

3. Biological Impacts and Mitigation

The biological impacts associated with the NWT Diamonds Project will be negligible to minor. The majority of disturbances will be temporary, with the exception of the relatively long-term loss of aquatic habitat. Biological impacts experienced due to project activity should not affect the ecological integrity of the project area, or the larger ecodistrict, ecoregion or ecozone. The significance of the residual effects of these impacts is summarized in Section 2, [Table 2-1](#). A comprehensive evaluation of impacts and mitigation is contained in Appendix IV-A1.

Aquatic life will experience long-term habitat loss caused by the dewatering of seven lakes. However, these impacts are considered to be negligible to minor due to the abundance of habitat within the Coppermine River Basin and the Southern Arctic Ecozone. The creation of new habitat in the Panda diversion channel will compensate for lost stream habitat and migration routes. Ongoing consultation with the federal Department of Fisheries and Oceans will determine the appropriate method for compensation of lost lake habitat. Dam construction, road construction and traffic may cause some temporary and localized increases in siltation and sedimentation.

Local vegetation will be disturbed and some negligible to minor losses will be realized during project construction. Vegetation impacts will be temporary and restricted to the mine pits, waste rock dumps, the tailings impoundment, the permanent camp and roads. Preliminary assessment indicates that rare species have not been found on the claim block. Reclamation may result in a minor gain in vegetation due to the rehabilitation of the Long Lake tailings impoundment.

Wildlife may be disturbed by increased human activity and mining activities throughout all stages of project development. Wildlife will experience some negligible to minor habitat loss around the pits, tailings impoundment, permanent camp and roads. Habitat loss and disturbance may cause some species to avoid the project area. However, experience from other northern mines, highways and oil and gas projects shows that species such as caribou are known to habituate to operations. Minimization of habitat loss combined with employee education on wildlife issues will reduce the potential for wildlife impacts. Particular attention will be focused on the protection of caribou and vulnerable species such as grizzly bears and wolverine.

3.1 Aquatic Life

Fish have been identified as a valued ecosystem component due to their intrinsic value as well as their importance as a food source, and to a lesser extent, for their associated recreation value. Impacts of project development to fisheries are of cultural, public and professional concern.

The main project activities affecting aquatic life in both lakes and streams at the NWT Diamonds Project will take place during the construction and operation periods. The project activities include road construction, culvert installation, lake dewatering, pit dewatering, winter exploration drilling, tailings disposal, stream diversions and dam construction. Angling by project employees and sampling during ongoing monitoring may also have an impact on aquatic life.

The impacts that may result are as follows: habitat loss, habitat modification, shoreline modification, hydrological alteration, migration route disruption, habitat degradation and loss of fish through exploitation and biological sampling.

3.1.1 Habitat Loss

The aquatic system will be affected in seven lakes: Panda, Misery, Koala, Leslie, Fox 1, Long and Airstrip. The first five will be lost due to dewatering prior to mining, Long Lake will be used for tailings disposal and Airstrip Lake will be dewatered to obtain construction materials. The total lake area lost through dewatering and filling these lakes will be 891 ha, which accounts for 0.06% of the total surface area of lakes in the Coppermine watershed.

Stream habitats will be affected by the lake dewatering itself and changes in the hydrologic cycle resulting from lakes being removed from the watershed. Streams connected to the dewatered lakes will experience loss of flow, resulting in the loss of arctic grayling spawning and rearing habitat.

3.1.1.1 Mitigation

In keeping with the federal “no net loss” guiding principle, it is expected that mitigation of lake habitat loss will be primarily through the establishment of a habitat fund for off-site enhancement of habitat and productivity. Within the Koala watershed, mitigation will focus on conserving the habitat by managing shoreline development for those lakes not dewatered or infilled. Fish populations in the lakes designated for dewatering will be harvested and the catch distributed among northern communities before operations begin.

NWT Diamonds Project has consulted with the Department of Fisheries and Oceans (DFO) and determined that the most effective means of mitigating stream habitat losses is to create new habitat in the water diversion channel between Panda and Kodiak lakes. The channel has been designed to allow fish migration upstream from Kodiak Lake to the northwest sub-basin of Panda Lake and provide suitable spawning habitat for arctic grayling. It will also replace stream habitat lost between Panda, Koala and Kodiak lakes. Benthic organisms are expected to colonize the channel rapidly and establish a food base for fish. The channel will be monitored regularly to determine flow rates, water levels and turbidity and to assess its suitability for supporting fish

populations. This new habitat should be suitable for spawning grayling, as it has been designed to meet their substrate and flow velocity requirements.

The lakes will be dewatered at times other than the brief freshet period when water flow is at a maximum. Discharge rates will be monitored so as not to exceed normal peak flows.

3.1.1.2 Residual Effects

When the dewatered lakes eventually refill, a limited amount of steep littoral habitat for benthos and fish will be restored. When the drainage system of these lakes is reopened, the pre-existing stream channels are expected to provide functional habitat once again.

In view of the abundance of lakes and aquatic habitat in the surrounding ecosystem and the permanent habitat improvements provided in the diversion channel, which are expected to be retained, the overall impacts are considered to be negligible.

3.1.2 Habitat Modification

Fish habitat may be modified as a result of road, dam, bridge and diversion channel construction, installation of culverts and winter drilling. The impacts of these activities may include sedimentation, fluctuations in water level and disruption of migration routes.

3.1.2.1 Turbidity and Sedimentation

One of the most significant impacts on aquatic systems in the Koala and adjacent watersheds will result from increased turbidity and sedimentation. Deposition of suspended material on benthic habitats may cause a disruption of an organism's life support systems, especially the gills and mouth (Ward 1992). Some organisms can adapt to silty conditions but few organisms survive in heavy silt. Sands and silts that accumulate in lakes result in the degradation of spawning and nursery habitat and the suffocation of fish eggs and juveniles. Sedimentation can also make the substrate unsuitable for growth of periphytic and benthic organisms, thus reducing the availability of fish food. In northern ecosystems with short, strongly connected food chains, reduction in primary and secondary production will affect higher trophic levels.

Another physical effect of turbidity and sedimentation in lakes is the reduced photosynthesis caused by decreased light penetration. Consequently, primary productivity and the transfer of energy across the whole of the foodweb, including fish, is decreased (Lloyd *et al.* 1987). Turbid waters also reduce fish growth rate, as well as disease resistance (Alabaster and Lloyd 1982). Reduced penetration of light has been shown to be detrimental to fish that depend on visual recognition of prey, as do most salmonids (Schmit and O'Brien 1982). Several studies have shown that fish (including grayling) tend to avoid turbid waters (Lloyd *et al.* 1987).

Increased turbidity resulting from winter exploration drilling in Koala Lake has been associated with decreases in plankton abundance (Volume II, Section 3.1.1). However, in the year following the cessation of drilling, populations increased in abundance, indicating that plankton have considerable recuperative capacity, and effects are short-term.

Sedimentation in Kodiak and Nema lakes may increase due to construction of the Panda diversion channel and the proposed southern dewatering outflow from Long Lake. Upon completion of construction, short-term sedimentation is expected until the new channels stabilize. In addition, streams with road crossings may be subjected to short-term increased sediment loads due to runoff from disturbed surfaces, culvert installation and bridge construction.

3.1.2.2 Mitigation

Management and monitoring of construction and operational practices will minimize production and release of sediment into nearby waters. Construction guidelines for stream crossings that maximize efficiency and minimize habitat degradation will be followed (DFO and B.C. MOE, Lands and Parks 1992). Where possible, construction will be minimized in areas where spawning areas and critical rearing habitat have been identified in lakes and streams.

To eliminate turbidity in drill return water during the 1994/1995 winter drilling program, a flocculant was added to increase the settling rate of solids. In addition, drill water was deaerated and discharged to the lake bottom to prevent turbulent mixing and re-distribution of sediments. Finally, a diffuser was employed to prevent scouring of the immediate area at point of discharge. Sediment loading will continue to be minimized in future drill programs. In any event, water will be discharged to aphotic depths (below the level at which photosynthesis occurs), where water movement is low (providing good settling conditions), and benthic and planktonic organisms are of low abundance or non-existent.

Management of the hydraulic regime, the provision of sedimentation ponds and, if necessary, the addition of settling agents to the water are all envisaged mitigation procedures to meet water licence requirements.

Concentration and duration of exposure to suspended solids are important variables in determining the impact on aquatic life (Newcombe and MacDonald 1991). It is important to monitor these variables to determine possible effects on fish specifically and biological productivity in general. The monitoring program presented in Volume III, Section 10, elaborates on the suspended solids monitoring.

3.1.2.3 Residual Effects

The overall impact of turbidity and sedimentation will be minor, fairly localized and short term. From initial construction through the decommissioning phase, habitat may be affected at times by sedimentation and turbidity, but only in localized areas. However, wind and ice action will redistribute sediments and tend to return shorelines to their original condition as the finer fractions will be redeposited in deeper waters. As lake trout spawning habitat is abundant in most lakes, other areas will be available if one site is degraded through sedimentation.

3.1.3 Shoreline Modification

Various degrees of shoreline modification will occur from the time of first construction until decommissioning. Changes in shorelines could result in loss or change in littoral habitat. Construction of channels and dams will cause some degree of disturbance in spawning and rearing habitat, which may reduce the reproductive success of fish. Shoreline modification may also result in changes in wave patterns or in the normal cycles of particulate removal and replenishment, since areas that were formerly swept clean may now accumulate sediment. Habitat suited to the production of benthic organisms may be exposed or flooded during the main period of growth. In all cases, the impact of anticipated shoreline modification is expected to be negligible to minor.

3.1.3.1 Mitigation

Shoreline development will be kept to a minimum. Where necessary, properly designed shoreline modifications may be beneficial through the provision of artificial spawning substrates and rearing habitat (Martin 1955; Prevost 1957; Peck 1982; Evans *et al.* 1991). The Panda diversion channel has been designed in consultation with DFO to accommodate habitat requirements of affected fish species. A substrate of coarse material and gravel will be used, similar to that present in the streams between Panda, Koala and Kodiak lakes.

3.1.3.2 Residual Effects

While affected shorelines may remain disturbed for many years, the overall amount of shoreline modification and associated impacts are expected to be negligible to minor.

3.1.4 Alteration of the Hydrological Regime

To facilitate lake and pit dewatering, the hydrologic regime of several lakes and streams will be altered. Kodiak Lake will receive Panda diversion channel outflow, which will replace inflow from Koala Lake. Moose and Fox 2 lakes will lose inflow from Leslie and Fox 1 lakes, respectively, once dewatered. Nema Lake will have a new inflow from the Long Lake tailings impoundment.

Fluctuating stream flows may result from lake dewatering and the construction of dams, diversions and culverts. Consequently, habitats used for rearing, spawning, feeding and migration may be affected. During the dewatering period, increases in flows downstream may result in increased erosion of the stream bed and, therefore, cause increases in turbidity and sedimentation. Increased discharge at inappropriate times may disrupt stream spawning fish or may be deleterious to larval and juvenile fish.

Apart from those lakes being dewatered and Grizzly Lake (future potable water supply), lakes are not expected to be affected by mine-induced drawdowns. The total expected withdrawal from Grizzly Lake will be approximately 100,000 m³/a, which may result in a temporary decrease to below normal low water during the summer low water period. If it persists into the fall and winter, it may expose any shallow lake spawning areas to dessication and freezing. Lake trout eggs remain in rocky substrates for several months during winter, at which time they are highly susceptible to water level fluctuations (McNamee *et al.* 1987). In any case, alteration of water levels or changing the natural cycle of water level fluctuation is predicted to have minor impacts.

It may be expected that autumn precipitation, beginning in September, will raise the water level before freeze up. Similar disruption can occur with arctic grayling spawning and nursery habitat in streams, during the early summer. Frequently, the freshet serves to remove silt from spawning beds prior to the grayling reproduction period. Increased flows, at levels below the freshet maximum, will enhance stream habitat, increasing periphyton production and larval drift. Streams with enhanced summer flow may improve juvenile grayling habitat and survival.

3.1.4.1 Mitigation

Management of the flow regime will ensure that the normal cycle of discharge is not greatly disrupted. To ensure that flow velocity is not excessive during lake dewatering, a criterion was established that flow rates during dewatering will not exceed 50% of peak spring discharge. The time required to dewater each lake will range from four to six weeks depending on lake size. Culverts and other stream crossings will be designed to meet available guidelines (DFO 1992; DIAND 1990; Katopodis and Gervais 1991; Katopodis 1991; Ontario MNR 1990; Saremba and Mattison 1984). Water levels and velocities through culverts will be monitored as required to check for obstructions that may affect discharge.

Water from lake and pit dewatering will likely exceed TSS criterion at some point during the dewatering process. This water will be stored in settling ponds. Following adequate settling, water will be released to the environment. Flocculant may need to be added to the released water to ensure the TSS criterion is met.

3.1.4.2 Residual Effects

The levels of lakes and the flow in their connecting streams will eventually be re-established though at an equilibrium different from the predevelopment conditions. Changes to the hydrology of the Koala watershed will not measurably affect Lac de Gras and the lower Coppermine River. Given the area and water volume of Lac de Gras, any changes in the discharge from the Koala drainage will be sufficiently buffered. Therefore, the overall impact of altering the hydrological regime will be temporary and negligible.

3.1.5 Disruption of Migration Routes

Dam construction and the dewatering of some lakes will create barriers to fish movement. Most of the affected lakes form headwaters (Fox 1, Misery, Airstrip) so upstream migration will not be a concern. Fish passage will be obstructed between Panda and Kodiak lakes and between Moose and Long lakes. Moose Lake is also at the outflow of Little Lake; therefore, an alternate migration route may be used by fish.

Culverts may create barriers to fish movement if water levels and flows are altered. Fish migration may be inhibited by culverts if there is excess or reduced discharge, if the downstream side is eroded or if the culvert is perched above the streambed. Culverts installed in permafrost regions are highly susceptible to complete freeze-up during winter, resulting in the blockage of both water and fish during the early freshet periods in spring. Such ice dams divert subsequent streamflow causing road washouts and a large pulse of sedimentation. Arctic grayling and longnose sucker would be most affected by ice dams, since they utilize streams for spring spawning.

3.1.5.1 Mitigation

The diversion channel between Kodiak and Panda lakes is intended to compensate for migration routes lost as a result of dewatering Panda and Koala lakes. The channel has been designed to accommodate the needs of migrating fish. The weakest swimmer among the migrating fish caught in the Koala watershed is the round whitefish. By limiting flows to meet the needs of this species, the needs of other species should be met (Katopodis 1983). Water levels and velocities will be monitored regularly.

Culverts will be designed according to the appropriate guidelines and maintained on a regular basis (DFO 1992; DIAND 1990; Katopodis and Gervais 1991; Katopodis 1991; Saremba and Mattison 1984). Measures will be taken to reduce ice buildup as necessary.

High flow velocities and volumes in the stream connecting Paul Lake and Lac de Gras make this location unsuitable for culvert installation. A bridge will thus be constructed enabling unimpeded flow and fish movement.

3.1.5.2 Residual Effects

The migration between Moose and Leslie lakes is expected to be reestablished after the Leslie pit refills. The Panda diversion channel between Panda and Kodiak lakes will remain in place after the closure of the mine, thus providing continued access upstream. Therefore, the impact to migration routes is deemed to be temporary and negligible.

3.1.6 Exploitation

Elevated angling pressure in a number of local lakes is expected due to work force increases. The extent of angling pressure on a lake is strongly dependent on the quality of fishing. Angling tends to select large fish from the population (Healey 1978b). Grayling and trout are the two species of most interest to anglers. Fish in the region are slow growing and the replacement rate of large individuals is relatively slow. Therefore, the fish stocks are sensitive to exploitation. The level of angling pressure that can be withstood without disruption of the fish population is likely to be low.

3.1.6.1 Mitigation

Fishing restrictions during construction and operations are expected to prevent exploitation of the lakes.

3.1.6.2 Residual Effects

The effect on fish populations by anglers will be negligible as a result of the catch restrictions. Following project termination, any lakes that have been fished should revert to pre-exploitation levels over the time.

3.1.7 Biological Sampling

Biological sampling may continue during exploration, construction and operational phases, as deemed necessary. This applies to components within the aquatic ecosystem which support and sustain fish life and the aquatic habitat.

3.1.7.1 Mitigation

Efforts will continue to reduce mortality during all sampling periods. Based on experience gained in 1994, the following steps are proposed:

- exclusive use of small-mesh gillnets
- sampling intensity to be reduced during the day in warm weather (mid-summer) to minimize heat exhaustion, but may continue in the cool evenings

- experiment with the use of circular holding tubs (as opposed to rectangular tubs) to provide a less restrictive environment for the fish during sampling.

3.1.7.2 Residual Effects

Unlike angling, which selects large individuals, the use of trap and gill nets ensures that a wide range of sizes and species are removed from the study lakes. Therefore, the population structure will not have changed greatly, although the fish density may have been lowered slightly in sampled lakes.

If fish mortality in lakes is maintained at a low level, sampled lakes should return to their original status within several years of project completion. The impact from biological sampling will be negligible.

3.1.8 Habitat Degradation

The probability that aquatic habitat in the project area will be degraded by spills of fuel, lubricant and anti-freeze during transportation, and drainage from waste rock dumps and tailings areas is low. Benthic and planktonic components of lakes and streams can be the most sensitive to contaminants. Among the fish species present, lake trout is probably the most sensitive, as it is normally an inhabitant of clear, clean, cold, well-oxygenated water. Lake trout are also long-lived top predators; therefore, they may accumulate contaminants in their tissues. Long-term exposure to chronic levels of contaminants could reduce growth, fertility and longevity (Evans *et al.* 1991).

3.1.8.1 Mitigation

The likelihood of fuel, lubricant or antifreeze spills during transportation have been assessed, and adequate precautions will be taken to minimize such events. Preparations will be made in advance to have materials and equipment on hand for cleanup, as mitigation involves immediate response to contain spills and leaks. All staff involved in handling, transfer and storage of potentially hazardous materials will be trained in spill contingency and emergency response procedures, as outlined in Volume III, Section 4.2.

Accordingly, any water discharged to the receiving environment will meet the standards set forth in the NWT Water Licence. Geotechnical inspections will be conducted at dam sites on a regular basis to determine if there is a seepage of tailings water. Regular monitoring of water quality will help to identify any seepage at an early stage.

3.1.8.2 Residual Effects

The time for recovery after a spill will depend on its nature and extent. Assuming spills and leaks will be contained quickly and the probability of occurrence is low, the impact on aquatic life will be negligible.

3.2 Vegetation

Local ecosystems, composed of areas of distinct plant communities with their associated soils, occur in a relatively predictable manner across the landscape. The ecosystem mosaic changes across the landscape in response to environmental factors such as local climatic effects (snow accumulation areas), soil physical properties (soil texture, coarse fragment content and composition, drainage) and physiographic factors (slope position, slope angle and slope aspect). Ecosystem mapping of the NWT Diamonds Project claim block identifies local ecosystems and provides an inventory of plant and soil components. This inventory and classification provides an ecological framework for assessing impacts and mitigating vegetation lost or damaged by development.

Impacts on vegetation will take place during all stages of the development and can be divided into two classes: areas where existing vegetation will be completely lost due to excavation and burial, and areas where vegetation will be degraded due to different levels and kinds of disturbance.

3.2.1 Loss of Vegetation

Vegetation currently occupying proposed disturbed areas such as pits, waste dumps and site infrastructure will be lost. The area of each of the ten ecosystem types within each mine area was calculated by overlaying the boundaries of each development on the 1:10,000 ecosystem map (Table 3.2-1) (Volume II, Section 3.2, describes the ecosystem types). Approximately 200 ha of vegetation will be lost in pit areas. The distribution of ecosystem units in pits shows that about 58% of the area lost will be of the three ecosystems from the Dwarf Shrub physiognomic group. Another 32% is dominated by Tussock Tundra. About 8.2 ha (4%) is in Sedge-shrub, a wetland ecosystem. There are no significant Tall Shrub types.

The present vegetation cover will also be lost under waste rock dump areas, and in low-lying areas around Long Lake. The five dump areas to be used will cover about 546 ha, including 47 ha of Sedge Tundra and 120 ha of Tall Shrub. The Long Lake tailings will cover a 14 ha Sedge Shrub at the head of Long Lake and will also cover 16 ha of Tall Shrub units.

Haul roads and access roads will cross a mosaic of ecosystem units and existing vegetation will be buried. For the most part, roads cross Dwarf Shrub Tundra and are located so as to avoid wetlands and other important habitats where possible.

Excavation of eskers for construction and road building will also result in the removal of vegetation. Although at a lower density, eskers support a mixture of ecosystem types including Low Shrub, Open and Closed Mat and Herbaceous Tundra.

3.2.1.1 Mitigation

Mitigation of impacts on vegetation in the development area will include revegetation measures or natural recovery. A thorough botanical survey of areas where vegetation will be disturbed will be conducted to ensure no endangered, rare or threatened species are present. As part of the rehabilitation program, the Long Lake basin used for tailings storage will be rehabilitated. Reclamation plans are described in detail in Volume III, Section 9.2.2.2.

Road mitigation will consist of planning roads to minimize damage to important ecosystems which include wetlands and Tall Shrub communities.

3.2.1.2 Residual Effects

The five open pits will be left to fill gradually with water at the end of the project. Some lichen colonization of rocks is expected by crustose lichens with scattered plants in sheltered areas, similar to the Open Lichen Unit. Waste rock dumps will bury existing vegetation, but these areas will be rehabilitated. Soil texture of the road material is very coarse, so recolonization of abandoned road surfaces is expected to be slow. The overall residual effects of habitat loss are negligible as reclamation measures will mitigate the loss of vegetation.

**Table 3.2-1
Vegetation Loss in Project Area**

Pits	Ecosystem Area by Ecosystem Unit (ha)										Total
	1	2	3	4	5	6	6s	7	8	9	
Leslie Pit			1.0			1.5	0.5	9.2		0.5	12.7
Fox Pit			1.8					8.0			9.8
Panda Pit		1.9	12.0					16.0	35.0	16.3	81.2
Koala Pit		4.5		45.3		9.8	1.0			15.6	76.2
Misery Pit	1.8		4.0					15.0			20.8
Total Losses Due to Pits	1.8	6.4	18.8	45.3	0	11.3	1.5	48.2	35.0	32.4	200.7
Tailings											
Impoundment	1	2	3	4	5	6	6s	7	8	9	Total
Long Lake	1.0	14.1			16.3		7.7	23.8	21.3		84.2
Waste Rock											
Dumps	1	2	3	4	5	6	6s	7	8	9	Total
Leslie West Dump		30.5	1.4			11.2			14.8	15.8	73.7
Leslie East Dump					3.0	4.5				3.2	10.7
Fox Dump			0.4		56.2	0.8	14.4	82.3	12.8		166.9
Koala-Panda Dump	0.4	1.4			53.3	10.8		24.2	0.5	25.0	115.6
Misery East and South Dumps		2.5	35.2		5.4			51.0	7.5		101.6
Misery North Dump		12.4	5.0		2.1			6.0		52	77.5
Total Losses Due to Dumps	0.4	46.8	42.0		120.0	27.3	14.4	163.5	35.6	96.0	546.0

1 = Sedge-grass

2 = Sedge-shrub

3 = Sedge-tussock

4 = Sedge-tussock-shrub

5 = Tall Shrub

6 = Low Shrub

6s = Low Shrub/Cliff

7 = Open Mat

8 = Open Lichen

9 = Closed Mat

10 = Herbaceous Tundra

11 = Emergents

3.2.2 Degradation of Vegetation

In some cases, development activities are expected to degrade vegetation and result in reduced production or shifts in vegetation species composition over a given area. The two key impacts are the potential effects of traffic along winter roads and potential air quality issues. More localized potential impacts include changes to soil drainage patterns and human trampling (trails) around camps and developments.

3.2.2.1 Winter Roads

The impacts of vehicular traffic along winter roads on vegetation will vary with the characteristics of the vegetation, soil, road protection and use of the road. The identified ecosystems (Volume II, Section 3.2) support different plant species compositions. The ability of each of these species to withstand and recover from traffic is also different (Table 3.2-2). For example, grass and sedge species sprout annually from rhizomes, and they can recover from damage to aerial parts much more rapidly than dwarf shrubs, where resprouting can be very slow. In all arctic and subarctic species, recovery from damage is slow compared to warmer climates in southern Canada. A study of the effects of winter roads on vegetation near Norman Wells showed that cover of dwarf shrubs and perennial herbs was reduced to one-quarter that of adjacent, untravelled areas after one winter of heavy use (Adam 1973). Peats along the roads were compacted but intact. Ecosystems with Organic soils are expected to be most affected by winter roads. Removal or reduction of vegetation cover can reduce the thermal insulation and cause deeper active layers to develop. In the study carried out by Adam (1973), the active layer under the road was 65% deeper than in adjacent areas.

Vegetation can also be affected indirectly through impacts of vehicle traffic on soils, especially compaction and displacement. Compacted soils can be poorly aerated so that uptake processes are affected and water infiltration is reduced. Displaced soils are compacted in some areas and piled into linear ridges in others. Both of these effects change soil properties for plant utilization and can result in impounding of water and small scale thermokarst effects.

The degree of protection of vegetation by snow or ice cover on winter roads is an important variable in determining the general impacts. Snow-compacted or ice-capped snow roads with a sufficient cover of snow or ice will reduce impacts of vehicle traffic on vegetation.

Another impact is the amount of traffic on a given section of road. Well-insulated roads with light traffic that avoid susceptible ecosystems will have a relatively low impact on vegetation. Conversely, the degradation of vegetation will be highest where roads are poorly capped by snow or ice, where vehicle traffic is high and where the vegetation is most susceptible to damage.

**Table 3.2-2
Preliminary Assignments of Overall Habitat Value
and Susceptibility to Surface Disturbance Rankings
for Tundra Ecosystems of the BHP Claim Block**

Ecosystem Unit	Overall Habitat Value	Susceptibility to Surface Disturbance
1. Sedge-grass	H	H
2. Sedge-shrub	H	H
3. Sedge-tussock	M	H
4. Sedge-tussock-shrub	M	H
5. Tall Shrub	H	H
6. Short Shrub	M	H
7. Open Mat	L	M
8. Open Lichen	L	L
9. Closed Mat	L	M
10. Herbaceous Tundra	H	M
11. Emergents	H	M

H = high, M = medium, L = low. Mitigation.

Given the susceptibility of the vegetation in the project area to damage and the slow recovery of affected areas, several mitigative measures will minimize any potential impacts. Lakes are utilized where possible to minimize portages and road routes are chosen to minimize drifting snow. Roads are also used for short periods and have limited traffic. Roads are built as per land use regulations with a minimum of 10 cm of ice and snow.

Insulation

Vegetation can be protected by providing an insulating cover of compacted snow or an ice-cap to protect vegetation.

The degree of snow cover or ice capping required to protect vegetation will differ with the height of the vegetation. Vegetation will often trap wind-driven snow. Taller vegetation traps more snow, thereby providing adequate coverage of the different ecosystems. Where snow coverage is inadequate it will be necessary to develop a protective capping over the vegetation mat.

Rehabilitation

Where vegetation has been damaged or completely removed, it can be expected that pioneer species such as grasses, sedges and lichens will slowly recolonize the sites. As part of the rehabilitation process, any denuded areas would be reseeded to increase the rate at which this natural recolonization will proceed. Where vegetation has been damaged but not destroyed, the site will be left to allow existing plants to recover naturally.

3.2.2.2 Residual Effects

It will not be possible to completely avoid damage to vegetation due to the use of winter roads. However, if mitigative measures are followed, these effects will be minimal and the overall impact on habitat and biodiversity should be minor. The most significant impact of winter roads on vegetation will be aesthetic. As already stated, revegetation and recovery following disturbance is very slow in arctic climates, so that residual effects of the development may be visible for some time.

3.2.2.3 Air Quality

The principal air quality concerns related to vegetation impacts are dust from roads and the process plant, and gaseous emissions, primarily NO_x and SO₂. Dust will be generated by the ore processing plant and vehicular traffic on roads. Thick dust cover can impede photosynthesis and reduce plant growth and vigour. Given the very coarse nature of esker material used to construct the roadbed, the proportion of fine textured particles will be low, and thus dust production is expected to be low.

Although emission levels of NO_x and SO₂ are generally below federal air quality annual objectives, the ISC2 model predicts that concentrations will exceed hourly standards a few times a year due to inversions (Section 2.5). A potential impact of gaseous emissions on vegetation is the production of “acid rain” when molecules react with water. Acid precipitation reduces the pH of soils with low buffering capacity and reduces productivity and biodiversity at the landscape level over a long time period. Most inversions will occur in the winter, however, when plants are dormant, with only one or two such inversions per year predicted for growing season months. The potential for these brief exposures to affect the vegetation is low given the size of the emission source and brief periods in which they are expected to take place.

3.2.2.4 Mitigation

Mitigative measures to minimize production of dust and gaseous emissions are discussed in Section 2.5. Outside of minimizing output of gaseous emissions and dust, there is little that can be done to mitigate the effects of NO_x and SO₂ on vegetation. However, the

present proposed levels of emission present a very slight risk to vegetation communities in the area.

3.2.2.5 Residual Effects

Given the predicted low response of area vegetation to the deposition of acid rain or direct damage from elevated ambient gas levels, it is anticipated that there will be negligible residual effects from air quality issues in the area.

3.2.2.6 Other Types of Degradation

Vegetation may be affected on a local scale by a range of activities including compaction due to road building and other developments. Trails will be developed around the camp and development areas, where humans regularly use recreational areas. In addition, waste rock drainage may alter vegetation communities at a local scale, either by direct effect or by their effect on soil pH and moisture regime.

3.2.2.7 Mitigation

Although proper road construction practices will be employed, there will be compaction. However, roads will be scarified at closure to loosen compacted soils, where feasible. The potential for the production of acidic or basic leachates from waste rock is not expected, but contingencies will be in place for collection and treatment of leachate if required.

3.2.2.8 Residual Effects

Long-term effects of these types of disturbance will be localized and generally minor in impact. However, even with localized impacts, the effects will persist for a long time due to the very slow growth and recovery rates of plants in an arctic climate.

3.3 Wildlife and Habitat

Wildlife and wildlife habitat are considered valued ecosystem components. In particular, two wildlife species and one habitat element were the focus of most concerns expressed during scoping meetings: barren-ground caribou (*Rangifer tarandus*), grizzly bears (*Ursus arctos*) and eskers.

Caribou are a central link in the food chain and a critical component of the arctic ecosystem, depended upon by people and by other wildlife species. Grizzly bears are of concern because they are considered a “vulnerable” species and are known to be dangerous in certain conflicts with humans. As barren-ground grizzlies are at the low end of the range of productivity and densities in North America, populations can withstand little human-caused mortality. Furbearers have economic importance and, for

some species, an affinity to special habitats. The wolverine is a furbearer of concern because it is a low density, low productivity species that may conflict with humans in wilderness areas. Birds occupy a tremendous variety of ecological niches, and some, mainly waterfowl species, are used by humans as food. Small mammals are an important component of the biodiversity of arctic ecosystems and comprise part of the prey base for carnivorous mammals and birds.

The most important habitats for wildlife within the Lac de Gras area are eskers, riparian areas, wetland habitats and cliffs. Eskers are important to wildlife for denning, feeding and travel. Riparian habitats, wetlands and cliffs are used for feeding, nesting and security cover.

The majority of wildlife species are present at Lac de Gras only in summer. Some only migrate through the area, not stopping at all or only briefly to rest, while others remain to breed, nest and den. It is difficult to separate the effects due to development from external factors, both environmental and human, when considering species with extensive movements, such as barren-ground caribou and migratory birds. These limitations must be recognized when assessing the impacts of the project on wildlife and their habitats. A variety of influences outside of the project area can affect the occurrence and distribution of migratory species at Lac de Gras, and changes may be due to factors unrelated to the development of the project.

Impacts on wildlife associated with project activities may take place throughout all phases, from exploration through post-decommissioning. These impacts can be classed as 1) impacts on habitat, 2) impacts on wildlife or 3) impacts on wildlife and habitat.

Habitat impacts refer to the loss and degradation of habitat, including losses due to roads and construction. Wildlife impacts refer to physical and behavioural disturbance, including displacement and habituation. Habitat may either be lost or degraded, reducing its value for wildlife. Habitat loss results primarily during the construction phase. Degradation of habitat is a secondary effect of habitat loss during construction and operation. Impacts on wildlife include physical and physiological disturbance, displacement and habituation.

Impacts of habitat loss and degradation that apply to all wildlife species are discussed in Sections 3.3.1 and 3.3.2. Potential impacts on small mammals are considered in these sections. Impacts specific to other valued ecosystem components are discussed in the sections following. The project area refers to existing and proposed developments. The wildlife study area refers to the 1,900 km² area used for baseline wildlife studies.

3.3.1 Habitat Loss

Arctic ecosystems are characterized by severe climatic conditions. As a result, most species of plants and animals are near their ecological limits in terms of acquiring sufficient energy and nutrients for growth and reproduction. Thus, their rate of recovery from perturbations can be extremely slow (Sage 1981). The sensitivity of arctic ecosystems is an integral component of the assessment of impacts of the project and in implementing appropriate mitigative measures.

The project activities that have or will result in loss of habitat include roads, the airstrip, the diversion channel, infrastructure facilities and mine development. The latter includes lakes to be used for pits and tailings disposal and waste rock dumps. Habitat losses will be realized during exploration, construction and operation periods.

3.3.1.1 Loss of Habitat due to Linear Developments

Existing linear developments in the project area consist of 15 km of roads, which access Fox and Panda lakes and the 1,950 m airstrip. A 3.5 km fish diversion channel between Panda and Koala lakes has been initiated. A haul road to connect the permanent process plant with the pipe at Misery is proposed. At 27 km, this will be the longest road within the development. In 1994, there were a number of winter roads and snowmobile trails for exploration. These roads and trails did not intersect spring caribou migratory routes.

The impact of roads can be much greater than the sum of area lost. Roads dissect home ranges and travel corridors. They can be barriers to movements or they may attract wildlife, deflecting species from traditional movement corridors and resulting in increased energy expenditure and possibly impaired survival. There is the potential for wildlife displacement because of activity on the road and for collisions between vehicles and wildlife.

Roads eliminate the habitat upon which they are built. Gravel fill used for building roads and airstrips buries the vegetation that it covers. Unless gravel fill is substantially altered, early succession plants recolonize the gravel's surface slowly (Cargill and Chapin 1987). A second impact arises from the source of gravel fill. As there is a limited amount of substrate for road building in the barren lands, quarries are typically established in eskers. However, eskers are also high quality wildlife habitat and use as quarries can result in the loss of habitat for wildlife.

The potential impacts of a road are dependent on the road route and the type of construction. Roads that create a barrier to vision because of height have the potential to hide predators and can deter caribou (Surrendi and DeBock 1976; Roby 1978). Wolves also learn to use such roads as vantage points in searching the landscape for

prey and as a screen for stalking caribou close to the road (Roby 1978). Caribou may have difficulty negotiating roads with steep embankments.

Existing roads to Panda and Fox were built on generally poor quality habitat for wildlife, using material from an adjacent esker. The habitats displaced by the road were upland tundra habitats. While they represent a loss, in particular for small mammals, some bird species and ground squirrels, this loss is small compared to the amount of similar habitat available. The esker used for road and airstrip building was a small isolated esker 1.5 km in length.

The route proposed for the Misery haul road was assessed for its importance to wildlife. Overall, habitat quality for wildlife along the road route is poor although there is some use of the low shrub tundra by birds and small mammals. The amount of wetland and shrub riparian habitat in the corridor is minimal and surrounded by poor habitat in the form of cobble fields. The more productive habitats are found at a wetland area adjacent to the proposed Paul Lake - Lac de Gras bridge crossing and at other stream crossings where there is better soil development and sufficient moisture to support riparian tall shrub communities. Wherever possible, these habitats will be avoided during road construction. There are two glacio-fluvial deposits adjacent to the proposed route. These deposits are small and do not currently maintain carnivore dens. If possible, these can also be avoided.

The route is adjacent to two water bodies, the southeast shore of Paul Lake and a northern bay of Lac de Gras. Impacts on waterfowl and shorebirds will be minimal, as there are no direct effects on the shoreline habitat. The Paul Lake - Lac de Gras crossing itself is rocky with no shoreline vegetation. Perching birds may be displaced temporarily from upland tundra habitats during road construction. After road construction, bird species that prefer to nest or feed in gravelly habitats may be attracted to the road edges. Ptarmigan (*Lagopus* spp.) adapt readily to humans and development and are unlikely to be affected by the road.

Gravel fill for the Misery haul road will come initially from waste rock material at the Panda pit and later from the Misery pit. Airstrip Lake will also be dewatered and the adjacent esker used as a source of material. Another potential quarry site (Misery esker), if necessary, is the south end of the Lac du Sauvage esker. This quarry site is at least 3 km from wolf and bear dens. At what distance from disturbance bears and wolves will den successfully is unknown, as are the potential effects of esker alteration and disturbance on adjacent wildlife. However, removing material from the terminus of the esker will not dissect it and, consequently, will maintain its integrity as a travel route for caribou and other wildlife. If this quarry is needed, use of adjacent areas by carnivores will be monitored to determine the response of wildlife to such an activity.

3.3.1.2 Loss of Habitat due to Project Construction

Elevated structures (camps, buildings, etc.) can have negative and positive effects on wildlife because few such features occur naturally in the tundra landscape. These structures can act as barriers to movement or as sanctuaries from predators, pests or weather. Caribou may use buildings to escape wolves. Elevated structures can be used as bird platforms for feeding, hunting or nesting. The habitat that will be lost to wildlife because of building and road construction is rocky upland tundra and generally of poor quality. However, such habitats may be locally important to small mammals and breeding birds.

Few riparian or wetland habitats are found at the NWT Diamonds plant site, the dewatered lakes (Panda, Misery, Koala, Leslie, Airstrip and Fox 1) and the waste rock dump locations. The best habitat is located at the upper reaches of Long Lake. This limited habitat is important to wildlife species that use this area, and over the short term its elimination represents a small-scale loss. Other riparian and wetland habitats, however, are found elsewhere in the study area. Reclamation efforts, in particular the establishment of wetlands on the tailings ponds at Long Lake, will result in an increase in habitat quality over the long term.

There are no cliffs within areas to be developed, thus nesting sites of raptors will not be affected. However, raptors are wide-ranging birds and could be affected by activity at some distance from nesting sites. The response of birds of prey to roads and mine development will be monitored.

It is unlikely that the mine development will pose a migration barrier to caribou. With the exception of the Misery area, few, if any, caribou frequent the project area during spring and fall migration. However, some caribou were present during summer, grazing in adjacent habitats. Experience with northern caribou and other developments suggests that if caribou do encounter the project development during migration, they will circumvent it. They will likely circumvent the Misery mine development as well; however, caution must be exercised to minimize potential disturbance from road and aircraft traffic.

3.3.1.3 Mitigation

Most of the eskers within the wildlife study area have been surveyed and existing dens identified. Where possible, these dens will be protected from disturbance. Dewatering Airstrip Lake would have negligible effects on waterfowl and other wildlife species, as habitat quality surrounding the lake is poor and wildlife use has been minimal.

The existence of roads may enhance habitat at closure. It provides esker-like structures that will encourage use by wildlife. Ground squirrels are adaptable and will likely use these new habitats. However, it is unknown whether eskers suitable for the denning of

carnivores can be created with the current level of knowledge. Ongoing studies on the characteristics of such dens may provide guidelines to re-create such habitat.

Rehabilitated roads may also attract species other than carnivores. Gravel fill material is analogous to natural features such as gravel bars on stream flood plains. Such habitats attract bird species that select dry or gravelly sites for nesting and attract caribou as they provide relief from insects.

Reclamation will return habitats to a usable state for wildlife, on a progressive basis. For example, due to the filling in of cells at the Long Lake tailings pond in five year intervals, the creation of wetlands can begin after five years, instead of after the mine life of 25 years. Previous research has shown that wildlife can respond quickly to attempts to rehabilitate habitats. For example, caribou in arctic Alaska fed preferentially on vegetation growing in some disturbed areas that were associated with oil development (Klein 1980; Hanson 1981).

3.3.1.4 Residual Effects

The mine pits will be left to fill with water after mining ceases. The filling of these pits with natural precipitation will take many years and the resultant lakes will be deep and unproductive. On a watershed scale, this represents a habitat loss for wildlife species, particularly some birds and small mammals. However, the quality of the habitat lost is relatively poor in comparison to other habitats within the wildlife study area and will be compensated for by wetland creation at Long Lake. There is also the potential for plant species to naturally recolonize the disturbed edges of the pits, creating new habitat. Overall, the significance of impacts associated with habitat loss are estimated as minor.

3.3.2 Habitat Degradation

Habitat degradation resulting from the project may include damage of the tundra vegetation, either physically or through the effects of air pollution, dust or other contaminants, and non-neutral drainage from waste rock dumps and tailings areas. Nitrous oxides and sulphur dioxide emitted from power generators, vehicle and aircraft engines, and other motors are potential sources of ecological impacts.

Air pollution associated with the project is unlikely to affect feeding habitats for wildlife. Air quality impacts associated with particular project activities and local meteorological conditions will be minimal and temporary. Also, the proposed camp and road locations are adjacent to habitat, which is generally low in value for wildlife.

Dust created by road traffic during the summer months is expected to settle within 300 m to 500 m of roads. As control measures to reduce the amount of dust produced will be implemented, the quantity of dust is unlikely to have a major impact on

vegetation and wildlife. The spill of fuel, lubricant and anti-freeze on the site or during transportation is another potential hazard.

3.3.2.1 Mitigation

Mitigative actions to be imposed are those that will minimize air pollution and dust deposition for the protection of air quality. The likelihood of fuel, lubricant or antifreeze spills during transportation has been assessed and precautions will be taken to minimize such events as addressed in Volume III, Section 4.2. In the event of a spill, cleanup measures will be implemented immediately.

3.3.2.2 Residual Effects

Rehabilitation will restore degraded habitats to a usable form for wildlife and may enhance habitats. No residual effects on wildlife and wildlife habitats are expected. Assessment of water quality within the tailings ponds for potential impacts on wildlife will be part of the environmental monitoring program.

3.3.3 Disturbance

Disturbance to wildlife can occur throughout all stages of the project and can be associated with many human activities. Displacement of wildlife from important habitats is one possible result of disturbance if habitats have been lost or degraded or if human presence discourages the presence of wildlife. Aircraft and noise are two project activities that can result in disturbance and/or displacement.

Habituation may result whenever wildlife come into contact with humans and their activities. It is defined as the lessening of a response to a stimulus that occurs often (McLellan 1990). Habituation permits wildlife to become accustomed to development and can decrease the effects of disturbance. However, habituation can also bring wildlife into conflict with people or other wildlife.

3.3.3.1 Physical and Physiological Disturbance

Disturbance may be characterized in two ways: disturbance that results in physical injury, and/or disturbance that results in behavioural changes. Physical injuries are readily observable. They include myopathy, damage to internal organs, energy loss, decreased reproductive activity and habituation. Such injuries can result from hunting, access by humans, collisions with vehicles and harassment.

Lack of physical injury or an apparent lack of reaction by wildlife cannot always be interpreted as an absence of disturbance. An animal may overtly appear calm but physiologically could be experiencing panic. Physiological indicators describe the

impacts of disturbance more realistically than does observed behaviour. Such indicators, however, are difficult to obtain as they require intrusive monitoring of wildlife.

Behavioural disturbances are those that cause an animal to change its behaviour, such as avoiding feeding habitats, changing traditional travel routes or using habitats less secure from predators or from insect harassment. The degree of disturbance will be variable depending on species, sex, age class and time of the year. At times of stress, such as late winter, calving season or fly season, such disturbance may further compromise the health of an animal. Conversely, an animal may be more tolerant of disturbance because of environmental stress. An example of the latter is caribou use of roads and airstrips to escape insect harassment.

Aircraft and noise are two potential sources of behavioural disturbance. Aircraft can affect wildlife if the noise presents a disturbance, or if the visual aspect of the aircraft coupled with noise presents a disturbance, especially for species with avian predators. Wildlife reactions to noise exposure are not easily defined or predicted, as there is extensive variation in behavioural responses, depending on a number of factors including the type of disturbance, the species, age, sex and time of year (Busnel 1978).

Noise may have adverse effects on physiological functions and behaviour of animals (Dufour 1980; Mancini *et al.* 1988). However, noise is not necessarily an alien component of the environment. Some species live in a naturally noisy niche, such as near rivers or waterfalls or amidst the social noises of dense and large colonies such as ducks and geese. Many species can and do adapt to human activity and noise, learning to take advantage of the presence of humans (Busnel 1978). This habituation depends on the type of noise and its frequency. For example, transient loud noises generally induce a reaction of alarm, but some species learn to ignore explosive noises if stimuli are repeated often enough. Some noises attract wildlife because of curiosity, or if the noises approximate distress calls of prey.

Noise at the NWT Diamonds Project will be associated with the permanent camp, mine pits, vehicle traffic and aircraft. Disturbance may result during construction of roads and during operation. Caribou appear to have a greater aversion to vehicular traffic rather than to a road itself (Surrendi and Bock 1976; Roby 1978). Other species respond similarly to roads. In general, the larger the vehicle and the faster the speed, the greater the disturbance. Clouds of blowing snow or dust behind fast moving vehicles adds to the intensity of disturbance. Caribou and grizzly bears will adapt more readily to frequent, regularly spaced traffic than infrequent and irregularly spaced traffic.

3.3.3.2 Displacement

Displacement may be due to physical or behavioural causes. Physical exclusions are accomplished by the presence of a road, buildings and other visual obstructions, or by the use of fencing or other methods with the objective of deterring wildlife. Behavioural

displacements occur when wildlife do not feel secure in using habitats they have used previously, even if the integrity of those habitats has not been compromised.

The significance of displacement depends on the importance of habitats from which wildlife are displaced. The most critical habitats are those that provide some or all of a species' life requisites, those that they require for survival. These include habitats necessary for reproduction, such as dens, nesting and calving areas, habitats used for security (protection from predators), insect harassment and weather, and habitats used for feeding.

3.3.3.3 Habituation

Direct human interference such as feeding of animals is not necessary for wildlife to become habituated. Animals will become habituated if doing so provides a benefit. For example, raptors may use buildings and other elevated structures for nesting. Foxes will hunt small mammals in habitats disturbed by humans such as road edges. Caribou use roads and air strips to escape insect harassment, and will frequent buildings to escape wolf predation.

Habituation can be desirable if it lessens the effects of disturbance on wildlife. A caribou encountering a helicopter for the first time will respond very differently than one that has become habituated to helicopters. Habituation is not desirable when the proximity of wildlife becomes a safety issue for humans and for wildlife. For example, habituated grizzly bears are dangerous animals and most likely will need to be destroyed, resulting in a loss to the population.

3.3.3.4 Mitigation

Mitigative measures specific to valued ecosystem components are described under their respective sections. General measures pertaining to all wildlife species include traffic control on roads and prevention of disturbance during migration periods. Baseline studies, habitat mapping and verification will assist in determining seasonally important habitats and times of use. Speed limits may be imposed during migrations to avoid collisions. Drivers will be informed and will observe extreme caution at all times. Aircraft type, frequency of flights, altitudes flown and designated flight paths will also assist in minimizing disturbance to caribou, bears and migratory waterfowl.

Hunting and trapping will not increase with the construction of the roads or during operation, as firearms will not be permitted at the permanent camp except for safety purposes. Habituation of wildlife because of access to human foods will be prevented. Putrescible garbage will be incinerated and will not be available to wildlife. Additionally, feeding of wildlife will not be permitted.

3.3.3.5 Residual Effects

Wildlife species such as grizzly bears, wolverine and wolves differ in their approach to developments. Problems may arise, even if all attempts have been made to prevent conflicts. Such situations will be dealt with on a case by case basis. Wildlife conflict persons will be designated to deal with wildlife problems. These persons will be trained in methods of deterring wildlife.

Many wildlife species will habituate and use roads, due to the ease of hunting and travel. As a result, there is the potential for a small number of accidental deaths on roads, especially during poor weather conditions. Diligence on the part of drivers, however, will prevent such occurrences.

3.3.4 Bathurst Caribou

There is a large body of literature on the effects of development on caribou and caribou movements, due to a large part to the development of oilfields in northern Alaska. This research suggests that caribou are resilient to the disturbances that have taken place on their ranges. It is important to place potential impacts from the NWT Diamonds Project into perspective. Other areas have been subject to considerably more extensive and intensive disturbances, without negative impacts on caribou.

Throughout North America, there is a lack of evidence that habitat losses or disturbance resulting from development have been significant factors in altered productivity of caribou or in adult mortality resulting in population declines (Bergerud *et al.* 1984). On the Alaskan oilfields, any displacement was localized and herd productivity was not adversely affected (Cameron 1983). A number of northern caribou herds have been subjected to developments much greater in area than the NWT Diamonds Project and have remained stable or increased in size despite these developments.

The Porcupine caribou herd is the only major international herd in North America. Its range extends from the Richardson and northern Mackenzie mountains in the Northwest Territories across northern Yukon and into Alaska. Since 1960, the Dempster Highway has bisected portions of the winter range in northern Yukon. In 1976 new construction transected major spring migration corridors in the northern Richardson mountains. The highway was completed in 1978 and caribou continue to cross the highway en route to their winter ranges south of the highway (Bergerud *et al.* 1984).

The range of the Nelchina herd in Alaska is dissected by the following major highways: Denali, Richardson and Glenn. These roads themselves have not been a barrier to caribou movement, although human access contributed to over-hunting (Bergerud *et al.* 1984). Construction of the Trans-Alaska oil pipeline, which generally parallels the Richardson highway, bisected herd migration corridors. Despite this development,

there was an increase in numbers and productivity, commencing during construction (Bergerud *et al.* 1984).

The Fortymile herd in Alaska is dissected by the Steese, Alaska and Taylor highways. No barrier effect or range abandonment due to these roads has been documented (Bergerud *et al.* 1984). Also in Alaska, the Central Arctic herd continued to migrate north, south and parallel to the Trans-Alaska pipeline and Dalton highway during and after construction.

The Kaminuriak herd is the easternmost of the barren-ground caribou herds living on the Northwest Territories mainland. The Hudson Bay railroad to Churchill, Manitoba, did not act as a barrier to movements during or after construction

Despite their resiliency, caribou do exhibit behavioural responses to development. These responses can have negative demographic consequences if the caribou are forced to forego conditions necessary for their survival.

3.3.4.1 Habitat Loss

The most significant impacts of development on caribou are those that affect sensitive habitats at sensitive times of the year and the most sensitive age and sex groups. Examples include the calving periods, important water crossings where there are no alternative routes of travel, and low-level aerial surveys conducted over migrating or calving cows (Klein 1980).

Sensitive habitats for the Bathurst caribou herd are those used during the periods of the life cycle most important to the long-term survival of the herd. The criteria that can be used to assess the importance of habitats for migratory caribou (Porcupine Caribou Technical Committee 1993) are as follows:

- *Energy Balance:* The habitat that sustains a productive female during the time of year when she is normally in a negative energy balance is of concern, as this is when caribou are least tolerant of disturbance. Habitats used during the spring migration of Bathurst caribou will be most important at this time. At Lac de Gras, such habitats are found along the north shore of Lac de Gras and the corridor connecting Exeter Lake and Exeter and Ursula eskers.
- *Reproductive Contribution:* Calving is the most sensitive of all time periods. Calving does not take place at Lac de Gras.
- *Escape Requirements:* This refers to the repeated use of areas primarily to avoid or escape from external factors, primarily predators and insects. Key habitats are those that offer relief from insects while still providing some food. This is most critical for lactating females. As 1994 was a dry year with less insect

harassment than usual, caribou distribution within the wildlife study area may not be indicative of what habitats, if any, are important for relief. Continued monitoring will delineate the use of habitats at Lac de Gras during times of intense insect harassment.

- *Intensity of Use:* Many factors influence the distribution and abundance of caribou throughout their extensive range. The area that will be affected by the Project is less than 0.1% of the 250,000 km² range of the Bathurst caribou herd. Lac de Gras does not represent major wintering or summering areas, and consistently high densities of caribou do not exist.
- *Exclusivity of Use:* If a particular area is used almost exclusively at a particular time of year, with no alternative habitats being selected, that area is extremely important. Such areas typically are calving grounds or water crossings during the fall. The narrowing between Lac de Gras and Lac du Sauvage appears to be a popular crossing for caribou but is not exclusive, as caribou have the option of circumventing Lac du Sauvage.

3.3.4.2 Habitat Degradation

In general, habitat degradation will not affect caribou use of habitats. There is a concern that tailings disposal in Long Lake will degrade the water quality for caribou and other wildlife. Water quality modelling and simulation testwork results have indicated that metal concentrations are considerably below levels deemed safe for humans and other mammals.

A second concern is the stability of the new substrate provided by the tailings to support the weight of caribou. These tailings ponds could essentially be traps, resulting in caribou drowning.

3.3.4.3 Disturbance

The fall and spring migration periods, an approximate period of four weeks each beginning in late April and mid-October, are the times that caribou will be the most susceptible to disturbance. The length of the migration period will be dependent on weather and snow conditions, especially during the spring. In general, the larger the group, the greater the likelihood of avoidance reaction or deflection when confronting obstructions or encountering aircraft (Murphy and Curatolo 1987). This susceptibility may be tempered, however, as movements during migration are strongly directional and less likely to be impeded than when caribou are on summer or winter ranges.

Caribou may be more susceptible to disturbance during the spring migration than during other times. The spring migration is primarily comprised of pregnant females, which may be accompanied by yearling males (Heard 1989). Females with young of the year

show a stronger avoidance of obstructions during spring than during the winter (Klein 1980). During summer when levels of insect harassment are high, caribou show strongly motivated movements to insect relief areas and seem less responsive to other disturbances.

Caribou crossed the existing road system, the airstrip and used adjacent habitats during the summer of 1994. They will likely continue to use these areas in the future. Caribou are attracted to disturbed habitat such as roads, airstrips and disturbed tundra vegetation if such areas provide feeding opportunities or escape from insects and predators (Klein 1980; Fancy 1983; Curatolo and Murphy 1986). The only concern is the possibility of collisions with vehicles and aircraft.

The largest numbers of caribou (herds of 100 to 1,500) observed during 1994 crossed the proposed Misery haul road during migration. The spring migration was spread out along the route (km 10 to km 30 of the Koala Camp to Misery section), with the fall migration primarily using km 25 to km 30. More than a year's data are necessary to substantiate whether these are typical patterns of movement. Smaller post-calving aggregations took place in the road corridor in June and July, although this may have been atypical. The dry season resulted in decreased insect harassment and may have led to caribou being more spread out and spending more time grazing in the area.

Caribou are expected to continue to transverse the Misery haul route and are unlikely to be deterred by the road. It is possible that during summer caribou will use the road to escape insects, leading to possible collisions with vehicles; however, relatively small numbers of caribou remain resident during this period.

The Panda diversion channel, open pits and waste rock dumps will constitute new elements in the environment. These developments are situated on relatively poor habitat, primarily cobble fields and rocky tundra, and are outside the major caribou migratory pathways. For example, of the caribou observed during 1994, only 2% were located from 0 to 3 km from the diversion channel. The maximum number seen in one day in this corridor was 35 during the spring.

Aircraft

Where it has been measured, barren-ground caribou response to aircraft appears to be greatest during post-calving and lowest during fall migration (McCourt and Horstman 1974). Aircraft height is important, with the majority of caribou responding to aircraft flying at less than 90 m (McCourt and Horstman 1974). The largest groups showed the greatest response to aircraft during calving and winter; group size was not a factor during other seasons. Caribou became habituated as responses to the presence of aircraft decreased with increasing exposure (McCourt and Horstman 1974).

Caribou reacted more strongly to helicopters (Bell 206) than fixed wing (Cessna 185) aircraft at low altitudes (<90 m). No differences were observed at altitudes more than 90 m (McCourt *et al.* 1974). Reactions at more than 300 m were unpredictable but, as a rule, infrequent. Groups of caribou grazing or bedded reacted most often, with bedded caribou exhibiting the strongest reaction. A correlation between group size and reactivity was evident only at less than 90 m where the larger groups reacted most often and most intensely.

Noise

Noise is associated with many project activities, such as vehicle traffic and aircraft. The response of Yukon barren-ground caribou to noise was assessed by simulating a compressor station (McCourt *et al.* 1974). In general, caribou avoided intense noise but did not change their migration routes. Results were similar during spring, summer and fall.

Caribou were observed near the exploration camp, exploration declines and the diversion channel during the summer of 1994. They did not exhibit extreme reactions or evidence of disturbance to the noise or activity at the site. Caribou observed during blasting activity had habituated to this noise, as they did not exhibit any reaction but continued to graze.

3.3.4.4 Mitigation

The unpredictable movements of the Bathurst caribou herd suggests that critical areas or habitats do not have permanent status and that land use activities cannot be judged according to the herd's previous behaviour. Outside of traditional knowledge, caribou use of Lac de Gras in earlier years is unknown. The routes chosen for spring migration are often affected by local snow conditions and can vary from year to year. Depending on snowmelt, cows can remain on the wintering grounds during spring or initiate migration early (Porcupine Caribou Technical Committee 1993). It is possible that during any year, depending on conditions, Lac de Gras may be largely bypassed by caribou migrating in the spring. Caribou must divert around Contwoyto Lake in the fall and as a result may be more apt to pass through Lac de Gras at this time.

When caribou are within the wildlife study area, the habitats used and their seasonal importance will be documented. Habitat mapping and verification will identify which plant species are important to caribou and when. High use areas will be identified and protected from disturbance if possible. Monitoring will assist in defining the long-term importance of the Lac de Gras area to caribou.

Planning for the Misery haul road corridor included the identification and avoidance of important habitats for wildlife. Critical wildlife habitat (riparian, wetlands) and important landscape features (eskers, glacio-fluvial deposits) will be avoided wherever possible.

The Misery haul road will be 10 m in width and low in height, generally 1 m to 2 m above the surrounding ground, and will not create visual barriers for caribou.

During the construction and operation phases, equipment operators will be instructed to observe caution. To date, there have been no collisions during the exploration phase or during the construction of the airstrip. Caribou appear to have a greater aversion to vehicular traffic rather than to the road itself (Surrendi and Brock 1976; Roly 1978).

For the Panda diversion channel, 75% of its length will have gentle slopes and in any case, caribou can easily exit where the cut is shallow. Water levels will typically be low.

Behavioural responses of caribou to visual barriers may be used to deflect them away from the open pits. The deflection of the caribou expected in the vicinity will not alter the traditional migratory pathways of caribou, as open pits are not located within a migratory pathway. Further, evidence suggests that historical methods of hunting, including the use of stone fences and stone or sod cairns that simulate obstructions, have not led to the disruption of traditional movements of caribou or to the extinction of specific herds (Klein 1980). In Yukon, caribou circumvented a snow fence barrier, after which they continued on in their original direction (McCourt *et al.* 1974).

Low level air traffic, both fixed-wing aircraft and helicopter, associated with monitoring programs will be controlled over the north shore of Lac de Gras during the spring and fall migrations. If other migration corridors are identified during monitoring, these habitats will also be protected. For monitoring purposes, caribou will be surveyed with a fixed-wing aircraft flying at an elevation of 150 m. During spring of 1995, migrating caribou showed no response to aircraft flying at this height.

Hunting of caribou will not increase on the NWT Diamonds Project site with the construction of the haul roads or during mine operations. Road access to this site is only possible during the three-month winter road period when the caribou are not present in the project site area. At no time will firearms be permitted at the site except for safety purposes.

