Screening Report

For

Yukon Zinc Corporation's Wolverine Project

September 20, 2006

Prepared by:
Development Assessment Branch
Government of Yukon

Yukon
Executive Council Office

Executive Summary

The Project

The Wolverine Mine is a proposed underground mining and milling project that is intended to process 1250 tonnes per day of mill feed. Ore will be processed in a conventional flotation mill, producing lead, zinc and copper concentrates. Concentrates will be trucked to tidewater at Stewart, British Columbia.

The Wolverine Mine is located in the Finlayson district of the southeast Yukon, approximately halfway between the communities of Watson Lake and Ross River, a short distance west of the Robert Campbell Highway. The project area occupies the traditional territory of the Kaska aboriginal people, many of whom reside in the communities of Ross River and Watson Lake.

The mine facilities will include an airstrip, 25 km access road to the Robert Campbell Highway, underground mine, tailings impoundment facility (for permanent disposal of tailings), temporary waste rock storage area, process mill, a camp facility and ancillary buildings and equipment. Power will be provided by on-site diesel generators.

Based on known reserves, the mine is expected to be in operation for approximately 12 years. Additional exploration may yield further reserves and increase mine life. The project is expected to directly employ 121 persons onsite once in operation. Crews will work on a two week in, two week out rotation. Chartered flights from Whitehorse, Watson Lake and Ross River will transport workers to and from the mine.

The Environmental Assessment

This environmental assessment was triggered because Yukon Zinc Corporation applied for a Quartz Mining Licence and a Type A Water Licence in November of 2004. Both authorizations required to undertake the project were included in the Law List regulation pursuant to the *Environmental Assessment Act* (EAA) and cannot be issued without an environmental assessment first being completed. The Yukon departments of Energy, Mines and Resources and the Executive Council Office identified themselves as Responsible Authorities (RAs) pursuant to the EAA for this project. The 1500 tonne per day ore production capacity triggered a screening level of assessment under EAA.

Yukon Zinc Corporation submitted a Project Description report with their regulatory authorization applications. Based on a broad consultation on the Project Description, the Responsible Authorities issued detailed environmental assessment information guidelines to Yukon Zinc Corporation in March of 2005. These guidelines provided the proponent with the basis of information required for a detailed environmental assessment report that would be necessary in order to allow for the completion of this screening report.

Yukon Zinc Corporation submitted their Environmental Assessment Report at the end of October of 2005. The RAs referred it to a broad consultation. YZC submitted a further

response to the regulatory review of their Environmental Assessment Report, mainly to respond to water management issues requiring further clarification. The RAs worked through all remaining issues with Yukon Zinc Corporation through June of 2006.

The Wolverine Project is a massive sulphide multi metallic deposit. As such, concern about the possibility of acid rock generation exists. A considerable focus of the environmental assessment for this project was ensuring that the project will be developed and decommissioned with a strong emphasis on acid rock generation mitigation.

The environmental mitigation for the project evolved through the environmental assessment process as Yukon Zinc Corporation responded to the concerns being raised. Concern that 0.5 metre of water cover over tailings was mitigated by the proponent's commitment to place one metre of non reactive material over tailings, then topped by 0.5 metres of water. Tailings dam design criteria was increased to withstand a 1:10,000 year hydraulic event whereas the original proposal was for a 1:1,000 year design. The tailings facility will also be lined with a synthetic liner to respond to concern about seepage interaction with groundwater. Operations water treatment proposals were enhanced and a closure passive biological water treatment system down gradient of the mine workings has been proposed to mitigate the potential for metals migration from the mine workings through groundwater and into down gradient surface waters. Financial security is required to ensure that mitigation measures are implemented.

Significant concern on the part of the Kaska people and other reviewers was expressed surrounding the effect this project may have on the considerable wildlife values in the project locale. The Finlayson Caribou Herd was identified as particularly susceptible to habitat changes that development projects can bring. The selected haul road route traverses the least critical caribou habitat of all the options considered. Additional mitigation requirements include the need for access restriction and haul road reclamation upon mine closure and additional measures to be incorporated within an environmental agreement between Yukon Zinc Corporation and the Yukon government department of Environment.

All technical comments received during the course of this screening were considered in the development of this report. Copies of all correspondence related to this screening are contained in a project Public Registry as required under the EAA. The RAs held open houses in the communities of Ross River and Whitehorse in November of 2005 to solicit comments on the project. Further community meetings were held in Ross River and Watson Lake in January of 2006 and in Ross River in May of 2006 to specifically solicit the views of the Kaska, many of whom place considerable cultural and economic importance in traditional subsistence activities within the project locale. A focus of this screening is to ensure these activities can continue and where there is a disturbance, it is reversible through the decommissioning and reclamation of the mine and its associated infrastructure.

In addition to requiring mitigation measures to protect values within the project locale, follow-up programs have been specified in this report as a means of assessing, reporting

and adapting mitigation measures to mine conditions during all phases of the project. Requirements for maintaining the site in temporary closure are in place should it be necessary to suspend operations before the exhaustion of metal reserves. Criteria for decommissioning and reclamation plans and spill response are also specified.

Table of Contents

List of Figures

1. Introduction

The purpose of this screening report is to summarize the results of an environmental assessment that was conducted on Yukon Zinc Corporation's (YZC) Wolverine Project, a proposed base and precious metal mining and milling operation in the southeast Yukon. This screening was conducted pursuant to the (Yukon) *Environmental Assessment Act* (EAA[1]).

1.1 Project Overview

The Wolverine Mine is a proposed underground mining and milling project that is intended to process 1250 tonnes per day (tpd) of mill feed. Ore will be processed in a conventional flotation mill, producing lead, zinc and copper concentrates. Concentrates will be trucked to tidewater at Stewart, British Columbia.

The Wolverine Mine is located in the Finlayson district of the southeast Yukon, approximately halfway between the communities of Watson Lake and Ross River, a short distance west of the Robert Campbell Highway.

The mine facilities will include an airstrip, 25 km access road to the Robert Campbell Highway, underground mine, tailings impoundment facility, temporary waste rock storage area, process mill, a camp facility and ancillary buildings and equipment. Power will be provided by on-site diesel generators.

Based on known reserves, the mine is expected to be in operation for approximately 12 years. Additional exploration may yield further reserves and increase mine life. The project is expected to directly employ 121 persons onsite once in operation. Crews will work on a two week in, two week out rotation. Chartered flights from Whitehorse, Watson Lake and Ross River will transport workers to and from the mine.

Exploration activities in the Wolverine Mine area have been ongoing since the mid-90s, and were still ongoing at the time of this writing

1.2 Purpose of the Project

The purpose of the Wolverine Project is for the mining and milling of metals.

1.3 Need for the Project

Under EAA, the Responsible Authorities (RAs) have discretion whether or not to consider need for the project in the scope of the assessment. It is the RAs discretion to not consider need for project in this screening.

[1] Refer to Appendix 1 for a list of acronyms and abbreviations used throughout this report.

1.4 Timing Considerations

YZC has indicated that they would like to commence construction of the mine during the spring of 2007, with production commencing in spring 2008.

To accommodate the proposed schedule, the Yukon Government, as RA for this project, has made every effort to conduct this environmental assessment in as efficient and timely a manner as possible.

1.5 Regulatory Context

This screening was triggered by YZC's submission of a Type A Water Use Licence application to the Yukon Water Board, and an application for a Quartz Mining Licence to the department of Energy, Mines and Resources.

Both Water Use Licence and Quartz Mining Licence applications trigger an environmental assessment pursuant to EAA. Both authorizations are included in the Law List pursuant to EAA and cannot be issued without an environmental assessment having been completed, with a determination that the project may proceed. A screening level of environmental assessment will apply to this project due to the daily ore tonnage processing rate of 1500 tpd (a Comprehensive Study pursuant to EAA would have been required if the daily tonnage processing rate had been 3000 tpd or more).

The Yukon government confirmed its involvement in this screening by identifying two RAs: the departments of Executive Council Office (ECO) for the Water Use Licence and Energy, Mines and Resources (EMR) for the Quartz Mining Licence. The Development Assessment Branch of ECO took the lead in coordinating the screening on behalf of both RAs. On November 3rd, 2004 ECO undertook an exercise to identify other potential RAs and expert authorities within the Yukon and Federal Governments[2]. The Yukon departments of Environment and Community Services, Highways and Public Works and the federal departments of Environment, Natural Resources Canada and Fisheries and Oceans identified themselves as expert authorities who could contribute specialized advice to the RAs undertaking this screening. Fisheries and Oceans Habitat and Enhancement Branch had tentatively declared themselves as an RA for this project due to the potential requirement for a Fisheries Authorization but soon withdrew after determining that a Fisheries Authorization would not be required for the project to be undertaken (Gotch, 2004). No other federal or Yukon agencies declared themselves as RAs for this project.

The *Yukon Environmental and Socio-economic Assessment Act* (YESAA) will not apply to this project due to the fact that all relevant regulatory applications required to undertake the project were submitted to Yukon regulators prior to the effective date of part II of the YESAA legislation on November 13th, 2004. However, many issues that

[2] The Yukon and federal Governments entered into an agreement to harmonize EA coordination shortly after devolution in 2003.

would be required to be considered under YESAA have been included in the scope of this assessment.

2. Project Description

2.1 Definition of the Project, Activities and Schedule

The following is a summary extracted from the Environmental Assessment Report (EAR) (YZC, AXYS Consulting, 2005) and EAR Response to Public and Regulatory Reviews (response document) (YZC et al. 2006). The reader is referred to the EAR and response document for further descriptive details on the Wolverine project.

2.1.1 Overview of Project Activities to Date

The property was originally staked as the Fetish claims in July 1973 and restaked as the Kink claims in September 1982. By July 1993 only one Kink claim remained and Atna Resources Ltd. (Atna) re-staked the rest of the property as the Foot claims. In 1995, the property was optioned by Westmin Resources Limited (Westmin) and conducted a drilling program that resulted in the discovery of the Wolverine deposit on the Kink Claim. By the end of 1995, Westmin entered into a 60/40 joint venture with Atna. An airstrip was constructed near the deposit in 1996, and drilling programs significantly expanded the known area of mineralization in 1996 and 1997. In 1998, all activities at the Wolverine property ceased with concerns that the zinc concentrate was less marketable with the high selenium levels, and with the acquisition of Westmin by Boliden Ltd.

In March 1999, a junior mining company known as Expatriate Resources Ltd. (now named Yukon Zinc Corporation) acquired a 60% interest in the Wolverine Joint Venture from Boliden Westmin (Canada) Limited. In 1999, joint venture partners Expatriate Resources (Expatriate) and Atna conducted metallurgical and marketing investigations on the Wolverine deposit.

In March 2000, Expatriate agreed to purchase the Kudz ze Kayah exploration lands in the Finlayson District from Cominco Ltd. and initiated a pre-feasibility study (Hatch Associates, 2000). This study assessed a single development plan known as the Finlayson Project, which included an open pit and milling operation at Kudz ze Kayah and an underground mining operation at Wolverine. Pre-feasibility results were positive and Expatriate entered the environmental permitting process in September of 2000. However, in September 2001, Expatriate relinquished its acquisition agreement with Cominco Ltd. and the environmental permitting process for the Finlayson Project was suspended.

In May 2004, Expatriate purchased Atna's 39.4% interest in the Wolverine Joint Venture and now owns 100% of Wolverine. Atna retained a royalty interest on net precious metals revenues only. A portion of the Wolverine Project lands is also subject to two small royalties to the original claim holders. Subject only to these royalties, Expatriate has a 100% interest in the mineral claims that comprise the Wolverine Project. Expatriate commenced the advancement of Wolverine as a stand-alone mine-mill complex in June 2004. In October 2004, Expatriate announced plans to move the development of the Wolverine deposit to bankable feasibility and a production decision.

In November 2004, Expatriate submitted its *Wolverine Project Description Report* (Gartner Lee Ltd., 2004) to the Yukon government's Department of Energy, Mines and Resources and a Type A Water Use Licence application to the Yukon Water Board. In December 2004, Expatriate re-organized its assets to shift its non-core assets into a separate entity called Pacifica Resources Ltd. The Wolverine and surrounding Finlayson District claims were retained in Expatriate, which was renamed Yukon Zinc Corporation. With the exception of four claims, YZC owns all of the claims within the areas that mine site infrastructure and access road location are proposed, except for the Money claims for which it has an option agreement that provides for access.

