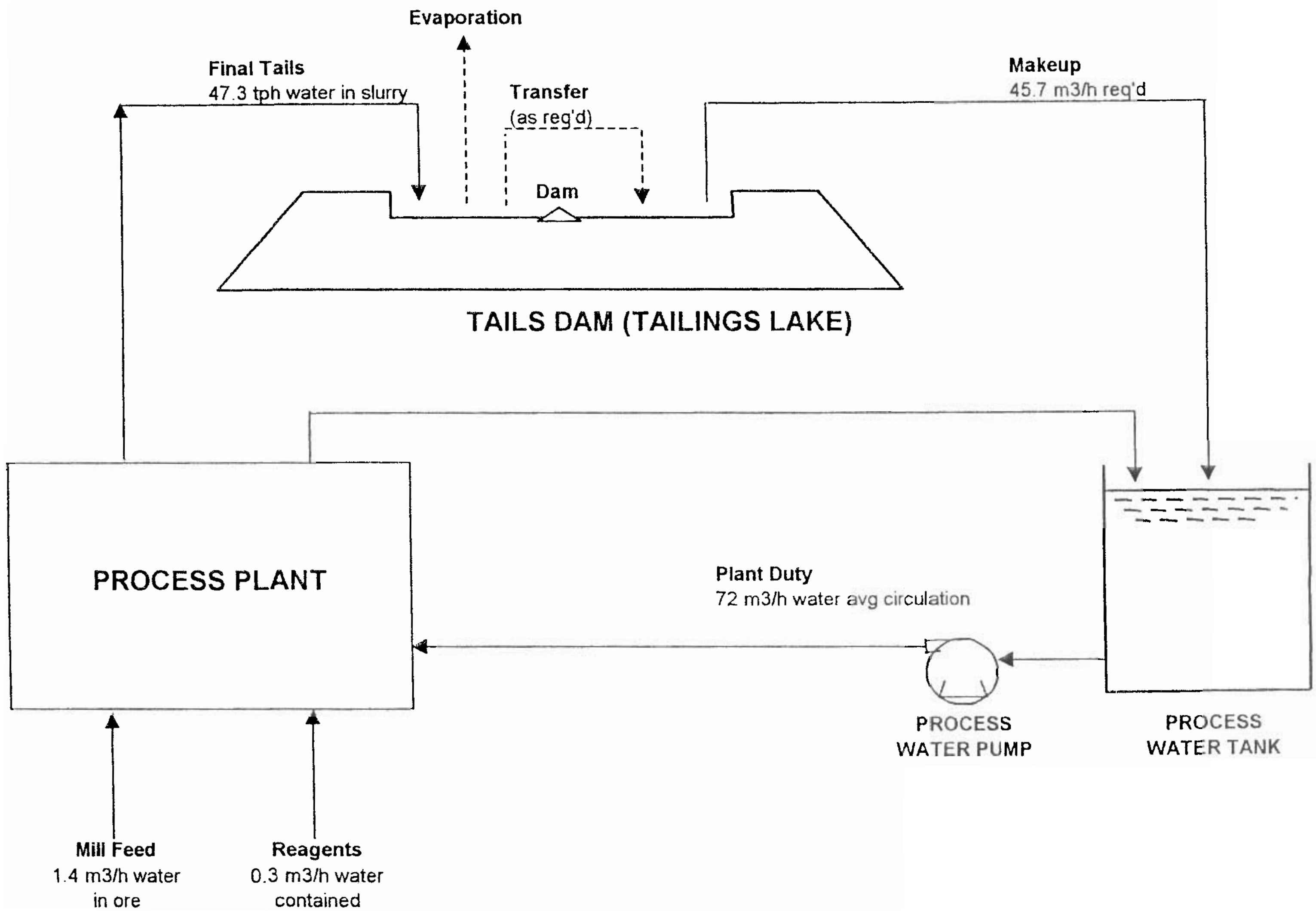


FIGURE 8. **SIMPLIFIED DIAGRAM OF PROPOSED PROCESS WATER BALANCE**



3.2.3 Water management

The overall mill process water needs will be 73.6 m^3/ hr. The in plant process water recovery rate will be 27.9 cu. m / hr. The net water requirement will be 45.7 m^3 / hr. The source of make-up water will be Tail Lake by way of a insulated and heated return line from a barge mounted pump. It is estimated that the rate of raw water from Doris to the mill will be approximately 10 m^3 / hr.

Potable water needs are estimated to be 2 m^3 /hr. and will be drawn from Doris Lake.

Under normal operations the raw water draw from Doris Lake will be 12 m^3/hr.

3.2.4 Tailings management

Tailings will be produced at two points in the mill processing cycles; following the concentration circuit, and from the cyanide leach circuit. The gravity concentration process will yield 90% of the tailings with the balance going to the cyanide leach circuit. On recovery of the remaining gold in the cyanide leach circuit all the tails from the cyanide leach tanks will be filtered to retain as much cyanide as possible for recycling. The filtered tailings will be pumped to a cyanide detoxification reactor prior to discharge to Tail Lake. The combination of detoxification and the effects of slurry concentration in the gravity circuit will result in very low cyanide levels going to Tail Lake.

Tailings will be produced at approximately 600 dwt /day with a composition of 35% solids. They will be pumped approximately 5,250 m to the south end of Tail Lake. Tailings deposition will be by end-of- pipe discharge. The location of the discharge point will be moved as required and over time the tailings beach will move north toward the tailings containment dam across the narrows of Tail Lake.

Water will be decanted from Tail lake as required by a controlled siphon outlet with the discharge into the water course below Doris Lake. No discharge from Tail Lake will be released into Doris Lake. The Tail Lake catchment area is approximately 4.4 km^2. The natural recharge area of the lake is relatively small and decant from the lake, if required will likely occur following the spring freshet. It is expected that taking mill make-up water from Tail Lake will keep it in a negative water balance for most of the year.

There will be a maximum 10 m head in the tailings line at its lowest point where it crosses the outflow to Doris Lake. This is subject to minor changes following detailed engineering.

3.2.5 Waste management

All solid non-combustible and non-hazardous waste will be disposed of in the mined out pit. Combustible waste and kitchen refuse will be incinerated. Waste oil will be burned in a waste oil burner similar to the one installed at Windy Camp in 2001.

3.2.6 Waste rock

Pit and underground mining development rock in excess of site construction needs will be placed approximately 200 m north of the pit. It will be placed in adjacent rows by end-dump deposit with the surface leveled to prepare for the next layer. Side slopes will be at the natural angle of repose for waste rock. Analyses for acid generation potential of Doris orebody wallrock showed that the potential for acid generation is very low and that there is an abundance of carbonate which will be a natural buffer and so minimize any acid generation risk from waste rock (Knight Piesold, 2001). Final waste rock volume estimates will be included in the Project EIS.

3.2.7 Camp

The camp will have a capacity for 70 - 80 persons. Being a short term operation it will be a basic camp providing accommodations, kitchen and dining, and a modest relaxation/recreation area. Catering and housekeeping will be provided by 8 contract personnel on-site who will be on the same - 14 days in and 14 days out. Industrial health and safety needs of the camp and Project workforce will be served by an industrial health professional on site at all times.