Predictive modelling and testwork indicate that the water quality in the tailings impoundments will remain well within established guidelines for the protection of livestock (CCME). Water quality will be monitored on a regular basis. Historical experience could be used to divert caribou from the Long Lake tailings pond during the five-year operations period when the substrate may be unstable. Subsequently, reclamation will establish wetlands which may be used by caribou and other wildlife.

3.3.4.5 Residual Effects

With appropriate mitigative measures in place, caribou will be largely unaffected by the NWT Diamonds Project. Based on caribou response to development elsewhere, the overall impact on caribou of the NWT Diamonds Project is expected to be minor.

3.3.5 Grizzly Bears

Grizzly bears and their habitat could be affected by the NWT Diamonds Project in the following ways:

- direct mortality due to encounters with humans and attraction to garbage
- habitat loss, modification or damage due to the camp, buildings and roads. This includes the loss of important seasonal habitats such as riparian areas and wetlands.
- physical disturbance and displacement due to intensive activity from the ground and air.

3.3.5.1 Habitat Loss

The area comprising the proposed NWT Diamonds facilities, camp, existing roads and the proposed Misery haul road does not contain important bear habitats for feeding, security or denning. The Misery pit will be situated near the Lac du Sauvage esker and is the closest to important habitat for grizzlies, including denning.

Cover is an important habitat characteristic in how grizzlies respond to disturbance, especially in wilderness areas. In southwest British Columbia, cover reduced responses of grizzly bears to human activities such as people walking and moving vehicles (McLellan and Shackleton 1989b). Bears in areas infrequently used by humans fled from a person on foot in every encounter (ten cases). In seven of these cases, they ran more than 1 km, or out of the immediate drainage. In areas of frequent human use, bears fled in ten of 16 cases (McLellan and Shackleton 1989b), suggesting some bears had habituated.

The NWT Diamonds Project will not remove or significantly alter cover important to grizzly bears. Recognition of the importance of cover will help in predicting where conflicts between bears and people on the ground may occur and in avoiding such conflicts.

3.3.5.2 Interactions with Humans

Grizzly bears can be compatible with humans and development. In some areas, grizzly bears are capable of at least partially habituating to human activities with little harm, if

the activities are frequent enough and innocuous (McLellan 1990). Frequent hiking or driving may elicit milder reactions than rare activities of the same type (McLellan 1990). Similarly, industrial activities that result in predictable operations may produce fewer extreme reactions of grizzlies than the more extensive and unpredictable exploration phases of development (McLellan 1990). Within a wilderness area, it is possible for grizzlies to habituate to roads if the intensity of vehicular use becomes constant and predictable (McLellan 1990).

In general, grizzly bears respond strongly to aircraft, especially in open areas. In open, northern habitats, 67% of bears ran from fixed-wing aircraft and 80% ran from helicopters (Klein 1974; Quimby 1974; Harding and Nagy 1980). In southwest British Columbia, grizzlies responded more strongly at 150 m or less from aircraft than when further away (McLellan and Shackleton 1989a). In Yukon and Alaska, bears sighted by aircraft while the bears were feeding on kills were reluctant to leave (McCourt *et al.* 1974). Similarly at Lac de Gras, the one bear that was sighted from a helicopter on a caribou kill remained on the kill. The 13 bears sighted from the helicopter that were not on kills immediately went for cover, either into tall shrubs or lakes.

Typically, as human activity in previously remote habitat increases, so do bear-human encounters. However, it is not inevitable that encounters will be negative. Problems between bears and humans can be traced to bears conditioned to human foods because of improper waste disposal, inadequate incineration, availability of food due to carelessness or active feeding by workers, and carelessness of persons in the field.

3.3.5.3 Mitigation

In the short term, habitat mapping and verification will assist in determining seasonally important habitats for bears, including those habitats that provide security cover. In the long term, research will provide more information on bear habitat use. This research is part of the Slave Geological Province regional study, a cooperative initiative among government and industry to develop a regional land use plan. The bear research was initiated during spring of 1995 under the direction of the Department of Renewable Resources and the University of Saskatchewan.

Important bear habitats will be identified for reasons of human safety and to prevent disturbance to grizzly bears. Seasonally important habitats will not be disturbed, where possible, by human activity when they are in use by grizzlies. Persons working in the field will be advised and will be instructed when to avoid these habitats.

Successful efforts to prevent bear/human conflicts were in use at the NWT Diamonds exploration camp and will be implemented at the permanent camp. All food wastes and garbage will be incinerated on site on a regular basis. Education has been proven to be a significant component in preventing negative bear/human encounters (Banci 1991). Personnel working on the NWT Diamonds Project will be required to take a bear

safety course. Bear awareness programs for camp residents will be an ongoing process through slide shows, presentations and informational brochures. Firearms will be limited to safety purposes only.

Aircraft and vehicle restrictions will be imposed, when possible, to assist in avoiding conflicts with bears. Bears will not be approached at low altitudes with aircraft. Particular attention will be paid to Misery Lake, where the potential for interactions with bears and conflict is higher than in the rest of the NWT Diamonds Project area.

3.3.5.4 Residual Effects

Grizzly bears are individuals and differ in their approach to developments. If problems occur, each situation will be handled on a case by case basis. Wildlife conflict persons trained in methods of deterring wildlife will deal with wildlife problems. If bears cannot be deterred, the assistance of the Department of Renewable Resources to tranquilize and move the bear will be requested.

The low density of grizzly bears in the project area and the low habitat quality for bears, in conjunction with an aggressive bear safety preventative program, suggest that impacts on grizzlies will be minor. However, even the loss of one female grizzly can have significant impacts on the population.

3.3.6 Furbearers

Lac de Gras is remote, above treeline and has a low diversity and abundance of furbearers. Foxes and wolverine (*Gulo gulo*) live in the area year-round while wolves are generally present when caribou are present. The two primary concerns regarding the impacts of the NWT Diamonds Project on furbearers are the loss or degradation of denning habitat, and habituation to humans and human foods.

3.3.6.1 Habitat Loss

Foxes and wolves den primarily in eskers. Reproductive success may be affected if denning habitat is lost. Wolverine do not den in eskers but den in tunnels dug into the snow.

Feeding habitats of these carnivores is directly related to the habitat of their prey. Habitat losses due to roads, infrastructure, pits and waste rock dumps are unlikely to have a negative effect on furbearers. Furbearers may use roads for ease of travel and for hunting. Winter exploration roads are temporary, do not comprise a loss of habitat and are unlikely to pose any direct impacts on furbearers present in the area during winter. There is a potential, however, for vehicle collisions.

3.3.6.2 Interactions with Humans

Arctic foxes have a tendency to concentrate wherever there is garbage, litter and feeding of wildlife by people. As a result, the increased abundance of foxes can depress the productivity of bird populations, particularly waterfowl (Garrott and Eberhardt 1987; Eberhardt *et al.* 1982). High fox densities in human activity areas are also undesirable because of disease transmission, in particular rabies. Arctic foxes also carry the tapeworm *Echinococcus multilocularis*, which can infect humans (Garrott and Eberhardt 1987).

Wolverine and wolves may also become habituated, although the increase in populations, as seen with foxes, does not occur. Wolverine may be attracted to camps and human activity, becoming nuisances by breaking into buildings and consuming food. Similarly, wolves can become habituated, relying on people for food.

3.3.6.3 Mitigation

Measures to protect eskers and denning habitat will be instituted. The majority of eskers on the mineral claims will remain undisturbed. Employee awareness and education are important means of avoiding vehicle collisions with furbearers. The policy prohibiting the feeding of wildlife will be supported by educational efforts.

3.3.6.4 Residual Effects

Foxes and other wildlife species will habituate and use roads, even if they are not fed, due to the ease of hunting and travel. As a result, there may be a small number of accidental deaths of furbearers on roads, especially during poor weather conditions. Overall, however, the significance of this impact will be minor.

3.3.7 Birds

Potential negative impacts on birds from development are exclusion from feeding and other important habitats, and the expenditure of energy due to disturbance. The periods during which disturbance may be critical include migration, nesting and moulting.

The potential distance birds can fly without stopping is directly proportional to their energy reserves at departure (Davis and Wiseley 1974). During flight, the metabolic rate increases and more energy is used. Disturbance can have negative consequences for reproductive success or even survival of birds, if birds are forced to take flight before satisfying their energy requirements. The effects of disturbance will be more critical in years that are naturally poor in food availability.

During incubation, nesting females draw on fat reserves to sustain themselves throughout the incubation period (Davis and Wiseley 1974). The stress of disturbance could affect

the female's energy reserves, leading to mortality. Disturbance may cause the nesting bird to abandon nest and clutch. The absence of the female from the nest also allows predators access. Some species, such as jaegers (*Stercorarius* spp.) and gulls, have learned to follow humans and prey on the eggs of nesting birds that have been flushed by humans (MacInnes and Misra 1972).

Following the breeding season, ducks and geese enter a moult period, which renders them flightless for several weeks. During this time they have high energy requirements and are vulnerable to predation, the effects of weather and other disturbances. Moulting habitats tend to be secluded and are traditional sites with shelter and a good food supply. It is unknown whether moulting habitats exist in the Lac de Gras area.

3.3.7.1 Habitat Loss

In general, habitats lost due to mine development and haul roads will be poor in quality and low in value for birds, although some species may be displaced. However, many bird species are adaptable. Structures such as buildings, communication and weather towers can provide nesting opportunities for cliff-nesting birds of prey (Ritchie 1991). Those that have been used by Rough-legged Hawks and Gyrfalcons (*Falco rusticolus*) include a stick nest on a building air vent, cairns or beacons, mining dredges, stone piles, artificial nests on tundra, and Raven (*Corvus corax*) nests on pipelines, gold dredges, abandoned pilings and a gold miner's sluice box (Ritchie 1991). At the Lac de Gras exploration camp, ravens nested on a fuel tank three years in a row.

In the short term, construction of the Panda diversion channel will eliminate nesting and feeding habitat for some birds such as Lapland Longspurs (*Calcarius lapponicus*), Sparrows, Horned Larks (*Eremophila alpestris*) and Rock Ptarmigan (*Lagopus mutus*). However, in general, bird diversity within the channel corridor is low because of the low quality habitat comprising primarily rocky tundra with interspersed vegetation. This loss is small with respect to the surrounding habitat within the wildlife study area and negligible on the ecozone scale.

In the long term, there may be enhancement of nesting and feeding habitats of these bird species. The channel may create microhabitats, such as rocky slopes, which in general are lacking in the development area. This will provide new habitat for birds and for small mammals, ground squirrels and ermine.

3.3.7.2 Disturbance

There is a potential for birds within the project area to be disturbed by noise from the permanent camp, blasting, activity near the mine pits, road traffic and aircraft. The negative impacts of noise on birds include exclusion from feeding habitats and the expenditure of energy to avoid the noise. The response of birds to noise varies among species (Renewable Resources Consulting Services Ltd. 1994). Few studies have

quantified the specific characteristics of noise stimuli and the intensity and duration of behavioural response of birds to noise. Research available, however, indicates that some bird species may be negatively affected by noise.

In Yukon, Snow Geese (*Anser caerulescens*) had variable reactions to noise simulating a gas compressor station (Wiseley 1974). Some birds were confused or surprised. The majority of flocks that reacted deviated from normal flight by temporarily changing directions. White-fronted Geese (*Anser albifrons*), Canada Geese (*Branta canadensis*) and Tundra Swans (*Cygnus columbianus*) reacted similarly to Snow Geese. Intense reactions of geese and swans may have been because these birds were hunted and they had become trained to avoid human presence and loud noises (Wiseley 1974).

The effect of simulated sound on the behaviour of other birds did not appear to be as great as on geese and swans (Wisely 1974). Simulated gas compressor noise in Yukon had no measurable effect on the reproductive success of terrestrial breeding birds (Gollop *et al.* 1974c). Species such as Arctic Loons (*Gavia arctica*), Red-breasted Mergansers (*Mergus serrator*) with young and Short-eared Owls (*Asio flammeus*) appeared to be unaffected (Wisely 1974). Many showed no change in behaviour, including Ravens, Glaucous Gulls (*Larus glaucescens*), Peregrine Falcons (*Falco peregrinus*), Gyrfalcons, Parasitic Jaegers (*Stercorarius parasiticus*) and Lapland Longspurs.

Birds may encounter noise within the NWT Diamonds Project during migration or during nesting. Observations during 1994 suggest migrating waterfowl were not deterred or deflected by noise originating from the exploration camp and vehicles on roads. This may change depending on weather and food conditions.

Fixed-wing Aircraft

Typically, waterfowl are disturbed by aircraft. This is probably because birds of prey are their natural predators. For example, Bald Eagles (*Haliaeetus leucocephalus*) are a frequent cause of natural disturbance to waterfowl species, and Gyrfalcons and Peregrine Falcons are the next most numerous cause (Davis and Wiseley 1974).

The majority of studies have examined the response of large concentrations of waterfowl in important staging habitats to aircraft, a situation that does not occur at Lac de Gras. Results, however, do indicate the sensitivity of such birds to disturbance. On the North Slope of Alaska and Yukon, Snow Geese reacted to aircraft at extensive distances (Davis and Wiseley 1974). They flushed at aircraft flying at 2,440 m to 3,050 m, although the severity of disturbance was unknown and not determined. All flocks of Snow Geese on the Yukon North Slope were disturbed by a Cessna 185 flying as high as 3,050 m (10,000 feet; Schweinsburg 1974). Flocks located as much as 15 km from aircraft were flushed.

In a Yukon study, disturbance from float-equipped aircraft reduced the number of waterfowl using small ponds and thaw lakes during breeding season (Schweinsburg *et al.* 1974). Some species (Scaup, Red-necked Grebe) became tolerant of aircraft activity (Schweinsburg *et al.* 1974). Females with broods did not avoid disturbance flights whereas non-breeding birds did. For some species, the reaction depended on proximity to the aircraft.

Little information is available on the response of birds of prey to noise and aircraft. It is unlikely that fixed-wing aircraft will present a major influence on breeding birds or waterfowl within the wildlife study area. Such aircraft will be limited to flights in and out of the camp, which for the most part are at high altitudes and are unlikely to fly over large flocks of staging geese or important breeding areas.

Helicopters

In general, helicopters cause more disturbance to birds than do small single engine aircraft because they generate more noise. In Yukon, helicopter passes over coastal breeding colonial gulls at 915 m and 760 m produced no apparent disturbance to incubating birds (Gollop *et al.* 1974a). Some effect was evident at 610 m, and increased steadily until disturbance reached 100% at 150 m or 75 m levels. However, these behavioural responses did not translate into an effect on reproductive success as there were no abandoned clutches or young. This may have been because incubating birds could not risk leaving their young. Non-incubating birds showed less tolerance to disturbance (Gollop *et al.* 1974a).

Helicopters did not drive ducks and geese away from moulting habitats, but these birds were flightless and could not leave easily (Gollop *et al.* 1974a). Ducks were aware of and showed some response to the helicopter. Oldsquaws rested and slept on water more on disturbance days; Surf Scoters rested less. Swimming and feeding of Oldsquaws appeared unaffected; Surf Scoters swam and fed more. First responses occurred at 255 m when birds began moving off land and out from shore. Surf Scoters appeared to be more sensitive than Oldsquaws.

Helicopter use at the NWT Diamonds Project will be limited to transport, possibly exploration and environmental monitoring. Intense use during mine operation is not anticipated.

Humans

Human presence can be another form of disturbance during breeding for some bird species including gulls, Arctic Terns and Lapland Longspurs (Gollop *et al.* 1974b). People are likely to engage in recreational activities such as hiking at the project site during the summer. If they encroach on nesting habitats, such activities can have a

negative impact on breeding birds. There will also be human activity during environmental monitoring and reclamation activities.

3.3.7.3 Mitigation

The key to mitigating negative impacts on birds is to identify potential important habitats and to limit disturbance in those habitats. This work is ongoing. Avoidance, where possible, will be the primary measure to protect any critical habitats. Nesting areas will be variable depending on habitat and will include eskers, islands, gravelly areas, low mat tundra, low shrubs, tall shrubs, shorelines and wetlands. Nesting habitat for birds of prey, primarily cliffs, does not exist within areas which will be developed. However, raptors are wide-ranging birds and could be affected by activity removed from nesting sites. Some activities, such as the Panda diversion channel and the establishment of wetlands on tailings ponds at Long Lake, may result in increased habitat for birds in the long-term.

3.3.7.4 Residual Effects

The loss of lakes due to mine development suggests that impacts may be moderate to high on the local, watershed level, if these habitats are limiting. However, it is more likely that impacts will be low because more extensive nesting habitats for waterfowl and shorebirds are available elsewhere in the wildlife study area. Also, habitat enhancement may result in a net increase in habitat for birds. With appropriate measures in place, the overall significance of the NWT Diamonds Project on birds is expected to be minor, and in some areas, will be positive.

4. Socioeconomic Impacts and Mitigation

The socioeconomic impact assessment of the NWT Diamonds Project starts with a review of two factors: supply and demand. The supply side is the Northwest Territories...its people, businesses, infrastructure and resources. The demand side is the prospective owner/operator of a diamond mine, with its need for staffing, goods and services and infrastructure. Both the NWT and the Proponent have a vested interest in the project, and both can obtain positive benefits from the project.

For the NWT, benefits could include a reduction in high levels of unemployment, particularly in First Nations communities, opportunities for new business development and business expansion and a new source of export funds in an economy about to experience government funding cutbacks. On the other hand, a mine could also exacerbate existing social problems, particularly problems related to alcohol abuse.

For the project the benefits could include a reasonable rate of return to shareholders on their investment in North America's first commercial diamond mine. Successful operation of a diamond mine could enhance the Proponent's position as a potential developer and operator of other profitable mining ventures in the NWT and across Canada.

On the supply side, people in the Northwest Territories, and particularly people in Aboriginal communities, have repeatedly expressed a need for training and jobs for a young and growing population. The project can play a significant role in employing and training Aboriginal people for the NWT's mining industry.

At a time when the governments of both Canada and the Northwest Territories are cutting budgets, the NWT Diamonds Project can contribute millions of dollars annually in direct and indirect taxes, fees and royalties.

In determining the socioeconomic impacts of the NWT Diamonds Project it is necessary to develop a baseline against which change can be compared. Baseline figures for economics, income, population, etc., were generated using a broad range of data and were used for much of the analyses in this report. As another form of baseline analysis, the Proponent solicited perceptions of the project from communities and individuals. These perceptions make up the first two sections of this report.

In this report, socioeconomic impacts are assessed by project phase, location of impacts and level of impacts. There are two project phases:

- *Preproduction/Construction/Start-up* – This phase covers the period of time from the arrival of the project in the Northwest Territories (mid 1990) through mine development and construction, to preliminary start-up activities at the mine.

- *Operations (at 9,000 and 18,000 tonne production levels)* – Operations are examined at two benchmark stages: the year 2000 when the project is in full operation at a 9,000 tonnes per day production level and the year 2007, when operations have expanded to an 18,000 tonnes per day production level.

The project has the potential to affect several communities as well as the NWT and Canada as a whole. Certain communities have been selected for impact analysis. These communities or locations are as follows:

- First Nations Communities (Treaty 8 and Treaty 11)
- Coppermine
- Yellowknife
- Hay River
- rest of the Northwest Territories
- total NWT
- total Canada.

Each location, reasons for selection and impacts are discussed in detail in the following sections.

To assess the level of socioeconomic impacts, it is necessary to first identify those activities or factors causing impacts and then develop a method to determine the importance of each factor.

The specific activities that could cause socioeconomic impacts include the following:

- direct NWT Diamonds Project employment and income
- the project purchases of goods and services and resulting indirect employment
- respending of the project-related household income and resulting induced employment income
- the project-related use of existing infrastructure and services
- use of land resources in the vicinity of the proposed mine
- adjustments to government revenues and expenses.

These activities are examined using the following criteria to determine the magnitude of the impact:

- *Extent of Activity by Phase* - For example, how many NWT residents could be hired by the project during construction, operations?
- *Geographic Location the Activity would Affect* - For example, which NWT communities could these employees come from?
- *The Project, Government, other Policies that could Influence the Level of a Specified Activity* - For example, what is the project's policy on northern hiring? What is the government's policy on training for the mining industry?

It was determined that employment and income could have the greatest socioeconomic impact. For this reason, levels of employment and income and related purchases of goods and services are analyzed in detail in Section 4.3. Estimates developed for NWT hires by location, income by location, purchases by location, etc., are then used in subsequent sections to determine potential impacts.

The general approach to impact assessment is discussed in Section 1.1. The significance of residual effects (the impacts that may persist after mitigation has been implemented) has been evaluated according to the following definitions:

Major: the whole population of NWT affected over several generations

Moderate: community affected over one or more generations

Minor: a specific group of individuals within a community affected during less than one generation

Negligible: a specific group of individuals within a community affected during a short period

The socioeconomic impact matrices by magnitude, geographic extent and timing are shown in **Tables 4-1 to 4-6**. The probability of occurrence, mitigation enhancement and the significance of residual effects are shown in **Table 4-7**.

Table 4-1
Socioeconomic Impacts Directly Related to the NWT Diamonds Project
Preproduction/Construction/Start-up
1993 to 1998 - Part A

Project Related Effects	First Nations	Coppermine	Yellowknife	Hay River	Total NWT
Direct Employment	57 person-years	28 person-years	165 person-years	64 person-years	330 person-years
Indirect/Induced Employment	62 person-years	29 person-years	546 person-years	234 person-years	898 person-years
Reduction in Unemployment Rate	5%	6%	2%	6%	1.4%
Direct Employment Income	\$3.7 million	\$1.7 million	\$14.4 million	\$5.2 million	\$26.3 million
Indirect/Induced Employment Income	\$2.6 million	\$1.2 million	\$26.8 million	\$10.6 million	\$42.3 million
Increase in Employment Income (%)	18	14	4	11	3
NWT Diamonds Project Purchases of Goods and Services	\$8.8 million, mainly labour services	\$4.4 million, mainly labour services	\$112.9 million	\$45.8 million	\$176.4 million
Aboriginal Participation	112 person-years	53 person-years	121 person-years	107 person-years	427 person-years
Total Population Growth due In-Migrants	None expected	None expected	474	177	651
New Households	-	-	158	59	59
School Age Children (est.)	-	-	150-155	55-60	205-215
Growth in Local Economies	\$12.6 million	\$6.2 million	\$127.3 million	\$51.1 million	\$202.7 million
Infrastructure - Roads	-	-	Minor impact on road leading to winter road	-	Minor impact during winter resupply
Infrastructure - Rail	-	-	-	Positive impact if supplies moved by rail	-
Infrastructure - Air	-	-	Minor increase in Yellowknife air traffic	-	-

Table 4-2
Socioeconomic Impacts Directly Related to the NWT Diamonds Project
Preproduction/Construction/Start-up
1993 to 1998 - Part B

Project Related Effects	First Nations	Coppermine	Yellowknife	Hay River	Total NWT
Employment/Income	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive
Municipal Infrastructure ^(a)	-	-	Negligible ⁽¹⁾	Minor Negative ⁽²⁾	Negligible
Traditional Aboriginal Lifestyle/Culture	Minor Negative ⁽³⁾	Minor Negative ⁽³⁾	Negligible	-	Minor Negative ⁽³⁾
Heritage Sites	Negligible	Negligible	-	-	Negligible
Land-Use - Sports Hunting Outfitters	Negligible ⁽⁵⁾	Negligible ⁽⁵⁾	Negligible ⁽⁴⁾	-	Negligible
Land-Use - Sustenance Hunting	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	-	Negligible ⁽⁶⁾
Community Well-Being	Minor Negative	Minor Negative	Negligible ⁽⁸⁾	Minor Negative	Negligible ⁽⁸⁾
Job/Education Aspirations	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive
Government Expenses ^(b)	Negligible ⁽⁹⁾	Negligible ⁽⁹⁾	Negligible	Negligible	Negligible
Business Climate	Minor Positive	-	Moderate Positive	Minor Positive	Moderate Positive

- (a) Municipal Infrastructure: impacts are based on the capacity of existing infrastructure to handle the estimated population influx as a direct result of the project
- (b) Government Expense: impacts are assumed to be due to additional spending on infrastructure, schools, health care, staff for regulatory agencies and other services required to support an increase in population which is directly related to the project.
- (1) Existing infrastructure is sufficient for a population of 20,000. The current population is 17,000.
- (2) Municipal infrastructure (housing and schools) are near capacity with the current population.
- (3) The move to a wage economy is well underway.
- (4) Potential impact on Guide Outfitters in the immediate area of the project.
- (5) If the Guide Outfitters have fewer clients then there are fewer jobs for guides from these communities.
- (6) Two weeks on/two weeks off rotation and work policies allows time for hunting.
- (8) Unemployment levels are only affected by 2% to 3% so that there is negligible impact on the community as a whole.
- (9) There may be a minor increase in expenses resulting from the increased demand for education given the possibility of jobs at the mine.

Table 4-3
Socioeconomic Impacts Directly Related to the NWT Diamonds Project
Operations Phase I
Year 2000 - Part A

Project Related Effects	First Nations	Coppermine	Yellowknife	Hay River	Total NWT
Direct Employment	82 person-years	31 person-years	154 person-years	80 person-years	398 person-years
Indirect/Induced Employment	21 person-years	11 person-years	295 person-years	119 person-years	453 person-years
Reduction in Unemployment Rate	11%	11%	3%	10%	3%
Direct Employment Income	\$5.0 million	\$1.8 million	\$11.6 million	\$5.7 million	\$27.3 million
Indirect/Induced Employment Income	\$0.7 million	\$0.4 million	\$14.0 million	\$5.6 million	\$21.0 million
Increase in Employment Income (%)	41	27	7	20	5
NWT Diamonds Project Purchases of Goods and Services	\$2.2 million mainly labour services	\$1.1 million mainly labour services	\$35.8 million	\$17.9 million	\$57.3 million
Aboriginal Participation	97 person-years	39 person-years	76 person-years	72 person-years	330 person-years
Total Population Growth due In-Migrants	None expected	None expected	800	200	1,000
New Households	217	-	269	64	331
School Age Children (est.)	-	-	250-275	60-70	310-345
Growth in Local Economies	\$7.2 million	\$2.9 million	\$47.4 million	\$23.5 million	\$84.6 million
Infrastructure - Roads	-	-	Minor impact on road leading to winter road	-	Minor impact during winter resupply
Infrastructure - Rail	-	-	-	Positive impact if supplies moved by rail	-
Infrastructure - Air	-	-	Negligible capacity available at Yellowknife airport to handle increase in air traffic	-	-

Table 4-4
Socioeconomic Impacts Directly Related to the NWT Diamonds Project
Operations Phase I
Year 2000 - Part B

Project Related Effects	First Nations	Coppermine	Yellowknife	Hay River	Total NWT
Employment/Income	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive
Municipal Infrastructure ^(a)	-	-	Negligible ⁽¹⁾	Minor Negative ⁽²⁾	Negligible
Traditional Aboriginal Lifestyle/Culture	Minor Negative ⁽³⁾	Minor Negative ⁽³⁾	Negligible	-	Minor Negative ⁽³⁾
Heritage Sites	Negligible	Negligible	-	-	Negligible
Land-Use - Sports Hunting Outfitters	Negligible ⁽⁵⁾	Negligible ⁽⁵⁾	Negligible ⁽⁴⁾	-	Negligible
Land-Use - Sustenance Hunting	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	-	Negligible ⁽⁶⁾
Community Well-Being	Minor Positive ⁽⁷⁾	Minor Positive ⁽⁷⁾	Negligible ⁽⁸⁾	Minor Positive ⁽⁷⁾	Negligible ⁽⁸⁾
Job/Education Aspirations	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive
Government Expenses ^(b)	Negligible ⁽⁹⁾	Negligible ⁽⁹⁾	Negligible	Negligible	Negligible
Business Climate	Minor Positive	-	Moderate Positive	Moderate Positive	Moderate Positive

- (a) Municipal Infrastructure: impacts are based on the capacity of existing infrastructure to handle the estimated population influx as a direct result of the project
- (b) Government Expense: impacts are assumed to be due to additional spending on infrastructure, schools, health care, staff for regulatory agencies and other services required to support an increase in population which is directly related to the project.
- (1) Existing infrastructure is sufficient for a population of 20,000. The current population is 17,000.
- (2) Municipal infrastructure (housing and schools) are near capacity with the current population.
- (3) The move to a wage economy is well underway.
- (4) Potential impact on Guide Outfitters in the immediate area of the project.
- (5) If the Guide Outfitters have fewer clients then there are fewer jobs for guides from these communities.
- (6) Two weeks on/two weeks off rotation and work policies allows time for hunting.
- (7) Increased employment, income, training and the introduction of the community mobilization program offsets potential increase of alcohol and drug use and family disruption.
- (8) Unemployment levels are only affected by 2% to 3% so that there is negligible impact on the community as a whole.
- (9) There may be a minor increase in expenses resulting from the increased demand for education given the possibility of jobs at the mine.

Table 4-5
Socioeconomic Impacts Directly Related to the NWT Diamonds Project
Operations Phase II (Year 2007)

Project Related Effects	First Nations	Coppermine	Yellowknife	Hay River	Total NWT
Employment/Income	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive
Municipal Infrastructure ^(a)	-	-	Negligible ⁽¹⁾	Minor Negative ⁽²⁾	Negligible
Traditional Aboriginal Lifestyle/Culture	Negligible ⁽¹⁰⁾	Negligible ⁽¹⁰⁾	Negligible ⁽¹⁰⁾	-	Negligible ⁽¹⁰⁾
Heritage Sites	Negligible	Negligible	-	-	Negligible
Land-Use - Sports Hunting Outfitters	Negligible ⁽⁵⁾	Negligible ⁽⁵⁾	Negligible ⁽⁴⁾	-	Negligible
Land-Use - Sustenance Hunting	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	-	Negligible ⁽⁶⁾
Community Well-Being	Moderate Positive ⁽¹⁰⁾	Moderate Positive ⁽¹⁰⁾	Negligible ⁽⁸⁾	Moderate Positive ⁽¹⁰⁾	Negligible ⁽⁸⁾
Job/Education Aspirations	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Positive
Government Expenses ^(b)	Negligible ⁽⁹⁾	Negligible ⁽⁹⁾	Negligible	Negligible	Negligible
Business Climate	Minor Positive	-	Moderate Positive	Moderate Positive	Moderate Positive

- (a) Municipal Infrastructure: impacts are based on the capacity of existing infrastructure to handle the estimated population influx as a direct result of the project
- (b) Government Expense: impacts are assumed to be due to additional spending on infrastructure, schools, health care, staff for regulatory agencies and other services required to support an increase in population which is directly related to the project.
- (1) Existing infrastructure is sufficient for a population of 20,000. The current population is 17,000.
- (2) Municipal infrastructure (housing and schools) are near capacity with the current population.
- (4) Potential impact on Guide Outfitters in the immediate area of the project.
- (5) If the Guide Outfitters have fewer clients then there are fewer jobs for guides from these communities.
- (6) Two weeks on/two weeks off rotation and work policies allows time for hunting.
- (8) Unemployment levels are only affected by 2% to 3% so that there is negligible impact on the community as a whole.
- (9) There may be a minor increase in expenses resulting from the increased demand for education given the possibility of jobs at the mine.
- (10) Aboriginal workforce and the community has adapted to working at the mine. At this stage, the positive effects of employment outweigh the negative effects.

Table 4-6
Socioeconomic Impacts Directly Related to the NWT Diamonds Project
Closure

Project Related Effects	First Nations	Coppermine	Yellowknife	Hay River	Total NWT
Employment/Income	Moderate Negative	Moderate Negative	Minor Negative	Minor Negative	Minor Negative
Municipal Infrastructure ^(a)	-	-	Negligible ⁽¹⁾	Negligible	Negligible
Traditional Aboriginal Lifestyle/Culture	Minor Negative ⁽¹¹⁾	Minor Negative ⁽¹¹⁾	Minor Negative ⁽¹¹⁾	-	Minor Negative ⁽¹¹⁾
Heritage Sites	Negligible	Negligible	-	-	Negligible
Land-Use - Sports Hunting Outfitters	Negligible ⁽⁵⁾	Negligible ⁽⁵⁾	Negligible ⁽⁴⁾	-	Negligible
Land-Use - Sustenance Hunting	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	Negligible ⁽⁶⁾	-	Negligible ⁽⁶⁾
Community Well-Being	Moderate Positive ⁽¹²⁾	Moderate Positive ⁽¹²⁾	Negligible ⁽⁸⁾	Moderate Positive ⁽¹²⁾	Negligible ⁽⁸⁾
Job/Education Aspirations	Minor Negative ⁽¹³⁾	Minor Negative ⁽¹³⁾	Moderate Positive ⁽¹⁴⁾	Moderate Positive ⁽¹⁴⁾	Moderate Positive ⁽¹⁴⁾
Government Expenses ^(b)	Minor Negative ⁽¹⁵⁾	Minor Negative ⁽¹⁵⁾	Negligible	Negligible	Negligible
Business Climate	Minor Negative ⁽¹⁶⁾	-	Minor Negative ⁽¹⁶⁾	Minor Negative ⁽¹⁶⁾	Minor Negative ⁽¹⁶⁾

- (a) Municipal Infrastructure: impacts are based on the capacity of existing infrastructure to handle the estimated population influx as a direct result of the project
- (b) Government Expense: impacts are assumed to be due to additional spending on infrastructure, schools, health care, staff for regulatory agencies and other services required to support an increase in population which is directly related to the project.
- (1) Existing infrastructure is sufficient for a population of 20,000. The current population is 17,000.
- (2) Municipal infrastructure (housing and schools) are near capacity with the current population.
- (6) Two weeks on/two weeks off rotation and work policies allows time for hunting.
- (8) Unemployment levels are only affected by 2% to 3% so that there is negligible impact on the community as a whole.
- (11) Seasonal or rotational employment is required to maintain a dual economy. Regional employment with terms similar to NWT Diamonds Project may not be available making it harder to maintain a similar income level concurrent with a traditional lifestyle in the remote communities.
- (12) Enhancement of the well being of the communities is sustainable after mine closure.
- (13) Workforce will be well trained but employment in the more remote communities or a similar rotation may not be available.
- (14) Workforce will be well trained with a good resume and references, Yellowknife has the best chance for other jobs.
- (15) May increase due to increased unemployment in the communities.
- (16) 25+ years of business should enable businesses to attain a broad enough customer base to handle the closure of the mine.

**Table 4-7
Socioeconomic Impacts, Mitigation, Enhancement and Residual Effects**

	Probability of Occurrence	Mitigation/Enhancement	Significance of Residual Effect
Employment/Income	H	<ul style="list-style-type: none"> • Preferential recruitment • Innovative selection process • Aboriginals trained as interviewers • Extensive training programs • Transportation from selected communities to the mine site • Rotational work scheduled • Equal opportunity employer • Contractor and subcontractor policy • Wage economy income enhances the traditional economy • Financial counselling 	Major Positive
Municipal Infrastructure	L	<ul style="list-style-type: none"> • Non-applicable 	Negligible
Traditional Aboriginal Lifestyle/Culture	H	<ul style="list-style-type: none"> • Rotation work schedule • Cross-cultural training • Traditional knowledge study 	Minor Negative
Traditional Aboriginal Lifestyle/Culture (continued)	H	<ul style="list-style-type: none"> • Consultations/workshops/interviews • Education and training • Waver of strict educational requirements • Community mobilization programs • Transportation from selected communities to minesite • Income from the wage economy enhances the land-based economy 	Minor Negative
Heritage Sites	L	<ul style="list-style-type: none"> • Archaeological surveys • Avoidance • Detailed recording of sites • Consultation Program • Heritage workshops • Dene mapping (land use maps) 	Negligible

(continued)

Table 4-7 (continued)
Socioeconomic Impacts, Mitigation, Enhancement and Residual Effects

	Probability of Occurrence	Mitigation/Enhancement	Significance of Residual Effect
Land-Use-Sports - Hunting Outfitters	L	<ul style="list-style-type: none"> • Re-route aircraft • Minimizing meetings 	Negligible
Land-Use-Sustenance Hunting	L	<ul style="list-style-type: none"> • Traditional knowledge study • Rotational work schedule • Wage economy enhances traditional land-based economy • Environmental advisory group • Biological/wildlife studies • Traditional Dene/Inuit mapping • No hunting policy at project site 	Negligible
Community well-being	M	<ul style="list-style-type: none"> • Community mobilization • Drug and alcohol free work environment • Employee assistance programs • Extensive training programs • Rotation schedule • Aboriginal community-based counselors 	Moderate Positive
Community well-being (continued)	M	<ul style="list-style-type: none"> • Financial Counselling • Banking services/facilities 	Moderate Positive
Job/Education Aspirations	H	<ul style="list-style-type: none"> • Scholarship program • Summer student employment • Job training/Education programs • Benefits agreement Education/training committee • Certification program • Preferential recruitment • Transportation from selected communities • Cross-cultural training • Employee assistance programs • Career Counselling 	Moderate Positive
Government Expenses	H	<ul style="list-style-type: none"> • \$1.00 of economic benefit equals \$0.05 of government costs 	Major Positive

(continued)

Table 4-7 (completed)
Socioeconomic Impacts, Mitigation, Enhancement and Residual Effects

	Probability of Occurrence	Mitigation/Enhancement	Significance of Residual Effect
Business Climate	H	<ul style="list-style-type: none"> • Preferential business opportunities through Proponent/contractor or sub-contractor • Wage income from the project will enhance consumer spending in the NWT • Benefits Agreement - Business opportunities committee Northern and Aboriginal • The project will be one of the largest industrial operations in the NWT, with a 25 year life • New export industry for Canada 	Moderate positive

The probability of occurrence is defined as follows:

High: Previous research/traditional knowledge/experience indicates the VEC **has experienced** the same impact from activities of similar types of projects.

Moderate: Previous research/traditional knowledge/experience indicates the VEC **may have experienced** the same impact from activities of similar types of projects.

Low: Previous research/traditional knowledge/experience indicates there is **a small likelihood** that the VEC has experienced the same impact from activities of similar types of projects.

Unknown: There is **insufficient research**/traditional knowledge/ experience to indicate whether the VEC has experienced the same impact from activities of similar types of projects.

4.1 Local and Regional Perceptions of the Project

The assessment of local and regional community perceptions to the Proponent's NWT Diamonds Project is based on feedback from community meetings, scoping meetings, specific interviews, workshops, field trips to the Koala exploration site and individual interviews that are part of the Proponent's research on traditional knowledge. Educational trips to BHP's operations on the Navajo Nation in New Mexico and direct community involvement programs also provided sources of opinion about the proposed development (see Volume I, Section 5, for detailed discussion of the communications program).

These community feelings and perceptions have developed with time from skepticism to guarded optimism based on the Proponent's communications program and the Proponent's operational track record to date on the NWT Diamonds Project. Prior to the formal implementation of the Proponent's consultation program, community concerns focused on regional land claims disputes, a lack of consultation about the project and the fear of potential interference with wildlife and traditional land use. Thus, the Proponent commenced its communications program to inform the First Nations people and other Northerners (and later the Inuit and Metis) about itself, about its operations and the proposed development (see further discussion of non-aboriginal perceptions under "Northern Content" below).

Although the initial informational meetings held by the Proponent answered many of the communities' questions and eased some fears in regards to traditional land use, the focus of questions shifted towards new key issues for each of the various communities. These issues have been considered as environmental components with ecosystem linkages. The valued ecosystem components (VECs) identified were employment/job training/business opportunities, traditional knowledge/life styles, caribou/wildlife, water quality/reclamation/environmental issues, archaeology and other social issues. Land claims and Northern Content were also added to the communities' collective cultural concerns. The Proponent's response to these key issues is cross-referenced to the relevant sections of the EIS in [Table 4.1-1](#).

Quotes and paraphrased comments of the different communities as voiced by their members, respective elders, chiefs and other community leaders are highlighted below to provide a cross-section of typical community perceptions and reactions to the Proponent, the project and the project's perceived effects. Not every community or interest group is mentioned, nor is every position stated, but rather abbreviated quotes and paraphrased comments are included to illustrate the range and diversity of the communities' perceptions to the project.

**Table 4.1-1
The Proponent's Responses to Key Issues**

Land Claims	Volume I, Section 1.4.2
Employment, Job Training and Business Opportunities	Volume I, Sections 1.5, 2.8.2, 2.8.5, 2.10, 4.3, 4.4, 4.6.11, 5.4 Volume II, Sections 4.2, 4.3 Volume III, Sections 1.1.3, 10.9 Volume IV, Sections 4.1, 4.2, 4.3, 4.4, 4.5, 4.11, 4.12, 4.14
Traditional Knowledge/ Lifestyles	Volume I, Sections 1.2, 5 Volume II, Sections 1.2, 4.1, 4.2, 4.3 Volume III, Section 1.2 Volume IV, Sections 4.1, 4.2, 4.8
Caribou/Wildlife	Volume I, Sections 4.7.2, 4.7.3, 5.1.1 Volume II, Sections 3, 4.2, 4.3 Volume III, Sections 6, 7, 9.2 Volume IV, Sections 4.1, 4.2, 4.8, 10.6
Water Quality, Reclamation and Environmental Issues	Volume I, Sections 1.5, 2.2, 2.5, 2.6, 2.7.10, 3.7, 4, 5.1.1, 5.4 Volume II, Sections 1, 2, 3, 4 Volume III, Sections 1, 3, 4, 5, 6, 7, 8, 9, 10 Volume IV, Sections 1, 2, 3, 4.1, 4.2, 4.8, 4.9
Archaeology	Volume I, Section 5.1.1 Volume II, Section 4.8 Volume IV, Sections 4.1, 4.2, 4.15
Social Issues	Volume I, Sections 1.4.2, 2, 4, 5 Volume II, Sections 1, 4 Volume III, Section 10.9 Volume IV, Section 4
Communications	Volume I, Sections 1.4.2, 2, 4, 5 Volume IV, Sections 4.1, 4.2
Northern Content	Volume I, Sections 1.3, 1.5, 2.8.1, 2.8.2, 2.10.3, 2.10.5, 2.11.6, 4.3, 4.5, 4.6 Volume II, Section 4 Volume IV, Section 4

4.1.1 Land Claims

Perhaps the most discussed community issue concerns the overlapping land claims of the Treaty 11 Dogrib and the Treaty 8 Yellowknives Dene. This overlapping land claim area includes the NWT Diamonds Project. The First Nations people were advised that the Proponent can only address issues arising from settled land claims as opposed to those dealing with unsettled land claims. Discussion of royalties, lease payments and land access fees must necessarily come from the federal government and the results of their negotiations with the claimant groups. The federal government has a fiduciary responsibility to the Aboriginal peoples requiring the government to consult with them

prior to undertaking actions that will affect their Aboriginal rights. The Proponent has taken the position that it would be inappropriate to speculate on the nature or outcome of any land claim settlement, nor would it be appreciated by the parties involved. Therefore, the Proponent has instituted a policy of inclusion with its consultation program for all the First Nations claimants as well as the Inuit and Metis.

Many Treaty 8 and Treaty 11 elders cited examples of burial sites, traditional hunting and trapping areas and past treaties as evidence of the validity of their claims. They believe that based on maps using this traditional knowledge, the NWT Diamonds Project is on their land and no other aboriginal group should be under this jurisdiction. Comments by the Metis are also included.

Elder Harry Simpson (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) said that the Dogrib historically have travelled to Lac de Gras to hunt and that the land must be preserved for future generations. He indicated that the regional land claim issue was a major issue and indicated that the boundary was critically important. “We are supporting the BHP group and I was hoping that they would support our claim with the federal government.”

Elder Joe Migwi (*Dogrib Treaty 11, Rae-Edzo, Scoping Meeting, Rae Lakes, March 28, 1995, Wha Ti, March 29, 1995*) “The Treaty 8 want us to change our chief’s boundary but we can’t do that”. He also said that the Dogrib had good traditional knowledge of the area around Contwoyto Lake because their ancestors hunted caribou there and they still use the area to harvest caribou.

Chief Charlie Jeremick’a (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) “The federal government agreed with the boundary defined by Chief Monfwi in 1921 – so now we have to use the boundary for our own purpose.”

Violet Camsell-Blondin (*Dogrib Renewable Resource Committee, Speaking Notes to EARP Panel, April 4, 1995*) “...the Dogribs seek greater control over development in our traditional territory because we are the ones who will suffer if there are any negative impacts. Unlike the developers, we and our descendants are not going anywhere. As did our ancestors, the Dogribs will continue to use and occupy these lands long after the mines are closed. As well, the Dogribs should have priority in terms of receiving the benefit from mining activities. Specifically, Dogrib communities should control and should benefit from sub-surface developments on our lands...”

Chief Jonas Sangris (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) “The government should solve our issues before they [the government] work on the mines. Other mines have to be sorted out first, he added, and the government needs to set out guidelines for development and to settle the land claims. “We are talking about politics and treaty boundary land, not Fort Rae’s land, it’s ours.”

Joe Charlo (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) said he was a young man in 1899 when the treaty was signed and he fished and trapped in the MacKay Lake area. People there had starved and there were lots of grave sites in the area. “We are the owners of this land.”

Roy Erasmus (*Treaty 8, Scoping Meeting, Dettah, April 8*) “The government is acting as if the mine is with Dogrib land claims...in the Dene/Metis field claim, the Yellowknife Band chose land east of Boundary Creek for Yellowknife Territory. The mine should not be allowed to proceed until boundary matters are settled; we are not against the mine but people should benefit.”

Chief Felix Lockhart (*Treaty 8, Scoping Meeting, Lutsel K’e, April 7, 1995*) said they did not want to be on “equal footing” (in government treaty negotiations) with other third party interest groups such as the government of the NWT. The community expects special status because “Canada has a fiduciary obligation” to them. He said, “There are conflicting land interests. The disputes go back to the Dene/Metis negotiations. There were aspects of that negotiation that we did not agree with, specifically extinguishment. So we are now in separate negotiations with the government. We have not resolved the issue of land areas. We don’t want any portions of our lands to be under other aboriginal groups, particularly under the comprehensive agreement. We want to resolve that amongst ourselves. The Peace Treaty with the Treaty 11 is still in place. Under Treaty Entitlement it is not really a land claim, it is a fiduciary responsibility to us.”

J.C. Catholique (*Treaty 8, Scoping Meeting, Lutsel K’e, April 7, 1995*) “The Treaty lands as it is written on paper, the map, is only the government’s point of view. The government says that the area of Lac de Gras is no man’s land, but that is not so.”

Gary Bohnet, President, Metis Nation (*Written Submission to EARP Panel, April, 1995*) “As the President of the Metis here in Yellowknife, I would like to state that we echo Mr. Douglas’s concerns in regards to BHP, and its lack of understanding of Metis rights to land and resources in the North Slave region. We encourage this review panel to remind BHP that the land and resources have been shared between Dene and Metis for hundreds of years. We do not, and will not, accept lesser recognition than any other aboriginal people in our homeland...”

4.1.2 Employment, Job Training and Business Opportunities

All of the Northern communities are interested in what the project might offer in terms of employment and business opportunities. Many of the Aboriginal people want an opportunity to participate in the wage economy while maintaining their cultural values, traditions and identities. Many feel that mining is a way to achieve this goal, largely because of the two weeks in/two weeks out shift schedule. Aboriginal people are concerned that the general lack of education and job experience will be barriers to

gainful employment. Aboriginal people want the Proponent to waive educational standards for employment and to provide training. They would also like to see preferential hiring of locals as well as business opportunities being offered to those communities near to the project.

Mayor Dan Marion of Rae-Edzo (*Dogrib Treaty 11, Press Release, April 4, 1995*) offered his community's qualified support of the project if BHP would live up to a commitment of jobs, training and business opportunities. He said, "We agree in principle with the Proponent that sustainable development implies a balance between social, economic and ecological systems...and for now we agree with BHP's tentative conclusion that the key impacts of this mining development are expected to be socioeconomic and they will be largely positive." To illustrate the potential economic importance of a mine, the mayor calculated that if 25 people from his community (less than 4% of projected total employment) worked full time at Lac de Gras, it would mean a 10% increase in community cash income and a 5% reduction in the current 42% unemployment rate. He indicated even more emphasis is needed on socioeconomic concerns.

With regard to business opportunities, he stated: "We realize there are limits to what we can do contractually from a small community. But we also realize, through recent past experience, that we can do a lot more...than expected." He also brought attention to the high unemployment rate of Rae-Edzo, long social assistance lines and comparatively low average annual incomes, economic issues that could be improved with the start of new mining operations.

Mayor Dan Marion (*Dogrib Treaty 11, Scoping Meeting, Rae-Edzo Hamlet Council Presentation, April 4, 1995*) "...we were encouraged to read that BHP fully intends – and I quote – 'to provide training and educational opportunities for young people, particularly those from First Nations communities.'...we were encouraged because we are convinced that without a genuine, concerted training effort on the part of all concerned, there will be very little progress on the employment front for Dogrib people. In short, we are most concerned that without adequate and proper training, the company's stated intention to hire First Nations people and to 'ensure that these benefits are shared equitably' will give way to BHP's other stated intention of hiring 'qualified' workers. In other words, without adequate training, 'qualified' will forever mean non-native...We have been barraged with good corporate – and government – intentions before, but had little to show for it when all was said and done. BHP and the Dogrib...are negotiating an IBA...this will be vital to achieving our mutual goal of maximizing economic benefits for all Dogrib People."

Steve Nicki (*Treaty 8, Scoping Meeting, Lutsel K'e, April 7, 1995*) "We are not against development. Aboriginal people sooner or later quit or lose their jobs while whites stay at their jobs. I want a safeguard at BHP where there is a certain quota but

that quota is strictly enforced. I don't just mean laborers, I would like to see the industry give scholarships and training to climb to the top."

Elder Alphonse Quitte (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) said that his people would have to live with their decision on this development for a long time and that if they share the land and resources, they can be successful and good results would come back to the communities that might be affected. He remarked that guarantees of employment for their communities would help.

Grand Chief Joe Rabesca (*Dogrib Treaty 11, Consultation and Impact and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) "...the Dogrib people want jobs. Trapping was very good – but no longer – so the people want jobs for the community."

Chief Darrell Beaulieu (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) "We are looking for economic certainties for all Dene. We have been dependent on the Government for too long."

Chief Darrell Beaulieu (*Information Package for Prospectors and Developers Association of Canada Convention, March 5-10, 1995, Treaty 8*) "When we have the authority to apply Dene rights to our lands, we will need a viable economy that is consistent with Dene values and principles: an economy in which our members can improve their socioeconomic circumstances without giving up our principles. Our populations are dominated by young people – our potential in human resources is enormous. We would appreciate greater acceptance by industry and government of the skills and expertise our people have, rather than constantly telling us how much we have to learn. We would appreciate greater recognition of skills drawn from Dene land-based activities – skills such as endurance, manual dexterity, and hand/eye coordination – for potential goods and service provision. Rather than being offered only narrow options from other people's concept of what our capabilities are, we would appreciate consideration for genuine participation in the fullest range of business."

"First Nations' corporations are at the early stages of development and, in spite of many obstacles, our economies are just emerging. Many interesting opportunities, for residents and other large and small businesses, can present themselves for joint ventures and partnerships. But we hope that, when seeking First Nations as partners, industry will approach us with offers that are equitable and balanced. This may require industry to demonstrate a generosity beyond current business practice. To ensure effective and mutual profitability in later years, industrial partners might be wise to protect their investments by supporting the advancement of their Dene partners' business and human resource capabilities. The satisfaction of conducting respectful and sincere collaboration in business may produce more than financial benefits for both industry and Dene governments..."

Jimmy Nitsiza (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) “Lac de Gras is far away but [we] would like to see young people get jobs – [there’s] a high percentage of Dogrib unemployment.”

Mary Dale Rabesca (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) “We need to get people trained on the job to get into the workforce.”

Chief Charlie Jeremick’a (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) “Training is necessary. I am concerned about the low level of education of many of the Dogrib. This might affect their ability to get jobs.”

Elder Romeo Wetrade (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) said that the present generation must turn to employment. “Many young people raised in the trapping economy are uneducated and cannot read or write. The company should respect young people’s need for job and training,” he added. He requested information and future job training in their native language so that more people can understand the project and obtain jobs.

Elder Joe Migwi (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) said that the Dene want BHP to provide employment and business opportunities and to hire more Dene from the area. “The Dene people are not trapping as in the past, therefore job opportunities and training are important.” He stated that the Dogrib would like to share business opportunities with mining companies for contracts such as trucking and winter road operations. “[Work] encourages young people to buy skidoos and boats/motors with the wages. That helps their parents [and] maintains their connection with the land. That strengthens the family, too. Elders are encouraging youth to get training and education before the mine goes in. The world is changing. Now the trapping is not so good [and] we have to turn to wage economy.”

Joanne Taptuna (*Coppermine, interview 1995*) “...mining...employment, is a good thing for the people, that’s what they need to keep them going.”

Johnnie Martin (*Yellowknife, interview 1995*) “There are not many trappers left. We need jobs.”

Elder A. Tailbone (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) said that they, as Dene, were not going to avoid development and that a wage economy would have to replace hunting and trapping.

J.C. Catholique (*Treaty 8, Scoping Meeting, Lutsel K’e, April 7, 1995*) said that “...we must work closely with BHP to understand their business. They should have one person hired as a liaison to let the community know what is going on...we don’t want to slow BHP down, we just want to work together with them.”

Typical questions asked by the students (*Wha Ti Youth Vision-Setting Workshop, Community Mobilization, Wha Ti , May 11, 1995*) “What jobs are open at BHP? What will the project do for the kids of Wha Ti? How is BHP going to help the community? What will all the BHP employees’ money do to the community of Wha Ti? Will BHP provide job training? What are the long term effects on the traditional lifestyle of the Yellowknives Dene First Nation?”

Chief Darrell Beaulieu (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) believed that job training should start now. Mining is a major industry, but there is no mining school similar to Arctic College that teaches people how to work for the government. He also said that the Treaty 8 had proposed a school of mines but it is not happening. “There are people all across the Territories who want jobs,” he said and wanted to know what a hiring centre in Yellowknife will mean to the community.

Chief Darrell Beaulieu (*Information Package for Prospectors and Developers Association of Canada Convention, March 5-10, 1995, Treaty 8*) “When they talk about benefits from mining for the Dene, they are usually referring to jobs for individuals. And the jobs usually turn out to be heavy equipment operating, labour or catering: jobs with few training requirements and low pay...job provisions by itself will not share enough of the benefits between industry and First Nations in a fair way...we want respectful involvement in industry ventures, to share equitably in the benefits of mineral development profits made from our land.”

Muriel Betsina of Dettah (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) was very concerned about young people and potential jobs and business opportunities. She believes that there are no contractors from the North at the mine and that the contractors do not care about how they treat people. At the same time, she said that families suffer due to women going to the mine to work. Many times they come home and have no money for two weeks. “It’s very hard for women. Sometimes they need a counsellor to help with problems. There should be scholarships and training with certificates being given to encourage the young people to stay in school.”

Elder Maurice Lockhart (*Scoping Meeting, Lutsel K’e, April 7, 1995*) “Money is good for people, but is the money worth it for the loss [of land and resources]?”

Representatives of the Metis Nation (*Luncheon, Yellowknife, May 3, 1995*) said that they were concerned about jobs for the Metis, training and education and business opportunities. They asked BHP to provide funding on an annual basis for a Metis to act as a BHP/Metis liaison officer.

The Reverend MacLachlan (*Anglican Minister, Scoping Meeting, Coppermine, March 14, 1995*) “...there will be some wage earners, probably at the lowest end of the skills level and the lowest end of the wages. The jobs that have been provided in

mining very largely require people to live away from home for 50% of their lives. They have wives and families in the community...”

An elder from Umingmaktok (*Inuit, Scoping Meeting, Umingmaktok, March 15, 1995*) said that there are very few employment opportunities in the North and he would like to see people from communities close to the project, get jobs.

Gerry Atatahak, Kitekmeot Hunters and Trappers Association (*Coppermine*) “It [the NWT Diamonds Project] has affected the people of Coppermine that were employed out [of] the Lac de Gras sports hunts...they weren’t able to work out of that area last year...well, for the families that these hunters and trappers provide meat for, I could see an impact there. But with the fur market being as it is today, with the Europeans banning Canadian furs from entering Europe, then I don’t see why these local hunters and trappers shouldn’t get jobs.”

Kitekmeot Hunter’s and Trappers Association (*Scoping Meeting, Coppermine, March 14, 1995*) said that they were concerned about further development and how it might affect their businesses.

Coppermine HTA-Webb Ltd. (*Written submission by Fred Webb to EARP Panel, March 22, 1995*) “A recent study conducted by a consultant, sponsored by the GNWT, showed that the Barrenlands Caribou Hunting Industry alone brought enormous benefits to the entire NWT. This is in the order of \$2 million, in new money, providing employment for nearly one hundred people, purchasing goods and services in the Northwest Territories. All of this is accomplished by using an insignificant portion of a renewable resource, with no resultant damage to the environment...our business depends entirely upon providing an ‘Arctic Wilderness Experience’ as perceived and paid for by the visiting client. No one travels to the heart of the Barrenlands, simply to harvest a caribou, millions of which are available in other considerably less expensive areas, from Labrador to Alaska. Our guests come because they enjoy a journey back in time, to an unspoiled part of the world, to hunt and travel with Aboriginal hunters as guides and companions. Naturally, one must provide livable accommodation, safe flying and a well organized operation. However, the main ingredient in all of this is the ‘wilderness’...from 1988 to 1991, we were a full and expanding operation. In the summer of 1992, the degree of interference caused by the exploration parties had a considerable effect upon the traditional route of the migrating caribou, and a worse effect upon the perception of a ‘wilderness experience’...the actual hunting was so badly interfered with that we felt obligated to invite people back the following year, at our expense, to make up for it...at this point, indeed, we do not know ‘what we want’, beyond the obvious wish that none of this had ever happened. At the very least we feel that we are entitled to consideration by the new developers, and protection by the Government of the Northwest Territories and the Government of Canada.”

Mayor Dan Marion (*Scoping Meeting, Rae-Edzo, April 4, 1995*) “We are dismayed by the BHP’s Project Descriptions’ concentration on Yellowknife as the source of material supplies and services, to the exclusion of virtually everyone else.”

Chief Jonas Sangris, Yellowknives Dene First Nation (*Navajo Mine Field Trip, October 31/November 1-2, 1994*) stated, “I like what I see here...how they work with the Navajo people...most of their people are Dene people. I feel a little better now that I’ve seen.”

Grant Blondin (*Yellowknife, interview 1995*) “The two week system works well for me. I would not mind staying in longer. I will be missing opportunities to learn when I go out.”

Leon Football (*Fort Rae, interview 1995*) “It is good for people to work for their families. I have a wife and three kids. I make money here, then I go back to them. I don’t think the mine will disrupt the communities. We need jobs. When we are done working, we go home...women are interested in working at the mine. They don’t always want office jobs. They need more chances.”

Bill Adamache (*Coppermine, interview 1995*) “I don’t see many young people out hunting and fishing for a living...what I see is a bunch of young people walking around the streets with their hands in their pockets and nothing to do. I think jobs are far more important than the loss of traditional occupations because those traditional occupations cannot support the amount of people that are around here...they better not hire 1,000 non-natives. They better hire 1,000 natives and if they don’t, there’s gotta be a reason why not and that’s because of poor planning. They didn’t start hiring people today and putting them in the mine sites down south to train them for this mine coming up on stream tomorrow.”

Anonymous (*Lutsel K’e, interview 1995*) “Young people have to move on and find jobs. They have to support their families. There are no jobs in the small communities. Today, most of the full-time hunters are old. Younger people hunt on their days off.”