2.1.2 The Wolverine Project

The Wolverine Project will consist of an underground mine, milling facilities and supporting infrastructure, including:

- Tailings impoundment facility;
- an airstrip;
- site roads;
- power plant;
- water supply;
- sewage disposal;
- a road connecting the facility to the Robert Campbell Highway (approx 25km.);
- temporary waste rock storage facility;
- a truckshop and warehouse;
- an assay lab;
- cemented rockfill (backfill) plants;
- water treatment plant;
- incinerator;
- accommodation complex; and,
- fuel storage facilities.

The mine life is expected to be approximately 12 years. The mine will take approximately 16 to 18 months to construct; capital costs for development are estimated at $127 million.

Two zones have been identified in the deposit: the Lynx and Wolverine zones. The deposit is located near surface and will be accessed by means of a decline.

2.1.2.1 Mining Method

Ore will be mined from the Wolverine and Lynx zones via an adjusted drift and fill mining method in conjunction with uphole slashing. The total material movement over the mine life is estimated at 8.34 Mt. Over the 12 year operating period an estimated 6.40 Mt of ore and 1.94 Mt of waste rock will be extracted. A total of 2.93 Mt of tails, dense media separation (DMS) rejects and waste rock will be stored in the tailings facility. 4.01

Mt of backfill will be deposited into the underground workings as paste backfill, using the balance of the waste. Approximately 1.4 Mt of concentrate will be trucked to smelters. Ore processing will involve crushing, dense media separation, and two-stage grinding followed by differential flotation processes to produce zinc, copper and lead concentrates.

2.1.2.2 Description of Operation

The mine will operate on two ten-hour shifts per day, seven days per week. The mine will run 365 days per year with crews on a two week in, two week out rotation.

There will be two portal entrances to the mine: the existing 1345m elevation portal and a new portal to be constructed at 1360m elevation. The 1345 portal will serve as an exhaust outlet for the mine. The 1360 portal will be the primary entrance and exit for workers, equipment and supplies. The access ramp will be 4.8m wide by 5m high, driven downgradient at 15%.

The ramp and stope access crosscuts will be located at the centre between the ore zones in the barrier pillar zone. A stope drift will be driven in ore along the footwall contact from the stope access crosscut parallel to the strike in both directions through the two ore bodies to the economic extremities of the two ore zones.

Drift and fill is the mining method selected for the project. Three distinct variants of the drift and fill mining will be employed: Drift and Fill with a Side Slash (DFSS), Drift and Fill with Retreat Panels (DFRP), and Drift and Fill with Primary and Secondary Panels (DFPS). Mining method selection will be determined by horizontal ore thickness.

Drilling will be done using electric hydraulic jumbos. A rockbolting machine will be used for bolting as required. Ore and waste haulage will be via 40-50t diesel haul trucks loaded by large scooptrams.

The mine will employ paste backfill as the primary fill. The paste plant will be located at the north end of the industrial complex, closest to the 1360 portal entrance. Mine development waste rock will also be used as loose unconsolidated fill in applications where it will not be exposed by future adjacent mining.

The current Wolverine ore recovery percentage estimates are 12.43% zinc, 1.44% lead, 1.37% copper, 337 g/t silver and 1.59 g/t gold. This reserve may increase based on exploration results.

Over the life of the mine, it is expected that a total of 6.4 Mt of diluted ore will be mined, plus 1.94 Mt of development waste. The final locations of various products is as follows: 1.4 Mt of concentrate to smelters; 4.01 Mt of tailings (2.7 Mt) and waste rock (1.3 Mt) used as fill in the mine; 2.93 Mt of tailings (1.25 Mt) and waste rock (1.68 Mt) permanently placed in the tailings pond.

The Wolverine mill has been designed to process 456,250 tonnes per annum of ore containing copper, lead, zinc, gold and silver; expected concentrate contained metal are 50,000 t of zinc, 4900 t of copper, 3300 t of lead, 110 Mg of silver and 0.4 Mg of gold. The plant will include facilities to produce separate copper, lead and zinc flotation concentrates. The plant will comprise of the following unit operations:

- Ore storage;
- crushing;
- Dense Media Separation (DMS);
- two stage grinding;
- differential flotation;
- rougher concentrate regrinding;
- concentrate thickening;
- concentrate filtration;
- concentrate storage;
- tailings and process water reclaim; and,
- underground mine water treatment. A portion of the treated water will be recycled as plant fresh water.

Process water will be reclaimed from the tailings facility[3] and recycled for use in the process plant. The facility will operate in a water surplus requiring an annual release of effluent into the receiving environment. Treated effluent will be pumped on a controlled basis to Go Creek below the confluence of Hawkowl Creek, and ultimately into Money Creek. A high-density sludge water treatment plant will be used to treat water during the operations phase. Sludge from the water treatment plant will be placed into the tailings impoundment. During closure, the mine will be flooded and engineered hydraulic bulkheads placed to block portals. The water treatment plant will continue to operate until the tailings facility pond water reaches acceptable discharge water quality.

Reagents used in the milling process will include lime, sodium metabisulphide, Aero 5100, zinc sulphate, sodium cyanide, sodium sulphite, potassium ethyl xanthate, methyl isobutyl carbinol and copper sulphate.

2.1.2.4 Site Infrastructure

Aside from the main mine facilities, road, airstrip and mill, there will be numerous support infrastructure, including: a maintenance workshop, warehouse, diesel-electric generating facilities, fuel and propane tank farm, sanitary facilities, 150 person camp, water supply system, sewage plant, domestic and industrial waste disposal. The existing camp on Wolverine Lake will not be used as part of this project and will remain an exploration camp. Figure 2-1 provides an overview of site components.

[3] All effluent reports to the TMF.

A two week supply of diesel fuel will be maintained at the site. Diesel will be trucked from Whitehorse and transferred to storage tanks. The storage tank pad will be lined and bermed in accordance with all relevant legislation pertaining to fuel storage in the Yukon.

2.1.2.5 Site Access

Personnel will access the site via aircraft on charters originating in Whitehorse, Ross River or Watson Lake. Vehicles will transport personnel from the airstrip to the mine.

After a positive production decision, a 25.2 km haul road from a staging area adjacent to the Robert Campbell Highway to the mine will be constructed (refer to Figure 2-2 for an overview of selected road route). The road will be 6 m wide and have a 20 m right-of-way. The road will head south, parallel to Tehká ki Tue[4] Creek, veering northwest away from Money Creek towards the mine site.

2.1.2.6 Waste Management

Waste streams associated with the Wolverine Mine include:

- Waste rock;
- tailings;
- water treatment plant discharge;
- water treatment plant precipitates
- sewage;
- domestic waste; and,
- miscellaneous special wastes.

Waste Rock

The project will result in the generation of a total of 1,940,000 t of waste rock. Waste rock generated from the Wolverine development is potentially acid generating. When sulphide bearing rock is oxidized (exposure to air and water), sulphuric acid can be released from the minerals, potentially mobilizing metals; this phenomena is known as acid rock drainage (ARD) (refer to section 7.1.1 of this report for further discussion on ARD).

A temporary impervious synthetic lined waste rock pad was constructed during the 2005 summer exploration program. The pad will be expanded to accommodate waste generated during the pre-production phase. During operations, waste from new development and waste temporarily stored on the pad will be trucked to the tailings impoundment facility for permanent disposal. Some waste rock will be retained underground for use as loose unconsolidated fill. Additional dilution waste rock

[4] Tehká ki Tue Creek (or Muskrat House Creek) had been incorrectly referred to as Light Creek in earlier project correspondence.

separated from the ore by the dense media separation (DMS) plant prior to processing will also be disposed of in the tailings facility.

Any leachate emanating from the waste rock on the temporary storage pad will be collected in a sump and treated to licence discharge standards.

Tailings

Tailings will be stored in a tailings impoundment facility. The facility will be located in a natural, northwest-southeast trending elongated depression perched on the northeast valley slope of Go Creek. At the end of mine life, the tailings dam will be approximately 37.5m high with a combined capacity for tailings, course waste and water of 2.1Mm³. The selected design criteria for the tailings impoundment is shown in Table 2-1.

Table 2-1 Selected Flood Design Criteria for Water Management Facilities (YZC et. al, 2006)

Facility	Min. Design Flood Return Period (years)	Flood Storage & Freeboard Allowance	Comments
Surface Water Diversion Ditches	100		-
Starter Dam and Stage-Raised Dam Emergency Spillway	200		Assume that upland surface water diversion ditches have failed.
Tailings Dam Closure Spillway	10,000		Assume that upland surface water diversion ditches have been decommissioned.
Seepage Collection Ditches	100		-
Seepage Recovery Pond Spillway	100		Assume that upland surface water diversion ditch is functioning.
Tailings Pond Flood Storage Allowance		0.3 m	
Tailings Dam Freeboard		2.0 m	

The proponent had originally proposed a 1000 year return period flood event for closure spillway design, but revised the return event to a 10,000 return period based on concerns raised by stakeholders during the review of the Project Description.

The intention is to commence tailings deposition after completion of a starter dam. The dam would be incrementally raised in years one, four, seven and 10. A Leachate Analysis for dam borrow materials was conducted, concluding that leachate issues are not expected with identified borrow materials. Geotechnical investigations of the tailings impoundment location were undertaken to confirm the stability of the selected location.

YZC expects that water treatment will be required for up to three years post-closure before tailings water reaches compliant level.

YZC had originally intended to retain a 0.5 m cover of water over the tailings. Concern was raised amongst reviewers that upon closure, 0.5 m was inadequate water cover due to the potential of wave action or wildlife to re-suspend tailings and to prevent oxidation. YZC responded to these concerns in their response document. They have revised their tailings management plan to include the placement of 1.0 m of Dense Media Separation (DMS) gravel over the tailings, plus 0.5m of water, as a component of their closure plan. The tailings facility will also lined with synthetic material to respond to concerns about tailings/groundwater interactions.

Site Water Management

Sewage

Site sewage treatment facilities will consist of pre-packaged wastewater treatment plants located at the camp and industrial complex. At each location, grey and black water will be collected via sanitary sewage systems and sent to a small in-ground concrete surge tank from where it will be pumped to the sewage treatment plant. Treated wastewater from the sewage treatment plants at the industrial complex and camp will be pumped to the TMF. Digested sludge from the treatment plant will be disposed of in the tailings facility.

Domestic Wastes

Putrescible kitchen wastes will be incinerated on site. Burnable non-putrescible waste will also be incinerated on site. Non burnable recyclable waste will be segregated and collected in designated recycling bins for periodic removal off-site. Non-hazardous solid wastes that cannot be recycled will be disposed of in a landfill. The landfill will be constructed early in the development phase and remain operational through the life of the mine.

Miscellaneous Special Wastes

YZC has committed to prepare a hazardous material handling plan prior to site development. The plan would address, but not be limited to the following:

- Tracking the volume of hydrocarbon and hazardous waste materials produced.
- Identification of disposal options.
- Appropriate transport, storage and handling procedures.
- Appropriate clean-up and emergency procedures for spills.
- Monitoring requirements.
- Contingency and response measures.
- Reporting requirements.

It is expected that the regulatory instruments required to undertake this project will contain provisions relating to the handling of special wastes.

Operations Water Management

The process plant, water treatment plant and TMF are all integral to the water management system planned for the Wolverine Mine. All effluent will report to the TMF. The intention is to reclaim water from the TMF for ore processing. Together with a portion of the tailings, the process water will be discharged to the TMF. The water treatment plant is intended to receive input from the underground workings and the TMF, however if surface runoff from the mine area is of unacceptable quality, it too will be pumped to the TMF. Treated water will be temporarily stored in polishing ponds prior to release. Treated water will be discharged, used as make-up water for the process plant or returned to the TMF if it does not reach discharge criteria.

High Density Sludge (HDS) technology has been selected amongst the technologies that YZC investigated. The sludge produced by a HDS process will be deposited in the tailings facility. Bench scale water treatment plant testwork was ongoing at the time of this writing.

YZC has committed to additional water treatment processes to supplement the HDS plant. Carbon columns and a patented biological selenium reduction (bioreactor) process will also be in place to ensure that effluent will meet water licence discharge standards. This approach employs bioreactors that use various microbes that utilize selenium (selenate and selenite) as an oxidant and produce elemental selenium as a precipitate. Naturally occurring bacteria will be immobilized in biofilms in a series of anaerobic reaction chambers. A nutrient added to each bioreactor with an organic substrate to foster growth of microbes that utilize selenate in an analogous fashion to those that reduce sulphate. Dissolved selenium oxyanions in water convert to solid elemental selenium. Bioreactor by-products will either be sold if marketable or buried in the tailings pond. (YZC & Lorax, 2006).

All effluent will be discharged to Go Creek post treatment; no project effluent will be discharged to Wolverine Creek[5]. Discharge to Go Creek will occur annually between May and October.

