King eider *Somateria spectabilis*	summer resident	sensitive	recreational and subsistence use
White winged scoter *Melanitta fusca*	summer resident	undetermined	recreational and subsistence use
Black scoter *Melanitta nigra*	summer resident		recreational and subsistence use
Surf scoter *Melanitta perspicillata*	summer resident		recreational and subsistence use
Red-breasted merganser *Mergus serrator*	summer resident	secure	
Common merganser *Mergus merganser*	summer resident		
Sandhill crane *Grus canadensis*	summer migrant	secure	
Lesser golden plover *Pluvialus dominica*	summer resident	secure	
Semipalmated plover *Charadrius semipalmatus*	summer resident	undetermined	
Lesser yellowlegs *Tringa flavipes*	summer resident	undetermined	
Ruddy turnstone *Arenaria interpres*	summer resident	secure	
Sanderling *Calidris alba*	summer resident	secure	
Semipalmated sandpiper *Calidris pusilla*	summer resident	sensitive	
Least sandpiper *Calidris minutilla*	summer resident	sensitive	
White-rumped sandpiper *Calidris fuscicollis*	summer resident	secure	
Baird's sandpiper *Calidris bairdii*	summer resident	secure	
Pectoral sandpiper *Calidris melanotos*	summer resident	secure	
Stilt sandpiper *Calidris himantopus*	summer resident	undetermined	
Common snipe *Gallinago gallinago*	summer resident	sensitive	

Red-necked phalarope *Phalaropus lobatus*	summer resident	sensitive	
Northern phalarope *Lobipes lobatus*	summer resident		
Pomarine jaeger *Stercorarius pomarinus*	summer resident	secure	
Parasitic jaeger *Stercorarius parasiticus*	summer resident	secure	
Long-tailed jaeger *Stercorarius longicaudus*	summer resident	secure	
Glaucous gull *Larus hyperboreus*	summer resident; colonial nesting on coastal cliffs and islands	secure	eggs are gathered
Thayer's gull *Larus thayeri*	summer resident; nesting on coastal cliffs and islands	not assessed	
Herring gull *Larus argentatus*	summer resident; colonial nesting on coastal cliffs and islands	secure	eggs are gathered
Sabine's gull *Xema sabini*	summer resident	secure	
Arctic tern *Sterna paradisaea*	summer resident	secure	
Common nighthawk *Chordeiles minor*	summer resident		
Horned lark *Eremophila alpestris*	summer resident	sensitive	
Cliff swallow *Hirundo pyrrhonota*	summer resident	secure	
Bank swallow *Riparia riparia*	summer resident		
Northern wheatear *Oenanthe oenanthe*	summer resident	undetermined	
Gray-cheeked thrush *Catharus minimus*	summer resident	secure	
American robin *Turdus migratorius*	summer resident	secure	
Water pipit *Anthus spinoletta*	summer resident	sensitive	

Yellow warbler *Dendroica petechia*	summer resident	undetermined	
Yellow-rumped warbler *Dendroica coronata*	summer resident	undetermined	
Blackpoll warbler *Dendroica striata*	summer resident	may be at risk	
American tree sparrow *Spizella arborea*	summer resident	sensitive	
Savannah sparrow *Passerculus sandwichensis*	summer resident	secure	
White-crowned sparrow *Zonotrichia leucophrys*	summer resident	sensitive	
Harris's sparrow *Zonotrichia querula*	summer resident	sensitive	
Lapland longspur *Calcarius lapponicus*	summer resident	secure	
Smith's longspur *Calcarius pictus*	summer resident	secure	
Snow bunting *Plectrophenaz nivalis*	summer resident	sensitive	
Common redpoll *Carduelis flammea*	summer resident	secure	
Hoary redpoll *Carduelis hornamanni*	summer resident	secure	

* species appearing in **bold print** have been confirmed to breed in at least one location in the Project region .

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

3.6.4 Mammals - Terrestrial

All terrestrial mammals in Nunavut, including polar bear, are protected by the Wildlife Act (Nunavut). This territorial statute is administered by the Government of Nunavut Department of Sustainable Development. The distribution and economic status of mammals in the Project area is summarized in Table 14.

Table 14 Terrestrial mammals reported to occupy the Project area.

Species	Habitat and Distribution	Conservation Status*	Economic Status
Masked Shrew *Sorex cinereus*	expected throughout Project area	not assessed	

Arctic hare *Lepus arcticus*	expected throughout Project area	secure	recreational and subsistence use
Arctic ground squirrel *Spermophilus parryii*	expected throughout Project area; inactive in winter	secure	occasional subsistence use
Tundra redback vole *Clethrionomys rutilus*	expected throughout Project area	undetermined	
Brown lemming *Lemmus sibiricus*	expected throughout Project area	secure	
Greenland collared lemming *Dicrostonyx torquatus*	expected throughout Project area		
Tundra vole *Microtus oeconomus*	expected throughout Project area	not assessed	
Wolf *Canis lupus*	expected throughout Project area	sensitive	recreational, subsistence and economic value
Arctic fox *Alopex lagopus*	expected throughout Project area	secure	economic value
Red fox *Vulpes vulpes*	expected throughout Project area	secure	economic value
Grizzly bear *Ursus horribilis*	expected throughout Project area; inactive in winter	sensitive	recreational, and economic value
Short-tailed weasel *Mustela erminea*	expected throughout Project area	secure	
Least Weasel *Mustela nivalis*	expected throughout Project area	not assessed	
Wolverine *Gulo luscus*	expected throughout Project area	sensitive	recreational, subsistence and economic value
Barren-ground caribou *Rangifer tarandus*	migratory; historic calving ground in Project area	secure	recreational, subsistence and economic value
Muskox *Ovibos moschatos*	expected throughout Project area	secure	recreational, subsistence and economic value

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

3.6.5 Mammals - Marine

Marine mammals in the Project shipping lanes include the same species that the current marine shipping would encounter in Lancaster Sound and Coronation Gulf; seals, whales and walruses (Chapman and Feldhamer, 1982; JWEL 2001). These species are protected by the Fisheries Act (Canada) which is administered by the Federal Department of Fisheries and Oceans. Table 15 enumerates the species that are

reported for the shipping route and for Bathurst Inlet and also indicates their conservation and economic status in the northern economy.

Table 15 Marine mammals reported for the shipping lanes serving the Bathurst Inlet port.

Species*	Distribution	Conservation Status**	Economic Status
Ringed seal *Phoca hispida*	throughout marine east and west shipping routes	secure	important subsistence use in coastal communities
Bearded seal *Erignathus barbatus*	throughout marine east and west shipping routes	secure	important subsistence use in coastal communities
Bowhead whale *Balaena mysticetus*	western route to Amundsen Gulf and eastern route to Lancaster Sound; endangered species	at risk	harvest in Nunavut by special permit of the Minister for DFO
Beluga *Delphinapterus leucas*	western route and eastern route in Lancaster Sound	sensitive	important subsistence use in coastal communities
Narwhal *Monodon monocerus*	eastern route in Lancaster Sound	secure	important subsistence use in coastal communities
Walrus *Odobenus rosmarus*	western route to Amundsen Gulf and eastern route to Barrow Strait	secure	important subsistence use in coastal communities

* species known to be resident in Bathurst Inlet are shown in **bold print**

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

3.7 TRADITIONAL KNOWLEDGE

The Project area has been occupied by Inuit for many generations as shown by archaeological remains on the land. Inuit families living in Kitikmeot communities today lived at various locations in the Project area within the past 50 years and have an intimate knowledge of the land, the waters, and the fish and wildlife that they harvested. Two different projects have undertaken to document the traditional knowledge of elders in the region. The Naonaiyaotit Traditional Knowledge Project (NTKP) documented responses by elders from the West Kitikmeot Region of Nunavut to a set of 145 questions on 10 specific land based themes. The Tuktu Nogak Project focused on traditional knowledge of caribou. In both projects the resulting information was compiled in geographic referenced databases. Access to the NTKP database remains proprietary until the necessary verification of the data sets are completed. When both traditional knowledge data bases are accessible, the information that is relevant to the Project development sites and road alignment will be extracted and examined to ensure that Project plans are, or can be made to be, compatible with important features like burial sites and traditional carnivore dens that may be at risk of disturbance in the present alignment and site configurations. This information will be submitted in support of the Project EIS.

3.8 HERITAGE RESOURCES

Survey of heritage resources and archaeological sites along the proposed road alignment beginning at Contwoyto Lake and terminating at the port site on Bathurst Inlet was completed in July and August 2001,

and August 2002. In 2001 the survey area included the entire Project area, which focused on sites that showed high potential in a preparatory study of landforms and other terrestrial features of the general area of the road and port, as well as previous archeological studies in the region. Specific objectives of the 2001 fieldwork included confirming the location and condition of known sites in the Project area as well as recording new, previously unrecorded sites. This field work included an aerial overview of the project area, foot traverses and visual inspections of areas with high potential, and shovel testing for the presence of artifacts and other evidence of human occupation (Fedirchuk McCullough & Associates, 2001; unpublished).

Additional survey was completed in 2002 at the Bathurst Inlet port site and the proposed bridge crossing at Amagok Creek, along with further study of a stone feature site near George Lake (FMA Heritage Resources Consultants Inc, 2003; unpublished). The 2002 field study was included in a work plan based on the results of the 2001 field study and approved by the Nunavut Chief Archaeologist.

Due to the heritage resources survey in 2001 and 2002, an inventory of 69 heritage resources sites in the Project area was developed including:

- 37 precontact artifacts scatters
- 15 precontact stone feature sites
- 13 precontact isolated finds
- 2 historical/traditional sites
- 1 precontact campsite
- 1 mixed type sites

Please see Figure 27 for the locations and distributions of known heritage sites in the Project area.

Presentation of the results of the heritage resources survey took place during public meetings with members of the local Inuit communities in January to April of 2002. Additional meetings with the elders of Kugluktuk and Cambridge Bay were conducted separately in May 2002, to present the survey results and discuss any concerns regarding the preservation and/or mitigation of heritage resources sites relative to the Project.

While survey of all Project areas is now complete, mitigation of the port facility on Bathurst inlet remains to be conducted. Further study and mitigation of the port site heritage resources will be included in future work plans, as will elder and community consultation regarding the port site heritage resources sites. The combined data of survey, consultation and mitigation will be used for impact assessment and to develop a heritage sites mitigation plan for use during project construction.

3.9 SOCIAL AND ECONOMIC SETTING

A social and economic profile of the Kitikmeot Region of Nunavut is provided in the Draft West Kitikmeot Regional Land Use Plan (1997). The traditional land use areas of each of the West Kitikmeot communities - Kugluktuk, Bathurst Inlet, Umingmaktok, and Cambridge Bay - were provided by the Nunavut Planning Commission and are shown in Figures 28 to 31 in relation to the proposed Project.

Census Canada data (collected in 2001) for the region showed a population of 4,816 with 4,334 Inuit comprising 90% of the overall population of the region. The largest communities in the West Kitikmeot Region are Cambridge Bay (population of 1,310 in 2001), and Kugluktuk (population 1,215 in 2001). The populations of each community were in periods of rapid growth, in that both will double in size within a generation. The population projections for Cambridge Bay and Kugluktuk for 2005 are 1,581 and 1,556 respectively (Dillon, 2001). In both communities more than 50% of the population was less than 25 years of

age and at the current rate of growth, that characteristic is unlikely to change. The social and economic profile of the region will be updated in the Project EIS based on the full 2001 Census Canada data.

The draft West Kitikmeot Regional Land Use Plan emphasized the importance of traditional land based activities to the economy of the West Kitikmeot. The overall labour force of Cambridge Bay and Kugluktuk showed an unemployment rate of 23%. Both communities showed a significant number of adults with less than Grade 9 education.

Tables 16, 17, and 18 provide social and economic profiles prepared in a study of Kitikmeot communities for the Hope Bay Joint Venture (Hornal 2000; courtesy of Miramar Mining Corporation) and updated with some data from the 2001 Canada Census.

A more comprehensive description of the social and economic setting of the region is in preparation and will be submitted in support of the Project EIS. This will include an assessment of the capacity of the labour force and businesses in the region to participate in the construction and ongoing operations of the Project.

