

MINTO

EXPLORATIONS LTD.

MINTO PROJECT

CUMULATIVE EFFECTS ASSESSMENT

Prepared for Minto Explorations Ltd.

by:



Access Mining Consultants Ltd.

July, 1999

Table of Contents

1.0 Introduction	1
1.1 Approach	3
1.2 Scope	6
2.0 Project Setting and Description	9
2.1 Project Setting	9
2.2 Project Description	9
3.0 Cumulative Effects Assessment	12
3.1 Valued Ecosystem and Cultural Components	13
3.2 VECC Project Effects	17
3.3 Other Projects & Activities	20
3.4 Regional Issues	23
3.5 Effects and Significance Assessment	24
4.0 Cumulative Effects Conclusions	31
5.0 References	32

List of Tables

Table 1 Minto Project Study Area and Setting Summary	11
Table 2 Selected Valued Ecosystem and Cultural Components (VECC's)	15
Table 3 Possible Project Effects on VECC's and their Mitigation	18
Table 4 List of Previous, Current and Potential Projects or Activities in the Assessment Study Area	21
Table 5 Significance Ranking Definitions	25
Table 6 VECC Project Effects Assessment and Significance Ranking	26
Table 7 VECC's and Other Activities Effects Significance Ranking	28
Table 8 Cumulative Environmental Effects Summary	30

List of Figures

Figure 1 Minto Project Location Map	2
Figure 2 Cumulative Effects Study Area	8

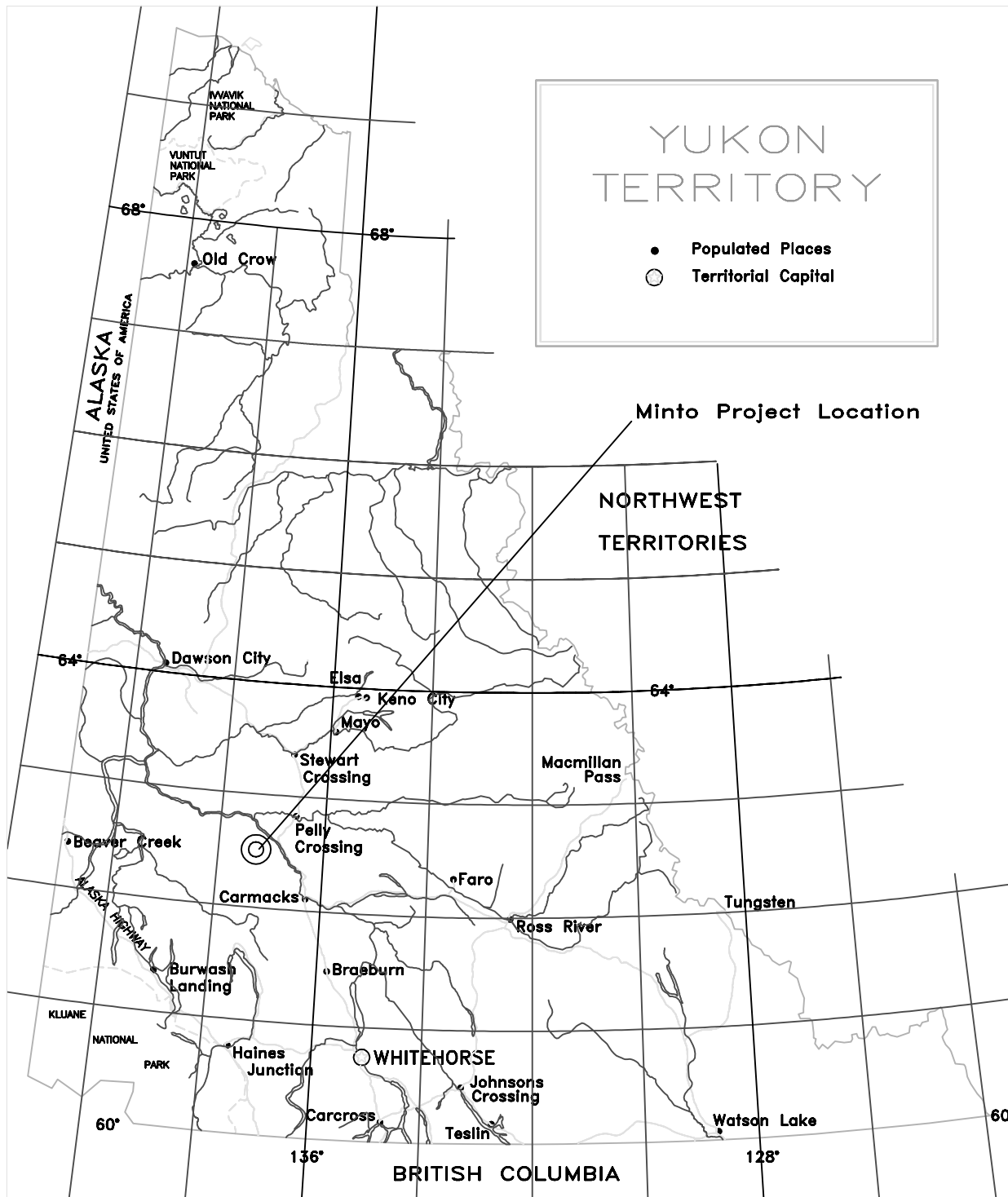
1.0 INTRODUCTION

This Cumulative Effects Assessment (“CEA”) for the Minto Project has been completed in support of Minto Explorations Ltd.’s (“Minto”) Mine Production Licence Application. Figure 1 provides a general location map for the Minto Project.

Recent amendment of the *Yukon Quartz Mining Act* (“YQMA”), Section 139 (1), requires a Mine Production Licence for the Minto Operations. The requirement for a Production Licence became effective June 16, 1999. At present, there are no regulations available concerning Production Licensing; however, DIAND has produced a Draft Interim Policy Framework for Mine Production Licences (DIAND, January 1999), which provides policy direction and Production Licence application requirements. Of particular importance is the policy relating to projects that were previously screened under the Environmental Assessment Review Process Guidelines Order (“EARPGO”), such as the Minto Project. This policy notes that production licensing for projects screened under EARPGO may be based on the previous screening, but completion of a CEA may be required.

CEA’s are required for every environmental assessment conducted under the *Canadian Environmental Assessment Act* (“CEAA”), subsection 16(1). The initial EARPGO Level II screening report (DIAND and RERC) completed for the Minto Project did not explicitly consider cumulative effects, although the subsequent Land Use Application (#YA5F045) and Type B Water Licence Application (#MS95-013), triggered a joint Level I Screening under the CEAA which did consider cumulative effects for the project access road, Big Creek bridge crossing, and barge landings.

Based on DIAND’s draft Interim Policy Framework, Minto was instructed to prepare a CEA in support of a Mine Production Licence Application. This document presents a CEA for the Minto Project, prepared in accordance with guidelines provided by the CEAA Agency and DIAND, Yukon Region.