Personnel on site during the ore processing and underground mining phase will be:

Mining	20
Mill operations and site services	25
Camp	8
Technical & Admin	12
Total	65

3.3 Project closure

On the completion of milling and ore processing in December 2006 the mill and all processing circuits will be dismantled and scrubbed to recover all remaining gold which will be smelted as the final element of Doris Project gold production and recovery. All washdown water will be directed through the cyanide detox unit prior to discharge to Tail Lake.

The site will then be on "care and maintenance" for approximately 8 - 10 weeks to await improved weather and outdoor working temperatures more suitable for site disassembly. Dismantling and removal of all salvageable items to the laydown area on the beach for removal by sea-lift in 2007 will be completed in approximately 12 - 16 weeks.

All non-salvageable and non-hazardous items will either be incinerated if combustible, placed underground or in the pit with other solid waste for permanent disposal. All hazardous materials will be either treated on site or shipped south by barge.

The tailing pipeline will be removed before spring melt. The last 2 km of the tailings pipeline service road will be scarified.

The portal will be sealed with a welded steel cover bolted in place and made inaccessible in compliance with mine safety requirements.

By the end of July 2007 the only remaining items at the site will be the accommodations, kitchen, sewage treatment plant and the envirotanks for fuel storage. The camp will remain in place to support future exploration activity on the Hope Bay belt. The gen set trailer will be replaced with a smaller unit for the camp's ongoing power supply. The roads between the beach and camp including the airstrip, will be left in tact and useable.

The road to Tail Lake will remain serviceable to allow for monitoring Tail Lake water quality until sign-off. On sign-off, the dam will be breached, the road scarified, and the water crossing over the Doris Lake outflow removed. It is expected that this would be completed in 2008 at the latest.

4.0 Description of Project Environment

4.1 Introduction to Baseline Studies

Initial field work in the Hope Bay greenstone belt was done on the Boston gold prospect near Spyder Lake approximately 60 km south of the Doris Project area. Environmental studies at Boston started in 1993 (Rescan, 1993). Systematic environmental studies in the Doris Project area began in 1995 (Klohn-Crippen, 1995). The scope of systematic environmental studies between the two study areas included climate, stream flow, water quality, sediment quality, aquatic biology, fish populations, terrestrial ecosystem mapping, and wildlife populations. Studies for BHP continued through 1999. On taking ownership of the property from BHP in 1999, the HBJV reviewed the scope of the environmental baseline studies to date and supplemented the existing data with several specific studies in 2000 and 2001. Results of the studies done on the north end of the Hope Bay belt in the area of the Doris Project will be summarized in the appropriate sections that follow.

The inventory of environmental baseline study report titles is provided in Appendix 2. Data from these studies will be integrated with results of the West Kitikmeot Slave Study that are relevant to the Project area and submitted in support of the Project EIS.

4.2 Climate

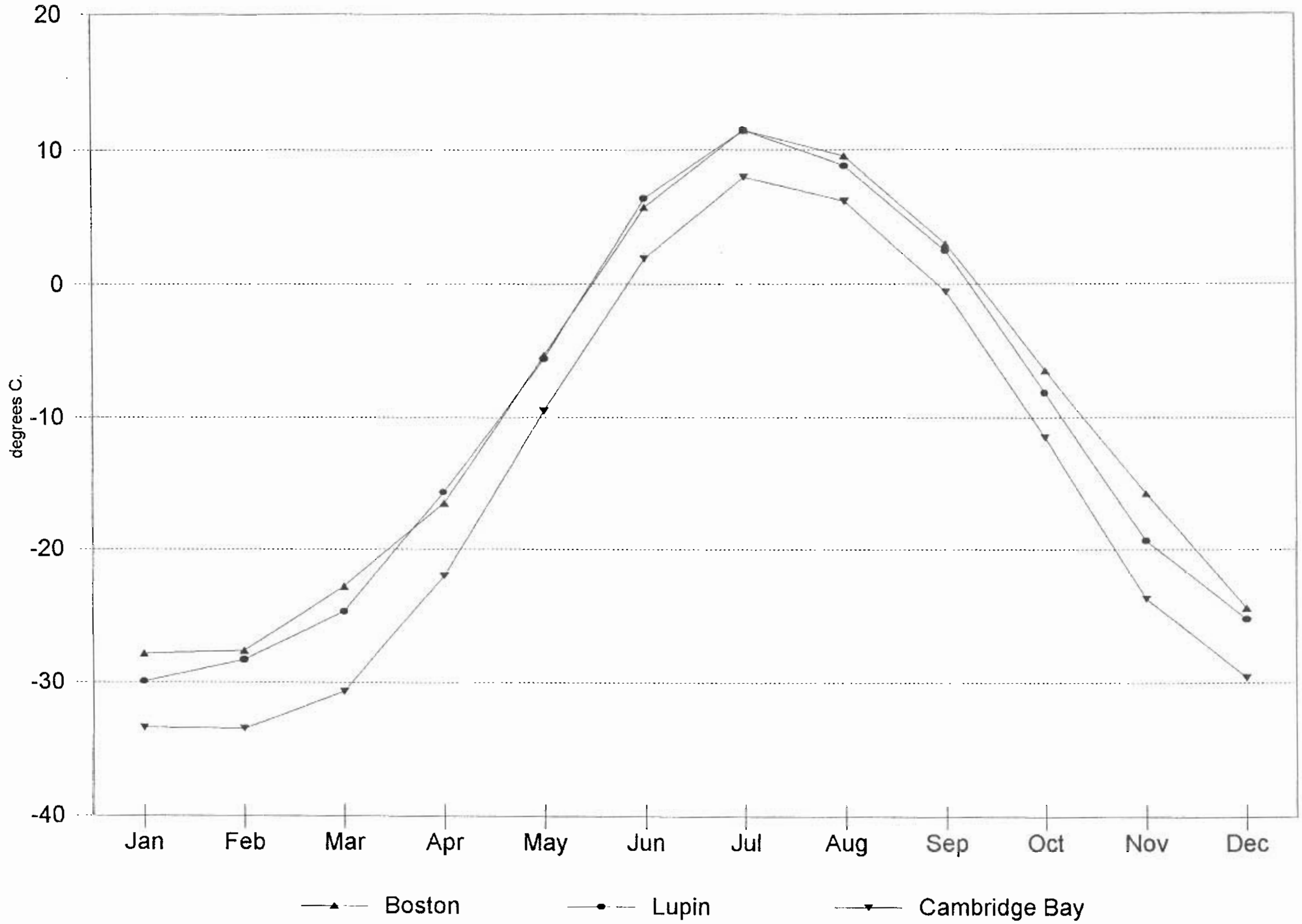
The climate for the Project area is characterized by short, cool summers and long cold winters. The mean annual temperature of the Project area is -14 deg. C. (National Atlas of Canada) with continuous permafrost. Annual precipitation is relatively low with roughly half falling as rain.