Debbie Klengenber (*Coppermine, interview 1995*) “...because of the high unemployment rate and the fact that less people are able to make a living traditionally like hunting and trapping, and stuff like that – even though there is some negative to it [young people working in the mines] – it’s hard to see it all as negative because of the increase of jobs it gives the young people something to look forward to, [that] they’re not going to school for nothing.”

Monaca Ayha (*Deline and Rae Lakes, interview 1995*) “We cannot live off the land forever. We are spoiled now. We want houses, not tents. It is good that young people know that they have to go out and work. This is better than being stuck and bored in a small community. A 16-year-old girl should have to work. That way, she will not steal

or get in trouble. If you don't have money, you are reduced to crime...half the men don't hunt anymore. Even good hunters don't hunt 12 months a year. Men need jobs to buy supplies. They could hunt on their two weeks off. Once you have hunting skills, you will not lose them. The men who work here are not stuck in camp for 6 months at a time. They get time off. Working will help them to buy hunting equipment. Elders have to let their sons lead their own lives...it is a native fault that they think they can do a job that requires advanced education without having finished high school. Our people need education. If they cannot read, how can they expect to do specialized jobs? People need to have their basic education before they can expect specialized training. They cannot simply get jobs because they are natives. People have to work their way up. If people want better jobs, they have to work for those positions...native people must be serious about their own education if they want to be competitive against outside workers."

Paul Mackenzie (*Yellowknife, interview 1995*) "Native people should be more involved in the management of the mine. It might lessen the [negative] impact of the project."

Mary Ann Football (*Rae Lakes, interview 1995*) "BHP is giving our kids training. The young people need training. It will help them stick with jobs. People in the mine might get steady jobs if they could earn training certificates. Then, they could get jobs elsewhere."

Roy Erasmus (*Yellowknives Dene First Nation*) "All our people get labour, not management positions... [my] people do not last too long in labourer positions...Yellowknives people should receive jobs and training. [We] want a Yellowknives Dene manager of the mine in a certain timeframe, [we] want the mine to be sustainable, [we] want our children to hunt on and use land in the project area, [and] not be scared to eat and drink water in the area, [we] want the working environment to be a safe one, we don't need industry bad enough for people to get hurt."

4.1.3 Traditional Knowledge

Traditional knowledge is, by its very nature, broad, pervasive and permeates all aspects of Aboriginal life. There has been considerable discussions on the nature of gathering, interpreting and applying traditional knowledge to the NWT Diamonds Project. The most common request of Aboriginal people is that the collecting of traditional knowledge should be done by the band members themselves in their own way by their own people. Traditional knowledge is regarded as private and proprietary, and the communities want to preserve their intellectual rights to this information. At the same time, most Aboriginal people feel that traditional knowledge should be incorporated into the planning, development and monitoring of any project in the region. There are also issues of preserving traditional knowledge and traditional lifestyles concurrent to participating in a wage economy.

Speaker's Name Unknown (*Dogrib Treaty 11, Scoping Meeting, Rae-Edzo, April 4, 1995*) Dene have traditional knowledge of the land – they had their own biologists or medicine men that told them where the caribou were. The Dogrib Treaty 11 must be recognized as the body from which to collect this information. It has been passed down by generations. The government doesn't listen to traditional knowledge, it listens to scientific knowledge. Traditional knowledge will also be used in land claims settlements.

Dogrib Treaty 11 Council (*Written Submission to EARP Panel, April 11, 1995*) "Traditional knowledge of aboriginal people is not simply 'considered', it is applied to determine facts and to provide a knowledge base for decisions about land and resource use management...the Proponent should not simply 'consider' traditional knowledge but to systematically apply it throughout its Impact Statement."

Aaron Herter (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) "You got a good example of traditional knowledge when the Chief spoke a few minutes ago about winter roads and how the snowbanks on winter roads redirect the movement of caribou...I recognize that traditional knowledge in these guidelines may in fact be precedent setting but this is all the more reason to make this a precedent with impact because the information has some value to the overall EIS."

Fred Sangris, Environment Coordinator, Yellowknives Dene First Nation (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) "We have traditional names for the area in which BHP is working."

Gary Bohnet, President, Metis Nation (*Written Submission to EARP Panel, April 1995*) "...the EIS should be required to give a detailed description of the climate, past, present and future...we recommend the proponent consult our elders for local knowledge on the variability in weather and climate to gain an appreciation on the extremes in conditions that are not reflected in the relatively short period for runoff records in the region..."

Ted Blondin (*Dogrib Treaty 11, Speaking Notes Presented to EARP Panel, April 4, 1995*) "Traditional knowledge of the Dogrib people relating to the potential impacts of the proposed BHP mine must be fully considered in this Review, and the Dogrib Treaty 11 Council must be recognized as the responsible body for collecting and presenting this traditional knowledge for the purposes of the Review."

Grant Blondin (*Yellowknife, interview 1995*) "People should get the mining companies to deal holistically with their projects. They must understand that [everything is] tied together. Problems should not be put off for economic reasons. Everything in the Native world is in a continuous cycle...if people want to live in a traditional way, the opportunity should exist for mine workers on their days off. Maybe people could take their time off in camps with elders."

Leon Football (*Rae Lakes, interview 1995*) “Some people go hunting on their days off. We still need to keep our traditional skills. Those are our ways. We need to pass on those skills to our kids.”

Debbie Klengenberg (*Coppermine, interview 1995*) “...even if our nomadic lifestyle has changed drastically, we’re still nomadic in the sense that spring, summer [and] fall we’re still out camping and doing things like that, while we may not do it on a year round basis. And I think a lot of young people still have that connection and if that’s just reinforced, and family participation on their two weeks [off], it would enhance that, [and] also give them...lifeskills and some on-the-land skills...listen to the elders and to the people with the traditional knowledge and don’t just do it as a token...really listen and apply what [you] hear.”

Ida McWilliam, Kitekmeat Regional Superintendant of Social Services (*Coppermine, interview 1995*) “I think you need people from BHP that are going to take an active interest in how we live and how we deal with day-to-day life in our community. You can’t expect them to be Inuks [Inuit], but at least have an appreciation of why we do things the way we do. They have to take an active role in trying to get a good grasp and a good understanding of why we do the things we do, why we are the way we are...why people believe what they believe and not take it as if it’s a myth or [not give it]...consideration at all.”

Monaca Ayha (*Deline and Rae Lakes, interview 1995*) “At one time I was very involved in a native women’s healing circle. Recently, I was asked to participate in once again. It was a last minute thing, but BHP understood my need to be involved. BHP helped me. The mine is my home away from home.”

Paul Mackenzie (*Yellowknife, interview 1995*) “There will be an impact on our communities if young people do not have as much exposure to the elders. Bring the elders to the mine once in a while, (that) might help communications within the communities.”

Jean Taipana (*Coppermine, interview 1995*) “...we might be losing our traditional ways even though it’s already going. Young people are losing their language; they don’t even try anymore, they don’t try speak. Nobody uses traditional tools anymore. [They] use store bought things. There’s less sewing cause the ladies are buying clothes cause they have money now. We’re just about losing our traditional ways already but maybe we could move on and you know employment might be good but we have to think about the environment and the animals around.”

4.1.4 Caribou/Wildlife

Caribou play a central role in the lives of the Aboriginal people. A conservative estimate is that the six Dene communities harvest an average of three caribou per

household annually. From a social perspective, potential project effects on caribou elicited more concern during public meetings than any other species. The importance of caribou to the Aboriginal people historically and at present cannot be overestimated.

Elder Harry Simpson (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) indicated he was speaking on behalf of the community when he said, “We do not want to see mistakes of the past being repeated.” He enumerated their concerns: caribou migrating through the Lac De Gras area, ensuring that historic sites and burial grounds are not tampered with, and that they didn’t want to see anything happen to the wildlife or environment. Mr. Simpson said that their ancestors had depended on the land and lived off it. He made reference to the fact that trapping had declined and they had to consider this ‘type of development’ as an alternative for the communities.

Chief Charlie Jeremick’a of Wha Ti (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) said that he was concerned about preserving eskers and lakes – wildlife habitat in Lac de Gras area. He specifically stated that they did not want an all weather road because it might be a barricade to the caribou. He said that they were not against a winter road but just cautious and concerned that snowbanks at the sides of the road might keep caribou on one side of the road.

Grand Chief Joe Rabesca (*Dogrib Treaty 11, Consultation and Impact and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) They [the elders] have hunted and trapped on the area and are worried about the caribou migration through the area. There is only one herd [of caribou].

Former Grand Chief Alexie Arrowmaker (*Dogrib Treaty 11, Consultation and Impact and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) Regarding the activity at Lac de Gras our concern is that we know it has good fishing and a good caribou migration.

Elder Joe Migwi (*Dogrib Treaty 11, Consultation and Impact and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) “Hydro power is more feasible than diesel to prevent effects on wildlife. I don’t want to see [diesel] power generating plants because of the effect on wildlife.”

Joseph Pe’a (*Dogrib Treaty 11, Traditional Knowledge Meeting, Yellowknife, June 21, 1994*) “There is a concern for the good gravel sites in the barrens where there are fox dens, wolf dens and bear dens. These need to be protected. We would like you to watch out for dens while getting gravel so as not to upset the wildlife habitat.”

Aaron Herter (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) When there are hundreds of kilometres of winter road with high snowbanks, this threatens to redirect, perhaps not completely barricade, the movement of the caribou.

Certainly it may change their migration patterns and that is the concern with their winter roads.

Elder Joe Migwi (*Dogrib Treaty 11, Traditional Knowledge Meeting, Yellowknife, June 21, 1994*) There was a concern that once the mine was being built, there will be all kinds of machinery which could affect the migration route because of the noise and the machines. Mines have contaminated and polluted the environment.

Elder Morris Lockhard (*Scoping Meeting, Lutsel K'e, April 7, 1995*) said "Our ancestors lived off the land. We have lost a lot of hunting grounds. There are a lot of animals that we don't see anymore and it is not our fault. White people have a lot of machines that we do not have that pollute our land. The diamond mine is not far. They will be doing a lot of work in our area. Even a lot of small animals will lose their homes."

Jerry Etanowak (*Chairperson for Coppermine H.T.A, Scoping Meeting, Coppermine, March 14, 1995*) "The caribou are starting to take different migration routes, splitting up into two – going east of Lac de Gras and also west of MacKay Lake. Because of the fact of these migration route changes last year, our joint venture program did not go last year. Our sports hunting camp did not go because of the lack of caribou."

John Hunter (*Scoping Meeting, Coppermine, March 14, 1995*) added his concern about low flying aircraft and the effect on caribou and grizzly bears. He asked about the use of eskers for gravel since eskers are used by wildlife for dens, e.g., grizzly bears, foxes and wolverine. He indicated that he had heard stories about caribou drinking water from waste lakes.

A member of the Hunters and Trappers Associations (*Scoping Meeting, Coppermine, March 14, 1995*) "Caribou migration is a concern. There used to be an outfitters camp there [Lac de Gras, I think]. They closed that camp because of the exploration camps having all the development there. We have guides who used to go there. A lot of caribou move through Lac de Gras and there are caribou crossing there as well. Also, Lac de Gras has a lot of fish, comes under the water basin – anything up river will probably affect something down here."

Gerry Atatahak (*Coppermine, interview 1995*) "...the denning areas for grizzlies, wolves, foxes...they tend to den in eskers and there the wildlife habitat denning area should be protected and rerouted, if possible, should a road go through an esker or material is obtained from an esker for a road...with the project site being located just north of Lac de Gras, the migration routes regarding caribou in the fall now have changed to the west end of Lac de Gras and also the east side of MacKay Lake. They are now showing signs of rerouting their migration route instead of going through, like in the past by the project site...hunting wise and trapping, they [land impacts] would affect

me in that way a great deal 'cause Lac de Gras area, north of it, that is all accessible out of Coppermine, so changes in caribou migration routes, wildlife, denning areas, all that...I'm concerned in regards to protecting these species of animals so they continue to thrive."

Jimmy Ross Miyok (*Coppermine, interview 1995*) "...if they (biologists) find out where all those dens are and the most used areas, they can try and stay away from those and wouldn't hurt as much probably."

Bill Adamache (*Coppermine, interview 1995*) "I think most of your naturally shy animals like wolves, wolverines, these types of things, they'll pass by, but they won't hang around. I think more of the grass eating type(s) would hang around...caribou, musk-ox because they are safe from the carnivores there."

Debbie Klengenber (*Coppermine, Interview, 1995*) "I think everybody whose concerned with this project would have to be very, very conscious of the migration patterns of caribou...we're all used to country foods, we supplement our daily food intake with country food and if that's depleted, I don't see us surviving very long."

Jim Peterson, President, N.W.T. Barren Ground Caribou Outfitters Association (*Written Submission to EARP Panel, April 1995*) "...the allocation of caribou for outfitting is in jeopardy if the resident and aboriginal harvest increases and/or the productivity of the herd decreases. It is our belief that the direct and cumulative effects of the project and related projects in the future may contribute direct and indirect impacts that will increase the annual caribou harvest from this herd and may decrease the herd's productivity. Also, since our services focus on the total wilderness experience, and since natural wildlife populations are an integral element of the wilderness experience, our concerns also focus on potential impacts to fish and wildlife populations other than caribou..."

Bill Erasmus, National Chief (*Dene Nation, 1995 Submission to EARP Panel*) "We have one of the largest caribou herds in the world who have always been here. Are we destined to experience the devastation that First Nations in the South have lived through with the decimation of their buffalo? When the caribou disappear, it is only a matter to time before we also disappear."

Fred Sangris (*Yellowknives Dene First Nation, 1995*) "Of particular importance are the caribou, which migrate through the [proposed mining] area, and which we harvest in the spring and fall when they are in their wintering area below the treeline. The food from these harvests is stored in a community freezer and shared throughout the community. The caribou is very important to our people. How will they be affected? Will they move around the area, or will it [the mine] change their migration route?"

Darrell Beaulieu (*Yellowknives Dene First Nation, 1995*) “Caribou are our mainstay, they feed us, and plays a big role in perpetuating our status as Yellowknives Dene.”

Elder Andrew Gon (*Rae Lakes, communication to BHP, 1995*) “The mine area is where my ancestors waited for caribou. I don’t want [their] migration routes affected. Oils spills on roads, use of winter roads by non-native people who disturb animals...things are being done without consultation. Caribou are very, very important. They can get pollution from roads and road use, migration (patterns) or numbers of caribou might change because of mine.”

Ida McWilliam (*Coppermine, interview 1995*) “...as it is now without the caribou that we use...[even] with me and my husband working, we can’t afford to live exclusively off...the food we get from the store...we have to supplement it with caribou. How is this going to impact the rest of the community? A lot of people in the community sustain themselves almost exclusively on caribou meat. How much of this...operation you’re looking at, if it’s going to take away a good portion of our caribou, then it’s not going to be worthwhile...that’s something I’m very concerned about...[it’s] fine to give up a little bit to gain, but if you’re going to be disturbing so much that we have no caribou in 10 years, 20 years, then I would say don’t go with it...in the long run I’m concerned that we’re going to be the ones [who] end up paying [for] the fact that caribou would be moving away, [and] fish would be contaminated or depleted eventually. And like who is going to decide that it’s worthwhile to start a mine?...why go into it all or to the point where we lose in the long run, where we end up with no more [animals] or contaminated wildlife, a food source we have depended on for as long as I can remember? Like, who’s going to balance it and say it’s not worthwhile or it is worthwhile?”

Sonny Arden (*Metis, interview 1995*) “For all the mines that I’ve been around up in the North here, I’ve never seen any impacts whatsoever on any of the animals. They come around, and they’re around there and, like I say, white foxes and those things. After awhile you can feed them by hand. It [the mine] doesn’t interfere with them. They’re running around in between the buildings and the equipment and the caribou are doing the same thing, you have to stop to get to the cook house, you have to stop and let them go by before you can go and stuff like that and they’re laying up against the tanks.”

Archie Mandeville (*Metis, interview 1995*) “No, [the caribou] they just keep moving. They go into the timber and they go into, around Yellowknife, not too far, I mean quite a way from Yellowknife and only after freeze up they come there on the ice. Otherwise, they don’t go there like the other – the migration, it’s a big migration of caribou that goes through. They start from Bathurst about – around the last week in July, and then they start their migration and then about the 25th of July to the first of August they will hit Pellet Lake and go along Contwayto Lake and then they go around

and head for northwest of Fort Rae, maybe a hundred miles. They're in the tundra...it won't affect no wildlife in that area. But you see, the wildlife, the migration is not always on line there, sometimes there are no animals at all, period. They are over on the coast by Coppermine and through there and they go to Bear Lake and they go to the Dempster Highway...Lac de Gras is a kind of a bad place because sometime you get caribou and sometimes you don't. They were trappers that lived there years ago, maybe 50 or 60 years ago, white trappers they go out there and they just about starve because the caribou don't come, they change migration. The mine is not going to affect them at all in no way."

Peter Kamingoak, elder, Kitekmeot Inuit Association (*Coppermine, interview 1995*) "I know it [the caribou herd] always rotate. Some years we get lots of caribou, lots of foxes; some years we don't. It doesn't mean the caribou is scarce or it doesn't mean the foxes are scarce they rotate. Maybe they get more foxes in Cambridge Bay year after year after. [They] may be in Gjoa Haven, they migrating, they go around in circles so there's always lots but the movement is the one that makes them look scarce."

Agnes Ayalik (*Coppermine, interview 1995*) "The environment will be damaged [by the mine] and the animals will be negatively affected in some way. I really don't know how it will be in the future, maybe the animals will adjust and adapt or may never return to the area."

4.1.5 Water Quality, Reclamation and other Environmental Issues

Many members of the Inuit and First Nations communities voiced their concerns regarding possible changes to water quality and water flowrates. The Inuit of Coppermine are particularly concerned with water quality and the effects on fish and human health (Coppermine is the only community in the same water drainage system as the NWT Diamonds Project). The Aboriginal people are also concerned about pollution and contamination to the land. Many emphasized that it is their responsibility to protect the land for future generations and that mere respect for the land was needed by the Proponent.

Elder Joe Migwi (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) stated one of his community's key concerns of potential environmental impact citing the lack of cleanup and the bad experience with Rayrock. He said this had led to cancer and pollution. He said that the tailings of Rayrock were still draining into the Marian River and talked about dead beavers and fish found floating in the river. Joe also raised concerns over the type of power that BHP would use at the mine and potential accidents when hauling hazardous materials. He warned against destroying the land and said that, "through cooperation with one another we will try to keep the environment safe and clean."

Former Grand Chief Alexie Arrowmaker (*Dogrib Treaty 11, Consultation and Impact and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) said that on the quality of water and river flow, it is important to keep the quality of the water high for everything which lives off it, including people.

Judy Jarlo (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) said that no one camps out anymore because of the mining industry, destroying their land and environment. “Chemicals are destroying the land, now we have to chlorinate the water to be able to drink.” She said that tailings pond water must go into Great Slave Lake and some fish are deformed so it can’t be healthy.

Chief Felix Lockhart (*Treaty 8, Scoping Meeting, Lutsel K’e, April 7, 1995*) said “...there is a lack of understanding, a lack of respect for the land. We identify the land with a spiritual connection to the land. In January, with a presentation here, BHP said they control the land. BHP drains lakes. That is not minor change, neither is the airport. BHP minimizes the effort to reclaim. We think that the mine will never be the same. BHP has made no real attempts to understand the land.”

Stephanie Marlow, a youth spokesperson from Lutsel K’e (*Treaty 8, Scoping Meeting, Lutsel K’e, April 7, 1995*) said “The diamond mine will pollute the water, animals will be scared away – it will not be good for us.”

J.C. Catholique (*Treaty 8, Scoping Meeting, Lutsel K’e, April 7, 1995*) added “We have good land here. People pay a lot of money to come here. Only lately have people gone underground...we use the area by the mine. It is part of our traditional land. When people say that mining will destroy the land, it will, like the mine near here. The fish started to have puss. Mines always dump their waste in a lake or a river but that is where fish feed. In the North, the air and the land is very sensitive to the way that mining companies deal with sewage. Like, if you burn something, the smoke stays longer. We must work closely with BHP to understand their business.”

Johnny Washie (*Dogrib Treaty 11, Gameti [Rae Lakes], May 1995 from an editorial in the May 15, 1995 edition of News North*) “BHP is making every effort to plan the diamond mine carefully so as not to damage the environment.”

Fred Sangris (*Yellowknives Dene First Nation written presentation to EARP Panel, 1995*) “...we want to work with the Panel to ensure we can have peaceful co-existence with this mining development – to share our land and resources, as the Elders have taught us, but to share them in a way that respects our right to live our own lives in our own way on our own lands...[We] want development to be sustainable – development that...does not unduly damage our lands or deny us access and opportunity to pursue our traditional land-based activities.”

James Eetoolook, V.P. NTS (Nunavut Tunngavik Incorporated) (*Inuit, Scoping Meeting, Coppermine, March 14, 1995*) “The number one issue that will be talked about by the Nunavut people is the protection of the environment of Coppermine.” He continued by saying, “The BHP Diamond Mine will affect Coppermine people through the Coppermine River. So eventually this project will have an impact on people and their environment. Therefore, we have a provision in our claim (agreement) to negotiate an IIBA (Inuit Impact Benefit Agreement).”

An Umingmaktok elder (*Scoping Meeting, Umingmaktok, March 15, 1995*) expressed his concerns about rivers and oceans because his people had lived off the land and wanted to keep it that way.

Josie Kusugak (NTI) (*Scoping Meeting, Coppermine, March 14, 1995*) “People will keep telling you about the water. The Inuit are very particular about their water. Any hint of contamination in anything is frightening.”

Joanne Taptuna (*Coppermine, interview 1995*) “Our fish supply is already depleting in some lakes, personally I wouldn’t like to see the draining of lakes or the removal of fish. We have only one source of water, and that’s very important and if they end up draining into the Coppermine River, it’s gonna have a direct effect on us and draining the lakes and depleting the fish is going to have a direct effect on us as well...the tailings ponds should be monitored carefully so that there’s no leakage or to make sure that it’s cleaned up properly, make sure it’s not spilled anywhere.”

Jimmy Ross Miyok (*Coppermine, interview 1995*) “Well, like they say, they don’t use any chemicals to...mine their diamonds, so I think it would be a lot better than mining other minerals...When I went for that tour, [it] didn’t look they were using chemical(s), it was like they were treating it [water] pretty good. Metals...if they can take those and ship ‘em back south instead of leaving them out on the land, it’ll be a lot better for them [wildlife] and for the future...when they’re finished with this project, say 15, 20, 25 years from now, they should do the best they can to restore the land as they found it in the first place... get rid of the strip, the roads...haul all their garbage down to recycling plants or to the cities down south...take the buildings out, get rid of the dikes, cover up their holes in the ground, and [then] it’ll be pretty well restored.”

Ida McWilliam (*Coppermine, interview 1995*) “...vegetation in our area grows extremely slow and once you start digging up whatever, that takes hundreds of years for that little bit of ground to grow. You disturbed it and the best you can do is try to put it back the way it was so that it can try and repair itself and grow over...It will get a covering eventually, but it takes so long and I think once you’ve gotten as much as you try, I think you still leave bits of things that weren’t there to begin with, I don’t think the land will ever recover...”

Coronation Impact Review Committee (*Written Submission to EARP Panel, April 12, 1995*) “The regional context must include Coppermine and its residents due to the widespread public concern of possible pollution of the Coppermine River...how will the proponent satisfy the general fear among residents of possible pollution of a river of great importance to their lives?”

Grand Chief Joe Rabesca (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) “The environment and wildlife are affected by diesel generators. I will not support diesel [generators] because of the effect on land and water.”

Former Grand Chief Joe Migwi (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) “When [mine] developments started we expected the developers to return the developments to the natural state. People became sick with cancer and the developments are blamed...the tailings have affected the river that flows into Rae-Edzo. Animals, fish, muskrat, beaver were all affected. Because of the abandoned mine, a 3-4 mile radius is affected and our people cannot hunt and trap there.”

Jimmy Nitsiza (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) said that the Dogrib want control over environmental issues and wildlife, in particular caribou migration.

Gary Bohnet, President, Metis Nation (*Written Submission to EARP Panel, April, 1999*) “The Project Description Report treats the natural environment, habitats and fish and wildlife populations in a very cursory manner. It demonstrates lack of familiarity with literature on northern species, especially northern literature...direction to the proponent is necessary in order to develop a complete EIS without serious deficiencies that will hamper a rigorous review.”

Doug Arden (*Yellowknife, interview 1995*) “I don’t see that moving the fish will have any impact. It is better than killing them all off. They should try and move the fish out of the lakes. Having mine employees who want to fish after hours, practice catch and release would be a good idea. That will help keep the lakes near the mine from having depleted fish stocks...I am not a water biologist...[but] Marion Lake is fairly murky and the Mackenzie River have a lot of sediments. There are good fish in both of these. If a dike [around the tailing impoundment area] ever burst, it would probably scare the fish. The impact on other renewable resource users in the area would be relatively short-term.”

Bill Adamache (*Coppermine, interview 1995*) “This camp construction if you weigh [it], you have to weigh the economic benefits as opposed to the environmental impacts and they’re saying the 25 square mile area will have dust and noise and stuff like that. Is the environmental impact on that 25 square miles compared to the hundreds of

thousands of square miles that are out there that are still pristine and are of no use and it could be conserved. You know these questions are really two-sided. You could look at both sides of them and I could argue with myself all day. Once the construction is completed they're [the animals] gonna come back, then again it won't affect us here, got nothing to do with us...this [the tailings] really concerns the char stock cause that lake feed directly into the Coppermine River system. If the water is polluted and the fish are poisoned it'll have a definite impact on us. That's something that's gonna have to be monitored very carefully."

Peter Kamingoak (*Coppermine, interview 1995*) "I don't like that [catch-and-release]. You know catch and let the fish go. I don't like that. It hurts the fish. If they're sport [fishing] they should give it [the fish] to the people instead of letting them go. I don't know how it's gonna affect the fish when they been dead."

Gerry Atatahak (*Coppermine, interview 1995*) "Contaminants that do run off from these lakes while they're being used...[and] even after they're drained and restored back to [their] natural state...I'm quite concerned in regards to it, like more or less contaminants would be entering the main river system that flow into the Coppermine River basin."

4.1.6 Archaeology

Burial sites, a traditional heritage concern, were frequently mentioned by the Aboriginal community elders. Specific issues discussed on this topic included making the Proponent aware of burial site locations and special identification markings, and emphasizing the importance of respectful preservation of the sites.

Former Grand Chief Alexie Arrowmaker (*Dogrib Treaty 11, Consultation and Impact and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) "There is concern because mining exploration covers a lot of areas and we are concerned about burial sites. Some sites are recorded in documents but others are unrecorded – if you happen to find a burial site – respect the site."

Elder Joe Migwi (*Dogrib Treaty 11, Traditional Knowledge (Burial Sites) Meeting, Yellowknife, June 21, 1994*) "We know where burial sites and traditional grounds are. We will try to identify these areas. There is a certain area we would like to pinpoint on Courageous Lake. On the Northeast side of Courageous Lake, there are heavy trees and this is the only place around the lake where there are trees. We would like to protect these trees and there are two burial sites also there."

Joseph Pe'a (*Dogrib Treaty 11, Traditional Knowledge Meeting, Yellowknife, June 21, 1994*) "Once we are there or are flying there, it will be easier to pinpoint certain burial sites. The only way to identify burial sites is that you will see rocks on

certain areas in a circular arrangement. These rocks vary in lengths and size depending on the size of the person's body. The circle could be narrow but very long."

Elder Harry Simpson (*Dogrib Treaty 11, Traditional Knowledge Meeting, Yellowknife, June 21, 1994*) "Elders have a concern and want to make sure the ancestors are protected and nothing happens to their heritage. We feel better now knowing that their land and their ancestors' heritage will be protected."

Louie Wayne (*Dogrib Treaty 11, Traditional Knowledge Meeting, Yellowknife, June 21, 1994*) "I'm really touched about the people selected to talk about the grave sites and protected burial sites."

Loraine Catholique (*Treaty 8, Scoping Meeting, Lutsel K'e, April 7, 1995*) "We need preservation of our cultural sites. The land in question is under treaty debates yet the government hands out permits to do work on the land."

Joanne Taptuna (*Coppermine, interview 1995*) "...I would...like to see our camping areas, or the land that we travel, be left the way it is instead of spoiling it. I don't like to see [where] our parents, [and] parents' parents travelled and camped [spoiled], they should leave it the way it is."

4.1.7 Social Issues

Increased employment has both positive and negative effects. The biggest concern is that increased wages in the communities has the potential to compound existing social problems such as alcohol and drugs. Other concerns include the disruption of family life, the need for education on money management and the difficulties of preserving traditional lifestyles concurrent with a wage economy.

Former Grand Chief Alexie Arrowmaker (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) "If we look at our areas [communities] drugs and alcohol are a problem so we have to make plans to address this problem with young people when there is development."

Mary Dale Rabesca (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) "Things are changing. Pensions are small. There are cutbacks in social services and social housing. We will have to live on a wage economy." She was also concerned about the social problems that might result from people earning wages. She wondered if there was any way the company could help decrease social problems.

Elder Joe Migwi (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) said he agreed with Mary Rabesca and conceded that there were alcohol problems in the communities. He wondered how the company would control alcohol in the camp.

Chief Charlie Jeremick'a (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) A wage economy is becoming important to the Dogrib. They prefer a wage economy to welfare. He said, "The communities want to work with BHP to alleviate social problems" (workshops for the community mobilization program were requested). He added that there is no opposition to the project if it is done in partnership and cooperation.

Reverend MacLachlan (*Anglican Minister of Coppermine, Scoping Meeting, Coppermine, March 14, 1995*) voiced his opinion that, "The largest impact visible from higher wages in this community have been higher drink orders and the impact of high drink orders and alcohol in the community has been disastrous..."

Ida McWilliams (*Social Services of Coppermine, Scoping Meeting, Coppermine, March 14, 1995*) "...I am concerned about money coming into the community. This causes more problems. We are short staffed and rely on other regions for help. Once you get more money coming into the communities you are probably going to get more drinking – more problems – families having problems. Who is going to fill in the gaps?" The government are always talking about cutbacks. I am concerned there is not going to be enough staff. Living in Coppermine, my concern is that with all this development, a lot of people come in and control is taken away from the community. I don't know how you would control that or monitor it but I would hate to see Coppermine becoming something else other than how it is now – sure, we have our problems but this is home...I think it becomes really hard for families to be away (from each other), two weeks in/two weeks off, especially during this time of year (Spring) where everybody's going out hunting...I know two weeks off seems a good long time...but taking into consideration that you're gone away from your family, away from your community for two weeks at a time, I think it is probably a very hard way to live. And, I don't know, maybe somebody has another way of handling it, maybe shorter shifts or maybe taking families in every so often, but I don't know how economical that would be."

Ida McWilliams (*Coppermine, interview 1995*) "...The idea of banking is so foreign to most of us that you think, well, I got money, I should spend it. It is something that I'm bad for too and it takes a long time before you turn around and say well, if I put this much away every week, this is what I could get, if I save this much money. And I guess if people are going to be hired from here, then, that's also another area that they should be helped with to say well, if you put a little bit of money away each week, even though it might be a little bit hard at first, I can eventually get a Honda, I can get a ski-doo, I can get a house someday or whatever. But for most of us, it seems like it's not reachable, so why bother?"

"I've only been to the Lupin mine and the effects of that you see in the community...you see all the people that work for the mines, they have snowmobiles now and four-wheelers, boats and motors, something to go out and have fun with out on the land. Before working for the mine, some of these people

were on social assistance and now they're being more independent, they have machines to go out hunting, and for their kids go to out hunting with" (Jimmy Ross Miyok, Coppermine)

Stephanie Marlow, Youth Spokesman Lutsel K'e (*Treaty 8, Scoping Meeting, Lutsel K'e, April 7, 1995*) "The youth do not want the mine. There will be more money which means more booze and drugs. We don't want that. We don't want the mine."

Elder Joe Migwi (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) He indicated that while job creation might be a good side effect of the project, he was concerned with the negative effects of social problems, particularly alcohol and drug use by young people. He suggested that the company consider ways to help when young people are affected by social problems.

Elder Joe Migwi (*Rae-Edzo*) "Social problems will be created by mining activities, and it is good to have alcohol-free zones...but we have well-educated young people. They need...work, too. The world is changing. Now the trapping is not so good [and] we have to turn to wage economy."

Elizabeth Joss (*Coppermine, interview 1995*) "...[the] most thing I'm worried about is health and violence, and drugs and booze, but I like the idea of them opening up this [mine] so people could have jobs, put people to work."

Bill Adamache (*Coppermine, interview 1995*) "Any kind of shift work is gonna [to] disrupt a family, but people have to realize that if you want to make a living...you have to make to commitments. I mean, everybody's gotta make sacrifices....for me, I don't see that this mine this BHP is putting in is gonna have any impacts on this community or on the people here. That mine is in Denedeh country. It's a, I mean if there was a mine here we would make sure all our people were taken care of first before we went to Inuvialuit [Western], or if any place else and they're gonna do the same thing, so I see very little impacts from people here. I see very few jobs coming out of here, there, maybe three or four or five but the cost of transportation out of here is going to be too cost primitive when they can hire people on the road system in the south or the Inuvialuit and Denedeh claim area. They're not going to hire out of here."

Anonymous (*Lutsel K'e, interview 1995*) "It would help if BHP would fly native workers from their home communities. Travel from Yellowknife to the home communities takes a big portion of peoples' pay. It would slow the movement of people out of the communities into Yellowknife. The influx of dollars will be an impact. One reason for moving to Yellowknife is alcohol. If people had a ticket all the way back to their home community, they would spend their salary there."

Anonymous (*Lutsel K'e, interview 1995*) "The more money you make, the more you can do for your families. If a person wants to drink, that is up to them. If they are smart, they buy what they need."

Monaca Ayha (*Deline and Rae Lakes, interview 1995*) "Native women are finally getting a chance. For years they were at the beck and call of men. They now have a chance...native women often work while the men stay at home. If I have a son, he will work. Boys are spoiled when they are young...because they are going to be hunters. They don't learn how to work. I am glad that my grandparents made me get up in the morning and work...abuse of money depends on the individual. Money will provide more access to alcohol, but it also lets people to improve themselves. If they are working at least they are not out breaking and entering other peoples' homes...this mine is going to help us socially. It will give us money to travel south and see the world. I have bought a house now. The mine has helped me to set higher social standards. I am going back to school. My self-esteem is higher...I like the feeling of independence."

Murielle Kitsura (*Dettah, interview 1995*) "Sometimes women in the camp do not know whom to turn to. They need a counsellor out there to help with problems. If women get sick on their two weeks off, they still have to go back or risk getting fired. Dene women need privacy in their work environment."

Grant Blondin (*Yellowknife, interview 1995*) "Drugs and alcohol are big problems. If you make more money some may smoke or drink it away. Youth need to learn how to manage their money and their lives. You can't let friends make your decisions. Youth need help developing life skills. They need positive role models. Communities are hard on people who want to change. The communities need to evolve and develop."

Debbie Klengenberg (*Coppermine, interview 1995*) "I don't know if you'll ever prevent social problems, they've existed even before the beginning of this project. Just increase awareness and [have] ongoing counselling...availability of treatment programs, increase awareness promoting a dry work site – alcohol free, drug free...I think if you have an orientation program where you give them lifeskills and budgeting, and...basic skills and included the spouse in that, a little one to one counselling of the responsibilities will differ when the spouse is not home, try to incorporate some budgeting...and financial responsibility on that and so that all their money doesn't go into improper things and...they could last."

Sonny Arden (*Metis, interview 1995*) "I think that the two weeks on and off is about the simplest thing for a family because they're not away that long and they get home life for two weeks and then get back to work for two weeks. I think that's a wonderful thing...BHP is going to be involved in two different cultures there. They take people, say from Yellowknife or Fort Rae, or people from Aklavik and people from Cambridge Bay or some of those northern communities, they are going to be absolutely different

than the people from here, so they got to contend with two different cultures there and that's where the problems are going to come in, too. I really don't know what you can do about that."

Archie Mandeville (*Metis, interview 1995*) "Not too many people hunting nowadays. They only go whenever there is caribou around – not as far as Lac de Gras, either. They go maybe to MacKay Lake, Jolly Lake, Lockhart River, but they can't go any further. Even there, if you go to Pellet Lake, Contwayto, it's \$1,250.00 for the airplane fare. Native people can't afford that. The old people save their money and they pool it up and then they charter a plane and the government sometimes puts out \$10,000 to get the meat in for them and sometimes they got too much meat. Nowadays the aircraft costs so much money, it's \$7.00 a mile and that's both ways. If they're taking you out there, you have to pay both ways."

Jean Taipana (*Coppermine, interview 1995*) "There's more and more people not drinking any more and you know it all depends on the individual. I think sometimes people say more money they're drinking more but that's not always the case. There's people that are not drinking any more and people are working towards making a house or something so you can't really say anything. It's hard to predict."

Ron Tologanak, Executive Director Kitekmeot Hunters and Trappers Association (*Coppermine, interview 1995*) "...usually young people they try to adapt to what's going on and usually their cultural values are gone...or they don't care about it [their culture] anymore after they start making good money."

4.1.8 Communications

The Proponent's communication process was discussed at many of the different community meetings. Community perceptions ranged from the Proponent not making enough effort or not starting early enough, to the Proponent doing a good job of keeping everyone informed and listening to community concerns. Most hoped that the Proponent would continue its consultations along the current lines to promote better relationships in the future.

Roy Erasmus of Dettah (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) expressed concern about how BHP was allowed to start exploration without their approval, even though he indicated that he is not against development.

Elder Joe Jarlow (*Dettah, interview 1995*) "Dene, Metis and Whites should all work together. We are not saying don't make a move to our lands. We're just saying don't go over our heads. Don't ignore us. Listen to what we have to say..."

Chief Henry Gon (Rae Lakes, interview 1995) (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) "In the past there

have been a lot of activities on the land but no benefit to or consultation with the Dogrib. Today we know what is going on – we want Dogrib involvement – we want a plan to work together...”

Chief Joe Judas (Snare Lakes, interview 1995) (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) “Our people are aware of international developments on our lands – our people are curious about what is happening on the projects. We have to represent our people. [Our] people have always said that developments have by-passed the Dogrib in the past. People are aware – they hear about these things in school. We have a mandate to get involved with developers.”

Chief Joe Rabesca (on Colomac Agreement Discussion) (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) “We are on the right track by talking – [we must] keep talking.”

Elder Joe Migwi (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) “It is good that the company has invited us to see the site that it is developing. One of the reasons we want to see the site is that it is an eye-opener for us as Dogrib Nation. We want to know what is happening on our lands and we want to be involved. Without Dogrib participation, it will be difficult to develop.”

Elder Joe Migwi (*Rae-Edzo, 1995 communication to BHP*) “I am happy to hear BHP respects us and we respect them. (I’m) glad we have a good relationship.”

George McKenzie (*Consultation and Benefits Agreement Meeting, March 8, 1994*) “I am grateful that the elders are having the trip to visit the Lac de Gras site. I have a request for the regional high school [Edzo]. There is great interest in a trip to the site in the future so it would be nice if BHP would give the school a chance to see the site. Also summer jobs – high school students want to get summer jobs.”

Elder Nick Black (*Dogrib Treaty 11, Consultation and Benefits Agreement Meeting, Yellowknife, March 8, 1994*) “In the past, we experienced a lot of activity where we have never benefited. The land was being developed but we were never consulted. We as a Nation have to be involved – other people from other countries are coming on our land and becoming rich.”

Johnny Washie (*Dogrib Treaty 11, Gameti [Rae Lakes], May 1995 from an editorial in the May 15, 1995 edition of News/North*) “Great warriors from BHP diamond groups come to Gameti to talk to the local people. They pass on information about their plans for the wildlife and historical sites. They discussed the economic benefit package which includes on-the-job training.”

Chief Darrell Beaulieu (*Treaty 8, Scoping Meeting, Dettah, April 8, 1995*) Yellowknives are not an interest group – we are the landowners. In 1993, Yellowknives Dene Band passed resolutions and sent out to mining companies that they had to have consent of Yellowknives Dene Band before it could commence.

Elder Joe Migwi (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) said that in any future development (within Dogrib territory) he would like to see consultation with the Dogrib Nation take place. He (Migwi) indicated confidence in the Panel's (future) report. He said that the whole development is going in the right direction because they (infer BHP) are consulting with the communities on what role they will play in development.

Chief Charlie Jeremick'a (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) Dogrib want to be consulted about any activities within that area, and have control of activities.

Elder Harry Simpson (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) He approved of the fact that BHP had been meeting regularly with the Dogrib since they had found diamonds and wanted to see an ongoing good relationship with the company.

Alex Nitsiza (*Dogrib Treaty 11, Scoping Meeting, Wha Ti, March 29, 1995*) "Maybe we should allocate money to have more discussion, more understanding."

Elder Harry Simpson (*Dogrib Treaty 11, Scoping Meeting, Rae Lakes, March 28, 1995*) said, "We seem to agree with what BHP is proposing because they have taken the right approach in consulting communities before they go ahead. BHP seems to have respect for the communities and are consulting the communities regularly, which is good."

The Metis (*luncheon, Yellowknife, May 3, 1995*) expressed their concerns that they had not been consulted during the initial stages of exploration, therefore, a lack of information on the project was emphatically stated as an issue. A subsequent luncheon revealed that they wanted a better relationship with BHP and they requested periodic updates on the project.

Gary Bohnet, President, Metis Nation (*Written Submission to EARP Panel, April, 1995*) "There has been no recognition by BHP of the Metis in the North Slave region...if this indicates the quality of research conducted by the proponent, this could be a very long review process."

Jim Peterson, President of the Barren Ground Caribou Outfitters Association (*Public Meeting, Yellowknife, March 1995*) "The consultation process [with the outfitters] should have started four years ago when the project first started."

“In the past, mines have not listened to these people (i.e., Aboriginal people) and they have not been involved. May of the problems with the mines up the Yellowknife drainage are the fault of the companies who ran them. They were left years ago, but are only being talked about now. They should have started worrying about those mines a long time ago. But what do these old problems have to do with this project? Things are done differently now. Scientists and natives should be able to work together to make things better” (Doug Arden, Yellowknife).

4.1.9 Northern Content

Chambers of Commerce and individual business people are very interested in potential employment and business benefits from the Proponent’s presence in the Northwest Territories. The Chambers of Commerce in particular wish to promote responsible business development and to capture as much new business as possible for local Northern suppliers and contractors. However, the Chambers do not want to see “development at any cost;” rather, they promote the principles of sustainable development.

Randy Mulder, President, Coppermine Chamber of Commerce (*Written Submission, Scoping Meeting, March 14, 1995*) “The community of Coppermine has had a long standing relationship with resource development. Most families have had or are now benefiting from income earned in the mining industry and the community as a whole has prospered from this activity.”

“The fact remains that we are still a community which relies heavily on income support from governments be they territorial or federal. The past few years have shown that programs such as these are fast becoming extinct and this means that we need alternatives. Resource development is a viable alternative.”

“Many of the social problems that we face here can be directly attributed to the lack of employment. The popular belief that money injected contributes to unlawful or unacceptable behaviour is a fallacy...people need jobs! True, there will be some negative effects, such as substance abuse, but can it be statistically proven that all individuals gainfully employed are substance abusers? I think not. The negatives are easily recognized while the positives are overlooked. This is not a valid argument against development.”

“If we try to force out development, how are we going to survive? We cannot go back in time. No one is prepared to go back to living on the land. It is an extremely hard life. For those professing the evils of development, I ask where are the dollars going to come from to enable us to maintain a reasonable lifestyle? Are you prepared to reduce your standard of living by 50% or more? And if so, when finally at that level would it not be reasonable to assume that in desperation we will be forced to deal with the issue

and then have absolutely no say in how development takes place. My point is that we will see resource development in this region sooner or later. I would like to see us involved now while we can contribute productively as opposed to later with no part to play.”

NWT Chamber of Commerce (*Written Submission to EARP Panel, April 5, 1995*) “...the BHP Diamond Project is one of those rare opportunities which has the potential to enhance the NWT’s ability for self reliance and self healing...we do not believe however that development should happen at any cost....this project has a projected possible life span of 25 - 35 years. NWT residents have already benefited from the jobs created during the staking stage. It’s projected that the construction stage will employ 1,000 people; 650 jobs in the operation stage; and an undetermined amount during the shut-down stage...this project directly affects three regions of the NWT labour force; the North Slave, South Slave and Kitikmeot regions, and has the potential to “directly” eliminate over 25% of the unemployment in that area and “indirectly” eliminate an additional 7 - 17% of unemployment through spin-off jobs...we were encouraged that a northern community was selected as the point of hire for these jobs, but we would still like to ensure that:

- priority for these jobs continue to be given to northern residents and that there is inclusion of covenants into the permits that will ensure involvement by northerners
- negotiations with aboriginal groups and impact areas be solidified to ensure their concerns are identified
- consultations take place between BHP and educational systems to provide appropriate training for necessary trades
- to ensure that a northern community will always be designated as the point of hire to guard against the “Fly-In, Fly-Over” type of operation of the past.”

Richard C. Secord, (*Solicitor, Parlee McLaws, City of Yellowknife, Written Submission to EARP Panel, April 11, 1995*) “...the City of Yellowknife believes that the proponent should be required to do an economic impact analysis to capture the economic impact of its project at the local level [City of Yellowknife] the territorial level and the national level...the City of Yellowknife would expect the economic impact analysis to indicate:

- How much of the construction costs would be spent on local sourcing of materials in the City of Yellowknife?
- How much of the annual operating costs would be spent on local sourcing of materials in the City of Yellowknife?

- How many of the 650 permanent employees would make the City of Yellowknife their home?”

Braden Burry Expediting (*Written Submission to EARP Panel, April 5, 1995*)

“...my concern with this project is that it be allowed to continue in a timely manner. The project has some strong momentum at the present and I strongly believe that if the decision of the Minister or this process is delayed unduly that it will have a negative effect on the economy of the north, and may even put the project in jeopardy...BHP is proposing that they will spend in excess of \$500 million putting this deposit into production. Is the panel aware that this money is being injected into the Canadian economy from offshore as foreign investment? At this point in time, can the Canadian economy afford to ignore the obvious economic benefits that will be offered not only to Yellowknife and the north but to the entire country? I would like to know when the last time that a project of this magnitude has been proposed in Canada without the proponent having their hand out looking for employment grants, tax breaks, cheap power or other major concessions that are supported by the Canadian taxpayer? Will the EIS clearly point out the benefits of this project to the Canadian economy over the life of the project? Will the EIS presented by BHP clearly spell out the cost of the project, will there be any cost to the Canadian Taxpayer?”

Yellowknife Chamber of Commerce (*Submission to EARP Panel, April 6, 1995*)

The Yellowknife Chamber of Commerce asked the Proponent to narrow the margin between relinquishment of the non-renewable resource of diamonds and sustainable compensation. The Chamber believes this will provide more equitable compensation to the NWT and with the extra compensation they can become more self-reliant as the federal government cuts their financial ties to Ottawa. The Chamber focused on five main impacts to the Northern economy and requested clarification on the following:

1. Location of bona fide administrative mine office in Yellowknife: What level of commitment is BHP making to locate its bona fide mine administration offices in Yellowknife? How many families do they envision relocating to Yellowknife for the management operations? What is BHP’s required administrative infrastructure?
2. Northern employment and work rotations: Will BHP ensure that prospective employees have resided in the Northwest Territories for a period of at least one year and hold a valid NWT health care card? Will BHP provide an employee benefit package which will encourage Northern residency? Will BHP ensure that a one-week work rotation is seriously considered?
3. Purchasing policies: What is BHP’s purchasing policy, as well as details pertaining to price, geographic or any other qualifiers which are used? Can BHP ensure a significant improvement in percentages of Northern purchasing over the Territorial average? Is BHP willing to help northern suppliers become more knowledgeable in their bidding, service, and competitiveness as relating to BHP’s needs?

4. Value-added industries: In order to examine what value-added industries derived from this diamond mine may be located in Yellowknife, we require clarification on the processes the diamonds go through. We require further information on specific processes, infrastructure requirements, and labour involved with the sorting operation. The Yellowknife Chamber of Commerce believes that sorting and cutting operations located in the North are integral to the sustainable development that we are trying to achieve. The Chamber requires the proponent's assurance of assistance in developing these industries.
5. Community benefits: ...BHP indicates in their project report that they will monitor environmental and socioeconomic impacts of their operations over the life of the project. Can BHP identify precisely what socioeconomic impacts will be monitored and how this will be effectively accomplished? What assurance can you give that contractors to this project will maintain a majority of Northern content in labour and services?

“The commitment of mining companies to the NWT is weak...a small percentage of these companies' expenditures are left in the NWT. The Yellowknife Chamber of Commerce sees the proposed BHP Diamond mine as an opportunity to enhance and enrich the economic environment of the Northwest Territories.”

4.2 Aboriginal Employees' Perceptions of the Project

To augment the Proponent's baseline study of Traditional Knowledge, anthropologists Dr. Marc Stevenson and Chris Hanks interviewed Aboriginal people working at the NWT Diamonds Project. The objective of the interviews was to gain a better understanding of existing Aboriginal perceptions of the socioeconomic and environmental impacts of the project from those who, by being directly involved, have some familiarity with it.

A total of ten Aboriginal people were interviewed. At the time of the interviews, these ten people were either employed directly by the Proponent or by contractors working at the project site. The individual interviews were conducted in May 1995 at Koala Camp. The ages of the interviewees ranged from 22 to 51, averaging 32 years, and three of the ten were women.

Interviewees were presented with a variety of topics dealing with the presence of the mine and mine operations. They were asked if they had any opinions or concerns regarding that topic and how they perceived that topic would affect the

environment or Aboriginal community. Summaries of the responses are presented below. Numbers next to each topic indicate the number of people out of the ten interviewed who offered an opinion on that particular topic. Details of the individual responses to the anthropologists' questions are listed in Appendix IV-C2.

4.2.1 Socioeconomic Issues

Foreign Names of Lakes: (10 out of 10)

Opinions are evenly divided between those who feel the names do not matter and those who feel Aboriginal names would have been more appropriate.

Employment in the Mine: (8 out of 10)

All those who responded recognize the importance of education and training. Aboriginal people cannot expect to get good jobs without adequate schooling and education, and they cannot expect to get better jobs without earning them. The project is giving Aboriginal people training and the opportunity to earn training certificates that might help them get other jobs elsewhere. It was mentioned that Aboriginal people need more involvement in the management of the mine.

Shift Work: (10 out of 10)

Overwhelmingly, everyone favours the two weeks on/two weeks off rotation over one week on/one week off. With one exception, shift work has not caused any family problems. The one problem occurred when an individual's work shift fell over the Christmas holidays, and that person was told (by someone at home) that the only reason anyone works over holidays is because they are greedy. This person could have left the work site but stayed, feeling it was the responsible thing to do.

Ethnic Conflict: (10 out of 10)

Half of the people have had no problems with ethnic tension or discrimination. Others have experienced some friction with other employees or southern workers who feel Northerners lack education.

Loss of Youth in the Communities: (9 out of 10)

The majority of interviewees either feel the mine will not disrupt communities or see the mine as a positive opportunity. There are concerns among the others that young people will lack exposure to elders and spend their wages unwisely on drugs and alcohol. It is important that the youth have positive role models and develop life skills in managing money and their lives. Some feel that the jobs are temporary and that when they are finished the Aboriginal employees will return to the community. Others feel that having tasted a new life, they will not want to return. Women who have traditionally taken

wage jobs in the community while the men go hunting and trapping may be the biggest beneficiaries of the employment opportunities at the mine, because they have learned to work in a wage economy.

Loss of Hunters/Trappers: (9 out of 10)

Loss of hunting and trapping time is not a problem, since the two weeks on/two weeks off shift rotation allows plenty of time for hunting and trapping on the days off.

Disruption of Traditional Economies: (6 out of 10)

Several suggestions were made on this topic. The primary way in which the project could help the communities is by allowing, sponsoring or helping Aboriginal people to go on the traditional fall caribou hunt. The project could also assist Aboriginal workers by flying them from their home communities to the mine for their work shifts and by encouraging them to take time off from work to attend family funerals. One person commented that the communities are so used to being pampered by the federal government that they have stopped trying. It would help if the project could encourage the people of the community to show some initiative.

Introduction of Wage Labour: (8 out of 10)

The consensus is that money itself is not bad and it is up to the individuals as to how they spend their money. It is recognized that some people will use their wages to buy necessities and improve themselves, and others will waste it on alcohol. Families need to work with their kids on drugs and alcohol. The project could help by flying people back to their communities instead of just to Yellowknife, where alcohol is easily available.

Influx of Non-aboriginals: (6 out of 10)

The consensus is that this is not a problem. The project should hire and train more Aboriginal people. Affirmative action can help Aboriginal people who have an education but lack experience.

Mine Has Contributed to Tensions Between Dene Groups: (9 out of 10)

Almost everyone agrees the mine has contributed to tensions between the Treaty 8 and Treaty 11 people due to problems in determining an agreeable boundary over the mine site area. In general, the workers do not want any part of what they consider a political argument. They consider themselves the same people. One person has experienced trouble because of perceptions that his group has received preferential treatment. The consensus is that the boundary dispute should not be a concern of the Proponent; it should concern only the Aboriginal people and possibly the federal government. One

person believes the feuding people are being played one against the other by the federal government.

Loss of Archaeological Specimens: (9 out of 10)

Graves and old camp sites must be left alone. Burial sites are sacred.

Separation of Socioeconomic and Environmental Impacts: (7 out of 10)

The project could learn a lot from Aboriginal people and needs to try and understand the Aboriginal perspective. An on-site cultural officer would help both the project and Aboriginal people to better understand each other. Some Aboriginal people are shy and find it hard to express themselves in English.

Length of Operation: (7 out of 10)

Most of the people who responded hope the project will last for its projected 25 year life or longer. One person said the project should focus on only one deposit and not develop others until the impact of development could be determined.

Other Concerns: (3 out of 10)

The project needs to hire and train more Aboriginal people who have taken the time to get their basic education. Having kids tour the mine site is a good idea. The project should help communities. Southern employees need to be educated about northern life and undergo cross-cultural awareness training. There is a disparity between the better wages and benefits paid by the Proponent versus the poorer wages and benefits of the subcontractors. One person said that cleaning ladies in particular are not treated well.

4.2.2 Environmental Issues

Roads: (9 out of 10)

Both environmental and safety issues were raised with regard to the effects of roads within the project area and increased traffic on the Echo Bay winter road.

The majority see no problems with the roads within the project area. Of particular importance is the effect these roads might have on the caribou. Most believe the caribou are not bothered by the presence of roads, road traffic or even the mine site itself.

A few people said the effect of increased winter road traffic on wildlife is not a problem, whereas others feel the winter road would give greater access to game and thus increase hunting pressure. Since many of the respondents hunt or trap, improved access is generally seen to be positive.

Increased road traffic would increase the chance of strandings and accidents. Additionally, there would be a greater chance of spills, which might affect the environment.

Airstrip: (10 out of 10)

A clear majority of the interviewees believe the airstrip does not affect wildlife, particularly the caribou. The concerns raised by the others are aircraft noise, the possibility that birds might be scared from their nests and the problem of caribou wandering on the airstrip. The overwhelming consensus is to leave the airstrip in place after the mine is abandoned to serve as an emergency landing area and/or for hunters and trappers.

Camp Construction: (9 out of 10)

Comments centered on the impact of camp construction on wildlife and Aboriginal life and over the long term. The majority feel that camp construction will adversely affect wildlife, primarily because of noise and the decreased range for the local animals. One person noted that the animals will eventually adapt and get used to the camp. Particular care must be taken to prevent negative impact on animals due to greater interaction with humans. Many animals, especially scavengers, will be attracted to the camp. The project must continue to train its people, particularly short-term workers, not to bother and feed the animals. Dust control during the construction phase is a concern. There will be an initial loss of vegetation, but this can be restored after the construction phase.

The consensus is that, due to the remoteness of the site, the camp construction will not affect traditional Aboriginal activities.

Camp Operation: (8 out of 10)

Most people believe that scavengers like bears, wolves, wolverines, foxes, ravens and seagulls will be attracted to the site, particularly if the project is not careful with its dump. The project tries to keep away bears, wolverines and foxes with electrical fences. Opinion is split as to whether other animals, particularly the caribou, will be driven away by this influx of other animals. The consensus is that the caribou will naturally adjust their migration routes as necessary.

It was suggested that Aboriginal hunters be allowed to hunt and trap nuisance animals. It was noted though that if one group is allowed to hunt, everyone should be allowed to hunt. Increased trapping opportunities, if the project allows, is the only way traditional Aboriginal people would be affected by camp operations.

Dewatering Lakes: (10 out of 10)

The lake dewatering plan is a contentious issue because it brings to the surface conflicts between Aboriginal tradition and the benefits of the mine. There are two separate issues: the actual dewatering, and what to do with the fish. Half the people see no problem in dewatering the lakes as long as the fish are not killed. The other half do not like the idea of dewatering lakes, either because of the loss of habitat or because of concerns for the fish. Regardless of what happens to the lakes, almost everyone is concerned about the fate of the fish. Many have a problem with the concept of catch, move and release, given the traditional Aboriginal view that not eating a fish that has offered itself is disrespectful. A preferred method of moving the fish is via a diversion ditch so the fish do not need to be handled. One suggestion was to offer some of the fish to the elders as traditional food. It was mentioned that the project has been open to suggestions on what to do with the fish. The majority of interviewees take a pragmatic approach and conclude that it is better to move the fish by any means than to kill them. There is one main dissenter who believes the fish are keyed to spawn in specific lakes and thus cannot be moved.

The consensus is that dewatering these lakes will not affect traditional Aboriginal people who would probably not fish in these particular lakes.

Removal of Lake Bottom Sediments: (6 out of 10)

Several of the interviewees were not familiar with this topic. Of the others, half did not think acid mine water would be a problem. The rest were more cautious, saying that water pollution might be a problem and that it required close monitoring. The project must be prepared to deal with waste rock and acid mine water should a problem arise. Revegetation is considered necessary, and the sediments must be made suitable to support revegetation.

Open Pit Operations: (9 out of 10)

The two major issues are dust and blasting. Opinions are evenly divided on whether or not dust can be controlled. Concerns are windy days, the possibility that watering the roads may not be sufficient to control dust, health hazards to humans and animals, effects on vegetation and water quality, and possible harmful substances contained in the dust. Humans can wear masks if necessary, but animals, particularly the caribou, are at risk. If the caribou herd gets sick from the dust, the Aboriginal people will suffer.

Most interviewees do not think blasting will be a problem. Concerns were raised that blasting might scare animals and change denning habits. In addition there are safety concerns about warning Aboriginal people and keeping wandering caribou from blast sites, particularly during migrations.

Processing Operations: (8 out of 10)

Opinions are varied as to what impact the tailings will have on water quality or what the impact of a catastrophic release of water might be downstream. Some feel there will be no problem; even if a flood or a dike break were to occur, the muddy water would not adversely affect fish or Aboriginal people downstream since the muskegs could absorb the fines. One person added the important proviso that there would be no problem as long as the water was only muddy and did not contain chemical contaminants. It was mentioned that, over the past year, the Proponent has attended to problems promptly and would react quickly to repair a dike leak. Others feel that a flood of muddy water could affect fish and people downstream. Another was familiar with tailings ponds in Yellowknife, which were termed dead waste lands, and was concerned that the mine tailings ponds could have the same fate. Others were just against using Long Lake as a tailings site and asked if there might be another, more isolated pond that could be used instead.