0 100 200 300
KILOMETRES

Lambert Conformal Conic Projection
with Standard Parallels at 49°N and 77°N

Minto Explorations Ltd.

Minto Project Location
General Location Map

ACCESS MINING CONSULTANTS LTD.

SCALE: 1 : 6 000 000

FILE: 224-6

DATE: 31/05/96

DRAWN:

DWG:

FIGURE: 1

1.1 APPROACH

The Minto Project ("the Project") was previously screened under the EARPGO for the mining and milling operations, and a positive determination was reached under Section 12 (c):

" the potentially adverse environmental effects that may be caused by the proposal are insignificant or mitigable with known technology, in which case the proposal may proceed or proceed with mitigation, as the case may be."

A Water Use Licence (QZ96-006) was subsequently issued for the Project under the *Yukon Waters Act* ("YWA") in January 1998 and signed by the Minister of DIAND on April 28, 1998. In 1998, the construction of the mill footings, employee camp, and grout curtains for the tailings/water dam were also completed.

In October 1995, Minto submitted a Land Use Permit application and a Type B Water Licence Application for the following project components:

- Site access road construction;
- Big Creek bridge crossing;
- Minto Creek culvert crossing;
- Barge landings;
- Yukon River ice bridge;
- Construction Campsite;
- Quarry sites.

The CEAA Level I Integrated Screening was completed in August 1996, with subsequent approvals for the Land Use Permit and Water Use Licence. Construction of the site access and bridge crossing were initiated in the fall of 1996 and completed in the spring of 1998.

The focus of this CEA has been on the mining and milling operations and EARPGO screening for the Type A Water Use Licence. The previous *CEAA* screening has been utilized where possible.

Pursuant to the mitigation measures recommended in the EARPGO screening reports *and* required by the water licences, Minto Explorations Ltd. has complied with, or is in the process of, appropriate compliance. There have been no changes to the Project since the EARPGO screening, and positive 12(c) determination for the mine or the *CEAA* screening for the access road was completed. The significance of any subsequent changes to the project or amendments to current licences and permits will be screened under the *CEAA*.

As this Project has previously undergone environmental review, the following approach was taken towards completion of the CEA for the Minto Operation:

- *CEAA* Guidelines and Other CEA Reviews:

CEAA Agency and DIAND's Reference Guides and other reference material were reviewed. (FEARO, Sept. 1994a, FEARO, Sept. 1994b, DIAND 1997, *CEAA* 1996) This also included a review of CEA's for various other mine projects screenings or activities (*CEAA* Comprehensive Study Report, Dublin Gulch Project; *CEAA* Screening, Kudz Ze Kayah Project; and Viceroy Minerals Corporation, Cumulative Effects Assessment, Access Consulting Group, 1999).

- Minto Project Review:

All relevant existing Project information on the Minto Project was reviewed and assessed. This included the Minto Project Initial Environmental Evaluation (IEE), Water Licence Application and Licence, EARPGO and *CEAA* screening reports, various licence submissions and other pertinent information sources or reports. A listing of Project documentation that was reviewed for this CEA is included in Section 5. Based on discussions with Minto management, they confirm that there have been no changes to the Project.

- Other Projects or Activities Review:

Other possible activities or projects as defined by CEAA and located within the study area were identified. Minto personnel, study area stakeholders, interested citizens, various government agencies and boards, and Selkirk First Nation personnel were consulted as part of this review. Resource inventory maps for mineral claims and land use activities were also obtained. Pertinent information was reviewed to compile a list of other possible activities or projects within the CEA study area.

- Cumulative Environmental Effects Assessment:

Following stated DIAND CEA guidelines, a systematic assessment of possible cumulative effects was undertaken. The scope for the assessment was established and geographic and temporal boundaries were defined. The valued ecosystem and cultural components were identified, based on information derived from the EARPGO screenings, and environmental effects from the Project's activities were examined. Possible cumulative effects on valued ecosystem components were noted. The environmental effects of other activities on valued resources within the study area were identified, and these effects were considered in combination with the Project effects. Mitigation measures from previous screenings and licence terms and conditions were considered and the significance of the possible cumulative effects evaluated. Best professional judgement, subjective valuation, and risk assessment were used to determine the appropriateness and significance of issues. Throughout the review, previous information, assessments and mitigation measures were used as part of the assessment.

The following sections of this report provide a scope for the CEA, a summary of the Project conditions, and a detailed discussion of the CEA.

1.2 SCOPE

The following exercise was undertaken to establish the scope for the CEA:

- Project Scope:

The principal Project is the mining and processing of ores associated with the Minto operation ("the Project"). This includes all the physical works or activities associated with the construction, operation and decommissioning of the open pit mine, processing facilities and exploration activities within the Project claim block. Other project components include the physical activities and works associated with upgrading and operation of the access road and watercourse crossings for the project.