Table 16 Demographic Profile of Kitikmeot Communities

	Kugluktuk	Cambridge Bay	Bathurst Inlet	Umingmaktok	Gjoa Haven	Taloyoak	Kugaaruk	Kitikmeot Region
Population[1,2,3,4,7]								
2001	1,215	1,310	5	5	960	720	605	4,816
1998	1,267	1,413	15 [5]	51	957	729	539	4,971
1996	1,201	1,351	18	51	876	648	496	4,641
1991	1,059	1,116	18	53	783	580	409	4,018
Percent Change								
1996-2001	0.9	-3.1	-72.2	-90.2	9.2	11.1	22.0	3.7
1996-1998	5	5	0	0	8.5	11	8.5	7.1
1991-1996	13.4	21	0	-4	12	12	2.1	15.5
Age of Pop. (2001)[7]								
Under 15 years	425	435	N/A	N/A	385	290	275	1,820
15 to 64	740	845	N/A	N/A	535	420	315	2,865
65 +	50	30	N/A	N/A	20	10	10	130
Ethnicity (1996) [6]								
% Aboriginal	92.0	79	100	100	96	94	95	90
% Non Aboriginal	8.0	21	0	0	4	6	5	10
Gender (1996)[4]								
Female	590	640	N/A	N/A	460	350	290	2,345
Male	625	670	N/A	N/A	495	370	310	2,475

1. GNWT Bureau of Statistics, 1999a. *(Numbers may not add due to rounding.)*
2. GNWT Bureau of Statistics, 1999b.
3. GNWT Bureau of Statistics, 1999c.
4. GNWT Bureau of Statistics, 1997.
5. R. Homal, Pers. Comm. 1999.
6. GNT Bureau of Statistics, 1999b
7. 2001 Census *(Numbers may not add due to rounding.)*

N/A = Not available

Source: R. Hornal 2000 (except 2001 data)

Table 17 Profile of working aged adults in Kitikmeot communities

	Kugluktuk	Cambridge Bay	Bathurst Inlet	Umingmaktok	Gjoa Haven	Taloyoak	Kugaaruk	Kitikmeot Region
Population 15 yrs. & older (2001)[4]	790	870	N/A	35	*510*	375	280	3,080
Level of Education of Working Age Population (2001) (Percent)[1]								
Less than Grade 9	38.3	23.0	N/A	N/A	46.1	45.3	55.4	38.3
High School W/O Certificate	19.5	18.4	N/A	N/A	16.7	18.7	14.3	17.9
High School Diploma	2.0	5.2	N/A	0	2.0	2.7	0	2.8
Trade or Other Certificate	31.5	39.7	N/A	N/A	30.4	25.3	21.4	32.0
University Without Degree	2.0	5.2	N/A	0	2.0	4.0	3.6	3.1
University Degree	6.7	8.6	N/A	0	3.9	4.0	3.6	5.8
Employment by Industry (1996) (Percent)[1]								
Goods Producing	15.7	16.0	N/A	N/A	4.1	4.5	6.7	13.0
Retail & Wholesale	11.2	12.0	N/A	N/A	16.3	25.0	20.0	14.9
Gov't., Education & Health	48.3	43.2	N/A	N/A	40.8	40.9	46.7	43.8
Other Services	24.7	30.4	N/A	N/A	34.7	18.2	33.3	28.1
Income Support (1998/99)[2]								
# of Cases in fiscal year 1998-99	1,437	1,246	2	96	1,828	1,113	830	6,550
Average $ Amount/Case/month	$590	$541	$826	$447	$628	$721	$725	$629
Income Support (1995/96)[3]								
# of Cases in fiscal year 1995-96	1,131	808	22	120	1,856	1,417	887	6,241
Average $Amount/Case/month	$550	$508	$676	$635	$730	$696	$726	$659
Number Tax Returns Filed in 2001[4]	560	695	N/A	N/A	390	315	205	2,230
Average Income in 2001[4]	$25,502	$31,494	N/A	N/A	$19,014	$18,306	$18,887	$24,449

1. GNT Bureau of Statistics, 1999b.
2. Ecklund, L., Pers. Comm., 2000.
3. GNWT Dept of Education, Culture & Employment, 1996.
4. 2001 Census

N/A = Not available

Source: R. Hornal 2000 (except 2001 data)

Table 18 Labour force activity in Kitikmeot communities

	Kugluktuk	Cambridge Bay	Bathurst Inlet	Umingmaktok	Gjoa Haven	Taloyoak	Kugaaruk	Kitikmeot Region
Persons 15 yrs. & over in 1999 [1]	821	935	N/A	N/A	539	416	324	3,035
Labour Force (I 999)	476	728	N/A	N/A	308	290	204	2,006
Employment Rate	42%	67.1%	N/A	N/A	34.9%	59.1%	48.8%	78%
Unemployment Rate	27.5%	13.9%	N/A	N/A	39%	15.2%	22.5%	22%
Participation Rate	58%	77.9%	N/A	N/A	57.1%	69.7%	63.0%	66.1%
Persons 15 yrs. & over in 1996 [2]	745	865	N/A	35	*505*	375	275	3,080
Labour Force (I996)	470	635	N/A	20	275	230	155	1,960
Employment Rate	53.0%	67.1%	N/A	42.9%	38.6%	49.3%	43.6%	33.9%
Unemployment Rate	14.9%	7.9%	N/A	N/A	29.1%	19.6%	22.6%	15.1%
Participation Rate	63.1%	73.4%	N/A	57.1%	54.5%	61.3%	56.4%	63.6%
Persons 15 yrs. & over Involved in Traditional Activities (1994)[4]								
% Hunted & Fished	56.1	28.3	N/A	38.2	60.6	86.2	96.5	57.8
% Made Crafts	30.7	15.1	N/A	29.4	20.1	39	5.8	23.8
% Trapped	7.3	7.1	N/A	32.4	9.6	13.3	15.8	9.8
Number of Working Age Residents Not Working But Wanting Work (I 999)[1, 3]								
	250	183	N/A	N/A	179	118	106	836
Number of Working Age Residents Not Working But Wanting Work (I 994)[4]								
	292	141	N/A	9	195	167	125	929
Employment Rate (1994) (% Employed)[4]								
% Aboriginal	30	54	N/A	32	37	41	42	41
% Non Aboriginal	80	94	N/A	N/A	88	72	100	87
% Female	29	63	N/A	19	31	41	40	43
% Male	45	68	N/A	44	47	45	46	57

1. GNT Bureau of Statistics, 1999a.
2. GNT Bureau of Statistics, 1999b.
3. GNWT Bureau of Statistics, 1999d.
4. GNWT Bureau of Statistics, 1994.

N/A Not available

Source: R. Hornal 2000

4.0 PUBLIC CONSULTATION PROCESS

The process of developing this Project has its roots in the Kitikmeot Region of Nunavut. The overall Community Advisory Committee to the Project is chaired by Mr. Charlie Evalik, President of KIA and includes representatives of the Kitikmeot communities, the HTO's, and Government of Nunavut. The details and technical aspects of the Project were developed under the supervision of the Project's Technical Committee described above. The Technical Committee has been active in consulting in the Kitikmeot Region and on May 6 and 7, 2001 met with the mayors and municipal councils in both Kugluktuk and Cambridge Bay respectively. Also, elders from each of these communities visited heritage sites along the road alignment in July 30, 2001 and July 2002 as part of the Project's heritage resources study.

This Project Description was developed under the direction of the Project Technical Committee. The original Project was reviewed in public meetings in Kugluktuk and Cambridge Bay in January and Gjoa Haven, Taloyoak, and Kugaaruk in March. A special meeting was held on January 15, 2002 in Cambridge Bay to review the Project with persons from Bathurst Inlet and to discuss concerns related to Project operations. A meeting was held in Bathurst Inlet on July 20, 2002 with most of the summer residents present. A similar consultation process will attend the development of the Project EIS expected for late 2003. In these consultations, special emphasis has been placed on confirming local knowledge of the Project area, and also on community and local work force preparations for Project construction and operations.

Meetings were also held with the Yellowknife City Council and various GNWT Departments in November 2002. A public "open house" was held for Yellowknife residents on November 19, 2002.

It is understood that ongoing consultations and reporting social, economic and environmental performance will be a feature of Project operations and that these activities may be requirements of an Inuit Impact Benefit Agreement between the Project and the Kitikmeot Inuit Association.

5.0 PROJECT ENVIRONMENTAL EFFECTS

Interactions between the Project and the environment will occur during both construction and operations. Potential interactions during Project construction will span the full length of the Project, a distance of 211 km. Similarly, potential interactions during operations span the full length of the road.

A comprehensive suite of environmental baseline studies was initiated in 2001 and completed in 2002. The studies include water quality, sediment quality, vegetation, meteorology, ecosystem mapping, fish habitat, fish populations, bird populations, small mammals, carnivores, and caribou and muskox. These studies will be used to prepare the Project EIS.

5.1 PORT CONSTRUCTION

Port construction and operations will involve both the marine and terrestrial environment. The wharf will be a sheet pile rock filled structure extending into Bathurst Inlet. The terrestrial elements of the port include a 150-person camp, a 180 million litre tank farm, a maintenance facility, diesel power plant and an airstrip (Figure 6).

Construction at the site will begin as soon as the construction fleet is delivered by barge in the late summer of 2005. Construction will be completed 16 months later in the winter of 2006. Construction will require quarrying 270,000 m^3 of local rock. The rock will be removed by drill, blast, haul sequence and will be used to develop the structures and roads at the port site. Much of the rock will be crushed to various sizes as required for site development.

Construction workers will be based at the 150-person camp at the port and a 20-person camp at Contwoyto Lake. These bases will support two mobile construction camps working on specific spreads of road between the port and Contwoyto Lake. Mobile construction camps will typically house 60 workers. Mobile camps will relocate every 60 days. All combustible camp waste will be incinerated in a mobile industrial incinerator that will be moved with the camp. Sewage will be treated in a skid mounted sewage treatment plant prior to release onto the tundra. Non-combustible waste will be returned to the base camps for permanent disposal.

5.1.1 Air Quality Effects

Air quality at the port will be affected by several primary activities. Construction equipment exhaust contains greenhouse gasses. Quarrying, crushing, hauling, and placing rock produces dust.

5.1.2 Marine and Freshwater Effects

5.1.2.1 Marine

The wharf will extend into the marine environment 140 metres along approximately 160 metres of shoreline; 22,000 m^2 of seabed will be covered by crushed rock required to fill the sheet pile wharf. The sheet pile will be placed by driving it from the surface of the ice in the spring of 2006. The surface of the wharf will be 5 m above water level. A small crushed rock jetty will also be built to serve barge traffic between the port and Kitikmeot communities (Figure 6). It will extend 100 m into the marine environment to the three-metre water

depth and cover about 4,400 m^2 of seabed. Environmental sampling at the port in August 2001 showed that 11 species of fish occur in the marine environment of the area (see Table 10 for marine fish species in the Project area). These data will be reported in support of the Project EIS.

5.1.2.2 Freshwater

Port construction does not encroach on any freshwater streams or water bodies. Potable water for camp needs will be produced by desalination. Port construction will not affect any freshwater fish populations.

5.1.2.3 Terrain

The port site is a well-drained tundra upland that is covered in dry land tundra plants. Studies in 2001 included a terrain analysis for ecosystem mapping. The resulting maps will be used for designing and planning the environmental management system for the port area.

Facilities at the port will require tundra terrain alteration by placing blasted and crushed rock for road and site development. Areas affected will be:

- 150 person camp, truck stop and power house sewage treat plant: 7.0 ha
- cargo lay down and service road and ammonium nitrate storage: 63.0 ha
- fuel tank farm and fuel dispensing and load out station: 53.0 ha
- airstrip and heliport 28.0 ha

The total area of altered terrestrial terrain at the port will be 151.0 ha

The wharf area occupies an additional 8 ha.

5.1.2.4 Birds

The port area is habitat for migratory upland tundra breeding birds as well as ptarmigan and raptors (see Tables 12 and 13 for birds of the area). Preliminary surveys of the area in 2001 showed no concentration of breeding birds in the area nor any evidence of species designated for special conservation status. Raptor nesting at the port was not reported from 2001 studies. Further surveys are planned for the area. A full review of data and information from related literature will be developed and submitted in support of the Project EIS.

5.1.2.5 Mammals

The upland habitat of the port is suitable for lemmings, voles, ground squirrels and arctic hare, all of which should be expected there. Site construction therefore will change habitat used by rodents and hare in the port area. One wolverine and one grizzly were observed at the port area in 2001 (Rescan 2003c).

Studies in 2001 did not identify any carnivore dens in the port area. The Project area is within the normal range of foxes, wolves, wolverine and grizzly bear. All should be expected in the area at any time of year other than grizzly in winter.

The port area is muskox range and they should be expected in all seasons. One small herd was observed south of the port area in 2001 (Rescan 2003c).

Historic data on the distribution of the Bathurst caribou herd calving grounds show that the port site and adjacent lands were occupied for caribou calving of "medium density" in 1986. This was the only calving activity noted in the vicinity of the port area in fourteen surveys reported in the 1965 to 1996 period (Sutherland and Gunn, 1996). Bathurst herd calving grounds since 1996 have been 100 km or more to the west of the port site. Monitoring caribou use during the calving season of traditional calving grounds near the Prudhoe Bay oil development in Alaska showed that calving grounds continued to be used following initial

oil field infrastructure (roads and pipelines) development on the calving ground (Dau and Cameron, 1986; LGL, 1994; Murphy and Lawhead, 2000).

5.2 PORT OPERATIONS

Annual activity cycles at the port will be determined by marine shipping conditions and the Contwoyto Lake winter road. The estimated mean annual volumes that are planned to be handled at the port every year for the first 10 years of operations are in Table 19.

Table 19 Estimate of annual volume of cargo passing through the port in years 1 - 10.

	Imports		Exports	
Destination/Source	**Fuel (000's L)**	**Supplies (t)**	**Fuel (000's L)**	**Supplies (t)**
Lupin	14,030	4,700		
Ekati	72,300	20,000		
Diavik	53,800	9,400		
Jericho	8,640	2,660		
Hope Bay	7,200		7,200	
Gjoa Haven	4,840	80	4,840	80
Cambridge Bay	9,360	150	9,360	250
Kugluktuk	4,800	110	4,800	110
Taloyoak	3,180	60	3,180	80
Bathurst Inlet	50		50	
Umingmaktok	60		60	
Total	**178,260**	**37,160**	**29,490**	**560**

The number of barge trips for each of the Kitikmeot communities served by the barge from Bathurst Inlet is estimated to be one for Taloyoak, two Gjoa Haven and Kugluktuk, and three for Cambridge Bay**.**

The year round labour force of 17 to 31 for port operations will be based at the camp. The camp usage at the port will increase in response to cargo volumes on the road and may reach 150 in winter when the major fuel haul to all participating sites is under way.

5.2.1 Air Quality Effects

The dominant environmental effect of the land-based activities at the port will be dust, noise, and exhaust emissions. Dust will be managed by an ongoing surface watering effort. Noise will be addressed initially by placement of buildings and roads so that port activities do not unduly disturb workers "off shift" who are sleeping. Exhaust emissions will be reduced by an overall fuel conservation effort including residual heat recovery in the powerhouse for space heating.