Power Plant: (9 out of 10)

There are three evenly divided groups of answers concerning the impact of the power plant on the environment: there is no problem with the diesel generators; the power plant is noisy; and the noise, vibrations and exhaust may affect the wildlife. Those expressing the latter opinion think that power should be obtained or supplemented from other sources, either from the Snare River or, because the environment is so pristine, from a clean but energy conscious source (i.e., solar or wind power). It was mentioned that diesel fuel must be stored properly and safely.

Waste Management: (9 out of 10)

Waste management concerns focus on spills, sewage and trash. The problem of spills was mentioned by almost everyone interviewed. Although equipment is provided at site to clean up spills, and the Proponent is conscientious about taking care of spills promptly, the major problem is one of attitude, particularly from the contractors, who either do not report and try to hide spills, or just do not take the time to attend to them. The project needs to educate the contractors and purge this “don’t care” attitude. At present, there are simply not enough environmental people to oversee everything.

Opinions are mixed on the state of the sewage system, ranging from it being a big problem to it being a problem that is being dealt with. Most of the people who are familiar with the deplorable conditions of dumps in the communities believe that trash should be back-hauled to Yellowknife on the winter road.

Direct Terrestrial, Indirect Terrestrial and Aquatic Impacts: (7 out of 10)

These categories were poorly defined and resulted in a variety of responses ranging from recreational to environmental issues. Two people supported sport fishing by mine employees, and one of these promoted catch and release. A third person said that catch and release was disrespectful to the fish. Another interviewee wished he could hunt and trap at the mine site on his off hours. One person thought that defined roads would lessen environmental damage, while another thought that roads would harm the plant life. There are other concerns that the caribou might leave the area, tailings might cause environmental and health problems and contamination might occur, making the area unsafe for hunting. One person felt the project should take seasonal wildlife activities into account when planning mine operations.

Reclamation: (10 out of 10)

Though some believe the land can never be completely restored, all agree that it is essential that the project do a thorough cleanup and meaningful reclamation. The reclamation should be an ongoing process and not left until the very end.

Environmental Monitoring: (10 out of 10)

All the interviewees believe that Aboriginal people should be involved in the environmental monitoring process. This would serve several purposes: the Aboriginal people would better understand the mining process, they could learn how monitoring is done and they could report back to the elders and communities on the process and progress. Most of the people feel that input from both the elders and scientists would be useful and should be considered in the environmental monitoring process. Some consider it very important that the elders be consulted, whereas others are willing to place their faith solely in scientists without the input of traditional knowledge.

Previous Experience with Mines: (10 out of 10)

Four of the interviewees had previous experience working at mines and two others had worked for drilling or pipeline companies. One of the people previously employed at an open pit mine said it had had a very negative impact on the wildlife, and feels it would be important for the project to consult with the elders to lessen a similar negative impact. Another person who worked at the same mine saw no negative impact. One of the people who worked for an oil company said the elders feel the oil was stolen from them.

Other Environmental Concerns: (7 out of 10)

Because of the closeness of the Aboriginal people to the land, the overriding environmental concerns are keeping the land clean and looking after the fish and animals upon which the Aboriginal people have relied for thousands of years. Keeping the land

clean means not only controlling wastes and pollutants, but also maintaining an ongoing cleanup and reclamation program.

4.3 Employment and Income

The Proponent will spend approximately \$750 million in 1994 dollars on the development, construction and start-up of the NWT Diamonds Project, up to year 1988. Once operational, annual expenditures, including employment are estimated at \$163 million at the 9,000 tonnes per day production level, rising to over \$200 million once the mine reaches an 18,000 tonnes per day production level.

During the preproduction/construction/start-up phase, and over its projected 25 year life span, the NWT Diamonds Project can make a positive and lasting impact on the Northwest Territories; however, the extent of this impact will depend ultimately on the Proponent's level of expenditures within the Northwest Territories.

The Proponent is committed to northern preference in hiring and purchasing, and has established policies and procedures to support this commitment (Volume I, Section 4). The ability of the NWT labour force and the NWT business sector to respond to, and fulfill the project's employment and goods and services needs will ultimately determine NWT expenditure levels.

This section assesses the probable level of success of the labour force and the business sector in meeting the Proponent's needs. This success is measured in potential employment and income to NWT residents. In subsequent sections of this report, estimated levels of employment and income are major indicators used to determine potential levels of impact.

NWT Diamonds Project expenditures in the NWT will result in the creation of new jobs and the expansion of overall earned income. Three main categories of employment and income are examined in this section:

- direct employment and income resulting from jobs at the NWT Diamonds Project
- indirect employment and income resulting from jobs created as a result of project purchases of goods and services in the Northwest Territories
- induced employment and income resulting from the respending of people employed directly by the Proponent and indirectly by suppliers to the Proponent.

Since it was obvious early in the assessment that the existing NWT labour force could not provide all the immediate technical skill requirements of the project, it was necessary to examine potential in-migration (people who could move to the NWT for direct or

indirect project employment) as part of the employment assessment for both the construction and the operations phases of the project.

The methods and assumptions used to develop detailed estimates of employment and income by locations are explained in each sub-section. They are based on an extensive review of existing literature and visits/interviews in Yellowknife, Hay River and Coppermine. Since surveys of First Nations communities were not permitted, estimates for these communities were based mainly on secondary information sources.

Employment and income have been selected as the major indicators for this assessment since there is a direct relationship between these indicators and many of the other social and economic impacts. The results of this section are used extensively in subsequent sections.

For both the construction and operations phases, employment and income have been assessed by location and by type (direct, indirect, induced). Summaries of these estimates are presented in [Tables 4.3-1, 4.3-2 and 4.3-3](#). The estimates developed for these prime indicators establish the Proponent's potential level of expenditures in the Northwest Territories, which in turn establishes the potential level of socioeconomic impact in the Northwest Territories.

This section examines the Proponent's labour, goods and services requirements, determines the NWT's ability to fill these requirements and estimates potential levels of employment and income by location.

The following NWT locations were selected for analysis:

Yellowknife, the capital of the NWT, has the largest population and the most diverse business community in the NWT. The First Nation community of N'dilo was included with Yellowknife because all existing demographic, employment, income, labour force and community health data is combined with Yellowknife by the various agencies maintaining these statistics. The Proponent has designated the City of Yellowknife as its hiring base for the NWT Diamonds Project. Transport to and from the mine, free of charge, will be from Yellowknife and a number of other designated communities.

Hay River is the second largest community in the study area and a secondary supply centre to the project. Considered a transportation hub of the Western Arctic, Hay River is the terminus of the only rail line in the NWT. The Hay River Reserve is included with all Hay River statistics and estimates. Hay River served as a supply centre for Pine Point Mine for over 20 years, and is actively pursuing

**Table 4.3-1
Summary of NWT Diamonds Project
Related Employment & Income
Preproduction/Construction/Start-up Phase - to 1998**

Location	Type	Person-years	Income (\$000)
Yellowknife	Direct — Contractors	43	\$3,311
	Direct — NWT Diamonds Project	122	11,122
	Indirect	382	21,010
	Induced	164	5,740
	Total	711	41,183
Hay River	Direct — Contractors	27	1,940
	Direct — NWT Diamonds Project	37	3,260
	Indirect	180	9,000
	Induced	54	1,620
	Total	298	15,820
First Nations	Direct — Contractors	20	1,260
	Direct — NWT Diamonds Project	37	2,493
	Indirect	51	2,295
	Induced	11	275
	Total	119	6,323
Coppermine	Direct — Contractors	7	440
	Direct — NWT Diamonds Project	21	1,301
	Indirect	24	1,080
	Induced	5	125
	Total	57	2,946
Rest of NWT	Direct — Contractors	3	189
	Direct — NWT Diamonds Project	13	1,000
	Indirect	23	1,035
	Induced	4	100
	Total	43	2,324
Total NWT	Direct — Contractors	100	7,140
	Direct — NWT Diamonds Project	230	19,176
	Indirect	660	34,420
	Induced	238	7,860
	Total	1,228	\$68,596

Source: Outcrop estimates.

Table 4.3-2
Summary of NWT Diamonds Project
Related Employment & Income
Operations - Year 2000

Location	Type	Person-years	Income (\$000)
Yellowknife	Direct	154	\$11,557
	Indirect	191	10,385
	Induced	104	3,640
	Total	449	25,582
Hay River	Direct	80	5,686
	Indirect	86	4,600
	Induced	33	990
	Total	199	11,276
First Nations	Direct	82	5,009
	Indirect	12	530
	Induced	9	225
	Total	103	5,764
Coppermine	Direct	31	1,760
	Indirect	7	310
	Induced	4	100
	Total	42	2,170
Rest of NWT	Direct	51	3,249
	Indirect	2	90
	Induced	5	125
	Total	58	3,464
Total NWT	Direct	398	27,261
	Indirect	298	15,915
	Induced	155	5,080
	Total	851	\$48,256

Source: Outcrop estimate.

**Table 4.3-3
Summary of NWT Diamonds Project
Related Employment & Income
Operations - Year 2007**

Location	Type	Person-years	Income (\$000)
Yellowknife	Direct	254	\$18,677
	Indirect	251	13,685
	Induced	152	5,320
	Total	657	37,682
Hay River	Direct	140	10,236
	Indirect	112	6,030
	Induced	50	1,500
	Total	302	17,766
First Nations	Direct	137	9,149
	Indirect	26	1,160
	Induced	16	400
	Total	179	10,709
Coppermine	Direct	57	3,690
	Indirect	11	490
	Induced	7	175
	Total	75	4,355
Rest of NWT	Direct	66	4,379
	Indirect	5	225
	Induced	7	175
	Total	78	4,779
Total NWT	Direct	654	46,131
	Indirect	405	21,590
	Induced	232	7,570
	Total	1,291	\$75,291

Source: Outcrop estimates.

Colomac mine business. Hay River is currently the pick up and drop off point for Colomac staff.

First Nations Communities: The Treaty 8 and Treaty 11 bands are both involved in negotiations with the federal government for overlapping lands that include the NWT Diamonds Project. For the purposes of the socioeconomic analysis the Treaty 11 communities of Wha Ti, Snare Lake, Rae Lakes and Rae-Edzo are combined with the

Treaty 8 communities of Dettah and Lutsel K'e into a single category called "First Nation Communities." The Treaty 8 community of N'dilo is included with the City of Yellowknife since the historical statistics are combined with Yellowknife.

Coppermine is the only community within the same water drainage system as the proposed project. In addition, this community has over two decades of experience with rotational employment and over a decade of rotational employment experience with the mining industry.

The Rest of the NWT includes communities such as Umingmaktok/Bathurst Inlet, Cambridge Bay and Deline. These communities were not assessed separately since the employment and income numbers are not expected to cause serious community impacts. The rest of the NWT also includes the populations in four of the five NWT regions. To date, all of these regions have had people working at the site (Boyd 1995a).

In conjunction with employment and income indicators, a number of other indicators were used in socioeconomic impact assessments:

- the social health of the communities: education levels, crime levels, unemployment levels, social assistance payments, social agencies operating in the communities
- levels of resource harvesting activity
- existing uses of land and infrastructure
- capacity and diversity of businesses within the study area.

Since employment and income are the major impact indicators they are discussed in detail in this section. Other indicators are discussed in the setting (Volume II, Section 4) and other impact sections of this volume (Volume IV, Section 4).

4.3.1 Preproduction/Construction Start-up

The preproduction or advanced exploration stage started in 1993 with the decision to initiate a bulk sampling program at the NWT Diamonds Project property in the Lac de Gras area. By the end of 1994 the Proponent had over 250 people working at the site and 15 in their Yellowknife office. Expenditures by the end of 1994 exceeded \$100 million. Approximately one-third of this amount was spent in the Northwest Territories, mainly on the purchase of goods and services and on wages for NWT residents. First Nations and other Aboriginal people averaged 25% of the on-site staffing requirements during the advanced exploration program.

Total capital expenditures through the preproduction/construction/start-up phase are projected to be approximately \$750 million in 1994 dollars. Close to half these

expenditures are for the actual construction of the mine and ancillary facilities. The construction time frame is expected to span 20 to 22 months. After this initial construction period, it is expected there will be additional construction capital expenditures particularly for underground mining and equipment replacement. These additional construction costs, though not included in this analysis, are included in the overall picture presented in the Economic Impacts section (Section 4.14). Total capital expenditures over the life of the project are expected to be \$1.2 billion.

During the preproduction/construction/start-up phase (to early 1998) the project's NWT expenditures are estimated to be \$203 million or close to 25% of the project's total capital cost. These expenditures will generate more than 1,200 person-years of employment in the NWT, and \$68.5 million in new earned income (Table 4.3-1).

4.3.2 Direct Employment and Income Levels – Construction

NWT residents could fill 33% of the direct employment requirements during the Preproduction/Construction/Start-up phase of the NWT Diamonds Project, equivalent to a total of 330 person-years. Direct employment includes both project employment and employment with major contractors hired by the Proponent to complete construction. NWT resident direct income during this phase could reach \$26.3 million. Direct NWT Diamonds Project employment will account for the majority of the person-years (230) and the income (\$19.1 million) during this phase.

Direct NWT Diamonds Project employment and related income could have a major effect on the economy and people of the Northwest Territories. The extent of the impact will depend on the number and home communities of NWT residents hired for the project and the movements of the labour force into or out of NWT communities.

Although direct project employment will reduce unemployment rates in specific areas of the Northwest Territories, it should be noted that the Proponent will not be hiring only the unemployed. Many of the people the project hires could already have jobs in the NWT. Hiring by the NWT Diamonds Project is expected to start a trickle-down effect, which in fact opens entry level jobs to unemployed people. For example, if the Proponent hires the water truck driver from a small community, that position would then become open to another community member, who may not qualify for a direct project job, but can gain valuable work experience as the water truck driver. Again, if the project hires a shift foreman from another NWT mine, this could start a chain of promotions which could ultimately result in the hiring of another employee in an entry level position at another mine. Virtually all NWT Diamonds Project hires in the NWT will result in net employment gains to the NWT.

During the preproduction/construction period, there will be two types of direct employment: direct employment with the major contractors hired to build the mine, processing plant and auxiliary facilities such as living quarters, power plant, etc. and

direct employment with the Proponent. Both types of direct employment have been examined in this analysis.

4.3.2.1 Level of Employment and Income with Construction Contractors

During the 20 to 22 month construction period, the major contractors will have total labour requirements of approximately 7,000 person-months or 590 person-years. Most of this need will be for skilled tradespeople. Unfortunately skills required by many of these trades are limited or non-existent in the NWT. **Table 4.3-4** shows the number of resident tradesmen in relevant skill categories.

The number of NWT residents hired for work with major contractors will depend mainly on the following:

- availability of NWT skills/labour supply
- amount of work sub-contracted to NWT companies
- northern hiring centres established for construction employment
- NWT hiring directives issued with Proponent tender calls to major contractors.

Availability of Skills/Labour Supply in the NWT

Close to 3,500 trades certificates have been earned in the NWT since trade designations were established here, starting in 1964. Heavy equipment operators (444), electricians (303), carpenters (267) and motor vehicle mechanics (238) appear to be the main areas of expertise among the 39 designated NWT trades certifications. Certified journeymen in a range of trades are primarily located in Yellowknife and Hay River (Lutra 1995).

As of November 1994, there were 436 registered apprentices across the Northwest Territories. Close to half this number were first year apprentices and 25% of all apprentices were based in Yellowknife. There were only four apprentices in North Slave communities outside of Yellowknife. Trades with the largest number of apprentices include carpenters, electricians, plumbers and heavy equipment operators. A total of 203 of the registered apprentices are in the North Slave (115), South Slave (61) and Kitikmeot (27) regions (Lutra 1995).

**Table 4.3-4
Demand/Supply Match of Major
Contractor Skill Requirements**

Trade/Activity	Person-month Requirements	Journeyman Certified in NWT to Date*	NWT Registered Apprentices 1994	Resident Journeyman NS/SS/K**
Boilermakers	217	-	-	-
Carpenters	880	267	86	211
Electricians	912	303	62	188
Insulators	13	-	-	-
Ironworkers	1,114	-	-	-
Labourers	1,055	N/A	N/A	N/A
Millwright Mechanics	598	99	3	46
Operators	786	N/A	N/A	N/A
Pipefitters	523	30	2	19
Sheetmetal Worker	372	16	1	12
Truck Drivers	370	N/A	N/A	N/A
Cement Masons	124	-	-	-
Painters	120	66	5	53
Total	7,084			

* Includes total number of certificates since the trade was designated in the NWT. Does not include total number now resident in the NWT, since some have likely moved.

Sources: GNWT Department of Education, Training and Culture 1994.

** Total number of certified journeymen per required trade, now residing in the North Slave, South Slave and Kitikmeot Regions, the three GNWT regions closest to the mine.

Source: Lutra 1995 and GNWT Department of Education, Culture & Employment.

Certified NWT tradespeople and trades apprentices have jobs with contractors, government, mines or service businesses.

Potentially, all carpenter, electrician and painter positions could be filled by NWT journeymen. Since most of these people are already employed on a full time basis, it is unlikely many would leave their jobs for short term employment on construction, unless they plan to seek a permanent position with the NWT Diamonds Project after construction.

The construction phase also includes over 1,000 person-months of employment for labourers and 370 person-months of employment for truck drivers. With some preparation, many of these positions could be filled by NWT residents.

Amount of Work Sub-Contracted to Northern Companies

The amount of construction work sub-contracted to northern companies will have an impact on overall NWT employment during the construction phase. For example, if a northern firm was awarded the painting contract, that firm would use resident staff to complete the job. However, if the painting contract went to a southern company, it is quite likely they would move staff in to do the job, since most, if not all the qualified painters in the north are already working for northern companies.

In the construction plan, the Proponent states that it will use local NWT resources “consistent with availability and commercial viability.” Some potential NWT-based contracts (identified by the Proponent) could include survey services, temporary mechanical/electrical installations, water/power services; road work, architectural design of the permanent camp, to name a few. Use of northern contractors could increase the overall level of NWT employment during the construction phase. Some use of northern contractors has been factored into the direct employment assessment for construction (Table 4.3-5).

**Table 4.3-5
Distribution of Major Contractor
Employment by Person-months***

Activity/Skill	NWT Resident Person-months/Employment					Total
	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	
Carpenters	72	48	24	18	18	180
Electricians	48	36	–	–	6	90
Labourers	240	120	192	48	0	600
Millwright/Mech.	36	24	–	–	–	60
Operators	36	24	–	18	–	78
Pipefitters	12	12	–	–	–	24
Sheetmetal Workers	12	12	–	–	–	24
Truck Drivers	48	36	24	–	12	120
Painters	12	12	–	–	–	24
Total	516	324	240	84	36	1,200

* A person-month is equivalent to 210 hours (three weeks on @ 70 hrs per week, followed by one week off.) Therefore 1,200 person-months, equals 100 person-years.

Northern Hiring Centres Established for Construction Employment

To give preference where possible to First Nations and other NWT residents, the Proponent will assist in recruiting workers for major contractors via the establishment of part time employment coordinators in certain communities (Boyd 1995b). As well,

personnel staff of the NWT Diamonds Project located in Yellowknife during construction will assist with placement of northerners in construction-related jobs.

NWT Hiring Directives Issued with Tender Documents

The construction plan for the NWT Diamonds Project centres around the award of multiple contract packages to established contractors with the experience and resources to successfully undertake multi-million dollar work programs in a harsh climate at a remote site. Further, the Proponent states in its contracting approach that given the location of the site, it is appropriate to rationalize the number of contracts and thereby mitigate mobilization costs and redundant indirect costs. This means a few very large contractors will carry out the work. Few, if any, northern contractors have the experience to undertake a construction job of this magnitude. NWT resources will be utilized consistent with availability and commercial viability, and that the EMCM Contractor (Engineering, Procurement and Construction Management) will make effective use of the local population for support positions on the job site and will structure a subcontracting plan to use local contractors where deemed appropriate.

NWT Person-years of Employment with Major Contractors

Despite every effort made to involve NWT residents in construction employment with contractors, it will be difficult to fill more than 15% to 20% of the direct construction labour requirements with northerners. A much larger proportion of project related construction employment will occur indirectly or through responding effects.

Based on a match of construction skill requirements with existing skills in the NWT and a consideration of the limited construction period, the consultants estimate that NWT residents will fill 17% of the labour requirements of major contractors during the construction phase. Close to 66% of this employment will be in the non-trades areas, specifically labourers and truck drivers and operators (Tables 4.3-4 to 4.3-5).

Estimates of the distribution of direct NWT labour force employment with contractors for the NWT Diamonds Project by community and job skill is shown in Table 4.3-5 and 4.3-6.

NWT Income from Major Contractors Employment

During the actual construction period, income earned by NWT residents through jobs with major contractors, will be just over \$7 million. NWT resident construction income could be distributed as shown in Table 4.3-7, based on the potential hires by skill level per community, hourly rates for various jobs, plus northern allowance and other benefits.

**Table 4.3-6
Percentage Distribution of Major Contractor Employment
by Person-years per Location***

Located	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	Total
Potential Hires	43	27	20	7	3	100

* Location assessment was based on matching project requirements to available skills in a community or group of communities.

Source: Outcrop estimate.

**Table 4.3-7
NWT Resident Income from
Major Contractor Employment by Location**

Location	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	Total
Income (\$000)	\$3,311	\$1,940	\$1,260	\$440	\$189	\$7,140
% of NWT Income by Location	46%	27%	18%	6%	3%	100%

Source: Outcrop estimate.

Although NWT residents could fill 17% of the construction contractor labour requirements, they will earn only 13% of the total \$53.9 million construction labour cost. Since NWT residents do not have the needed skills for many of the higher paying trades jobs (Table 4.3-4), they will likely fill lower paying positions.

In-Migration Resulting from Major Contractor Employment

It is not likely that many, if any, people will move to the Northwest Territories for a short term job with the major contractors handling the construction. Since most of the construction contractors will likely be from outside the NWT, they will fly in rotational staff for the majority of the construction labour requirements. Some “job seekers” may arrive in the NWT searching for construction jobs, but since most contractor hiring will be done in southern Canada, it is not likely these in-migrants will secure a construction job ahead of an existing NWT resident. “Job seekers” could fill the large number of indirect jobs which could be generated by project expenditures on goods and services, or induced jobs (particularly in Yellowknife), resulting from household responding.

4.3.2.2 Level of NWT Diamonds Project Construction Employment and Income

During the construction phase, the NWT Diamonds Project will increase staff to handle mine start-up activities. The Proponent estimates it will have 485 of the required 666 operations positions filled as construction ends and mine start-up begins. A total of 268 of 442 NWT-based positions could be filled by NWT residents (Table 4.3-8).

**Table 4.3-8
Potential Number of NWT Diamonds Project Employees
by Location End of Construction Phase**

Activity Area	Current NWT/ Residents	In-Migrants	Canadian Rotational	Off-site	Total
Preproduction Stripping	91	12	64	–	167
Off-site Sorting	–	–	–	28	28
Production Plant Start-up	37	4	50	–	91
Off-site Management	–	–	–	15	15
Preproduction Minesite/YK	86	38	60	–	184
Total	214	54	174	43	485

Source: Outcrop estimate.

Since some of the above employees will have worked for the Proponent for three years at this point, and some will have worked only three months, detailed start time and income information was applied to calculate the actual person-years of employment and income during the preproduction and construction phase (Table 4.3-9).

**Table 4.3-9
NWT Diamonds Project Person-years of
Employment and Income
Preproduction/Construction/Start-up Phase**

	NWT		Outside NWT		Total
	Current NWT/ Residents	In- Migrants	Canadian Rotational	Off-site	
Total Person-years	184	46	150	37	417
Person-years by Location	230		187		417
% by Location	55%		45%		100%
Income (\$000) by Location	\$19,176		\$15,353		\$34,529
% Income by Location	56%		44%		100%

Source: Outcrop estimate.

4.3.2.3 Summary of Direct Employment and Income – Construction

Total NWT direct employment during the preproduction/construction/start-up phase will represent 33% of all construction employment. NWT income will be 30% of total income (Tables 4.3-10, 4.3-11, 4.3-12).

**Table 4.3-10
Person-years of Direct Employment for NWT Residents During the
Preproduction/Construction Phase by Location**

	Yellowknife	Hay River	First Nations	Coppermine	Rest/ NWT	Total NWT
<i>Contractors</i>						
Existing Residents	43	27	20	7	3	100
New Residents	–	–	–	–	–	–
<i>NWT Diamonds Project</i>						
Existing Residents	76	37	37	21	13	184
New Residents	46	–	–	–	–	46
Total	165	64	57	28	16	330

Source: Outcrop estimate.

**Table 4.3-11
Summary of Direct Employment Income
for NWT Residents during
Preproduction/Construction/Start-up Phase by Location**

	Yellowknife (\$000)	Hay River (\$000)	First Nations (\$000)	Coppermine (\$000)	Rest/ NWT (\$000)	Total (\$000)
<i>Major Contractors</i>						
Existing Residents	\$3,311	\$1,940	\$1,260	\$440	\$189	\$7,140
New Residents	–	–	–	–	–	–
<i>NWT Diamonds Project</i>						
Existing Residents	5,340	3,260	2,493	1,301	1,000	13,394
New Residents	5,782	–	–	–	–	5,782
Total	\$14,433	\$5,200	\$3,753	\$1,741	\$1,189	\$26,316

Source: Outcrop estimate.

Table 4.3-12
NWT Resident Employment and Income
as Percentage of Total Preproduction/Construction/Start-up
Employment and Income

	NWT	Rest of Canada	Total
Person-years			
Contractors	100	490	590
NWT Diamonds Project	230	187	417
Total	330	677	1,007
% of Total	33%	67%	
Income (\$000)			
Contractors	\$ 7,140	\$46,816	\$53,956
NWTDP	19,176	15,353	34,529
Total	\$26,316	\$62,169	\$88,485
% of Total	30%	70%	

Source: Outcrop estimate.

Although NWT employees account for 33% of the person-years of employment, they receive only 30% of the wage income. Again, this results from the assumptions that northern residents will assume many of the lower level positions, due to lack of education and skills.

4.3.2.4 Future Construction Requirements

The construction activity examined in this phase takes place up to and including the year 1998. There will be additional construction requirements as the mine's activities expand. Over the years this additional construction will generate another 73 person-years of employment and \$5.8 million in wage income in the NWT. A detailed analysis was not completed for this ongoing construction, however the projected employment and income figures for this construction are included in the cumulative NWT employment and income figures (Section 4.14).

4.3.3 Indirect Employment and Income Levels - Construction

Businesses in the Northwest Territories could supply up to \$176 million in goods and services to the projected NWT Diamonds Project during the Preproduction/Construction/Start-up phase.

This level of expenditures in the NWT could create 551 person-years of employment, result in wage income of almost \$29 million and generate substantial profits for NWT businesses.

Responding by those companies providing goods and services to the project could generate another 109 jobs and \$5.7 million in employment income.

In-migration to fill indirect employment needs is estimated at 139 people.

4.3.3.1 Background

In accordance with the Proponent's purchasing policy for this project, local NWT suppliers will have first chance at supplying required goods and services, if their prices are competitive, and if they can meet quality requirements. A northern preference differential will not be offered to NWT suppliers.

Historically, prices of northern goods and services have been higher than those of southern suppliers. The higher pricing structure reflects not only the higher cost of doing business in the NWT (transportation, rent, wage levels, supplies, costs) but also the limited volume of business available in a small marketplace (overheads have to be spread over limited sales volume).

Up to the end of 1994 the Proponent purchased \$39 million or 35% of its required goods and services in the NWT. Fuel, air support, land freight and northern contractors accounted for two thirds of the total NWT expenditures. This level of purchases appears to indicate that NWT businesses can be competitive when sales volumes increase. Experience in operating in the harsh Arctic environment also offers some northern businesses a competitive edge.

The following assessment of the NWT Diamonds Project potential level of NWT purchases assumes that NWT businesses are able to compete, do want to increase their volume of business, particularly in the mining sector, and can access required funds for expansion if required. Business organizations such as Chambers of Commerce and industry associations have confirmed these assumptions in submissions made to the Environmental Assessment and Review Process (EARP) Panel and the Proponent.

4.3.3.2 Methodology Used to Assess Potential Northern Purchases

The methodology used to assess potential spending by the Proponent on goods and services in the NWT, and to determine resulting indirect employment, included the following:

1. detailed review of all requirements by the Proponent for goods and services and matching with availability of these goods or services in the NWT
2. assessment of potential NWT purchases by dollar volume and location of sale
3. adjustment of dollar volumes of purchases to determine a "northern value" component (what stays in the NWT economy after leakage)

4. calculation of supplier-related employment. The following equation was used to calculate employment for each NWT purchase location:

$$\frac{\text{Northern Value Added}}{\text{wage income per job} + \text{profit retained in the NWT}} = \text{indirect employment}$$

5. assessment of indirect employment income
6. examination of respending of project suppliers (Level 2 suppliers) and employment and income generated by this business.

Review of Project Goods and Services Requirements and Matching with Northern Potential to Supply

The projected capital and operating costs of the NWT Diamonds Project include detailed listings of items that cost from \$1,000 to \$10 million. The requirements range from a sophisticated electric shovel and large haul trucks to half ton trucks, fork lifts, blasting supplies and office furnishings. The listing also includes services, such as air transport and fuel hauling. Some items may never be supplied by NWT businesses. Others are already being supplied by NWT businesses. Still others could be supplied in the NWT if appropriate distributorships were established by local businesses, for example to deal in parts needed for specialized pieces of heavy equipment.

Although potential NWT purchases by the Proponent through preproduction and construction might reach \$400 million, based on the match of the Proponent's requirements to the NWT business sector's ability to supply these requirements, this figure is considered optimistic for two reasons. Firstly, with a limited labour force, and a limited means of raising capital, it is not likely that new businesses could reach the required level of experience within the short construction period; and secondly, businesses may shy away from expanding based on short term construction contracts, without assurance of ongoing, long term, follow up business.

The NWT business community has experienced a number of major development/construction scenarios (Beaufort Sea exploration and the IPL oil pipeline from Norman Wells to Alberta among others). In each case the short term benefits were substantial, but these were followed by closing, downsizing and in some cases bankruptcy of northern businesses. From these "lessons learned", many NWT businesses will likely limit expansion to predicted future sales of their goods and services.

For these reasons, a healthy, but more conservative estimate of \$176 million NWT purchases is being used for this analysis (Table 4.3-13). These NWT purchase estimates are higher than the current level of purchases by the NWT mining industry in general (Avery, Cooper 1994a) and assume that NWT businesses will keep pace with new demands, and will successfully market their services to the project.

**Table 4.3-13
Project Requirements for Goods and Services
Preproduction/Construction/Start-up by Location of Purchase**

Category	Total (\$000)	NWT (\$000)	Rest of Canada (\$000)	Outside Canada (\$000)	Notes Re: NWT Purchases
Major Contractors	\$278,046	\$27,800	\$187,387	\$62,859	Subcontractors to major contractors ¹
Supplies, equipment	162,501	77,366	65,280	19,855	Everything from computers and light vehicles to fuel and heavy equipment
Contracted Services	106,491	35,838	60,218	10,435	Mine development, camp operations
Transportation	5,733	5,733	–	–	Ground freight, air transport (excluding construction materials priced FOB site in contracts)
Professional	9,606	920	7,914	772	Legal, marketing, public relations, environmental
Spending through to end of 1994	72,533	28,288	36,267	7,978	Spending by Proponent to end of 1994, which has not been broken out by categories. This represents the purchase of contract labour as well as other goods and services.
Miscellaneous	660	436	218	6	
Total	\$635,570	\$176,381	\$357,284	\$101,905	
%	100%	28%	56%	16%	

Note:

The above list reflects the consultants selection of purchases by category. It is representative, but not the final listing, since some goods and services expenses are combined with contract packages, or general expense categories. The listing is thought to be sufficiently reliable to determine potential indirect employment and business growth.

1: The NWT portion does not include employment income for NWT residents working directly for major construction contractors.

Source: Outcrop estimate, 1995.

Northern Value of Project Purchases of Goods and Services

Most of the goods sold in the NWT must be imported from outside the Northwest Territories (food, vehicles, parts, computers, etc.). This results in high “leakages” from the NWT economy. The dollar input to the NWT economy on the sale of an item such as a computer, or a truck, is the difference between the cost paid to the manufacturer or wholesaler and the cost paid by a local purchaser, less transportation costs. For example, if a store purchases a computer from the manufacturer for \$1,000, pays \$100 to have it shipped to the NWT, then sells it for \$1,500, the difference of \$400 flows into the NWT economy. The remainder is “leakage”. The part which stays in the North, and contributes to rent, wages, profits, is termed the “Northern Value” portion. The northern value portion of purchases varies. In the case of the purchase of services, such as accounting, secretarial or contract labour, more of the purchase price stays in the economy since fewer imports are involved and costs are paid directly for labour.

To establish a realistic impact of project purchases in the NWT economy, assessments are based on the “northern value” of purchases. In order not to overstate the potential impacts of these purchases, northern value estimates are generally assessed at a lower rate than may be the actual case (Table 4.3-14).

**Table 4.3-14
Northern Value of Potential Purchases
Preproduction/Construction/Start-up**

Category of Purchase	Purchase Amount (\$000)	Northern Value (\$000)
Major Contractors	\$27,800	\$11,120
Supplies, Equipment	77,366	10,385
Contracted Services	35,838	5,000
Transportation	5,733	3,990
Professional	920	855
Previous Spending	28,288	3,775
Miscellaneous	436	130
Total	\$176,381	\$35,255
%		20%

Source: Outcrop estimate.

To assess a northern value factor the consultants started with a known mining industry multiplier of 0.28 (NWT mining industry commodity intensity ratio multiplier of 0.28 for gross domestic product (GDP) at factor cost per dollar purchased (NWT Bureau of Statistics 1993a). Basically this means that for every

dollar spent by the proponent or subsequent suppliers, twenty-eight cents is retained in the NWT economy as wages and business profit. This multiplier was then lowered for a number of reasons. Firstly, over 40% of construction purchases will be for equipment and supplies. Within this category, on some major purchases, the local dealer will receive only 5% of the total sale amount. Also the factor was lowered to reflect the expected number of branch operations which will do business with the Proponent. They will hire locally, but will not retain any profits in the NWT.

The “northern value” of present and future project purchases is estimated at an average of about 20% of the actual purchase value, assessed on the range of products available in the North. The actual percentages used were product dependent and determined after analysis of each separate category of purchase. This northern value not only gives a more realistic view of the impact of NWT purchases, but also shows the benefit to other parts of Canada of purchases made in the NWT, since most of each dollar spent in the NWT will eventually leak to other Canadian locations, particularly manufacturing centres.

Supplier-related Employment by Location Based on Northern Value of Project Purchases

The more mature business communities in the NWT will secure the larger portions of NWT Diamonds Project spending on goods and services. Communities such as Yellowknife and Hay River have long histories of supplying goods and services to mining companies. They also offer a wider range of services and have more experienced people within their population. Smaller communities with an active private sector do have opportunities to supply goods and services, but to a lesser extent, based mainly on the size and scope of their operations. Even the very small communities, with limited business sectors, have an opportunity to participate in the provision of goods and services, mainly in the labour area. For example, if a services contractor from Yellowknife was awarded a camp maintenance contract, this contractor could in turn hire staff from smaller communities, thereby spreading the dollars from the contract, and the indirect employment opportunities, beyond the business base in Yellowknife.

Based on a matching of goods and services offered in communities, project purchase requirements and NWT labour force availability, the potential distribution of purchases is shown in [Table 4.3-15](#).

4.3.3.3 Person-years of Indirect Employment

Using the northern value portion of purchases, the indirect employment was assessed by assigning an estimate of wages and profit per position, by location and applying the indirect employment equation ([Table 4.3-16](#); Section 4.3.3.2).

**Table 4.3-15
Purchases and Northern Value Assessment per NWT Location
Preproduction/Construction/Start-up**

Location	Purchase Amount (\$000)	%	Northern Value Amount (\$000)	%
Yellowknife	\$112,885	64	\$22,250	63
Hay River	45,860	26	9,000	25.5
First Nations Com.	8,820	5	1,940	5.5
Coppermine	4,410	2.5	965	3
Rest of the NWT	4,406	2.5	1,100	3
Total	\$176,381	100%	\$35,255	100%

Source: Outcrop estimates.

**Table 4.3-16
Person-years of Indirect Employment per NWT Location
Preproduction/Construction/Start-up**

Location	Northern Value of Purchase (\$000)	÷	Wages & Profit Estimate Per Job¹ (\$000)	=	Indirect Employment Person-years
Yellowknife	\$22,250	÷	\$70	=	318
Hay River	9,000	÷	60	=	150
First Nations	2,000	÷	46	=	43
Coppermine	1,000	÷	50	=	20
Rest of NWT	1,000	÷	50	=	20
	\$35,255				551

1: These figures represent a higher than average wage level and allow for business profit retained in the NWT.

Source: Outcrop estimate.

This calculation of indirect employment was based on the business scene in the Northwest Territories in early 1995. It does not include any major new business initiatives that may be planned in First Nations communities. It also considers current education and skill levels in the NWT.

It should be noted that indirect employment is measured in person-years of employment in the preproduction/construction period. This measure has been selected to assess the total magnitude of employment, although some jobs

resulting from expenditures during this period could last for several years, while others could last for only months.

4.3.3.4 Indirect Income

Indirect income, is measured in income per person-year of employment. Although a person-year income could be \$50,000, in fact it could represent two people each working six months, for \$25,000 each. It could also represent half a wage per year, over two years, for the part of a job resulting from project purchases. An example of this could be a pilot working for an airline used by the project. The airline could attribute half the pilot's time and wages to project work, while the other half is attributed to other regular business of the airline.

Incomes for each indirect person-year of employment (Table 4.3-17) were established based on the types of indirect jobs and the education and skill levels of the labour force in the different locations. The Yellowknife indirect income level was set at \$55,000 per person-year, since there will be a higher representation of skills in the jobs to be filled as a result of project purchases in Yellowknife. On the other hand the income level in First Nations communities, Coppermine and the rest of the NWT was set at \$45,000, since the labour force in these communities will fill more of the semi skilled and unskilled indirect employment positions. Per person-year income in Hay River was set at \$50,000, based on experience with the mining industry (Pine Point) and skill levels in the labour force. All per person-year incomes are averages. In fact, some incomes could be much higher, and some lower than the averages stated here.

Table 4.3-17
Indirect Income by Location Preproduction/Construction/Start-up

Location	Employment (person-years)	Income per Person-year (\$000)	Location Indirect Income (\$000)
Yellowknife	318	\$55	\$17,490
Hay River	150	50	7,500
First Nations	43	45	1,935
Coppermine	20	45	900
Rest of NWT	20	45	900
Total NWT	551		\$28,725

Source : Outcrop estimate.

Based on these allocations of income per person-year of employment, a total of \$28.7 million of indirect income could be expected from this phase of the project.

4.3.3.5 In/out Migration

Yellowknife and Hay River will have the highest number of indirect jobs (Table 4.3-16). Currently Yellowknife has a low unemployment rate, and will require more people to fill jobs that result from the project's purchase of goods and services. Although some of the indirect jobs will be filled by currently employed people (leaving their jobs open for others) there could be an overall labour shortage in Yellowknife and Hay River which would necessitate some in-migration. It is anticipated that up to 70 people could move to Yellowknife and 40 could move to Hay River to fill these supplier jobs. Some of these people could come from other communities in the Northwest Territories, but the majority will likely come from outside the NWT, since there is a limited skills pool in the NWT to meet the needs of these new jobs.

Although it is difficult to assess the movement from small communities into Yellowknife or Hay River (since there will be more jobs available in these two communities) it is expected that any movement will be minimal. Most employment during this period is short term, to complete specific contracts and does not include guarantees of continuing employment.

4.3.3.6 Indirect Employment and Income (Level 2) Resulting from Business Responding

NWT suppliers of goods and services to the project will generate additional employment and income, as they in turn make purchases of goods and services in the NWT. For example, a trucking firm moving project supplies, may purchase new tires, fuel, parts, or repair services in the NWT, or may hire a local contractor to build a new garage. This business responding circulates project dollars further into the economy.

Utilizing a potential responding factor of 0.20 (spending 20 cents of each project dollar received in the NWT on additional goods and services) the potential preproduction/construction purchases could generate another \$35 million in spending (\$176,381 million x 0.2) in the Northwest Territories and result in another 100 plus NWT based indirect person-years of employment (Table 4.3-18). The responding factor of 0.20 is based on the non-metallic minerals commodity intensity ratio of 0.28 (NWT Bureau of Statistic 1993a) lowered to match estimated Northern Value.

Incomes for each person-year of employment generated by business responding (Table 4.3-19) were assessed at the same rate per location as income generated via purchases of goods and services (Section 4.3.3.2). The same rates were selected, since the responding will create additional employment in all levels of the labour force, from accountants required to provide financial advice, or architects to design new buildings for companies, to delivery people and apprentice mechanics.

**Table 4.3-18
Level 2 Indirect Employment by Number of
Jobs Resulting from Business Responding
Preproduction/Construction/Start-up**

	NWTDP Purchase (\$000)	Responding in NWT (x .20) (\$000)	=Northern Value of 2nd Level Purchases (\$000)	Wages/ Profits per Position (\$000) ¹	= 2nd Level Indirect Employment (Person-years)
Yellowknife	\$112,885	\$22,577	\$4,480	\$70	64
Hay River	45,860	9,172	1,820	60	30
First Nations	8,820	1,750	350	46	8
Coppermine	4,410	875	175	50	4
Rest of NWT	4,406	882	175	50	3
Total	\$176,381	\$35,256	\$7,000		109

Source: Outcrop estimate.

1: Wages/profits were adjusted upward in this second level calculation to reflect expected business growth factors during the construction phase.

**Table 4.3-19
Indirect Income Resulting from Business Re-spending
Preproduction/Construction/Start-up**

Community	Jobs	x	Average Income Per Person-year (\$000)	=	Indirect Income Business Re-spending (\$000)
Yellowknife	64		\$55		\$3,520
Hay River	30		50		1,500
First Nations	8		45		360
Coppermine	4		45		180
Rest of NWT	3		45		135
Total NWT	109				\$5,695

Source: Outcrop estimate.

Distribution of this second level of indirect employment and income is closely tied to the original NWT location of project purchases (Tables 4.3-20 and 4.3-21). For example, if a service is purchased in Hay River, then it is likely that most of the business responding effects will occur in Hay River. For this reason, the majority of the second level indirect employment and income occurs in Yellowknife and Hay River, although a portion is distributed to smaller communities.

**Table 4.3-20
Indirect Person-years of Employment
Preproduction/Construction/Start-up Phase**

	Indirect Employment Proponent Purchases (Person-years)	Indirect Employment Business Re-spending (Person-years)	Total Indirect Employment (Person-years)
Yellowknife	318	64	382
Hay River	150	30	180
First Nations	43	8	51
Coppermine	20	4	24
Rest of NWT	20	3	23
Total NWT	551	109	660

Source: Outcrop estimate.

**Table 4.3-21
Indirect Employment Income
Preproduction/Construction/Start-up Phase**

	Indirect Employment Income Proponent Purchase (\$000)	Indirect Employment Income Business Re-spending (\$000)	Total Indirect Employment Income (\$000)
Yellowknife	\$17,490	\$3,520	\$21,010
Hay River	7,500	1,500	9,000
First Nations	1,935	360	2,295
Coppermine	900	180	1,080
Rest of NWT	900	135	1,035
Total NWT	\$28,725	\$5,695	\$34,420

Source: Outcrop estimate.

In-Migration – Business Respending

Since most of the jobs generated by business respending occur in Yellowknife or Hay River, it is likely there will be some in-migration to meet overall labour force requirements (Table 4.3-22). This in-migration is estimated to be at the same level as in-migration for indirect jobs generated through the project’s purchase of goods and services. Some of the in-migrants could move to Yellowknife from smaller communities, but as in the first level indirect employment, the majority will likely come from outside the Northwest Territories. No attempt has been

**Table 4.3-22
In-migration Due to Indirect Employment
Preproduction/Construction/Start-up Phase**

	Proponent Purchase	Supplier Respending	Total
Yellowknife	70	18	88
Hay River	40	11	51
First Nations	-	-	-
Coppermine	-	-	-
Rest of NWT	-	-	-
Total NWT	110	29	139

Source: Outcrop estimates.

made to quantify out-migration from small communities to Yellowknife and Hay River during the Preproduction/Construction phase. To date there has not been any noticeable out-migration from the smaller communities, and it is doubtful this will happen during the Preproduction/Construction phase, since many of the jobs could be short term jobs tied directly to the time frame of this phase of the project.

4.3.3.7 Summary – Indirect Employment/Income Generated by Project Purchases

The Preproduction/Construction phase of the NWT Diamonds Project is already having an impact on northern businesses through the purchase of goods and services. Of the projected 660 person-years of employment these purchases will create in this phase, it is estimated based on expenditure to date that the NWT has already received more than 175 person-years of employment and related income as a result of exploration and sampling activities that have been undertaken to date (Outcrop estimate). Although a reduction in employment is projected for 1995 as a result of lower field activity, the employment level will increase substantially when construction starts.

Based on the estimated total construction purchase of \$176 million (Table 4.1-13) in goods and services in the NWT, the resulting indirect employment and income levels, by location are shown in Tables 4.3-20 and 4.3-21.

4.3.4 Induced Employment and Income Levels - Construction

Gross NWT household income could increase by \$60 million dollars during the Preproduction/Construction/Start up phase as a result of NWT Diamonds Project employment and purchase expenditures. The after tax portion of this income (apart from savings) will be spent on food, housing, clothing, personal services, vehicles, fuel, travel, etc. This respending of household income can result in an additional 238 jobs

and \$7.8 million in wage income in the Northwest Territories, through an effect called induced employment/income.

4.3.4.1 Background

Yellowknife is the shopping centre of the Northwest Territories. Its range of products and services and its lower prices (compared to more isolated NWT communities) attracts substantial in-person and telephone sales from residents across the NWT. People from nearby communities often go to Yellowknife to do their shopping including grocery shopping, and it is not uncommon for NWT resident business travelers to stock up on products from Yellowknife before returning to Coppermine for example, or Lutsel K'e. Hay River serves a similar role south of Great Slave Lake, but to a lesser degree, due to a smaller retail/personal service sector. Certain products such as cars or trucks, are only available in Yellowknife or Hay River.

Yellowknife and Hay River will benefit both from the respending income of their own residents working directly or indirectly for the project, and from residents of other communities. For this reason, these two communities also have the highest levels of induced employment and income.

In the smaller communities, Northern Stores, Co-ops and to a lesser extent private general stores are the main retailers. They carry product lines that range from snowmobiles and outboard motors, to food, hardware and clothing. Some smaller communities also have a restaurant. Purchases at these outlets will increase, however the levels of induced employment and income will be limited by the size of the retail/services sectors in these communities.

Smaller communities can also benefit from household respending through the sale of arts and crafts. Increased income in the economy, particularly in Yellowknife and Hay River, could have a positive impact on the sales of these products.

4.3.4.2 Methodology for Assessing Levels of Induced Employment and Income

The level of induced employment and resulting income was determined as follows:

- assess the project generated person-years of direct and indirect employment in each community
- develop respending multipliers for each community grouping
- assess induced employment person-years by applying a multiplier to the total employment (direct + indirect)
- assess potential income per person-year, based on types of induced employment and location

- determine level of project-induced employment income.

Project related employment in each community will include:

- direct project employment
- employment with major contractors developing the site
- indirect employment generated by project purchases of goods and services
- indirect employment generated by business respending of project suppliers of goods and services.

4.3.4.3 Person-years of Induced Employment

Respending multipliers vary by location and type of respending. They also change as circumstances in the NWT change. An acceptable, though not always accurate respending multiplier is 0.22 (NWT Bureau of Statistics 1993a). Based on the fact that a large portion of NWT respending occurs in Yellowknife, we have adjusted the multiplier to reflect locations of respending. Yellowknife has been assigned a higher multiplier, while the smaller communities have been assigned a lower multiplier. These multipliers are used in [Table 4.3-23](#) to determine induced employment.

Table 4.3-23
Person-years of Induced
Employment Resulting from Household Respending
Preproduction/Construction/Start-up

	Direct Proponent (person yrs.)	+Major Contractors (person yrs.)	+Indirect Proponent Purchases (person yrs.)	+Indirect Business Respending	x Respending Multiplier	=Induced Employment
Yellowknife	122	43	318	64	0.30	= 164
Hay River	37	27	150	30	0.22	= 54
First Nations	37	20	43	8	0.10	= 11
Coppermine	21	7	20	4	0.10	= 5
Rest of NWT	13	3	20	3	0.10	= 4
Total	230	100	551	109	0.24	238

Source: Outcrop estimate.

4.3.4.4 Induced Income

Jobs created through respending are mostly in the retail and services sector. They range from clerks in stores and waiters in restaurants, to hairdressers, handymen and gas

jockeys. They could also include people involved in arts and crafts production. The person-years equivalent could be made up of a wide range of part time jobs, as well as some full time jobs. In many instances these induced jobs would go to people entering the labour force. In some cases, they will involve student employment.

In general, these will be entry level jobs. Accordingly, the potential incomes are estimated to be lower and these incomes have been weighted to match wage income levels in the various NWT locations (Table 4.3-24).

Table 4.3-24
Induced Employment
Income Generated by Proponent Expenditures
Preproduction/Construction/Start-up

	Number of Person-years (\$000)	x	Average Income Per Person-year (\$000)	=	Induced Employment Income (\$000)
Yellowknife	164		\$35		\$5,740
Hay River	54		30		1,620
First Nations	11		25		275
Coppermine	5		25		125
Rest of NWT	4		25		100
Total	238				\$7,860

Source: Outcrop estimate.

4.3.4.5 In-migration Resulting from Induced Employment

It is likely there will be some in-migration to fill the induced employment requirements in Yellowknife and Hay River. The level of in-migration will be lower, since many of the induced jobs could be part time, and attract people who want to enter (students) or re-enter the work force. The in-migration for full time induced jobs could be from other NWT communities, since these jobs could afford an opportunity for young people to gain work experience, if work is not available in his/her home community (Table 4.3-25).

**Table 4.3-25
In-Migration Due to Induced Employment
Preproduction/Construction/Start-up**

	Person-years		
	Existing NWT Residents	In- Migrants	Total Induced Jobs
Yellowknife	140	24	164
Hay River	46	8	54
First Nations	11	–	11
Coppermine	5	–	5
Rest of NWT	4	–	4
Total	206	32	238

Source: Outcrop estimate.

4.3.5 Summary Levels of Employment and Income Preproduction/Construction/Start-up

The highest levels of project related employment and income will occur in Yellowknife (Table 4.3-26). As the largest and best serviced community in the Northwest Territories, it is in the best position to supply employees, goods and services to the project during the preproduction/construction/start-up phase.

Yellowknife will experience the highest level of in-migration, mainly for indirect jobs (Table 4.3-27). Total employment income of \$41 million over this phase is equivalent to 10% of annual earned income recorded by Yellowknife residents on 1992 income tax returns (the most recent year for which data is available).

Hay River is also expected to experience high levels of project-related employment and income. Hay River has had extensive experience in serving the mining industry (Pine Point, Colomac) and has a skilled labour force. Currently Hay River has a high level of seasonal employment (related to shipping and marine resupply, i.e., Terminal for Northern Transportation Company's Mackenzie River operations) and is actively pursuing full-time mining industry jobs for its residents. Total income of \$15.8 million during the preproduction/construction/start-up phase is equivalent to 21% of Hay River's annual income in 1992 (NWT Bureau of Statistics 1994b).

The First Nations communities with a combined population of under 3,000 could experience significant employment and impact benefits. Total projected income of \$6.3 million associated with the NWT Diamonds Project is equivalent to 33% of annual income for 1992.

**Table 4.3-26
Summary - NWT Resident Construction
Employment and Income**

Employment Levels (in person-years)	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	Total
Project - Direct	122	37	37	21	13	230
Major Contractors	43	27	20	7	3	100
Indirect – Level 1	318	150	43	20	20	551
Indirect – Level 2	64	30	8	4	3	109
Induced	164	54	11	5	4	238
Total	711	298	119	57	43	1,228
% of Total	58%	24%	10%	5%	3%	100%
Person-years						
Income Levels (\$000)						
Project - Direct	\$11,122	\$3,260	\$2,493	\$1,151	\$1,150	\$19,176
Major Contractors	3,311	1,940	1,260	440	189	7,140
Indirect – Level 1	17,490	7,500	1,935	900	900	28,725
Indirect – Level 2	3,520	1,500	360	180	135	5,695
Induced	5,740	1,620	275	125	100	7,860
Total	\$41,183	\$15,820	\$6,326	\$2,796	\$2,474	\$68,596
% of Total Income	60%	23%	9%	4%	4%	100%

Source: Outcrop estimate.

**Table 4.3-27
Summary - Construction/In-migration**

Employment Levels in Person-years	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	Total
NWTDP Direct Empl.	46	–	–	–	–	46
Major Contractors	–	–	–	–	–	–
Level 1 - Indirect	70	40	–	–	–	110
Level 2 - Indirect	18	11	–	–	–	29
Induced	24	8	–	–	–	32
Total	158	59	–	–	–	217

Source: Outcrop estimate.

Coppermine, with its experience in rotational employment and mining could also experience significant employment and income benefits. Projected wage income of \$2.8 million is equivalent to 26% of annual income in 1992 (NWT Bureau of Statistics 1994b).

A summary of in-migration for the construction phase is given in [Table 4.3-27](#). These figures are used in later sections to assess impacts on population growth and payroll tax.

4.3.6 Employment and Income - Operations

The proposed NWT Diamonds Project has a projected life of 25 years. The mine will reach a production level of 9,000 t/d in the year 2000. Ongoing development will increase production levels and employment requirements with the planned expansion to an 18,000 t/d production level in the year 2007. As ore is depleted around year 2021, staff levels will be reduced and preparations started for close down.

To assess the employment and income levels, two benchmark years are analyzed: year 2000 at the 9,000 t/d production level and year 2007, at the maximum 18,000 t/d production level. Staffing requirements at the mine will change from year to year, as the mix of surface and underground mining changes; however the years selected can provide a distinct picture for two different levels of impact. Since 18,000 tonnes is the highest projected production level, the analysis of this scenario includes potential maximum levels of employment and income impacts, while the 9,000 t/d analysis proves the minimum level of employment and income impacts once the mine is in production.

As in the construction phase, three types of employment and income are examined for the two benchmark years:

- direct employment with the project
- indirect employment resulting from project purchases of goods and services in the NWT
- induced employment resulting from household expenditures of direct and indirect employment with the project.

Direct, indirect and induced employment and income are analyzed separately for the 9,000 t/d and 18,000 t/d production levels (years 2000 and 2007).

4.3.7 Direct Employment and Income Levels – Year 2000

At the 9,000 t/d production level, 398 (62%) of the 638 NWT-based positions at the proposed NWT Diamonds Project mine could be filled by NWT residents. Existing NWT residents could fill up to 303 of these positions, while new residents (in-migrants) could fill 95 positions. The new residents will fill mainly skilled and management positions

Direct employment income in the Year 2000 will be \$27 million.

4.3.7.1 Background

At a production level of 9,000 t/d, the project will have 638 NWT-based positions. Another 28 jobs will be located in southern Canada. Of the 638 NWT based jobs, 8% will be in professional fields and will include senior management, engineers, geologists, metallurgists, chemists, site superintendents, etc. More than half of the professional staff will work on a four days in/three days out rotation and will live in Yellowknife. The existing NWT labour force includes people with the required professional qualifications and experience to fill a number of these jobs, (personnel superintendents, geologists, mining engineers, accountants). Most, if not all, of these people are already employed, but could move to NWT Diamonds Project jobs, leaving job openings at their former place of employment. More than half the jobs at the proposed NWT Diamonds mine (52%) require specific skills, mainly in the trades areas. These include foremen, specialized equipment operators, drillers, plant operators, lab technicians, electricians, mechanics, welders, instrument technicians, millwrights, etc. Although the NWT has experienced personnel in most of these areas (Table 4.3-4) it is not likely there will be sufficient numbers of qualified NWT residents to fill the 335 positions requiring skilled labour. Most potential NWT candidates for these jobs are probably now working though some could move to project jobs.

The remaining 40% of project positions are for semi-skilled or unskilled people. These include positions such as truck drivers, general operators, apprentices, helpers and clerks. All of these positions could be filled by NWT residents.

Apart from the senior positions on the 4/3 rotation, all other staff on site will work a 2/2 rotation (two weeks in, two weeks out). On-site staff will work 12 h/d, seven days per week.

For purposes of the employment assessment, project employees have been divided into four categories as follows:

- *Existing NWT residents:* People who already live in the Northwest Territories.
- *In-migrant resident employees:* People who move to the Northwest Territories.

- *Off-site employees:* People who work for the operator, BHP, at other locations in Canada.
- *Fly-in employees:* People who will work at the mine site, but will maintain residency in another Canadian province or territory, other than the Northwest Territories.

4.3.7.2 Methodology to Determine Level of Project Direct Employment and Income - Year 2000

To assess the levels of direct project employment in the Northwest Territories, it was necessary to determine the number of employees who will actually live in the Northwest Territories. This assessment has three parts.

The first part determined the potential hires of existing NWT residents. The second part matched the potential NWT hires with skill requirements and the third part examined unfilled skill requirements and determined which could be filled by in-migrants (or new residents) and which would be filled by rotational, fly-in employees.

1. Supply/Demand Match

The first step in determining the potential number of existing NWT residents who could work at the mine involved a supply/demand matching. Each project position was assigned a “northern hire potential” rating as follows:

- *H (high)* - skills exist in the NWT
 - labour supply exists and could be looking for a job, or a job change, i.e., truck drivers, labourers, purchasing agents, clerks
- *M (medium)* - skills exist in the NWT, but labour supply with this skill is limited, i.e., millwrights, welders, geologists
- *L (low)* - limited skills, limited labour supply for a particular requirement, i.e., chemists, superintendents, metallurgists

Over 300 jobs ranked as high potential for NWT hires. These included truck drivers, air control staff, operators, labourers, helpers. Many were in the semi-skilled or unskilled job classifications. Jobs rating a medium potential for NWT hires included many of the skilled and professional jobs, which could be filled by NWT residents if they chose to move from existing positions. In some cases, such as mechanics, the demand (60) would exceed the available NWT supply of these skilled workers.

2. Assessment of Potential NWT Hires

The next step was to determine the number of potential NWT hires. The following assumptions were used in this assessment:

Northwest Territories – Supply Side

1. In March 1995, Colomac had 95 NWT employees, including 30 from Aboriginal communities north of Great Slave Lake (Colomac 1995). Since the life span of Colomac is uncertain, some employees could choose the job security of the NWT Diamonds Project.
2. Nanisivik is getting closer to shutdown (Avery, Cooper 1994a), and some current employees there could seek job security with the NWT Diamonds Project.
3. More than half the 2,000 plus job applications received by the Proponent to March 31, 1995, were from NWT residents (Boyd 1995a).
4. The number of people reaching labour force age in the NWT will increase by 12% over the next five years (Norecon 1995).
5. Unemployment rates in the smaller, targetted hiring centres range from 30% to 40% (NWT Bureau of Statistics 1994b).
6. Government, community and Proponent sponsored “stay in school” programs will encourage more young people to complete at least Grade 10.
7. The Government of the Northwest Territories will direct more funds to mining related education and training programs, as activity in this sector intensifies across the NWT.
8. With government budget cuts, there will be fewer new government jobs and fewer jobs created by government spending on goods and services.
9. At least 30 of the 638 NWT-based positions are on a 4/3 schedule (four days at mine, three days off). These people will live in Yellowknife and most will be in-migrants (some have already moved to Yellowknife).
10. No other major mining projects in the NWT (over 100 employees) are scheduled to reach full operation before the Year 2,000.
11. During the advanced exploration phase, approximately 25% of the mine site work force was Aboriginal (Boyd 1995a).
12. By hiring NWT residents, the Proponent can recognize some savings on relocation costs.