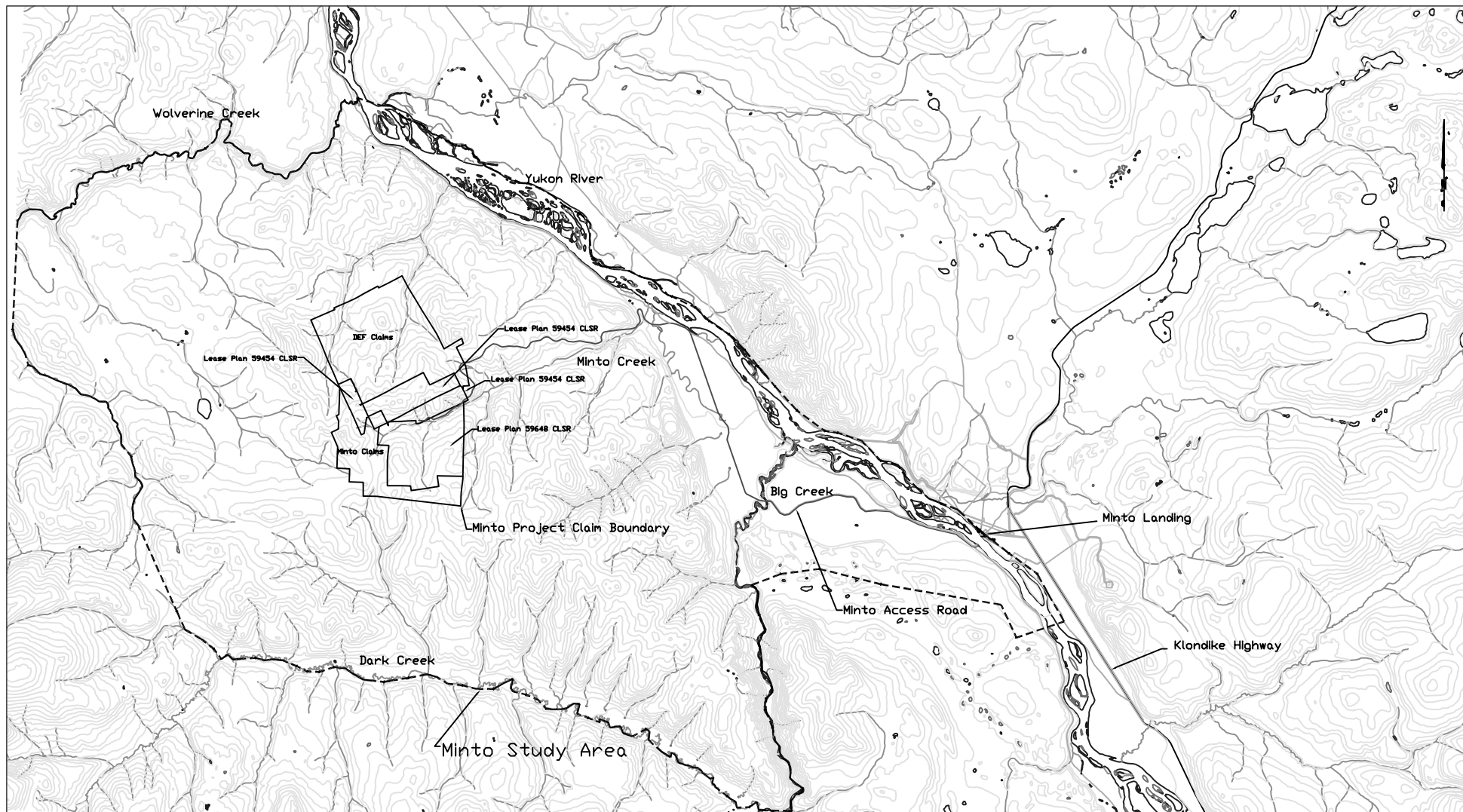
- Assessment Scope

The scope of this assessment is the cumulative environmental effects that are likely to result from the Project itself, considered in combination with other activities' environmental effects that have been or are likely to be carried out. The significance of the cumulative environmental effects has been determined following stated DIAND and CEAA Agency guidelines. Previous EARPGO and CEAA screenings were also used to assist with the cumulative environmental effects assessment.






- Spatial and Temporal Boundaries

Figure 2 shows an outline of the study area or spatial boundary that was used for the CEA. The study area includes both the Project and the Project access road to the junction with the Klondike Highway. Wolverine Creek to the north of the Project, Dark Creek to the south-west, Big Creek to the south-east, and the Yukon River to the east, were chosen as a natural physiographic boundary as they encompass both the Project footprint and downstream aquatic resources. For the access road, a 5 km corridor (2.5 km on either side of the road) was

selected starting from the Klondike Highway and terminating in the Upper Minto Creek drainage catchment area. The temporal boundary for the CEA includes all activities associated with the construction, operation and eventual decommissioning of the Project. It should be noted that some regional environmental effects (for example, wildlife habitat and recreational uses) might not fall entirely within the study boundary identified, but were nonetheless included to delineate mesoscale effects. Temporal considerations reflect the proposed life of the mine and associated closure/restorative schedules.



LEGEND

	Elevation Contour Interval 100 feet
	Stream, Creek
	Territorial Highway
	Secondary Road
	Study Area Boundary



Minto Project

Project Study Area

ACCESS CONSULTING GROUP

SCALE: NTS	FILE: 115110&111P	DATE: 24/11/99
NTS: 115 1/10, 115 1/11	DRAFTING: ASH	FIGURE 2

2.0 PROJECT SETTING AND DESCRIPTION

2.1 PROJECT SETTING

Table 1 provides a summary of the Project location and environmental setting information for the study area. This table provides physical Project location information, geographic reference, access route, watershed drainage, special designations, and key environmental features within the study area. The information has been extracted from a number of documents (see Section 5), including previous EARPGO and CEAA screenings, and are summarized in Table 1.

2.2 PROJECT DESCRIPTION

The Minto Project is a copper-gold-silver project located on the west side of the Yukon River approximately 75 km (47 miles) north-northwest of Carmacks, Yukon Territory. The mine site and access road lie within the traditional territory of the Selkirk First Nation and comprises part of land claim settlement parcels R-6A, R-44A (Type A settlement lands) and R-40B. Minto Exploration Ltd. concluded a comprehensive cooperation agreement with the Selkirk First Nation on September 16, 1997.

Copper deposits were first discovered in 1970 and sites were staked in 1971. Extensive exploration yielded the first significant drill intersection in July of 1973. The Minto and DEF claims and leases cover an area of approximately 10 square miles. Mineable reserves for the deposit, above a cut-off grade of 0.50% copper, consist of 8,818,000 tonnes at grades of 1.73% copper, 0.48 g/t gold and 7.5 g/t silver. Current project design parameters are based upon 6,510,000 t at grades of 2.13% copper, 0.62 g/t gold and 9.3 g/t silver.

The ore deposits are to be mined using conventional open pit truck and loader operations and processed in a mill with a designed throughput of 477,000 t of ore per year. Thickened tailings will be deposited upstream of the storage dam and supernatant liquor and precipitation will collect in the main water storage pond.

A total complement of 79 employees will be required once the mine is in full production. A camp to accommodate 54 people was constructed in 1998.

The property is accessible by crossing the Yukon River at Minto Landing. Barge landings have been constructed for ice-free crossing and an ice bridge is used upon freeze-up of the Yukon River. The initial 16 km of access road along the western side of the Yukon River and the bridge across Big Creek were constructed in 1996. The remaining 12.8 km was constructed in the latter portion of 1997.

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Table 1 Minto Project Study Area and Setting Summary