5.2.2 Marine and Aquatic Interactions

5.2.2.1 Marine

Marine shipping activities will be completed within the normal "open water" period - usually up to 110 days beginning mid-July. The arrival date of the first vessel for the season will usually be dependent on ice conditions in Victoria Strait northeast of Queen Maude Gulf. Inbound cargo will include 37,000 tonnes of dry

cargo (explosives, mining reagents, and grinding media) and 178 million litres of diesel fuel. Fuel will be transferred from ship to tank farm by two 12" diameter pipelines with a capacity of 5,600 litres/min. Outbound cargo will consist of fuel and supplies for Kitikmeot communities. Re-supply for the communities will require three barge movements from the port. The normal turn around time for a ship will be about 48 hours. The last ship movement to/from the port will occur in late October. All shipping will be completed without the assistance of an icebreaker to extend the shipping season. The environmental interactions will be similar to those of the annual barge re-supply to the communities of the Kitikmeot region of Nunavut, or the occasional cruise ship that has passed through the Northwest Passage in recent years. As with other developments in the Arctic, the Project will rely on icebreaker support to some degree during the shipping season, but the Project is not based on extending the normal shipping season.

Late season shipping is a concern raised by a hunter from Bathurst Inlet. A marine ice cover of four inches is sufficient to support both caribou and snowmobiles. Such conditions can be achieved in late October in some years. Concern is that if a ship were to make a transit through such ice and a snowfall obscure the track before the former ice thickness were to be re-established, caribou crossing Bathurst Inlet could be lost through the thinner snow covered ice (Sam Kapolak, Bathurst Inlet).

Interaction with marine life will be the same as with any other form of shipping in arctic water. No concentration of marine wildlife is expected along the route that is not now exposed to arctic marine traffic.

5.2.2.2 Aquatic interactions

Port operations will not encroach on any freshwater streams or water bodies. Potable water for camp needs will be produced by desalination at a rate of 40,000 litres/day. Sewage will be treated by extended aeration, with effluent discharged directly to Bathurst Inlet in compliance with guidelines for marine sewage disposal.

Port operation will not have any significant interactions with the freshwater environment or fish populations of the port area.

5.2.3 Terrestrial Interactions

All land-based activities at the port will be contained to the 159 ha of the site development. The dominant activity will be truck traffic from the road to the fuel depot during winter. It is expected that most of the fuel will be moved out in the January - April when the Contwoyto ice road is in place. No cargo will be moving in either direction during the period that the ice road is impassable, expected to be late April to mid-January. Dust management for port site road operations will be practiced.

5.2.3.1 Birds

The port area is habitat for migratory upland tundra breeding birds as well as ptarmigan and raptors (see Tables 12 and 13 for birds of the area). Preliminary surveys of the area in 2001 showed no concentration of breeding birds in the area nor any evidence of species designated for special conservation status. No occupied raptor nest sites at the port were reported from the 2001 studies (Rescan 2003c). Further surveys are planned for the area. A full review of data and information from related literature will be developed and submitted in support of the Project EIS.

Interactions of port operations with birds will be passive with no effects that are incremental to those of habitat alteration during construction.

5.2.3.2 Mammals

The upland habitat of the port is suitable for lemmings, voles, ground squirrels and arctic hare, all of which should be expected there.

Studies in 2001 did not identify any carnivore dens in the port area. The area is within the normal range of foxes, wolves, wolverine and grizzly bear. All should be expected in the area at any time of year other than grizzly in winter.

The port area is muskox range and they should be expected in all seasons.

Historic data on the distribution of the Bathurst caribou herd calving grounds show that the port site and adjacent lands were occupied for caribou calving of "medium density" in 1986. This was the only calving activity noted in the vicinity of the port area in fourteen surveys reported in the 1965 to 1996 period (Sutherland and Gunn, 1996). Bathurst herd calving grounds since 1996 have been 100 km or more to the west of the port site. Monitoring caribou use during the calving season of traditional calving grounds near the Prudhoe Bay oil development in Alaska showed that calving grounds continued to be used following initial oil field infrastructure (roads and pipelines) development on the calving ground (Dau and Cameron, 1986; LGL, 1994; Murphy and Lawhead, 2000).

Interactions of port operations with mammals will be passive with no effects that are incremental to those of habitat alteration during construction.

5.3 ENVIRONMENTAL EFFECTS OF ROAD AND CONTWOYTO CAMP CONSTRUCTION

The total length of the proposed road will be 211 km. It will be built in two sections; from the port (km 0) to km 126, and from Contwoyto Lake (km 211) to km 126. Km 211 - km 126 will be built in the January 2005 to October 2005 period starting from Contwoyto Lake as soon as the 2005 Lupin winter road allows mobilizing the construction equipment to Contwoyto Lake.

5.3.1 Air Quality

The dominant environmental effect of road construction will be dust, noise, and exhaust emissions. Construction noise will be mitigated by use of appropriate personal protective equipment. Dust will be produced from rock crushing and road construction. The working environment effects of dust, like noise, will be mitigated by use of appropriate personal protective equipment. Exhaust emissions will be reduced by an overall fuel conservation effort.

5.3.2 Aquatic Environments

Field studies in 2001 and 2002 (Rescan 2002b, 2003b) found nine species in the streams that cross the road alignment (see Table 12 for species of freshwater fish in the Project area).

The road alignment is such that construction will not encroach on any lakes. Numerous drainage basins, however, will be bisected by the road (Figure 32). The road alignment requires 111 water crossings.

The overall prerequisite in the preliminary design of each of the required water crossings was to avoid encroaching on the stream channel (other than during extreme flows) in streams known and expected to be fish bearing and so avoid disturbing potential fish habitat. The design for such crossings is either single span bridges or arched culverts. For crossings at intermittent streams that are not fish bearing, rock fords are proposed. These designs meet the above prerequisite for 109 of the 111 crossings. In stream abutments or double span bridges may be required at two locations: km 126.5 crossing the Mara River and km 165.5 on the port to Contwoyto road. Table 20 summarizes the location and preliminary design of each of the proposed water crossings for the alignment. Also, Figures 33, 34, and 35 provide photographs and drawings of streams that show an example of each design type of water crossing proposed.

Water crossings of a rock ford design (70) will be built in winter when no flow is expected. Likewise, site development for crossings requiring bridges (23) and arch culverts (18) will be completed in late winter when working conditions improve but before stream flow is expected.

The environmental effects of water crossings along the road on aquatic life and particularly fish populations will be negligible. All data from field studies will be reported in support of the Project EIS.

Recreational angling is expected to occur by workers living at the camps at the port and at Contwoyto Lake. Angling destinations by persons at the port are likely to be marine destinations on Bathurst Inlet. Contwoyto Lake will be used by anglers based at the Contwoyto camp. It is expected that the species of choice by anglers will be lake trout and arctic charr. The draft West Kitikmeot Regional Land Use Plan recommends that recreational angling at resource development sites be restricted in a 5 km area "around the development site". The Project will develop a strategy so that employees and contractors will be in compliance with the plan.

Table 20 Location, watershed, and fish habitat characteristics for water crossings

From Bathurst Inlet to Contwoyto Lake							
Final Road Chainage km	**Watershed Area km^2**	**Habitat Quality Rating***	**Estimated Stream Depth Design 1:25 yr m**	**Estimated Streamflow Design 1:25 yr m^3/s**	**Crossing Type/Length Rock Fill**	**Arch**	**Bridge**
					m	**m**	**m**
2.5	66.4	High	0.45	16.38			20
3.0	1.1	Low		0.63	X		
7.7	6.8	Low		2.68		X	
14.3	75.3	Low	0.83	18.09			10
18.7	1.7	Low		0.89	X		
21.5	1143.1	High	0.98	156.68			50
23.2	N/A	Nil		N/A	X		
24.8	0.7	Nil		0.44	X		
25.3	0.5	Nil		0.34	X		
28.5	3.4	Nil		1.55	X		
30.2	N/A	Nil		N/A	X		
31.5	0.3	Nil		0.23		X	
31.8	N/A	Medium		N/A		X	
31.9	42.7	Low	0.35	11.54			30
32.9	60.5	Medium	0.39	15.21			30
33.9	43.0	Medium	0.32	11.60			30
36.3	0.2	Nil		0.16	X		
36.9	0.4	Medium		0.28	X		
37.6	N/A	Nil		N/A	X		
38.6	2.6	Nil		1.25	X		
39.5	N/A	Nil		N/A	X		
40.2	9.5	Medium	0.22	3.50			20
41.5	6.1	Nil		2.46	X		
42.8	2.0	Medium		1.02		X	
45.5	2.5	Nil		1.21	X		
48.0	9.9	Medium		3.62		X	
50.5	46.3	Nil	0.59	12.30			20
52.4	3.6	Nil		1.62	X		
54.0	0.7	Nil		0.44	X		

Final Road Chainage km	Watershed Area km^2	Habitat Quality Rating*	Estimated Stream Depth Design - 1:25 yr m	Estimated Streamflow Design - 1:25 yr m^3/s	Crossing Type/Length Rock Fill	Arch	Bridge
56.8	5.2	Medium		2.17		X	
60.5	0.5	Low		0.34	X		
61.6	0.2	Nil		0.16	X		
66.5	0.5	Nil		0.34	X		
67.5	6.2	High		2.49		X	
67.8	N/A	Medium		N/A		X	
68.2	2.3	Medium		1.14	X		
70.3	39.8	High	0.46	10.91			20
72.2	3.9	Low		1.73	X		
72.4	N/A	Low		N/A	X		
73.2	1.6	Low		0.85	X		
74.0	16.0	High	0.42	5.29			10
75.1	6.3	Low		2.53	X		
76.6	N/A	Nil		N/A	X		
76.7	N/A	Nil		N/A	X		
77.0	0.5	Nil		0.34	X		
78.5	2.4	Low		1.17	X		
79.6	N/A	Nil		N/A	X		
81.7	1.6	Nil		0.85	X		
82.1	81.0	High	0.41	19.17			30
83.0	5.0	Low		2.10	X		
88.2	2.6	Low		1.25	X		
89.1	0.5	Nil		0.34	X		
89.3	1.0	Low		0.59	X		
91.3	2.2	Low		1.10	X		
92.0	4.2	Low		1.83	X		
95.5	4.4	High		1.89	X		
96.8	0.4	Nil		0.28	X		
98.3	1.2	Nil		0.68	X		
100.9	3.9	Low		1.73	X		
101.1	2.6	High		1.25		X	
104.3	13.4	High	0.23	4.60			30
110.8	23.8	Nil	0.34	7.25			20

Final Road Chainage km	Watershed Area km^2	Habitat Quality Rating*	Estimated Stream Depth Design - 1:25 yr m	Estimated Streamflow Design - 1:25 yr m^3/s	Crossing Type/Length Rock Fill	Arch	Bridge
111.5	1.4	High	0.14	0.77			20
112.8	18.1	Medium	0.33	5.84			20
115.0	5.0	Low		2.10	X		
116.9	1.3	Nil		0.72	X		
121.0	0.8	Nil		0.49	X		
121.3	1.2	Medium		0.68	X		
123.0	23.8	Nil		7.25	X		
126.5	1825.6	High	1.70	227.19			60
132.0	71.0	High	0.43	17.27			30
134.1	0.7	Nil		0.44	X		
141.8	1.9	Nil		0.98	X		
144.0	2.3	Nil		1.14	X		
144.9	1.0	Low		0.59	X		
147.1	2.7	Nil		1.29	X		
149.0	28.8	Nil	0.42	8.44			20
149.8	N/A	Nil		N/A	X		
153.0	0.6	Nil		0.39	X		
155.7	0.3	Low		0.23	X		
156.3	N/A	Nil		N/A	X		
156.7	N/A	Nil		N/A	X		
157.0	0.7	Low		0.44	X		
157.2	0.8	Nil		0.49	X		
158.3	15.8	High	0.33	5.24		X	
164.0	N/A	Low		N/A	X		
165.1	4.2	Medium		1.83	X		
165.2	N/A	Medium		N/A		X	
165.5	66.9	High	0.26	16.47			60
165.9	N/A	Nil		N/A	X		
166.4	0.1	Nil		0.09	X		
166.6	0.7	Medium		0.44		X	
167.7	13.5	High		4.63		X	
170.2	9.8	High		3.59		X	
174.1	8.7	Nil		3.26	X		
178.2	352.5	High	1.03	61.60			30

Final Road Chainage km	Watershed Area km^2	Habitat Quality Rating*	Estimated Stream Depth Design - 1:25 yr m	Estimated Streamflow Design - 1:25 yr m^3/s	Crossing Type/Length Rock Fill	Arch	Bridge
179.5	N/A	Low		N/A	X		
180.5	4.1	High		1.80	X		
183.4	0.6	Nil		0.40	X		
186.0	4.4	Low	0.32	1.89		3	
189.3	11.3	Medium	0.55	4.02		3	
190.8	0.8	Nil		0.49	X		
193.4	1.8	High		0.93	X		
194.0	N/A	Low		N/A	X		
195.3	0.3	Nil		0.23	X		
198.7	65.6	High	0.69	16.22			20
199.7	34.4	High	0.40	9.71			20
201.2	1.0	Medium		0.59		X	
203.7	12.4	High	0.26	4.32			10
205.2	1.5	Medium	0.20	0.81		3	
208.0	2.1	Nil		1.06	X		

* Rescan (2003)
Nil = no channel, no water (46)
Low = flow present but not fish (26)
Medium = fish present but low-valued (slimy sculpin or ninespine stickleback) (17)
High = high-valued fish present (Arctic grayling, burbot, lake trout, round white fish, Arctic cisco, Arctic char or longnose sucker) (22)

5.3.3 Terrestrial Environment Interactions

Road construction will involve developing a series of granular pits and quarries (37 in total) along the entire road alignment as shown in Figure 4. Each pit or quarry will alter approximately 2 ha of tundra terrain and habitat. A total of 2.9 million m^3 of rock and granular materials will be removed from these pits and quarries and placed on the right-of-way to build the road. Building the road with passing pullouts every 1,000 metres will cover 277.7 ha +/- of tundra habitat. The total terrain alteration along the alignment including quarries will be approximately 351.7 ha +/-. Studies in 2001 included a terrain analysis for ecosystem mapping. The resulting maps will be used for designing and planning the environmental management system for the road right-of way.