Figure 2-3 illustrates the site water balance during operations.

Closure Water Management

During closure, reclaim/recycle of process waters will cease. Tailings impoundment diversion ditches will be decommissioned allowing runoff from the catchment area to flow into the facility. The water treatment plant will remain operational until tailings water has reached a compliant level, estimated by YZC to be three years.

[5] There will be no surface discharge to Wolverine Creek, however groundwater interacting with mine may emerge in Wolverine Creek; bio-pass system contingency is intended to mitigate this concern.

During the course of this screening, numerous technical reviewers raised a concern that groundwater that interacts with the backfilled mine workings could eventually emerge in Wolverine Creek and increase metal levels in the receiving environment. In an effort to respond to reviewers' concerns, YZC submitted a contingency plan that would involve the construction of a bio-treatment channel along a 300-400m section of Wolverine Creek. Known as a bio-pass system, the approximately 2.5m deep and 3m wide system would intercept groundwater with potentially high selenium and other metal concentrations derived from water interacting with the backfilled mine. Wolverine Creek will be diverted around the trench. Organic substrate in the system will passively reduce selenium to solid phase elemental selenium. Other metals will be precipitated as metal sulphides. A gravel layer above the substrate will facilitate the lateral upward flow of treated effluent. The drainage layer above the organic substrate will be sealed by an impermeable geomembrane liner to prevent system exposure to benthic invertebrates or higher levels of the food chain. The liner will be topped by a layer of topsoil to protect it. (YZC & Lorax, 2006).

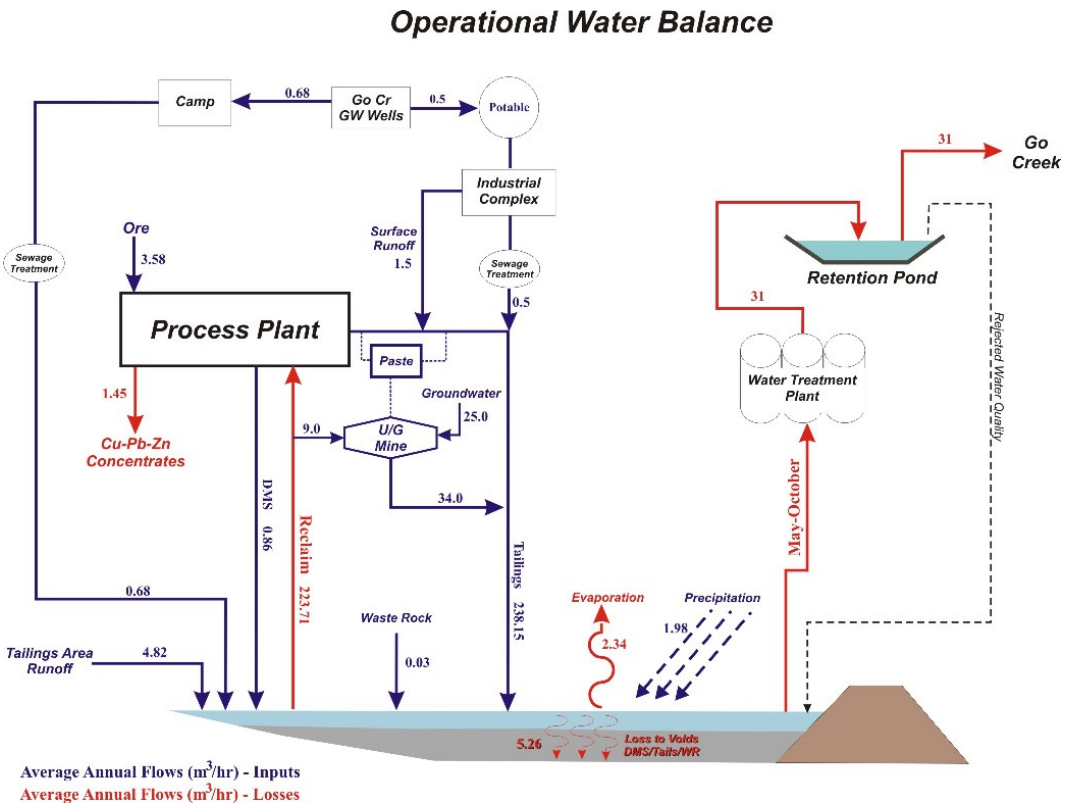


Figure 2-3 (YZC et. al, 2006)

3. Project Alternatives

3.1 Alternative Means of Carrying out the Project

The EAR Guidelines issued to YZC contained a requirement to consider alternative means of carrying out the project. In assessing alternatives, it is assumed that the project is a given and only alternative means of carrying out the project is an issue. Alternative means, for example include alternative sites, routes, sources of energy and alternative methods for construction, operation and mitigation.

The EAR included an evaluation of alternative means of carrying out the project relating to numerous mine design, operational and mitigative components of the project. This screening will focus on alternatives that relate to the environmental components of the project.

Waste Rock Disposal

YZC claimed that the existing waste rock disposal area was selected due to the fact it was located on the Go Creek drainage, it is naturally shaped to allow for the easy collection of water, is in close proximity to the portal and overburden is largely clay. The RAs accept YZC's selected site for the same reasons.

Tailings Disposal

YZC considered the sub-aqueous disposal of tailings and an alternative method involving on-land disposal of dry tails in paste form. The latter disposal method offers some advantages in that an expensive dam does not need to be constructed and direct water treatment is not required. Disadvantages include dust problems, pumping of tails is difficult and costly, ARD/ML concerns exist and operational costs are higher due to pumping costs and the need to add cement to the tails to maintain their paste form.

The RAs accept YZC's preferred alternative, that the sub-aqueous disposal of potentially acid generating tailings in a facility engineered to a high standard is a proven technology and appropriate for use under the current circumstances.

Tailings Facility Site Location Alternatives

YZC assessed the suitability of two potential locations for the tailings management facility. One location was across the Go Creek valley; this location would have the entire upper reach of Go Creek held back by the tailings dam and require the relocation of the air strip. The first location would also involve construction off of YZC's current block of mineral claims. The second location is approximately 500 metres to the east of the first possible location; it would cover a smaller area and would be lower risk since it would not be impounding the entire upper Go Creek drainage.

The location chosen was the second location described above. The RAs accept YZC's rationale for the selected alternative.

Haul Road Location

The RAs considered an alternative to the haul road location proposed by YZC that would involve an extension of the Kudz ze Kayah road to the Wolverine Mine. This alternative is not attractive from an environmental and socio-economic standpoint. It would exceed the 25 km length of the proposed route, cross difficult terrain that would involve considerable filling and earth moving, traverse sensitive caribou habitat, involve the crossing of numerous creeks and would be visible along the length of Wolverine Lake. A significant view of the haul road from Wolverine Lake would render the area considerably less attractive to consumptive and non-consumptive recreational uses and traditional pursuits. Further concerns arise regarding the fact that the holder of the tenure for the Kudz ze Kayah road would be required to consent to third party use of the road.

The RAs have concluded that the selected haul road location is preferable over an alternate route that joins the Wolverine Project with the Kudz ze Kayah Project.

3.2 Alternatives to the Project

YZC claimed in their EAR that the Wolverine Project is the only viable alternative for their goal of establishing a mine within the Finlayson district of the Yukon. The RAs accept the rationale provided.

4. Project Scoping

4.1 Scope of the Project

The scope of the project refers to the various components of the proposed undertaking or activity that will be considered as the project for the purposes of this screening. This must include the principal undertaking and any accessory activities or works that are directly linked to, or interconnected with, the principal project.

The EAR guidelines effectively defined the scope of the project that is subject to this screening, including the phases of the project and factors to be considered in order to satisfy the requirements of the EAA.

Subsection 11(1) of the EAA requires the RAs to determine the scope of the project in relation to which an environmental assessment is to be conducted. Subsection 11(3) requires that where a project is in relation to a physical work (a mine in this case):

> "…an environmental assessment shall be conducted in respect of every construction, operation, modification, decommissioning, abandonment, or other undertaking in relation to that physical work that is proposed by the proponent or that is, in the opinion of the responsible authority…likely to be carried out in relation to that physical work."

The above requires that the screening consider all phases of the project life from mine construction, operation through decommissioning, post closure and abandonment. All physical works and activities pertaining to the mine development, including access corridors must be considered.

The scope of the project includes the construction, operation, care and maintenance, closure, post closure and abandonment or any undertaking in relation to the project. This includes:

- access;
- underground mining, including all associated geochemical issues;
- waste rock handling and storage (permanent and temporary);
- mill;
- tailings management;
- fuel handling and storage;
- power generation and transmission facilities;
- explosives manufacturing and storage facilities and associated infrastructure;
- borrow pits;
- water sources, use and release, water control structures and treatment facilities;
- landfill;
- deposition of gaseous, solid and liquid wastes;
- ore storage areas, stockpiles and transfer pads;
- site facilities and infrastructure including camp and maintenance facilities, fuel and hazardous waste storage areas, land treatment facility, solid waste and liquid

domestic waste management facilities;
- VECCs potentially affected by the project;
- site transportation routes including airstrip, access road, ore haul road, and all other roads and trails; and
- off-site transportation routes including concentrate haul route (spills, safety and infrastructure requirements)[6].

4.2 Scope of the Assessment

Subsection 12(1) of the EAA outlines the factors that must be considered in a screening and by extension, the EAR for this project:

"12(1) Every screening or comprehensive study of a project and every mediation or assessment by a review panel shall include a consideration of the following factors:

> (a) the environmental effects of the project, including the environmental effects of malfunctions and accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
>
> (b) the significance of the effects referred to in paragraph (a);
>
> (c) comments from the public that are received in accordance with this Act and regulations;
>
> (d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and
>
> (e) any other matter relevant to the screening…such as the need for the project and alternatives to the project that responsible authority…may require to be considered."

Chapter 12 of The Umbrella Final Agreement (UFA) contains a clause (12.3.6) requiring government to make best efforts to implement interim measures for project assessment that are consistent with chapter 12 and existing law. The most notable difference between environmental assessment conducted in accordance with EAA and the *Yukon Environmental and Socio-economic Assessment Act* ("YESAA" - which arose from the requirements of chapter 12 in the UFA) is a broader requirement to consider the socio-economic effects of a project under YESAA than is required under EAA; YESAA also requires the consideration of (42(1)e "alternatives to the project …or alternative ways of undertaking or operating it…" whereas this is optional under EAA for a screening level of assessment.

[6] Off-site infrastructure beyond the haul road to the Robert Campbell Highway will not be subject to decommissioning and reclamation plans for this project.

In light of the interim measures provision of the UFA, utilizing the discretion under 12(1)e of EAA, the RAs, in agreement with the proponent, have considered the social and economic effects of the project on the communities of Ross River and Watson Lake more broadly in this screening than required by EAA, as well as a consideration of alternatives to the project and alternative means of carrying out the project.

The need for, and the requirements of a follow-up program are discretionary for a screening level of assessment under EAA. It is the RAs discretion to require a follow-up program for this project.

The RAs have identified specific areas on which to focus the screening on tangible values. A list of VECCs has been compiled by the RAs and is defined in s.6.3 of this screening report.

4.2.1 Temporal Scope of the Assessment

The RAs have chosen a temporal scope of 15 years for this assessment. This assessment has been conducted on an understanding that a period of 15 years will encompass project construction, production and decommissioning. Any further regulatory requirements required during the post closure period should be re-evaluated based on the experiences gained during the production and closure phases of the project.

4.2.2 Spatial Scope of the Assessment

With the exception of direct socio-economic issues and water/aquatic resources, the spatial scope of all other VECCs considered in this screening and cumulative effects assessment consists of the area identified in Figure 4-1. This area is similar to the spatial scope YZC identified as their Wildlife Regional Study Area, but has been modified to include the Kudz ze Kayah property, namely for the purposes of including it in the cumulative effects assessment. The RAs view this area as reasonably encompassing the effects of this project on VECCs, water/aquatic resources and direct socio-economic issues resulting from environmental changes caused by the project. In regards to concentrate haulage issues, the spatial scope extends from the mine to the British Columbia border.

The spatial scope of direct socio-economic issues assessment is limited to the communities of Watson Lake and Ross River (Socio-economic issues within the spatially scoped area identified in Figure 4-1 are limited to a consideration of the socio-economic effects of any direct and cumulative changes the project may cause in the environment.). The spatial scope of water/aquatic resource issues is limited to the Wolverine Creek, Nougha Creek and Money Creek (includes Go Creek) watersheds, including all waters along haul road route, to Frances Lake.