An automatic weather station was established at the Boston site in 1993 (Rescan, 1994). The meteorological data from Boston shows the same annual temperature profile as the data from similar stations at Lupin and Cambridge Bay (Rescan, 1999). The climate data for the study area or that for the Boston camp does not include a continuous record for either temperature or precipitation over full year period (Rescan 1999). It does however provide sufficient data to show that the annual profiles are similar to other central arctic stations like Cambridge Bay and Lupin. Figure 9 shows the annual mean monthly temperature profiles for Lupin, Cambridge Bay, and Boston. Figure 10 shows the annual precipitation profile for Cambridge Bay.

The climatic conditions of the Project area are similar to those of the other mines operating in Nunavut: the Lupin gold mine on Contwoyto Lake, and the Polaris and Nanisivik lead/zinc mines at Little Cornwallis Island and North Baffin Island respectively.

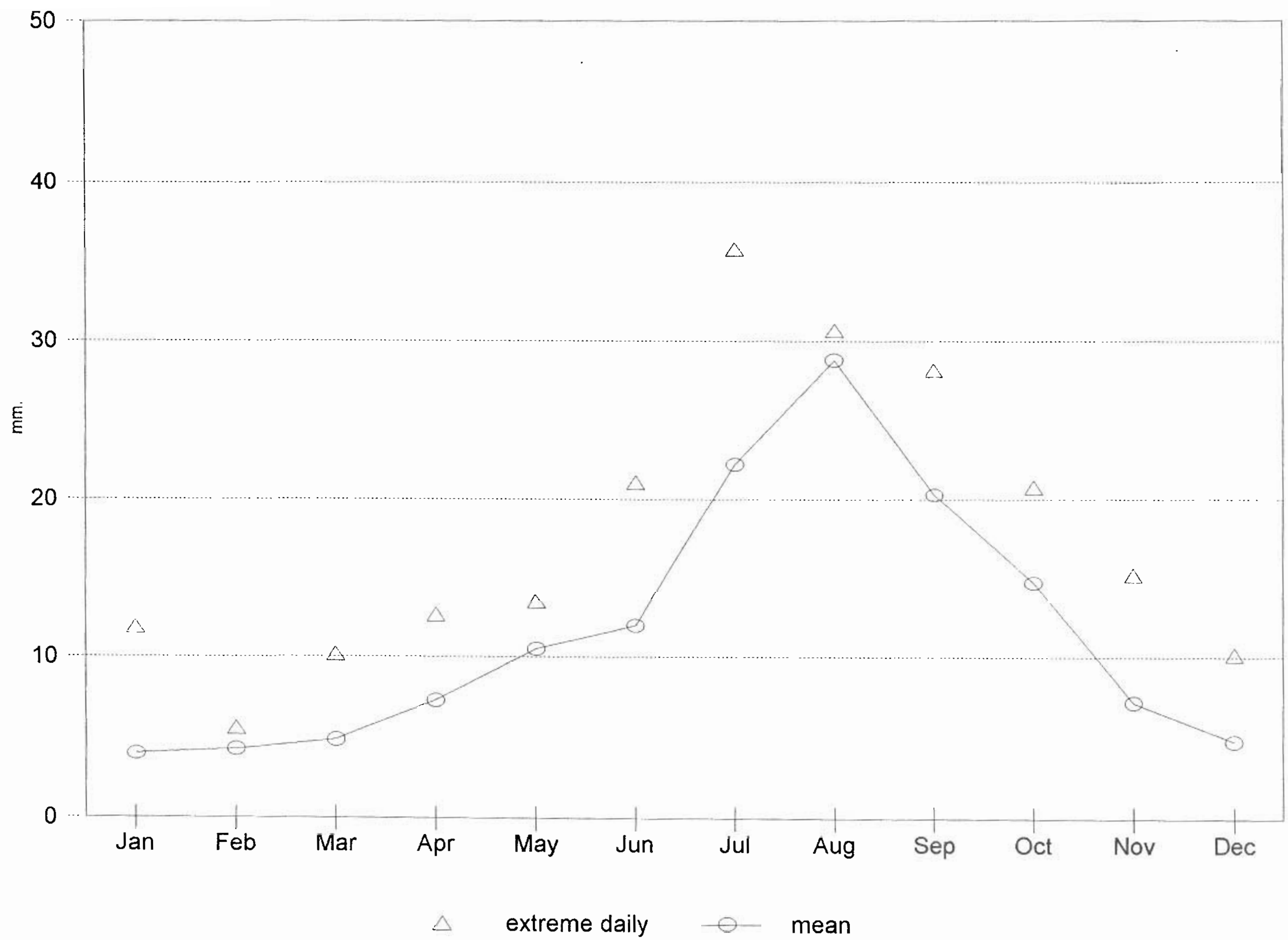
A more comprehensive review of climate data collected in the study area will be presented in reports supporting the Project EIS.

Figure 9. Annual Temperature Profile: Cambridge Bay, Lupin Mine and Boston Camp



Sources: Cambridge Bay 1927-1993 (Environment Canada 1994); Lupin 1983-2001 (SNC-Lavalin 2001); Boston 1998-2000 (Rescan 2001)

Figure 10. Cambridge Bay Annual Precipitation Profile: 1927 - 1993



Source: Environment Canada 1994. Canadian Climate Data

4.3 Geology and topography

The Hope Bay belt is greenstone of Archean age and lies within the Slave Geological Province in the Canadian Shield. This greenstone belt is seven to fourteen km wide and 80 km long. Archean volcanic greenstone hosts many of Canada's precious and base metal mines (i.e. Yellowknife, Timmins, Rouyn-Noranda).

The Doris Project area is on the north end of the Hope Bay greenstone belt. The geology in the area of the Doris Project contains a system of quartz veins more than 2 km in length. The Doris Hinge occurs where the Doris Central and Doris Lakeshore veins meet in a zone of mineralization 4 - 5 metres wide with a varying thickness from mere centimetres to 40+ metres.
It is visible at surface as a quartz outcrop and is at least 600 metres long, plunging North at a gentle 10 degrees and is truncated by a cross cutting diabase sill. The basaltic host rock of the Hope Bay belt is folded in shallow north-south trends which also plunges to the north. Younger diabase dykes and sills of Proterozoic age have intruded the basalt host rock. These dykes and sills cut across the zones of mineralization throughout the Hope Bay belt. In the Doris Vein System these range from 1 - 6 m thick.

Most of the gold mineralization is hosted in quartz vein systems. Sulphide content in the veins is generally low, averaging < 2% pyrite.

The topography of the Project area is generally a coastal lowland with numerous lakes and ponds separated by glacial land forms and parallel running geological intrusions of diabase dykes and sills. This forms long narrow drainage basins with a northerly flow. The dominant land form in the Project area is the Doris mesa, a 900 m X 900 m diabase sill rising from 20+ m asl (level of Doris Lake) to 158 m asl. It is a remnant that survived the erosive effects of the last ice age. The long and narrow north / south lakes vary considerably in depth and size. Doris Lake is 5+ kilometres long and less than 1 km wide; it is more than 8 metres deep for half its length with a maximum depth of 16 m (Klohn-Crippen, 1995). The local topography ranges from sea level at Roberts Bay to 158 m at the summit of Doris mesa approximately 3 km inland. The ridge separating Doris and Tail lake drainages rises to 70 m asl. The intervening valleys between the north / south ridges are broad, generally well drained, and support continuous sedge meadows on an organic moss matt. Soils are generally of marine lacustrine origin.