Region:	Yukon
Topographic Map Sheet:	NTS 115 I/10, 115 I/11
Geographic Location Name Code:	Minto Project
Latitude:	62° 36' N
Longitude:	137° 15' W
Drainage Region:	Yukon River
Watersheds:	Yukon River, Big Creek, Wolverine Creek, Dark Creek, and Minto Creek
Nearest Community:	Pelly Crossing, Yukon, approx. 33 km north on Klondike Highway
Access:	Klondike Highway, Barge crossing on Yukon River at Minto Landing, Minto mine access road
Traditional Territory:	Northern Tutchone, Selkirk and Little Salmon/Carmacks First Nation peoples. Traditional use for hunting, trapping and fishing.
Surrounding Land Status:	Selkirk First Nation Settlement Lands and Federal Crown Land
Special Designations:	Lhutsaw Wetland Habitat Protection Area located approx. 17 km NE of Minto Landing (outside the study area).
Ecoregion:	Yukon Plateau (Central) - Pelly River Ecoregion
Study Area Elevation:	Rolling hills above mine site at 1131 metres to 600 metres at the Yukon River Valley bottom.
Site Climate:	Temp. ranges from -30.9°C (Jan. 1994) to 12.1°C (July.1994). Mean annual temp. of -7.3°C. Mean annual precipitation is 378mm.
Vegetation Communities:	Riparian, black spruce, white spruce, paper birch, lodgepole pine, buck brush/willow and ericaceous shrubs, feathermoss, sedge, sagewort grassland, mixed, aspen, balsam, and sub-alpine. Discontinuous permafrost is present on site.
Wildlife Species:	Moose, caribou, Dall sheep, mule deer, grizzly and black bear, varying hare, beaver, lynx, marten, ermine, deer mouse, fox, mink, wolverine, least weasel, wolf, squirrel, porcupine coyote, muskrat, otter and wood frog. Bird species include: spruce, blue, ruffed, and sharptail grouse, waterfowl, raptors, and a variety of smaller birds.
Fish Species:	In the Yukon River, chinook, coho, and chum salmon, rainbow trout, lake trout, least cisco, bering cisco, round whitefish, lake whitefish, inconnu, arctic grayling, northern pike, burbot, longnose sucker and slimy sculpin; In Big Creek, Chinook and chum salmon, arctic grayling and whitefish species; In Wolverine Creek, chinook salmon, arctic grayling, and slimy sculpins; In Minto Creek and project area watershed (primarily lower reaches), slimy sculpin, round whitefish, arctic grayling
Known Heritage Resources:	East side of Yukon River in the vicinity of Minto Landing four historic sites designated KdVc-2 (Minto landing), KdVc-3 (Minto Resort), KdVc-4 (Old Tom's Cabin), and KdVD-1 (Minto Creek).

* Note: Information summary drawn from various sources including several Minto Project reports and the DIAND/RERC EARPGO Screening report.

3.0 CUMULATIVE EFFECTS ASSESSMENT

A cumulative effect can be defined as an incremental change or effect on the environment when combined with other past, existing or likely projects and activities. These effects may occur over a time and distance. The magnitude of the combined environmental effect can be equal to the sum of individual effects from each project (additive) or be equal to an effect greater than the sum (synergistic) (FEARO, 1994a, DIAND, 1997).

A cumulative effect typically occurs in one of the following three ways (DIAND, 1997):

- **Physical-chemical Transport:** The introduction of a chemical or physical contaminant into the environment (e.g., into the air or waterways) where the contaminant is transported elsewhere and interacts with contaminants from other projects, or interacts with environmental components (e.g., vegetation) that are also affected by other projects.
- **Landscape Nibbling:** Landscape nibbling affects vegetation and wildlife, and results from the combination of effects from landscape fragmentation, loss of habitat connectivity, and mortality.
- **Socio-economic:** The combined effects of various projects in a region may result in both positive and negative effects on human communities (e.g., social services and employment), use of the land (e.g., recreation), and traditional and cultural activities.

The framework for completing the CEA for the Minto Project was based on the steps listed below and discussed in the following sections:

- Establish a scope for the assessment and set geographic and temporal boundaries (Section 1.2);
- Define valued ecosystem and cultural components and identify environmental effects from the Project's activities on these components (Section 3.1 and 3.2);
- Identify other projects or activities in the study area, including regional issues, assess linkages and effects from other potential activities in combination with Project related effects (Section 3.3 and 3.4);

- Consider mitigation measures and evaluate significance of cumulative effects (Section 3.5), and;
- Summarize findings of CEA (Section 4).

3.1 VALUED ECOSYSTEM AND CULTURAL COMPONENTS

With the scope for the CEA study outlined (Section 1.2) and the study area defined (Figure 1), an identification of valued ecosystem and cultural components (“VECC’s”) was completed. VECC's are any part of the environment or society that are considered important or significant by governments and/or interested parties involved in the assessment process.

The identification of VECC's was based on a review of previous reports and studies completed for the Project (Minto Project Initial Environmental Evaluation, Water Licence Application, etc.) in the study area. Previous environmental screening reports for the Minto Project or for other projects or activities undertaken in the area were also reviewed and used. Table 2 provides a summary list of the VECC's that may be affected by the Project and rationale for their selection. An analysis of the potential environmental effects or impacts to VECC's resulting from the Project was then undertaken (see section 3.2).

Of the VECC's noted in Table 2, downstream water quality and fisheries resources, wildlife including caribou, recreation and tourism, traditional (hunting and trapping), and historic use are considered the most important VECC's from a regional view.

The Yukon watershed is considered a valuable resource. Protection of aquatic habitat and chinook and chum salmon fisheries is ongoing at local and regional management levels through management boards and international agreements on resource extraction and use. The Study area is comprised of several watercourses, each with several different fish species. Table 1 summarizes the various species and their distribution within the study area. The Yukon River also offers tourists and residents a popular vehicle for outdoor adventure. In addition to the river itself are the associated heritage sites and stops of interest along its banks.

The recognition of wildlife resources and their habitats was considered extensively as part of the EARPGO screening. Of specific importance are the Klaza and Tatchun/Glenyon caribou herds,

which maintain a portion of their home ranges near the study area (Hallam Knight Piesold Ltd., 1995). Migration corridors have been designated as key habitat for woodland caribou. The Klaza herd ranges to within 15 km southwest of the Project and presents a negligible risk for interaction with the Project; however, the Tatchun/Glenyon herd maintains a home range that may intersect portions of the access road. Interactions with other animals with large home ranges and those that habituate easily to humans, such as bears, were considered significant to this assessment.

The Selkirk First Nation has several tracts of settlement land adjacent to or within the study area. The importance of the area for traditional and historic use is reflected in the lands chosen by the Selkirk First Nation. However, the tract of settlement land surrounding the mine site was selected because of the known mineral potential. Selkirk First Nation concerns were addressed in September of 1997, upon the signing of a co-operation agreement with Minto Explorations Ltd. The Selkirk First Nation are strong supporters of the Project.

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Table 2 Selected Valued Ecosystem and Cultural Components (VECC's)