4.2.3 Factors Not Within the Scope of this Assessment

Undertakings in relation to the Wolverine advanced exploration program are beyond the scope of this assessment except in terms of their contribution to the cumulative effects of the Wolverine Project.

5. Public Consultation Program

Once received by the Development Assessment Branch, the Wolverine Project Description was referred to government, First Nations and stakeholders for a comprehensive technical review. All comments received were considered in the development of EAR guidelines. A notice was also placed inviting comments on the project description from interested members of the public, again, with all comments received considered in the development of EAR guidelines.

The Development Assessment Branch maintains a Public Registry as required by the EAA. All material relevant to the screening is retained on the registry and may be viewed by interested persons during regular business hours.

The EAR was referred to government, First Nations and stakeholders for a comprehensive 45 day technical review, with all comments received being considered in this draft screening.

The Development Assessment Branch of the ECO hosted open house information sessions in Ross River and Whitehorse at the end of November, 2005. The Project Coordinator and a YZC representative were also present. The purpose of the open houses was to familiarize interested community members about the project and solicit any concerns about the project.

Early during the technical review of the Project Description, the Development Assessment Branch sought clarification amongst the Ross River Dena Council (RRDC) and the Liard First Nation (LFN) as to who would be the contact for the purposes of this environmental assessment. The RRDC identified themselves as speaking on behalf of the Kaska Nation for this project and identified an individual as an appropriate contact. The RRDC, on behalf of the Kaska Nation, were subsequently involved in the technical meetings and discussions with YZC during the environmental assessment process. Numerous meetings between the RRDC, their consultant and government have been held over the course of the environmental assessment, with all input and comment considered in the development of this screening report.

On January 4th and 5th 2006, Yukon government funded consultation held by the RRDC in Ross River and Watson Lake respectively on behalf of both the RRDC and LFN. These community meetings brought Kaska members and elders into a forum with Yukon government and YZC employees to discuss concerns with the Wolverine Project at a community level. A report on both meetings was prepared by the RRDC and submitted to the RAs on January 24th, 2006.

A meeting on May 01, 2006 was held in Ross River to discuss the haul road route, wildlife and traditional knowledge. On May 30th, 2006 the RRDC held another community open house consultation session in Ross River. Kaska elders, as well as Chief and Council from the LFN were invited and attended the latter meeting. YZC personnel provided overviews on the project and government discussed various valued

components in relation to the project and how mitigation could be applied. There were numerous questions from community members, mainly directed to YZC personnel. There appeared to be community support for the project as long as socio-economic benefits accrued to the community and environmental safeguards were in place. A written report on the May 30th community meeting was submitted by the RRDC to the Development Assessment Branch on July 10th. This report, the January 24th report, input from Kaska representatives, comments heard at community meetings and all correspondence received from the RRDC on behalf of the Kaska Nation, was considered by the RAs in the development of this screening report.

A draft screening report was offered for public comment on July 26th, 2006 with a deadline for comment of August 18th, 2006; notice of the consultation was placed in two Yukon newspapers. Copies of the draft screening report were available in Whitehorse, Ross River and Watson Lake public libraries and on the Yukon government web site.

All comments received at all phases of this screening were considered by the RAs in the development of this report.

6. Description of the Existing Environment

6.1 General Regional Environmental Context[7]

The project is located on the eastern edge of the Pelly Mountains and the western edge of the Liard Basin ecoregions (Yukon Ecoregions Working Group, 2004). Specifically, the project is located on the western edge of the Campbell Range. The Campbell Range forms the eastern-most extent of the Pelly Mountains, and abuts the broad Yukon Plateau to the north and east. The area consists of moderate topography, glacially scoured mountains with no significant peaks. Bedrock exposure is sporadic and is confined to the higher-relief drainages and along mountainous ridges. The main valleys are wide and U-shaped. Glacial till covers the majority of the lower lying valleys and there is significant infilling by post-glacial sediments.

The proposed mine is located at the height of land between Go Creek watershed to the south and Wolverine Creek watershed to the north. Go Creek flows to Money Creek which drains east to Frances Lake. Frances Lake drains south to Liard River. Wolverine Creek flows north to Wolverine Lake. Wolverine Lake is drained by Nougha Creek northeast to Finlayson River, which flows southeast to Frances Lake.

The mine portal and proposed industrial complex are located along the Wolverine Creek-drainage. This area is a gently sloping subalpine ridge with an elevation ranging from 1200-1250 m asl. North of the mine area, slopes climb steeply to open alpine ridge with a summit elevation of approximately 1850 m asl. West and northwest of the mine area, the Wolverine-Little Wolverine Lake system is oriented roughly southwest-northeast for approximately 10 km. This lake system fills the wide U-shaped valley. The airstrip and proposed camp infrastructure is located near the headwaters of Go Creek. To the south, the land slopes gently into the Money Creek watershed.

The climate of the Wolverine Project area is typical of the northern Cordilleran interior with over 50% of precipitation falling as snow. The snow-pack generally peaks in early April although snow may continue to accumulate later in the year at higher elevations. Precipitation is higher on the windward side of Pelly Mountains to the west of the site, and there is a general trend toward higher precipitation in the direction of the Selwyn and Logan Mountains, to the north-east of the site. Snow-melt and ice break-up in area streams generally begins between late April and early May and lasts until June or early July, and this is when flow is high in watercourses. Summer thunderstorms, particularly during late stages of break up can result in significant peak flows throughout the months of May to September, although such events are most likely to occur in June or July. (YZC&AXYS Consulting, 2005).

[7] For detailed information on the regional environmental context, refer to: Smith, C.A.S., Meikle, J.C., and Roots, C.F. (editors). *Ecoregions of the Yukon Territory: Biophysical properties of Yukon landscapes.* Agriculture and Agri-Food Canada, RARC Technical Bulletin No. 04-01, Summerland, British Columbia, 2004.

6.2 Description of Site Specific Environment

The airstrip, proposed tailings facility and camp infrastructure are situated near the headwaters of Go Creek. The haul road route runs southeast from the mine area, traversing the upper Go and Hawkowl Creek watersheds, turning northeast through the Chip Creek and Bunker Creek basins of Money Creek. The northern third of the route parallels then crosses the Tehká ki TueCreek drainage, another tributary of the Finlayson River, before joining the Robert Campbell Highway. The only potential effects to the drainage basins in the project area occur as a result of mine activities at the project site and along the haul road to the Robert Campbell Highway (in lowermost reaches of basins). (YZC&AXYS Consulting, 2005).

The entire project area lies within the traditional territory of the Kaska Nation, who mainly reside in the communities of Ross River, Watson Lake (Yukon), Lower Post and Good Hope Lake (British Columbia). The traditional territory of the Kaska people extends from the southeast Yukon into northern British Columbia. There are interim protected First Nation lands within the spatial area scoped into this assessment.

The social and economic environment extends from the immediate project area to the communities of Ross River and Watson Lake[8]. Whitehorse may be peripherally affected by the Project due to its importance as a service centre for the entire Yukon.

Economic activities in the immediate project area generally include big game outfitting, recreational and subsistence hunting, trapping, fishing and gathering. Ross River and Watson Lake have populations of 335 and 1545 (2003) respectively. Both communities are considered service areas for the southeast Yukon, and offer a range of services including year-round accommodation, restaurants and airports.

There were no special management or wilderness designations or proposed designations in the project area at the time of this writing.

6.3 Valued Ecosystem and Cultural Components in the Study Area

6.3.1 Valued Ecosystem and Cultural Components considered in the EAR

The EAR Guidelines issued to YZC by the Yukon Government required the proponent to undertake studies on, and identify the effects of the project on numerous biophysical parameters. The EAR Guidelines further required the proponent to identify VECCs as a means of focusing the EAR on tangible environmental components that are considered intrinsically and economically valuable. Other considerations in VECC selection include importance to traditional use, recreational importance, legal value, scientific value and sensitivity.

The proponent identified and considered the following VECCs in their EAR[9]:

[8] Faro may also be peripherally affected.
[9] A brief summary of VECCs is provided in this report; the reader is referred to the EAR (YZC & AXYS, 2005) for complete VECC descriptions and data gathering methodology.

Ambient air quality

The project will release particulate matter (dust from mine area and road), SO_2, NO_X , CO, greenhouse gases (CO_2).

The project is located in a remote wilderness area with few anthropogenic sources of air emissions. Natural occurrences such as forest fires, windstorms (soil erosion) and atmospheric chemical reactions can release similar substances into the atmosphere.

The EAR guidelines required that the proponent consider the effects of the project on air quality. The proponent incorporated data from atmospheric monitoring stations in Whitehorse and Fort Nelson, BC to help define a regional air quality baseline, even though both these locations are affected by urban and industrial emissions.

Terrain, surficial geology and soils

This VECC includes key terrain features, surficial materials, permafrost, soils with high erosion potential, terrain hazards, sensitive soil types.

The EAR guidelines required a consideration of the effects of the project on terrain, surficial geology and soils. The proponent characterized baseline conditions through existing maps, aerial photos and field reconnaissance. Results were mapped and classified.

The landscape of the area is typical of an area that has undergone intense modification by ice and subsequent meltwater. Its glacial history is complex due to the history of multiple glaciations that have directly affected the area. All have been described as moving in a northerly direction into central Yukon. The project area has also been modified by erosion, solifluction, and volcanic ash deposition. The Quaternary history of the project area however is dominated by the impact of the last ice age with periglacial, colluvial, fluvial and volcanic processes playing a lesser role.

Morainal materials are the most widespread surficial deposit type, occupying approximately 64% of the project area. These materials were deposited directly by glacier ice in a sub, or supra-glacial setting. Colluvial surficial materials are also common, occupying about 24% of the project area. These materials are most common on steeper slopes. Organic and fluvial materials dominate valley bottoms and lower slopes each representing approximately five percent of the total project area. Morainal materials in the study area had textures that varied from loamy sand to sandy clay loam and highly variable coarse fragment contents. Soils belonging to the Brunisolic Order were the most commonly mapped soil on moraine. Organic accumulations were found in association with lacustrine, morainal and fluvial materials. Fluvial materials are most commonly found within valley floors flanking streams. Glaciolacustrine were found only in the Tehká ki TueCreek valley. (YZC&AXYS Consulting, 2005).

Water and Aquatic Resources

Includes:

- Surface water hydrology (runoff, flood flows, low flows, evaporation, snowmelt)

  Streams in the project area share similar hydrology. The lowest flows typically occur during March or April. Snowmelt begins in late April and lasts into June

with the peak of the freshet in late May or early June. Flows then decline steadily through fall until freeze-up. Because of the typically dry spring and wet summer, rain-on-snow events are most common in June. The magnitude of rainfall-derived flood peaks is generally less than the magnitude of the snowmelt flood peak, except in the smallest drainages where concentrated local rainfall from summer thunderstorms causes higher peak floods than are observed during snowmelt.

As required by the EAR guidelines, the proponent characterized project area streamflow conditions based on local observations and extrapolation from long-term regional climate and hydrometric data. Methodology included the interpretation of evaporation and snowmelt data, hydrometric data (local and regional), flow frequency analysis, peak and low flow analysis.

- Surface water and Sediment quality (total suspended solids, pH, conductivity, alkalinity, sulphate, metals, nitrogen compounds),

  Water sampling programs at the Wolverine site have taken place at irregular intervals since 1996. A monitoring program was implemented early in 2005 and will continue through 2006 (the EAR guidelines required a monitoring program throughout one continuous year). Go Creek, Wolverine Creek, Money Creek, confluences and areas along the proposed access road were part of the 2005 program. A QA/QC program was implemented, which included the collection of duplicate and triplicate samples, travel blanks, filter blanks and a comparison of total and dissolved metals concentrations. A summary of water quality results is provided in Table 6-1 for Go Creek and Tributaries, and Table 6-2 for Wolverine Creek.

  It is evident that the baseline water quality in Wolverine Creek is influenced by surface geology and the deposit, and contains high metal levels. Arsenic, Cadmium, Copper, Selenium and Zinc considerably exceed CCME guidelines on a regular basis.