The earthquake hazard in the Hope Bay belt is rated in the lowest risk category projected on a Canada wide scale (Adams et al. 1999).

4.4 Acid Rock Drainage Potential

Rock samples for testing Doris Project ore and wallrock (altered and unaltered) were tested for acid generation potential (Knight Piesold, 2001). The mineralized samples (5) from the Doris zone could be classified as having uncertain acid generating potential; three of five samples tested showed NP/MPA values below 3. Overall, the five Doris mineralized samples had NP/MPA values ranging from 0.9 to 52.1 with an average of 12.3. The unaltered wallrock samples (5) from Doris had NP/MPA values above 3.0 (average = 52.3). This rock type will not pose a significant risk for acid generation. One of the five samples of altered wallrock returned uncertain acid generation potential results; overall however the NP/MPA ratio for five samples of altered wallrock was 75.2.

4.5 Hydrology

The hydrologic regime of a water shed is determined by factors all dependant on annual precipitation. The Doris Project area receives approximately 200 mm of precipitation per year; a value that can vary in the range of 100 - 300 mm from year to year (see data for Cambridge Bay in Figure 10). The volume of water that discharges by way of runoff from tundra watersheds depends on the rate of spring melt, the amount of storage on the watershed in the form of lakes and ponds, and the amount of evaporation from water surfaces and transpiration from plants. The bulk of a tundra watershed discharge occurs during the short spring melt when daily flows peak sharply and drop off almost as quickly as they rise. It is not unusual for the stream flow to diminish to near zero in July and early August but then resume when rainfall increases in August and September. Hydrometric measurements near the Boston Camp in 1997-98 showed that runoff from the Aimaoktak and Stickleback watersheds south of Spyder Lake was 135 and 111 mm respectively; an amount that is roughly 55 - 65% of mean annual precipitation. The balance of the precipitation would be either stored in the lakes of the watershed or lost in evaporation and transpiration.

A more comprehensive review of precipitation and hydrometric data collected in the study area will be presented in reports supporting the Project EIS.

4.6 Water Quality

Water quality profiles for the lakes in the Doris Project area were developed from samples taken during baseline studies in April (through the ice) and in July. Marine water quality was also analyzed with samples collected in both Roberts Bay and Hope Bay. Samples from each site and period were analyzed for physical parameters, dissolved ions, nutrients and trace metals (Rescan, 1999).

Many of the analyses returned readings that were below detection limits which should be expected for samples from northern watersheds. Most water quality parameters therefore fall within CCME guidelines for freshwater aquatic life (2001). Selected parameters however were elevated. Aluminum in Ogama Lake (above Doris Lake) returned values of .008 - .227 mg/L (CCME guideline for Al is .100 mg/L). Chromium concentrations in Ogama and Pelvic Lakes showed values of .002 mg/L which equals the CCREM guideline. CCREM guidelines for copper were equaled or exceeded for all lakes samples in the Doris Project area and most lakes exceeded the guideline for lead (Rescan, 1999).

Marine samples collected in Roberts and Hope Bays showed results low in dissolved metals. Complete results of water quality analyses in the Project area will be presented in reports supporting the Project EIS.

All the water quality data collected in the study area will be presented in reports supporting the Project EIS.

4.7 Sediments

Predevelopment sediment samples have been collected from lakes within the Project area as well as the seabed in Roberts Bay and Hope Bay for analyses of total organic carbon (TOC) and selected metals to establish sediment quality baselines for freshwater and marine sediments

(Rescan, 1999). Samples from Doris Lake exceeded CCME interim sediment guidelines for arsenic, chromium, and copper. Marine sediment samples from Roberts Bay exceeded CCME guidelines for copper. The full suite of sediment quality data will be presented in documents supporting the Project EIS.

4.8 Freshwater and marine communities

Physical characteristics of the freshwater and marine environments have been measured. Bottom temperatures of lakes in late winter (April) are approximately 2.0 deg. C. Dissolved oxygen was variable with values in the water column at 8.0 mg/L or greater. Dissolved oxygen near the sediment layer fell to 2.0 mg/L. These conditions are adequate to support aquatic organisms throughout the arctic winter.

Summer sampling of the marine environment showed a temperature stratification of the deeper waters of Roberts Bay and Hope Bay. Dissolved oxygen was at 10mg/L or greater.

Biological communities were sampled with lakes, streams, and the marine areas showing the expected complement of organisms. In the marine system the shallow waters of Roberts Bay subject to ice scour (1.2 m deep) showed approximately 1/10 to density of benthic marine organisms compared to samples from a 16 metre depth (Rescan, 1999). Complete results of these studies will be provided with the Project EIS.

The marine fish habitat in Roberts Bay was investigated in 2000 (Rescan, 2001). The northern areas were rated as fair to good with significant amounts of bedrock and cobble while the southern portion was rated good to excellent on the basis of cover and invertebrate communities necessary for marine fish food requirements. It was also shown that anadromous char migrate through Little Roberts Lake, spending the summer in Roberts Bay and adjacent waters. These char overwinter in Roberts lake.

4.9 Fish populations

The Doris Hinge Project is situated on Doris Lake which is the last major water body on the drainage basin before it drains via Doris Creek through Little Roberts lake into Roberts Bay. Fish populations at risk from effects of the Project include Doris Lake (runoff and accidental spills), Tail Lake (tailing disposal) and Doris Creek including Little Roberts Lake (combined outflow from both Tail Lake and Doris Lake). Studies of fish populations by Rescan in the Doris Project area were conducted in 1996, 1997, 1998, and 2000. They included investigations of both lakes and streams including Tail Lake, the outflow of Tail Lake, Doris Lake, Doris Creek at the outflow of Doris Lake and near its mouth on Roberts Bay, and in Little Roberts Lake. Netting in Tail Lake produced only lake trout while Doris Lake yielded three species of fish: lake trout, lake whitefish, and lake cisco. Fish captured in Little Roberts Lake included these species plus broad whitefish and Arctic charr. The Arctic charr in Little Roberts lake included both juvenile fish and adults returning from the sea.

Electro fishing in the streams produced only one ninespine stickleback in the outflow to Tail Lake. No fish migration route was observed during habitat investigations of this stream, nor were any spawning, rearing, overwintering, or adult rearing habitats observed (Rescan, 1998) Electro fishing produced lake trout and juvenile arctic charr in the outflow just below Doris Lake but below the 2.3 m waterfall in the stream which is judged to be a barrier to upstream fish migration (Rescan, 1998). Electrofishing below the waterfall showed Arctic charr, lake cisco, lake trout, lake whitefish and ninespine stickleback - the most diverse site for fish species found in the Doris Project area. Likewise juvenile of both arctic charr and lake trout along with ninespine stickleback, were reported for the mouth of the stream near Roberts Bay. Studies of fish in Little Roberts Lake in 2000 showed the presence of several fish populations there (Arctic charr, broad whitefish, least cisco, lake whitefish and lake trout. The char population is anadromous and likely overwinters in Roberts Lake immediately upstream from Little Roberts Lake (Rescan, 1998, 2001).