Selected VECC	Potential Impacts	Mitigation
Topography	Surface disturbances	Limit disturbance, reclamation and revegetation where appropriate
Soils	Removal and displacement of soil during construction and mine operation	Progressive reclamation, revegetation and waste dump monitoring
Vegetation	Removal of vegetation during construction and mine operation, some wildlife habitat loss	Progressive reclamation and revegetation
Surface Water Quality	Deposition of deleterious materials in waters, construction, maintenance, run-off and precipitory related sediment loading	Apply previously developed polices and practices such as the Spill Contingency Plan, Water Treatment Contingency plans, Physical Monitoring and Water Quality Surveillance protocols (monitoring, sampling, and reporting as per Water Licence).
Groundwater Quality/Quantity	Seepage flows into groundwater table and/or watercourses supporting said groundwater	Apply previously developed polices and practices such as the Spill Contingency Plan, Water Treatment Contingency plan, physical/structural monitoring and water quality surveillance protocols (monitoring, sampling, and reporting); Operational requirements will not significantly effect hydrological regimes
Fish (arctic grayling)	Degradation/alteration of water quality and habitat	Construction and maintenance schedules to account for habitat sensitivity, climatic conditions, and activities of fish and their associated prey
Wildlife	Some direct (vegetation removal) and indirect habitat loss, possible interaction with vehicles and personnel on access roads	No firearm/hunting policy, Employee education, Roadway warning signs and speed control, wildlife monitoring, reclamation and revegetation
Grizzly and Black bears	Project within bear home ranges, habitation to humans at camp and or waste dumps	Bear Policy - report sightings, use of warning signs, employee education, appropriate food waste disposal
Caribou	Tatchun/Glenyon caribou herd home range may be affected by portions of access road	Facilitate natural ranging by minimizing disturbance
Furbearers	May be affected by access road	Speed limits and animal crossings observed. First Nation Agreement.
Air Quality	Exhaust emissions upon combustion of diesel fuel and fugitive dust- mining and roads	Follow standard industrial procedures for emission control, road watering
Visual Aesthetics	Project visual impact is point source and only a very small portion of the access road is visible from the Yukon River	Comprehensive reclamation upon closure
Land Use Capability	Project access increases potential for other land uses	Project access controlled. First Nation Agreement

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Table 2 Selected Valued Ecosystem and Cultural Components (VECC's)

Selected VECC	Potential Impacts	Mitigation
Residential/Recreational Use	Possible conflict with residential, commercial, and recreational users at Yukon River crossing and Klondike Highway access	Trapper and First Nation agreements; Precautionary elements on Yukon River regarding barge crossing and winter ice bridge use
Resource Use (Trapping)	Access road to cross existing traplines, possible furbearer avoidance due to direct or indirect habitat loss	Trapper access maintained and identified, compensation agreements negotiated with proponent
Traditional/Historic Use	First Nation traditional use and heritage resources	Use areas known, First Nations Agreement, archeological assessment of heritage resources, are known and avoided; sites of historic/traditional importance discovered during project life will be secured and proper authorities notified
Socio-Economic Conditions	Local job creation & training. Contracts with Selkirk First Nation and royalty payments.	Co-operative agreement with Selkirk First Nation to monitor local community socio-economic conditions.

3.2 VECC PROJECT EFFECTS

The EARPGO screening for the Minto Project addressed a number of potential environmental effects resulting from various Project related activities. Mitigative measures or specific commitments were proposed by the company to address potential environmental effects. In addition, as a result of the environmental screening for the Project, additional mitigative measures were identified and requirements established as terms and conditions of the Water Use Licence.

This assessment utilizes the previous environmental screenings and reports to establish a summary of the potential environmental effects resulting from Project activities. In addition, local knowledge and observations of actual effects and mitigation success have been incorporated into the review for the components of the Project that have been constructed. The benefit of this knowledge was considered as part of the CEA.

The potential effects and linkages between the Project disturbances or activities and the VECC's were then assessed. Interactions between the VECC's and the Project effects within the spatial boundaries of the study area, as well as regionally, were also considered. Seasonal or temporal interactions with the VECC's were also considered.

Table 3 provides a summary of the possible types of Project environmental effects, the VECC's affected, and the mitigative measures designed to address potential effects. The reader is referred to the EARPGO screening and the supporting company documentation for a complete discussion of the Project environmental effects and a description of mitigation measures. Typically, the Water Use Licence has mitigation measures as licence terms and conditions. As noted in Table 3, Project effects are mitigable.

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Table 3 Possible Project Effects on VECC's and their Mitigation

Possible Types of Project Effects	VECC's Affected	Effects Mitigable		Mitigation Description	Mitigation Reference
		Y	N		
Possible effects summarized from DIAND 1997. "Users Guide for Screening Cumulative Effects".	Complete listing of VECC's summarized in Table 2	Y	N	Mitigation measures summarized from EARPGO screening, water licence and Project IEE	
Environmental					
Soil erosion, permafrost disturbance	Wildlife	X		Progressive reclamation, revegetation, closure plan	1, 2,
Vegetation disturbance and habitat loss	Wildlife, traditional use	X		Progressive reclamation, revegetation, closure plan	1, 2
Altered water quality - chemical	fish, wildlife, traditional use	X		Water quality surveillance programs and studies, water treatment, Spill Contingency Plan	1, 2, 3
Altered water quality - physical	fish, wildlife, traditional use	X		sediment ponds, erosion control	
Altered water flow	fish and wildlife	X		water management, flow monitoring and action plans	1, 2, 3
Altered air quality	Wildlife, human	X		emission treatment, road watering	1, 2, 3
Direct habitat loss	bear, caribou, furbearers	X		progressive reclamation, revegetation, closure plan	1, 2
Direct wildlife mortality	Wildlife and fish	X		no hunting, speed limit	1, 2, 3
Habitat fragmentation	Wildlife, traditional and trapper use	X		progressive reclamation, revegetation, closure plan	1, 2, 3
Habitat alienation	Wildlife, traditional and trapper use	X		reclamation, revegetation, access	1, 2, 3
Cultural		X			
Reduced quantity of resources	Wildlife, furbearers, water, vegetation,	X		water treatment, reclamation, avoidance	1, 2, 3

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Possible Types of Project Effects	VECC's Affected	Effects Mitigable		Mitigation Description	Mitigation Reference
Reduced quality of resources	Wildlife, furbearers, water, vegetation, fish	X		water treatment, reclamation, avoidance	1, 2, 3
Reduced resource use/trapper harvest	Recreation, traditional and trapper use	X		reclamation, no hunting, avoidance, access, precautionary signage	1, 2, 3
Loss of cultural value	Spiritual values, historic values	X		avoidance	1, 2, 3
Altered visual aesthetics	Visual aesthetics	X		Recontouring, reclamation - Visual disturbance is predominantly point source and not visible from Yukon River (except one small portion of access road)	1, 2, 3
Improved socio-economic conditions – Pelly Crossing	Community socio-economic conditions	X		Co-operative Agreement with Selkirk First Nation	3

Note: Table modified after DIAND, 1997. Users Guide for Screening Cumulative Effects. Yukon DIAND Northern Affairs Program.

Reference Notes: 1= EARPGO Screening Report Recommendations; 2 = Water Licence Terms and Conditions; 3=Project IEE

3.3 OTHER PROJECTS & ACTIVITIES

Once the potential effects to VECC's resulting from the Project are understood, interactions and/or linkages with other projects or activities within the study area are now considered. Table 4 provides a summary of the potential projects and/or activities within the study area. This information was obtained from a number of government agencies and boards responsible for the issuance of various permit authorizations. Mineral and land tenure resource maps were also obtained from the DIAND Whitehorse Mining Recorder and Land Resources.

Based on discussions with government resource managers (Rienks, P., 1999), Selkirk First Nation (Trudeau, D., 1999), and interested stakeholders including Minto Explorations Ltd., there were no likely potential projects identified in the study area. The key past, existing and likely activities and land uses that may cumulatively interact with the Project are discussed below.