Table 6-1 Summary of Water Chemistry, Go Creek and Tributaries[1] (YZC & Axys, 2005)

Parameter	Range		# of Times CCME Exceeded	Notes
	Minimum	Maximum		
Conductivity µmhos/cm	69	160	N/A	
PH	6.9	8.1	N/A	
Hardness mg $CaCO_3$/L	28	76	N/A	
Sulphate mg/L	3	11	N/A	
Nitrate mg/L	<0.005	0.173	N/A	
Ammonia mg/L	<0.005	<0.05	N/A	
Total Phosphorus mg/L	0.002	0.006	N/A	
Total Aluminum mg/L	0.0009	0.070	0	
Total Arsenic mg/L	0.00005	0.0004	0	Oct 1995 data excluded, <0.02 mg/L
Total Cadmium mg/L	<0.000017	0.00021	Measurable in 6 samples	Most values < detection (detection limit higher than guideline)
Total Chromium mg/L	0.0002	< 0.010	0	
Total Copper mg/L	0.001	0.006	8	Exceeds guideline on 4 dates, by up to 3 fold
Total Iron mg/L	0.01	1.31 mg/L	1	One date with high values, Hawkowl Creek
Total Lead mg/L	0.0001	<0.001	0	

Total Mercury mg/L	0.0005	<0.001	N/A	
Total Molybdenum mg/L	0.0002	0.03	0	
Total Nickel mg/L	0.003	0.02	0	
Total Selenium mg/L	0.0005	0.0012	1	Slightly exceeds guideline on 1 date
Total Silver mg/L	0.00001	0.0001	0	
Total Zinc mg/L	0.001	0.013	0	

Notes: 1. 7 sites; n=91 samples; 1995 to 2005
N/A = not applicable

Table 6-2 Summary of Water Chemistry, Wolverine Creek[1]
(YZC & Axys, 2005)

Parameter	Range		# of Times CCME Exceeded	Notes
	Minimum	Maximum		
Conductivity µmhos/cm	221	271	N/A	
PH	7.4	8.3	N/A	
Hardness mg $CaCO_3$/L	8 to	143	N/A	
Sulphate mg/L	16	35	N/A	
Nitrate mg/L	0.046	0.300	N/A	
Ammonia mg/L	0.005	<0.05	N/A	
Total Phosphorus mg/L	0.009	0.012	N/A	
Total Aluminum mg/L	0.002	0.059	0	
Total Arsenic mg/L	0.00018	0.0038	0	Oct 1995 data excluded, <0.02 mg/L
Total Cadmium mg/L	0.00019	0.00184	17	All samples exceed guideline by 2 to 24 fold
Total Chromium mg/L	<0.0001	< 0.001	0	
Total Copper mg/L	0.0009	0.006	2	Up to 1.5 times higher than guideline
Total Iron mg/L	<0.003	0.29	0	
Total Lead mg/L	0.0001	<0.001	0	
Total Mercury mg/L	<0.00002	<0.0005	N/A	
Total Molybdenum mg/L	0.0009	<0.03	0	
Total Nickel mg/L	0.002	0.0064	0	
Total Selenium mg/L	0.0006	0.004	17	All samples exceed guideline 2 to 4 fold
Total Silver mg/L	0.00001	0.00005	0	
Total Zinc mg/L	0.055	0.198	17	All samples exceed guideline 1.6 to 6.6 fold

Notes: 1. one site; n=17 samples, 1995 to 2005
N/A = not applicable

Stream sediments were sampled in October 1995, July 1996 and June/July 2001 using two different approaches. The baseline was expanded in 2005 to provide more representative data and meet requirements of the EA Report Guidelines. Data from the 1995, 1996, 2001 and 2005 programs is summarized in Table 6-3. There were variances in results from year to year likely due to different sampling methods, but 1995 and 2005 results are similar.

The 2005 program (23 stream sites) followed recommendations of the EAR Guidelines, with samples collected from riffle areas using a 2.5 cm diameter PVC tube to extract fine sediment from below the cobble and boulder substrate. This method was recommended by Environment Canada for consistency with recent

Yukon programs. Samples were sieved in the laboratory and the <0.063 mm fraction analyzed for total metals. This method was followed in order to obtain representative data for riffle habitat.

Analysis of data clearly indicates high levels of metals in Wolverine Creek sediment at W09, particularly zinc.

Table 6-3 Sediment Chemistry Data for Wolverine, Go and Money Creeks, 1995-2005 (Jacques Whitford, 2006)

Metal	Year	Fraction (mm)	Wolverine Creek W09	Money Creek W11	Go Creek W16	ISQG[1]
As mg/kg	1995	0.15	Not analyzed	Not analyzed	Not analyzed	5.9
	1996	-	Not analyzed	Not analyzed	Not analyzed	
	2001	<0.230	ND	Not sampled	ND	
	2005	<0.053	**12.8**	4.1	**8.1**	
Cd mg/kg	1995	0.15	**14**	0.8	**7.1**	0.6
	1996	<0.070	**11.5**	<0.5	**3.5**	
		>0.070-2	**4.5**	<0.5	0.5	
	2001	<0.230	**22**	Not sampled	**6.25**	
	2005	<0.053	**12.3**	0.42	**7.53**	
Co mg/kg	1995	0.15	9.2	9	20.3	none
	1996	<0.070	14	13	28	
		>0.070-2	11	7	23	
	2001	<0.230	13	Not sampled	24.6	
	2005	<0.053	11.9	6.3	25.9	
Cr mg/kg	1995	0.15	23.8	29.2	**57.8**	37.3
	1996	<0.070	**98**	**108**	**172**	
		>0.070-2	**61**	**55**	**167**	
	2001	<0.230	**46.8**	Not sampled	**94.2**	
	2005	<0.053	29.3	28.1	**67.3**	
Cu mg/kg	1995	0.15	**67.1**	16.1	**54.7**	35.7
	1996	<0.070	**50**	17	**53**	
		>0.070-2	20	7	**36**	
	2001	<0.230	**114.4**	Not sampled	**81.4**	
	2005	<0.053	**67.9**	22.7	**91**	
Fe g/kg	1995	0.15	24.2	32.3	30.3	none
	1996	<0.070	40.1	43.3	56.1	
		>0.070-2	28.4	19.1	53.4	
	2001	<0.230	36.9	Not sampled	52.4	
	2005	<0.053	28.5	17.4	38.3	
Mn mg/kg	1995	0.15	973	3310	3,070	none
	1996	<0.070	935	1695	1,860	
		>0.070-2	740	600	1,185	
	2001	<0.230	1,596	Not sampled	7,468	
	2005	<0.053	802	537	4,120	
Mo mg/kg	1995	0.15	3	<1	2	none
	1996	<0.070	4	3	1	

Metal	Year	Fraction (mm)	Wolverine Creek W09	Money Creek W11	Go Creek W16	ISQG[1]
		>0.070-2	3	1	1	
	2001	<0.230	ND	Not sampled	ND	
	2005	<0.053	2.7	0.7	1.8	
Ni mg/kg	1995	0.15	72.1	41.9	46.6	
	1996	<0.070	79	58	64	
		>0.070-2	37	25	48	none
	2001	<0.230	106.2		56	
	2005	<0.053	82.5	25.5	53.2	
Pb mg/kg	1995	0.15	32	15	9	
	1996	<0.070	35	30	8	
		>0.070-2	20	28	6	35
	2001	<0.230	ND	Not sampled	ND	
	2005	<0.053	32.5	**40.5**	28.9	
Se mg/kg	1995	0.15	<2	<2	<2	
	1996	<0.070	Not analyzed	Not analyzed	Not analyzed	
		>0.070-2	Not analyzed	Not analyzed	Not analyzed	none
	2001	<0.230	ND		ND	
	2005	<0.053	2.2	0.6	3.3	
Zn mg/kg	1995	0.15	**2,860**	**133**	**249**	
	1996	<0.070	**2,440**	**148**	**182**	
		>0.070-2	**892**	60	110	123
	2001	<0.230	**4,314**	Not sampled	**315**	
	2005	<0.053	**2,860**	93.9	**309**	

Notes: one sample per site
numbers in bold indicate concentrations higher than CCME ISQG
1. ISQG = interim sediment quality guideline

- Groundwater (quality (pH, conductivity, alkalinity, sulphate, metals, nitrogen compounds and flows)

  A consideration of hydrogeology was a requirement of the EAR Guidelines. The effects of the project on hydrogeology and the effects of hydrogeology on the project are of paramount importance due to the fact that the development will alter groundwater flow paths, may mobilize metals which could affect ground and surface water quality, and will determine the quantity of water that recharges the mine workings upon closure.

  The EAR defined baseline conditions by characterizing hydraulic conductivity in the mine area utilizing inflatable packer testing apparatus at two exploration borehole locations. Table 6-4 provides a summary of the borehole packer test results.

Table 6-4 Results of Mine Area Borehole Packer Testing (YZC & Axys, 2005)

Location	Test Number	Packer Test Interval (along borehole axis)		Calculated Hydraulic Conductivity (cm/s)	Qualitative Description of Hydraulic Conductivity Relative to Other Test Intervals
		Top (m)	Bottom (m)		
PZ-A	1	33.5	125.0	2.62×10^{-6}	Average

(Lynx)	2	67.1	115.8	6.59×10^{-7}	Less permeable
	3	118.0	194.2	2.18×10^{-6}	Average
	4	128.0	145.4	6.84×10^{-5}	More permeable
PZ-B (Wolverine)	1	73.8	156.1	7.51×10^{-6}	Average
	2	117.3	156.1	1.30×10^{-5}	Average
	3	135.0	156.1	3.94×10^{-5}	Average
	4	150.3	156.1	1.72×10^{-7}	Less permeable
	5	74.7	83.8	1.81×10^{-4}	More permeable (i.e., fractured/fault zone)

The EAR Guidelines further required YZC to develop a hydrogeologic model for the mine. Table 6-5 presents a summary of the inferred hydrostratigraphic units and the assigned hydraulic conductivity values used to develop the conceptual hydrogeologic model.

Table 6-5 Summary of Inferred Hydrostratigraphic Units (YZC & Axys, 2005)

Hydrostratigraphic Unit	**Composition**	**Assigned Hydraulic Conductivity (cm/s)**
Overburden	Soil and Talus	1×10^{-4}
Weathered bedrock	Rhyolite/Argillite Sedimentary and Volcanoclastic Rocks	5×10^{-4}
Host bedrock	Rhyolite / Argillite Sedimentary and Volcanoclastic Rocks	1×10^{-5}
Upper iron formation	Exhalites	1×10^{-6}
Host bedrock	Rhyolite/Argillite Sedimentary and Volcanoclastic Rocks	1×10^{-5}
Lower iron formation	Exhalites	1×10^{-6}
Host bedrock	Rhyolite / Argillite Sedimentary and Volcanoclastic Rocks	1×10^{-5}
Mineralized zone	Massive Sulphides	1×10^{-6}
Host bedrock	Rhyolite / Argillite Sedimentary and Volcanoclastic Rocks	1×10^{-5}

- Periphyton and Benthos

  The EAR Guidelines required a consideration of periphyton and benthos given their sensitivity as indicators of changes in water chemistry and their vital ecological role as primary and secondary producers, and are therefore effective indicators of aquatic health. The Metal Mine Effluent Regulations (MMER) pursuant to the (federal) *Fisheries Act* requires the biological monitoring of mine receiving environments, including benthos.

  Table 6-6 lists the various sampling programs that have been implemented for the Wolverine Project since 1996.

Table 6-6 Periphyton, Benthos and Zooplankton Sampling Program for the Wolverine Project, 1996 to 2005 (YZC & Axys, 2005)

Site	**Location / Relevance to Project**	**Stream Benthos**			**Lake Benthos**	**Lake Zooplankton**	**Periphyton**
		1996[1]	**1997[2]**	**2005[2]**	**1996[3]**	**1996[4]**	**Sept 2005**
W01	Nougha Cr. at outlet of Wolverine Lake / Reference site, regional cumulative effects monitoring	X		X			X
W09	Wolverine Cr. at Wolverine Lake / Monitoring effects of mine portal and dewatering		X 3 dates	X			X
W11	Money Cr. u/s of Go Cr. / Reference site for potential effects on Money Cr.			X			X

W12	Go Cr. u/s of Money Cr. / Project effects on Go Cr.	X		X			X
W14	Money Cr. d/s of Go Cr. / Project effects on Money	X		X			X
W16	Go u/s of Hawkowl Cr. / Project effects on Go Cr.			X			X
W21	Nougha Cr. at Highway / Reference site, regional cumulative effects monitoring	X					
W23	Money Cr. u/s of Dollar Cr. / Reference site, regional monitoring	X					
W26	Wind Cr. / Reference site on tributary of Wolverine Lake	X					
W72	Light Cr. near Highway/ Project effects of road			X			X
W73	Bunker Cr. / Project effects of road			X			X
W75	Creek entering Jimmy Lake / Reference site			X			X
	Wolverine Lake / Reference site, regional cumulative effects monitoring				X	X	
	Little Wolverine Lake / Monitoring effects of mine portal and dewatering				X	X	
	Little Jimmy Lake / Reference site for effects on Little Wolverine Lake				X	X	

Notes:
1. Artificial substrates, July 15/16 to August 21/22, 1996, 300 µm mesh net, 3 replicates per site
2. Hess sampler, May, July and Sept. 1997, September 2005, 3 replicates per site (except 1 replicate/site at W72 and W73).
3. Ekman dredge, August 20 – 23, 1996, 3 replicates per site
4. Wisconsin tow-net, August 1996, horizontal tow at 1-2 m

Samples were collected in the 1996 program utilizing artificial substrate samplers. The 1997 program utilized surber samplers. The 2005 program utilized different methodology; samples were collected from coble in natural riffle habitat (rather than artificial substrate) utilizing a Hess sampler with a 210µm mesh size. Benthic invertebrate abundance in the Wolverine Project area is summarized in Table 6-7. It is apparent that project area water courses support vibrant populations of benthic invertebrates.