Table 4: Freshwater fish species present in waters of Doris Lake and adjacent streams and lakes (from Rescan, 1997).

Species	Habitat / abundance	Conservation status *	Economic status / potential
Lake cisco *Coregonus artedii*	lake and stream	secure	
Arctic charr *Salvelinus alpinus*	lake and stream, anadromous, common	sensitive	subsistence and recreational use
Lake whitefish *Coregonus clupeaformis*	lakes	secure	subsistence use
Broad whitefish *Coregonus nasus*	lakes, maybe anadromous	secure	subsistence use
Lake trout *Salvelinus namaycush*	lake and stream, anadromous, common	secure	subsistence and recreational use
Ninespine stickleback *Pungitius pungitius*	lakes and streams	secure	

* the conservation status of freshwater fish in Nunavut as ranked in "Nunavut Wild Species Report, 2000" (Government of Nunavut, unpublished).

Marine fish populations in Roberts Bay have been investigated in a preliminary manner and it is known that Arctic char from Roberts Lake migrate through Little Roberts Lake and spend the summer in Roberts Bay and adjacent waters.

Fish tissue from fish in Doris, Patch, Windy and Pelvic Lakes were collected in 1996, 1997 and 1998 for analyses of metal concentrations.

No fish species known for the Project area is rated by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) for special conservation consideration (GN, 2000). A comprehensive report on fish populations and fish habitat in the Doris Project area will be prepared and submitted in support of the Project EIS.

4.10 Habitat

Comprehensive bioterrain mapping was completed that showed the distribution of terrestrial ecosystem component for the Hope Bay belt (Westroad Resource Consultants, 1998). Elements relevant to the Doris Project area will be presented in support of the Project EIS.

4.11 Birds

The Project area supports a full complement of tundra bird species; both migratory and protected by the Migratory Birds Conventions Act (Canada), and species protected by the Nunavut Wildlife Act. Bird species observed during the course of work and study in the Hope Bay belt and reported by Rescan (1996; 1997), and Calef and Hubert (2000a) are summarized in Table 5 (Nunavut) and 6 (Canada).

The bird populations in the area are similar to other tundra habitats with the exception of raptors. The abundance of cliff habitat provided by the sills and dikes in the Hope Bay Belt provides nesting habitat for cliff nesting raptors. Therefore, unlike much of the tundra, the Hope Bay belt is home to numerous raptors. Figure 11 shows the distribution of known nest sites in the Hope Bay belt. Only one known nest site (occupied by peregrines in 2000; vacant in 2001) is known to occur within 2 km of the Doris Project mine and mill site. A comprehensive review of raptor nest site occupancy and production of young will be developed for all the data collected by the Project since 1996 and others in prior surveys and submitted in support of the Project EIS.

Table 5: Birds protected by the Nunavut Wildlife Act known to occupy and breed in the Hope Bay belt.

Species	Distribution	Conservation status*	Economic status
Golden eagle *Aquila chrysaetos*	terrestrial; summer resident	sensitive	
Gyrfalcon *Falco rusticolus*	terrestrial; summer resident and migratory	secure	
Peregrine falcon *Falco peregrinus tundrius*	terrestrial; summer resident and migratory	may be at risk	
Rough-legged hawk *Buteo lagopus*	terrestrial; summer resident and migratory	secure	
Willow ptarmigan *Lagopus lagopus*	terrestrial; summer resident and migratory	secure	recreational and subsistence use
Rock ptarmigan *Lagopus mutus*	terrestrial; summer resident and migratory	sensitive	recreational and subsistence use
Raven *Corvus corax*	terrestrial year round resident	secure	
Snowy owl *Nyctea scandiaca*	terrestrial; summer resident and migratory	secure	
Short-eared owl *Asio flameus*	terrestrial; summer resident and migratory	sensitive	

* the conservation status of birds Nunavut as ranked in "Nunavut Wild Species Report, 2000" (Government of Nunavut, unpublished).

Definitions for the conservation status used by the Government of Nunavut (2000) are provided below.

- "may be at risk means" that the species may be at risk of extinction or extirpation, and are therefore a candidate for detailed risk assessment.
- "secure" means that the species is not at risk or sensitive.

- "sensitive" means that the species is not at risk of extinction or extirpation but may require special attention or protection to prevent them from becoming at risk.
- "undetermined" means that there is insufficient information, knowledge, or data available to reliably evaluate the general status of the species.

Table 6: Birds species protected by the Migratory Birds Conventions Act (Canada) reported to occupy the Hope Bay belt.

Species	Distribution	Conservation status*	Economic status
Red-throated loon *Gavia stellata*	summer resident	secure	
Arctic loon *Gavia arctica*	summer resident	secure	
Yellow-billed loon *Gavia adamsii (Gray)*	summer resident	secure	
Tundra swan *Cygnus columbianus*	summer resident	secure	
White-fronted goose *Anser albifrons*	summer resident	secure	recreational and subsistence use
Canada goose *Branta canadensis*	summer resident	secure	recreational and subsistence use
Northern Pintail *Anas acuta*	summer resident	secure	recreational and subsistence use
Greater Scaup *Aythya marila*	summer resident	undetermined	recreational and subsistence use
Oldsquaw *Clangula hyemalis*	summer resident	secure	recreational and subsistence use
Common eider *Somateria mollissima*	summer resident; primarily marine	sensitive	recreational and subsistence use
King eider *Somateria spectabilis*	summer resident; primarily marine	sensitive	recreational and subsistence use
Red-breasted merganser *Mergus serrator*	summer resident	secure	
Sandhill crane *Grus canadensis*	summer resident	secure	
Lesser golden plover *Pluvialus dominica*	summer resident	secure	
Semipalmated plover *Charadrius semipalmatus*	summer resident	undetermined	
Semipalmated sandpiper *Calidris pusilla*	summer resident	sensitive	
Long-tailed jaeger *Stercorarius longicaudus*	summer resident	secure	

Herring gull *Larus argentatus*	summer resident; colonial nesting on coastal cliffs and islands	secure	eggs are gathered where accessible collected
Arctic tern *Sterna paradisaea*	summer resident	secure	
Horned lark *Eremophila alpestris*	summer resident	sensitive	
Water pipit *Anthus spinoletta*	summer resident	sensitive	
American tree sparrow *Spizella arborea*	summer resident	sensitive	
Savannah sparrow *Passerculus sandwichensis*	summer resident	secure	
White-crowned sparrow *Zonotrichia leucophrys*	summer resident	sensitive	
Lapland longspur *Calcarius lapponicus*	summer resident	secure	
Snow bunting *Plectrophenaz nivalis*	summer resident	sensitive	
Redpoll spp. *Carduelis spp.*	summer resident	secure	

* the conservation status of birds Nunavut as ranked in "Nunavut Wild Species Report, 2000" (Government of Nunavut, unpublished).