Mineral Exploration Activities/Expansion of the Project: As discussed in Section 2.2, the Minto Project is comprised of a series of copper-gold-silver deposits, an open pit mine, mill facility and related infrastructure. Continued exploration by Minto within the Project claim boundary has identified a number of additional targets for further investigation. Minto Explorations Ltd. has an approved Class III Mining Land Use Operating Plan (LQ00004) to permit exploration and diamond drilling on the property. The Operating Plan expires on April 25, 2004. Possible environmental effects of developing these zones would include: soil and vegetation disturbances, habitat loss, soil erosion or sediment releases to water courses altering water quality, and altered groundwater flows. These deposits are located within the existing drainage encompassed by the present Water Licence. Mitigation measures similar to those used throughout the current planned operation would be employed to address potential environmental effects with the development of any new ore zones.

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Table 4 List of Previous, Current and Potential Projects or Activities in the Assessment Study Area

Activity Type	Holder	Comments
MAP SHEET 115 I/10		
WATER USE		
MS95-013	Minto Explorations Ltd.	Bridge construction, Culvert installation and Construction and Maintenance of Barge Landings
LAND USE/MINING LAND USE		
YA5F045 (closed)	Minto Explorations Ltd.	Existing road reconstruction, new road construction, barge landings, bridge over Big Creek, Culvert at Minto Creek, ice bridge over Yukon River, Camp and Quarry sites.
YA4F740, 20, 08, 94 (closed)	Dieter Heinz	Upgrade road access between km 420 Klondike Highway and existing lease 115 I/10 0000-00012
YA1F031 (closed)	Dieter Heinz	Road upgrading km 422 Klondike Highway
YA8F233 (closed)	Minto Resorts	Upgrade existing access from km 431 Klondike Highway to lot 149 plan 60169 on Yukon River
YA2F308 (closed)	Colt Enterprises	Maintenance and repair of several Northwestel tower roads
YA5S058 (closed)	YTG Highways Transportation and Engineering	Geotechnical investigations along Northwestel road: km 432 Klondike Highway RHS
YA6S140 (closed)	YTG Community and Transportation Services	Geotechnical investigations along Northwestel road: km 432 Klondike Highway RHS
YA 5F938 (closed 19.05.99)	Minto Explorations Ltd.	Move equipment and haul fuel from the barge landing site on Yukon River near Minto Creek to mineral claims
YA6Q215 (closed 11.05.99)	YTG	Quarry Development and production: km 432 Klondike Highway RHS
Plan 54173: FB7333: Lot 14	Government of Canada	Surveyed and undeveloped
Plan 54257: FB7148: Lot 13, Group 4	Government of Canada	Police Reserve (Minto Post)
Plan 41572: Subdivision: BM 1529	YTG	Two Blocks A and B contain 20 lots each
Plan 60169: formerly Lot 149, now Lot 1000	Selkirk First Nation	Minto Resorts operation
Plan 10669	YTG	Access Rd

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Activity Type	Holder	Comments
R-3A, R-40-B, R-6A, R-11B, R-44A, R-43B, R43B/D-1	Selkirk First Nation	Settlement Lands – Category A and B Lands
S-109B/D, S-129B, S-31B, S-119 FS, S-127B/D, S-127B	Selkirk First Nation	Site Specific Lands
Barge Service	Jacobs Industries Ltd.	Operates barge service from Minto Landing, transporting fuel, equipment, and personnel to and from destinations on the Yukon River
River Taxi/Tour Operator	Heinz Sauer	Transports visitors from Minto Landing to Fort Selkirk, undertakes various expediting duties along Yukon River
MAP SHEET 115 I/11		
MINERAL TENURE		
MC Lots 76 to 93 Plan 59454	Minto Explorations	Mining Leases- designated Minto
MC Lots 94 to 129 Plan 59648	Minto Explorations	Mining Leases- designated DEF
MC Lots 1000-1010 (a) Plan 64926	Minto Explorations	Mining Leases
Mineral Claims	Minto Explorations	Minto Explorations Ltd. - various mineral claims designated Minto and others designated DEF
WATER USE		
MS95-013	Minto Explorations Ltd.	Bridge construction, Culvert installation and Construction and Maintenance of Barge Landings
QZ96-006	Minto Explorations Ltd.	Type A water licence Quartz mining
LAND USE		
YA5F938 (closed 19.05.99)	Minto Explorations Ltd	Move equipment and haul fuel from the barge landing site on Yukon River near Minto Creek to mineral claims
YA5F045 (closed)	Minto Explorations Ltd	Existing road reconstruction, new road construction, barge landings, bridge over Big Creek, Culvert at Minto Creek, ice bridge over Yukon River, Camp and Quarry sites.
Other		
R-18B, R-41B, R-6A, R-40B, R-95B/D	Selkirk First Nation	Settlement Lands – Category A and B Lands
S-126B/D, S-57B/D, S-120B/D	Selkirk First Nation	Site specific lands
Trapline #145	Glenn Bullied	Active trapline use and cabin
Trapline #146	McGinty Family of the SFN	Active trapline use

Timber Harvest: Timber harvesting does occur in the region but it occurs beyond the boundary of this study. Any proposed logging would require Land Use and Timber Permits to ensure that project effects are mitigated. Potential environmental effects of these activities include disturbance of soils, clearing of vegetation, wildlife habitat loss or alienation, altered water quality from stream sediments and effects to other resource users (trapping and traditional use). It should be noted that the study area was recently subjected to a series of forest fires which have impacted the local environment, and reduced timber harvest potential.

Mine Access Road: Access to the project and associated infrastructure is to be restricted to Project personnel, contractors, Selkirk First Nation members and existing trapline holders only. The access road has been constructed with mitigation measures designed to mitigate potential impacts on soils, vegetation, wildlife habitat, and water quality.

Yukon River Traditional/Residential/Recreational Use: The Yukon River, in the vicinity of the Minto Project access route at Minto Landing, has the potential for increased residential and recreational usage such as fishing, hunting, hiking and canoeing/rafting. Residential/Commercial use in the area is considered low; however, tourist visits to Fort Selkirk are becoming more popular. It is reasonable to expect that recreational and traditional use activities (hunting, fishing, berry picking) in the study area may increase with time. Potential effects include reduced quantity/quality of resources and reduced resource use (trapping, traditional/cultural use).

3.4 REGIONAL ISSUES

As part of the CEA, consideration was given to regional issues that may interact with Project effects or with other local activities' effects. Some of these regional issues were noted previously, including protected settlements lands, historic sites (Minto Landing), regional land use, salmon habitat protection and harvesting, and key or unique wildlife migration corridors (particularly the Tatchun/Glenyon caribou herd).