Table 6-7 Benthic Invertebrate Abundance, Wolverine Project Area, 2005 (Jacques Whitford, 2006)

Site		**Abundance (organisms/m^2)**			
		Mean[1]	**St. Dev.**	**Minimum**	**Maximum**
Nougha Creek	W01	278,000	149,000	131,000	428,000
Wolverine Creek	W09	9,000	7,300	3,100	17,000
Money Creek	W11	8,100	5,000	2,200	13,000
	W14	41,000	38,000	13,000	84,000
Go Creek	W16	43,200	8,033	35,400	51,444
	W12	2,300	183	2,100	2,430
Tehká ki TueCreek	W72	23,000	11,000	14,000	35,000
Bunker Creek	W73	31,000	20,000	10,000	49,300

Site		Abundance (organisms/m^2)			
		Mean[1]	St. Dev.	Minimum	Maximum
Tributary to Little Jimmy Lake	W75	4,000	800	3,120	4,703

1. Mean of three samples per site

- Fish – fish habitat, metals in fish tissue

  Numerous fish species have been documented in some of the sub-basins affected by project development, including bull trout (*Salvelinus confluentus*), lake trout (*S. namaycush*), arctic grayling (*Thymallus arcticus*), burbot (*Lota lota*), northern pike (*Esox lucius*) and slimy sculpin (*Cottus cognatus*).

  None of the species known or suspected to occur in the upper Liard drainage are listed as a species at risk under the federal *Species at Risk Act*, however bull trout are regarded as sensitive.

  Fish are a socially, culturally and economically important resource for the Ross River people and Yukoners in general. Fish are sensitive to chemical changes to water and sedimentation as a result of activities related to mine construction and operation..

  The EAR Guidelines required an assessment of fish and their habitat in the project area and consideration of project effects on fish and their habitat. The EAR contained an assessment of fish habitat on Go Creek, Money Creek, Wolverine Creek and streams affected by the proposed access alignment. The results of fish and habitat studies undertaken in 1996 and 1997 were summarized in the Project Description Report (GLL, 2004). The 2005 program incorporated the 2004 fish surveys along the road corridor and also involved fish and habitat surveys along 27 sites; this program took place between August 3 and 7, 2005 as identified in Table 6-8.

  Table 6-8 Watershed-specific Fish and Fish Habitat Survey Locations, 2005 (YZC & Axys, 2005)

Major Drainage	Stream	Number of Sample Sites		Access Road Stream Crossings (September 2005 Alignment)
		Ground Survey	Aerial Survey	
Finlayson River	Tehká ki TueCk.	5	4	8
Money Creek	Bunker Ck.	7	2	1
	Chip Ck.	1	4	7
	Go Ck.	6		1[1]
	Money Ck.	2		Nil
	Pup Ck.	1		1
	Hawkowl Ck.	3		2
Wolverine Creek	Wolverine Ck.[2]	2		Nil[2]
	Total:	27	10	19

Notes:
1. Flows and water quality in Go Creek will be affected by treatment plant effluent discharge and a diversion from upper Go Creek to the tailings facility
2. Flows and water quality in Wolverine Creek will be affected by mine dewatering during operations and potential discharge of contaminated groundwater during closure

Fish habitat data collected included: fish cover, channel morphology, substrate composition, water quality parameters, stream stage, riparian vegetation and channel characteristics. Slimy sculpin were collected from three sites during the 2005 field program and were analyzed for metals as a means of characterizing pre-mining metals baseline in tissue. (YZC, AXYS 2005).

Vegetation

Includes rare plants, uncommon vegetation communities, mature and old forest, wetland and riparian vegetation, alpine vegetation, productive berry producing areas (traditional use), forest, metals levels in vegetation.

The EAR contained a comprehensive baseline study and assessment of vegetation in the area affected by the project. Representation of Bioclimatic zones within the study areas is summarized in Table 6-9.

Table 6-9 Representation of Bioclimatic Zones in Project Area (YZC& Axys, 2005)

Area	Boreal Lowland (ha)	Boreal Highland (ha)	Subalpine (ha)	Alpine (ha)	Total (ha)
Project Footprint	108.9	1,088.7	988.7	0.0	2,186.4
Vegetation LSA	153.9	1,487.5	1,255.6	3.1	2,900.1
Vegetation RSA	808.9	7,114.3	4,842.8	1,210.5	13,992.7
Forest Resources RSA (FRRSA)	8,134.6	15,092.2	17,923.6	3,541.2	54,691.6

Notes: LSA – Local Study Area

RSA – Regional Study Area

Wildlife

The EAR Guidelines required an assessment of the effects of the project on wildlife. The EAR contained an assessment of the effects of the project on wildlife and their habitat. Key issues considered were habitat availability, disruption to movement patterns and mortality risk. Consideration of the effects of the project on biodiversity was also considered. Both a local and a regional study area were identified and incorporated into the assessment.

Wildlife values in the project area are high and are a valued source of food for the Kaska people. Mining can affect wildlife and their habitat through habitat loss, fragmentation and direct mortality. Wildlife VECCs identified in the EAR included woodland caribou, moose, thinhorn sheep, black and grizzly bear, lynx, hare, marten, trumpeter swan, beaver, song birds, and raptors. Of particular note is the importance of the area to the Finlayson Caribou Herd.

Land Use

Includes effects of the project on settlement and transportation infrastructure, mineral and oil and gas activity, forestry and agriculture, subsistence and non-subsistence fishing and hunting, trapping, tourism and non-consumptive recreation, guide-outfitting and protected areas. The project is located on two traplines (RTC # 250 and 405) and a big game outfitting concession.

There are no formal land use planning activities taking place in the project area. Several interim protected First Nations land claim blocks are located within the area. Numerous mineral claims exist in the vicinity, some of which are actively being explored. There is currently no oil & gas, agriculture or forestry activity taking place within the Wolverine area. Recreational use is common, mainly fly-in angling on lakes within the project area.

Heritage Resources

Heritage resources include palaeontological, archaeological, historical and traditional sites that may be affected by the project. The EAR Guidelines required a consideration and assessment of heritage resources within the project area. A 2005 heritage resource assessment was undertaken, with no historical sites having been discovered in the project footprint area. These findings, however, do not preclude the possibility that there are as yet unidentified heritage resources within the project area worthy of protection; heritage resource mitigation is discussed in s.7.1.4 of this screening report.

Socio-economic Conditions

Socio-economic (or social and economic) conditions includes employment opportunities, contract and business opportunities, community health, traffic interruption/safety, and maintenance of subsistence practices and traditional way of life.

The EAR Guidelines required a consideration of the effects of the project on socio-economic conditions. An assessment of project effects on socio-economic conditions was included in the EAR.

Any social and economic effects of the project will be most felt in the communities of Ross River and Watson Lake. Whitehorse, as a service centre for the entire Yukon, will also be peripherally affected.

6.3.2 VECC Selection by Responsible Authorities

The RAs for this project, through the EAR Guidelines, required numerous bio-physical, cultural and socio-economic parameters be considered by the proponent in their EAR. The EAR Guidelines, at the same time, left it to the proponent to explicitly identify VECCs in their EAR.

The RAs have considered the VECCs identified in the EAR in light of the EAR Guidelines and will base this screening report on a consideration of the same VECCs. The RAs have added waterfowl to the list of wildlife VECCs that are considered in the scope of this screening.

6.4 Potential Environmental Hazards

Any component of the project may be affected by environmental hazards.

The EAR Guidelines required a consideration of potential environmental hazards that had the potential to affect the project. The EAR included a consideration of environmental hazards on the project. Of specific concern is the potential affect of environmental hazards on long-term engineered project structures such as the tailings dam.

The Tintina Trench is a localized seismic zone. As a result, a 10,000 year return period has been selected as the design criteria for the tailings impoundment structure.

Slides, avalanches and floods resulting from precipitation and extreme weather events could impact the project causing localized flooding in creek drainages. Floods are a natural hazard that must be considered in project design, particularly in relation to tailings management and stream crossings. Two year and 100 year peak flow analysis of local creeks was included in the EAR. A 10,000 year design flood event for the tailings dam and closure spillway was selected as a means of mitigating concerns related to peak flow and flood events.

Wildfires mainly caused by lightning are common in the mixed spruce boreal forests in the project area locale. The Yukon government's department of Community Services, Protective Services Branch, retains firefighting crews in the communities of Ross River and Watson Lake during the summer wildfire season. Clearings around project infrastructure should also minimize the impact of any potential wildfire on the project.

The RAs have considered the effects of climate change on this project; this is summarized in s.7.3.3 of this screening report, Effects of the Environment on the Project.

7. Predicted Environmental Effects of the Project and Mitigation

The proponent proposed numerous measures to mitigate against likely significant adverse environmental and socio-economic effects in their EAR and response document. The mitigation measures specified in this section are generally above and beyond those initially proposed by the proponent in the Project Description Report, EAR and EAR Response Document, May 11th 2006 and June 22nd 2006 follow-up documents and result from specific concerns raised during the technical review of the EAR and subsequent correspondence. It is the expectation of the RAs and a requirement of this screening report that all of the mitigation measures proposed by the proponent will be implemented as outlined in the EAR, response document and subsequent documentation, and regulatory authorizations will reflect this assumption, except where such proposed mitigation (and follow-up) is modified by the requirements defined in this screening. Requirements for monitoring and adaptive management are addressed in section 8 of this screening report, follow-up program.

7.1 Project Effects on Environmental Components

7.1.1 Water Quality and Aquatic Habitat

7.1.1.1 Acid Rock Drainage and Water Treatment

A primary concern with any hard rock mine in sulphide bearing mineralization is the possibility of ARD and subsequent metal leaching into ground and surface waters, with resultant negative effects on aquatic life.

Potentially Acid Generating (PAG) waste rock will be stored on an engineered liner during operations. The waste rock, along with some of the tailings, will be permanently disposed of in a subaqueous tailings management facility; some of the tailings will be placed back in the underground workings as paste backfill. Water in the tailings facility would be treated during operations and post-closure, as would water from the mine workings, until Water Use Licence compliance standards are met. The expectation is that the portal would flood post-closure, eliminating the oxidizing conditions that lead to acid rock drainage.

The EAR guidelines required the development and submission of a predictive model for the water chemistry of the underground workings at closure. The model submitted with the EAR utilized 1996-97 humidity cell data, and due to high detection limits for most elements, only considered zinc. The RAs and numerous technical reviewers were not satisfied with this model as the 1996-97 data had been regarded as preliminary. Due to the time required for new humidity cell testwork to yield credible results, YZC instead updated the model setting 1997 humidity cell leachate concentrations at or below their detection limit as detection limit values. The effects of paste backfill on closure water quality were

simulated utilizing laboratory studies on metal release rates from the Crandon property, a massive sulphide zinc-copper deposit in Wisconsin, with generally similar mineralization as found at Wolverine.

The results of the water quality model were provided in the response document and are shown in Table 7-1 as Mass Loading and Base Case concentrations. Conservative assumptions were built into the model, such as no consideration for source control measures or attenuation through soil horizons. The modelling exercise undertaken leads to the conclusion that groundwater that interacts with the backfilled mine at closure may be of poor quality, and therefore, appropriate mitigation measures to protect Wolverine Creek, Little Wolverine and Wolverine Lakes are required.

Table 7-1 Predicted Mass-Loading and Base Case Concentrations at Closure

Parameter	Mass-Loading Model[10] (mg/L)	Base Case Model[11] (mg/L)
Sulphate	776	852
Aluminum	1.16	0.001
Arsenic	0.275	0.277
Cadmium	0.0537	0.0560
Copper	0.358	0.020
Iron	5.10	0.00001
Lead	0.459	0.045
Molybdenum	0.099	0.096
Nickel	0.635	0.632
Selenium	0.509	0.505
Silver	0.161	0.161
Zinc	6.06	1.50

(YZC et. al, 2006)

Humidity cell testwork on samples from the Wolverine site were subject to humidity cell testwork commencing in December of 2005. While the modelling undertaken provides useful insight, the results of the humidity cell testwork commenced in December of 2005 must be provided for discussion at the water licencing hearing.