Bird surveys in 1996 in the general area of the Doris Project reported an adult breeding bird density of 1.99 birds/ha (range .48 - 3.08 for 8 sample transects) with 11 species represented. Water fowl surveys were also completed which showed 7 species breeding on the north end of the Hope Bay belt. Non-breeding Canada geese were the most abundant followed by white-fronted geese and northen pintail ducks. Canada geese, white-fronted geese and pintails all breed in the Project area. Habitats in which any of these species concentrated for either nesting or migration were not reported for any area in the Hope Bay belt (Rescan, 1998). A more detailed review of birds in the Project area will be submitted in support of the Project EIS.

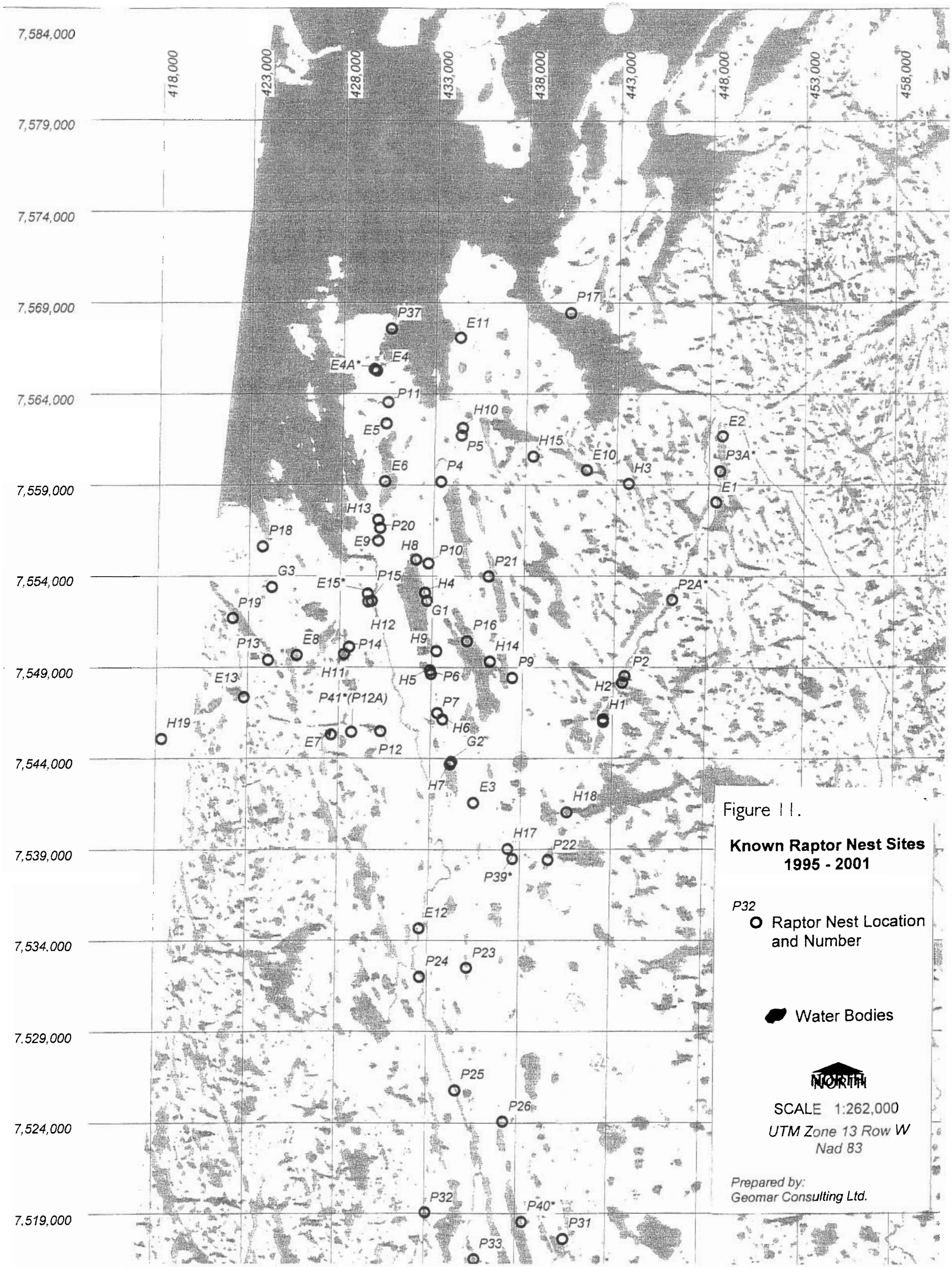


Figure 11.

Known Raptor Nest Sites 1995 - 2001

4.12 Mammals - terrestrial

The environmental studies in the Hope Bay belt by the Hope Bay Joint Ventures and its predecessor BHP have included systematic wildlife surveys for large mammals in the Doris Project area annually since 1996. A full report on the results of these surveys and related studies will be compiled and submitted in support of the Project EIS.

All terrestrial mammals in Nunavut are protected by the Wildlife Act (Nunavut). This statute is administered by the Government of Nunavut Department of Sustainable Development. The distribution and economic status of mammals in the Project area are summarized in Table 7.

Table 7: Land mammals observed in the Project Area - 1996 - 2001.

Species	Habitat and distribution	Conservation status*	Economic status
Masked shrew *Sorex cinereus*	insectivore active all year in dry habitats	not assessed	
Arctic hare *Lepus arcticus*	prefers habitats with cover	secure	recreational and subsistence use
Arctic ground squirrel *Spermophilus parryii*	active in dry terrain; hibernates for winter	secure	occasional subsistence use
Tundra redback vole *Clethrionomys rutilus*	active all year in dry habitats	undetermined	
Brown lemming *Lemmus sibiricus*	active all year in dry habitats	secure	
Greenland collared lemming *Dicrostonyx torquatus*	active all year in dry habitats		
Tundra vole *Microtus oeconomus*	active all year in dry habitats	not assessed	
Wolf *Canis lupus*	known dens in Hope Bay belt	sensitive	recreational, subsistence and economic value
Arctic fox *Alopex lagopus*	dens not confirmed but in Project area in winter	secure	economic value
Red fox *Vulpes vulpes*	known dens in Hope Bay belt	secure	economic value
Grizzly bear *Ursus horribilis*	active throughout Project area; inactive in winter	sensitive	recreational, and economic value
Short-tailed weasel *Mustela erminea*	active all year	secure	
Wolverine *Gulo luscus*	expected throughout Project area	sensitive	recreational, subsistence and economic value
Barren-ground caribou *Rangifer tarandus*	migratory; Project area includes winter range for Victoria Island herd	secure	recreational, subsistence and economic value

Muskox *Ovibos moschatos*	active all year throughout Project area	secure	recreational, subsistence and economic value

* the conservation status of birds Nunavut as ranked in "Nunavut Wild Species Report, 2000" (Government of Nunavut, unpublished).

No habitat that is critical to any aspect of the local mammal populations annual life history has been observed in the Project area.

