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

N/A = Not available

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.)*

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

N/A Not available

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

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 andcompleted 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 portinclude 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 thethree-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 winterwhen 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