13. The labour force attached to the mining industry in Canada is accustomed to living in remote locations, and moving to areas of new mining activity when an existing mine closes (i.e., Pine Point Mine, Denison Mines (Elliot Lake), Cyprus Anvil, Faro, Yukon). People from recently closed mines (BHP's Island Copper Mine) will be looking for new positions and may be willing to move to the Northwest Territories.
14. Arctic College will expand mining related programs in line with mining industry requirements.
15. Many NWT residents will prefer rotational employment to unemployment.
16. NWT residents are better prepared for the harsh climate at the job site, and have more experience with working in northern conditions.
17. The 2/2 rotational work schedule will assist Aboriginal employees to maintain traditional activities concurrent with wage employment.

The Proponent (Demand Side)

1. Round trip air transportation will be supplied for employees from Yellowknife, Wha Ti, Rae Lakes, Snare Lake, Lutsel K'e and Coppermine.
2. Orientation and training programs will be provided, including cross-cultural programs. The Proponent will initiate special training programs for entry level employees. Programs will be tailored to the needs of the labour force.
3. All employees will receive a northern allowance equivalent to approximately \$800 per month.
4. The Proponent will initiate an aggressive recruiting program in the NWT, particularly in First Nations communities.
5. The Proponent will consider flexibility in its policies, as they relate to traditional lifestyle (adjusted work schedules subject to work requirements, if required through hunting season, northern foods on site).
6. The Proponent may establish employment coordinators in certain communities to assist with recruiting new hires, and maintenance of work schedules of existing employees.
7. The Proponent may assist with the relocation costs of non-NWT residents who choose to move to the NWT.
8. The Proponent will provide comfortable, well-serviced camp facilities, with mainly private room accommodation.

Estimate of Potential Hires

The number of potential hires was estimated by using a simple equation that examined potential hires for positions with the Proponent, via an interest factor, a success rate factor and an improvement factor. The calculation assigned weightings to the various factors, by community, to determine potential hires. The various factors used in this calculation are discussed below.

Interest Factor

The interest factor was used to determine the level of interest in the possibility of having a job at the NWT Diamond mine. This calculation determines the number of possible candidates for jobs by location. This factor assessed the following:

1. jobs currently available in the community
2. alternative employment opportunities outside the community (i.e., new Cascades Power Plant which will be in operation by the time the mine start-ups)
3. experience with wage employment
4. skill/educational levels in the community
5. income levels within the community
6. level of participation in traditional economy
7. availability of transportation to and from the site
8. distance from the site to home community (jobs more attractive to people in North Slave region, than to say people from Fort Laird, or Tuktoyaktuk)
9. level of community development (what municipal, economic, social structures operate within the community)
10. cost of living in the community
11. work attitudes, motivation
12. indicated/stated interest in working for the project if/when jobs are available.

Success Rate Factor

The interest factor determines numbers of residents who might consider or want employment with the project. The success rate factor provides estimates of potentially successful candidates. This factor considers:

1. past experience with rotational employment, or employment away from home
2. full time, part time, or casual experience with the mining industry in mining or exploration
3. recent efforts to expand/improve education/skill levels
4. employment track records at other NWT mines offering rotational employment
5. employment track record in other jobs.

Improvement Factor

This factor attempts to quantify improvement over previous experience, i.e. how much better can the labour force in a community be expected to do over their previous experience, based on lessons learned, special policies to encourage northern hires, cuts in government assistance programs or other project-related advantages. The factors having an impact on whether improvement can occur are:

1. increased need for wage employment
2. attractive wage levels, northern allowance, benefits
3. Proponent ability to take advantage of experience gained at other mining operations
4. flexible entry levels for aboriginal employees
5. long-term career planning available to employees
6. employment as a solution to some social problems.

It should be emphasized that, although these factors have been developed through an analysis of community baseline data, and in some cases interviews with community residents (Yellowknife, Hay River and Coppermine), they should still be regarded as preliminary. As more information becomes available, these factors could be refined. Obviously, it is the residents of the various locations themselves who will ultimately determine the extent of their interest and success. Nevertheless, it is felt that the factors presented in this analysis are sufficiently realistic for the purposes of the socioeconomic impact assessment.

It has also been assumed that these factors remain constant over the years, although in fact interest may increase if project jobs turn out to be especially attractive, (good living conditions, well designed training programs, high incomes) and if the labour force is enthusiastic about improving education and skill levels. Factor values may decrease if additional jobs become available in home communities (possibly through the purchase of goods and services) or if other major projects go ahead at the same time.

Table 4.3-28 provides the detailed calculation of potential hires from the NWT, by location.

Table 4.3-28
NWT Diamonds Project
Potential Employment by Community
(First Full Year of Operations)

Community	Labour Force Age	In Labour Force	X Interest Factor	= Possible Candidates	X Success Rate	= Potential Candidates	X Improve Factor	= Potential Hires
Rae-Edzo	1,101	573	26%	149	25%	37	1.4	52
Wha Ti	261	158	20%	32	20%	6	1.3	8
Rae Lakes	174	65	20%	13	20%	3	1.3	4
Snare Lake	92	29	10%	3	20%	1	1.2	1
Lutsel K'e	223	139	20%	28	20%	6	1.2	7
Dettah	148	71	30%	21	35%	7	1.4	10
Subtotal								82
Coppermine	710	383	25%	96	25%	24	1.3	31
Hay River & Hay River Reserve	2,740	2,196	8%	176	25%	44	1.25	55
Yellowknife	12,519	10,948	3.5%	383	20%	77	1.1	84
Rest of NWT								
Inuvik	6,093	4,359	3.5%	153	10%	15	1.2	18
Fort Smith	4,064	2,742	3.5%	96	15%	14	1.25	18
Kitikmeot	2,260	1,464	4%	59	15%	9	1.2	11
Keewatin	4,066	2,543	1%	25	15%	4	1.1	4
Total								303

- 1: Since the labour force figures for N'dilo were not broken out from Yellowknife, potential hires from N'dilo have been considered as part of the Yellowknife grouping, which also includes some 400 additional First Nations residents, who make their homes in Yellowknife.
- 2: Employment estimates for Umingmaktok/Bathurst Inlet and Cambridge Bay are included in the Kitikmeot Region.

Sources: NWT Bureau of Statistics 1994a and Outcrop estimate.

Factor Influences

Interest factors are highest for Rae-Edzo and Dettah, communities that have had people working at the project site, and have verbally indicated an interest in jobs. Yellowknife, with low unemployment has the lowest interest rate. Only 7% of the work force is unemployed (NWT Bureau of Statistics 1994a), and the interest factor considers half of this group. NWT regions also have been assessed low interest factors overall, with the interest factor declining in direct proportion to increased distance from the mine and

related increases in cost to travel to Yellowknife. Hay River also shows an overall low interest rate, again because its unemployment rate at 16% is lower than First Nations communities or Coppermine.

The highest success rate has been assigned to Dettah. This is influenced by performance of Dettah residents at the site to date (Boyd 1995a) and proximity to Yellowknife. Rae-Edzo and Coppermine were also assessed high success rates based on previous mining/rotational work experience of their residents. Hay River residents also have mining experience, both with Pine Point Mines and Colomac.

The factors are also influenced by the Cascades Power Project on the Snare River, which is scheduled for completion in 1997. The assessment assumes that people particularly from Snare Lake may seek employment opportunities with the power project, which is closer to home, and offers more conventional hours and work rotation.

For further assessments in the employment analysis throughout this report, the potential hire figures were combined as shown in [Table 4.3-29](#).

**Table 4.3-29
Potential NWT Diamonds Project Hires by Location**

Yellowknife	84
Hay River ¹	55
First Nations ²	82
Coppermine	31
Rest of NWT ³	51
Total	303

- 1: All references in the Employment Section include the Hay River Reserve in Hay River calculations.
- 2: First Nations Communities refer to Treaty 8 and Treaty 11 communities of Rae-Edzo, Wha Ti, Rae Lakes, Snare Lake, Dettah and Lutsel K'e. N'dilo is included with Yellowknife.
- 3: Rest of the NWT includes Umingmaktok/Bathurst Inlet and Cambridge Bay in the Kitikmeot Region estimates.

Source: Outcrop estimate.

The rest of the NWT section includes four of the five remaining GNWT administrative regions. Baffin has not been considered, due to the high transportation costs to get to Yellowknife for work rotations. The Inuvik region includes the Mackenzie Valley communities and Tuktoyaktuk. Residents of these communities have had considerable industrial experience with the Esso/Interprovincial project and the Beaufort Sea exploration program.

Fort Smith Region includes all the communities south of Great Slave Lake excluding Lutsel K'e and Hay River which are recorded separately. Some of these residents have had previous experience with Pine Point Mine. The Kitikmeot includes all the communities but Coppermine, which has been assessed separately. People in the Kitikmeot have had experience with Echo Bay Mines (Lupin) and some have worked at Cominco's Polaris Mine.

Although the numbers are small, the assessment also looked at the Keewatin. Potential Keewatin-based employees could balance the cost of transportation to Yellowknife and back, with the \$800 per month northern living allowance. Keewatin residents have had some experience with the mining industry (Culloton Lake) and have a young population in need of jobs.

3. In-migration/Rotational Fly-in

The third part of the assessment determined which unfilled skill requirements would be filled by in-migrants and which would be filled by rotational, fly-in employees.

In-migration

Full-time employment during operations is expected to result in some in-migration. If existing NWT residents fill 303 of the 638 NWT based positions, 335 positions will have to be filled by people from outside the Northwest Territories. Of this number a total of 95 could choose to move to the Northwest Territories once they are employed by the project. This assessment was based on the number of 4/3 rotation positions, which necessitates NWT residency, the mobility of mining people within the industry, and commuting distance and cost, if an employee chooses not to move to the NWT. For example, a skilled millwright hired from northern Ontario or northern Quebec, would likely opt to move to the NWT rather than pay the commuting costs. The assessment also examined personal income tax rates across Canada and concluded that the lower rates in the NWT could offset a portion of the higher cost of living in the NWT.

It is estimated that 70 of these in-migrants will settle in Yellowknife, while 25 could choose Hay River. Potential in-migrants to Hay River could include former Pine Point Mine workers who may wish to return to the NWT. As well, Hay River is planning an aggressive campaign to attract project employees to its community, which offers lower housing and living costs than Yellowknife.

Southern Canada Rotational

The balance of the required work force (240 people) will be fly-in rotational workers. Since these workers will have to pay their own way to and from Yellowknife, it is likely they will be based in western Canada. These employees are likely to be somewhat

older than the NWT hires, with the required mining experience. This group will likely own homes and have families and social connections in southern communities, and will not want to break these ties.

4.3.7.3 Summary NWT Resident Direct Employment and Income Levels - Operations/Year 2000

NWT residents (existing residents and new residents) could assume 63% of the NWT-based positions. They could occupy 64% of the professional and management positions, 41% of the skilled positions and 91% of the semi-skilled and unskilled jobs (Table 4.3-30).

Table 4.3-30
NWT Diamonds Project
Direct NWT Hires by Skill Requirements - Operations
(Existing and New Residents)

Category	Existing			Total
	NWT Residents	In-Migrants	Non-Resident	
Professional/Highly Skilled	12	23	20	55
Skilled	82	56	197	335
Semi-Skilled/Unskilled	209	16	23	248
Total	303	95	240	636

398
 = 63% of labour requirement
 resident in NWT

Source: Outcrop estimate.

Income

Income per location was established by matching jobs to qualifications. For example, if the employment calculation per community assessed a certain number of jobs per community, potential jobs were assigned, based on skill levels in that community, then allocated the wage for that job to the location.

Although NWT residents will assume 63% of the NWT-based jobs with (Table 4.3-30) the Proponent, they will earn a lesser 58% of the annual income, since NWT residents will have a majority of the semi-skilled and unskilled jobs. The average income per NWT hire with northern allowance and benefits is estimated at approximately \$68,000 (Table 4.3-31). Annual wages for unskilled positions, including northern allowance and benefits, will be higher than the NWT average earned income of \$43,000 (NWT Bureau of Statistics 1994b).

**Table 4.3-31
Summary of NWT Diamonds Project
Direct Employment Numbers and Income by Community**

	Potential Hires	Potential Total Income Per Year (\$000)	Average Annual Income Per Job (\$000)¹
Yellowknife	154	\$11,557	\$75 ²
Hay River	80	5,686	\$71
First Nations	82	5,009	\$61
Coppermine	31	1,760	\$57
Rest of NWT	51	3,249	\$64
	398	\$27,261	

1: Average income includes northern allowance and benefits.

2: The higher average in Yellowknife reflects the number of senior management people who will live in Yellowknife.

Source: Outcrop estimate.

4.3.8 Indirect Employment and Income Levels – Year 2000

At the 9,000 t/d production level, NWT Diamonds Project could spend \$57 million annually on the purchase of goods and services in the Northwest Territories. This represents 70% of all goods and services expenditures (excluding labour) and is much higher than the mining industry average of 26% in 1992 (Avery, Cooper 1994a).

The projected \$57 million in NWT expenditures by the project would support 298 indirect jobs with a total potential annual income of \$16 million.

Two hundred and ten of these jobs could be filled by existing NWT residents, while 88 would be filled via in-migration to the Northwest Territories.

4.3.8.1 Background

The total value of purchases of goods and services by six NWT operating mines in 1992 was \$208 million (Avery, Cooper 1994a). Of this amount, \$35 million in purchases of goods and services were made in the Northwest Territories and the balance in other parts of Canada and around the world. NWT purchases represent 17% of the total operating mines purchases for that year.

If the \$75 million purchase of smelting/refining treatment charges for processing ores and concentrates is removed from the listing, the total purchase balance is reduced to \$133 million, and NWT purchases represent a higher proportion, 26%, of all purchases (Table 4.3-32). The industry average purchase figures are somewhat skewed by the fact that two of the NWT's major operating mines (Polaris and Nanisivik) are in remote locations, not easily serviced by NWT businesses. Of necessity these mines import supplies, particularly large quantities of fuel, from outside the Northwest Territories.

**Table 4.3-32
Comparison of Existing Mines Expenditures (1992)
and NWT Diamonds Project Projected Expenditures in the NWT**

	Total (\$000)	NWT (\$000)	% in NWT
Existing Mines			
Supplies	\$92,070	\$23,449	25
Services	25,373	10,644	42
Transportation	15,514	1,125	7
	132,957	35,218	26
Smelting/Refining, etc.	74,641	–	
Total	\$207,598	\$35,218	17%
NWT Diamonds Project			
Supplies	\$50,567	\$38,501	76
Services	17,608	5,619	32
Transportation	13,158	13,158	100
Subtotal	81,333	57,278	70
Off site sorting (in house)	2,729	–	
Total	\$84,062	\$57,278	68%

Sources: Avery, Cooper 1994a.

At the 9,000 t/d production level, the Proponent estimates annual goods and services expenditures of \$81 million (Table 4.3-33). Of this amount, \$57 million in purchases could be made in the NWT. This figure exceeds the combined purchases of all six NWT operating mines in 1992 and may appear to be optimistic. However, this significant improvement in NWT spending reflects:

- the project's location near a major supply/service centre
- the project's need for services best supplied by experienced northern businesses (air transportation, winter road hauling)
- the Proponent's stated commitment to a northern purchasing policy

**Table 4.3-33
Projected NWT Diamonds Project Purchases – Year 2000**

Category	NWT (\$000)	Other/ Canada (\$000)	Outside Canada (\$000)	Total (\$000)
Supplies	38,551	6,390	5,676	50,617
Services	5,619	4,245	7,744	17,608
Transportation	13,158	–	–	13,158
	\$57,328	\$10,635	\$13,420	\$81,383

Source: Outcrop estimate.

- the Proponent’s track record to date in northern purchasing (\$39 million in NWT purchases or 35% of total purchases of \$110 million during its first 18 months in the NWT to December 31, 1994)
- the relative size of the mine in comparison with other NWT mines (nearly twice the staff of the second largest mine).

4.3.8.2 Methodology

The methodology used to determine the level of project purchases of goods and services in the Northwest Territories, and the indirect employment and income resulting from these purchases were similar to that used in the preproduction/construction phase analysis.

- detailed review of requirements
- matching of project needs with NWT availability by location
- assessing purchase levels by locations
- determining northern value of these purchases (after leakage)
- based on northern value and wages/profits retained in the NWT, assessing potential number of indirect jobs
- establishing income for these jobs
- supplier responding (Level 2 purchasers) and resulting employment and income levels
- analysis of in-migration levels.

Purchase Requirements and Availability by Location

During operations, purchase requirements are of three types: supplies, services and transportation (Table 4.3-33). Supplies make up almost two thirds of the total purchases, and range from various types of fuel and lubricants, to blasting accessories, general mine supplies and health and safety supplies. Services purchases include camp catering and maintenance contracts, temporary labour services, plus other general and professional services. Transportation includes air transport of personnel and supplies to the site, as well as ground transportation of fuel and blasting supplies to the site.

Potential Purchases by Location

The majority of project goods and services purchases will be made in Yellowknife (62%) and Hay River (31%) (Table 4.3-34). Seven percent of the purchases could be distributed among the smaller communities, which would largely consist of labour services. Purchases such as fuel, transportation services, vehicle and equipment parts will be captured by the more developed business communities in Yellowknife and Hay River. Potential purchases of goods and services in Hay River include such high ticket items as fuel, heavy equipment as well as miscellaneous parts and supplies. The estimates assume that Hay River, with a rail line to the community, lower business costs, and an aggressive business community, will get a good share of these purchases.

**Table 4.3-34
NWT Diamonds Project
Potential NWT Purchases by Location – Year 2000**

Community	Purchase Level (\$000)	% of Projected NWT Purchases
Yellowknife	\$35,814	62
Hay River	17,856	31
First Nations	2,153	4
Coppermine	1,075	2
Rest of NWT	430	1
Total NWT	\$57,328	100%

Source: Outcrop estimate.

This assessment does not make allowances for the possibility of joint ventures between larger NWT businesses and native development corporations, or the establishment of new businesses in smaller communities. Either of these steps might direct more purchases and related employment to the smaller locations.

Indirect Employment, Based on Northern Value of Purchases

As explained in Section 4.3.3.2, Northern Value is assessed as the portion of purchase dollars that will be retained in the NWT economy after leakage. This represents the wages/profit portion of an expenditure. The Northern Value of purchases by the project is used (rather than the actual purchase price) in order to truly reflect the value of that purchase in an import economy. For example a project purchase of a \$25,000 pick-up truck at a local dealer, would not put \$25,000 into the NWT economy. A large portion of this amount would be returned to the manufacturer in Ontario. Other leakages would also occur on this sale, but the part left provides income (to either owner or employee) and profit.

To determine indirect employment the Northern Value portion of sales was divided by an amount which covers wages and profit per employee. These figures varied for the different locations and were assessed on types of indirect employment by location, and potential wages for that type of employment (Table 4.3-35).

**Table 4.3-35
NWT Diamonds Project
Indirect Employment Numbers by Location – Year 2000**

	Potential Proponent Purchases \$000	Assessed Northern Value of Purchases \$000¹	÷ Wages/ Profit Per Job \$000	= Indirect Employment
Yellowknife	\$35,814	\$11,201	\$67	167
Hay River	17,856	4,158	57	73
First Nations	2,153	475	50	10
Coppermine	1,075	270	50	6
Rest of NWT	430	100	50	2
Total	\$57,328	\$16,264		258

1: In the construction section the Northern Value is assessed at 20% which is lower than the mining industry commodity intensity multiplier of .28 (representing increase to GDP) due to the fact that commissions on large items may be lower (i.e. 5% on expensive heavy equipment) and profits may leak to head offices. In the operations phase, there will be lower equipment purchases (5% commission) and higher parts purchases (25% commission). As well the wages component could be higher. For these reasons, the NWT Bureau of Statistics multiplier of .28, was used with adjustments for locations (1993a).

Source: Outcrop estimates 1995.

Indirect income by location was determined by multiplying the number of jobs by a wage as determined in Section 4.3.3.2 (Table 4.3-36).

**Table 4.3-36
NWT Diamonds Project
Indirect Employment Income by Location – Year 2000**

	Potential Indirect Jobs	X	Average Salary Per Job (\$000)	= Income (\$000)
Yellowknife	167		\$55	9,185
Hay River	73		55 ¹	4,015
First Nations			45	450
Coppermine	10		45	270
Rest of NWT	2		45	90
Total	258			\$14,010

1: The indirect salary level for Hay River was raised in the operations phase (over construction phase) due to perceived intense competition for labour in this community.

Source: Outcrop estimates.

4.3.8.3 Indirect Employment and Income Resulting from Suppliers Responding in the NWT (Level 2)

Suppliers to the mine will circulate project dollars in the NWT economy as they purchase other services in the NWT to carry out their project contracts. These purchases could range from fuel and stationery supplies, to new vehicles or office space rental. For employment calculations, only the Northern Value (part of the purchase assumed to be retained in the NWT) was considered (Tables 4.3-37 and 4.3-38).

4.3.8.4 Summary of Indirect Employment and Income Levels – Year 2000 (Level 1 and Level 2)

As the major supplier of goods and services, Yellowknife will have the highest level of indirect employment (Table 4.3-39) and indirect employment income (Table 4.3-40). Hay River will also have high indirect employment, but smaller communities with limited capacity to supply goods and services will have limited indirect employment from project operation.

4.3.8.5 In-migration

Since most of the new indirect jobs will be in Yellowknife and Hay River, in-migration for indirect jobs will impact these two communities (Table 4.3-41). Based on labour force availability, Yellowknife could need up to 63 additional workers to fill jobs resulting from the proponents purchases of goods and services, and Hay River could experience in-migration of 25 people. Since the number of

**Table 4.3-37
Indirect Employment by Number of Jobs
Resulting from NWT Diamonds Project
Suppliers' Responding in NWT – Year 2000**

	Proponent Purchases (\$000)	Responding in NWT¹ (\$000)	Northern Value of 2nd Level Purchases² (\$000)	÷ Wages and Profits Per Position (\$000)	= Indirect Employment
Yellowknife	\$35,814	\$7,163	\$1,432	\$60	24
Hay River	17,856	3,571	714	55	13
First Nations	2,153	431	86	50	2
Coppermine	1,075	215	43	50	1
Rest of NWT	430	86	17	50	0
Total	\$57,328	\$11,466	\$2,292		40

1: Responding set at 20% for this calculation.

2: Northern value set conservatively at 20% of purchases.

Both of the above figures are adjustments to the mining community.

Source: Outcrop estimates.

**Table 4.1-38
Indirect Employment Income Resulting from
NWT Diamonds Project Suppliers' Responding
in the NWT – Year 2000**

	Potential Jobs	X	Average Income Per Year¹ (\$000)	Income Per Location (\$000)
Yellowknife	24		50	\$1,200
Hay River	13		45	585
First Nations	2		40	80
Coppermine	1		40	40
Rest of NWT	0		40	0
Total	40			\$1,905

1: Average incomes are set lower than in Level 1 Purchase Impacts, based on the types of goods and services that would be purchased.

Source: Outcrop estimate.

**Table 4.3-39
NWT Diamonds Project
Summary of Indirect Employment
by Location – Year 2000**

	Level 1 Proponent Purchase of Goods & Services	Level 2 + Business Responding of Proponent Suppliers	= Total Indirect Employment
Yellowknife	167	24	191
Hay River	73	13	86
First Nations	10	2	12
Coppermine	6	1	7
Rest of NWT	2	0	2
Total	258	40	298

Source: Outcrop estimate.

**Table 4.3-40
NWT Diamonds Project
Summary of Indirect Employment Income
by Location – Year 2000**

	Level 1 Proponent Purchases (\$000)	Level 2 Supplier Responding (\$000)	Total Indirect Employment Income (\$000)
Yellowknife	\$ 9,185	\$1,200	\$10,385
Hay River	4,015	585	4,600
First Nations	450	80	530
Coppermine	270	40	310
Rest of NWT	90	0	90
Total	\$14,010	\$1,905	\$15,915

Source: Outcrop estimate.

indirect jobs in the smaller communities is quite low, no in-migration is expected. However, some people from the smaller communities could move to Yellowknife or Hay River to fill indirect jobs.

4.3.9 Induced Employment and Income Levels - Year 2000

Induced employment from household responding of NWT Diamonds Project direct and indirect employment dollars could generate an additional 155 jobs in the Northwest Territories. Annual income for these jobs will be approximately \$5 million (Table 4.3-42).

**Table 4.3-41
NWT Diamonds Project
In-Migration Due to Indirect Employment
Year 2000 (Number of Jobs)**

	Level 1 Proponent Purchases	Level 2 Supplier Responding	Total
Yellowknife	57	6	63
Hay River	23	2	25
First Nations	-	-	-
Coppermine	-	-	-
Rest of NWT	-	-	-
Total NWT	80	8	88

Source: Outcrop estimate.

**Table 4.3-42
NWT Diamonds Project
Induced Employment – Year 2000**

Location	Direct Employment	Indirect + Employment	Responding x Multipliers	Induced = Employment (Number of Jobs)
Yellowknife	154	191	.30	104
Hay River	80	86	.20	33
First Nations	82	12	.10	9
Coppermine	31	7	.10	4
Rest of NWT	51	2	.10	5
	398	298		155

Source: Outcrop estimate.

Induced employment is generated by the household responding of project direct and indirect employees. Much of the induced employment occurs in the retail, hospitality/entertainment and personal services sector. Income levels for these jobs are lower, and could actually involve a number of part time jobs, equivalent to one full time job. Induced employment levels are highest in locations offering a range of spending opportunities (for a more complete discussion, see Section 4.3.4).

The methodology used to assess induced employment in the construction phase was also used for the operations phase:

$$\text{Direct Employment} + \text{Indirect Employment} \times \text{Responding Multiplier} = \text{Induced Employment.}$$

Multipliers varied per location, by respending potential at each location. Income for jobs created by respending were set at a lower rate, to reflect the types of jobs to be filled. When considered as person-years of employment, it is likely a number of part time jobs will make up one person-year of employment (Table 4.3-42). The induced income resulting from these jobs is shown in Table 4.3-43.

**Table 4.3-43
NWT Diamonds Project
Induced Income – Year 2000**

	Number of Induced Jobs	x	Average Wages per Job	=	Induced Income (\$000)
Yellowknife	104		\$35	=	\$3,640
Hay River	33		30	=	990
First Nations	9		25	=	225
Coppermine	4		25	=	100
Rest of NWT	5		25	=	125
Total	155				\$5,080

Source: Outcrop estimate.

4.3.10 Summary Employment and Income Levels Year 2000

Nearly half of all employment generated by the project will be at the mine by the year 2000 (Table 4.3-44). Indirect employment will drop somewhat from its construction level. It should be noted that the employment and income for the construction phase covers several years and may represent many more seasonal positions.

4.3.11 Mine Expansion and Related Increases in Employment and Income – Year 2007

As the mine expands its operations and starts underground mining, its need for employees and goods and services will increase. By the year 2007 this additional activity will generate another 440 jobs in the Northwest Territories, and additional employment income of \$23.7 million dollars per year.

At the 18,000 t/d production level, project expenditures will generate up to 1,300 jobs and \$75 million in employment income to the NWT economy annually.

To determine impacts at this second benchmark production level, additional staffing and goods and services requirements were reviewed, and estimated direct,

**Table 4.3-44
NWT Diamonds Project - NWT Residents
Employment and Income Summary – Year 2000**

Location	Income			Total
	Direct	Indirect	Induced	
By Number of Employees				
Yellowknife	154	191	104	449
Hay River	80	86	33	199
First Nations	82	12	9	103
Coppermine	31	7	4	42
Rest of NWT	51	2	5	58
Total	398	298	155	851
Income (\$000)				
Yellowknife	\$11,557	\$10,385	\$3,640	\$25,582
Hay River	5,686	4,600	990	11,276
First Nations	5,009	530	225	5,764
Coppermine	1,760	310	100	2,170
Rest of NWT	3,249	90	125	3,464
Total	\$27,261	\$15,915	\$5,080	\$48,256

Source: Outcrop estimate.

indirect and induced employment and income levels were determined by applying the same method used for the Year 2000 (9,000 t/d) analysis (Section 4.3-7 through 4.3-9).

4.3.11.1 Direct Employment and Income Levels – Year 2007

It is assumed that the skill levels of the NWT labour force will have improved by the time the mine reaches this production level, and that NWT residents (existing and new) will fill all new positions with no additional requirements for fly-in rotational employees from other parts of Canada. **Tables 4.3-45, 4.3-46 and 4.3-47** show the potential level of direct employment of NWT residents at this benchmark (18,000 t/d production level), the home locations of these employees, the number of in-migrants included in resident NWT employment, and potential income.

Table 4.3-45
NWT Diamonds Project
NWT Direct Employment – Year 2007

Production Level	Existing NWT Residents	New NWT Residents	Rotational From Rest of Canada	Off-site	Total
9,000 tonnes					
# of Person Years	303	95	240	28	666
Year 2000	398		268		
Percent of Work Force	60%		40%		
Expansion					
Requirements	212	44	–	12	268
18,000 tonnes					
# of Person-years	515	139	240	40	934
Year 2007	654		280		
Percent of Work Force	70%		30%		

Table 4.3-46
NWT Diamonds Project
Direct Employment by Location – Year 2007

	Employment					Total
	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	
9,000 tonnes	154	80	82	31	51	398
Additional Existing Residents	71	45	55	26	15	212
Additional In-Migrants	29	15	–	–	–	44
= 18,000 tonnes	254	140	137	57	66	654

Source: Outcrop estimate.

**Table 4.3-47
NWT Diamonds Project
Direct Income by Location – Year 2007**

	Direct Income (\$000)					Total
	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	
9,000 tonnes Employment Level	\$11,557	\$5,686	\$5,009	\$1,760	\$3,249	\$27,261
+ Additional Employment	7,120	4,550	4,140	1,930	1,130	18,870
18,000 tonnes Employment Level	\$18,677	\$10,236	\$9,149	\$3,690	\$4,379	\$46,131

Average incomes per location increase substantially at this phase, although all incomes are stated in 1994 dollars. This assumes that NWT residents will capture more of the higher paying, skilled positions as they gain more mining experience.

Source: Outcrop estimate.

4.3.11.2 Indirect Employment and Income Levels – Year 2007

NWT purchases of goods and services could increase by \$21 million when the mine is operating at the 18,000 t/d production level (Table 4.3-48). This increase in NWT purchases could generate an additional 107 jobs (Table 4.3-49) and \$5.7 million (Table 4.3-50) in personal income in the NWT.

**Table 4.3-48
NWT Diamonds Project
Purchase of Goods & Services – Year 2007**

	Purchase of Goods and Services		
	Year 2000 (\$000)	+ Additional Requirements (\$000)	= Year 2007 (\$000)
Supplies	\$38,501	\$12,766	\$51,267
Services	5,619	3,735	9,354
Transportation	13,158	4,511	17,669
	\$57,278	\$21,012	\$78,290

Source: Outcrop estimate.

**Table 4.1-49
NWT Diamonds Project
Additional Indirect Employment by Location – Year 2007**

	Potential Purchases (\$000)	Northern Value of Purchase (\$000¹)	Wages & Profit Allocation (\$000)	Indirect = Employment (Number of Jobs)
Yellowknife	\$13,027	\$4,038	\$67	60
Hay River	6,500	1,485	57	26
First Nations	1,800	720	50	14
Coppermine	400	175	50	4
Rest of NWT	285	125	50	3
Total	\$21,012	\$6,553		107

1: Northern Value portion increased to 0.31 (1993 = 0.28 NWT Bureau of Statistics 1993a) to reflect potential improvements in the NWT economy.

Source: Outcrop estimate.

**Table 4.3-50
NWT Diamonds Project
Additional Indirect Income by Location – Year 2007**

	Potential Number of Jobs	Average Salary Per Job (\$000)	Income Per Location (\$000)
Yellowknife	60	\$55	\$3,300
Hay River	26	55	1,430
First Nations	14	45	630
Coppermine	4	45	180
Rest of NWT	3	45	135
Total	107		\$5,675

Note: A second level supplier respending calculation was not prepared for the year 2007.

Source: Outcrop estimate.

Indirect employment (in person-years) was calculated by allocating potential purchases by community, establishing the northern value of purchases and dividing by a dollar figure that includes wage costs per employee, plus a profit calculation, to determine potential indirect employment.

4.3.11.3 Induced Employment and Income Levels – Operations Year 2007

The annual household respending of some \$24.5 million in direct and indirect wages, is expected to generate an additional 77 jobs (Table 4.3-51) and \$2.5 million in income in 2007 (Table 4.3-52).

**Table 4.3-51
NWT Diamonds Project
Induced Employment**

Location	Jobs		X	Responding Multiplier	=	Induced Employment
	Direct	Indirect				
Yellowknife	100	60		.3		48
Hay River	60	26		.2		17
First Nations	55	14		.1		7
Coppermine	26	4		.1		3
Rest of NWT	15	3		.1		2
Total	256	105				77

Source: Outcrop estimate.

**Table 4.3-52
NWT Diamonds Project
Additional Induced Income by Location**

Location	Number of Induced Jobs	X	Average Wage Per Job	Location = Income
Hay River	17		30	510
First Nations	7		25	175
Coppermine	3		25	75
Rest of NWT	2		25	50
Total	77			\$2,490

Source: Outcrop estimate.

4.3.11.4 Summary of All Employment & Income – Year 2007

Tables 4.3-53 and 4.3-54 summarize the employment and income for year 2007 at a production level of 18,000 t/d.

4.3.12 Potential Employment and Income Impacts

4.3.12.1 Reduction in Unemployment

Based on 1994 unemployment rates, the proposed NWT Diamonds Project could reduce overall unemployment in the Northwest Territories by 1.4% during the construction phase and 3% during the operations phase (NWT Bureau of Statistics

**Table 4.3-53
NWT Diamonds Project
Summary of all Employment – Year 2007**

		Year 2000 + Additional Requirement = Year 2007		
Yellowknife	Direct	154	100	254
	Indirect	191	60	251
	Induced	104	48	152
	Total	449	208	657
Hay River	Direct	80	60	140
	Indirect	86	26	112
	Induced	33	17	50
	Total	199	103	302
First Nations	Direct	82	55	137
	Indirect	12	14	26
	Induced	9	7	16
	Total	103	76	179
Coppermine	Direct	31	26	57
	Indirect	7	4	11
	Induced	4	3	7
	Total	42	33	75
Rest of NWT	Direct	51	15	66
	Indirect	2	3	5
	Induced	5	2	7
	Total	58	20	78
Total Employment		851	440	1,291

Source: Outcrop estimate.

1994a). There is a lower impact in the construction phase because contractors will employ more non-resident workers due to skill shortages in the NWT labour market.

Reduction in unemployment rates will be significantly higher in the NWT locations targetted for employment (Table 4.3-55).

During the operations phase, approximately 450 NWT-based jobs (direct, indirect, induced) will be held by new NWT residents (210) and residents of other parts of Canada (240). More of these positions could be assumed by existing NWT residents, if they are prepared to improve their education and skills training. In the longer term, a higher number of jobs could be held by NWT residents, as they acquire more education and skills and gain more experience in the mining industry.

**Table 4.3-54
NWT Diamonds Project
Summary of Income – Year 2007**

		2000 + Additional Requirement = Year 2007		
		(\$000)	(\$000)	(\$000)
Yellowknife	Direct	\$11,557	\$7,120	\$18,677
	Indirect	10,385	3,300	13,685
	Induced	3,640	1,680	5,320
	Total	25,582	12,100	37,682
Hay River	Direct	5,686	4,550	10,236
	Indirect	4,600	1,430	6,030
	Induced	990	510	1,500
	Total	11,276	6,490	17,766
First Nations	Direct	5,009	4,140	9,149
	Indirect	530	630	1,160
	Induced	225	175	400
	Total	5,764	4,945	10,709
Coppermine	Direct	1,760	1,930	3,690
	Indirect	310	180	490
	Induced	100	75	175
	Total	2,170	2,185	4,355
Rest of NWT	Direct	3,249	1,130	4,379
	Indirect	90	135	225
	Induced	125	50	175
	Total	3,464	1,315	4,779
Total Employment		\$48,256	\$27,035	\$75,291

Source: Outcrop estimate.

4.3.12.2 Increase in Income Levels

Project-generated employment could increase NWT wage income by 3% per year during the construction phase and 5% per year during the operations phase assuming 1995 employment levels (Table 4.3-56). Aboriginal communities and Coppermine could experience substantial increases in earned income in both the construction and operations phase. Currently these two locations have average incomes well below the territorial average, and the Dogrib First Nations communities have the lowest average earned income in the Northwest Territories.

**Table 4.3-55
NWT Diamonds Project
Reduction in NWT Unemployment, Construction and Operations**

Location	Current Unemployment Rate (1994) %	Potential Reduction in Unemployment Rate as a Result of Proponent Generated Employment %
Construction		
Yellowknife	7	2
Hay River	18	7
First Nations	39	5
Coppermine	31	6
Total NWT	17%	1.4%
Operations Year 2000		
Yellowknife	7	3
Hay River	18	9
First Nations	39	11
Coppermine	31	11
Total NWT	17%	3%

Source: Outcrop estimate.
NWT Bureau of Statistics 1994a.

4.3.12.3 Increase in Aboriginal Participation in the Wage Economy

Assuming that the potential hires from each location could reflect the proportion of Aboriginal people in that location, Aboriginal hires could make up 35% of the construction employment requirements, and 39% of the operations employment requirements. As education and skill levels increase, this percentage could increase to 40% by the year 2007 (Table 4.3-57).

4.3.12.4 Increase in Number of Females in Mining Jobs

Females make up 44% of the labour force in the NWT and have an unemployment rate of 14%. According to Statistics Canada, women employed in the mining industry accounted for 4% of the total work force. Women accounted for 12% of the total work force during the exploration and appraisal stage of the NWT Diamonds Project. Of these, 50% were Aboriginal women hired from local communities.

**Table 4.3-56
NWT Diamonds Project
Increases in Earned Income, Construction and Operations**

Location	1992 Earned Income (\$000)	Additional Proponent Related Income Per Year (\$000)	% Increase in Earned Income
Construction			
Yellowknife	\$385,600	\$16,480	4
Hay River	56,600	6,328	11
First Nations	14,100	2,529	18
Coppermine	8,155	1,178	14
Total NWT	\$979,000	\$27,438	3%
Operations Year 2000			
Yellowknife	\$385,600	\$25,582	7
Hay River	56,600	11,276	20
First Nations	14,100	5,764	41
Coppermine	8,155	2,170	27
Total	\$979,000	\$48,256	5%

1: Annual income through construction assumes an equal income per year (total income of \$68,596 ÷ 2.5) through a 30 month preproduction (eight to ten months)/construction (20 to 22 months) period.

Source: NWT Bureau of Statistics and Outcrop estimate.

Earned income based on 1991 taxable income less unemployment and social assistance payments.

(NWT Bureau of Statistics 1994c).

Depending of their education and experience, the Aboriginal women held positions in the office, catering or housekeeping staffs. Where interest was expressed, the Proponent encouraged Aboriginal women to explore other fields and offered training for them to do so. One woman successfully trained to become a plant labourer, and later took additional training to become a water quality technician. Another Aboriginal woman started as a lab technician at the camp and has since transferred into the Environmental Department as an environmental technician. Over the summer of 1994, four Aboriginal female high school students from local communities worked with the Environmental Specialist, (transferred to the Diamonds Project from BHP's Navajo Mine) collecting data to be used in later reclamation projects at the camp.

The non-aboriginal women employed on the NWT Diamonds Project were primarily professionals, including geologists, wildlife biologists, archaeologists, anthropologists and mining engineers. Some women worked as surveyors and

**Table 4.3-57
Aboriginal Participation
NWT Diamonds Project Generated Employment**

Location	Estimated Proponent Generated Employment	Aboriginal % of Population	Potential Aboriginal Employees
Construction	Total Person-years		
Yellowknife	711	17	121
Hay River	298	36	107
First Nations	119	94	112
Coppermine	57	93	53
Rest of NWT	43	79	34
Total	1,228		427
% of Total Employment			35%
Operations Year 2000	Annual Person-years		
Yellowknife	449	17	76
Hay River	199	36	72
First Nations	103	94	97
Coppermine	42	93	39
Rest of NWT	58	79	46
Total	851		330
% of Total Employment			39%
Operations Year 2007	Annual Person-years		
Yellowknife	657	17	112
Hay River	302	36	109
First Nations	179	94	168
Coppermine	75	93	70
Rest of NWT	78	79	62
Total	1,291		521
% of Total Employment			40%

Source: NWT Bureau of Statistics 1994b.

environmental technicians, while others worked as catering staff. In the Yellowknife office, women occupy a number of supervisory positions. The administrative supervisor is also the payroll administrator and is taking courses towards a Payroll Management designation. The accounting supervisor is a woman, as is the senior buyer, both of whom have several years of mining industry experience.

It is Proponent's policy to encourage women to work for the company in both traditional and non-traditional occupations. The Manager of Human Resources, has become an advocate for the NWT outreach project of the Manitoba Women in Trades and Technology Association (MBWITT). This is a regional initiative through the WITT National Network, located in London, Ontario. WITT is an education and advocacy organization which is dedicated to promoting and assisting in the recruitment, training and employment of women in trades, technology, operations and blue collar work. The Proponent is committed to promoting work opportunities for women in the mining industry and has agreed to work with MBWITT during the development and operations phases of the project.

4.3.12.5 Labour Market Disruption

The NWT Diamonds Project and its suppliers will be looking for the best people available to fill jobs. Although each will hire some people who are currently unemployed, both the proponent and suppliers will likely hire a larger number of NWT residents who already have jobs. This will trigger a chain reaction in the labour market, similar to that experienced during the expansion of government in the past. When one person leaves an employer to accept a job with the project or a major supplier, the employer will then attempt to fill the vacancy with a person recruited from another local business. Eventually, through a trickle-down effect, some unemployed people will get jobs at lower levels. However, if the skills lost to an employer cannot be replaced by the existing labour market, then the employer at the bottom of the supply/demand spiral will have to look for new staff outside the Northwest Territories.

In the smaller communities, the labour market disruption will be minimal. Generally people will be ready to move into vacated positions, particularly in semi-skilled or unskilled jobs. In Coppermine and the First Nations communities, there could be some labour market disruption if current employees of Lupin or Colomac choose to move to NWT Diamonds Project jobs. However, if the vacated jobs could be filled by semi-skilled or unskilled workers, there should be an ample supply of local applicants for the positions.

Labour pool disruption will be felt most in Yellowknife. More of the jobs in Yellowknife demand specific skills and often these skills are in limited supply. This disruption/job change syndrome is relatively common in Yellowknife. Employers have learned to deal with this problem after years of competing with government for the available labour supply.

Hay River could also experience some labour market disruptions, as seasonal workers, particularly those connected to the Mackenzie River shipping operations, could move to full time jobs with the project or its suppliers. However, with a higher unemployment rate than Yellowknife, Hay River has a larger local labour supply, and does not anticipate any problems filling seasonal positions (Canada Human Resources telecom. 1995).

In Yellowknife and Hay River, the work force disruption impact will coincide with the project recruitment and hiring schedule. Although there will be re-staffing costs for the many Yellowknife and Hay River businesses that will be affected, these are generally considered part of the regular costs of doing business in a remote area.

4.3.12.6 Student Employment/Work Experience.

Household respending of wages earned via direct project jobs, or via jobs with NWT Diamonds suppliers is expected to add over 200 person-years of induced employment in the NWT. Many of these jobs could be part time jobs in retail, hospitality and personal service businesses. In Yellowknife, where the labour supply is already limited, many of these part time jobs could be filled by students.

During the Proponent's bulk sampling program, NWT students filled seasonal jobs at the work site (Boyd 1995a). Jobs at the site can introduce students to various mining career possibilities and can encourage them to continue their education. Every effort will be made by the Proponent to involve students in seasonal employment. In the long term, a student employment program could lead to more NWT people in skilled and professional jobs.

Residual Effects

Employment and related income could have a major positive effect on the people in the study area communities, if they are prepared to get the education and training required for many of these jobs and if they are prepared for a career commitment.

Without improvement in education and skill levels, particularly in smaller communities, the employment and income effects will be reduced as fewer people will be able to meet entry-level requirements for jobs that offer advancement potential.

4.3.13 Mine Closure

The NWT Diamonds Project is planned for 25 years of production. Towards the end of this period, employment levels will inevitably decrease. The structure of a mine shutdown is important in minimizing impacts to employees and local communities.

The Island Copper Mine near Port Hardy, BC is a BHP-operated mine that has been in production for approximately 25 years and is scheduled for closure in January 1996. The closure plan for Island Copper, that was initiated over three years prior to this closure date, can serve as a blueprint for a similar event for the NWT Diamonds Project. Details of the closure plan are discussed in two press releases and in two newspaper articles that are included in Appendix IV-C3 and

IV-C4. The Company implemented two programs to assist employees in job retraining and educational upgrading and in identifying future career opportunities. An Industrial Adjustment Committee, with representatives from management, unions and the federal and provincial governments, was established in January 1993 to recommend employee assistance and training programs and to monitor the impacts of the mine closure.

4.3.13.1 Closure Plan

The main elements of a closure plan will include:

- notification to employees and communities in advance of the anticipated closure date so that there is sufficient time for affected individuals to make appropriate plans
- education or re-training programs to help employees find jobs that are relevant at the time of closure
- cooperation with communities, industries and governments in locating alternate employment opportunities
- provision for facilities, interviews and counselling to assist individuals determine their best course of action.

A significant mitigation factor for the NWT Diamonds Project is that no new “mining-only community” will be developed. Employees will travel from existing communities to work a two-week on/two-week off shift schedule at the mine. A large percentage of the employees are expected to come from the City of Yellowknife, which is the largest city in the NWT. In June 1995, several senior officials of the City of Yellowknife visited Port Hardy to investigate firsthand the effects of mine closure on the community. Subsequent meetings with the delegation from the city indicate that the city officials were favourably impressed with the closure plan for the Island Copper Mine.

4.3.13.2 Residual Effects

The level of the impact on employees, industries and communities will largely be determined by the state of the local economy at the time of closure. This cannot be determined beforehand. It is likely that other mines or industrial activities will be developed which will alleviate any regional loss in employment. Regardless, the legacy of the mine development will be a highly skilled and trained workforce,

stronger and healthier Northern communities and 25 years of wealth creation that, if invested wisely, will result in creating a framework for sustainable development for the region.

4.4 Population Growth/Decline

The number of in-migrants and their new residence locations are determined in the preceding section based on the needs of the project, the available labour and skills and the potential effects due to direct, indirect and induced income. This section summarizes these results and investigates the potential impacts of the population changes.

4.4.1 Causes of Impacts

The potential causes of socioeconomic impacts due to population changes are the following:

- New direct, indirect and induced jobs generated by the proposed NWT Diamonds Project
- Arrival of itinerant “job seekers” attracted by the publicity the project will generate in other parts of Canada
- Large percentage of total jobs located in Yellowknife and Hay River.

4.4.2 Potential Level of Impact

Based on the preceding analysis, specific details of the potential level of impact can be summarized as follows:

- Between 250 and 300 people could move to Yellowknife as a result of the NWT Diamonds Project. Assuming a household size of three, the total population increase in Yellowknife could be 750 to 900 people. This translates to a 4% to 5% increase in the total population of the city.
- Hay River could require an additional 65 to 75 people to meet labour force requirements. Considering household size, this could mean an additional 200 to 225 people, or a 6% to 7% increase in total population.
- Aboriginal communities and Coppermine would not experience in-migration as a result of the NWT Diamonds Project. With higher unemployment rates, these communities could meet labour force requirements with their existing populations. Potential in-migration, even from nearby communities, would be curtailed by lack of available housing.

- NWT residents from outside Yellowknife and Hay River, who are not hired directly by the NWT Diamonds Project, could move to one of these larger communities to fill indirect/supplier related jobs.

4.4.3 In-migration

In-migration could occur for the following reasons:

- The NWT does not have enough skilled people to meet the projected direct and indirect employment requirements that could be generated by this project.
- Yellowknife with a high labour force participation rate and a low unemployment rate, does not have a large enough labour pool to meet projected NWT Diamonds Project requirements.
- Some unemployed people in smaller communities will move to Yellowknife or Hay River to fill the larger numbers of jobs available in these centres.

In-migration can be divided into various types as discussed below.

4.4.3.1 NWT Diamonds Project-generated Employment

Project-generated employment is the total number of direct, indirect and induced jobs that could be created by the proposed NWT Diamonds Project ([Table 4.4-1](#)).

4.4.3.2 Labour Force Re-alignment

Many Yellowknife residents hired by the project will already have jobs. This will create job vacancies in other mines, businesses and government. Although some of these vacancies will be filled through internal promotions or hiring from yet other companies, eventually, to meet skill requirements, additional employees will have to be recruited from other NWT locations or from outside the NWT. This chain reaction from project hiring will result in a need for approximately 50 new Yellowknife residents. In Hay River, with a 16% unemployment rate, it is likely that labour force needs can be filled from the local population.

4.4.3.3 Job Seekers

Yellowknife will likely attract “job seekers” lured north by stories of jobs and wealth. Distance, cost and climate will limit the numbers that arrive, and success in securing employment will determine the number who actually stay. Since there is no way to accurately assess the number of “job seekers” who could arrive and stay in Yellowknife, a number of 50 has been estimated. Few, if any “job seekers” will go to Hay River, since most will be attracted to the project’s main hiring centre.

**Table 4.4-1
Summary of BHP Generated In-migration**

	Preproduction/Construction – to 1998					Total
	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	
Contractors	-	-	-	-	-	-
Proponent	46	-	-	-	-	46
Suppliers/Level 1	70	40	-	-	-	110
Suppliers/Level 2	18	11	-	-	-	29
Responding	24	8	-	-	-	32
Total	158	59	-	-	-	217
	Operations – Year 2000					Total
	Yellowknife	Hay River	First Nations	Coppermine	Rest of NWT	
Proponent Direct	70	25	-	-	-	95
Suppliers/Level 1	57	23	-	-	-	80
Suppliers/Level 2	6	2	-	-	-	8
Responding	10	5	-	-	-	15
Total	143	55	-	-	-	198

Source: Outcrop estimates.

4.4.3.4 NWT Resident Moves

NWT residents who move from outlying communities to Yellowknife or Hay River could include:

- employees of the Proponent who do not want to pay commuting costs between their home communities and Yellowknife
- unemployed people who can get jobs with suppliers to the project.

Since there is a strong attachment to family and community in the NWT, it is not likely that many people would trade their home community for Yellowknife or Hay River, but possibly a maximum of 10 people could move to Yellowknife and about five to Hay River.

4.4.3.5 In-migration Summary

In summary, the most likely scenario for project generated population growth would see a population increase of about 800 in Yellowknife and 200 in Hay River by the year 2000 (Table 4.4-2). This 1,000 person in-migration is less than

**Table 4.4-2
Summary of Total In-migration**

Cause	Yellowknife	Hay River
Project Direct/Indirect and Induced Jobs	158	59
Labour Force Realignment	50	-
Job Seekers	50	-
From NWT Communities	10	5
Total	269	64
x Households (3)	807	192
Rounded	800	200
Population Increase	5%	6%

Source: Outcrop estimate.

one-third of total NWT in-migration of 3,300 recorded in 1993 (NWT Bureau of Statistics 1994b). Over the past 10 years, out-migration has exceeded in-migration in the NWT for a net 10-year loss of 5,200. More than half this loss was recorded in the two years following the completion of the pipeline from Norman Wells to Alberta.

4.4.4 Potential Impacts

4.4.4.1 Yellowknife

Yellowknife will receive the highest number of in-migrants. Discussions with the Yellowknife City Council and the Yellowknife Chamber of Commerce indicate that Yellowknife is prepared for this population increase and relies on this type of growth to expand its economy.

Public Infrastructure and Services

Infrastructure and services can readily accommodate a population increase of 800 people (Volume 2, Section 4.4). A major subdivision is being developed and private contractors will build houses as needed. With the completion of one new school in 1994 and a second new school in 1995, there should be ample capacity for school age in-migrants. Currently Yellowknife has limited excess power capacity, but this will be remedied once the planned Cascades power project comes on-line (expected completion by late 1996).

Private Investment

Private investment is adequate to meet the requirements of business expansion in Yellowknife. This investment could go to the development of housing,

commercial buildings or new retail or service companies needed by a growing population.

Increase in Tax Base

Property tax revenues will increase as more people move to Yellowknife. Three-hundred new households could add over \$750,000 to Yellowknife tax revenues.

More Skills in the Community

Many in-migrants will bring new or needed skills to the community. This will increase the overall skills pool in Yellowknife.

4.4.4.2 Hay River

Like Yellowknife, Hay River desires population growth and wants to encourage NWT Diamonds Project employees to move to Hay River (see Hay River, Volume II, Section 4.5).

Public Infrastructure and Services

In general, Hay River has adequate infrastructure and services to meet a population increase of 65 households. There could be a requirement for additional serviced lots and the school may have to be expanded, but these are potential impacts that Hay River anticipates and is planning for, with or without project immigration.

Private Investment

The Hay River business community could meet the private investment requirements of needed expansion.

Increase in Tax Base

Property tax revenues will increase as more households are added to the community.

More Skills in Community

Hay River appears to be positioning itself as an NWT satellite mining town. It currently supplies goods and services to Colomac Mine, and wants to expand this role with the NWT Diamonds Project. Expanding the skill base in the community will ensure its competitive position in the mining supply industry.

4.4.4.3 First Nations and Coppermine

In-migration will be limited to Yellowknife and Hay River. A few people from First Nations communities and Coppermine could move to Yellowknife for employment with project suppliers, but the number would be small, and the impact negligible.

4.4.5 Mitigation/Enhancement

The level of in-migration to Yellowknife and Hay River is well within the handling capability of either community. In fact, both communities, particularly Yellowknife, could handle higher levels of in-migration.

An estimated 240 rotational mine employees will live outside the Northwest Territories. If more of these people were encouraged to live in the Northwest Territories, more benefits would accrue to Yellowknife and Hay River. The task of attracting these people to Yellowknife or Hay River will lie mainly with the two municipalities.

4.4.6 Impact Timing

Most of the total number of in-migrants will arrive through the construction phase. Although some may leave after construction, additional in-migrants will arrive, resulting in an almost consistent number through both construction and operations.

4.4.7 Residual Effects

In-migration will have a positive, moderate impact on Yellowknife. With the pending division of the NWT into two territories and reductions in NWT government spending, Yellowknife requires new sources of activity to maintain its existing economic base and is depending on the NWT Diamonds Project to provide this activity. The impact on Hay River will also be positive, and will fill part of the need for more economic activity in this community.

4.5 Local Economies

4.5.1 Situation

The economy of the Northwest Territories is based mainly on the recirculation of government dollars. Mining, oil and gas, tourism, arts and crafts and other goods-producing industries bring needed export dollars to the NWT economy. All these sectors combined are equal to approximately 33% of the government contribution to the northern economy.

Within this government-dominated economy, there are two distinctly different sub-economies. Larger centres flourish on the retail and service industry built up

around government expenditures and to a lesser degree expenditures of the NWT export sectors. Smaller centres rely almost entirely on direct government dollars, in wages, transfer payments, grants, contracts and, to a limited degree, the purchase of goods and services from local businesses. Exports from these small communities make up a very small portion of total income and are usually limited to renewable resources, tourism and arts and crafts.

Since the main providers of goods and services are in the larger centres of Yellowknife and Hay River, it is these communities that will benefit most from project activities. With a limited service sector, geared mainly to local needs, it is almost impossible for small communities to take advantage of project purchases unless they develop specialized services to meet specific project or mining industry requirements.

Although smaller communities cannot benefit extensively from project purchases without substantial business development, they can obtain economic benefits from direct employment with the NWT Diamonds Project and with suppliers to the project in the larger communities.

4.5.2 Causes of Impacts

The causes of impacts on local economies are the following:

- project-generated employment in the NWT: direct, indirect and induced
- project purchases of goods and services in the NWT
- demand for specialized services
- population growth in the NWT.

4.5.3 Level of Impact

The level of impact relates directly to the number of people employed directly by the NWT Diamonds Mine per NWT location and the volume of project purchases of goods and services per NWT location.

During both construction and operations, Yellowknife will receive the greatest benefit in terms of new dollars into the economy. With the largest population in the region and the most mature business community, Yellowknife is best positioned to take advantage of project expenditures. Although total earned income will increase by over \$25 million per year once the mine starts operation, this represents a modest overall earned income increase of 5% compared to overall income increases that will exceed 30% in communities where unemployment is much higher ([Table 4.3-56](#)).

As the second largest community in the region, Hay River could also receive substantial benefits from the project during the construction and operations phases. Like Yellowknife, Hay River will benefit from both direct project employment of its residents and project purchases of goods and services.

Although the economic benefits to smaller communities will be substantial, they will be mainly from direct project employment. The purchase of goods and services will be more concentrated in Yellowknife and Hay River, with smaller communities receiving less than 10% of total project purchases. Following is a summary of the potential purchases and employment income per community during construction, operations in the year 2000 and expanded operations in the year 2007. All purchase estimates are based on existing community businesses and do not consider new business ventures. Also all purchases and employment income are in 1994 dollars ([Table 4.5-1](#)).

4.5.4 Local Economy – Yellowknife

4.5.4.1 Level of Impact

During the period from the early 1990s until the end of initial mine construction (approximately 1998), the NWT Diamonds Project could expend over \$127 million dollars in the City of Yellowknife through project purchases and project wage income ([Tables 4.3-1](#) and [4.3-15](#)). Although inputs to a local economy usually diminish after the construction phase, this will not be the case with the NWT Diamonds Project. In fact, project dollars into the Yellowknife economy could increase on a per annum basis when the mine goes into operation. This reflects the expected higher level of direct employment of Yellowknife residents during the operations phase as compared to the construction phase. By the year 2000 direct project expenditures in Yellowknife for wages and purchases of goods and services could be \$47 million per annum ([Table 4.3-31](#) and [4.3-34](#)). Assuming the percent of purchases by location remains constant, this could increase to \$67 million per annum in 2007 when the mine reaches a production level of 18,000 tonnes per day ([Table 4.3-47](#) and [4.3-48](#)). During its first 18 months of operation in the NWT, the company spent the majority of its \$39 million in NWT purchases in Yellowknife. This expenditure was divided among 175 businesses with purchases from at least six of these businesses exceeding \$1 million. Another 12 companies supplied the project with goods in the \$100,000 to \$1 million range.

**Table 4.5-1
Purchases and Income Summary per Location**

Community	Purchases (\$000)	NWT Diamonds Project Generated Income
		Direct/Indirect/Induced (\$000)
Construction¹		
Yellowknife	\$112,885	\$14,433
Hay River	45,860	5,200
First Nations Communities	8,820	3,753
Coppermine	4,410	1,741
Rest of NWT	4,406	1,189
Total NWT	\$176,381	\$26,316
Operations – Year 2000		
Yellowknife	\$35,814	\$11,557
Hay River	17,856	5,686
First Nations Communities	2,153	5,009
Coppermine	1,075	1,760
Rest of NWT	430	3,249
Total NWT	\$57,328	\$27,261
Operations – Year 2007		
Yellowknife	\$48,841	\$18,677
Hay River	24,356	10,236
First Nations Communities	3,953	9,149
Coppermine	1,475	3,690
Rest of NWT	715	4,379
Total NWT	\$78,340	\$46,131

1. Over a number of years
Source: Outcrop estimates, 1995.

4.5.4.2 Reasons for Economic Impacts in Yellowknife

Yellowknife will play a major role in the project for the following reasons:

- developed, diversified economy with experience in serving the mining industry
- available capital to expand business infrastructure and inventory
- adequate supply of industrial land and commercial space for business expansion

- skilled labour force and local training facilities to train more people in needed mining skills
- need to develop new business to replace expected losses in government business in line with budget cuts and the upcoming division of the Northwest Territories
- closest major location to mine site and transportation centre for supplies and personnel going to the mine site
- municipal government that supports and encourages mining and related development
- access to financial services to assist with business growth (banks, accountants, financial consultants)
- long history of dealing with change and ability to adjust to new requirements of new players in the economy
- business opportunities arising from servicing population growth generated by project activity.