4.12.1 Insectivores

Only one species of insectivore, the masked shrew, is known to be active in the Project area. It was captured in small mammal trapping samples in 1996. This small mammal is active all year long and occupies dry habitats where it feeds almost exclusively on insects, their eggs, and larvae.

4.12.2 Rodents

Five species of rodent are known to occupy the Project area. Tundra red-backed voles, tundra voles, and two species of lemming, plus the Arctic ground squirrel are found throughout the Project area in well drained habitats suitable for these herbivores. Only the ground squirrel hibernates. The voles and lemmings are active all year long and display a cyclic population growth and decline pattern that repeats every 3 - 5 years. The effect of this cycle can be observed in raptor nesting /fledging success, especially that of the rough-legged hawk, an aerial predator of small mammals, particularly rodents. Fox production and survival of young is also affected by the breeding cycle of small rodents.

4.12.3 Lagomorphs

The Arctic hare is a ubiquitous tundra herbivore that occupies habitats that offer both forage and cover. Both are plentiful in the Project area and Arctic hare and their sign can be observed in numerous locations throughout the area in all seasons.

4.12.4 Carnivores

Carnivores in the Project area range from the small short-tailed weasel to the large grizzly bear including foxes, wolves, and wolverine. Dens of both fox and wolf are known for the Hope Bay belt; one fox den is approximately 4 km southwest of the Doris Project site (Rescan, 1998). Grizzly bear studies in the Project area included telemetry collars on three males and three females in 1997 and 1998. The movement data for grizzly in the Hope Bay belt were consistent with that for grizzly bear generally, that males have a greater annual range than females (Messier and Case for WKSS. 1998). These data along with the relevant findings of the WKSS will be prepared and submitted in support of the Project EIS.

4.12.5 Ungulates

The Project area is occupied by both caribou and muskox. Aerial surveys since 1996 have examined the distribution of both caribou and muskox in the study area at all seasons of the year (Calef and Hubert, 2000b). A survey area of 26 east /west transects have been flown every year since 1996. This survey pattern covers the core of the Hope Bay belt, an area of approximately 675 km^2. The area of the Doris project is covered by transects 15 - 26; transect 15 is 17 km south and transect 26 is 25 km north of the Doris Project site.

4.12.5.1 Muskox

Muskox have been observed on every aerial survey and are widely distributed throughout the Hope Bay belt. Table 8 shows a summary of the number of groups of muskox observed on aerial surveys since these began in May1996.

Table 8: Groups of muskox observed during aerial surveys over the Doris Project area: 1996 - 2001.

Season / Year	1996	1997	1998	1999	2000	2001
Winter January- April	n.d.	3 (1)	4 (1)	1 (1)	n.d.	n.d.
Spring May - June	2 (2)	3 (2)	5 (2)	2 (1)	5 (3)	3 (2)
Summer July - August	8 (3)	8 (3)	6 (2)	3 (1)	2 (1)	n.d.
Fall September - October	0 (1)	0 (1)	0 (1)	n.d.	n.d.	n.d.
Winter November-December	1 (1)	1 (1)	0 (1)	n.d.	n.d.	n.d.

n.d. means "no data" as no surveys were completed in the season indicated.

A more detailed review of muskox in the Project area will be prepared and submitted in support of the Project EIS.

The Hope Bay belt is within the range of three different caribou herds- the Bathurst herd shared between Nunavut and the NWT, the Queen Maud Gulf herd that ranges on the mainland predominantly within the Kitikmeot region of Nunavut, and the Victoria Island herd which spends the calving period and the summer on Victoria Island and migrates to the mainland for the winter. It is not possible to conclusively distinguish animals from the individual herds during aerial surveys and so herd affinity of animals observed on surveys is not known.

4.12.5.2 Caribou

Observations of caribou for all aerial surveys over the Doris Project (transect 15 - 26) area are summarized in Table 9. The seasons of the year are those assigned to the annual cycle of caribou by the Beverly and Qamanirjuaq Caribou Management Board (1999).

Table 9: Groups of caribou observed during aerial surveys over the Doris Project area: 1996 - 2001.

Season	1996	1997	1998	1999	2000	2001
late winter	n.d.	9 (1)	6 (1)	15 (1)	n.d.	n.d.
spring migration	n.d.	n.d.	n.d.	n.d.	10 (1)	19 (1)
calving	24 (2)	37 (2)	70 (2)	54 (1)	44(2)	9 (1)
calf sites	1	2	3	0	0	0
post-calving	51 (3)	1 (2)	1 (1)	1 (1)	0 (1)	n.d.**
late summer	n.d.	4 (2)	6 (1)	n.d.	n.d.	n.d.
rut	0 (1)	n.d.	0 (1)	n.d.	n.d.	n.d.
early winter	7 (1)	6 (1)	38 (1)	n.d.	n.d.	n.d.

* number in ( ) indicates the number of surveys data combined for the observations recorded

** a transect survey was not done because observations taken during raptor surveys showed no caribou in the study area

n.d. means "no data" as no surveys were completed in the season indicated.

It is noteworthy that of the numerous observations of groups of caribou in the Project area in the Table above, during the calving period, very few groups with calves were observed and none in the last three years (1999 - 2001 incl.). Additional observations add significant detail to the summary in Table 9. The high number of caribou in the Project area in the 1996 post-calving period probably belonged to the Queen Maude Gulf herd as the Bathurst herd calving ground that year was west of Bathurst Inlet with the highest density of calving observed 100 km west-southwest of the mouth of the Burnside River (Gunn et al, 1997). In 1996 the Queen Maude Gulf herd calved across the Queen Maude Bird Sanctuary (Gunn, et al. 2000) and could have easily moved north and west, a portion of which may then have been observed on the Hope Bay Belt in mid July. The high number of caribou in the early winter of 1998 coincided with a very late freeze-up of Dease Strait delaying the arrival of the Victoria Island herd on the mainland that year with migration still underway on the December 3 survey date (Rescan, 1998). Return migration to Victoria Island begins in late April and continues through early June with cows leading and bulls returning later (Gunn et al, 1997). Movements of cows monitored by satellite telemetry in May 2000 showed migration north across the sea ice in the May 1 - 14 period (GN - DSD, unpublished caribou movements map). A full review of all available information on the caribou in the Project area will be prepared and presented in support of the Project EIS.

4.13 Marine Wildlife

4.13.1 Marine Birds

A reconnaissance of the shorelines of Warrender Bay, Parry Bay, and Melville Sound for marine bird colonies was completed in August 2000. Only five colonies of herring gulls were found. Numerous concentrations of flightless waterfowl including broods were observed, especially near the shores of Warrender Bay and Parry Bay. The most numerous species were eider, Canada geese, and mergansers (Calef and Hubert, 2000). There were no concentrations of any bird species observed in Roberts Bay during this survey.