The rough base course of rock for the alignment will be laid down in winter and so reduce thaw penetration the following summer. The additional course of -100 mm is expected to ensure that the permafrost profile migrates into the base of the road to ensure terrain stability to the roadbed.

5.3.3.1 Birds

The road alignment is habitat for migratory upland tundra breeding birds as well as ptarmigan and raptors (see Tables 12 and 13 for birds of the area). Preliminary surveys of the area in 2001 showed no concentration of breeding birds in the area nor any evidence of species designated for special conservation status. Raptor nesting along the road alignment was observed between km 7 and km 35 in 2001 (Rescan 2003c). Further surveys are planned for the area. A full review of data and information from related literature will be developed and submitted in support of the Project EIS.

Neither the roadbed nor any of the pits or quarries encroaches on water bodies and so no shoreline waterfowl-nesting habitat is at risk. Quarry and pit development, and roadbed construction may displace upland nesting birds.

5.3.3.2 Mammals

The habitats along the road and at the pits and quarries are occupied by lemmings, voles, ground squirrels and arctic hare, all of which were observed in the Project area during studies in 2001.

The Project area is within the normal range of foxes, wolves, wolverine and grizzly bear. All should be expected at any point along the alignment at any time of year except grizzly in winter.

Muskox occupy the tundra traversed by the proposed road alignment and are present the whole year.

Caribou of at least two herds occupy the area of the road alignment for part of the year. The Bathurst herd will migrate across the road alignment during the calving migration of the cows in April and May and the spring migration by the non-calving portion of the herd will occur a month later. Post calving aggregations ranging in size up to tens of thousands of cows with calves may spend brief periods in the vicinity of the alignment during the later part of June and into July. Small bands of mixed herds should be expected for the remainder of the summer until late August when most of the Bathurst herd is usually on ranges further south. The likelihood of interactions with the Bathurst herd for the remainder of the year, from the fall through the winter, is low. Figures 36 a - f show the distribution of Bathurst caribou for 1996 - 2000 as shown by satellite telemetry data courtesy of the West Kitikmeot Slave Study, and Dr. Ann Gunn and her colleagues in the Government of the Northwest Territories Department of Resources, Wildlife and Economic Development.

The area of the alignment near Nose Lake and vicinity was also shown to be part of the Queen Maud Gulf caribou herd range (Gunn et al, 2000). Unlike the Bathurst herd, the Queen Maud Gulf herd does not migrate

south for the winter and telemetry locations from animals in that herd showed that the area east of Contwoyto Lake was occupied by animals of this herd in the summer of 1996 and 1997 and the winter of 1997.

Construction activities will generally be concentrated on specific portions of road, 20 - 30 km stretches accessible from the particular quarries that are active. Interactions of road construction operations with mammals generally will be passive with no significant effects on the animals. Interactions with caribou may be such that construction work will temporarily halted to allow the caribou to pass through the construction zone. This will likely be the case during the calving and spring migrations. The "invasion" of a post-calving aggregation would make road construction impossible for a period of 12 - 36 hours if the animals decided to "settle in for a feed and a rest".

5.4 ENVIRONMENTAL EFFECTS OF ROAD OPERATIONS

Road operations will be winter only. The winter traffic estimated for the first ten years of road operations is summarized by Table 21.

Table 21 Seasonal road traffic to sites serviced by the Bathurst Inlet Port and Road Project in years 1- 10

Destination	Total Trucks
Lupin	500
Ekati™	2,400
Diavik	1,600
Jericho	300
Total	**4,800**

Road maintenance crews will be based at the port and the Contwoyto Camp. Systematic maintenance activities will involve snow removal, sanding and grading as required in winter. Summer maintenance work which will include operating several quarries along the road and crushing rock to produce the -50 mm materials for surface dressing will be carried out in late July and August.

5.4.1 Air Quality

Truck and barge operations will produce exhaust emissions. Exhaust emissions will be reduced by an overall fuel conservation effort.

5.4.2 Aquatic Environment

There will be no direct interaction between the road and the aquatic environment. The flow at non-intermittent stream crossings will reach the level of the bridge or culvert abutments only at very high flows. Water will be required for camp needs at the Contwoyto camp.

The camp at Contwoyto Lake will require 6,000 litres water/day for potable needs and emergency fire fighting. It will be drawn from Contwoyto Lake. Standard intake screens will be in place to prevent fish from entering the water intake. Sewage treatment will be by extended aeration with effluent discharged on the tundra "field".

5.4.3 Terrestrial Environment Interactions

There will be no interaction between road traffic and the elements of the terrestrial environment.

5.4.3.1 Birds

The interactions with birds during road operations will be passive and no incremental effects to those of the construction phase are expected.

5.4.3.2 Mammals

The interactions with mammals during road operations will be passive and no incremental effects to those of the construction phase are expected. It is expected that the interactions will be considerably reduced in that the road will operate in winter only.

The road will be operated between January and April. No caribou will be in the Project area at that time of the year (Figure 9). Summer maintenance work will begin when the spring migration and calving season is over and most caribou have moved south.

In the N.W.T. and Nunavut, the Lupin winter road cuts through the winter range of the Bathurst herd and crosses spring migration routes. In the period of winter road operations (1982 to the present) the herd has increased from estimates of 100 - 120,000 in 1979 to 360,000 in 2001 (GNWT).

The effects of road operations on caribou populations will be negligible. Hunting by Project personnel and the personnel of contractors will not be permitted. Figures 9a and 9b show the herd in March and June respectively and Figures 36 (a-f) show the distribution of the Bathurst herd from 1996 - 2000 as shown by telemetry data.

5.5 LUPIN WINTER ROAD

The Lupin winter road will continue to operate into the Project area and freight originating in Yellowknife will include non-bulk freight destined to all the sites served by the Bathurst Port Road including cargo destined for Kitikmeot communities hauled to the port.

5.6 BATHURST INLET PORT AND ROAD OPERATIONS EFFECTS ON THE SOCIAL AND ECONOMIC ENVIRONMENT OF KITIKMEOT

The Project construction phase and operations provide a significant potential for jobs to workers in the region. Project construction will create 2826 man-months of work over a 16 month period with a payroll of $26.8 M. Operations will create up to 31 jobs (both seasonal and full time) with an annual payroll of $1.5 M. Payroll for contract drivers will create an additional annual payroll of $9 M.

Diesel fuel costs for each of the Kitikmeot communities served by the Project could be reduced by up to one third the current price. The costs of general cargo from Yellowknife via the port will be competitive compared with current freight costs via Hay River. The cost of freight on general cargo out of eastern Canada is estimated to be at least 30% less than current freight costs via Hay River.

5.7 EFFECTS OF THE OPERATION OF THE BATHURST INLET PORT AND ROAD PROJECT ON THE SOCIAL AND ECONOMIC ENVIRONMENT OF THE N.W.T.

It is expected that much of the seasonal hauling capacity required for the winter fuel haul from the port will be provided by a contracted fleet based outside of Nunavut that would roll through Yellowknife every January en route to the port. The tanker units would likely be loaded, discharge their cargo at a tank farm en route and travel the remaining distance to the port empty. There is one aspect of the effects of the Project on the western Canadian economy that can be measured quite directly. All the cargo imported through the port destined for existing operations (Lupin, Ekati™, and Diavik) is cargo currently transported through Yellowknife. Cargo destined to the port for export to Kitikmeot communities would continue to be procured in western Canada but pass through Yellowknife instead of being routed to Hay River. Table 22 summarizes the estimated volume of Project current cargo that would be rerouted as a result of the Project.

Table 22 Estimate of current annual cargo volumes re-routed through Project facilities

Destination	Loads Re-routed Through Project	Contents
Lupin and Jericho	(800)	22.7 M L fuel; 7,360 tonnes supplies
Ekati™	(2,400)	72.3 M L fuel; 20,000 tonnes supplies
Diavik	(1,600)	53.8 M L fuel; 9,400 tonnes supplies
Kitikmeot communities	20	560 tonnes supplies
Net change	**(4,780) loads***	

* = loads re-routed away from current Lupin winter road

5.8 ENVIRONMENTAL EFFECTS ON PUBLIC HEALTH

No aspect of the Project construction phase or the operations phase touches directly on the public health of any communities in Nunavut or the N.W.T. Public health and industrial workplace health and safety needs at the camps and facilities operated by the Project will served by an industrial health professional "on site" at all times. This will complement the capacity that will be on site at Diavik, Ekati™ and Lupin to deal with emergencies anywhere in the Project's transportation network. Also, the camps and all related facilities will be operated in compliance with all public health standards in Nunavut.

6.0 CUMULATIVE ENVIRONMENTAL EFFECTS

Cumulative environmental effects will be addressed in the Project EIS. The sites and related activities in the region assessed for cumulative environmental effects will include ongoing operations and those proposed projects that have been submitted to agencies for environmental review. These include: Lupin Mine and the Jericho Diamond Project in Nunavut; the Ekati™ Diamond Mine, and the Diavik Diamonds Project in N.W.T. Non mining activities that will be included in the review of cumulative effects will include traditional harvesting and tourism (including outfitting) in Nunavut.

The overall incremental environmental effect of this Project will be building and operating a port and an all-weather road between Bathurst Inlet and Contwoyto Lake connecting via a winter road to the mines in Nunavut and N.W.T. The roads will operate in winter only. Serving mine sites increases the volume of the cargo on the Project's road but does not increase the environmental effects of the Project in that it directs existing cargo volumes to their destinations by way of a shorter and more economical route.

Ekati™
By supplying bulk goods, including fuel, to Ekati the Project will reduce the number of loads on the southern portion of the Lupin winter road by 2,400.

No new or additional environmental effects on the environment of either the West Kitikmeot region of Nunavut or the North Slave region of the N.W.T. should be introduced by moving these goods by a different route.

Diavik
The Diavik diamond mine is re-supplied by the Lupin winter road.

The effect of this Project supplying bulk goods, including fuel, to Diavik will reduce the number of loads on the southern portion of the Lupin winter road by 1,600. No new or additional environmental effects on the environment of either the West Kitikmeot region of Nunavut or the North Slave region of the N.W.T. should be introduced by way of sourcing these goods by way of a different route.

Lupin
Lupin Mine has been producing gold since 1982. The effect of this Project supplying bulk goods, including fuel, to Lupin will reduce the number of loads on the southern portion of the Lupin winter road by 500.

No new or additional environmental effects on the environment of the West Kitikmeot region of Nunavut will be introduced by way of sourcing these goods by way of a different route.

Jericho
The Jericho Diamonds Project is located 3.5 km west of Contwoyto Lake 20 km northwest of Lupin. It is currently at the project review stage. It is proposed that the Jericho site would be served by a 32.5 km extension of the Lupin winter road. The configuration of this Project would not introduce any changes to the Jericho Project. Operationally, the Jericho Project may have access to the winter road over a slightly longer period each winter compared to the current Lupin winter road season. The proposed volumes for annual re-supply to the Jericho Project are estimated to be from 157 to 312 loads annually for an 8 year period (Tahera Corporation, 2001).

The social and economic effects of the Project on the Kitikmeot region include an infusion of employment and contracting opportunities for its residents. The construction phase is expected to create 2,826 man-months of employment over a 16 month period. The payroll for construction will be an estimated $26.8 M.

Project operations will create 31 jobs every year with an annual payroll of $1.5 M. The services for contracted drivers hauling on the road will add $9 M for a total estimated annual payroll of $10.5 M. The creation of new opportunities close to the traditional community of Bathurst Inlet may see a return to the community of family members who moved out in recent years due to lack of opportunity there (Page Burt, Naturalist at Bathurst Inlet Lodge, personal communications).

It is possible that a significant portion of the Project payroll can be retained by the region. In a study of potential social and economic effects of a gold mine in the Keewatin, it was estimated that in addition to the direct payroll to the region, government would benefit by $22,469 for every new job created in the region that was filled by a previously unemployed person. These benefits are a combination of tax revenue and saving in social program costs (Nexus, 1997).

The Project will provide lower costs for fuel, supplies and power (diesel fuel) resulting in a higher standard of living for Kitikmeot residents. Annual savings on fuel alone are estimated as being at least $3 million.

The cumulative effects assessment in the Project EIS will describe expected effects of the Project in concert with existing and prospective activities indicated above, with traditional and historic activities on major VECs, and social, cultural and economic make-up of the Kitikmeot region of Nunavut. It will also review the expected effects on the winter road traffic between Yellowknife and the mining sites that have traditionally been re-supplied entirely by the Lupin winter road

7.0 MITIGATION MEASURES AND RESIDUAL IMPACTS

The risk of environmental effects from Project construction and operations relate to the direct interactions between the Project and elements in the environment. The interactions and related environmental risk outlined in Table 7 above will be elaborated on here.