4.5.4.3 Potential Impacts

Since Yellowknife thrives on growth, it needs a constant supply of new economic activity to fuel this growth. It especially needs new economic activity to replace anticipated losses in government spending. Over the past few years, mineral exploration, particularly diamond exploration, has been the engine of growth for the Yellowknife economy. This exploration activity has allowed businesses to start the expansion required to adequately service an expanded northern mining industry, and has added to the local supply of service and retail operations.

The economic impacts in Yellowknife, as described below, will be mainly positive, although there could be some minor inconveniences during the initial stages of construction and project hiring. Positive impacts far outweigh negative impacts in Yellowknife, since a project such as the NWT Diamonds Project is needed if Yellowknife is to continue to grow and prosper.

Business Expansion Resulting in More Jobs and More Northern Purchases

During construction, project employment and purchase expenditures could generate 546 person-years of indirect and induced employment in Yellowknife, or three additional person-years of employment for every NWT Diamonds Project direct person-year of employment (Table 4.3-1). In the construction phase, project purchases of goods and services will contribute more to the Yellowknife economy than direct employment. During operations, as purchases of goods and services

are reduced and more Yellowknife residents are hired to work for the project, the economic benefits to Yellowknife will be divided more evenly between direct employment and the purchase of goods and services. By the year 2000, overall project purchasing in Yellowknife could result in one person-year of employment for every \$185,000 expended on goods and services. This is somewhat higher than the industry multiplier in the NWT, which if applied to \$185,000 in expenditures on goods and services would result in only 0.7 jobs for this expenditure (NWT Bureau of Statistics 1993a).

Supply and Demand Imbalances

Initially there could be some imbalance between the demand for certain products and services and the supply capability of Yellowknife businesses. Small customers may have to wait for certain goods or services while businesses service the larger mining customers. This imbalance will likely be temporary as businesses gear up to new demands in the marketplace.

Business Disruption

A main cause of business disruption could be loss of existing staff to the project or a project supplier. This impact will occur mainly during the mine's initial staffing process and will be temporary. For Yellowknife businesses that experience staff losses, there will be some costs in recruiting, hiring and training new staff to replace those lost to the project.

Development of More Competitive Marketplace

The NWT Diamonds Project has stated it will purchase goods and services in the NWT if suppliers can provide competitive costs and service. The Proponent will have a Northern preference purchasing policy, but will not offer a Northern price differential. To ensure they get their share of project purchases, Yellowknife companies will have to examine their competitive edge and use this to their advantage. As volume of sales increase, businesses will be able to lower margins and spread operating costs over higher sales volumes, for a net increase in profit. National companies, particularly retailers, who have established in Yellowknife in the past few years have used sales volume to maintain competitive pricing of their goods.

Establishment of More Branch Operations in Yellowknife

Branch operations could provide needed goods or services that do not now exist in Yellowknife. It is possible they could force closures of smaller businesses that are unprepared for this level of competition. Some branch operations could be adjuncts to existing businesses (addition of a new product line) or they could be large-scale operations prepared to hire many Yellowknife residents. Although some of the branch operations could be direct suppliers to the project (explosives,

equipment dealers, consulting firms), others could be directing their products at increased household responding in Yellowknife. These branch operations could be franchises (fast food operations, health spas, retailers) or they could be operations controlled by a regional office or head office in southern Canada. Initially branch operations can reduce business volume of existing businesses, but experience with branches moving into Yellowknife to date has resulted in increased purchases in the North, and often expansion of existing markets for specific goods or services.

Increased Cost of Living

Yellowknife's cost of living is currently 26% higher than the cost of living in Edmonton (NWT Bureau of Statistics 1995c). Higher housing, fuel and transportation costs account for much of this difference. The differential in food costs has narrowed in the past few years as sales volumes have increased. There is no firm evidence to support either an increase or a decrease in the cost of living as a result of the NWT Diamonds Project. Depending on supply and demand, housing prices could increase, although there has been a general decrease in housing costs over the past five years. Increased sales volumes as well as more competition in the marketplace could lower prices on some consumer items such as food, clothing and furniture. High project salaries could also affect the cost of living if other employers are forced to raise salaries to retain employees. Meeting these increased operating costs could mean an increase in the cost of the end product, whether it be accounting services or a hamburger.

Strengthening the City's Position in the Mining Sector

Although Yellowknife has been associated with gold mining for over 60 years and has serviced local mines as well as mines further afield, the city received limited national recognition as a mining centre until the recent discovery of diamonds. As the designated hiring base, transportation and service centre for North America's first diamond mine, Yellowknife can build its existing mining services and introduce new ones to solidify its position as the diamond mining centre of Canada and a prominent mining supply and service centre. This could encourage future mine developers to use Yellowknife as their base of operation, taking advantage of expanded or new services set up for the NWT Diamonds Project.

Less Dependence on Government Purchases

Most businesses in Yellowknife depend on government direct or indirect purchases for their survival. After government, the NWT Diamonds Project could be the largest purchaser of goods and services in the city. Although businesses would continue to rely on government purchases, their potential market would expand to include not only the projected diamond mine but also suppliers to the project and a growing service and retail sector.

Potential for Increased Tourism

Yellowknife will receive increased media coverage in connection with the development of a diamond mine. This in turn can establish a new level of awareness for Yellowknife as a travel destination and the diamond capital of Canada. The Klondike Gold Rush of the 1890s continues to draw people to the Yukon, just as the diamond story of the 1990s could draw tourists to Yellowknife now and in the future.

Improved Profitability

Project expenditures will circulate throughout the economy of Yellowknife, reaching into every sector. Increases in sales volumes could boost marginal businesses into a profit situation and provide more successful businesses with re-investment dollars needed for expansion. Since profits of Northern-owned businesses generally stay in the North (purchase of vehicles, construction of new warehouse) these initial profits can in turn generate more profit as project dollars spread through the economy. Improved profitability can lead to more flexibility in hiring and training. Training a person for a job costs money, since the person does not operate at full capacity until he/she is properly trained. If businesses were more profitable, they could afford to hire more unskilled workers and provide them with necessary training.

4.5.5 Local Economy – Hay River

4.5.5.1 Level of Impact

Hay River is expected to capture significant benefits from the NWT Diamonds Project. Dollar value of direct employment income and purchases of goods and services will be lower in Hay River than in Yellowknife, but will represent a much larger percent increase in total earned income and in total business sales volume. Through construction, project expenditures in Hay River could exceed \$50 million, mainly in the purchase of goods and services, projected at \$45 million (Table 4.3-1 and 4.3-15). Per annum expenditures during the initial years of operation could exceed \$23 million (Table 4.3-31 and 4.3-34), rising to \$34 million (Table 4.3-47 and 4.3-48) by the year 2007, when the mine reaches its full production capacity of 18,000 tonnes per day.

4.5.5.2 Reasons for Impacts

Hay River is well-positioned to be a supplier of labour and goods and services to the proposed NWT Diamonds Project for a number of reasons:

- over 20 years as the major supply centre for Pine Point Mine
- currently the staging centre and supply centre for Colomac Mine

- aggressive private sector that wants the community to become a mining supply/service centre
- lower cost of doing business in Hay River versus Yellowknife
- less reliance on government dollars and more reliance on private industry dollars
- terminus of the only rail line into the Northwest Territories
- diversified business community that has learned to be very competitive as it re-grouped to survive the closure of Pine Point Mine
- higher unemployment rate than Yellowknife (16% versus 7% in Yellowknife), therefore larger available labour supply (NWT Bureau of Statistics 1994a)
- fairly high skill levels in the labour force, often acquired via seasonal employment with local marine operations or via prior mining/exploration employment (Hay River is the terminal of all Mackenzie River/Western Arctic shipping and is the headquarters for Northern Transportation Co. Ltd., the NWT's largest marine shipping company)
- home base for some major NWT suppliers, including one of the largest vehicle dealers and the largest equipment dealer in the Northwest Territories
- committed to marketing its services to the mining industry and marketing the town to new project hires who may consider moving to the NWT.

4.5.5.3 Potential Impacts

In general, the impacts in Hay River are expected to be similar to those in Yellowknife and to have a positive effect on the economy. As a smaller community, it could experience more difficulty in dealing with an economic boom, particularly in the early stages when business will have to expand to balance the needs of existing customers and those of new customers. During this stage there could be some strain on services, but this would be a temporary situation.

Development of a Small, Specialized Manufacturing Sector

Of necessity, Hay River has diversified into many areas and has facilities to do custom manufacturing of products that may be required by the mining industry. These include construction industry components (doors, windows, roof trusses, fuel tanks) as well as furniture. Hay River currently has a more diversified manufacturing sector than Yellowknife.

Broaden Market Opportunities for Non-Mining Businesses

In addition to being a transportation and manufacturing centre, Hay River is the only commercial agriculture centre in the NWT, producing eggs, pork, chicken and some vegetables for the Northern market. It also has a logging/sawmill business. These operations could benefit from an increased market for their products generated by project operations.

Add Stability to the Hay River Economy

Hay River's economy has been through many highs and lows over the past 30 years. As a trans-shipment centre, it boomed through the heady days of Pine Point Mine construction, Beaufort Sea oil and gas exploration and construction of the oil pipeline from Norman Wells to Alberta. Between construction projects, it serviced the mine and people in Pine Point. After projects ended and the mine closed, the Hay River economy sagged, but has improved with the development of a light manufacturing sector, an agricultural sector and the establishment of Hay River as the hiring and service centre for Colomac Mine. If the town is able to position itself as a mining supply/service centre for a range of mining operations, it could add more stability to the economic base of the community.

4.5.6 Local Economy – First Nations Communities

Although the total dollar amount expended in First Nations communities is much lower than the amount that would be expended in Yellowknife or Hay River, the overall positive impact of these dollars would be much more significant. Hiring by the project is expected to reduce unemployment in Aboriginal communities from almost 40% to 30%. The project could also cause an increase of total earned income in these communities by over 33%. This increase in income could create a market for new goods and services in the communities to meet the needs of these new wage earners.

Local economies in First Nations communities will benefit more from direct project employment than from project purchases of goods and services. This is the reversal of the situation in larger communities where the main benefits accrue from project purchases. In most First Nations communities the business sector is small and is often limited to a very few businesses geared to servicing the local market. Although the business sector is larger in Rae, and is closely tied to the Dogrib Development Corporation, it seldom handles contracts outside the immediate Dogrib area and has limited capacity for handling large projects. This situation could change via negotiated project contracts and the development of new businesses, but this assessment is based on the current situation in these communities.

During construction/preproduction, First Nations communities could benefit from up to \$12.5 million in project expenditures (Table 4.3-1 and 4.3-15). A large

portion of this would be labour expenditures for mine employees, or employees for a range of labour contracts from catering to camp maintenance. This expenditure would be spread over several years. Annual project operations expenditures in First Nations communities could be \$7 million by the year 2000 (Table 4.3-31 and 4.1-34), and over \$12 million by the year 2007 (Table 4.3-47 and 4.3-48), with most of the expenditure for wages and benefits for direct project employment.

4.5.6.1 Potential Impacts

On the economic side, the impacts would be positive. Increased dollars in the economy could foster the expansion of existing businesses or the start-up of new businesses, particularly in the retail and personal services area. In turn this could generate more employment and wage income.

A more long-term impact could be the development of new businesses to service the NWT Diamonds Project and the mining industry in general and create new jobs and income for First Nations people. New business development initiatives may be suggested by the project, but the final decisions on the types of businesses that may be best suited to the population will have to originate with First Nations people and be developed by them either individually or in conjunction with local or regional development corporations.

4.5.6.2 Expansion of Arts and Crafts Market

Additional income could be earned in communities via induced employment in the arts and crafts industry. A growing population in Yellowknife and Hay River, and more business visitors to Yellowknife (rotational pass-throughs and project-related visitors) plus an increase in tourism in Yellowknife, could expand the market for arts and crafts products and encourage increased production of traditional items. Since many of the producers are women, this could add to their earning capacity and encourage more community members, possibly even spouses of people working at the mine, to become involved in this sector of the economy.

4.5.7 Local Economy – Coppermine

Coppermine's economy will benefit mainly from direct NWT Diamonds Project employment, with a much smaller ongoing benefit from the purchase of goods and services. During the construction/preproduction phase, project expenditures in Coppermine could be \$6 million. By the year 2000 annual project expenditures in Coppermine could be \$2.8 million, increasing to \$5 million by the year 2007.

Project purchases could include some services, but similar to the First Nations communities, will likely centre around the purchase of contract labour services in a number of areas. It is unlikely Coppermine could be competitive on the purchase of most goods due to its remote location.

Although ongoing economic impacts in Coppermine will be positive and will increase the community's involvement with the mining sector, they should be comparable to economic benefits the community currently receives from Lupin Mine employment and expenditures.

A main positive element could be the development of more mining skills within a wider segment of the population. This could prepare the community to take advantage of future mining developments planned closer to their home community. With training gained at Lupin and at the NWT Diamonds Project, the community could be in a better position to establish a mining service centre in Coppermine in the event other planned developments go ahead in Nunavut.

4.5.8 Mitigation/Enhancement

To take advantage of project purchase opportunities, the business community requires the following:

- advance notice of requirements so that business is prepared to respond to tenders when they are issued. The NWT Diamonds Project could provide this information via the various Chambers of Commerce across the NWT and advertisements in local newspapers.
- breaking contracts into smaller components. Few NWT businesses may have the resources to handle multi-million dollar contracts, but many can respond to certain parts of contracts. Some years ago the government started breaking its construction contracts into smaller units and has succeeded in having more Northern companies involved in larger projects.

4.5.8.1 Out-sourcing

The Proponent is willing to consider out-sourcing some site services, whereby an NWT company has the skills to perform the work but would need assistance from the Proponent in providing specialized equipment.

Another service that could be out-sourced is the recruitment/employee co-ordination function. At a Northern Saskatchewan mine this function is handled successfully by a native-owned personnel placement agency (Intergovernmental Working Group 1992).

Preferential Contracting

Through Impact and Benefit Agreements or Co-existence Agreements, the Proponent is prepared to work with Aboriginal people to identify business opportunities and to assist with establishing Aboriginal-owned companies to handle specific contracts.

Joint Ventures

Smaller communities that are prepared to aggressively pursue business opportunities generated by project purchases could tap into needed business expertise by establishing joint ventures with companies in larger centres or companies not currently resident in the North. For Yellowknife companies, a joint venture with a smaller Aboriginal community could provide needed labour supply and could increase opportunities for obtaining project business under its joint venture partner's ability to access the project's Aboriginal preference policy. For smaller communities, a joint venture could provide a way of training and employing more of its residents and allow it to tender on work that it could not consider on its own.

Government Assistance Programs

The Government of the Northwest Territories has a number of grant and "last resort" loan programs to help entrepreneurs start and expand small businesses. To take advantage of project purchase opportunities, some small businesses may need timely financial and consulting assistance. The government could develop a plan to efficiently handle these requests to ensure that project-related opportunities are retained in the North and benefits accrue to locations outside Yellowknife.

4.5.9 Residual Effects

Since all NWT communities need employment and an expanded market for sales of goods and services, the impact of the proposed NWT Diamonds Project on the NWT economy can be assessed as major. At the same time, most of the positive effects will accrue to the larger centres with larger populations and more mature business communities. To spread more benefits to smaller Aboriginal communities, the Proponent will work with interested parties in these communities to investigate opportunities for providing needed goods and services to the project.

4.6 Pass-through Traffic - Yellowknife

The potential impacts to Yellowknife due to increased air activity and increased personnel flow through Yellowknife are described in this section.

4.6.1 Causes of Impacts

Impacts will result from two main factors:

- Yellowknife is the main hiring centre. As such, most employees will depart from and return to Yellowknife en route to and from the mine.
- Two-week staggered rotational patterns will mean a steady flow of people through Yellowknife.

4.6.2 Potential Level of Impact

The magnitude of these impacts based on the projected level of activity is as follows:

- An estimated 240 rotational fly-in employees from southern Canada will pass through Yellowknife each month. Where possible, flights to and from the mine will be set to coincide with scheduled service from and to Edmonton.
- Another 150 NWT-based rotational employees from locations outside Yellowknife (or the designated air charter pick-up centres of Wha Ti, Rae Lakes, Snare Lake, Lutsel K'e or Coppermine) will pass through Yellowknife each month. Poor connections between regional airlines' scheduled flights and mine charters may necessitate overnight stays in Yellowknife for some of these employees.
- Considering three rotations into and out of the mine each week, there could be 35 to 40 people coming into Yellowknife, and the same number leaving, three days per week, year-round.
- In the event of flight delays or cancellation due to weather, the level of impact would increase.

4.6.3 Reasons for Impacts

Impacts could result from the increased use of Yellowknife facilities and services.

4.6.4 Potential Impacts

4.6.4.1 Spending in the Local Economy

With tight scheduling, fly-in rotational employees from southern Canada will not have much time to spend money in Yellowknife. In fact they are not likely to leave the Yellowknife airport, but could spend money there if products were available.

NWT resident employees who pass through Yellowknife will have more time between flights (overnights in some cases) and will want to stock up on supplies to take back to their home communities.

4.6.4.2 Increased Accommodation Usage

Employees from some NWT communities will be forced to stay overnight in Yellowknife on their way to and/or from the mine. Since they will have to pay this cost themselves, they will be looking for lower-priced accommodation. During the summer tourism season, when accommodation facilities are at peak capacity, this could be a problem.

In the event of flight cancellations, up to 40 people (NWT employees from communities outside Yellowknife and rotational employees from southern Canada) could require overnight accommodation in Yellowknife.

If there is a major conference in Yellowknife at the same time, hotels could be hard-pressed to meet this requirement. As well, some workers may not have the money to pay this additional cost and could choose to camp out in the airport until flight time the next day.

4.6.5 Mitigation/Enhancement

- Via local retailers, a selection of products might be available for sale at the airport, including NWT arts and crafts. For many rotational employees from southern Canada, this will be their only chance to purchase any gifts or souvenirs from the North.
- The Proponent will make every effort to schedule work changes to avoid overnight stays in Yellowknife.
- Where employees are forced to stay overnight in Yellowknife, the Proponent will use its corporate presence to assist employees in securing available accommodations at reasonable rates.

4.6.6 Impact Timing

The impacts of Yellowknife pass-through traffic will be lower during the construction phase for two reasons:

- Employees based in southern Canada will likely travel on direct charters between Edmonton and the mine site.
- The planned 3/1 construction rotation (three weeks on/one week off) will reduce the number of potential pass-throughs.

The pass-through traffic will increase during operations, once most employees have to catch planes to the site from Yellowknife.

4.7 Use of NWT Infrastructure and Services

As a self-contained unit, the project's direct use of public infrastructure will be limited. It will provide its own power generation, security, health, water and sanitation, waste disposal and air control services. It will share costs for the operation of a private winter road from Tibbitt Lake, north of Yellowknife, to the mine cut-off road.

The mine's main use of public infrastructure will be in transporting supplies and people to the site. NWT highways from Alberta to Yellowknife and from Yellowknife to the start of the winter road will be utilized for transportation of both construction and resupply materials. The Yellowknife airport will be the centre for personnel transport and airborne supplies.

4.7.1 Transportation

The analysis of transportation activity levels and related impacts has been divided into sections by type of transport. The two most important types of transport for the NWT Diamonds Project are ground transport, by truck, and air transport.

4.7.1.1 Ground Transport

Project Requirements

It is anticipated that construction and preproduction will require a total of 3,600 truckloads to move all required materials, equipment, fuel and supplies to the site. Approximately 1,700 truckloads will be moved in the first year and 1,900 in the second year. Subsequent annual resupply of the site will require 572 truckloads of materials and 1,380 truckloads of fuel in the year 2000, increasing to 718 and 2,095 truckloads, respectively, by the year 2007. Some supplies such as fuel may be shipped by train to Hay River, then transported by truck to Yellowknife and on to the mine, while others will travel the entire distance by truck. Air transport of supplies will be limited to perishable supplies (food) and critically needed supplies. Diamonds will be shipped from the site by air (BHP Diamonds Inc. 1995a).

All supplies to be moved on the winter road (337 km from Tibbitt Lake to Lac de Gras and 35 km from Lac de Gras to the site) will be marshalled in Yellowknife, to be moved during a maximum 12-week period from mid-January to mid April. To meet winter road timing requirements, it is anticipated that construction material loads would start arriving in Yellowknife in late December/early January and continue to arrive until March. Any loads that cannot be transported across the Mackenzie River by existing ferry service will utilize the ice road across the river once it has been certified for the required weight.

All NWT highway regulations pertaining to truck transport (and particularly maximum allowable cargo limits per vehicle type) will be followed.

NWT Highway Infrastructure

NWT Highway 1 (Alberta/NWT border to just south of the Mackenzie River) has average annual daily traffic (AADT) of 200 vehicles. The AADT of Highway 3 (Junction of Highway 1 south of the Mackenzie River to Yellowknife) is 130 on the section north of Fort Providence and south of Rae-Edzo and 310 on the portion between Rae-Edzo and Yellowknife (NWT Transportation 1993). Road

transport could also use Highway 2 for materials transported from the rail terminus in Hay River, and will use Highway 4 from Yellowknife to Tibbitt Lake (Figure 4.7-1).

All highways come under the jurisdiction of the NWT Department of Transportation. Highway 1 is paved to its connection with Highway 3, and 134 km of Highway 3 are paved. The Department of Transportation provides ferry service for the Mackenzie River crossing and maintains an ice road across it in winter.

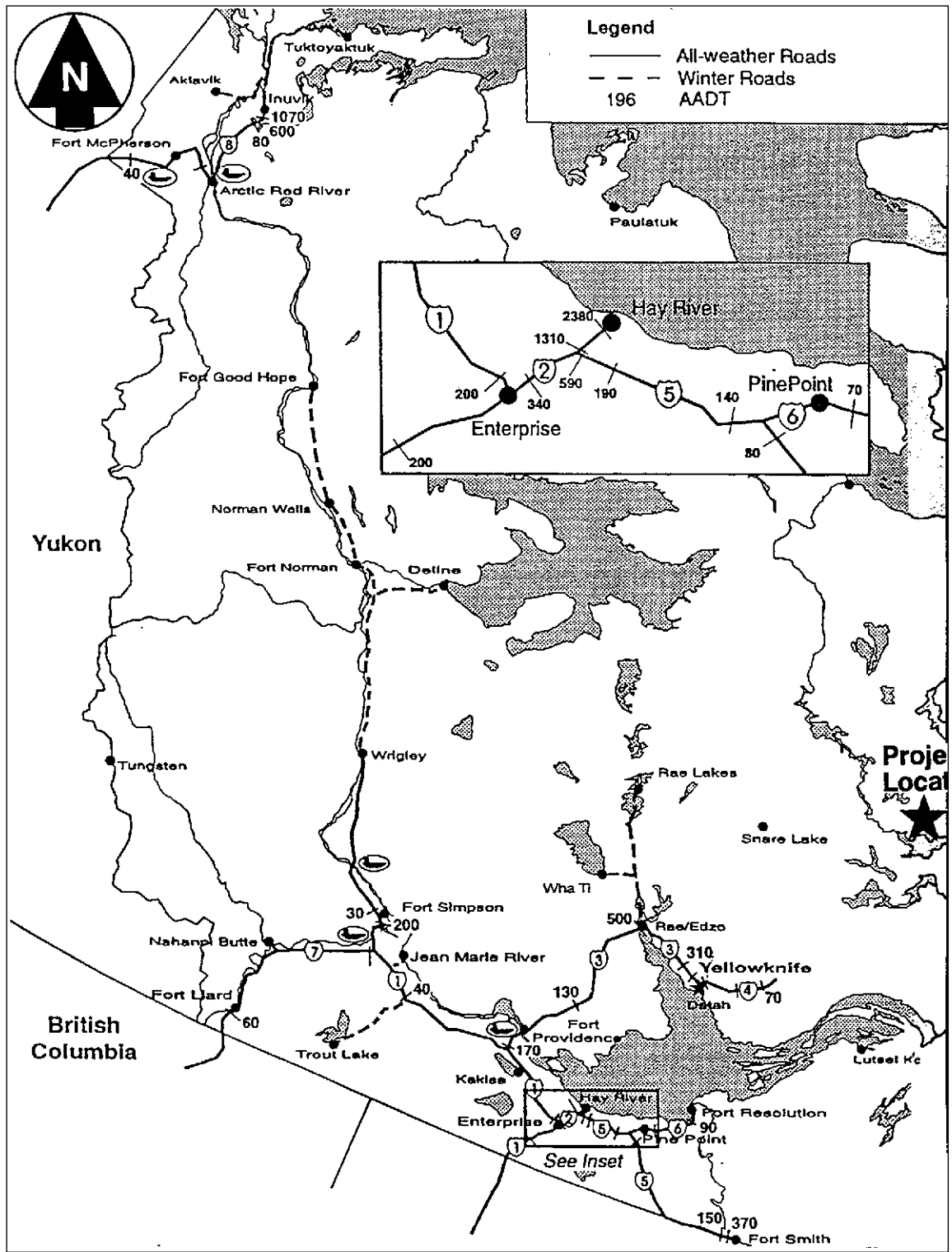
The NWT highway system between Yellowknife and the Alberta border and between Yellowknife and Tibbitt Lake is used more in the summer, when tourist traffic is added to resident and trucking traffic on these routes. The majority of all goods required to service the 17,000 people of Yellowknife are transported by truck on this highway system.

Highway 4 from Yellowknife to Tibbitt Lake is currently used by Echo Bay Mines to access its winter resupply road (Figure 4.7-2).

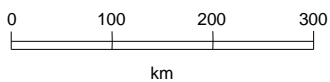
Currently the highway system is under-utilized, particularly in the winter (NWT Transportation 1995). Department of Transportation statistics for usage of Highways 1, 2, 3 and 4 during the potential months of the Proponent's road transport activities are shown in Table 4.7-1. Where different sections of the highways receive different usage, two or more locations are noted. Usage statistics are shown for November, December, January, February and March, which would be the most likely truck shipping months. The statistics show that roads leading to/from larger communities are much busier than stretches of road through more isolated areas.

Summary

The first year of construction will require the highest use of the NWT Highway system. A total of 1,700 loads of varying sizes are projected for transport that

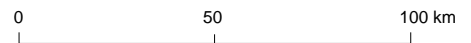
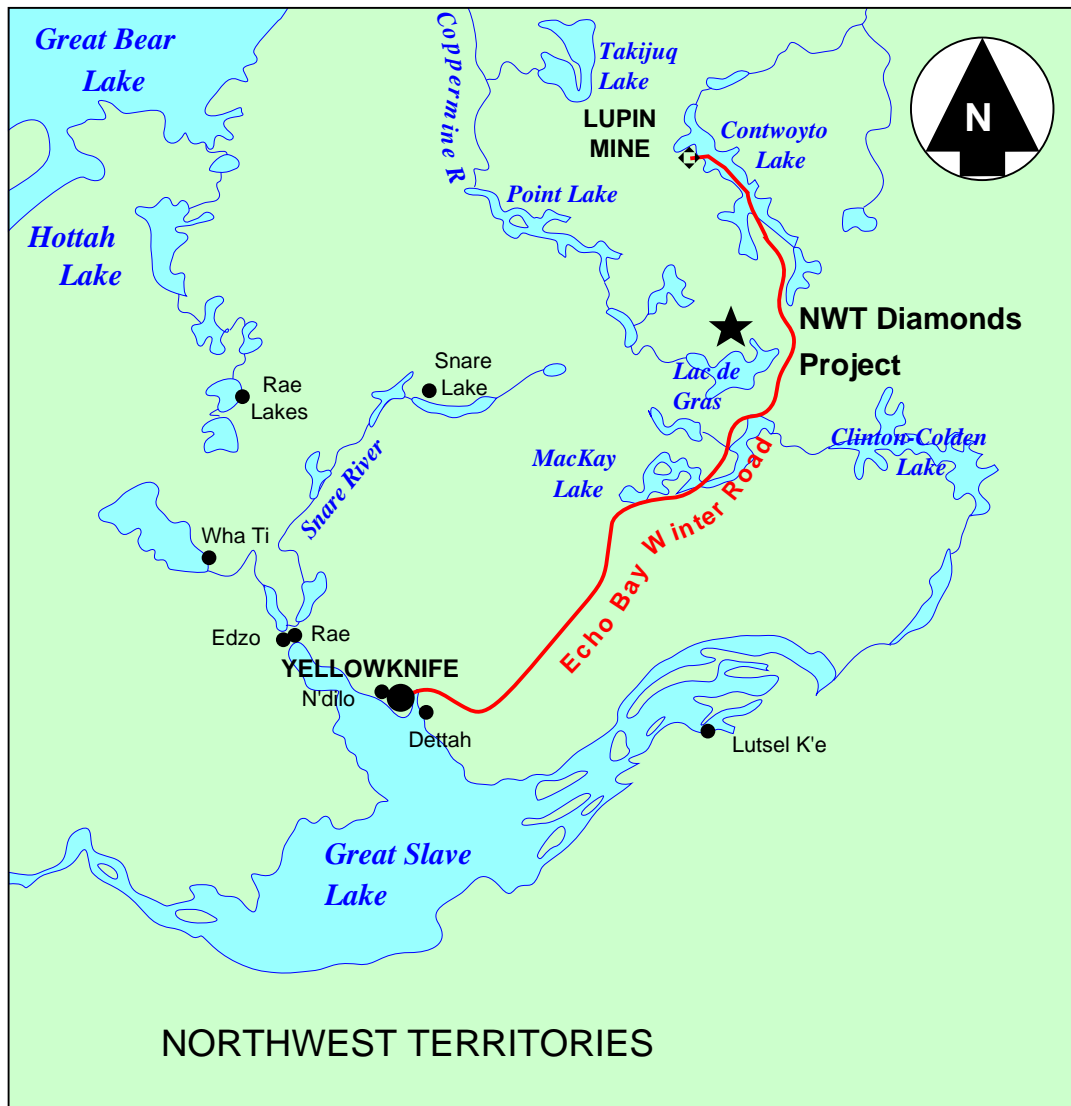


NOTE: AADT = Average Annual Daily Traffic



NWT DIAMONDS PROJECT

Figure 4.7-1
NWT Highway
System



**NWT
DIAMONDS
PROJECT**

**Figure 4.7-2
Winter Road to
Lupin Mine**

**Table 4.7-1
1991 Traffic on NWT Highways**

NWT Highways	Average Daily Traffic (Number of Vehicles)				
	Nov.	Dec.	Jan.	Feb.	Mar.
Highway 1					
km 58 south of Alexandra Falls	131	138	120	158	200
Highway 2					
km 32 - 40 m north of Highway 2 & 5 intersection	1,053	895	727	810	1,043
Highway 3					
km 152 - 30 km north of Chan Lake	94	78	83	129	139
km 305 - 1.7 km east of Boundary Creek	264	256	263	294	307
Highway 4					
km 10 - 25 km east of Yellowknife Bridge	511	328	N/A	N/A	N/A
km 43 - 11 km east of Prelude East access	22	11	48	83	95

Note: For all of the highway sections listed above, except Highway 4, the busiest day of the week is Friday. For Highway 4, the busiest day is Sunday, when Yellowknife residents drive out to visit, sightsee or take advantage of recreational facilities.

Source: NWT Highway Traffic 1993. NWT Department of Transportation.

year. If all shipments were distributed evenly over the 12 week winter road shipping period, approximately 40 additional trucks per day (20 in each direction) would use the highway system. This could result in a 3% increase in traffic on the more heavily used roads and a 40% to 50% increase on the section of Highway 4 that leads to the start of the winter road.

Potential Ground Transportation Impacts and Suggested Mitigation

Conflicts for Current Highway Users

Since most of the project’s road transport activity will be after the tourism season and the most popular vacation season for NWT residents, there will be limited impact on visitor or residential use of the highways. Additional traffic on the Ingrahm Trail leading to the winter road at Tibbitt Lake could cause concerns for the residents of this area. Here traffic could increase up to 50%. Announcements in local newspapers or on the radio could warn potential users of all NWT highways of higher activity times so they can be prepared for the truck traffic when they set out on the highway.

Potential for More Highway Accidents

Any increase in highway use could also lead to an increase in highway accidents. The potential for accidents could be reduced if current highway users, both residential and other truckers, are aware of planned project high use periods. If trucks travel in convoys, some basic procedures for managing traffic would be adopted in order to curtail “passing accidents,” which can happen on this two-lane highway.

Since most of the project’s road transport will be in winter, there will be limited, if any, problems with dust and the potential accidents this hazard can cause.

Increased Highway Maintenance Costs

The increase in traffic is not expected to cause any significant increases to government in highway maintenance costs since this work will be done mainly after freeze-up when the roadbeds are most stable. A Transportation Department official estimated that the only additional cost would be in some minor surface maintenance caused by more traffic moving the loose gravel on the roads (NWT Transportation 1995). Such additional costs would be more than compensated for by territorial fuel taxes paid by the project.

4.7.1.2 Rail Transport

The planned use of the rail system by the Proponent to move all fuel and certain other goods could have a positive impact, especially for the community of Hay River. The rail link to the Northwest Territories was built in the early 1960s in support of the Pine Point lead/zinc mine. Since the mine closed down in 1988, service on the line has been reduced and little upgrading has been undertaken. Increased use of the line could ensure its survival and could lead to improvements in the service and the facility. As well, usage would maintain existing rail jobs in Hay River and could lead to some new jobs.

4.7.1.3 Air Transport

Project Requirements

The project has established Yellowknife as its main employment staging centre and will provide air transportation for its staff between Yellowknife and the mine site. It will also provide transportation between the site and the communities of Wha Ti, Rae Lakes, Snare Lake, Lutsel K’e and Coppermine. All air transport between the six employee pick-up points and the mine will be via chartered aircraft ranging from Twin Otters to 737 jets. Rotations of staff will be staggered so there is a constant but manageable number of people flying in or out of the site at any one time.

During the operations phase, approximately 240 employees are expected to maintain residences in southern Canada and travel to Yellowknife on rotation to connect with the company charter into the site. Potentially, 150 NWT residents who do not live in one of the designated air pick-up centres will also have to travel to Yellowknife to connect with the charter to the site. It is estimated that up to 200 of these people could fly to Yellowknife, while the balance would drive. These employees could add some additional 680 passenger pass-throughs at the Yellowknife Airport per month (340 x 2 - coming and going) and could occupy 680 airline seats.

During construction, when the majority of the personnel are expected to come from southern Canada, personnel transport will likely include direct charters from Edmonton to the site, as well as Yellowknife-site charters. The entire construction/preproduction phase will require over 900 aircraft trips to the site. In the operations phase, aircraft trips to the site will start at just over 500 per year and will increase to about 700 per year when the mine reaches a targetted 18,000 tonnes per day production level.

NWT Situation

All air traffic to the site will be through the Yellowknife airport (including flights from other pick-up centres, which will originate in Yellowknife). This airport has two asphalt runways, one capable of handling 727 and 737 jets and one for smaller aircraft. In the early 1990s a new fully-serviced terminal building and parking lot were constructed to meet Yellowknife's growing air travel demands. In July of 1995 responsibility for airport facilities will be transferred to the NWT government.

Air traffic at the Yellowknife airport in 1991 was 197,000 passengers and 46,700 aircraft movements. These figures do not include the increase in exploration activity over the past few years. Unofficial estimates of aircraft movements for 1994 were 66,000.

Scheduled and charter air services (fixed-wing and rotor) are provided by more than a dozen NWT companies. Two of these airlines, Canadian North and NWT Air, provide daily jet service (five to six flights weekdays in each direction) between Yellowknife and Edmonton. Neither is operating at capacity.

During construction, if all required 900 flights took off from and landed at Yellowknife (900 x 2 = 1800), the total increase in aircraft movements at the Yellowknife Airport would be less than 3%. During operations, with a maximum requirement for 700 flights annually, the increase in air traffic over the 1994 level would be about 2%.

It is difficult to estimate an increase in air passengers through Yellowknife during construction, since contractors may choose to fly southern-based employees direct

from Edmonton to the mine. If all major contractor employees passed through Yellowknife, the total annual passenger count would be 15,340 (590 employees x 13 rotations x 2 flights per shift), or about an 8% increase in annual passengers over 1991 levels.

Based on an estimate of 18,200 project air passengers per year (700 employees x 13 rotations x 2) during operations, annual air passengers at the Yellowknife airport would increase by about 9% over 1991 levels. Traffic and passengers at the airport are known to have increased substantially since 1991, and it is more likely that the increases in annual passenger volumes for construction and operations will be 6% and 7%, respectively.

Potential Impacts and Suggested Mitigation

Terminal and Runway Congestion at Yellowknife Airport

There is congestion at the Yellowknife airport only a few times during the day, generally when a number of flights, usually morning flights, are leaving at the same time. By scheduling project flights around these busy periods, any potential for congestion can be avoided. Generally the airport facilities are under-utilized.

Disruption of Scheduled Services

To meet the aircraft and timing requirements of the project, it is possible that some airlines that have NWT Diamond Project contracts may have to cut back on some existing scheduled services. Since most of the destinations in the study area are generally serviced by at least two airlines, it is not likely that a cut in flights will have an impact on access to a community. In most cases where competing airlines service a single community, there is unused capacity, so a reduction in a flight will seldom affect travellers.

Competition for Available Airline Seats

Each month, an estimated 240 employees could be flying between Edmonton and Yellowknife. With staggered rotational scheduling, this could mean an additional 20 passengers on both northbound and southbound flights three weekdays each week. This number would not take up the present unused capacity between Yellowknife and Edmonton (NWT Air 1995). The Proponent will assist employees to make reservations early enough to ease or avoid potential holiday rush periods.

Improved Air Service for Residents

Additional use of NWT airlines could lead to improved service for NWT residents. With improved revenues, airlines could choose to expand their fleets, add additional flights, add new destinations or upgrade service.

More NWT Employment and Income

Increased use of NWT airlines for both scheduled and charter service will increase employment with these suppliers and mean more employment and more income in the NWT.

4.7.1.4 Water Transport

It is not likely the project will use water transport (barge from Hay River to Yellowknife), since most required supplies must be transported to the site in winter.

4.7.2 Communications

The project's telecommunications services will probably be provided by NorthwesTel, the main supplier of this service in the NWT. With its new satellite now operational, NorthwesTel should have sufficient capacity to handle all the calls per day expected from the site, including data transfer. No disruption to regular NWT telephone service is anticipated.

4.7.3 Power

The Proponent plans to generate its own power for site operations, so will not require power from the NWT Power Corporation, the main power supplier in the NWT. All fuel for power generation will be trucked in by winter road.

4.7.4 Fuel Supply

Similar to most small communities in the Northwest Territories, the project will bring in an annual fuel supply once a year during winter road operation. Fuel would be purchased via NWT suppliers but will be separate from regular community requirements and will have no impact on the needs of Yellowknife or Hay River.

4.7.5 Territorial Infrastructure

Apart from highways, the project will have few direct requirements for use of NWT infrastructure. However, indirect requirements will be generated by new employees moving to the North (Section 4.4 Population Growth) and in changes to social structures and education expectations. These are discussed in subsequent sections.

4.7.6 Municipal Infrastructure

Since most of the project operations will be on site, there will be limited direct use of municipal infrastructure by the Proponent. However, there will be some

pressure on municipal infrastructure in Yellowknife and Hay River due to population and business growth. These impacts are discussed in Sections 4.4 and 4.5.

4.8 Traditional Economies and Lifestyles

As discussed in Volume II, Section 4.2, “The Traditional Economy” is based on the seasonal harvesting of renewable resources where the level of production is partially dependent on the natural population cycles of the harvested species. This economy has already been affected by a government induced wage economy, which has reduced Aboriginal dependence on traditional systems. At present only 16% of the NWT Aboriginal population engages in traditional activities – with the objective of selling their products for gain, not subsistence – and fewer than 400 people participate in traditional activities on a year-round basis. Nevertheless, close to 70% of Aboriginal men hunt and fish to supplement the family food supply and maintain traditional ties to the land (GNWT, Renewable Resources). Thus, this subsistence component remains of essential importance to Aboriginal people and must be considered in the planning of the project. This example is typical of the dilemma that faces the Proponent: how best to mitigate the impacts of a wage-based economy and other associated concerns that flow from the Proponent’s operations and still respect the traditional land-based lifestyle.

4.8.1 Potential Causes of Impacts

Mining impacts that may have the potential to affect the traditional economy and lifestyle, although not exhaustive, are identified as follows:

- long distance commuting for labour
- increased income and accompanying involvement in a wage economy
- education and training programs
- hiring of Aboriginal women.

4.8.1.1 Long Distance Commuting for Labour

After confirming the viability of a mine site, many of the major challenges facing the Proponent concern the attraction and deployment of labour. In remote, unpopulated areas such as Lac de Gras, the use of long-distance commuting (LDC) is a widely practiced method of supplying labour. The Proponent’s policies regarding work rotation schedules have been designed to try and accommodate aspects of a traditional lifestyle concurrent with participation in the wage economy. The Proponent’s objective is to optimize employment of Aboriginal people. After careful consideration, the Proponent has proposed a two weeks on/two weeks off (2/2) rotation schedule for the project.

Research has shown that the two-week rotation period enables Aboriginal employees time to pursue traditional subsistence activities instead of disrupting their lifestyles (Appendix IV-C5). “Living on the land” is still an important feature of Aboriginal life in the North. The harvesting of game is an essential and celebrated endeavour. There are traditional harvesting events throughout the year, the two major ones being the spring rutting season and the fall caribou hunt. The spring rutting season is widely viewed as a time for most Aboriginal people to renew their traditional close contact with nature. It is typical for this time to be used to teach children about their ancestral roots and traditional hunting/survival skills. Living on the land is considered to be the most important link to preserving traditional knowledge.

Given the high degree of importance placed on these pursuits, it is important that the Proponent’s rotation schedule facilitate the continued participation of the Aboriginal work force. It should be noted, however, that these needs will be addressed by the standard work rotation schedule of the mine, as the creation of special exemptions has proved to breed resentment among the non-Aboriginal work force. As one manager explained, “If management treats them differently, then so will their co-workers.” The 2/2 schedule provides the best option for accommodating Aboriginal concerns on continued participation in these traditional pursuits, while removing the need for special exemptions.

The longest government-assisted harvest of caribou does not exceed 12 days, and many are as few as two days in length. The GNWT Department of Renewable Resources estimates the average length of a caribou hunt is now one day, due primarily to improved access to the herds via winter roads.

The spring rutting season poses another potential problem: most Aboriginals like to live on the land for several weeks at a time. The 2/2 rotation resolves the problem by allowing the employee to receive two weeks of vacation, with an additional two-week period off for a total of approximately four consecutive weeks off.

Interviews with the Aboriginal employees at the Lupin mine site indicate that they are very content with the flexibility this schedule gives them to pursue important elements of their traditional lifestyle. The Lupin gold mine, some 150 km north of the project, has been in production since 1982. In 1986, the work force voted to move from a 4 weeks on/2 weeks off (4/2) schedule with 8-hour shifts to a 2/2 schedule with 12-hour shifts. The mine operator, Echo Bay Mines, has its work force vote annually on the retention of this schedule. Nine years later it is still in place. Worker satisfaction with the rotation schedule is reflected in the steady reduction of Lupin’s employee turnover rate to its current position of less than 6% annually.

Another factor that makes a 2/2 schedule well-suited to northern Aboriginal needs is the wide geographic dispersion of their communities across the NWT. The long

off-work period lessens the impact of time lost to commuting, as well as halving the total amount of commute time that would be experienced under a 1/1 rotation. The longer rotation ensures the feasibility and accessibility of employment opportunities for a greater number of northern Aboriginal people, regardless of where their community is situated within the NWT.

Additionally, the Aboriginal culture has fostered strong ties with the family, extended family and their community. Rotational shift work will require people to be separated from their families while they work at the site. This could create marital pressure for families not used to separation. Studies indicate that 68% of the Canadian LDC work force are married (includes non-Aboriginal people as well); however, the number of divorced employees is double that of the general public. Labour Canada found compelling evidence that the higher rates were not the direct consequence of the work system. Rather, the “foreign legion syndrome” is responsible for attracting a number of employees to the mine who are already separated or divorced. The relative isolation is sometimes viewed as therapeutic by the employees and is sought out as an alternative lifestyle.

Research has also found that the level of satisfaction experienced by workers and their spouses with the rotation pattern does not really drop until schedules exceed the 2/2 rotation.

On a positive note, workers surveyed as to the most attractive benefits of LDC frequently responded that they enjoyed the large block of uninterrupted time. There are strong sentiments as to the quality time this allows them to spend with family members. The rotation offers a significant decrease in the frequency and total duration of a variety of stressors in the lives of workers and their families as compared to shorter durations. The “at work” rotation is well below the length of time at which a measurable deterioration in worker health, safety, morale and family relationships begins (21 days). The Proponent wishes to safeguard these vital issues for all its employees and at the same time its productivity. A worker’s sense of “team”, accountability and stability increases over longer stays, with a resulting improvement in worker morale and productivity.

4.8.1.2 Increased Income and Accompanying Involvement in a Wage Economy

Increased employment and income may have both positive and negative impacts on the traditional lifestyle. It is estimated that project-based wages could increase income by as much as 40% in the Aboriginal communities. In project activities to date, 25% of the employees have been Aboriginal. As mentioned in Volume I, Section 1.2, the Aboriginal people wish to participate in a wage economy but also desire to remain in their home communities and maintain their traditional lifestyles.

The rotation schedule discussed above accommodates this desire, but the wage economy provides the supplementary means by which to enhance hunting and fishing harvests. The influx of money can be used to purchase equipment such as

boats, motors, snowmobiles, rifles, tents, etc., and to secure needed supplies such as gas, ammunition, basic foods and staples. Modern equipment increases the hunter's mobility and the productivity of the hunt. The increased income allows Aboriginal people to maintain their connection to the land and continue to pass their heritage on to their children. Thus, ironically, the impact of wages combined with a two-week rotation period can actually promote and sustain the traditional lifestyle activities. Further discussion of the wage economy versus the traditional economy is found in Volume II, Section 4.2.

Other secondary impacts of employment in a "mixed" or "dual" economy, such as confidence, self-esteem, independence and stability, could easily be offset by negative impacts of increased income such as alcohol and drug abuse, resulting in greater family violence and family breakdown. Alcohol abuse has become a recognized problem in Aboriginal societies and as a result many of the communities, such as Wha Ti, Rae Lakes, Snare Lake and Lutsel K'e, have declared themselves as "dry communities" in order to deal with the problem.

As addressed in Volume 1, Section 1.2, and Volume IV, Section 4.10, the Proponent will assist in mitigating these potential impacts by instructing employees on money management, conducting drug education and personal counselling and implementing Community Mobilization programs. The Proponent recognizes that the solutions to social problems can only be effective if they are initiated by the communities themselves. It must be emphasized that the Proponent provides the catalyst for the program, but it is ultimately the community's responsibility to make the program successful. It is the Proponent's belief that such an approach creates healthy environments characterized by independence rather than dependence.

It is also hoped that through the Community Mobilization programs the elders and young workers will form partnerships in such a way as to mitigate non-traditional lifestyles in a traditional way. For example, it has been suggested by elders that a greater sense of social responsibility could be instilled by encouraging employees to share their income with family members in order to buy things useful to the whole family. They believe that this could be a traditional means of mitigation since, traditionally, Aboriginal families have always shared products derived from the barren lands economy (fish, meat etc.). In addition, the Proponent is committed to maintaining a healthy work environment and has established an alcohol/drug-free policy. Drugs and alcohol are strictly forbidden at the Project site, and the policy is being enforced.

Finally, the chances of success in dealing with social problems are "enhanced if they are addressed within the context of a buoyant economy – one that provides jobs for those who want them and a meaningful choice for those who want to consider some combination of wage employment and traditional pursuits" (Stabler/Howe 1990).

4.8.1.3 Education and Training Programs

The Proponent recognizes the importance of education to assist Aboriginal people in their desire for increased participation in higher caliber jobs in a wage economy.

As addressed in detail in Volume I, Section 2.10, the Proponent has instituted several programs to mitigate employment expectations by the Aboriginal people that are not normally achieved due to an absence of a high school education, job skills or previous work experience. The Proponent's initial waiver of strict educational requirements is designed to make job opportunities available to more Aboriginal people. Another way of encouraging Aboriginal involvement is by providing training programs. People who want to work for the NWT Diamonds Project but have no mining experience will be eligible for Pre-employment Training, a program the Proponent is developing in cooperation with Aurora College (Arctic College). This will familiarize people with mining, wage economy skills and wage income skills, and also give them some other skills such as equipment operations. This will give them a much better chance of getting a full time job. Once employed, training will include orientation, initial job, certification and continuing development training. Much of the training is done on the job where an employee learns by observing an experienced operator. This method of training fits well with the Aboriginal concept of learning, where knowledge is passed on from the elders through observation and discussion. Employment and training with the NWT Diamonds Project is expected to generate a greater depth of skill and experience among Aboriginal people in the local communities. Through proficiency of language skills, job skills and improved economic status, it is hoped that the trickle-down effect will benefit the communities as a whole.

4.8.1.4 Hiring of Aboriginal Women

It should also be noted that the Proponent is committed to providing education and training for Aboriginal women to increase their opportunities in business and a wage economy. Twenty-five percent of the Aboriginals working at the exploration camp are female. Depending on their education and experience, the women hold positions in office, catering or housekeeping. Where interest is expressed, the Proponent encourages Aboriginal women to explore other fields and offers them training to do so. One woman successfully trained to become a plant labourer and later took additional training to become a water quality technician. Another Aboriginal woman started as a lab technician at Koala and has since transferred into the Environmental Department as an environmental technician. Over the summer of 1994, four Aboriginal female high school students from local communities collected data to be used in later reclamation projects at Koala.

Monaca Ayha of Deline and Rae Lakes summed up her feelings on the Proponent's policy by saying,

“Native women are finally getting a chance. For years they were at the beck and call of men. They now have a chance...Native women often work while the men stay at home. If I have a son, he will work. Boys are spoiled when they are young ...because they are going to be hunters. They don’t learn how to work. I am glad that my grandparents made me get up in the morning and work...This mine is going to help us socially. It will give us money to travel south and see the world. I have bought a house now. The mine has helped me to set higher social standards. I am going back to school. My self-esteem is higher...I like the feeling of independence.”

4.9 Land Users in Vicinity of the Mine

4.9.1 Causes of Impact

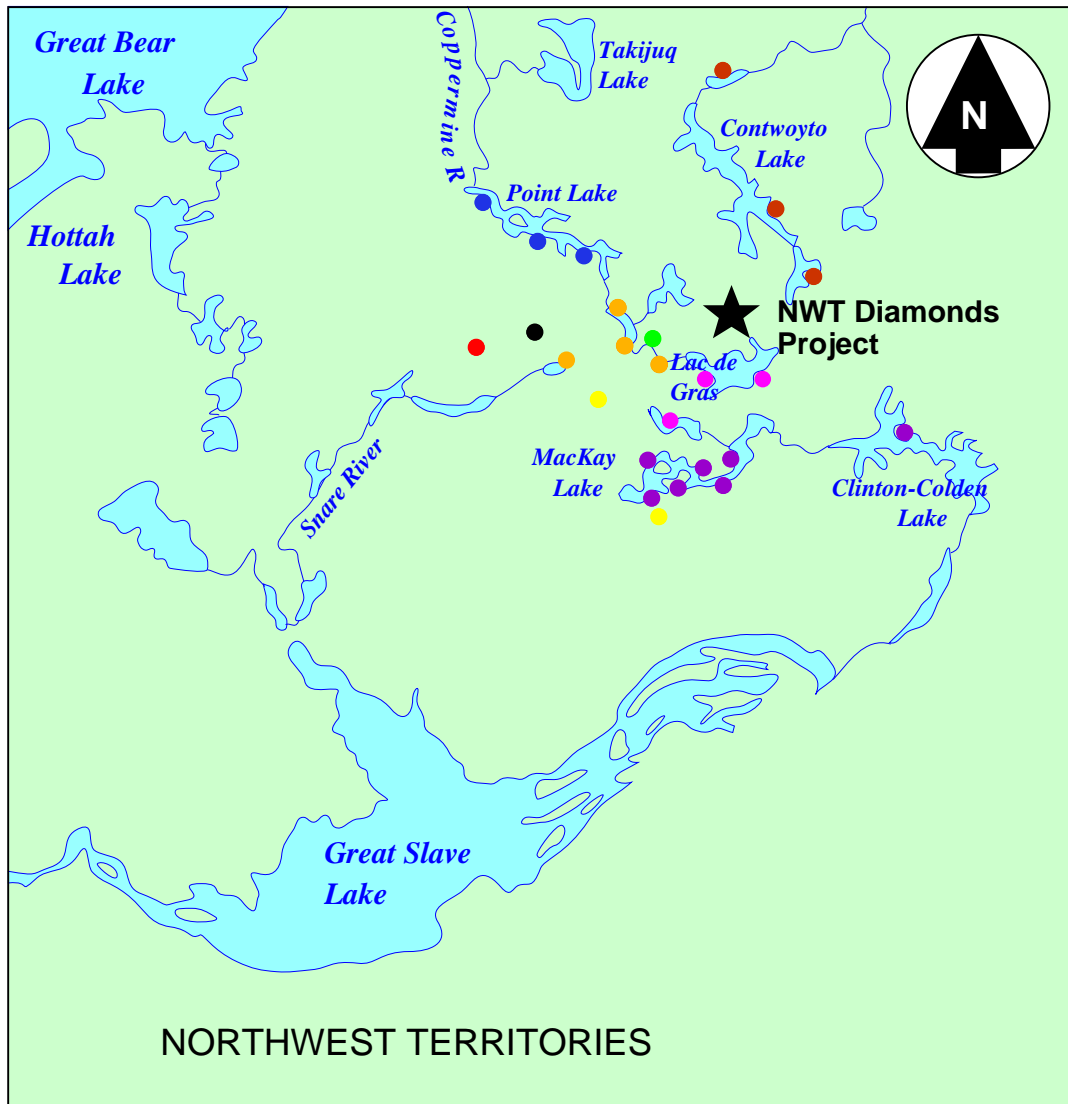
Activities associated with project construction and ongoing operation may disrupt the activities of other land users in the vicinity of the proposed mine. This disruption may relate to a perceived loss of “Arctic wilderness experience by customers,” a possible loss of jobs or income and indirect effects associated with a significant change in the migration patterns of the Bathurst caribou herd. Given the “diamonds rush”, it may be difficult to isolate NWT Diamonds Project activities from other exploration activity in the area, particularly in the early phase of the project.

4.9.2 Potential Level of Impact

The potential level of impact is dependent on the number of other land users, their activities, their level of activity and their proximity to the proposed mine site. The main activities are hunting, trapping and recreation.

4.9.2.1 Barrenground Caribou Sports Hunting Outfitters

Currently there are nine barrenground caribou sports hunting outfitters with 23 licensed camps within a 200 km radius of the project site ([Figure 4.9-1](#); Economic



- Adventures Northwest Ltd.
- Arctic Safaris
- Aurora Caribou Camp
- Burnside HTA/Tundra Camps
- Cadieux's Caribou Pass Outfitters
- Camp Ekwo (Rabesca Resources)
- Peterson's Point Lake Camp
- True North Safaris Ltd.
- Webb/Qaivvik/Coppermine HTA

0 50 100 km

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**Figure 4.9-1
Location of Sport
Hunting Outfitters**

Development and Tourism 1995e). About half of these camps are 100 km or less from the site. Two camps are located on Lac de Gras – one at the west end of the lake and one at the east end. These camps are owned jointly by the Coppermine HTO and Webb Ltd. and are operated by Qaivvik Ltd. of Yellowknife. Residents of Coppermine and First Nations communities are employed as seasonal guides at these camps. During the fall sports hunting season, these camps inject nearly a quarter of a million dollars into the economy of Yellowknife and the home communities of the guides (Table 4.9-1; Webb 1995). If these and other camps are unable to provide the Arctic wilderness experience they advertise, substantial income could be lost to the NWT economy.

4.9.2.2 Coppermine River Tour Outfitters

Six licensed canoeing/rafting outfitters offer trips of varying length (km) and duration (days) on the Coppermine River system. Most of the trips are from two to three weeks and start at points downstream from Lac de Gras, headwaters of the Coppermine River. Only very long trips (30+ days) start at the west end of Lac de Gras and cover the complete river system. The starting point for this trip is approximately 40 air km from the mine site, and clients are flown in to a point near the west end of the lake (NWT Economic Development and Tourism 1975, 1995f).

4.9.2.3 Trappers

Coppermine trappers use a general barren land area south of the community for some of their trapping activities. Information on precise trapping areas was not available, but part of the area used could extend to a point north of Lac de Gras (Outcrop 1995). No information was available on Dene use of this area, although government land use maps indicated that most Dene trapping was done south of the project site. Due to the severe drop in the market for wild furs, trapping activity has declined across the entire Northwest Territories and currently makes up less than 0.1% of total personal NWT income (NWT Bureau of Statistics 1994b).

4.9.2.4 Aboriginal Hunters

The proposed project is located in the range of the Bathurst caribou herd (population approximately 500,000). Aboriginal people derive substantial income-in-kind from harvesting caribou for food and for byproducts used for clothing and arts and crafts production. Any major dislocation to the herd could reduce income-in-kind levels from the traditional economy.

**Table 4.9-1
NWT Economic Impacts from the Outfitted
Caribou Hunting Industry in Unit F, 1993**

With Outfitters	Direct	Indirect and Induced	Total	Multiplier
Income, wages and salaries	\$1,251,400	\$250,300	\$1,501,700	1.2
Employment (person weeks)	900	585	1,485 (30.3 person/years)	1.65
Directly with other NWT businesses				
Combined income and wages/salaries	\$350,000	\$70,000	\$420,000	1.2
Total	\$1,601,400	\$320,300	\$1,921,700 (new money into economy)	

The \$1,601,400 in industry revenue generated in 1993 by nine active outfitters can be broken down as follows:

- 1: Paid to outfitters by guests:
 - \$475,300 in NWT wages paid by outfitters
 - \$776,180 to purchase in the NWT, required supplies, equipment, services, interest payments on borrowed capital, taxes, depreciation reserve for the replacement of capital, outfitter wages, and after tax profits or the return to capital.
- 2: Paid directly to other NWT business by the guests of outfitters:
 - \$350,000 for all supplies and services.

Source: EXCEleration Corp. 1994.

4.9.3 Potential Impacts

Disruption of “Arctic Wilderness Experience:” Visitors expecting a wilderness hunting experience could be discouraged from booking at some hunting camps, due to potential aircraft activity in the area (the co-owner of one camp has indicated that this is already happening, although the activity cannot be attributed directly to the Proponent).

Loss of Jobs/Income: Between 10 to 20 seasonal guides at Lac de Gras camps could lose income if the Lac de Gras camps are unable to operate (Webb 1995). Owners of these camps could lose operational income and be forced to forfeit their original investment. Similar impacts could be felt by other camps closer to the project site.

Loss of Income-in-kind: Hunters who depend on the Bathurst Inlet caribou herd, particularly as it reaches the more southerly part of its migration route, could see a reduction in income if there is any major disruption in the herd’s movements. (It

should be noted that the herd does not follow an identical migration route from year to year, but does generally migrate in directions that depend on weather and food supply.) Potential impacts on the Bathurst caribou herd as a result of the NWT Diamonds Project are discussed in Section 3.3.4.