4.13.2 Marine Mammals

A survey for marine mammals over the offshore ice between the Project area and Kent Peninsula west to the marine route through Bathurst Inlet in June 1996. Only ringed seals were observed. The density of seal observed on the surveys ranged from 0.6 - 0.71 seals / km^2 . These density values fall between lower densities for the species observed along the Yukon north coast and Beaufort Sea, and higher densities observed in the Western Amundsen Gulf near western Victoria Island (Rescan, 1997). Other large marine mammals including polar bear are not common in the marine approaches to the Project area. A walrus was observed during an aerial survey in October 1998 (Rescan, 1999) and a single bearded seal was observed during the coastal survey for bird colonies in August 2000 (Calef and Hubert, 2000). No marine mammals were observed in Roberts Bay during the August 2000 survey and no seals were observed in Roberts Bay during the June 1996 (Rescan, 1997) survey for marine mammals.

5.0 Social and Economic Environment

The Project is located within the traditional land use areas of Bathurst Inlet, Umingmaktok, and Cambridge Bay (Nunavut Planning Commission, 1997; see Figures 12, 13, and 14).

A social and economic profile of the Kitikmeot Region was prepared for the Project in 2000 (Robert Hornal & Associates). The details that follow in this review are a summary of that report.

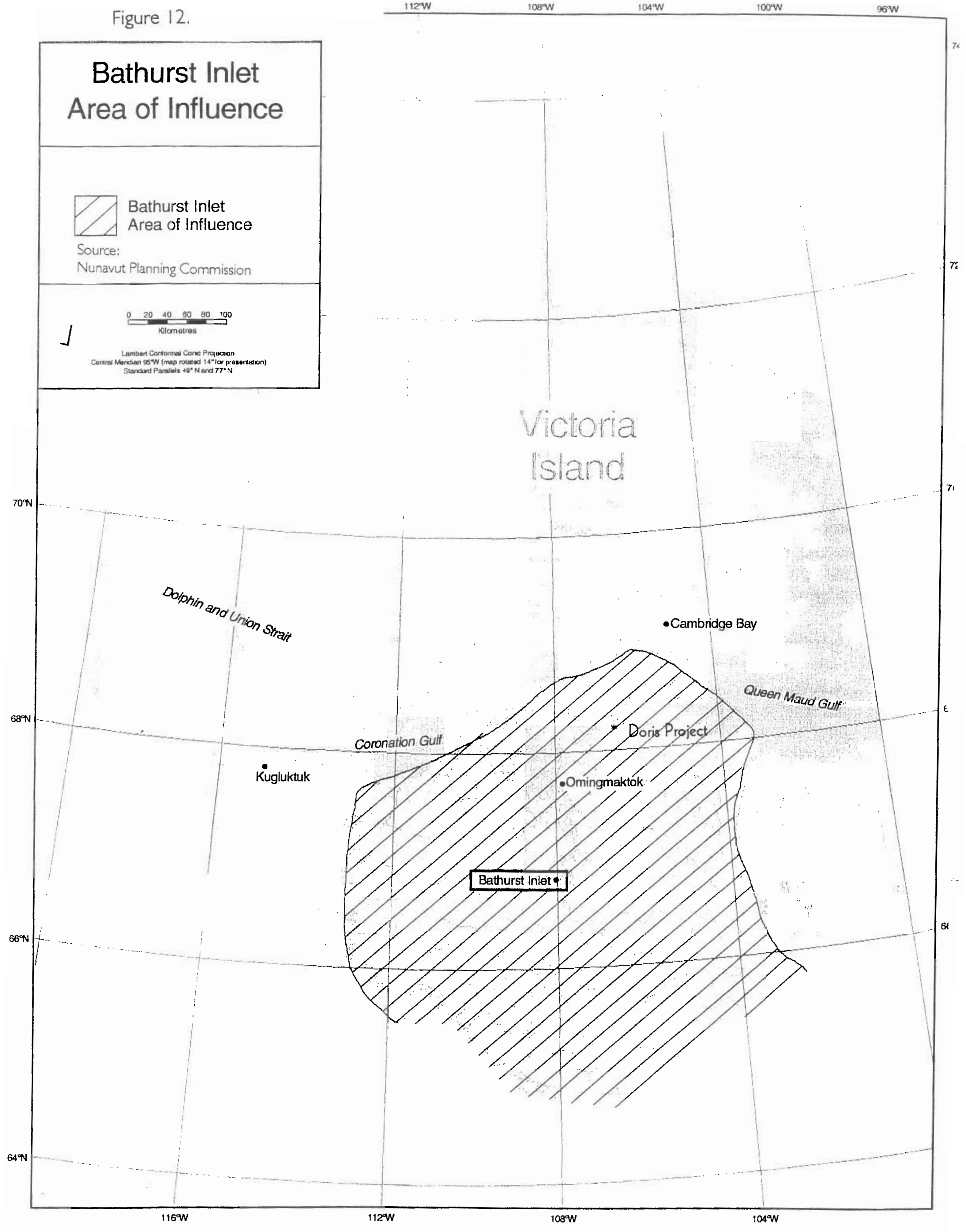
The Kitikmeot Region of Nunavut has seven communities; from west to east they are Kugluktuk, Bathurst Inlet, Umingmaktok, Cambridge Bay, Gjoa Haven, Taloyoak, and Kugaaruk. The demographic profile of the region shows a population in 1998 of 4,971 growing at a rate of over 3 % per year. It is a young population with 39% less than 14 years of age. Over 90% of the population is of aboriginal decent, primarily Inuit. In 1996 males in the region outnumbered females by 90 persons. Tables 10, 11 and 12 provide community specific demographic data.

The economy of the region is a mix of three dominant elements: the wage economy, government transfer payments, and the traditional economy. In 1996, 43.8% of the workforce was employed in the public sector. In 1998-99 the region had 6550 person months of income support, up 4% from 2 years previous however the average value dropped by 5% from $659. to $629. per person month in this period.. Many families depend on a blend of these economic pursuits by combining the benefits of wage employment, transfer payments, and hunting and fishing for domestic needs. Hornal reported that in 1994, 57.8% of the residents hunted and fished, 23.8% made crafts, and 9.8% trapped.

A labour force survey was completed by the NWT Bureau of Statistics in each community in 1999 prior to the division of the NWT into NWT and Nunavut. The survey showed 1564 residents were employed and 442 unemployed for an unemployment rate of 22% up from 15.1% in 1996. Data on training and education in Hornal's report showed that in 1996, 43.7% of the residents over 15 years of age had a high school certificate, 17.9% had some high school but no certificate, and 38.3% had less than a grade 9 education. Tables 10, 11, and 12 show employment and workforce profiles for the region.

An updated social and economic profile based on 2001 Census Canada data will be developed and submitted in support of the Project EIS.

Figure 12.



Bathurst Inlet
Area of Influence
Bathurst Inlet
Area of Influence
Source:
Nunavut Planning Commission
0 20 40 60 80 100
Kilometres
Lambert Conformal Conic Projection
Central Meridian 95°W (map rotated 14° for presentation)
Standard Parallels 49° N and 77° N
112°W
108°W
104°W
100°W
96°W
116°W
70°N
68°N
66°N
64°N
Victoria Island
Dolphin and Union Strait
Cambridge Bay
Queen Maud Gulf
Doris Project
Coronation Gulf
Kugluktuk
Omingmaktok
Bathurst Inlet