Generally, local or national guidelines (CCME Freshwater Aquatic Life), permit operating conditions and standards (land use, water licence, forestry permits), and management initiatives and plans (Fish and Wildlife Harvest limits, Yukon Placer Authorization), provide mechanisms to ensure that potential regional issues and environmental effects are addressed.

This CEA has recognized the importance of VECC's at both a local and regional level, and the potential interactions of the regional and local Project environmental effects. The cumulative assessment of these impacts and the evaluation of the significance of these effects considered regional implications.

3.5 EFFECTS AND SIGNIFICANCE ASSESSMENT

Once all of the potential effects to the VECC's as a result of Project related activities were assessed, an effects interaction assessment was completed for the potential effects and a significant ranking assigned to determine potential cumulative effects. Definitions for the environmental effects assessment and ranking are provided in Tables 5 and 6. Table 6 summarizes the results of this stage of the assessment. The effects assessment of the VECC's with the Project related effects were based on three types of interactions: duration, magnitude, and geographic extent.

Overall significance rankings of low, moderate or high were assigned to each VECC based on duration, magnitude and extent of interaction of effects associated with the Project. Significant rankings were based on DIAND, 1997 guidelines and are defined in Table 5 below.

Table 5 Significance Ranking Definitions

Questions for each VECC Type	Significance Rankings			Significance
	Low (L)	Moderate (M)	High (H)	Conclusion
Biological Species VECCs				
1. How much of the population may have their reproductive capacity and/or survival of individuals affected? Or, for habitat, how much of the productive capacity of their habitat may be affected?	<1%	1-10%	>10%	L if Low. If M or H, go to question 2.
2. How much recovery of the population or habitat could occur, even with mitigation?	Complete	Partial	None	L if Low. If M or H, go to question 3.
3. How soon could restoration occur to acceptable conditions?	< 1 year or 1 generation	1-10 yrs or 1 generation	>10 yrs or > 1 generation	L, M or H

Physical-chemical VECCs				
1. How much could changes in the VECC exceed that associated with natural variability in the region?	<1%	1-10%	>10%	L if Low. If M or H, go to question 2.
2. How much recovery of the VECC could occur, even with mitigation?	Complete	Partial	None	L if Low. If M or H, go to question 3.
3. How soon could restoration occur to acceptable conditions?	< 1 year	1-10 yrs	>10 yrs	L, M or H

Socio-economic VECCs				
1. Could the effect be of concern to local residents or administrative authorities, or directly impact on commercial operations or subsistence livelihood, or alter quality of life of residents or recreational enjoyment by visitors?	Little or no concern or change	Some concern or change	Substantial concern or change	L if Low. If M or H, go to question 2.
2. Could the effect be unacceptable to users even after the application of compensation measures, mitigation or the ready availability of reasonable alternatives?	Acceptable to most people	Somewhat acceptable	Unacceptable to most people	L if Low. If M or H, go to question 3.
3. How soon could restoration occur to acceptable conditions?	< 1 year	1-10 yrs	>10 yrs	L, M or H

(DIAND, 1997 *Users Guide for Screening Cumulative Effects*)

Table 6 VECC Project Effects Assessment and Significance Ranking

VECC's (from Table 2)	Duration of Interaction	Magnitude of Interaction	Extent of Interaction	Significance Ranking
Soils	Long Term	Low	Low	Low
Vegetation	Long Term	Low	Low	Low
Surface Water Quality	Long Term	Moderate	Low	Low
Groundwater Quality/Quantity	Long Term	Low	Low	Low
Fish (Salmon, arctic grayling, slimy sculpin, round whitefish, northern pike)	Long Term	Low	Low	Low
Grizzly and black bears	Long Term	Moderate	Low	Moderate
Caribou	Long Term	Low	Low-Moderate	Low-Moderate
Furbearers	Long Term	Low	Low	Low
Air Quality	Long Term	Low	Low	Low
Visual Aesthetics	Long Term	Low	Low	Low
Residential/Recreational Use	Long Term	Low	Moderate	Moderate
Resource Use (Trapping)	Long Term	Moderate	Low	Moderate
Traditional/ Historic Use	Long Term	Low	Low	Low
Socio-Economic Conditions	Long Term	Moderate	Low-Moderate	Low

Legend: Level of interaction of Project environmental effects with VECC or significance ranking defined as low, moderate, or high and considers mitigation success (see Table3). Where duration of interaction = short term (1-3 years); medium term (4-10 years); long term (>10 years); Magnitude of interaction defines magnitude of effects on VECC; Extent of interaction = low (local); moderate (regional); high (territorial or national). See Table 5 for Significance Ranking Definitions.

After the effects assessment and significance rankings was completed for Project related environmental effects, effects were considered in combination with other activities in the study area. A description of the potential environmental effects from other related activities was presented in Section 3.3. These activities and their potential environmental effects are summarized below:

- Expanded Project Development and Mineral Exploration Activities and Access: Possible environmental effects include: vegetation/permafrost and wildlife disturbances, habitat loss, soil erosion or sediment releases to watercourses altering water quality, reduced quality/quantity of resources and trapper harvest.
- Yukon River Traditional/Residential/Recreational Use: Potential environmental effects include alteration and/or deterioration of water quality and riparian habitat, direct and indirect loss of wildlife habitat, and waterway related wildlife disturbances, altered surface water quality resulting from runoff or spills and reduced quantity/quality of resources or reduced resource use.

Table 7 presents a summary of the VECC effects with other activities. The significance of these effects in combination with other activity effects was ranked. The various other activities' environmental effects was noted and summarized in the table. An evaluation, similar to that presented in Table 6, was undertaken to determine the effects of the other activities on the VECC's and then considered in combination with the Project effects. The significance of these effects was evaluated. The potential for cumulative interactions with the Project was then identified. Definitions for significance rankings are provided in Table 5.

Based on this evaluation, three VECC's (grizzly and black bears, recreational/residential, and resource use) have a moderate potential for cumulative environmental effects interactions with the Project, while one VECC (caribou) has a low to moderate potential for cumulative environmental effects interaction with the Project. The remaining VECC's, with low interactions for cumulative effects, were not considered further in the evaluation.

Table 7 VECC's and Other Activities Effects Significance Ranking

VECC's (from Table 2)	Significance Ranking for Project Effects (from Table 6)	Other Activities Environmental Effects	Significance Ranking for Other Effects	Interaction for Cumulative Effects
Soils	Low	Yes	Low	Low
Vegetation	Low	Yes	Low	Low
Surface Water Quality	Low	Yes	Low	Low
Groundwater Quality/ Quantity	Low	No	Low	Low
Fish (Salmon, arctic grayling, slimy sculpin, round whitefish, northern pike)	Low	Yes	Low	Low
Grizzly and black bears	Moderate	Yes	Low	Moderate
Caribou	Low-Moderate	Yes	Low	Low-Moderate
Furbearers	Low	Yes	Low	Low
Air Quality	Low	Yes	Low	Low
Visual Aesthetics	Low	Yes	Low	Low
Residential/Recreational Use	Moderate	Yes	Moderate	Moderate
Resource Use (Trapping)	Moderate	Yes	Low	Moderate
Traditional/ Historic Use	Low	Yes	Low	Low
Socio-Economic Conditions	Low	No	Low	Low

Legend: Level of interaction of the environmental effects or significance ranking defined as low, moderate, or high. Definitions for significance rankings provided in Table 5.