Potential New Customers: The NWT Diamonds Project will introduce a multitude of employees, supplies, contractors and visitors to the NWT barren lands. This increase in people travelling to the NWT will expand the potential client base of the guide outfitters.

4.9.4 Suggested Mitigation/Enhancement

In order to avoid disruption of the wilderness experience, the Proponent will recommend that its charter aircraft fly around or avoid designated areas during the sport hunting season. During operations, the large charter (727, 737) aircraft will fly at high altitudes. This should reduce disturbance by aircraft.

In addition, the Proponent will meet with local outfitters on an annual basis to ascertain sources of concern so that the Proponent can attempt to minimize or eliminate any problems.

4.9.5 Timing

The construction phase will require over 900 aircraft movements into the site. Ground transport will proceed mainly in the months of January, February and March. Ongoing operations will start with a requirement for 500 aircraft into the site annually and will increase to 700 per year as operations expand. Resupply will be in winter via the winter road. Potential impacts could be felt during both the construction and operations phase.

4.10 Community Well-being

In 1992 and 1993, the Special Committee on Health and Social Services visited more than 20 NWT communities and listened to interested individuals, group representatives, chiefs, band council members, MLAs and front line health and community workers. The committee, composed of Northwest Territories MLAs, held public meetings in four of the NWT Diamonds Project study communities: Hay River, Lutsel K'e, Rae-Edzo and Yellowknife. At Rae, they also heard from representatives of Wha Ti and Snare Lake.

These meetings covered a range of social issues. The summary, from the committee's final report, reflects the opinions of many of those who spoke to the committee at public meetings in the study communities.

“Front line workers we surveyed identified alcohol and drugs as the major issue facing their communities. This self-destructive behaviour produces physical,

psychological, social, economic and legal problems for people with addictions, their families and their communities...The human and social cost of this problem is enormous. It seems to play a role in most of the cases handled through our community health centers. It is linked to many of the local offenses and criminal matters before the courts. We heard there is a clear connection between addiction and domestic abuse, sexual assault and the spread of sexually transmitted diseases.”

“We heard that gambling has become more than just a popular fundraising and personal pastime; it has become an addiction in its own right...A number of social problems have been linked to this increase in bingo and other gambling activities. These problems include neglect of children by their parents, people betting away social assistance payments, absenteeism from work and the total disruption of family life...” (Special Committee on Health and Social Services 1993).

The NWT Minister of Justice, Honourable Stephen Kakfwi, also released a report in 1993, called “Building a Strategy for Dealing With Violence in the NWT.” It highlights some additional community-based problems:

- Sexual assaults in the NWT are consistently four to five times the national average.
- As many as 80% of Aboriginal women have been victims of family violence at some point in their lives.
- The homicide rate averaged over the last ten years is 5.6 times the national average.
- The suicide rate among Inuit between the ages of 16 and 30 is ten times higher than any other group in Canada.

A report from Statistics Canada (Profile of Canada’s Aboriginal population 1995) adds this footnote to the inventory of NWT social problems:

- The average income of an Aboriginal household (both sexes over the age of 15) in the NWT is \$16,175, compared to an average income of \$24,001 (both sexes over the age of 15) for the rest of Canada.
- The cost of vandalism and the destruction of property in the north was \$1,153 per capita, compared to the Canadian average of \$205 per capita (Canada Statistics 1992).

The federal government stated in *The Liberal Perspective on Crime and Justice Issues* (August 1993) that it is committed to focusing on the potential of Aboriginal young people to decrease costs to social security, health and justice systems. It is also committed to strengthening the next generation’s respect for

customs. By helping to create confidence in local traditions through learning the connection elders have with the land, the government aims to build safe and healthy families and communities.

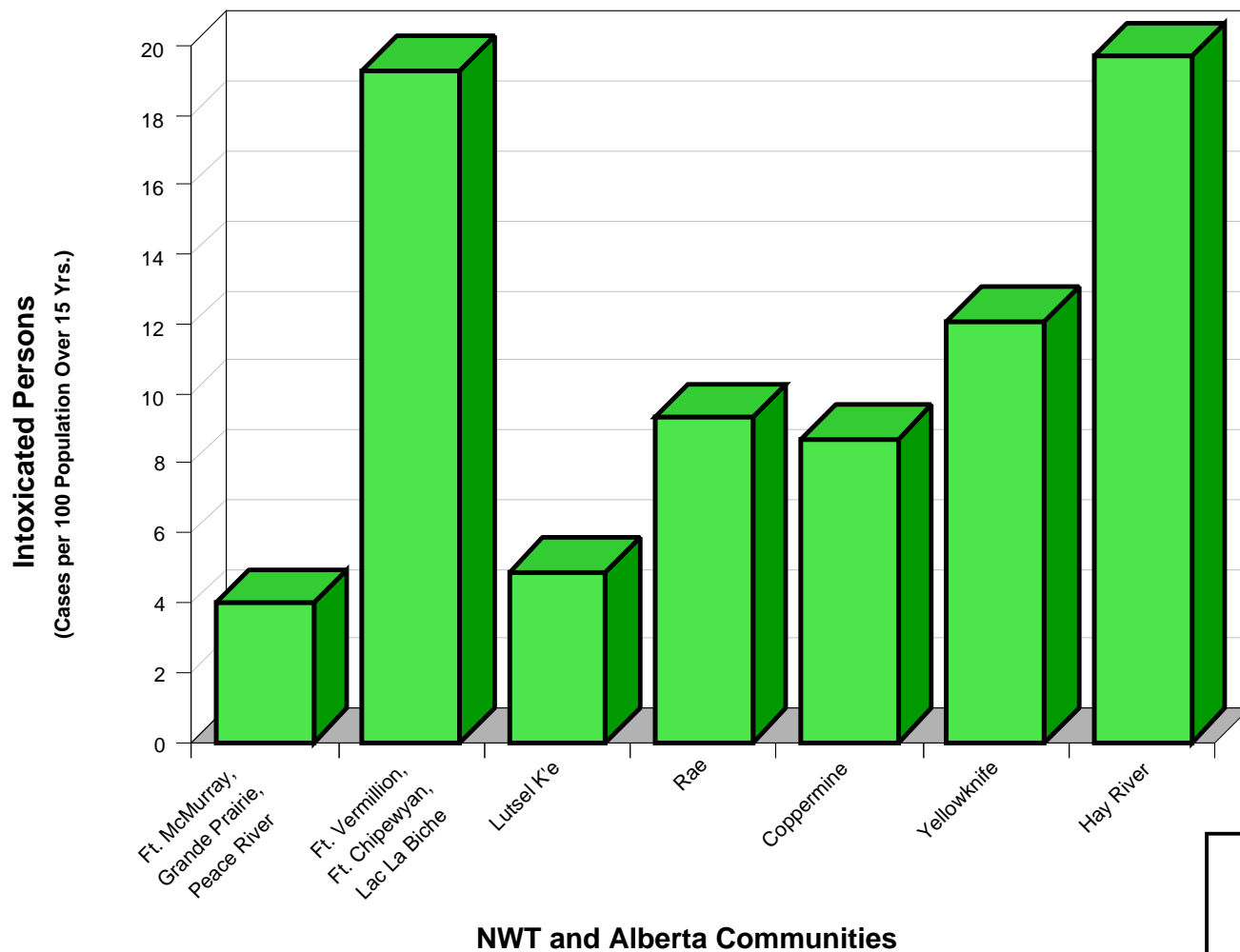
Many NWT residents indicated to the Special Committee on Health and Social Services that the roles and responsibilities of children, parents, women, men, elders, community leaders, spiritual leaders and workers are no longer clear. They also suggested that NWT community tolerance to drinking, drugs and family violence indicate a loss of self-esteem due to a loss of culture or lack of gainful employment, or both.

4.10.1 The Communities

Yellowknife has a mobile, well-educated and culturally diverse population. Although unemployment in the NWT as a whole is the highest in Canada, unemployment in Yellowknife itself is low, well below the Canadian average. There is high labour force participation and household incomes are higher than average for Canada. The principal employment sectors are government, mining and transportation. Yellowknife RCMP statistics indicate a high number of cases of intoxicated persons (Figure 4.10-1). Compared to comparable Alberta communities (Fort McMurray, Grande Prairie and Peace River), Yellowknife has a slightly higher rate of drug cases and a higher rate of assault (Figures 4.10-2 and 4.10-3). Yellowknife has a broad range of professional social services with experience in dealing with community and family problems. Many of these social agencies, however, also serve communities outside the city, and are often strained to meet the needs of the city itself. Community activists and professionals have experience in dealing with Yellowknife's growth and attendant social problems. A growing commitment to the community is also evident.

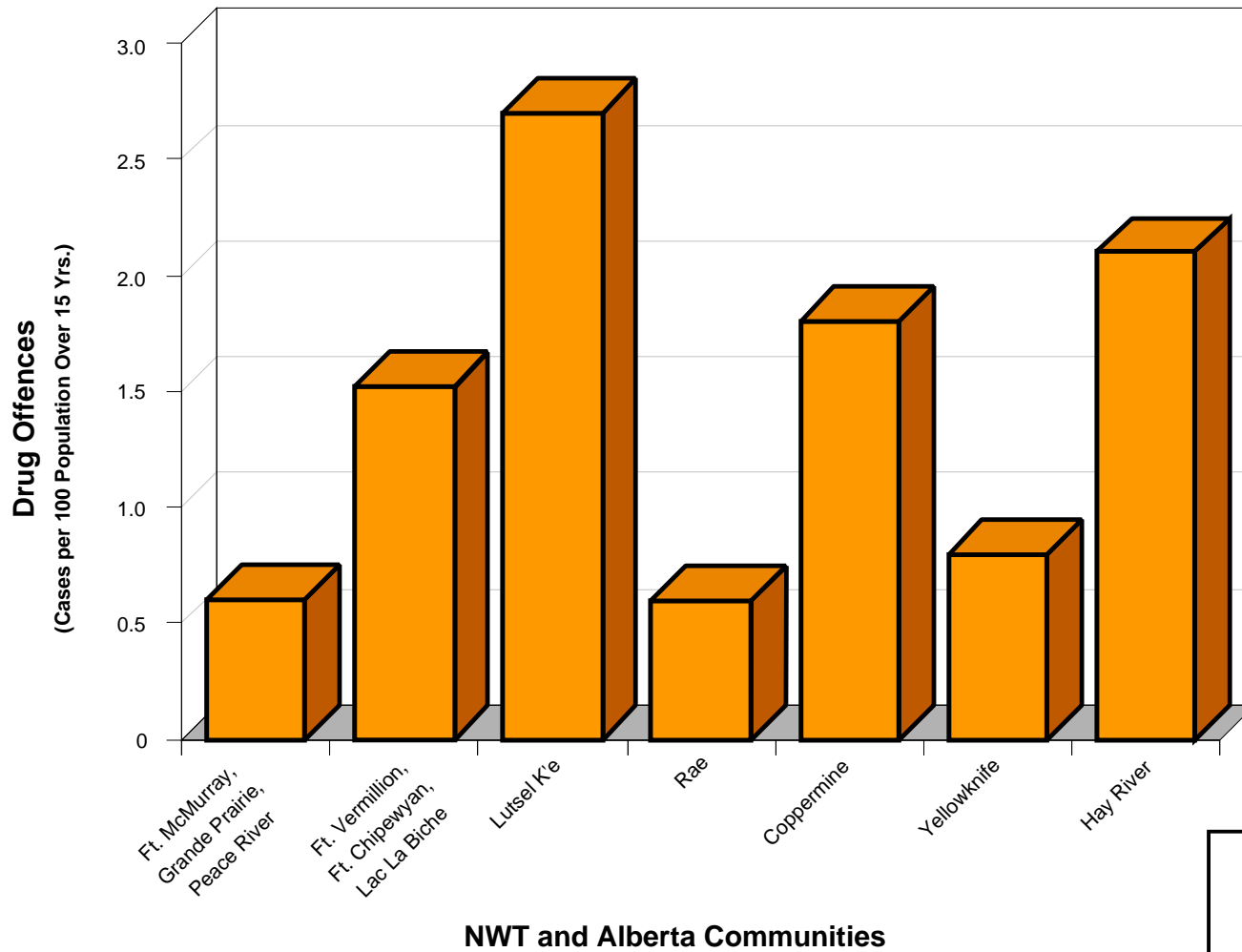
Hay River has a high work force participation rate but a higher rate of unemployment than Yellowknife. Like Yellowknife, there is a requirement for recognized skills (a trade or diploma) in order to take advantage of the higher paying jobs. RCMP statistics demonstrate that Hay River has a profile similar to that of small communities in Alberta (Ft. Vermillion, Ft. Chipewyan and Lac La Biche), with a high rate of intoxicated persons and property damage cases. The rate of assault is also high, and drugs are a growing problem. Hay River has a range of professional social services available and a largely English speaking population who can access them.

The seven First Nations communities in the study area, in contrast, have very little wage-based income. Only 15% of the population in 1991 had recognized educational qualifications. However, a large proportion of the labour force have at least some wage-based work experience or experience in the traditional land-based economy, which requires a different set of skills. In the First Nations study communities, unemployment rates range from 11% to over 50%. As few as 30%



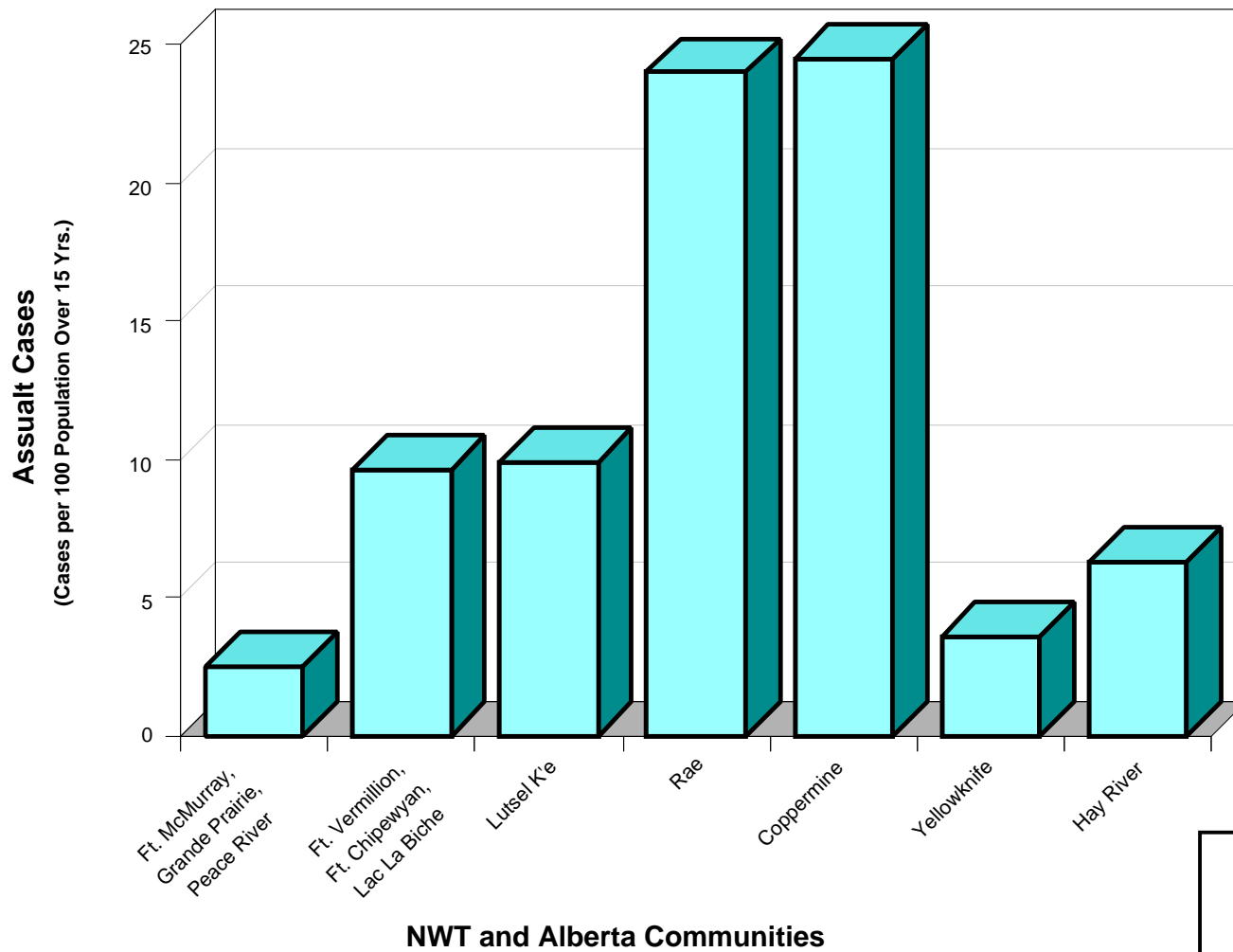
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**Figure 4.10-1
RCMP Statistics for 1994
Intoxicated Persons**



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**Figure 4.10-2
RCMP Statistics for 1994
Total Drug Offences**



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Figure 4.10-3
RCMP Statistics for 1994
Total Assault Cases

of jobs in these communities are accessible by unskilled workers. Generally, the economies in the First Nations study communities are based on subsistence combined with government transfer payments, government employment and seasonal construction employment.

According to RCMP statistics for 1994, assault and property damage are the most prevalent problems in the First Nation communities (Figures 4.10-3 and 4.10-4). Drugs are also beginning to appear in the statistics. Public intoxication is not as large a problem in the First Nations communities as it appears to be in Yellowknife or Hay River; however, community workers and the RCMP report that alcohol is involved in most cases they deal with. The First Nations study communities, each with a relatively small population base, have few organized resources to deal with social problems. Rae-Edzo has a school alcohol program. Rae Lakes, Wha Ti, Snare Lake and Lutsel K'e have adopted prohibition to deal with alcohol abuse.

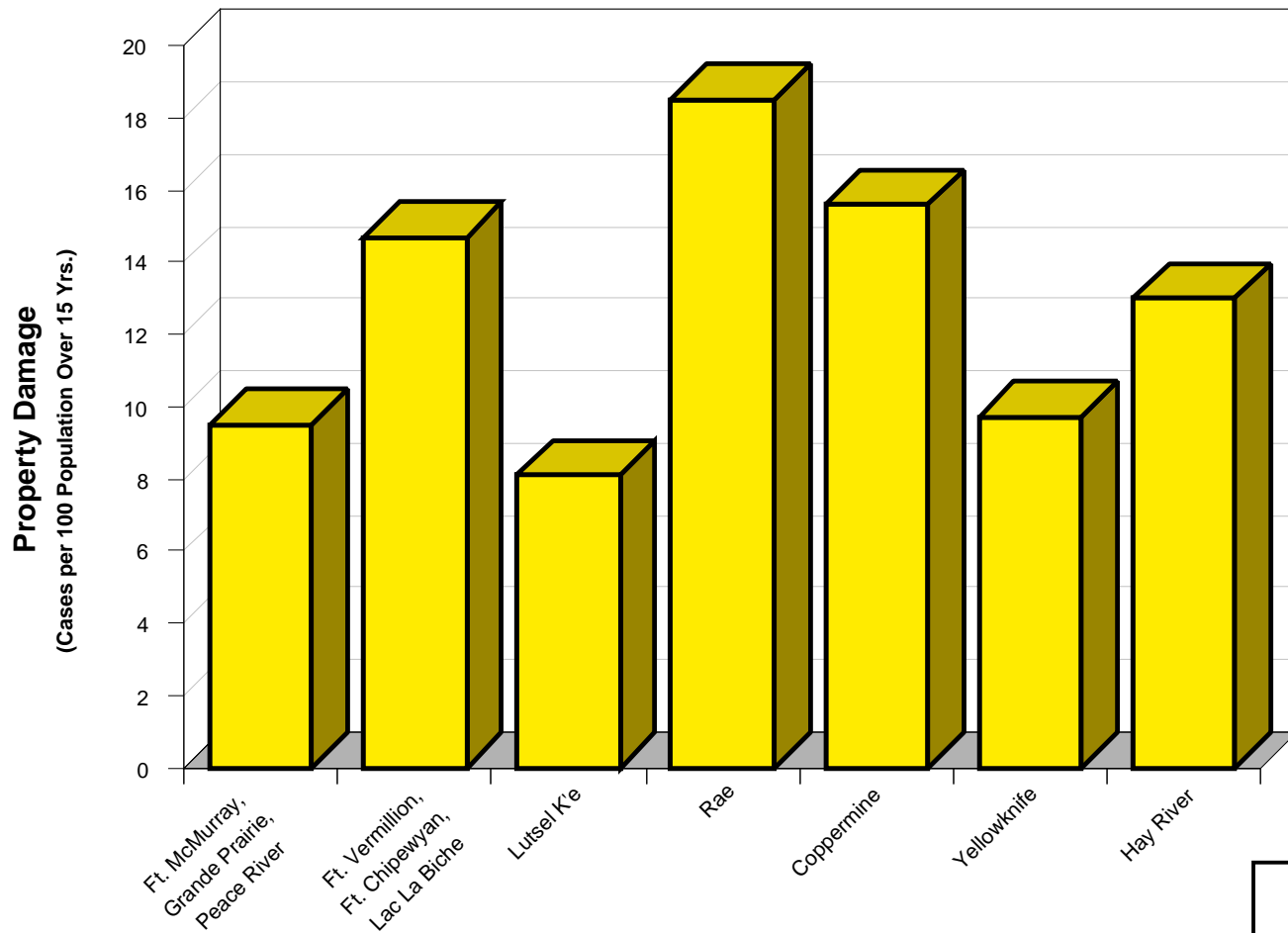
In the Inuit community of Coppermine, 87% of the population is under 45 years of age. Although some 25% of the adult population have recognized educational qualifications, the wage economy participation rate is only 54%, with unemployment averaging 31% in 1994. Nearly half the available jobs are provided by various levels of government. Approximately 40 full time jobs are provided by the mining industry, which also offers some part time exploration work. Compared to Alberta communities of similar size, Coppermine has a very high rate of assault. According to the RCMP and community workers, alcohol is involved in many cases of both property damage and assault.

4.10.2 Causes of Impacts

Impacts from mining that may have the potential to affect the social well-being of the local communities are as follows:

4.10.2.1 Employment and Income

Based on 1994 unemployment rates, the project is expected to reduce overall unemployment in the NWT by 3% during the operations phase. The project will add to the private sector jobs available in mining and will actively recruit Aboriginal and Northern employees for a portion of these jobs. Currently about 200 (NWT Energy, Mines and Petroleum Resources 1994) of a total of 1,037 NWT residents involved in the mining sector are Aboriginal people. With the opening of the NWT Diamonds Project, this number could double. Direct, indirect and induced income will increase earned income and purchasing power in many NWT communities. Impacts could be positive or negative, depending on how people choose to use this additional income. For further discussion please refer to Sections 4.3 and 4.8.



NWT and Alberta Communities

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**Figure 4.10-4
RCMP Statistics for 1994
Property Damage**

4.10.2.2 Long Distance Labour Commuting (Rotational Employment)

The impact caused by long distance commuting on individuals, families and communities is discussed extensively in Section 4.8. and in Appendix IV-C5.

4.10.3 Level of Impact

The level of impact will vary substantially from larger to smaller communities. Large communities such as Yellowknife and Hay River, with years of wage employment experience, will be affected more by outside influences than by employment and income factors. These outside influences, attracted by the perceived buoyant economy in Yellowknife, and to a lesser degree in Hay River, may not always be desirable. Some will be legal (companies who want to get in, make a fast dollar and get out) and some could be illegal (drug dealers, petty criminals, fraudulent businesses). Both could affect the quality of life in these larger centres.

Small communities with less wage employment experience, particularly industrial employment, will be more affected by internal factors that determine their ability to handle change. The actual level of impact will be tied directly to a community's readiness to take advantage of the employment opportunities and new income going to a community. In the larger communities such as Yellowknife, an earned income increase of \$25 million could attract outside people anxious to benefit from these new disposable dollars. In smaller communities, even a half dozen people working directly for the project could increase total community personal income by as much as 15%. The impacts in these communities will be in direct relationship to a community's ability to cope with rotational employment absences and spending of new wage employment dollars.

4.10.4 Potential Impacts

The incidence of social problems in the Northwest Territories is higher than anywhere else in Canada. The situation could improve or get worse, with or without a major mining project. Solutions to social problems can only be effective if they are initiated by communities, not outside agencies.

On one hand, project jobs and income for residents could help to improve self-esteem, establish a higher standard of living, improve education and skill levels and generally improve the quality of life in the communities hardest hit by social problems. On the other hand, project employment could aggravate existing social problems by increasing stress and related alcohol abuse, by alienating people from traditional lifestyle and by increasing the pace of change in communities already having difficulty dealing with change. What will actually happen will depend on the actions of individuals and communities. The following section lists some of the impacts that could result if communities do not change.

4.10.4.1 Increased Purchases of Alcohol and Drugs

Increased use of alcohol and drugs is one of the main concerns of the communities. If an alcohol problem already exists in the community, residents perceive a direct relationship between more income and more alcohol abuse. Communities are also concerned about increasing drug availability and abuse in their communities. Although there are no recent data to verify that increased income leads to increased alcohol and drug abuse, some RCMP officers have indicated that liquor consumption in communities increases in direct ratio to the increase in income. They base this assumption on the increase in liquor shipped into the community when money is available, and the increase in liquor offenses during related “binge” drinking.

Alcohol abuse in Northern communities has been identified as a temporary escape from substandard living conditions, overcrowding and stress related to self worth. Additional stress from dealing with unfamiliar situations, regimentation and peer group expectations could add to alcohol abuse.

Increased drug use could be of particular concern, since drugs are easier to conceal and usage is harder to detect. In smaller communities, especially ones that prohibit alcohol, drug use could become more prevalent. The severity of the impact will relate directly to the availability of alcohol and drugs and the degree of community acceptance and tolerance towards their use.

4.10.4.2 Higher Incidence of Gambling

The most prevalent form of gambling in First Nations communities is bingo. A large proportion of community populations, particularly women, spend substantial amounts of money each week playing bingo. Often this money is spent in Yellowknife where profits from this activity go to support Yellowknife organizations, thereby increasing the drain of earned income or transfer payments from the smaller communities. With the potential of higher incomes, it is quite likely that a larger portion of money could be spent on this form of gambling. While Coppermine reports a low interest in bingo, the incidence of other types of gambling is fairly high. RCMP report that this can lead to family hardship and, in some instances, crime.

4.10.4.3 Higher Incidence of Assaults, Other Crime

A large percentage of crimes committed in the NWT are alcohol-related. If alcohol consumption increases, crime (particularly assaults) could increase. Although there were no noticeable increases in crime over the past few years in the communities in the study area (in fact some communities showed decreases) it should be noted that these statistics could also reflect shortages in policing resources in these communities.

4.10.4.4 Strain on Policing Services

If alcohol and drug abuse (and crime that results from these abuses) increase, the existing policing strength in the study area will be hard-pressed to control the situation. Additional law enforcement personnel would be required. Also, if the “fast buck” businesses converge on larger centres, particularly Yellowknife, policing agencies may have to deal with more fraud.

4.10.4.5 Strain on Social Service Agencies

If alcohol and drug abuse and related crime increases, and communities cannot mobilize to handle the problem, there could be additional strain on social agencies that have to handle the aftermath of anti-social behaviour. These agencies could include government social workers, drug and alcohol counsellors and regional correctional centres.

4.10.4.6 More Pronounced Community Divisions Between Affluent and Poor

In smaller communities, mine wage employment could widen the gap between “haves” and “have nots” in the community. This could lead to some community disruption over ownership and use of material goods. In the Aboriginal communities that have a “Sharing culture,” there could be certain obligations to share the benefits of employment with extended family. This could lead to a “drag down” effect, whereby a person earning a good income, but obliged to share it, does not see the benefits of working and chooses to give up the job.

4.10.4.7 Acceleration of Value Changes

More materialism is now evident in the lifestyles of Northern people. Although “keeping up with the Jones’s” is a foreign concept in most small communities, there appears to be some status in owning certain desirable objects such as a new truck, snowmobile, boat or VCR. Values such as good hunter/provider are still respected but are shared with emerging values such as having a good job and income and the things these can provide.

4.10.4.8 Marriage Breakdown

Absence from home for two weeks at a time could have an impact on marriages (including common-law relationships), particularly if they are not stable to start with. Stress caused by a number of factors – need for money, separation, suspected infidelity, are major causes of marriage breakdown. With a rotational work system, marriages are likely to experience some of the stress of separation. At the same time, the availability of jobs may relieve some financial stress. Concerns about infidelity, often fanned by miscommunications, were noted in Coppermine when discussing rotational employment (Outcrop 1995).

4.10.4.9 Family Disruption

Absence from home could also lead to family disruption. The family unit is particularly important in Aboriginal cultures, and working away from home would reduce the amount of time a person could spend with his or her family. Also, less parental authority during the absences of a spouse might lead to an increase in juvenile offenses.

4.10.4.10 Increase in Drug Trafficking

Yellowknife is the most likely centre to experience an increase in drug trafficking. Drug offenses increased 9% between 1993 and 1994 (RCMP statistics). An increase in disposable income may lead to an increase in drug use and more trafficking. Since many NWT residents employed by the project will have to pass through Yellowknife on their way home, there is a possibility that readily available drugs may be purchased and carried to smaller communities.

4.10.4.11 Staff Turnover

Many of the potential social problems, from alcohol abuse to marriage disruption, could result in people quitting jobs with the project, or losing their jobs as a result of poor performance, or failure to turn up for a work rotation. A high turnover rate could deter others from trying employment at the mine.

4.10.4.12 Rising Levels of Self-esteem/Pride

Having a worthwhile job and earning a good income can raise levels of self-esteem. The job and related income can release an individual from government dependency, provide a way for the individual to control his or her life and position the person as a worthwhile provider to immediate and extended family. An increase in personal pride could reduce alcohol consumption in a community.

4.10.4.13 Transfer of Skills

Mastering new employment and other skills at the worksite through training programs could assist communities and families to deal with some existing problems related to lack of education.

4.10.4.14 Improved Standard of Living

Regular incomes can improve the standard of living of both individuals and communities. People with regular incomes can purchase/build their own homes, relieving some of the stress on housing in many communities. They can purchase more goods for their families (food, clothing, furniture, vehicles) and not only relieve stress of impoverished lifestyle, but circulate their dollars through the local economy to assist in overall improvements in the standard of living.

4.10.4.15 Change in Leadership Structure

In smaller communities, there are a limited number of people to handle the pressures of leadership. If the existing community leaders are also the ones who assume rotational positions with the project, there could be a change in leadership structure in a community. Women might assume more elected leadership positions, as could elders who are less likely to leave communities and go to work at the mine site.

4.10.5 Mitigation/Enhancement

4.10.5.1 Community Mobilization Programs

Increased wages in the community have the potential to compound existing social problems such as alcohol and drugs. This is of particular concern in the Aboriginal communities where the average earned income could increase by as much as 40%.

Recognizing that the solutions to social problems can only be effective if they are initiated by the communities themselves, the Proponent has offered to assist and participate in Community Mobilization programs. These partnership programs assist communities to mobilize their own resources to deal with existing social problems and potential future problems. To this end, the Proponent has engaged a specialist in the field of Aboriginal community mobilization (Mrs. Barb Brown of Community Development Associates) to serve as a facilitator of the process.

The entire process is community-driven. The issues, the problems and the vision of change are all set by the communities themselves. The process focuses mainly on the creative ability, community vision, identified priorities and practical solutions determined by each individual community. Management, control and accountability will be maintained at the local community level. The intention of the process is to constantly build, link and encourage partnerships between local community leaders, elders, young people, community members and other groups and organizations. This process respects traditional values and creates positive opportunities through workshops and training sessions to build safer and healthier communities, families and work forces. The process starts with an orientation and community Vision-Setting or Priority-Setting Workshop. This initial activity, which may incorporate traditional healing customs, allows people to determine their own priorities and to develop attainable action plans.

At the request of Chief Charlie Jeremick'a, initial mobilization meetings were held in Wha Ti in May 1995. Meeting notes from the initial Vision-Setting Workshop are included in Appendix IV-C1. Mobilization meetings with other local communities will be conducted during the summer of 1995. Initial discussions and workshops indicate that most communities are interested in strengthening, stabilizing and developing local community initiatives. This includes the

stimulation of local economic development, job creation and employment and training opportunities.

The future development of young people in the local communities appears to be a major focus and concern. The community of Wha Ti demonstrated their commitment to strengthen the opportunities for their youth by hosting the first community mobilization Vision-Setting Workshop in the NWT. Twenty-two students identified six priorities that would help them make positive decisions about themselves and the community of Wha Ti. The following suggestions were generated by the youth participants:

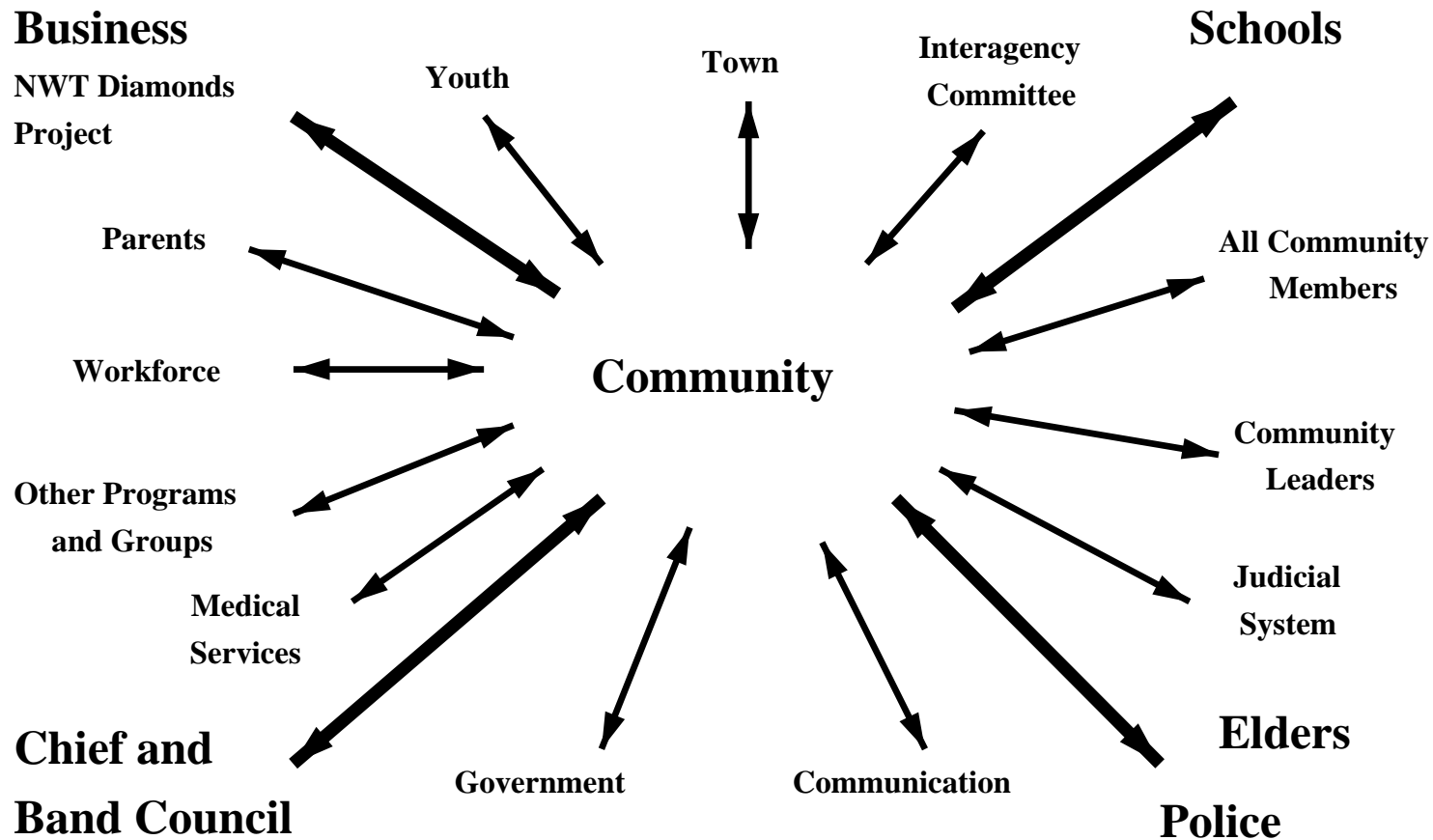
- get involved with elders, the community, jobs and family
- organize sports
- promote tradition
- promote education
- learn traditional skills
- plan a youth conference.

The complete Summary of Workshop Ideas generated by the youth can be found in Appendix IV-C1.

A Strategy of Partnerships

Community mobilization requires not only the commitment of local groups within the community but also the support and assistance of outside agencies as requested by the communities. A diagram illustrating the possible partnerships in the community mobilization process is shown in [Figure 4.10-5](#).

Partnerships need to be continually explored and encouraged. Partners will change as issues change. Potential external partners can include local businesses,



**NWT
DIAMONDS
PROJECT**

**Figure 4.10-5
Potential Partnerships in the
Community Mobilization Process**

law enforcement agencies, service clubs, schools, organizations and agencies, parent groups and various levels of government.

As the facilitator of the mobilization process, Mrs. Brown has already begun to identify possible partners for the process. In its initial phase, this partnership strategy has already generated significant interest. Many unique partners from different arenas have indicated a commitment and desire to explore new ways to collaborate and coordinate for the purpose of strengthening communities. By reducing or preventing such negative impacts as alcohol and other drug abuse, community and family violence, early school drop-out, poor self-esteem and self-worth, positive community development has a greater chance of being successful.

The RCMP, at both at the territorial and local community levels, have a national mandate to promote community policing initiatives. Much like everyone else, they have realized they need community support and more practical solutions to deal with most community offenses. The statistics supplied by the RCMP have helped provide a picture of the situation that exists in many NWT communities. Most of the local communities have high levels of alcohol and other drug abuse offenses and related consequences as well as high rates of community and family violence. RCMP "G" Division Headquarters in the NWT is sincerely interested in a collaborative and cooperative partnership with the NWT Diamonds Project and the local communities. The RCMP are interested in the prevention and reduction of alcohol and other drug abuse, of drug trafficking, of community and family violence and other such related criminal activities.

The Status of Women Council of the NWT have also indicated a commitment to explore the potential for partnering with the Community Mobilization project. They have resources to share, training workshop opportunities and local women's committees to draw upon.

The hospital in Yellowknife is an important partner in community mobilization. At an initial meeting, a member of the medical staff indicated the hospital's interest in the program as part of its community outreach mandate.

The potential partnership with services clubs in the NWT has been only briefly explored. The local Elks may be interested in supporting community programs and initiatives that are youth driven. From experience in other provinces and territories, potential partnerships with Rotary, Lions, Kiwanis and other clubs are very probable.

Preliminary discussions with the NWT Department of Education and its Regional Boards have indicated a sincere interest in a partnership with the community mobilization strategy. They are interested in supporting local community initiatives that will strengthen the development of young people and their potential.

Current investigation of community foundations found in Canada and North America has indicated there are many opportunities for joint partnership funding once community priorities and action plans have been identified. These funding partners will be developed at the local community level and will be submitted under each community's mandate.

Many federal government agencies and departments have a mandate to support local Aboriginal community development, including comprehensive planning, economic opportunities, pre-employment training, career management and educational opportunities for young people. Initial investigation has suggested potential partnership opportunities exist with the Secretariat of Youth, Training and Employment, the Solicitor General of Canada, Health Canada, Canadian Heritage, and Human Resources Development Canada.

Contributions from the Communities

Developing ongoing partnerships with local communities, various service agencies, businesses, schools and all levels of government will help sustain healthy communities. The cost of funding such strategies and programs should be a shared responsibility. There is a perception in the smaller communities that the Proponent can, should and will pay for everything. This perception needs to change and the "shared responsibility" concept encouraged. The participating communities need to provide tangible evidence of their level of commitment and to take responsibility for developing practical and attainable community solutions. Many resources, skills, experiences and capacities exist in the communities. These need to be identified, mobilized and linked to create a safe, secure and healthy community, which in turn results in a happy and motivated work force.

The ultimate success of the process is primarily dependent on the level of commitment of the communities themselves. Examples of tangible contributions which the communities are expected to make include:

- a serious commitment and donation of time from community leaders and respected community members
- the contribution of skills within the community such as the traditional wisdom of the elders, translation skills and food preparation skills
- the contribution of existing community facilities such as school rooms for meetings and translation equipment.

The mobilization program assists communities to identify community values and problems. It also helps communities set priorities for action and directs the communities to agencies that can work with them to help build safe, secure and healthy communities in the NWT.

Community mobilization is a way to mitigate against potential social impacts related to employment and increased income associated with the NWT Diamonds Project. However, it should be noted that the process is slow. “As long as it took the community to get to where it is now, so it will take the same length of time to heal” (Mrs. Barb Brown).

4.10.5.2 Employment Preference

The Proponent’s hiring preference will be given to NWT Aboriginal people and other NWT residents who have the skills required to work at the mine. It will be necessary to recruit from other Canadian provinces as well. An average of 830 people will be directly employed over the 25-year life of the mine. Two out of every three employees are likely to be residents of the North, and more than half of the Northern employees are expected to be Aboriginal people.

4.10.5.3 The Employment Training Programs

The Proponent recognizes the importance of education to assist Aboriginal people in their desire for increased participation in higher calibre jobs in a wage economy. As addressed in detail in Volume I, Section 2.10, the Proponent has instituted several programs to mitigate employment expectations by the Aboriginal people that are not normally achieved due to an absence of a high school education, job skills, or previous work experience. The Proponent’s initial waiver of strict educational requirements is designed to make job opportunities available to more Aboriginal people. Another way of encouraging Aboriginal involvement is by providing training programs. People who want to work for the NWT Diamonds Project, but have no mining experience, will be eligible for Pre-employment Training, a program the Company is developing in cooperation with Aurora College (Arctic College). This will give them a much better chance of getting a full time job. Once employed, training for all employees will include orientation, initial job, certification and continuing development training. Employment and training with the project are expected to generate a greater depth of skill and experience in the NWT, particularly among the Aboriginal people.

The Proponent has already established a scholarship program with the Treaty 11 Dogrib. This program includes a scholarship for university undergraduates (\$5,000 per year) and a number of scholarships for Grades 11 and 12 high school students (ten scholarships at \$500/scholarship). As the mine develops toward full production, these scholarship programs will be extended to other communities.

4.10.5.4 Two-week Work Rotation

In remote, unpopulated areas of Canada like the Lac de Gras area, the use of long-distance commuting (LDC) is a widely practiced method of supplying labour to the mine site. Once selection of the LDC approach is made, an important factor in effective human resource management is the work rotation schedule.

After careful consideration, the Proponent has selected a two weeks on/two weeks off rotation schedule for the NWT Diamonds Project. This rotation schedule has significant advantages over rotation schedules of other lengths. LDC research into longer rotation cycles has clearly indicated problems with on-site rotations of 21 days or greater; while rotations of shorter duration, such as one week on/one week off, would have drawbacks for the established socioeconomic environment of the Northwest Territories.

The case for a two weeks on/two weeks off rotation at Lac de Gras is soundly supported by findings in three areas: worker health, safety and productivity; family life implications; and the traditional lifestyles of Aboriginal communities in the North. The two weeks on/two weeks off rotation schedule minimizes the disruption of traditional lifestyles among the Aboriginal workers it seeks to attract to its work force and the family units and communities it will draw upon. Details of the impacts of traditional lifestyles are discussed in Section 4.8. Additional discussion on worker safety and family life implications can be found in Appendix IV-C5.

4.10.5.5 Alcohol and Drug Counselling

The Proponent has a drugs and alcohol policy in place that bans the use of controlled substances and alcohol in all areas of this operation, including the permanent camp. Employees are advised of this policy and are required to comply with it.

For those employees who request assistance, the company will provide a counselling program to workers who have problems with alcohol and drug abuse. As well, they will assist in placing employees in rehabilitation programs.

4.10.5.6 Employee Assistance Programs

The Proponent will provide access to an Employee Assistance Program (EAP) that will provide advice and assistance for employees on a range of issues, including financial management, drug/alcohol dependency and work-related stress management.

The program will include Aboriginal community-based counsellors to assist employees from those communities. All programs will respect the individual's confidentiality.

4.10.5.7 Banking Services/Facilities

Employees' pay is planned to be deposited directly to their bank accounts. Since there are no banking services in some of the smaller communities, the Proponent will use its influence with northern bankers to provide a basic level of banking service in those communities where it expects to do its hiring.

4.11 Cross-cultural Impacts

The work force at the site is expected to be comprised of people from many different cultures including First Nations, Inuit, Metis and non-aboriginal people. Causes of impacts due to cross-cultural interaction are identified below:

4.11.1 Causes of Impacts

- People from different cultural groupings may not be totally familiar with other cultures or values.
- Initially, the majority of the supervisory and professional positions will be held by non-aboriginal people who have a higher education level and more industry/mining work experience.
- Some of the Aboriginal staff will have limited wage employment experience. Without this wage experience, the Aboriginal employees may rely on cultural behaviour patterns, which may appear to be non-assertive and shy to their non-aboriginal co-workers.
- Some Aboriginal employees will have limited experience in being away from their home communities. In some cases, their home communities are smaller than the total size or population of the mine site.

4.11.2 Levels of Impacts

Close to 30% of the total mine staff could be NWT Dene, Inuit or Metis, while 37% of the staff could be from southern Canada with limited or no cross-cultural training. The balance will be non-aboriginal NWT residents, most with some experience in cross-cultural work environments.

4.11.3 Reasons for Impacts

Life experiences of the various groups will be dissimilar. These groups may not understand each others' values. Differences include or are rooted in a different appreciation for the land, a different appreciation of the importance of community and family, different life experiences, different exposure to the outside world and different educational levels.

4.11.4 Potential Impacts

4.11.4.1 Staff Turnover Among Aboriginal Employees

Due to cultural differences, Aboriginal employees may become discouraged and leave the mine work force, thereby creating high levels of turnover for the mine and concerns among Aboriginal communities about the desirability of working at the mine. All mines in the NWT with rotational work schedules have had to deal with relatively high staff turnover among Aboriginal employees for a variety of reasons, some relating to cultural differences.

Nanisivik, with a rotational schedule of 13 weeks on/4 weeks off (or an option to work 6.5 weeks on/2 weeks off), has annual turnover rates that have been as low as 30% and as high as 88% among its Inuit employees over the past three years. The company has concluded that many workers prefer to have a job for a few months, then take a few months off. The mine accepts these employees back, if they left on good terms. At the same time Nanisivik reported that it has some longer-term Inuit employees and has graduated several welders, several electricians and a millwright who are still working at the mine (Nanisivik 1995).

Lupin Mine, organized on a two weeks in/two weeks out rotation, has 68 Aboriginal employees. Of this number 40% have been with the company for six to 15 years, while 60% have been employed for one to five years. Lupin reports that two of its longest-term employees are Dene and one lives in Rae. Many Aboriginal employees are journeyman tradesmen, heavy equipment operators, mill operators, or work in the warehouse or assay lab. A shorter work rotation and more experience with wage employment may account for a lower turnover of employees at Lupin (Lupin 1995).

As Aboriginal people adjust to rotational mining jobs, turnover rates will likely decrease, though still continue to be above the mine's average. However, turnover is lower among more skilled Aboriginal workers and is lower in mines with shorter rotational periods. Providing opportunity for advancement and a schedule that allows time for traditional pursuits would appear to help reduce staff turnover.

4.11.4.2 Reductions in Productivity

Lack of racial understanding could affect the spirit of teamwork and the level of respect between individuals at the site. This could have an overall effect on productivity levels and the quality of work, and could indirectly affect mine safety and profitability.

4.11.4.3 Development of Factions on Site

An “us and them” attitude could develop at the mine site, resulting in limited interaction between the two groups and the development of a sense of isolation among Aboriginal employees.

4.11.5 Mitigation/Enhancement

4.11.5.1 Cross-cultural Orientation Programs

Cross-cultural orientation programs will be offered both at the time of employment and ongoing through the life of the mine. They will be two-directional: orienting other workers to the values, culture and traditions of NWT Aboriginal people, and orienting NWT Aboriginal people to values, traditions, lifestyles of the workers from other parts of Canada. Aboriginal people will be involved as instructors in these programs.

4.11.5.2 Sensitivity Training

Supervisory personnel will receive cross-cultural sensitivity training so they can assist in developing high levels of self confidence among Aboriginal employees, and can provide the proper day-to-day motivation in career progression.

4.11.5.3 Buddy System Approach

For inexperienced mine workers, a buddy system will be used to assist employees to develop the necessary skills for each job. This approach will include pairing Aboriginal and non-aboriginal workers but also experienced Aboriginal workers with inexperienced Aboriginals workers.

4.11.5.4 Career Planning

Career planning and career progression will be a priority, especially for Aboriginal workers. Having Aboriginal employees in positions of increased responsibility will assist to deter the development of an “us and them” mentality.

4.11.5.5 Concern Forums

Aboriginal employees, either collectively or individually, will be provided opportunities to raise concerns about employment and other issues. The Aboriginal Affairs Coordinator will assist with this process as part of his or her duties.

4.11.5.6 Impact Timing

The impacts will be most obvious during construction, when there is a larger proportion of southern workers will be employed. By the nature of the job, these people will be at site for a limited duration, will work for short minimizing the opportunity and time to get to know fellow employees. Mitigation programs for new employees will start during construction and run throughout the life of the mine.

4.12 Job and Education Aspirations

4.12.1 Causes of Impacts

There are several factors encouraging increased levels of education and training:

- new supply of jobs, many with higher than average wages
- project employees drawn from a number of smaller communities
- need for new skill requirements, or for increased numbers of people with existing skill requirements.
- awareness of mining industry jobs as alternative to the status quo
- availability of new Proponent and government-sponsored training and education programs geared to the mining industry
- development of more transferable skills within the NWT labour force.

4.12.2 Potential Level of Impacts

The impact will be greatest in communities where there are few opportunities for full time wage employment. In many of these communities, people have dropped out of school, partly because there is no direct correlation between getting an education and getting a job. Many jobs in the small communities are part time, often as labourers and do not require specialized training. Full time jobs requiring higher education levels, such as nurses, store managers, RCMP and teachers, are generally held by non-aboriginal people. Specialized training programs, often through Arctic College, are now preparing Aboriginal Northerners for positions as teachers, renewable resource officers, airport technicians, housing maintenance workers and heavy equipment operators. Current job aspirations of young people in communities are directed at the types of jobs they know (pilots, heavy equipment operators, taxi drivers, teachers). The hiring of even one or two employees from a community for the NWT Diamonds Project will expand knowledge of types of jobs and could encourage students to stay in school to get the education needed to start a career in the mining industry.

4.12.3 Reasons for Impacts

The young people in many of the First Nations and other small NWT communities have limited exposure and participation in the wage economy. Apart from government employment or transfer payments, there are few opportunities for accessing regular incomes.

The mining industry could be a new source of employment for Aboriginal people, if they are prepared to obtain the required education/training, and if they are prepared to commit themselves to a career in mining.

Initially the Proponent will hire some people who do not meet the educational/skill requirements for the job, and will provide training. This could be perceived two ways: as a way around education, since it is not necessary to complete schooling to get a good paying job; or as a reason to continue education to get a more interesting job that offers promotion and increased income possibilities over the long term.

It is interesting to note that in a 1992 survey of Aboriginal “role models” in the mining industry, almost every participant advised prospective Aboriginal employees to get more education.

The Aboriginal Role Models survey prepared by the sub-committee of the Intergovernmental Working Group on the Mineral Industry (1992) was developed to provide sample illustrations of Aboriginal people who are already involved in the industry. Fifteen people working in mines in northern Manitoba and northern Saskatchewan provided information for the case studies. In general, the role models advise younger people to stay in school and obtain as much education as possible. As well, many of the role models indicated job aspirations far beyond their present job – from becoming a social worker to becoming a mine manager.

In response to a request for the single most important advice for Aboriginal people, role model responses included:

Education. Stay in school. Northern liaison coordinator, Saskatchewan

Further your education. Jackleg operator, Northern Saskatchewan

Education plays an important role in your future, so get as much education and practical experience as you can. After all, the future depends on whatever you decide to make of it. Equipment operator, Northern Saskatchewan

Educate yourself. Clerk, Northern Saskatchewan

Your #1 priority should be to get the most and best education possible. Mill operator, Northern Saskatchewan

Stay in school. Get an education. Industrial mechanic, Northern Saskatchewan

Another survey carried out by the Intergovernmental Group on Aboriginal Participation in Mining (1991) questioned the barriers that prevent companies from hiring or contracting Aboriginal people. The three barriers identified most often by mining companies were lack of experience, very few or no job applications from Aboriginal people and inadequate education. Aboriginal people most frequently identified inadequate training and lack of experience, followed by the cost of training, as barriers to mining or mining related employment.

4.12.4 Potential Impacts

The impacts on education and job aspirations will relate to the success of the people who work for the project and their advancement to higher level positions. Attitudes towards the Proponent and jobs at the mine will also affect the level of impact, since people who like their jobs and like working for the company will make this known to other people in their communities.

4.12.4.1 Provide Incentive to Improve Educational Levels

Employment possibilities with the NWT Diamonds Project can provide an incentive for people to stay in school, if only to attain the education level required for apprenticeship positions. This can help emphasize the direct connection between education and jobs, which is not always evident in a small community with a limited number of jobs.

4.12.4.2 Expand Career Horizons

The NWT Diamonds Project could introduce a whole new range of career possibilities to Northern residents, particularly Aboriginal residents, just as government did when it arrived nearly three decades ago. Although mining careers have been part of the NWT mix for nearly 50 years, few Aboriginal residents chose to participate, often preferring seasonal or land-based employment close to home. With a greater demand for cash income, and more people chasing fewer jobs in small communities, young people will have to consider careers in potential growth areas such as mining. The two weeks on/two weeks off shift rotation at the NWT Diamonds Project offers a compromise between having a job and staying in the community. It allows Aboriginal people the opportunity to have a cash-paying job and yet still return to the community during their time off.

4.12.4.3 Improve Skills in Community Labour Pool

Many skills acquired at the NWT Diamonds Project could be transferable skills (mechanics, electricians, truck drivers, welders, cooks) that could be used in communities on a full time or part time basis. The Proponent's proposed training

programs will provide certification in a number of skill areas. This certification will give people a higher degree of mobility in the job market.

4.12.5 Enhancement/Mitigation

The Proponent can play an important role in raising education and job aspirations in First Nations and other Aboriginal communities. Some activities the company could undertake are listed below.

4.12.5.1 Education Incentive Programs

The Proponent is currently offering scholarships in Treaty 11 First Nations communities to encourage students to complete high school and go on to higher education (Boyd 1995c). In addition, a University undergraduate scholarship program has also been offered to Dogrib Treaty 11 communities. Both these programs contain a summer employment program.

4.12.5.2 Co-operative Training Approach

To ensure and enhance positive impacts, the Proponent is actively participating with northern training agencies in the development and delivery of specific programs including Arctic College upgrading programs.

4.12.5.3 Student Work Experience Programs

Students in larger centres generally participate in work experience programs in conjunction with their high school education. Smaller communities with fewer employers may have difficulty in setting up such a program. To encourage an understanding of wage employment in the mining industry, the Proponent may incorporate a work experience week at the site for students. Summer student employment programs were implemental in 1994 and are being continued.

4.12.5.4 Career Counselling

The Proponent, via its local co-ordinators and employees, will participate in community career shows and in ongoing career counselling. Materials will be made available to schools to let students know the types of jobs that could be available at the diamond mine and the qualifications required for these jobs.

4.12.6 Timing

The impact on job and education aspirations will start with the initial hiring of employees from a specific community. If these people are perceived to have good jobs, and to like their jobs, this could lead to a number of young people deciding to advance their education, either through high school or Arctic College upgrading programs, so they too can get a position with the NWT Diamonds Project.

4.12.7 Residual Effects

If residents, particularly younger Aboriginal people are not prepared to improve education or skill levels, or are not prepared to make the lifestyle changes required for rotational mining employment, there will be limited impact on job and education aspirations within the NWT.

4.13 Government Expenses/Income

Annual costs to the federal and territorial governments due mainly to the 1,000 people moving to the NWT as a result of the NWT Diamonds Project are expected to be \$4 million and \$10 million, respectively. Offsetting these costs is a potential \$3 million annual savings in social assistance and subsidy payments as a result of increased employment giving a net cost to governments of \$11 million per year over the expected 25-year life of the project. The economic benefit to Canada is given by the projected contribution of \$6.2 billion to the GDP. For every \$1 of economic benefit to Canada, the cost to the governments is \$0.05.

4.13.1 Potential Expenses to the Government of the Northwest Territories - Year 2000

Since the project will be self-contained at the site and will provide its own infrastructure and services, there will be few direct costs to government. Any costs to government will be more closely related to people involved with the project, rather than the project itself.

With or without the project, the NWT will incur additional costs to educate and train its growing population for the types of jobs available and to provide levels of service consistent with the rest of Canada. For this reason, it is difficult to isolate costs that are directly project-related. For this assessment, the cost increases have been tied directly to anticipated increases in NWT population.

The additional cost to the government is estimated as the variable cost component of government services associated with people moving to the NWT as a result of the NWT Diamonds Project. These government services include more schools, health services, regulatory personnel and funding for social agencies. The cost of these services can be estimated from the territorial government's capital and operations budget.

If the territorial government budget (\$1.2 billion) (NWT Financial Management Board Secretariat 1994, 1995) was spread evenly among all 62,000 NWT residents, the per resident expenditure would be approximately \$19,000 per year. These costs per person are quite likely higher in remote locations, where housing, transportation, health and education facilities are much more expensive to install and maintain and quite likely lower in the larger communities, which will experience the greatest growth through in-migrants. Some of the costs are fixed

and are not influenced by population changes. To account for these factors, this assessment has reduced the expenditure per new resident from \$19,000 to \$10,000. Based on an estimated project-generated population growth of 1,000 people, the additional costs to the territorial government could be \$10 million per year.

All project-generated population increases are expected to occur in Yellowknife and Hay River. In these communities, costs to provide and maintain government services are probably lower than in the rest of the NWT. In this case even the estimate of \$10,000 per year per person is probably high. This may be offset by the extra effort and dollars the government will have to put into small communities, particularly in education and training. For this reason, the calculation of government costs on a per capita basis, adjusted downward to recognize fixed costs, appears adequate for this assessment.

4.13.2 Potential Savings to the Government of the Northwest Territories - Year 2000

In the year 2000 there could be 851 new jobs in the NWT as a result of the NWT Diamonds Project (Table 4.3-2). Over 600 of these jobs may go to existing NWT residents. Although all these jobs will not go directly to unemployed people, through secondary and tertiary effects many unemployed people will get jobs as the end result of introducing more jobs to the marketplace. The most optimistic scenario is that up to 600 unemployed people could get jobs. For purposes of this assessment, a reduction in unemployment of 400 people is used. Savings will accrue to the government from this change in status of 400 people.

4.13.2.1 Social Assistance Payments

In the study area, the average social assistance payment was just over \$3,000 per year in the Yellowknife area (1994) and closer to \$4,000 per year in the Kitikmeot area (NWT Bureau of Statistics 1994b). Assuming that 400 people would no longer need social assistance, this could mean a \$1.4 million annual savings to the Government of the NWT (400 x \$3,500).