The overall mitigation measures that will be practiced are the product of a high level of environmental care and diligence by the proponent in all Project activities. Notwithstanding the best practice, and successful mitigation measures, some interactions between the Project and the environment will have residual impacts which are described for the relevant Project activity.

7.1 AIR QUALITY

Combustion of diesel and other hydrocarbon fuels will produce greenhouse gasses which cannot be avoided. The amount can be reduced by an aggressive energy conservation effort. The residual environmental effects of burning hydrocarbons are debatable but may include global warming.

7.2 MARINE SHIPPING

Marine shipping associated with the Project will take the form of vessels up to 25,000 tonnes and barges serving Kitikmeot communities. All shipping will be done by commercial carriers operating in compliance with the relevant Canadian laws and regulations.

The Project will go beyond the specifics of the law in mitigating the effects of shipping through the Kitikmeot Region. The shipping season will be planned so that no ship movement is required during the time of potential early winter ice cover on Dease Strait and so avoid the risk of interfering with caribou migration from Victoria Island to the Kent Peninsula. Also, no ship movement will be planned for the spring when caribou return to Victoria Island. The first ship of the season is planned for an open water arrival and so Project shipping will not interfere with human travel on the spring ice either.

No residual impacts of marine shipping are expected.

7.3 CAMP OPERATIONS

Interactions with the environment at Project camps will involve water quality, waste management, and wildlife. Sewage from the camps will be treated to meet waste water quality standards prior to discharge. All combustible waste will be incinerated on a regular basis so not to attract scavengers; non-combustible waste will be disposed of either at a solid inert waste site or be shipped out. All hazardous wastes that cannot be disposed of by the Project (i.e. used oil can be destroyed on site by a waste oil burner) will be shipped out.

A “Bear Alert” program will be used at all camps to advise personnel when grizzly bear are sighted at or near a camp.

Project employees will probably engage in recreational angling but hunting by Project personnel will be prohibited. The policy on recreational angling by Project workers will be in compliance with the West Kitikmeot Regional Land Use Plan (when approved).

No residual impacts are expected to water quality, fish populations or wildlife populations as a result of camp operations. The remains of a solid inert waste site could be visible for many generations.

7.4 UNLOADING SHIP CARGO

Handling marine bulk cargos has the attendant risk of spills with associated potential effects on coastal habitats. The first defense will be a code of best practice that will be followed by the commercial carriers and their staff. Next, the Project will adopt contingency plans that employ the best practice available for Arctic conditions.

No residual impacts are expected from normal port operations. Effective contingency plans and equipment with trained personnel will be in place to reduce the risk of residual impacts from accidents.

7.5 PIT /QUARRY DEVELOPMENT

Pits and quarries will alter an estimated 2 ha of tundra terrain at each site for a total of ± 74 ha at approximately ± 37 sites. Sites for pits and quarries will be selected with care so that the terrain disturbance can be contained in as small an area as possible. Quarries in sulphide bearing rock with a risk of acid generation in the quarry or by the rock on the road will be avoided. During operations, effective contingency plans will be in place to ensure that accidents do not result in residual impacts. On closure quarry and pit walls will be sloped to avoid progressive terrain alteration, but the visual effect of the pit and quarry will remain.

7.6 PORT SITE DEVELOPMENT

Port site development, like quarry and pit development will involve terrain alteration on a large scale. It is estimated that the cumulative area of all the development at the port will involve approximately 159 ha. , including the dock site. A Project environmental management system will be in place to reduce the risk of environmental effects from normal operations. Contingency plans will be in place to ensure that accidents do not cause long term impacts.

The residual impacts of port development will be the visual and inert. These effects of terrain alteration will be evident on the tundra for many years.

7.7 ROAD CONSTRUCTION

Road construction will affect a total estimated 277.7 ha with a further 74 ha for quarries. The alignment has been selected for its benign effects on drainage basins and terrain features like eskers. Road construction like pit and quarry development will be governed by rigorous attention to good practice and effective contingency plans to reduce the risk of long term environmental effects from accidents.

The presence of the road will not have any long term negative impacts on water, vegetation, or wildlife. Water crossings will be designed to avoid the stream channel in fish bearing streams during normal flows. Caribou will use the road as insect relief during periods of heavy insect infestation. The presence of the road, like the presence of an esker, will be visible for many generations.

The residual impacts of the road construction will be visual and inert. These effects of terrain alteration will be evident on the tundra for many years.

7.8 CONTWOYTO CAMP DEVELOPMENT

The Contwoyto Camp site development will occupy 1.5 ha. Like the road, Camp construction will be completed with care and diligence. The Contwoyto parking area and push outs, like the road, will be areas used by caribou as insect relief during periods of heavy insect infestation. The gentle terrain of the sites is such that the risk of progressive erosion is negligible.

The residual impacts of Contwoyto Camp construction will be visual and inert. These effects of terrain alteration will be evident on the tundra for many years.

7.9 PORT SITE OPERATIONS

Road operations at the port will produce dust in summer which will be subject to dust suppression by watering the surfaces. Contingency plans will address the risk of spills. Sedimentation ponds will be used as a back-up for spills that could affect the quality of run off water. These ponds will be located to collect run off so that it can be tested and held for treatment, if necessary, before entering Bathurst Inlet. No freshwater systems are at risk from port site run off.

No residual impacts are expected from normal port operations; effective contingency plans and equipment with trained personnel will be in place to handle accidents.

7.10 ROAD OPERATIONS

All trucks operating on the road will be required to carry a basic spill kit to handle incidental spills. A contingency plan and a mobile spill kit will be on standby at all times to handle accidental spills like a truck roll over. The road environmental management plan will show the drainage pattern for both sides of the road for the entire right of way so that effective cleanup measures can be initiated with full knowledge of the natural lay of the land.

Wildlife will always have the right of way; in the event of continuous caribou movement across the road, travel may be suspended.

No residual impacts are expected from normal road operations; effective contingency plans and equipment with trained personnel will be in place to handle accidents.

7.11 LOADING BARGE CARGO

The commercial carriers will be expected to employ best practices for fuel and cargo handling. The experience of Polaris and Nanisivik will be used in developing handling procedures and for related spill contingency plans.

Loading barges with deck cargo and fuel in holds will follow standard practice.

The port will be equipped with a full complement of spill containment and clean-up equipment.

No residual impacts are expected from normal port loading operations; effective contingency plans and equipment with trained personnel will be in place to handle accidents.

7.12 CONTINGENCY PLANS

Contingency plans that are specific to potential risks inherent in Project construction and operations will be submitted with the Project EIS. Included will be contingency plans for:

- discharging fuel from ship to tank farm
- tank farm operations and management
- unloading bulk materials at the port
- storage of hazardous materials at the port

8.0 ABANDONMENT/DECOMMISSIONING PLANS

It is expected that the Project as examined in the feasibility study (Nishi-Khon SNC and Kitikmeot Geosciences, 2002) will enhance the economics of resource development in the West Kitikmeot in a very significant way for the long term. Decommissioning the Project is therefore not foreseen. It is accepted however that elements of the Project will change and that selective decommissioning will be required from time to time.

8.1 QUARRIES

Quarries not required for maintaining the road way during operations will be contoured and abandoned on completion of road construction. At no time during the construction or operations of the Project will active erosion of any terrain on or adjacent to the port and road and associated lands be allowed to proceed unchecked or alter natural drainage patterns in adjacent lands.

8.2 ROAD

It is expected that the road will be in use for many generations in the future, nevertheless, the Project proponents acknowledge that non-renewable resources are finite and that some day in the future sections of the road and associated facilities may no longer be required. Closure and abandonment will include removal of all imported materials and structures, treating all contaminated soils, contouring all surfaces to reduce the possibility of erosion and to enhance the natural re-vegetation of all terrestrial surfaces disturbed or altered by the Project.

8.3 SEASONAL SHUTDOWN

The road and port operations are seasonal, road in the winter, port in the summer.

The Project's operations plan will include seasonal, temporary, and permanent closure procedures.

There will be some road maintenance in summer. Equipment used for building and operating the winter ice road on Contwoyto Lake will be laid up for the summer.

Temporary suspension of all operations might be associated with global economic factors that force the suspension of operations at all participating sites. One such factor could be a price increase of fuel oil to levels that make all mining in remote regions uneconomic. Contingency plans for such factors arising will be developed and submitted in support of the Final Project Description and Project EIS.

9.0 MONITORING AND MAINTENANCE PLANS

The Project will undertake environmental quality and public health monitoring programs as required by the Project's "license to operate" for both the construction and operating phases. Monitoring programs are expected to be prescribed by the Project's environmental regulators for water quality generally and for public health issues specifically. Furthermore, the Project would explore collaboration with other industry parties and government in the event that long term wildlife monitoring programs were to be initiated in the Kitikmeot region of Nunavut.

The Project permitting approvals requirements includes that an Inuit Impact and Benefit Agreement be negotiated with the Kitikmeot Inuit Association. It is expected that compliance and monitoring functions will be included in that agreement.

10.0 LIST OF INFORMATION SOURCES

Personal Communications

Page Burt, naturalist at Bathurst Inlet Lodge for 20+ years and principal investigator 2001 field studies of plants and vegetation in Project area.

Sam Kapolak, resident, community of Bathurst Inlet.

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FIGURES

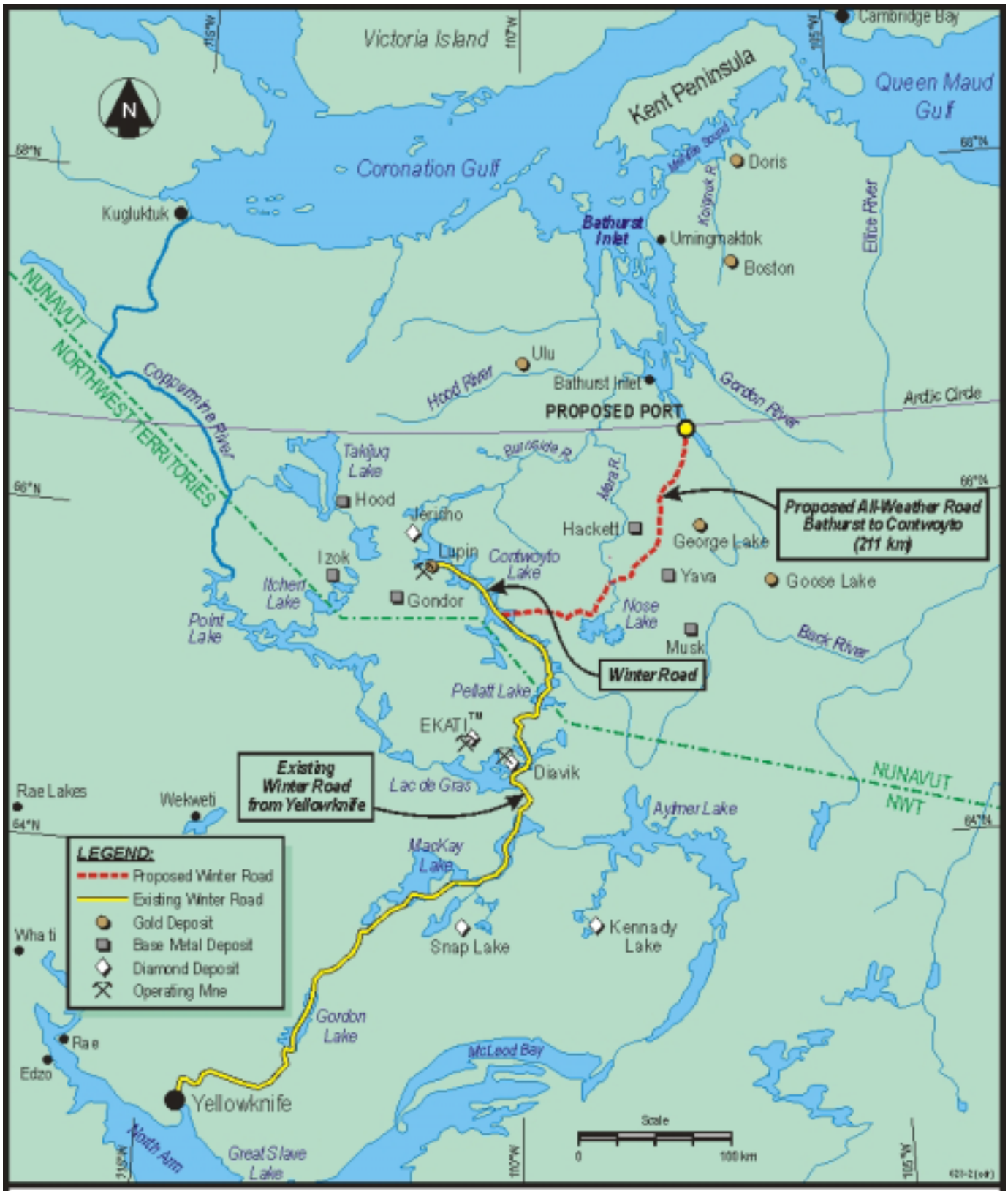
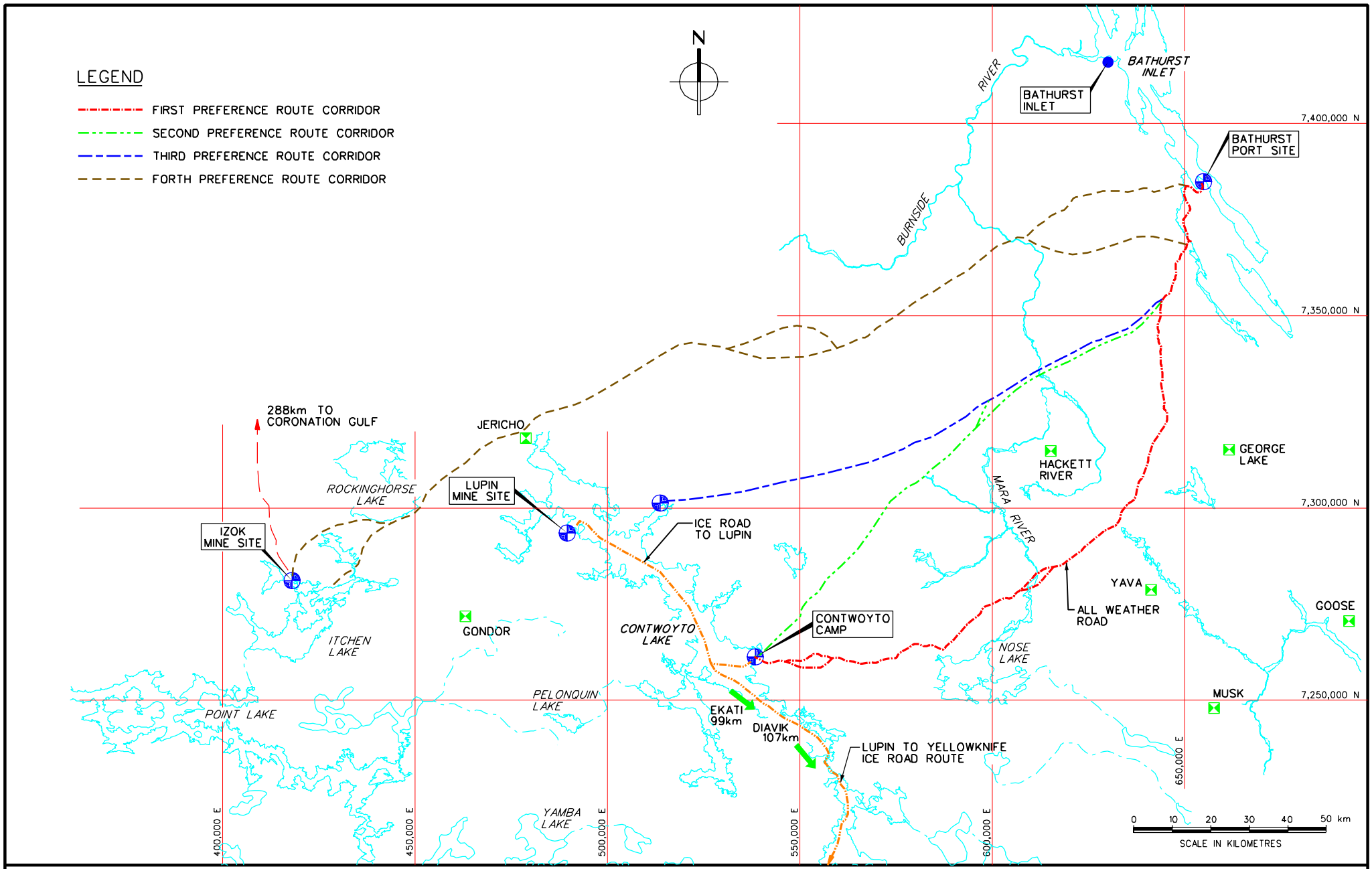