The VECC's with a moderate potential for significant cumulative interactions with the Project and the combined environmental effects of other activities were taken to the final step in the assessment to determine the significance of the cumulative effect. This cumulative environmental effects summary is provided in Table 8.

After considering the Project related environmental effects and the effects from other activities in the study area, an assessment of the pathway for the cumulative effects to be expressed was made. Reversibility of Project effects and mitigation were then evaluated to determine the potential for significant cumulative effects. Based on this review, the potential for significant cumulative environmental effects on Grizzly and Black Bear, Caribou, Resource Use (Trapping), and Residential/Recreational use were considered to be low.

**MINTO EXPLORATIONS LTD. - MINTO PROJECT
CUMULATIVE EFFECTS ASSESSMENT**

Table 8 Cumulative Environmental Effects Summary

Valued Ecosystem & Cultural Component (VECC) (see Table 7)	Project Activity	Potential Effect of the Project on the VECC	Other Activities & Projects With Effects on the VECC	Pathway for a Cumulative Effect to be Expressed	Project Effects Reversible Upon Mine Closure	Project Mitigation of Environmental Effects	Potential for Significant Cumulative Effects
Grizzly and Black Bear	Access road, mine site, mine employee activities	Increased access to animal populations, habitat loss, fragmentation, alienation, human interactions	Trapping, subsistence and recreational hunting; residential, commercial and other recreational uses	Animal mortality, habitat loss, fragmentation, alienation	Yes	Reclamation, revegetation, closure plan, access restriction, employee education and restrictions, waste management	Low
Caribou	Access road, mine employee activities	Migration disturbance, habitat loss, fragmentation, alienation	Trapping, subsistence and recreational hunting; residential, commercial and other recreational uses	Animal mortality, habitat loss, fragmentation, alienation	Yes	Reclamation, revegetation, closure plan, access restriction, employee education and restrictions	Low
Resources Use Trapping	Access Road and Mine operation	Disruption of trapping, hunting and fishing activity due to project-related activities	Subsistence and recreational hunting; residential, commercial and other recreational uses	Disruptive occurrence of activities	Yes	Reclamation, revegetation, closure planning, avoidance, maintain trail access, trapper agreements	Low
Residential/Recreational Use	Access Road and barge crossing	Disruption of waterway use	Commercial and other uses	Disruptive occurrence of activities	Yes	Precautionary elements on Yukon River regarding barge crossing and winter ice bridge use, Spill Contingency Planning	Low

4.0 CUMULATIVE EFFECTS CONCLUSIONS

The following conclusions from the CEA for the Minto Project are made:

- A number of valued ecosystem and cultural components (VECC's) are present in the study area. These VECC's include vegetation, water resources, fish and wildlife resources and other resource users including trapping, recreation, and traditional use.
- The Project related effects on the VECC's indicate that environmental effects are mitigable and that partial or complete mitigation success can be achieved. This conclusion fully supports the previous EARPGO screening and Decision for the Project.
- An evaluation of the environmental effects from the Project and other activities on local VECC's indicate a moderate potential for significant cumulative interactions with some VECC's (Grizzly and Black Bear, Caribou, Resource Use (Trapping), and Residential/Recreational use).
- Although there is a moderate potential for significant cumulative interactions, the potential for significant cumulative environmental effects on the selected VECC's was considered to be low, given the proposed mitigation and restorative measures to be applied progressively and upon mine closure.
- Monitoring of other resource users and local resource extraction in the study area should be undertaken by resource managers to continue tracking potential effects on VECC's and ensure that regional cumulative environmental effects are considered.

5.0 REFERENCES

- Access Consulting Group, 1999. *"Viceroy Minerals Corporation Brewery Creek Mine, Cumulative Effects Assessment"*.
- CEAA, December, 1996. *"Cumulative Environmental Effects Cross-referenced Annotated Bibliography"*.
- DIAND and Yukon Territory Water Board, April 1996. *"Environmental Assessment Screening Report and Project Summary: Land Use Permit Application YA5F045 and Water Licence Application MS95-013"*.
- DIAND, June 1997. *"Users Guide for Screening Cumulative Effects"*. Yukon DIAND Northern Affairs Program.
- DIAND and Regional Environment Review Committee, March 1997. *"Environmental Assessment Screening Report: Minto Explorations Ltd. Minto Property. Whitehorse, Yukon Territory"*.
- DIAND, January 1999. *"Mine Production licencing under the Quartz Mining Act Draft Interim Policy"*. Yukon Northern Affairs Program.
- Environment Canada and Fisheries and Oceans Canada, May 1997. *"Brief to the Yukon Territory Water Board, Re: Water Licence Application QZ96-006, Minto Explorations Ltd."*
- FEARO, September 1994a. *"The Responsible Authority's Guide to the Canadian Environmental Assessment Act"*.
- FEARO, September 1994b. *"A Reference Guide for the Canadian Environmental Assessment Act Addressing Cumulative Environmental Effects"*.
- Hallam Knight Piesold Ltd., December 1994. *"Minto Project, Initial Environmental Evaluation, Supporting Document I, Development Plan"*.

Hallam Knight Piesold Ltd., December 1994. *"Minto Project, Initial Environmental Evaluation, Supporting Document II, Environmental Setting"*.

Hallam Knight Piesold Ltd., December 1994. *"Minto Project, Initial Environmental Evaluation, Supporting Document III, Socioeconomic Description and Impact Assessment"*.

Hallam Knight Piesold Ltd., May 1995. *"Minto Project, Initial Environmental Evaluation, Supporting Document IV, Environmental Mitigation and Impact Assessment"*.

Minto Explorations Ltd., October, 1995. *"Minto Project, Application for Land Use Permit YA5F045"*. Submitted to the Yukon Territory Water Board.

Minto Explorations Ltd., October, 1995. *"Minto Project, Application for Water Licence MS95-13"*. Submitted to the Yukon Territory Water Board.

Minto Explorations Ltd., March 1997. *"Minto Project, Application for Water Licence QZ96-006"*. Submitted to the Yukon Territory Water Board.

Minto Explorations Ltd., 1997. *"1997 Annual Report"*.

Rienks, P., 1999. *"DIAND RMO, Carmacks Area, Pers. Comm."*

Trudeau, D., 1999. *"Bank Resource Officer, Selkirk First nation, Pers. Comm."*

Yukon Conservation Society and Canadian Parks and Wilderness Society, *"Yukonwild: Natural Regions of The Yukon"*. Whitehorse, Yukon Territory.