4.13.2.2 Housing Subsidy Reductions

If half of the group of 400 residents formerly on social assistance lived in public housing provided by the Government of the Northwest Territories, they were likely paying the minimum rent. Rents are geared to household income and increase as income increases. Some people may choose home ownership rather than higher rents, while others will pay the increase. The calculation of savings on rent subsidies assumes that half of the people who move into the work force as a direct or indirect result of the project will pay approximately \$500 more per month in rent. This could mean a \$1.2 million savings to the government.

4.13.2.3 Grants, Other Assistance

Currently the territorial government has a series of grant and assistance programs for all sectors of the economy. These range from grants to assist hunters and trappers to contributions to individuals and organizations for everything from travel to administration. These grant programs will continue, but with additional funds in the small communities and a more buoyant economy, the level of grants/assistance will likely decrease. A \$400,000 savings to the government in these types of assistance programs is estimated.

4.13.2.4 Summary of Savings

Potential annual savings are summarized below. The total savings to the Government of the NWT from these factors is \$3.0 million per year over the expected 25-year life of the project.

Social Assistance Payments	\$1.4 million
Housing Subsidy Reductions	\$1.2 million
Grants, Other Assistance	<u>\$0.4 million</u>
Total Annual Savings	\$3.0 million

4.13.3 Potential Expenses to the Federal Government

Current figures are not readily available for federal government expenditures in the Northwest Territories, by department. The most recent figures available record total federal government expenditures in the NWT for the year 1991. Excluding the annual federal grant to the NWT, these expenditures totalled \$586 million (Table 4.13-1).

Federal government expenditures in the Northwest Territories, excluding the annual grant to the Government of the Northwest Territories and some much smaller local grants, have increased at a faster rate than income. Between 1981 and 1991, expenditures went up by 178% compared with a 170% increase in income (Table 4.13-1).

**Table 4.13-1
Federal Government Revenue - Expenses**

		1981	1991	2001
		(\$ millions)		
Revenue	-Regular	160	432	734 ¹
	-Proponent	-	-	94
Total Revenue			432	828
Expenses ²	- Regular	211	586	820 ³
	- Proponent	-	-	4 ⁴
Total Expenses			586	824
Net (Income, less expenses)			<154>	4

Source: Canada Statistics 1994, Outcrop estimates.

- 1: Based on revenue increase of 170% over ten years.
2. Excludes grant to territorial government, but includes all other federal government expenses in the North.
3. Based on expenditure increase of 140% over ten years. See text.
- 4: Costs as a direct result of Proponent = 0.5% of total.

In future years, if the formula financing approach to funding the territorial government continues, overall expenditures in the Northwest Territories will decline as the amount of the grant is offset by new incomes generated by the territorial government. At the same time, federal government services will have to be maintained and there will be new costs associated with the division of the Northwest Territories. Although the grant reduction will offset some new costs, it is expected that federal expenditures in the NWT will continue to grow but at a lesser rate than in the past ten years. For this assessment, the growth rate of federal government expenditures over the next ten years is estimated to be approximately 140%. This lower increase than in the previous decade reflects the federal government's deficit cutting programs and transfers of some programs to the territorial government. It is estimated that the total federal expenditures in the NWT for the year 2001, excluding the annual federal grant, will be \$824 million.

Projected increases in federal expenditures as a result of the NWT Diamonds Project operations should be minimal. For this assessment they are estimated to add about 0.5% to total federal expenditures in the NWT in the year 2001. This is somewhat lower than the 0.8% increase in projected costs to the Government of the NWT. This results in an additional \$4 million annual increase in federal expenditure due to the project. This increase of \$4 million represents a per capita cost of \$65 per territorial resident, or \$4,000 for each new resident who moves to the NWT as a result of the project. No attempt was made to offset these costs with decreases in federal expenditure in other provinces from which the new NWT residents moved.

Currently some 18 federal government departments and agencies have active operations in the Northwest Territories. The NWT Diamond Project and related increases in the population will have limited or no impact on certain government operations in the NWT such as National Defence, the Canadian Coast Guard, Canadian Heritage, Parks Canada or Public Works Canada. Other federal government operations such as Human Resources Development Canada (which operates the Canada Employment Centres), Canada Mortgage and Housing Corporation, the Federal Business Development Bank, and Indian and Northern Affairs Canada could see some increase in activity if they maintain the same level of services in future years.

4.13.4 Government Expense Summary

The additional annual expenses and savings to the territorial and federal governments due to the project-related influx of 1,000 people to the NWT are summarized below. These show a net cost to government of \$11 million per year over the expected 25-year life of the project.

Additional cost to the NWT	\$10 million per year
Savings to the NWT	<\$3 million per year>
Additional cost to the federal government	<u>\$4 million per year</u>
Net cost to government	\$11 million per year

A measure of the economic benefit of the project is given by its contribution to the gross domestic product (GDP). Over the 25-year life of the project, the contribution to the GDP of Canada is \$6.2 billion (Section 4.14). Over the same period, the net cost to government is \$265 million (\$11 million per year x 25 years). In other words, for every \$1 of economic benefit accrued by Canada from the project, the federal and territorial governments will together have net costs of less than \$0.05.

4.13.5 Potential Revenue to the Government of the Northwest Territories

The Government of the Northwest Territories has two sources of revenue: own-source revenues such as taxes, fees and other direct payments, which account for approximately 25% of revenues; and a grant from the federal government that provides the balance of funds needed to deliver programs and services to the people of the Northwest Territories (NWT Financial Board Secretariat 1995). The amount of the grant from the federal government is determined annually by a rather complicated formula with a number of adjustment factors that address “catch up” and “keep up” situations.

This section examines the potential levels of Territorial Government revenue. Grant adjustment resulting from the NWT Diamonds Project is discussed in detail in Section 4.13.6.

Additional revenue to the Government of the NWT will be mainly in direct and indirect taxes paid by the Proponent, its employees, suppliers and supplier employees (Tables 4.13-2, 4.13-3). To assess a level of income, the year 2000 (9,000 tonnes per day) was selected as a sample year.

The revenue to the Government of the NWT is the sum of the direct and indirect taxes.

The proponent and suppliers will also contribute over \$3 million annually to the NWT Workers Compensation Board (WCB). This figure is not included, since it is assumed this amount is offset by potential compensation payments.

Annual Revenue (\$000)

Direct Taxes	\$23,588
Indirect Taxes	1,109
Total Income	\$24,697

The net annual expenses to the Government of the NWT for the year 2000 were \$7 million. Therefore, in the year 2000, the revenue to the Government of the NWT from the project will exceed expenses as a result of the project by approximately \$18 million.

4.13.6 Potential Effects on Grant Level

The NWT Diamonds Project could result in a revenue loss of \$7 million annually to the Government of the Northwest Territories if the current formula financing arrangements with the federal government do not change. Although new income and savings to the territorial government will exceed costs as a result of the project, these gains will be offset by greater reductions in the annual grant from the Government of Canada.

The formula financing approach deducts eligible territorial revenues from the territorial gross expenditure base to determine the annual grant entitlement each year (Expenditures minus Revenues = Grant). For both revenues and expenditures, a number of conditions and factors apply.

**Table 4.13-2
Potential Direct Territorial Taxes - Year 2000 (1995 tax rates)**

Type	Amount (\$000)	Effective Tax Rates¹	Notes
Fuel: Proponent purchases	\$3,227	Varies.	Tax rates vary for motive and non-motive diesel fuel, with a higher rate for motive. Fuel for power generation is exempt.
Fuel: Business purchases	1,000	Varies	Business purchases of fuels is an estimate only, but reflects high requirements for ground transport and aircraft fuel to carry out Proponent contracts.
Property Tax: Proponent	550		Based on estimated assessed value, 1994.
Corporate Income Tax: Proponent	14,750	14%	The NWT portion of corporate taxes (large corporations) is 14%. This represents about one-third of the total corporate taxes payable. Figure used is average per annum taxes over the 25-year life of the project. In actual fact, taxes will be lower in early years and higher as the mine reaches full production.
Corporate Income Tax: Suppliers	344	5%	Suppliers will be mainly in the small business category. The NWT taxes profits of these businesses at 5%. Only additional profits as a result of NWT Diamonds Project's business are included in this calculation.
Personal Income Tax: Proponent's employees resident in North	1,990	7.3%	Direct employment will generate \$27,261 million for NWT residents. The NWT collects 7.3% of this income.
Personal Income Tax: Indirect and induced income	1,533	7.3%	Income generated by indirect and induced NWT employment will be \$20,995.
Payroll tax: Proponent's non resident employees	194	1.0%	Employees working at the site, who do not live in the Northwest Territories, will pay 1% payroll tax. Total income for these fly-in employees is \$19,817 million.
Total	\$23,588		

1: Effective tax rates were provided by the NWT Bureau of Statistics 1995f.

**Table 4.13-3
Potential Indirect Territorial Taxes - Year 2000
(based on 1995 rates and on NWT wage income
of \$48,256 million generated by the Project)**

Type	Amount (\$000)	Effective Tax Rate ¹
Gasoline Tax - persons	145	0.3%
Tobacco Tax	386	0.8%
Profits of Liquor Commission	434	0.9%
Miscellaneous Taxes	48	0.1%
Other current transfers from persons (motor vehicle licences, misc. permits, etc.)	48	0.1%
Miscellaneous Territorial	48	0.1%
Sub Total	\$1,109	

1: Effective tax rates were provided by the NWT Bureau of Statistics 1995f.

On the revenue side, all existing taxes are included as revenue and most are subject to a “tax effort” adjustment factor. Only new taxes or increases in rates are not subject to the adjustment factor. For example, if a territorial sales tax were introduced, revenue from this tax would not be subject to the adjustment factor. Also, if corporate tax were raised by 1%, the revenue resulting from the rate increase would not be subject to the adjustment factor.

In the 1993/1994 Formula Financing Grant Calculation, the tax effort adjustment factor was 1.2743. In 1994/1995, this tax effort adjustment factor increased to 1.30 (NWT Finance 1995). This means that for every dollar in taxes (at 1987/1988 rates) collected by the NWT government, \$1.30 was taken off the grant in 1994/1995.

By the year 2000, the NWT Diamonds Project could generate an additional \$24.7 million in tax revenue to the territorial government (Tables 4.13-2 and 4.13-3). Most of these taxes (corporate taxes, personal income tax, fuel tax) are subject to the tax effort adjustment factor. Assuming that \$23 million is subject to adjustment at the current factor of 1.30, the territorial government will increase revenues by \$23 million, but have its annual federal grant reduced by \$30 million for a net revenue loss of \$7 million.

Several factors also apply to the expenditures side, which could slow down some of the revenue loss. The first is an economic growth factor that increases base expenditures by the lesser of the growth in provincial-local government spending (4.72% in the 1993/1994 calculation) or growth in nominal national Gross Domestic Product (2.42% in 1993/1994 calculations). The second factor on the

expenditure side relates to population growth. To compensate for the NWT's faster population growth, the expenditure levels are increased by the differential growth between the population growth of the NWT and Canada (assessed at 0.78% in 1993/1994 calculations). The application of these two factors in the 1993/1994 calculations added \$33.5 million to the expenditure base (NWT Finance 1995).

A small change may occur in the population adjustment factor due to projected in-migration to the NWT as a result of this project. This factor relates the NWT situation to the Canadian situation, and adjusts the expenditure base in line with population. In 1993/1994, the growth rate expenditure factor was 0.78%. If the project in-migration adjusted this number by between 0.05% to 0.1%, the loss in grant revenue from the project could be reduced by between \$500,000 to \$1 million as a result of expenditure increases.

4.13.7 Potential Impacts on Federal Revenue

During the period from 1981 to 1991, federal government revenue from the Northwest Territories increased by approximately 170% from \$160 million in 1981 to \$432 million in 1991 (Table 4.13-4). The majority of the increase was from the collection of personal income tax. During this period, two new mines opened and reached full operation (Polaris and Lupin), a third mine (Colomac) operated for less than a year, and one mine closed (Pine Point). Any income to the federal government from the NWT Diamonds Project in 1991 would have been minimal.

Over the next ten year period (1991-2001), it is likely that federal government revenue from the Northwest Territories, without the NWT Diamonds Project, will increase at least at the same rate as the previous decade. This is based on known mining exploration activity, business expansion in Yellowknife and other economic indicators in the non-renewable and renewable resource sectors (oil and gas leases and activities, increases in tourism). Expected NWT revenue to the federal government is estimated to be \$734 million by the year 2001, (\$432 million x 170%) without the NWT Diamonds Project.

NWT revenue to the federal government will increase by more than 11% once the NWT Diamonds Project reaches full operation. Over the lifetime of the project, the mine is projected to generate \$2,337 million in revenue to governments in corporate income tax, royalties, personal income tax, etc. (Table 4.14-10 in Section 4.14). The breakdown of this \$2,337 million to the various governments is as follows: \$627 million to the NWT government, \$1,704 million to the federal government, and the remaining \$56 million to the provincial governments. Although this amount will not be evenly distributed over the 25-year life expectancy of the mine, an even distribution has been calculated for

Table 4.13-4
Federal Government Revenue & Expenditures
Northwest Territories 1991

Revenue/Expenditures	\$ millions
Revenues:	
Direct Taxes:	
From persons	212
From corporate and government business enterprises	39
From non-residents (withholding taxes)	-
Indirect taxes	43
Other current transfers from persons	-
Investment income	138
Total Revenue	432
Expenditures:	
Current expenditure on goods and services	304
Transfer payments:	
To persons	73
To business:	
Subsidies	65
Capital assistance	5
To non-residents	-
To other levels of government:	
To provinces	1,042
To local	7
Interest on the public debt	139
Total current expenditure	1,635
Saving (Income - expenditures)	-1,203
Add: Capital consumption allowances	56
Deduct: Investment in fixed capital and inventories	29
Equals: Net lending	-1,176

Source: Canada Statistics 1994.

the purpose of this assessment. Using this approach, the average income to the federal government as a result of this Project will be approximately \$68 million per year.

4.13.8 Impact Levels

Although the project will provide a net annual income of close to \$18 million to the territorial government, it could reduce overall NWT government revenue by \$7 million per annum as a result of the formula financing arrangement for assessing the annual grant to the NWT Government. This reduction represents less than 1% of the current federal grant, but could have an effect on the provision of some programs, since cuts will be required in line with lower revenue levels. Once fully operational, the NWT Diamonds Project will provide sufficient revenue to the Federal Government each year to eliminate its NWT operating deficit (\$154 million in 1991) and provide a small operating surplus of \$4 million by the year 2001, excluding the grant to the territorial government (Table 4.13-1).

4.13.9 Residual Effects

With the formula financing tax effort factor, increases in tax revenues subject to the factor, whether from the Proponent or from other companies, will result in decreases to the federal grant and overall decreases in NWT government revenue. This will continue as long as the formula financing approach is used to determine the annual grant. Any changes to the formula are the responsibility of the federal and territorial governments.

4.14 Economic Impacts

The NWT Diamonds Project will provide substantial economic benefits to the NWT and to Canada as a whole. These benefits include jobs and associated wages and benefits, the purchase of capital and consumable goods and services by the mines, and revenues paid directly to the territorial and federal governments as taxes and royalties. In addition to direct benefits resulting from payments by the Proponent in the form of wages, purchases, royalties and taxes, there are indirect benefits generated by supporting industries and induced benefits that arise from the recycling of money in the economy.

Throughout this section, all benefits, costs and other financial amounts are presented in 1994 Canadian Dollars.

4.14.1 Methodology

The starting point for the economic impact analysis was the projected financial expenditure flows for the NWT Diamonds Project. Data used for this analysis included the following:

- detailed employment and wages statistics based on a matching between project job descriptions and the skills of the present NWT labour force (including output from training institutions)
- analysis of supply expenditures into regional supply sources (based on knowledge of the NWT economy and interviews with key suppliers, e.g., labour contractors)
- analysis of secondary effects on downstream suppliers and the consumer sector through input-output analysis results (the Bureau of Statistics, Government of the Northwest Territories and Statistics Canada)
- government revenues, in the form of anticipated corporate income tax and royalty payments (from the corporate entity itself); and federal and territorial taxes associated with project wages expenditure (assisted by the NWT Bureau of Statistics).

Project activities can be broken down into the following stages as illustrated in [Table 4.14-1](#): exploration, development, construction, mine operations and mine reclamation/closure.

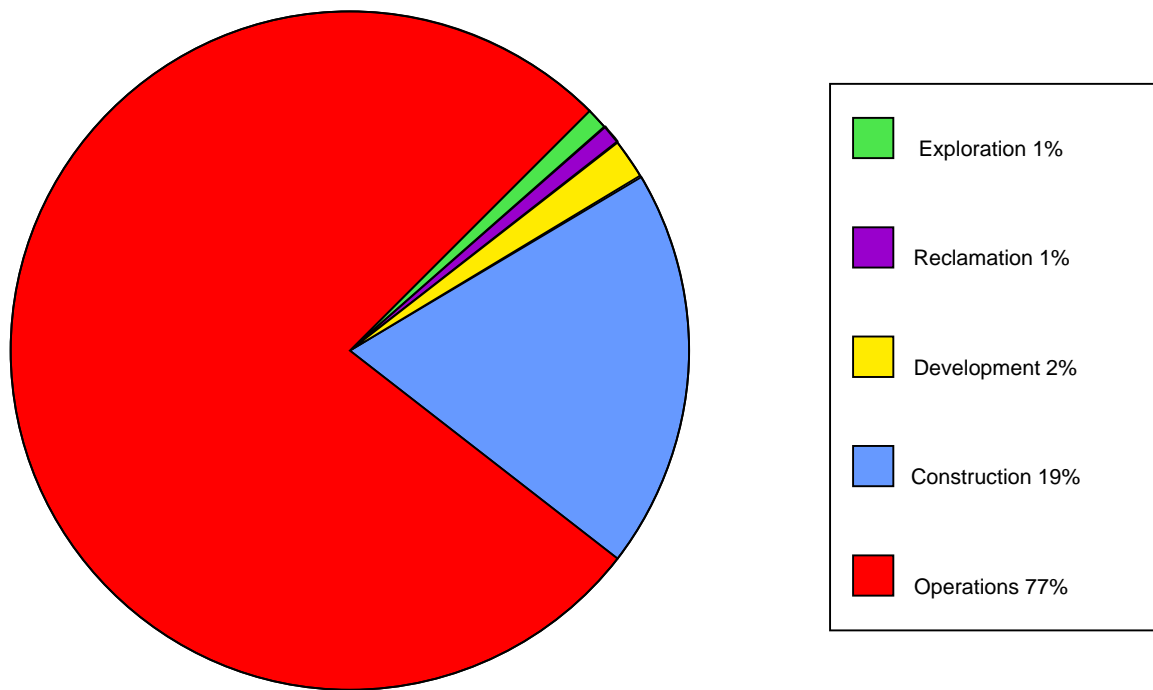
Economic benefits arise from the cash expenditures made during each of these stages. In the context of the total project, the expenditures associated with exploration, development and reclamation are very small (4% total) compared with the expenditures from construction and operations, as shown in the pie chart in [Figure 4.14-1](#). Their impacts cannot be meaningfully separated from the larger items. Therefore, for the purposes of this analysis, benefits associated with exploration and development have been combined with construction, and the benefits associated with reclamation and closure have been combined with operations.

The total economic impact of the NWT Diamonds Project is the sum of direct industry, indirect supplier, and induced consumer spending impacts. In this context, these impacts are broadly defined as follows:

- *Direct impacts* arise from pre-tax income and employment to mine workers. They also include distribution of project profits through royalties and taxes.
- *Indirect impacts* are generated by the supporting industries such as the supply and service sectors (e.g., equipment suppliers).
- *Induced impacts* arise from the recycling of money in the economy. This consists of the expenditure of wage income by mine employees and employees of suppliers on consumer goods and services.

**Table 4.14-1
Economic Impacts Associated with the NWT Diamonds Project**

Activities
exploration development construction mine operations <ul style="list-style-type: none"> • mining • processing mine reclamation/closure
Sources of Impacts
expenditures on <ul style="list-style-type: none"> • labour • fuel • equipment • parts/supplies • contract services
Types of Impacts
employment wages & benefits GDP or value added government revenues <ul style="list-style-type: none"> • fuel taxes • property taxes & surface rights fee • personal income taxes • corporate income taxes • mining taxes/royalties
Distribution of Impacts
the NWT Canada



Total Project Expenditures \$5.6 billion

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**Figure 4.14-1
Distribution of Total Project
Expenditures**

The total impact on the economy from all these effects is commonly quantified by the of Gross Domestic Product (GDP) (Table 4.14-2). The GDP or value added is the sum of the return to labour and the return to capital. The gross return to labour includes wages plus benefits. The gross return to capital includes interest payments, depreciation and before tax profits.

**Table 4.14-2
Impacts on GDP**

Beneficiary Group	Impact Indicator
(1) Labour	Wages plus Benefits
+ (2) <u>Business</u>	<u>Business Surplus</u>
= (3) The Economy	GDP or Value Added

Payments to governments in terms of income taxes, fuel taxes and the like represent a redistribution of the above incomes.

The business surplus component of value-added or GDP at the direct project stage is government tax revenues alone. (This means that direct GDP is direct wages plus those direct government revenues which are not included in the wage bill.) Business surplus also results from secondary purchases from local suppliers, and from the retail spending by project workers.

The total magnitude of impacts depends both on the absolute amount of expenditures, as well as the multiplied effects of these expenditures on the rest of the region. The multiplied effects depend on the economic structure of the region, in particular the import content of purchased goods and services. Imports, as well as taxes and savings, represent a “leakage” from the regional economy (i.e., money spent on imports that is not available for respending within the region).

In the simplest terms, impacts are measured in terms of three main flows: jobs (employment and wages); purchases (both capital and consumables, products and services); and taxes and other revenues paid to the governments.

The economic impacts resulting from the proposed mine construction and operation have been broken down into impacts on the Northwest Territories and Canada as a whole. Included in this analysis is an explicit identification of the anticipated tax revenue flows to the territorial and federal governments

4.14.2 Magnitude of the Project

The NWT Diamonds Project will be one of the largest, if not the largest, industrial operations in the NWT for the next decade. The project is expected to contribute \$2.5 billion to the GDP of the NWT and \$6.2 billion to the GDP of Canada over

the life of the project. A project of this magnitude would have an appreciable impact on many countries around the world, despite being considered a medium-sized mining operation on a world scale.

The expenditures over the life of the NWT Diamonds Project will total an estimated \$5.6 billion (Table 4.14-3). This consists of \$1.2 billion during construction and a total of \$4.4 billion during the 25 years of operation (1994 \$).

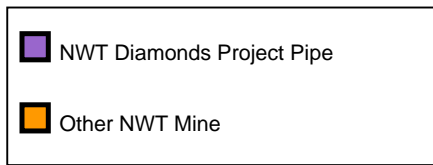
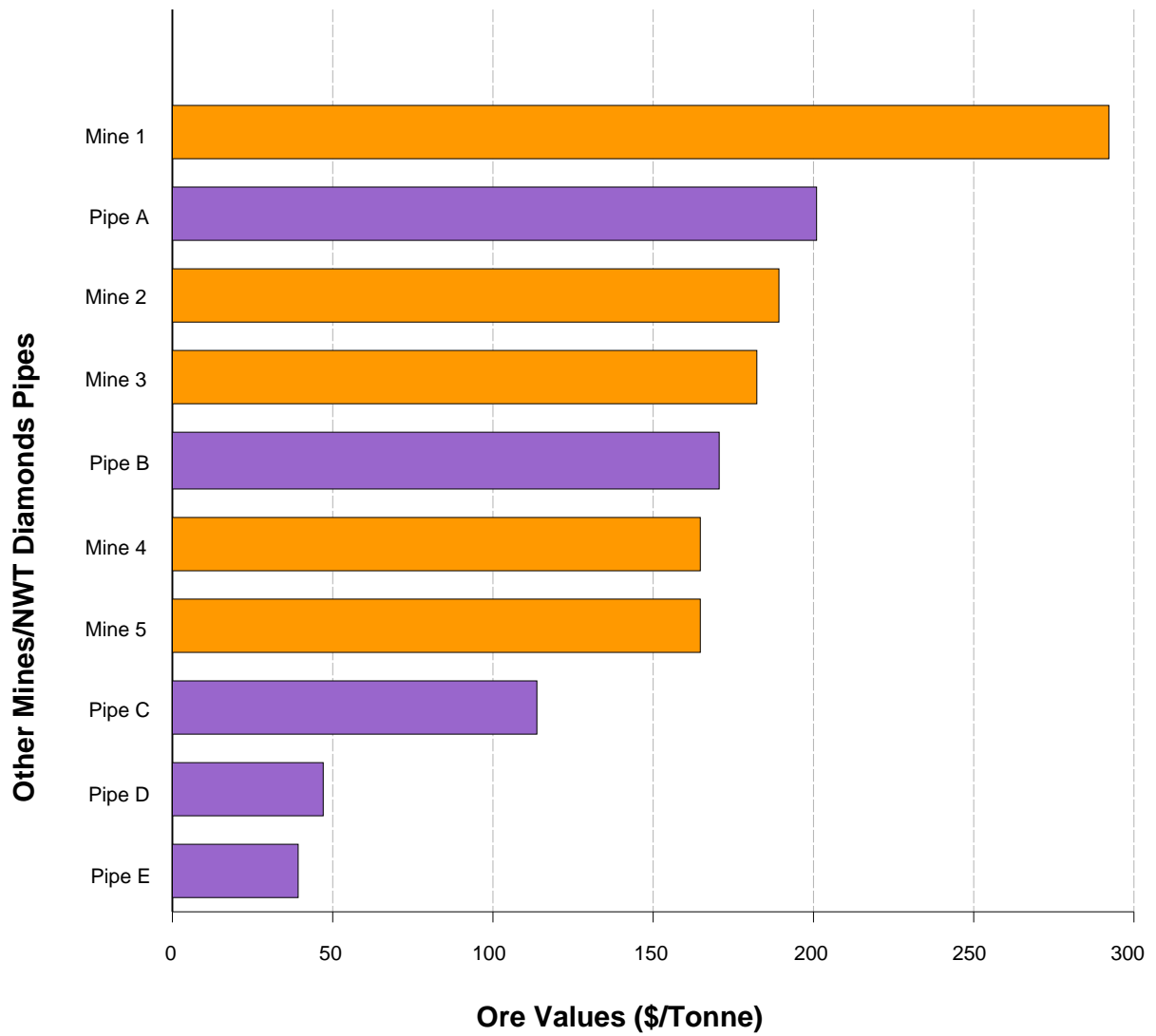
**Table 4.14-3
Expenditures Over the Life of the NWT Diamond Project**

Expenditures (\$ million)	Construction	Operations	Total
Wages	110	1,560	1,670
Goods and Services	<u>1,120</u>	<u>2,810</u>	<u>3,930</u>
Total	1,230	4,370	5,600
Direct Employment (PYs)	1,220	20,800	22,020

The \$3.9 billion in purchases of goods and services includes expenditures on equipment, materials, fuels, contract services, etc. The \$1.7 billion in wages includes payroll burden and benefits. The project does not require any subsidies from the government.

The project will generate significant employment benefits. Employment is measured in person-year equivalents to enable comparisons to other economic sectors and to the total economy. Approximately, 1,200 person-years of employment will be created during the construction phase. The operations phase will provide the bulk of the project employment, 20,800 person-years over the projected 25-year life of the project, or an average of 830 sustainable jobs annually.

The project is expected to generate revenues of between \$400 million and \$500 million per year throughout most of its 25-year life. Contrary to popular perception, the level of revenue is not due to the high intrinsic worth of diamonds. The higher level of revenue is due to the larger scale of the proposed mine versus the other existing operations in the NWT. Despite the very high product value of gem-quality diamonds in dollars/carats, values per tonne of ore mined are not much different from other mines in the NWT due to the large volume of ore that must be processed to extract the diamonds. This point is illustrated in Figure 4.14-2, which shows the estimated value in dollars/tonne of ore for five other mines in the NWT (gold and base metals) and the five proposed diamond pipes that make up the NWT Diamonds Project. Three of the five diamond pipes are expected to provide lower values per tonne of ore than the median for the NWT. The mine with the highest ore value per tonne in the NWT is a base metal operation.



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Figure 4.14-2
Ore Values for NWT Mines

Source: BHP/Dia Met Press Releases through February 1995 Canadian Mines Handbook/Annual Reports

4.14.3 Regional Sourcing of Expenditures

Having identified the magnitude of the project, it is important to discuss the distribution of benefits that accrue to local residents compared to the benefits that flow to Canadians outside of the NWT. These benefits take the form of employment and wages and supplier purchases.

The project will have a preferential Northern hiring policy. NWT residents with the requisite skills will have preferential hiring. Nevertheless, many jobs will need to be filled by other Canadians since much of the NWT labour force does not have the specific professional and technical skills that the project work force requires. Some of these other Canadians gaining long-term operations jobs at the mine site will choose to relocate to the NWT (so called “in-migrants”). Others will maintain a permanent residence outside of the NWT.

Based on a careful assessment of job descriptions and available skill levels of the NWT labour force, estimates have been made on the regional sourcing of labour for the project (Volume IV, Section 4.3).

The project will provide 1,218 person-years of employment during its construction phase and an average of 830 per year during operations Table 4.14-4. It is estimated that one in three construction and two in three operations workers will come from the NWT. The NWT wage bill will amount to \$32 million during construction and an average of \$39 million per year during operations (1994 \$). A more detailed assessment of employment wages associated with the project is given in Tables 4.14-5 and 4.14-6. Table 4.14-6 presents two operations scenarios: a 9,000 tonne per day operation expected by year 2000 and an 18,000 tonne per day operation projected for the year 2007.

The project is expected to have a very positive employment impact on the NWT, which currently suffers from the highest unemployment in the country. The overall unemployment rate for the NWT in 1994 was estimated at 17% (Table 4.14-7). The project is expected to reduce the overall unemployment rate in the NWT by 1.4 percentage points during the construction phase and by 3.0 percentage points during the operations phase. The impact on unemployment in the local Aboriginal communities is expected to be more significant. Hiring by the project could reduce unemployment rates in local Aboriginal communities from almost 40% to less than 30%. The actual impact on unemployment will depend in part on the interest and commitment of the different communities. The mining industry, which is the largest private sector in the NWT economy, employs approximately 1,800 people. Assuming no change in employment for other NWT mines, the addition of 830 jobs for the project during the operations phase is expected to increase the total mining industry employment in the NWT by almost 50% (Figure 4.14-3).

**Table 4.14-4
Employment and Wages During Mine Construction and Operation**

Employment (Person Years)	Construction^a	Operations per Year^b
NWT Residents	403	560
Other Canadians	<u>815</u>	<u>272</u>
All Canadians	1,218	832
Wages and Benefits (\$ millions)		
NWT Residents	32.1	39.2
Other Canadians	<u>75.7</u>	<u>23.2</u>
All Canadians	107.8	62.4

- a. Both the initial construction phase plus the expansion to underground mining.
- b. Averages over the 25 years. Employment and wages will be lower than this for the 9,000 tonnes/day production level and greater than this for the 18,000 tonnes/day production scenario.

**Table 4.14-5
Northern Employment and Wages During Mine Construction Periods**

Employment by Residence	Period to 1998	Period 1999 to 2022^a	Total
NWT Residents	330	73	403
Other Canadians	<u>677</u>	<u>138</u>	<u>815</u>
Total	1,007	211	1,218
Wages and Benefits \$000^b			
NWT Residents	26,300	5,800	32,100
Other Canadians	<u>62,400</u>	<u>13,300</u>	<u>75,700</u>
Total	88,700	19,100	107,800

- a. Additional construction activity occurs during the expansion to underground mining.
- b. Includes payroll burden (26%) plus contingency (10%).

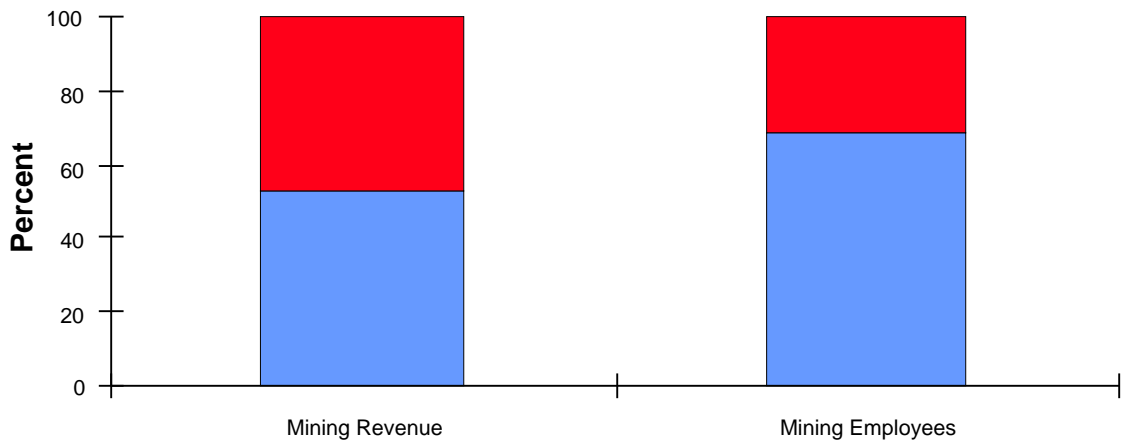
Table 4.14-6
Northern Employment and Wages During Mining Operations

Employment by Skill Level	Year 2000					Year 2007				
	NWT Residents		Other Canadian Residents	Total ^a	%NWT	NWT Residents		Other Canadian Residents	Total ^a	% NWT
	Existing	In-Migrants				Existing	In-Migrants			
Professional/Highly Skilled	12	23	30	65	54	18	27	28	73	62
Skilled	82	56	210	348	40	154	96	218	468	53
Semi-skilled/Unskilled	209	16	26	251	90	343	16	32	391	92
Total	303	95	266	664^a	60	515	139	278	932^b	70
Wages & Benefits (\$000)^c	19,600	7,700	22,700	50,000	55	35,300	10,900	23,400	69,600	66

a. Includes 28 off-site jobs in the rest of Canada with a wage plus benefits bill of \$2.3 million (off-site sorting and off-site management).

b. Includes 40 off-site jobs in the rest of Canada with a wage plus benefits bill of \$3.0 million (off-site sorting and off-site management).

c. Includes payroll burden (26%) plus contingency (10%)



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**Figure 4.14-3
Contribution of
Project to NWT Mining**

**Table 4.14-7
NWT Diamonds Project
Potential Reduction in NWT Unemployment
Construction & Operations**

Communities	Current Rate Unemployment (1994)	Potential Reduction in Unemployment Rate as a Result of Employment Generated by the NWT Diamonds Project
Construction		
Yellowknife	7%	2%
Hay River	16%	6%
First Nations	39%	5%
Coppermine	31%	6%
Total NWT	17%	1.4%
Operations Year 2000		
Yellowknife	7%	3%
Hay River	16%	10%
First Nations	39%	11%
Coppermine	31%	11%
Total NWT	17%	3%

In 1994, the total value of mineral production in the eight producing mines in the NWT was \$500 million. Assuming the production from other mines in the NWT remains roughly constant, at full production the NWT Diamonds Project is expected to double NWT revenues from mining.

As an additional important but less quantifiable benefit, the project will provide training and skill development for many NWT employees, in particular Aboriginal people, and create a pool of skilled workers for other industrial developments. A certification program is planned that will enable workers to document their newly acquired skills (Volume 1, Section 2.10).

The project will make substantial purchases from suppliers in the NWT and the rest of Canada. The distribution of purchases for the project (where purchase location is defined as the supplier address on the purchase order) has been projected as follows (Table 4.14-8):

Expenditures in the NWT will amount to an estimated \$310 million during construction and total \$1,940 million during operations. The higher Northern content for the operations phase, 69% versus 29% in the construction phase, is due to the fact that the construction phase requires machinery and equipment

**Table 4.14-8
Distribution of Project Purchases**

	Supplier Purchases (\$ million 1994)			
	Construction		Total Operations	
NWT	310	28%	1,940	69%
Rest of Canada	630	56%	380	14%
Rest of World	<u>180</u>	16%	<u>490</u>	17%
Total	1,120		2,810	

imported from the south, while the operations phase requires significant volumes of consumables available in the NWT. Table 4.14-9 displays the expected level of operations purchases and the Proponent's best estimate of source by region for the year 2000, the first year of full-scale open pit mining, and for the year 2007, when the maximum production level is reached.

NWT suppliers have the potential to benefit substantially from project expenditures, particularly during the expected 25-year operational phase of mine life.

The percent value of NWT purchases for current mines operating in the NWT ranges from 60% to less than 10%. Those mines with high spending in the NWT are primarily gold mines, whereas those with low spending in the NWT are base metals mines with treatment and refining costs. The 69% local NWT share of operation purchases expected for the NWT Diamonds Project is much higher than the average 26% local NWT share for existing mines in the NWT, as evaluated by Avery, Cooper & Co. (1994). The higher percentage of Northern content is largely due to the nature of diamond mining, which does not require smelting or refining operations outside of the NWT

The Northern content of the NWT Diamonds Project is of the same order as large gold mining operations. The NWT Diamonds Project should still be higher in this regard (9%) than gold mines, principally due to the reduced need for imported processing reagents.

4.14.4 Government Revenues and Costs

The taxation structures assumed by the Proponent in deriving estimates of the amounts payable to the federal and territorial governments takes into account four components:

**Table 4.14-9
Mining Operating Costs by Region of Spending (\$000)**

	Year 2000					Year 2007				
	NWT	Rest of Canada	Other	Total	%NWT	NWT	Rest of Canada	Other	Total	%NWT
Supplies										
Fuel exc. Fuel Tax	15,118	278	0	15,396	98	23,209	273	0	23,482	99
Fuel Tax	3,227	1,223	0	4,460	72	4,158	1,329	0	5,487	76
Lubricants	1,147	680	0	1,827	63	1,270	889	0	2,159	59
Consumables	898	0	0	898	100	1,856	0	0	1,856	100
Ammonium Nitrate	3,116	0	0	3,116	100	3,018	0	0	3,018	100
Blasting Accessories	1,825	0	0	1,825	100	1,768	0	0	1,768	100
Mine Supplies	15,367	3,918	0	19,285	80	18,676	4,148	0	22,824	82
Plant Parts/Supplies	378	1,514	5,676	7,568	5	812	3,247	12,176	16,235	5
Other Supplies	652	0	0	652	100	652	0	0	652	100
Subtotal	41,728	7,623	5,676	55,027	76	55,419	9,886	12,176	77,481	72
Transportation/Freight										
Air Transport	3,577	0	0	3,577	100	4,531	0	0	4,531	100
Fuel Freight	6,916	0	0	6,916	100	10,556	0	0	10,556	100
Blasting Freight	2,665	0	0	2,665	100	2,582	0	0	2,582	100
Subtotal	13,158	0	0	13,158	100	17,669	0	0	17,669	100

(continued)

Table 4.14-9 (completed)
Mining Operating Costs by Region of Spending (\$000)

	Year 2000					Year 2007				
	NWT	Rest of Canada	Other	Total	%NWT	NWT	Rest of Canada	Other	Total	%NWT
Services										
Contract Blasting	1,000	1,792	0	2,792	36	968	1,736	0	2,704	36
Temp Labour Services	297	0	0	297	100	297	0	0	297	100
Camp Catering	3,604	0	0	3,604	100	4,584	0	0	4,584	100
Camp Maintenance	508	0	0	508	100	550	0	0	550	100
Professional	210	1,495	0	1,705	12	210	1,495	0	1,705	12
Insurance	0	0	1,841	1,841	0	0	0	2,328	2,328	0
Other Services	0	958	5,903	6,861	0	0	1,104	6,868	7,972	0
Subtotal	5,619	4,245	7,744	17,608	32	6,609	4,335	9,196	20,140	33
Direct Government Payments										
Property Tax	550	0	0	550	100	660	0	0	660	100
Surface Rights Fee	0	968	0	968	0	0	968	0	968	0
Subtotal	550	968	0	1,518	36	660	968	0	1,628	41
Total	61,055	12,836	13,420	87,311	70	80,357	15,189	21,372	116,918	69

- NWT Mining Tax (paid to the federal government and then transferred to the NWT) of approximately 12%
- federal income tax including surface mining tax, based on resource profits with allowances made for resource depletion, which comes to approximately 28% to 29%
- territorial income tax of around 14%
- taxable dividends paid by the Canadian venture partners.

The taxable income of the project allows deductions for depreciation, resource allowance, exploration expenditure and development costs. These calculations also assume that the project can be treated as five separate mines for tax purposes. The net result, as laid out in [Table 4.14-10](#), is a total of \$2.4 billion (including personal income taxes) in revenues directed to federal and territorial governments over the construction and 25-year operating life of the project – effectively an average of nearly \$100 million per year contributed directly to Canadian governments. This income will be a large multiple of any investment these governments will have to make (on behalf of Canadian taxpayers) in expanding physical and social infrastructure to accommodate the project.

These tax revenues to the territorial and federal governments come at a time when governments are striving to balance their budgets. The revenue from the NWT Diamonds Project will assist the federal governments in their deficit reduction exercise and will be critical to the NWT government as it strives to develop a viable economy that is less reliant on federal subsidies over the coming decade.

There are potential costs in infrastructure and public services to be borne by the community to support people moving to the NWT as a result of the project. These costs are small compared to the expected benefits. The cost to the government (federal and territorial) is estimated as the variable cost component of government services associated with the moving of people to the NWT as a result of the project. These variable costs include expenditures associated with schools, health services, regulatory personnel and funding for social agencies. Based on an estimated project-generated population growth of 1,000 people, the additional cost to governments is estimated at \$14 million per year. Offsetting these costs, the increased employment generated by the project will lessen the social assistance burden upon government by approximately \$3 million per year. The net cost to governments is approximately \$11 million annually. Taking the GDP as a measure of the economic benefit, for every \$1 of economic benefit accrued by Canada for the project, the federal and territorial governments will together have net costs of less than \$0.05.

Table 4.14-10
Direct Economic Impacts of the NWT Diamonds Project

	NWT Impacts (\$ millions)			Canada Impacts ^c (\$ millions)		
	Construction	Operations ^d	Project Total	Construction	Operations ^d	Project Total
Direct Industry Impacts						
Employment (person years)	400	14,000	14,400	1,220	20,800	22,020
Wages and Benefits	30	980	1,010	110	1,560	1,670
Purchases Goods & Services	310	1,940	2,250	940	2,320	3,260
Gov't Direct Tax Revenues						
Fuel Tax	2	97	99	2	130	132
Property Tax	1	17	18	1	17	18
Surface Rights Fees	0	0	0	2	24	26
Corporate Income Tax	0	369	369	0	1,137	1,137
Large Corporation Tax	0	0	0	0	5	5
Mining Tax/Royalties	0	0	0	0	307	307
Dividend Withholding Tax	0	0	0	0	169	169
Personal Income Tax	2	71	73	27 ^a	381 ^b	408
Payroll Tax	1	5	6	1	5	6
UI Premium	0	0	0	6	70	76
CPP Premium	0	0	0	3	38	41
WCB Premium	8	54	62	8	54	62
Total	14	613	627	50	2,337	2,387

- a. Includes \$7 million in personal income tax payable to provincial governments.
b. Includes \$49 million in personal income tax payable to provincial governments.
c. Includes impacts to the NWT.
d. Total operations impacts over 25 years.

4.14.5 Downstream Impacts

Direct benefits to the NWT and Canada as a whole are illustrated in [Figure 4.14-4](#).

The total beneficial impacts of the NWT Diamonds Project (direct plus indirect plus induced) are more than twice as great as the direct benefits alone. Details are presented in [Table 4.14-11](#). In summary, it is projected that, over the construction and 25-year operations life of the project, the total benefits and the direct benefits to the NWT are as follows:

	NWT Direct	NWT Total
• person years of employment:	14,400	30,180
• wages and benefits (\$ millions):	\$1,010	\$1,740
• GDP (\$ millions):	\$1,495	\$2,480

On the same basis, Canada as a whole will receive:

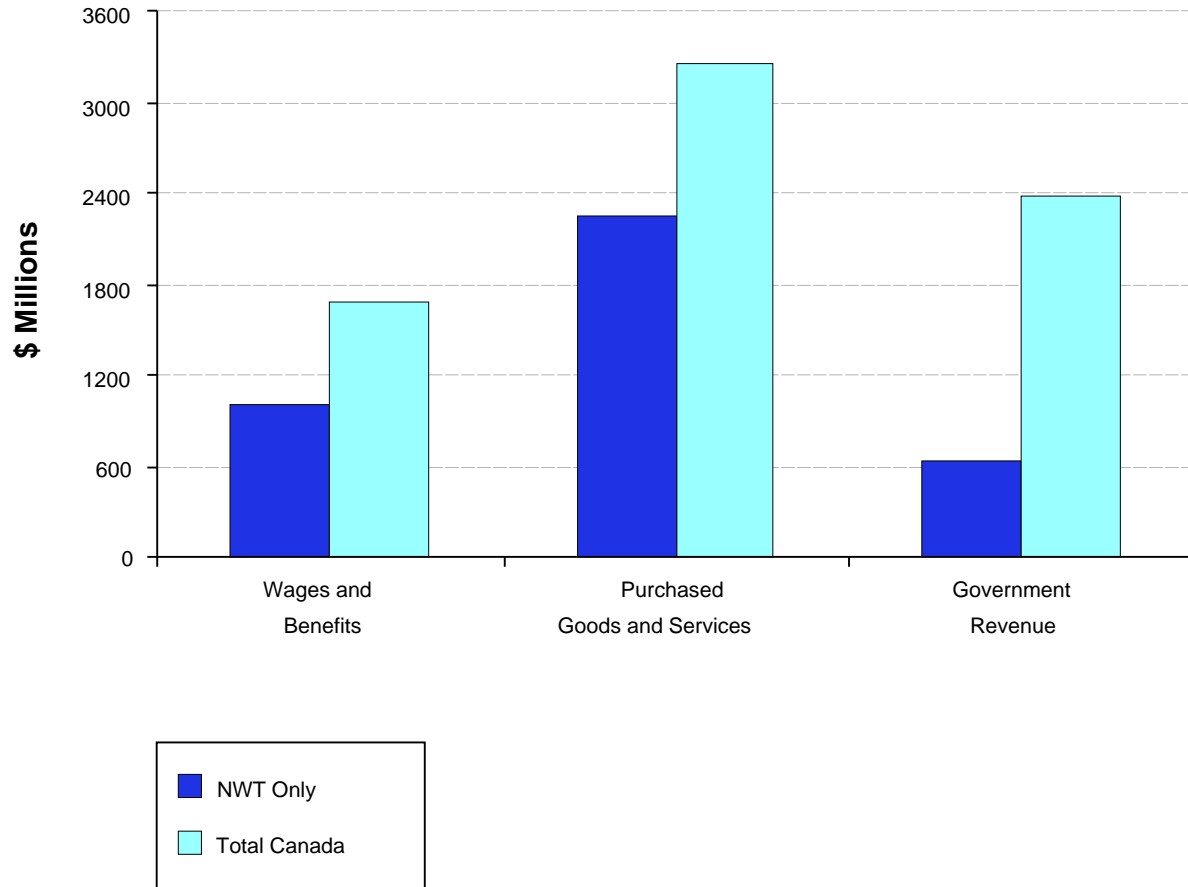
	Canada Direct	Canada Total
• person years of employment:	22,020	69,840
• wages and benefits (\$ millions):	\$1,670	\$3,600
• GDP (\$ millions):	\$3,460	\$6,230

The total impacts to Canada are substantially greater than those to the NWT alone. Clearly, all of Canada has an important stake in the project and will participate in its benefits.

4.14.5.1 Strategic Role of the Project for the NWT and Canada

Importance to the NWT Economy

The NWT Diamonds Project is a major business undertaking and once operational will generate more employment and a higher wage bill than any other Northern business. The project will generate an average of 830 sustainable jobs annually during the 25-year operations phase. Two out of every three employees are likely to be residents of the North, and more than half of the Northern employees are expected to be Aboriginal people. The Proponent's training programs will develop a large pool of skilled workers in the NWT. The project will also make substantial purchases from suppliers in the NWT and the rest of Canada. During operations, approximately 70% of every purchase dollar for the project is expected to be spent in the North. For many supplying industries and companies



**NWT
DIAMONDS
PROJECT**

**Figure 4.14-4
Direct Impacts of
the Project**

**Table 4.14-11
Direct and Total Impacts of the NWT Diamonds Project**

	NWT Impacts		Canada Impacts ^a	
	Direct	Total ^b	Direct	Total ^b
	(\$ millions)		(\$ millions)	
Construction^c				
Employment (person-years)	400	1,880	1,220	9,140
Wages and Benefits	30	100	110	450
GDP or Value-Added	35	130	110	560
Purchases Goods & Services	310	N/A	940	N/A
Operations (25 Year Total)				
Employment (person-years)	14,000	28,300	20,800	60,700
Wages and Benefits	980	1,640	1,560	3,150
GDP or Value-Added	1,460	2,350	3,350	5,670
Purchases Goods & Services	1,940	N/A	2,320	N/A
Construction plus Operations				
Employment (person-years)	14,400	30,180	22,020	69,840
Wages and Benefits	1,010	1,740	1,670	3,600
GDP or Value-Added	1,495	2,480	3,460	6,230
Purchases Goods & Services	2,250	N/A	3,260	N/A

a. Canada impacts include NWT impacts.

b. Total impacts are the sum of direct, indirect supplier and induced consumer spending impacts.

c. Includes both initial construction plus the post year 2000 expansion

Note: Figures are rounded.

in the NWT, this project will become their largest customer. The Proponent's hiring policies and employment benefits will be particularly significant for local Aboriginal communities.

Importance to the Mining Industry

In the period from 1988 to 1991 Canada fell from first to fourth among nations attracting exploration investment, and even Canadian mining companies reduced exploration expenditure in their home country from 81% (in 1987) to around 60%. A total of 44 Canadian mines closed permanently or temporarily during 1992 and 1993, with only 24 opening to take their place. Over the same two year period, Canada's mining industry lost a total of 6,450 jobs. This was the fourth straight year in which employment for the industry fell (statistics from the Mining Association of Canada).

Until recently, the mining industry in the NWT had been described as being "mature." Existing major mines in the NWT are facing depletion of their reserves

by the year 2000 and no major new mines have been announced. The “diamond rush” has come at a beneficial time for the NWT mining industry. With the announcement of the discovery of diamonds in 1991, exploration in the NWT has boomed, with a large number of high profile international mining companies including BHP, Anglo-American (from South Africa) and RTZ (of the U.K.) bringing investment and skills. Smaller exploration and mining companies have competed effectively with these majors and claims have been made on 21 million hectares of the NWT by over 200 companies (Figure 4.14-5). The search for mineral wealth in the NWT has spread from diamonds to other minerals. Exploration investment in 1994 exceeded over \$150 million, the highest yet for the NWT, and the NWT has become one of the more exciting prospect areas of the world.

The problems faced by the mining industry have not gone away, but the emergence of a major new mine and the renewed confidence in Canada shown by international investors such as BHP gives optimism to the industry.

Broadening of the Industrial Spectrum

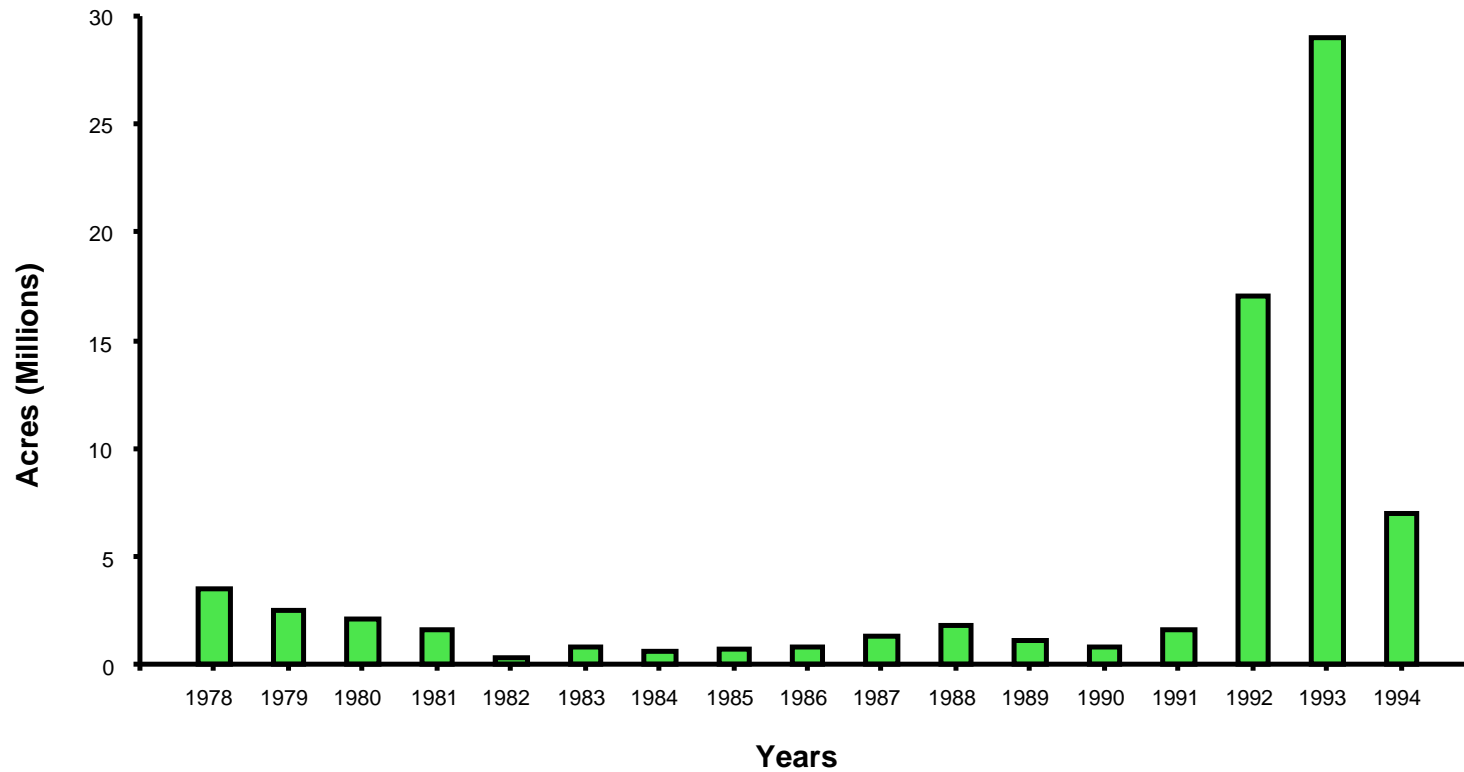
This will be the first major diamond mine in North America. As a new industry, the mine will have relatively long “coat-tail” effects on the business community. New skills will be required, which may be transferable to other industries seeking to establish in the NWT. It is expected that new businesses will set up in the NWT and existing NWT companies will expand and hire more workers to service the mine. Some of these potential business opportunities represent economic impacts beyond those analyzed in this report.

Importance to Canada

The NWT Diamond Project will generate significant tax revenues to both the territorial and federal governments at a time when governments are striving to balance their budgets. The income from the project is estimated to be many times greater than government expenditures related to any expansion of physical and social infrastructure to accommodate the project. For every \$1 of economic benefit accrued by Canada from the project, the federal and territorial governments will together have net costs of less than \$0.05. Furthermore, the diamond business is a new export-based business and as such the project will earn a significant amount of foreign exchange.

Contribution to the Conduct and Perception of Mining

The NWT Diamonds Project approach gives priority to Aboriginal and Northern hiring and procurement. It involves the Aboriginal communities at an early stage in the project design. This approach can serve as a model for other resource development projects in the North.



**NWT
DIAMONDS
PROJECT**

**Figure 4.14-5
Staking Acreage in the NWT**

The NWT and the rest of Canada are therefore significant beneficiaries in a number of dimensions, both tangible and intangible, from this project.

4.15 Archaeological Impacts

Historic sites and burial grounds are considered to be sacred by Aboriginal communities. Furthermore, the cultural information provided by the sites is also of great interest to archaeologists, anthropologists and the general public. The Proponent has conducted a survey to identify archaeological sites in the NWT Diamonds Project area. Wherever possible, these sites are then avoided.

The impacts that could cause the most disturbance to archaeological sites and resources would be those related to road construction. The removal of esker deposits for gravel materials could disturb or destroy archaeological sites unless appropriate mitigation measures are undertaken. The removal of esker deposits at archaeological sites would cause permanent damage, as it is impossible to rehabilitate the archaeological structure of a site once it has been disturbed. Unless site mitigation through surface collection and/or excavation is undertaken, site disruption would result in a complete loss of cultural information.

A heritage assessment was conducted in 1993 for the bulk sampling portion of the exploration phase of project development. The project site was evaluated by a GNWT archaeologist from the Department of Education, Culture and Employment, in accordance with “Guidelines for Developers for the Protection of Archaeological Resources in the Northwest Territories.” Particular attention was given to esker crossings and lake shores. The esker adjacent to the exploration camp and the Fox Lake access road was given clearance for quarrying.

The archaeological survey conducted for the NWT Diamonds Project was the first detailed archaeological investigation conducted in this area. Treaty 11 and Treaty 8 communities have been kept informed of the archaeological studies. Community meetings and visits to the site with elders have provided useful information regarding the identification and the cultural significance of certain land sites.

Six survey areas in the main exploration and development areas were assessed for archaeological significance. As there are no NWT guidelines regarding the determination of the archaeological sites, archaeological significance was defined according to British Columbia guidelines, with ratings of low, moderate or high significance. Archaeological field research in the survey area identified 50 sites with varying degrees of significance.

Three sites were judged to be of high archaeological significance, representing repeatedly visited camping locations. Two sites of moderate archaeological significance represented moderately high yields of artifacts, one being a possible quarry/lithic workshop and the other a site with significant buried deposits. Most

sites were assigned low-moderate or low significance. No archaeological sites were identified in the vicinity of Koala Camp, which is the main area to be affected by development.

There has been minimal archaeological disturbance during the exploration phase of the NWT Diamonds Project. The establishment of Falcon Camp and the levelling of an esker to erect a wind sock disturbed one archaeological site due to the removal of topsoil. This site had been assessed as being of low archaeological significance. Therefore, detailed recording of the archaeological site is considered to be sufficient mitigation.

Sites discovered during the inventory were recorded in detail using the Archaeological Survey of Canada site entry forms. Detailed maps of the sites were drawn and photographs were taken for future visual reference. The data collected have made a contribution to the understanding of archaeological resources in this region of the Northwest Territories.

As archaeological sites have been identified as a valued ecosystem component, great care has been and will be taken to avoid disturbing these sites in any manner. Future exploration and development will endeavour to incorporate archaeological surveys and resulting recommendations. Communities and the Prince of Wales Northern Heritage Centre will be consulted with respect to any field work and findings.

4.15.1 Mitigation

Generally, there are only a few options available for mitigation of archaeological disturbance. Avoidance is the most preferable means of preventing damage. The current plan of development avoids all known and identified “significant” archaeological sites. When this is not considered feasible, systematic data recovery should be done at all sites with moderate or greater archaeological significance. Threatened artifacts can be collected and unthreatened artifacts may be left *in situ*. The recording of information is judged to be appropriate mitigation at sites of low significance. Unsystematic collection of artifacts by project personnel, contractors and visitors within the project area will be discouraged.

4.15.2 Residual Effects

As long as archaeological sites are avoided, there should be no direct impacts to archaeological resources during construction, operation, decommissioning and post-decommissioning periods. The low probability of site disturbance if archaeological sites are identified and avoided prior to the removal of esker materials means that existing archaeological sites should continue to provide cultural information to future generations. Since mitigation measures are capable of reducing the significance of the impact, residual impacts are evaluated as being negligible.