FIGURE 1

Bathurst Inlet Port and Road Project - Location Map



BATHURST INLET PORT & ROAD PROJECT

ROUTE ALTERNATIVES REVIEWED SHOWING LUPIN WINTER ROAD ROUTE IN PROJECT AREA

FIGURE 2

the BATHURST INLET PORT AND ROAD PROJECT

NOTES:

1. MAPPING FROM GEOWEST ENVIRONMENTAL CONSULTANTS.
2. ZONE 12 UTM GRID SHOWN.
3. ALL WEATHER ROAD LAND OWNERSHIP JURISDICTION TABLE:

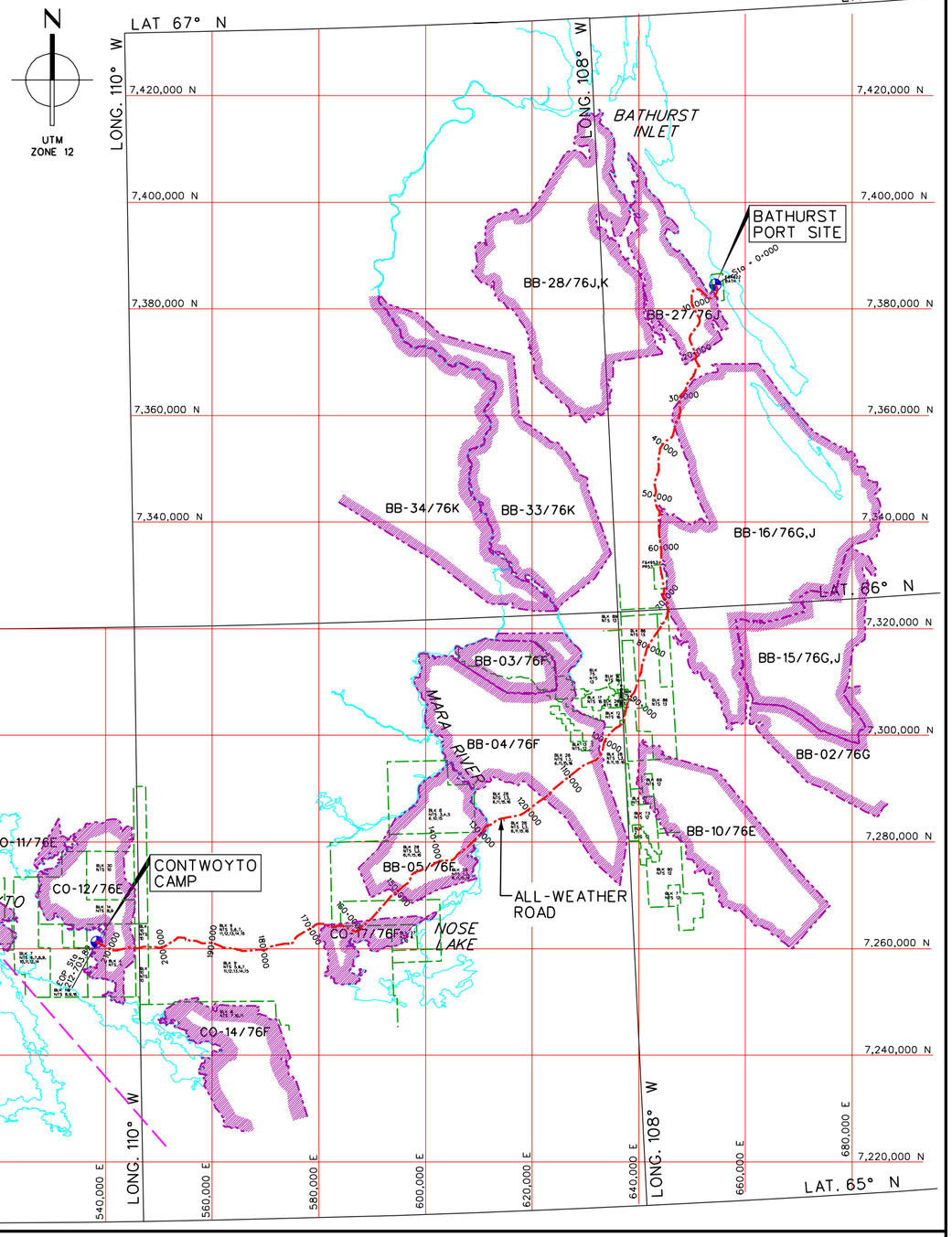
ROAD LENGTH (km)	ROAD LENGTH PERCENTAGE (%)	LAND OWNERSHIP
147.7	51.0	INUIT OWNED LAND
141.6	49.0	FEDERAL CROWN LAND

LEGEND:

- INUIT OWNED LAND
- MINERAL CLAIMS

0 10 20 30 40 50 km

SCALE IN KILOMETRES

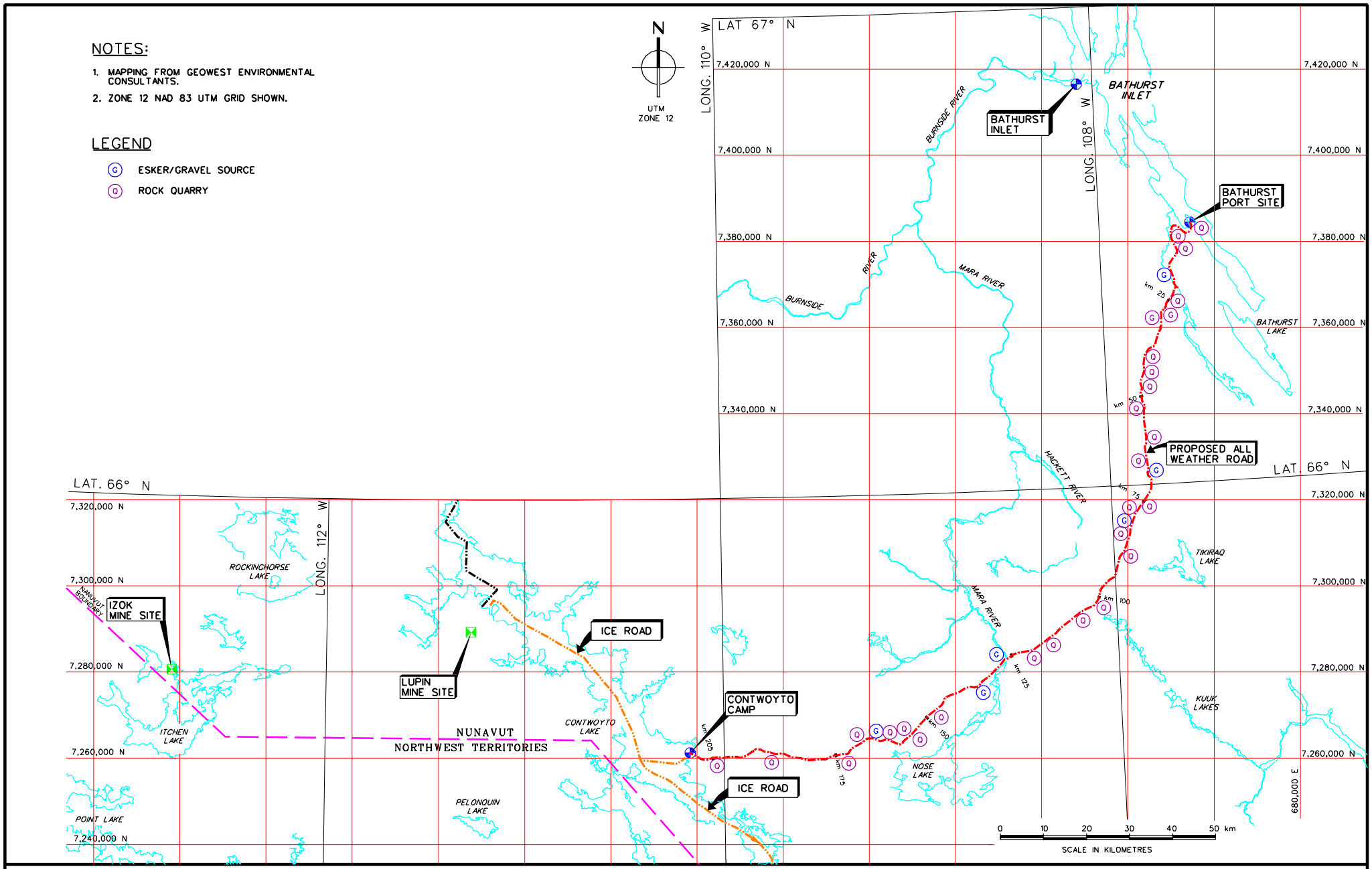


BATHURST INLET PORT & ROAD PROJECT

LAND USE AND OWNERSHIP OF ROAD ALIGNMENT

FIGURE 3

the BATHURST INLET PORT AND ROAD PROJECT

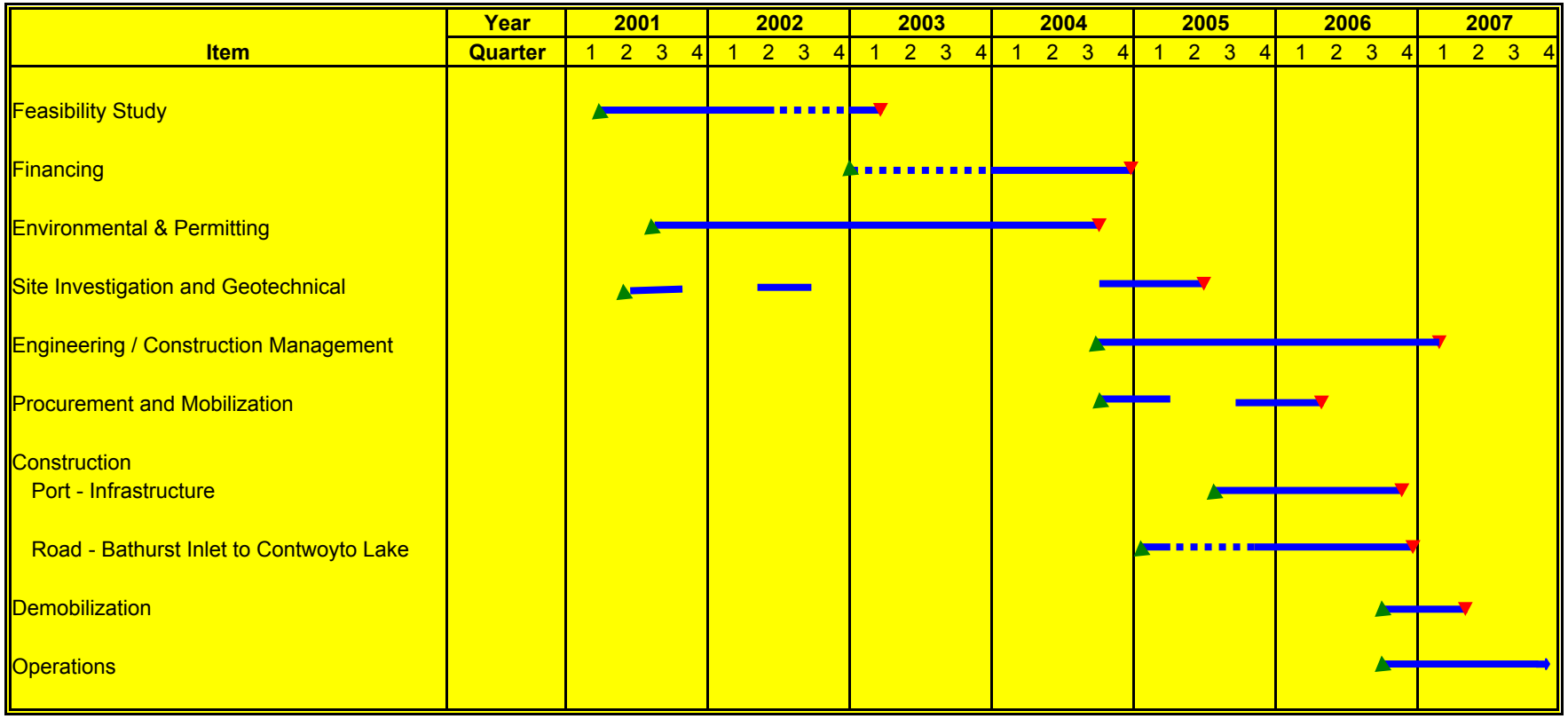


BATHURST INLET PORT & ROAD PROJECT

QUARRY AND BORROW PIT LOCATIONS FOR PROJECT CONSTRUCTION

FIGURE 4

the BATHURST INLET PORT AND ROAD PROJECT

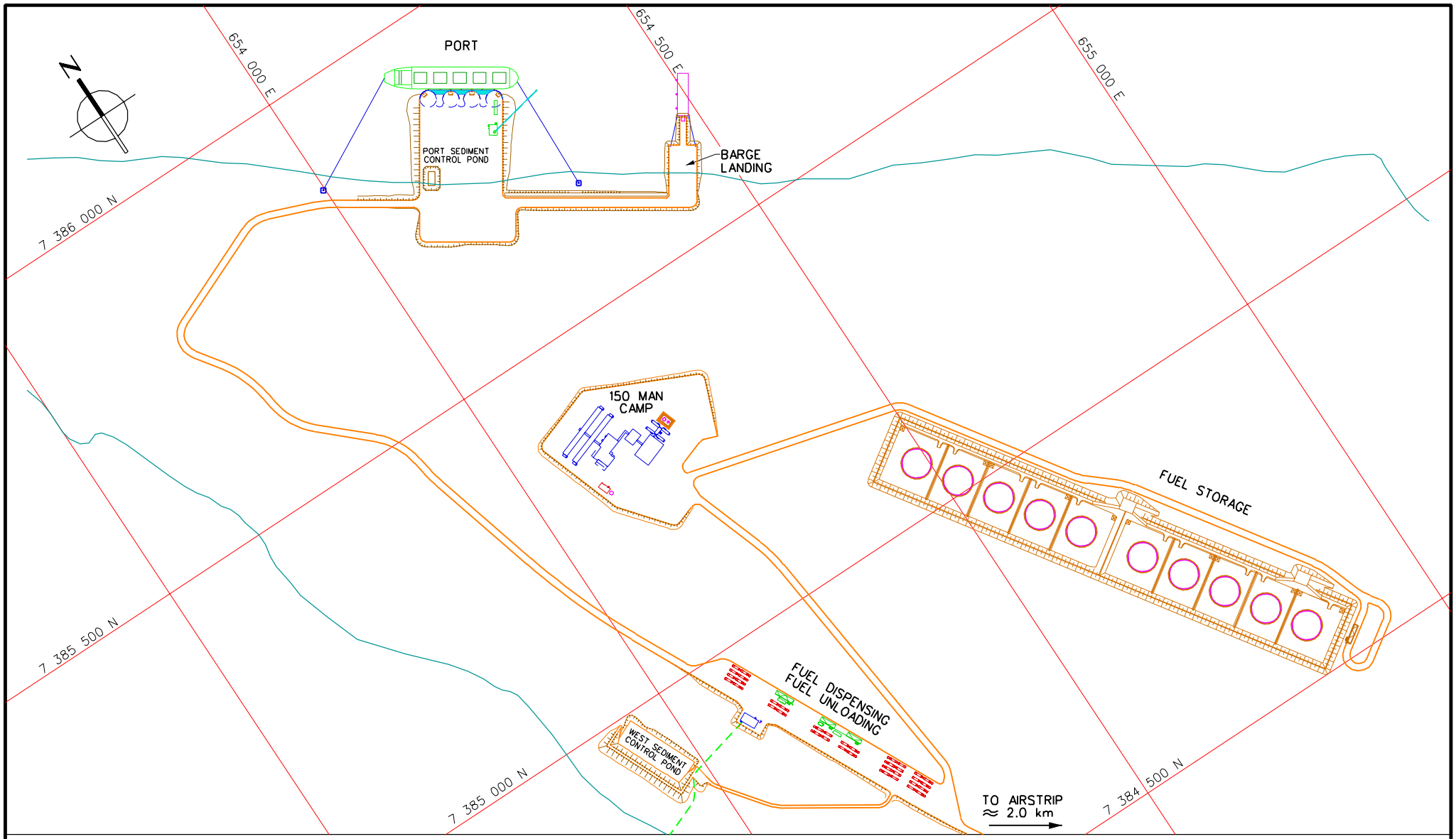


BATHURST INLET
PORT & ROAD FEASIBILITY STUDY

OVERALL PROJECT SCHEDULE

FIGURE 5
(Revised April/03)

the BATHURST INLET PORT AND ROAD PROJECT

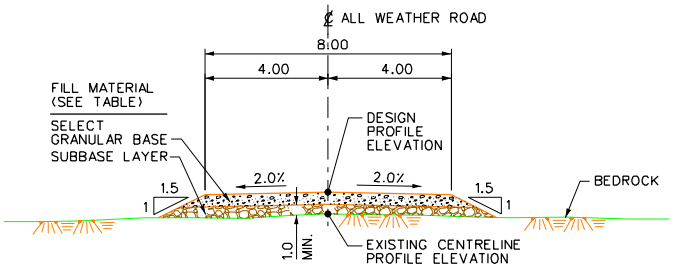


BATHURST INLET PORT & ROAD PROJECT

PORT LAYOUT

FIGURE 6

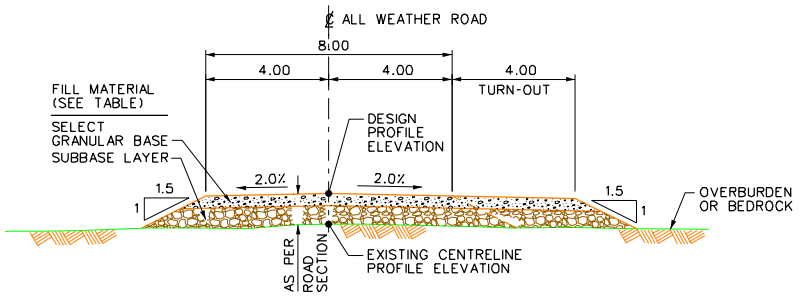
the BATHURST INLET PORT AND ROAD PROJECT



TYPICAL ALL WEATHER ROAD SECTION
ON BEDROCK OR WELL-DRAINED GRANULAR SOILS

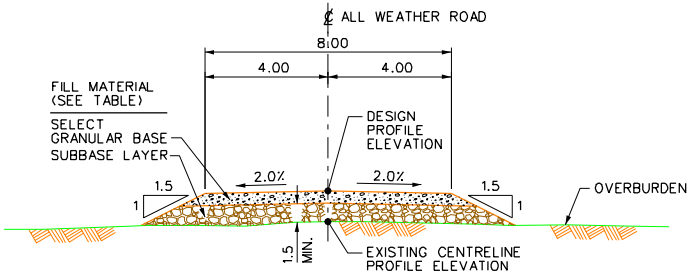
NTS

LAYER	THK.	MATERIAL DESCRIPTION
ALL WEATHER ROAD		
SELECT GRANULAR BASE	300mm	100mm CRUSHED ROCK
SUBBASE	0.6m TO 1.6m	600/900mm ROCK FILL