YZC identified source control measures to mitigate against ARD formation, including shotcreting of mine wall faces to minimize exposure to oxidizing conditions, and timely paste backfilling of spent workings, again, to minimize exposure of workings to oxidation. The RAs view source control measures as critical mitigation measures that must be implemented in a timely manner.

[10] Raw Mass Balance.
[11] Equilibrium Applied.

YZC submitted a closure groundwater contingency mitigation plan on May 11th 2006 to respond to reviewers' concerns regarding the possibility of metals leaching into groundwater that interacts with the backfilled mine workings on closure. YZC provided follow-up information again on June 22nd 2006 to respond to technical concerns raised in regard to the May 11th submission. YZC's groundwater contingency program consists of a "bio-pass" biological treatment system down gradient of the mine workings to intercept the groundwater flow that would otherwise emerge in Wolverine Creek. As this item relates to mine decommissioning, it is addressed in s. 7.1.6.2 of this report.

The information on paste backfill utilized for the closure water quality model, as stated previously, came from a detailed model undertaken for the proposed Crandon property in Wisconsin. While this material, in the view of the RAs, is applicable to the Wolverine situation, the Crandon property was never developed into a mine so model assumptions cannot be validated except through the experiences at the Wolverine Mine, should it be constructed and operated. Therefore, a plan to monitor the leachate from paste backfill must be implemented, as well as a program to track how the underground conditions at the Wolverine Mine affect the paste backfill, including deterioration, porosity and buffering capacity changes over time; this program is further discussed in s. 8.1.2 of this report.

YZC has proposed water treatment utilizing high density sludge (HDS) as treatment for the purpose of metals removal from waters that do not meet discharge standards. Residual sludge from the HDS process would be pumped to the tailings impoundment for disposal. Additional water treatment in the form of a carbon column and a bio-reactor will supplement the HDS process. Additional information, including bench-scale testwork, to validate water treatment plans must be provided for review and discussion at the water licencing hearing.

YZC has proposed a site specific discharge limit for Go Creek and site specific water quality objectives for the protection of aquatic life and associated point of compliance (W80 – limit of confirmed fish habitat in Go Creek). The RAs view the development of site specific discharge criteria as a regulatory matter for discussion at the water licencing hearing and resolution by the Water Board, and have therefore not subjected this specific proposal to a detailed analysis.

Concern has been expressed regarding the vulnerability of this project to water supply issues. The water balance model provided in the EA Response Document (YZC et. al, 2006) did not consider the formation of ice in the tailings pond during winter months. At least the top metre of the tailings impoundment pond is expected to freeze during winter months. Water lost to ice is not available to the mill for processing and since there is no provision for water re-supply, any water loss will accumulate over time. A small percentage loss on each cycle will cumulatively reduce the total amount of water available for milling. Furthermore, ice formation excludes many dissolved chemicals which results in a water supply

enriched with metals. The resulting return water will be higher in dissolved compounds than the test water used for mill flow sheet design. Contingency planning for addressing water over or under supply is a necessity.

Mitigation

The objectives of ARD and water treatment mitigation are the protection of water and aquatic life. The following mitigation measures are intended to ensure that water resource integrity is maintained throughout the life of the project. It is critical to ensure that PAG materials and mine waters are conservatively managed.

- Additional clarification on the site-specific quality and quantity of treatment plant input, and stability of residual sludge, must be submitted during the regulatory phase. A Water Treatment Manual that includes design details of the treatment facilities, protocols in regard to construction quality assurance and quality control (QA/QC) must be submitted to the Water Board prior to the water licencing hearing. Detailed designs and QA/QC documentation must demonstrate that design criteria can be met and that water treatment objectives can be achieved under site conditions for HDS, carbon column and bio-reactor treatment proposals.

- All aggregate and building material sources and potential 'cuts' related to road or infrastructure development must be characterized for acid generation potential prior to development; only non-reactive aggregate materials may be used for construction. Other than underground mine workings, sulphide or PAG materials cannot be disturbed for infrastructure development purposes.

- Source controls consisting of shotcreting and backfilling, to minimize the oxidation exposure of sulphide bearing underground workings, must be implemented in as timely a manner as practicable.

- A field pilot test of the bio-pass system must be undertaken at a location approved by a Water Resources Inspector within one year of commencement of mine production.

- The results of humidity cell testwork that commenced in December of 2005 must be presented to regulators prior to the licencing process. While this screening has been premised on modelling that utilizes data from other mines and preliminary site specific geochemical testwork, the results of the testwork that has been ongoing since December of 2005 must support the viability of the mitigation measures provided by the proponent as a means of mitigating the effects of an underground discharge from

backfilled workings at mine closure. The 2005 humidity cell testwork and the 2006 paste backfill humidity cell testwork must continue until regulators are satisfied that the geochemical characteristics of the Wolverine deposit have been defined. This long-term humidity cell data must be considered in the ARD/ML mitigations that will be developed for future detailed decommissioning and reclamation plans.

- A water supply management contingency plan must be developed and submitted to the Water Board prior to the water licence hearing. The plan must address contingencies for 1) a shortage of water supply, such as water lost to freezing during winter months and, 2) water surpluses, such as unexpected volumes of water inflow into the underground workings. Provision of fresh water input into the system must be considered and mitigation identified accordingly to afford an opportunity to discuss this matter at the water licence hearing.

- The proponent has committed to handle all materials, including ore, waste rock and tailings, as PAG material. This screening and determination are premised on the proposed conservative approach, and as such, must be reflected in regulatory instruments.

- Effluent can only be discharged to the Go Creek drainage.

- A program to quantify the water chemistry and flows associated with the underground workings must continue through the life of the mine. The need to ensure that mine flood water does not affect the environmental integrity of Wolverine Creek and Lakes must be considered a contingent liability and financially secured accordingly.

- In February of 2006, it became apparent that the underground workings would flood, and without corrective action by the proponent, a surface discharge to Wolverine Creek would occur during spring freshet. Hydrogeology data must continue to be collected and refined throughout the life of the mine. Plans for the construction of engineered hydraulic bulkheads, with an analysis of bulkhead surrounding material competence, must be submitted as a closure requirement.

- All waste rock must be placed below water level in the tailings management facility upon closure of the mine.

7.1.1.2 Tailings Management

YZC has proposed disposing of PAG tailings and waste rock under a 0.5 metre cover of water in a tailings management facility located on the upper reaches of Go Creek.

During the review of YZC's Project Description and subsequent EAR, several reviewers raised concern with the proposal to maintain a water cover of 0.5 m over the tailings, citing the possibility of wind induced wave action or wildlife disturbance of tailings to mobilize or expose sulphides to a degree that may lead to the onset of oxidation and metals release into Go Creek.

YZC responded to water cover concerns in their response document. YZC revised their closure plans to include the requirement to place 1.0 m of non-acid generating gravel sized DMS float rock on top of the tailings, then topped with a minimum of 0.5 m of water cover to be maintained permanently.

YZC further responded to concerns raised in the EAR concerning the original proposal to not line the TMF. Several reviewers raised concern with the possibility that the tailings may affect groundwater chemistry. YZC's response to these concerns was outlined in the EAR response document and consists of a plan to line the TMF with a 20 mil geomembrane liner.

Mitigation

The RAs consider the TMF to be one of the higher risk components of this project. The objectives of TMF mitigation requirements are to ensure that the facility is constructed and functions according to design criteria and that event estimation analysis is supported by all relevant data.

- A Tailings Management Manual that includes design details of the tailings management facility and protocols in regard to construction quality assurance and quality control (QA/QC) must be submitted to the Water Board prior to the water licencing hearing. Discussion of how lifts beyond the starter dam will be constructed must be provided. Diversion ditch designs and drawings must be provided. Any erosion protection requirements for the access road ditch must be identified and riprap/filter material specifications provided. Detailed design QA/QC documentation must demonstrate that design criteria can be achieved at all design and construction phases of the project.

- As a minimum standard, the tailings management facility must be engineered and constructed to withstand a 1 in 10,000 year flood event and return design earthquake.

- Piezometers must be placed in the downstream side of the crest and at the downstream toe of the tailings dam to monitor the build-up of any excess pore pressures in either the dam or the foundation soils.

- The estimates provided by YZC for hydraulic events were based on limited data. The proponent must continue to collect and utilize all available data, including contingencies to incorporate the effects of

climate change on design criteria, as well as event estimation methodologies to ensure that proposed design criteria at all phases of the TMF life are supported by reliable data.

- The seepage collection ditch must be located to ensure maximum seepage collection.

- The proponent's commitment to line the TMF with a 20 mil (minimum standard) geomembrane liner must be implemented.

- The proponent's revised plan to place a 1.0 m layer of gravel size material over tailings prior to closure must be a minimum regulatory requirement. The proposed cover material must be geochemically assessed with results of assessment provided to regulators for approval prior to material placement.

- The cost of upgrading the TMF to closure criteria at any point in the life of the project must be secured financially.

7.1.1.3 Sedimentation

Sedimentation in surface waters can be an issue during any phase of the project but is a particular concern during the construction phase, particularly while the tailings management facility is being constructed. *The Metal Mine Effluent Regulations* (Canada) contain total suspended solids criteria; the Water Licence is expected to contain discharge criteria for total suspended solids.

Mitigation

- Appropriate mitigation measures must be in place as required to control sedimentation of surface waters.

7.1.2 Vegetation

The development of the project will require the disturbance of surface vegetation in the immediate project area and along the haul road route. Concern exists regarding the possibility that invasive foreign plant species are occasionally introduced in reclamation seed mixes. These invasive species damage habitat by out-competing local species.

Mitigation

The objectives of mitigation measures designed to protect vegetation and supporting growth media is to ensure that disturbed areas are progressively

reclaimed as they are no longer needed for mine activities, and to protect local biodiversity by not importing foreign species.

- All growth media stripped for mine development purposes must be appropriately stockpiled for future reclamation use.

- Native species of seed must be used for reclamation purposes; seed mixture formulas must be approved by regulators prior to use. The proponent is encouraged to utilize indigenous seed for reclamation purposes; legume species must be avoided due to the fact they attract wildlife.

- The proponent must make best efforts to avoid the introduction of invasive species.

7.1.3 Wildlife

Numerous reviewers have raised concern with the potential for this project to disrupt the high wildlife values in the Finlayson area if focused management plans are not in place. The Finlayson Caribou herd is of particular concern due to the sensitivity of woodland caribou to development, particularly of linear corridors.

The EAR contained an assessment of effects of the project on wildlife. A Wildlife Management Plan in the EAR identified measures to be in place to protect wildlife values in the project area from disturbances arising from project activities. The plan addressed matters relating to firearm bans, limitations on vehicle use, forbidding the harassment of wildlife and prohibition on personal pets in the project area. A Waste Management Plan addressed issues pertaining to the storage and disposal of putrescible waste (incineration). The RAs believe that the Wildlife Management Plan identified in the EAR must be formalized during the permitting stage of the Project.

Based on discussion with Yukon government department of Environment biologists, the RAs have concluded that the haul road route selected will cause the least disturbance to wildlife values in the Finlayson area. The fact that haul trucks will head south at the Robert Campbell Highway rather than north through Ross River and Faro is a key management measure to lessen the impact of the project on the Finlayson Caribou Herd by reducing the possibility of direct caribou mortality on the highway.

Key to ensuring successful wildlife mitigation is construction and maintenance of the haul road with consideration of wildlife values. Access management to the site during all phases of the project is fundamental to mitigating the effects of the project on wildlife. Additional mitigation measures are necessary to ensure that

mine structures and activities, such as low flying aircraft, do not adversely affect wildlife within the scope of the project.

Mitigation

The objective of wildlife mitigation measures are to ensure that wildlife values are protected to the extent possible within the spatial scope of the Project. Where some disturbances are unavoidable, mitigation strategies must ensure that the disturbances are reversible as the project enters closure and post closure phases.

- Access to the haul road and mine must be restricted during all phases of the project.