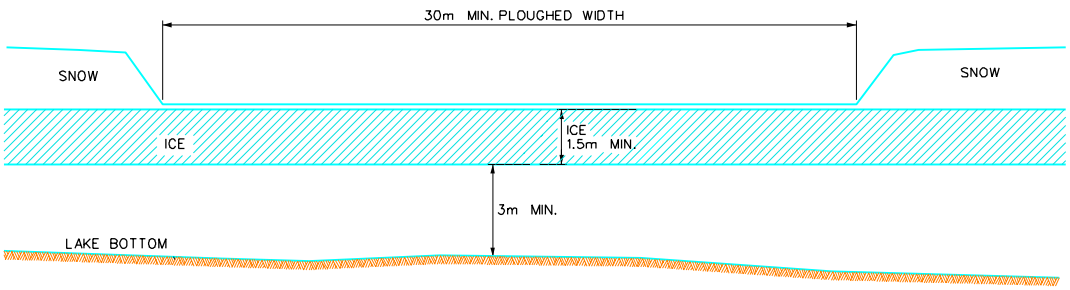
TYPICAL ALL WEATHER ROAD WITH TURN-OUT

NTS



TYPICAL ALL WEATHER ROAD SECTION
ON ICE-RICH SOILS

NTS



ICE ROAD SECTION

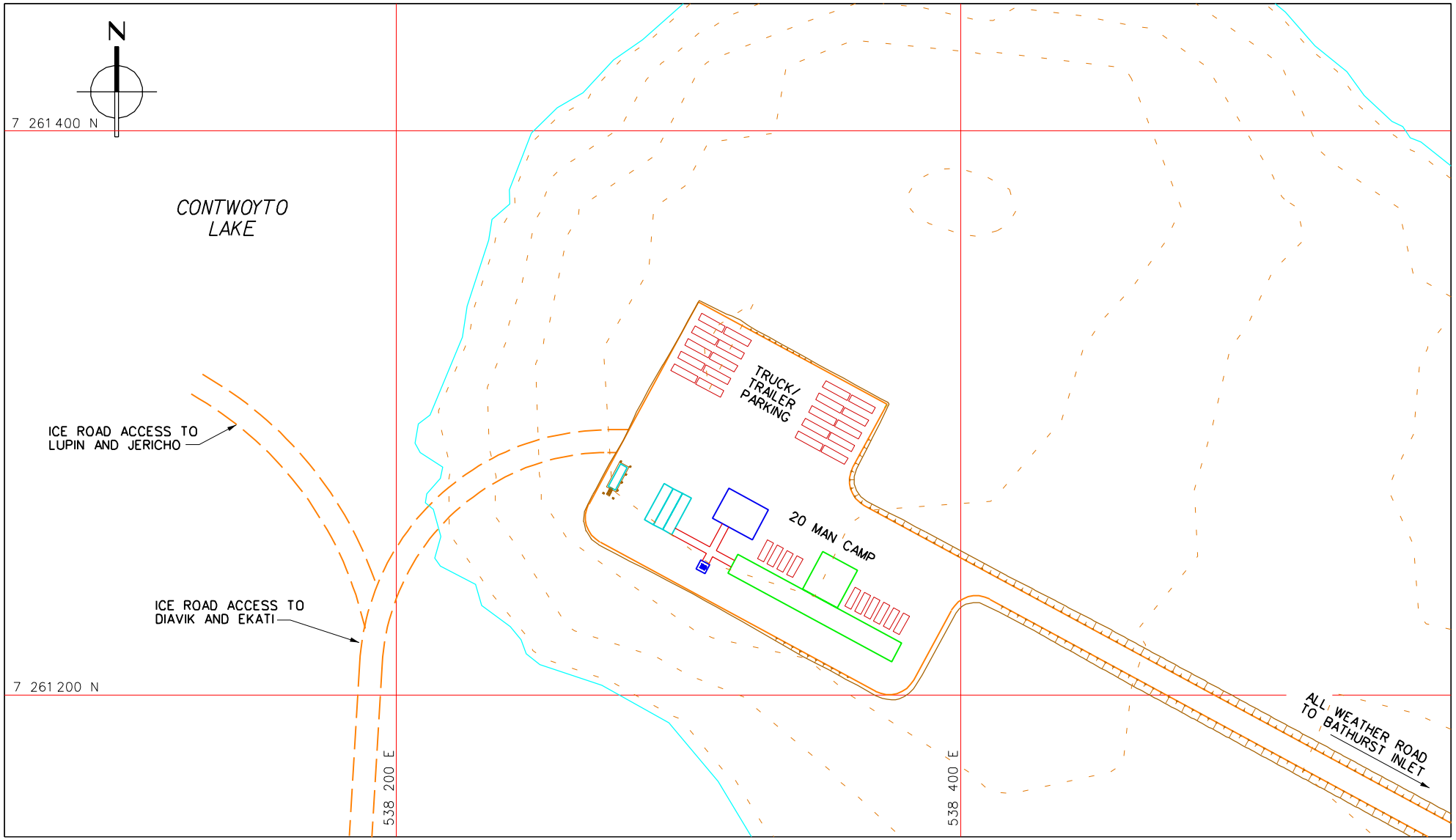
NTS

BATHURST INLET
PORT & ROAD PROJECT

TYPICAL CROSS SECTION OF
ALL WEATHER ROAD & ICE ROAD

FIGURE 7

the BATHURST INLET PORT AND ROAD PROJECT



BATHURST INLET PORT & ROAD PROJECT

CONTWOYTO CAMP LAYOUT

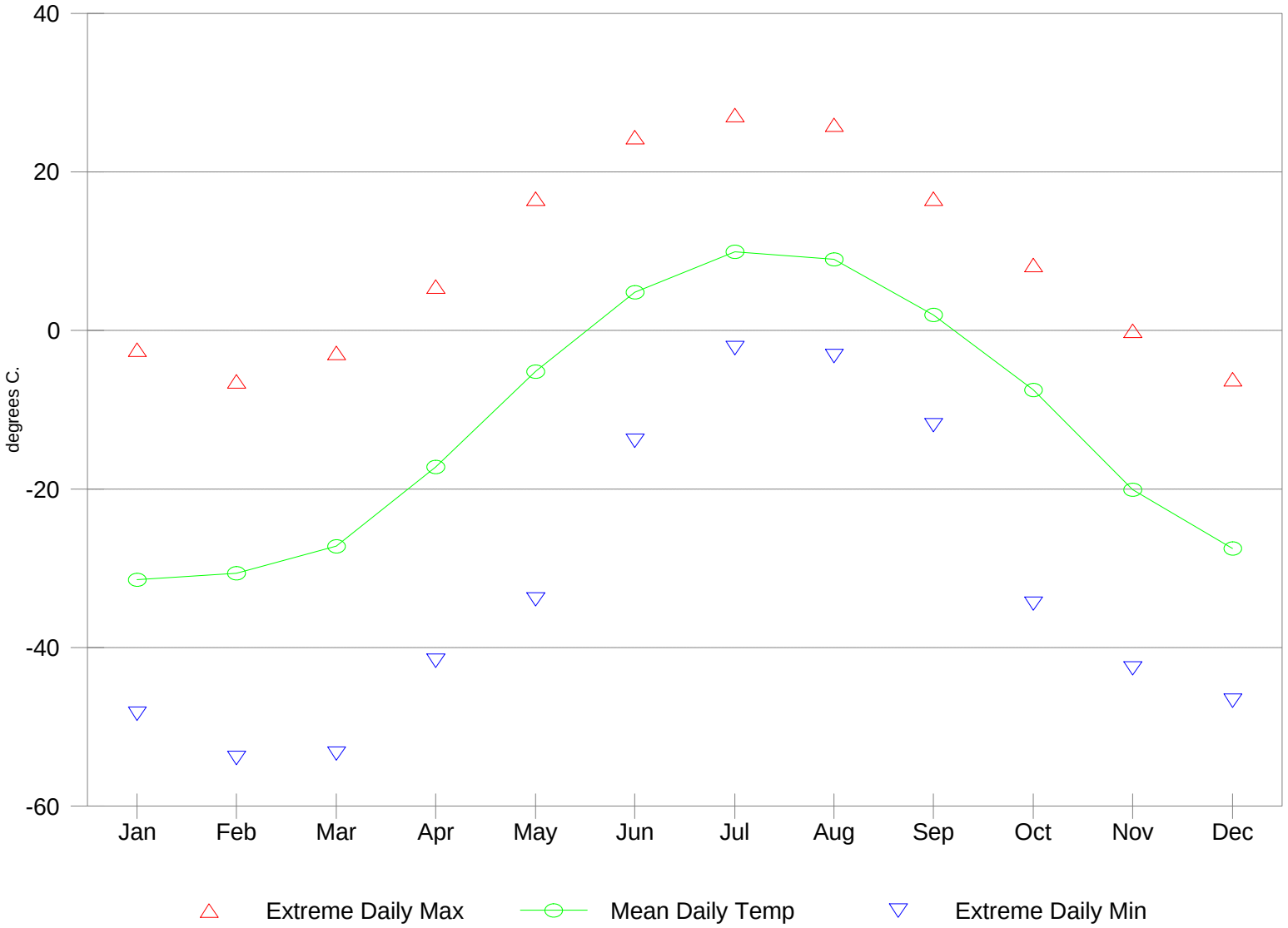
FIGURE 8

the BATHURST INLET PORT AND ROAD PROJECT


UMINGMAKTOK
BATHURST INLET
KUGLUKTUK
BAKER LAKE
NUNAVUT
Proposed All-Weather Road Bathurst to Contwoyto (211 km)
Sahtu Settlement Area
NORTHWEST TERRITORIES
South Slave Region
North Slave Region
FORT RAE EDZO
YELLOWKNIFE
DETTAH
NDILO
Deh Cho Region
Source: GNWT/RWED
FORT RESOLUTION
HAY RIVER
ENTERPRISE
WBNP
FORT SMITH
FITZGERALD
SASKATCHEWAN
Bathurst Caribou Herd
Scale 1:6,000,000
Mar-29
FIGURE 9A

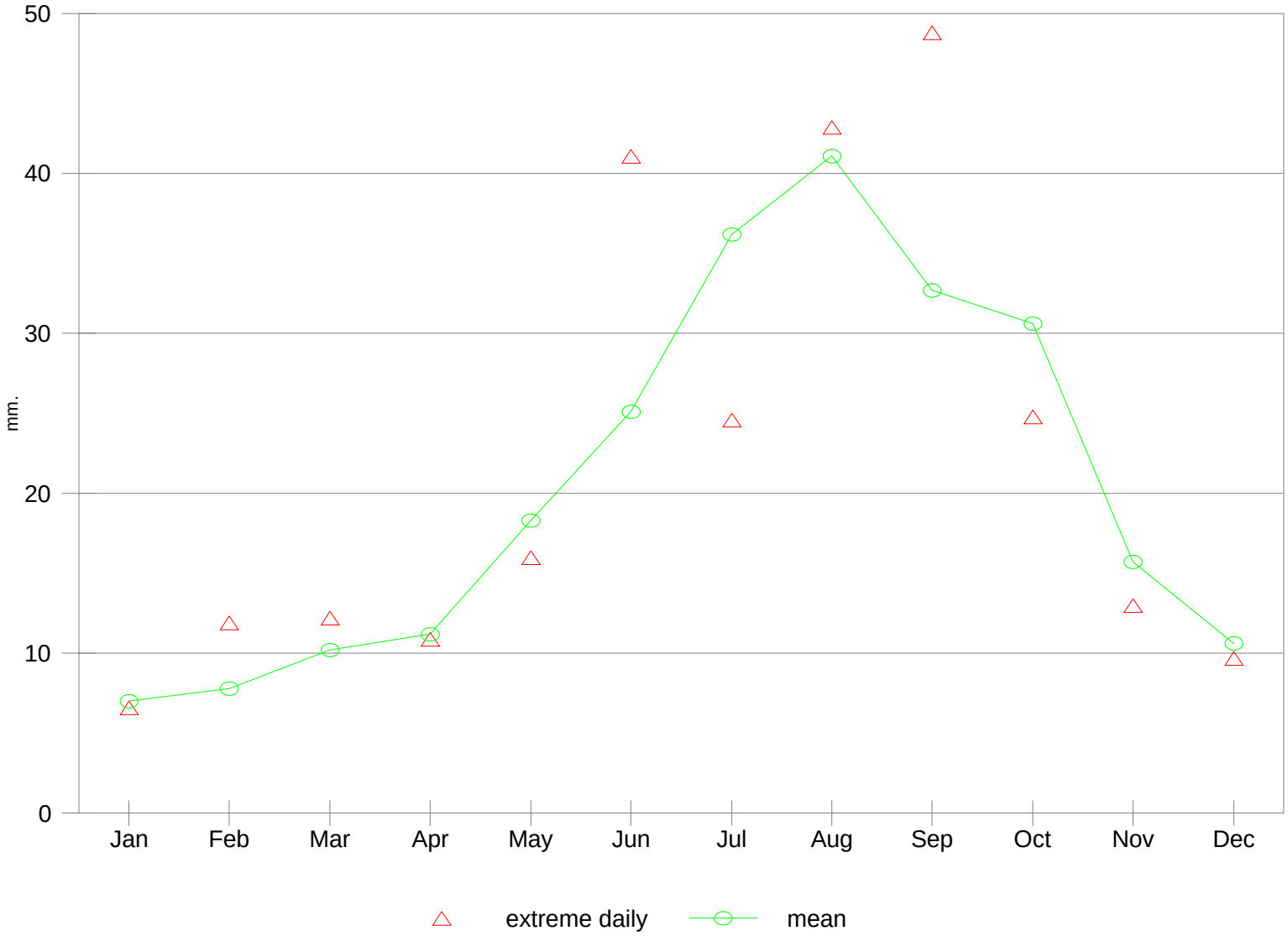

BATHURST INLET
Proposed All-Weather Road Bathurst to Contwoyto (211 km)
NUNAVUT
Sahtu Settlement Area
NORTHWEST TERRITORIES
South Slave Region
North Slave Region
Deh Cho Region
Source: GNWT/RWED
Bathurst Caribou Herd
Scale 1:6,000,000
Jun-09
WBNP
SASKATCHEWAN
FIGURE 9B

Figure 10. Contwoyto Lake Annual Temperature Profile: 1956 - 1982



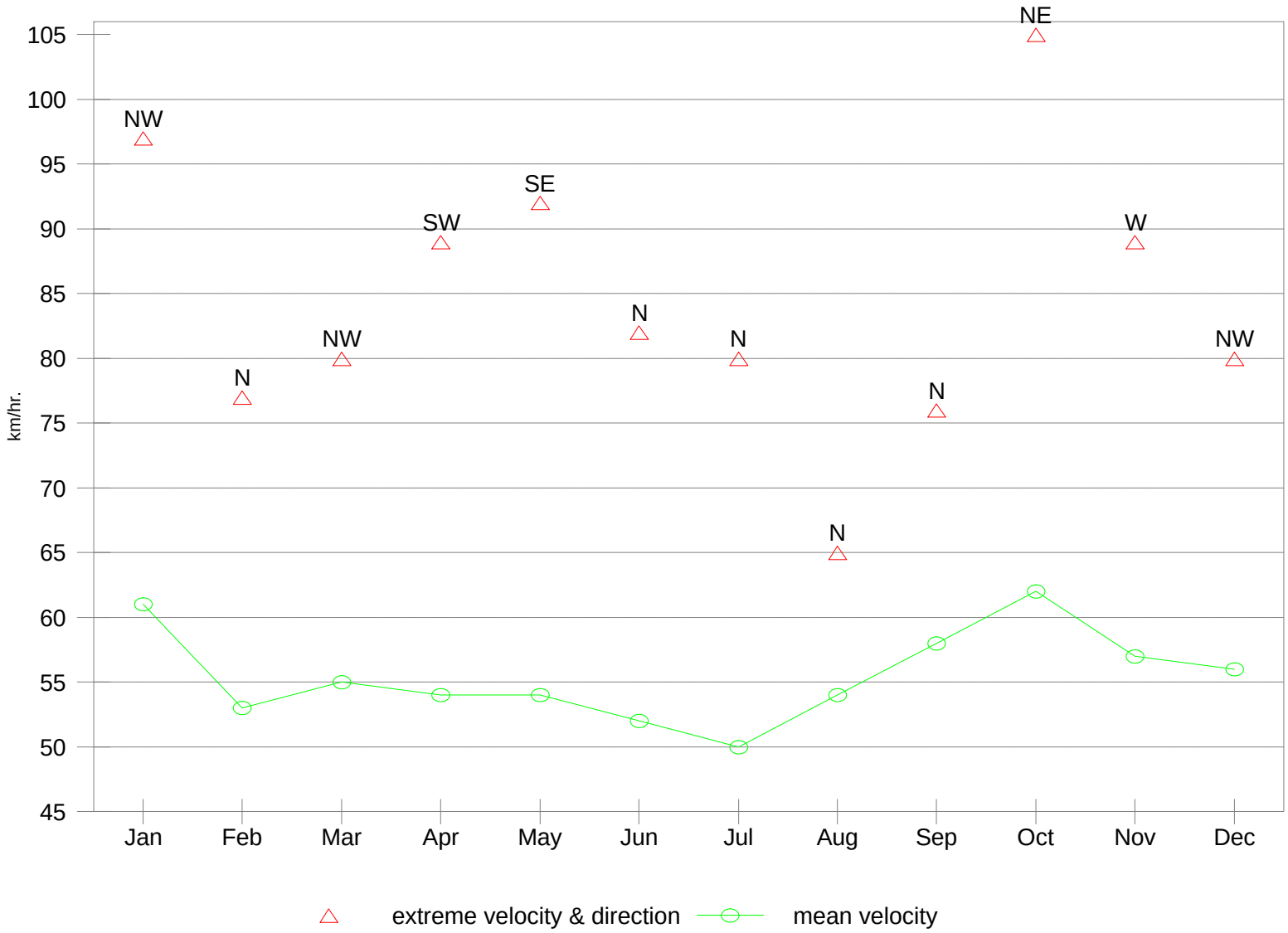
Source: Environment Canada 1994. Canadian Climate Data

Figure 11. Contwoyto Lake Annual Precipitation Profile: 1956 - 1982



Source: Environment Canada 1994. Canadian Climate Data

Figure 12. Contwoyto Lake Annual Wind Profile: 1956 - 1982



Source: Environment Canada 1994. Canadian Climate Data