- The proponent must enter into discussions on a formal environmental agreement with the Yukon government, as represented by the Yukon department of Environment, with a view to finalizing the agreement within six months of the issuance of the Quartz Mining Licence. The environmental agreement must address, but not be limited to the following:

    - Formalization of Wildlife Protection Plan and Waste Management Plan as identified in the EAR, including commitment to not allow employees' vehicles[12] on site, along with a 'no firearms'[13] and no hunting policy.
    - Formalize requirements to restrict access to the site during all phases of the project.
    - Commitments to avoid low level flights over lakes and critical wildlife habitat within the spatial scope of the project to the extent possible.
    - The agreement must formalize wildlife monitoring within the mine and haul road locations, including the monitoring of waterfowl and shorebirds within the TMF, particularly during migration periods.
    - The agreement must specify measures to restrict access during construction, operations, periods of temporary closure, decommissioning and post-closure, including provision for partial or full road reclamation as a means of access restriction, based on access requirements for decommissioning, monitoring and maintenance purposes.
    - The agreement must address the issue of appropriate speed limits on the haul road as a means of mitigating direct wildlife casualties.

- Fencing around any mine structure, including the tailings impoundment, must be installed at the discretion of a Mining Inspector if determined to be necessary for wildlife protection at any point during the life of the project.

- Prior to the commencement of haul road construction, the proponent and Yukon government, in consultation with the Kaska, must identify a suitable location for a gate to ensure its effectiveness in restricting access.

[12] Definition of vehicles includes all motorized on and off road vehicles.
[13] The camp manager may possess a firearm for purposes camp protection from bears.

- Snow-plow "push outs" to allow for the escape of wildlife on the haul road must be situated as approved by a Conservation Officer and/or the regional biologist of the Yukon department of Environment.

- Prior to the annual big-game hunting season, the proponent must contact the outfitting concession holder with a view to identifying areas where outfitting activities will be occurring; the proponent must make best efforts to amend flight schedules and routes to avoid flights within these areas during periods when outfitting activities are taking place.

- Aircraft flights must be routed to avoid active caribou rutting and sheep lambing areas to the extent possible.

- Plans for road decommissioning must be included in a subsequent detailed decommissioning and reclamation plan for the site, which must be a regulatory requirement (see temporary closure and decommissioning requirements under s.7.1.6.1 and 7.1.6.2 of this screening report).

- Financial security must be in place for road reclamation.

7.1.4 Heritage Resources

There are known culturally significant historical resources within the scope of the project area, yet no known physical and cultural values will be directly affected by this project. It is possible that ongoing work at the project site may uncover unknown heritage resources. Mitigation measures are required to ensure that mine workers do not disturb heritage resources and that any new heritage resource discoveries are reported.

The scope and methodology of any additional archaeological field work carried out at sites of traditional significance identified by the Kaska in the project area will be determined in cooperation with Yukon Heritage Resources. Mitigation of project impacts on archaeological resources will be determined in consultation with Yukon Heritage Resources and the Kaska.

Mitigation

- The Yukon Heritage Resources Branch, Department of Tourism and Culture and the proponent shall endeavour to develop a protocol in order to identify measures to be taken to respond to any encounter of heritage values. The protocol must identify steps to be taken in the event that a heritage value is encountered during any phase of the Wolverine Project.

- As a component of cross-cultural awareness training, all employees at the Wolverine Mine must be informed of the value of heritage resources to the Kaska people and on Yukon laws prohibiting the disturbance of these sites.

7.1.5 Socio-economic Issues

Effects on Communities

The EAR contained a detailed breakdown of the potential social and economic effects of the Wolverine Project. The conclusion was that the Project is not expected to result in likely significant adverse effects on the social and economic conditions of Ross River and Watson Lake. The direct and indirect employment opportunities offered by the project would provide positive social and economic benefits to community residents, including after the mine has closed as the skills acquired during the project could be transferred to other resource development projects in the future.

The project is designed to minimize negative social effects on local communities in that it will be a camp operation where employees will "fly in, fly out" for two week rotational shifts; workers will not be frequenting nearby communities except on their time off, thus avoiding potential disruption to community life that can occur when resource booms result in large spontaneous influxes of workers.

In August of 2005, a Socio-economic Participation Agreement (SEPA) between the RRDC and YZC was signed. The SEPA is a privileged document between YZC and the RRDC, however, the proponent identified some aspects of the agreement at the May 30th, 2006 community meeting in Ross River. The SEPA commits to hiring a Kaska liaison officer, priority hiring for Ross River Dena citizens, and then for other Kaska (in communities outside of Ross River including Watson Lake) and trapper compensation. Provisions of the SEPA also address opportunities for Kaska businesses to supply goods and services to the project. The SEPA also addresses some social issues such as a commitment to maintain an alcohol and drug free camp. Opportunities for training and scholarships, and provisions for community level support in the form of interest free loans to the RRDC are also components of the SEPA. Enhanced employment is expected to benefit the social and economic conditions in the communities of Ross River and Watson Lake.

While enhanced employment and contracting opportunities will provide socio-economic benefits to the communities of Ross River and Watson Lake, there is concern that increased income could lead to additional substance abuse problems. There are two full-time Yukon department of Health and Social Services (HSS) social service staff in Ross River whose functions include drug and alcohol counselling. If requested, HSS could provide training to First Nations staff or other community members to provide additional support in the community on substance abuse matters.

The Yukon Government, for the usual range and types of health and social services it provides to Yukon people and communities, addresses changes in requirements for those services through the normal operational and budgetary planning processes. The need for additional or expanded services is taken into consideration within those planning processes. If new or additional funding or staff are required, this will require approval by either the Legislature, or Management Board. For those health or social services which are normally offered by the Yukon Government in communities, the concerns and specific interests identified by the Ross River Dena Council and the Liard First Nation in their *Review of the Environmental Assessment for the Wolverine Project* (July, 2006) will be provided to the Department of Health and Social Services so that they can be considered within the department's planning processes.

Due to the fact that the SEPA has been concluded and authorized, there should not be significant adverse socio-economic effects of the project on the community of Ross River and also of other communities where Kaska residents reside. YZC's commitment to hire as many qualified staff, and procure as many local services as possible from Ross River, Watson Lake and other Yukon communities will help ensure that Yukon citizens and businesses will benefit from the development of the Wolverine Mine.

Mitigation

- The proponent must provide cross cultural training to all mine employees.

- The proponent must report annually on the number of Yukoners and non-Yukoners employed at the mine and the value of goods and services procured within Ross River, Watson Lake and the Yukon as a whole. Numbers associated with promotions, training and advancement opportunities for Yukon based mine employees must also be reported annually. These requirements should be included in the annual report to regulators.

Effects of Environmental Changes on Socio-Economic Issues

Consumptive and non-consumptive use of resources is prevalent within the scope of the Wolverine Mine Project area. Hunting, trapping, fishing (subsistence and recreational) and outfitting are all activities with a strong social and economic component that could be adversely affected if robust mitigation measures to protect fish and wildlife are not implemented. Section 7.1 of this report addresses mitigation measures to protect water and aquatic resources. Sections 7.1.3 and 7.3.1 of this report outline mitigation requirements to protect wildlife within the Wolverine Project area.

The proponent has committed to adopting Yukon guidelines for dealing with aerial impacts on wildlife; this is a component of the Wildlife Management Plan contained in the EAR that will be formalized with a project wildlife agreement (see s. 7.1.3 above). Further mitigation requires that YZC commit to avoiding airspace over the lakes in the project area, as these lakes are generally the focus of recreational, subsistence and commercial harvesting activities.

In comparison to other haul road location alternatives, the location chosen minimizes visibility from Wolverine Lake. The RAs consider this to be a critical mitigation at avoiding likely significant adverse economic effects on outfitting and tourism operations that utilize the Wolverine Lake area for consumptive and non-consumptive commercial uses.

Subsistence hunting and trapping is socially and economically important for the Kaska. The direct footprint of the mine will affect a small area and render a portion of land unsuitable for hunting and trapping, however, the changes will not be permanent. Trapline trails must be protected and where a disturbance is unavoidable, the disturbance must be reclaimed. Mine reclamation and road de-activation requirements, backed by financial security, will ensure that the mine and road footprint areas will be suitable for further subsistence pursuits in the future.

Some concern has been expressed regarding the safety of concentrate haul trucks on the Robert Campbell Highway, given the narrow, winding condition of the road in some areas. The Yukon Department of Highways and Public Works, Transportation Engineering Branch, establishes weight restrictions and speed limits on all Yukon highways based on safety and anticipated use design standard. It is expected that speed limits and weight restrictions will be adjusted as a result of this project if deemed necessary.

The RAs are satisfied that robust measures to protect wildlife, water and aquatic resources within the scope of the Wolverine Project will ensure that the prevalent economic use of the area for subsistence and commercial harvesting will be protected and the social benefits of these activities will continue, and there will not be a likely significant adverse environmental effect.

Mitigation

- All aircraft associated with the Wolverine Project must, to the extent possible, avoid airspace over, and in proximity to, Wolverine, Little Wolverine, Little Jimmy and Frances Lakes (will be formalized as component of the Environmental Agreement).

- To the extent possible, trapline and traditional trails must not be disturbed or blocked by project activities; where a disturbance is unavoidable the proponent must reroute trails. Reclamation of any disturbance must be undertaken as soon as practicable.

7.1.6 Decommissioning and Reclamation

7.1.6.1 Temporary Closure

The unpredictable nature of metal prices indicates that it may be necessary to temporarily suspend mine operations at some point during the life of the project until the return of more favourable market conditions. The EAR contained a conceptual temporary closure plan.

Mitigation

The objectives of mitigation measures to be implemented during periods of temporary closure are to ensure that the physical and geochemical stability of the property is managed and all structures and facilities maintained to accommodate future mining.

- The submission of a detailed temporary closure plan for review and approval must be a regulatory requirement; the plan must meet the following criteria in order for the site to remain in temporary closure. In the event that the following conditions are not met, final decommissioning of the project must take place.
  - The project must continue to meet all requirements for discharge.
  - The site must be under the continuous care of a full-time, on site caretaker.
  - All infrastructure and facilities required to resume mining, milling, hauling and waste treatment must remain on site and be maintained in good order.
  - Site access must continue to be restricted and monitored to ensure means of access restriction is maintained and not breached.
  - An adequate stockpile of building material must be maintained on site, along with functional heavy equipment, in order to ensure that personnel may be dispatched to the site to respond to an unexpected water management event on short notice.
  - All activities related to the care and maintenance of the site, including information substantiating the above requirements, must be included in the annual report to regulators (see s.8 of this screening, follow-up program).
  - Regulators may specify an upgrade of design criteria for any mine structure in the event of prolonged temporary closure.

7.1.6.2 Closure and Post-Closure

A conceptual decommissioning and closure plan was submitted with the EAR. The RAs are of the view that the conceptual plan identifies mitigation measures that are technically and economically feasible. However, the data that the conceptual decommissioning plan is premised on must continue to be collected, closure water quality and water balance models updated, and other relevant information considered in updated detailed decommissioning and reclamation plans.

Of particular note is YZC's proposal to construct a bio-pass passive groundwater remediation facility down gradient of the mine workings to intercept and treat groundwater that has interacted with the backfilled mine workings prior to reaching

Wolverine Creek. The RAs accept the proposed measure as a contingency measure that may or may not be necessary but that YZC has committed to construct. A program to test a model of the proposal under field conditions must be implemented during the operations phase of the mine life. Further hydrogeological data will need to be collected and interpreted to ensure that the facility is placed to capture groundwater that interacts with the backfilled mine workings. Further requirements centre on the need to ensure that long term management plans for the facility are in place.

Mitigation

The objective of decommissioning and reclamation is to physically and chemically stabilize, and restore the mine area to a functioning ecosystem that resembles pre-mine conditions as much as realistically possible. The decommissioning and reclamation commitments identified in the EAR must be reflected as requirements of regulatory authorizations.

- The submission of a detailed decommissioning and reclamation plan ('the plan') to achieve physical and chemical stability of the mine, for review and approval, must be a regulatory requirement; the plan must be updated and resubmitted to regulators at regular intervals. The plan and its subsequent updates must consider but not be limited to the issues identified in the EAR, and include but not be limited to the following:
  - Updates in the collection and further interpretation of hydrogeological information, related geochemical effects and underground discharge rates from mine workings, and effects on the receiving environment during closure and post-closure; a 3-dimensional numerical hydrogeological model for the underground workings must be provided.
  - Updated plans to mitigate a potential underground discharge from mine workings to receiving environment.
  - Results of efforts undertaken to test the bio-pass remediation system under site conditions, and any modifications required to be made to the bio-pass proposal to accommodate results of field trials and any enhanced knowledge of the relevant biological processes under site conditions, and enhanced understanding of relevant hydrogeological conditions to ensure facility is placed to capture groundwater that has encountered the backfilled mine workings. Detailed plans for the bio-pass system and creek diversion must be included. Plans for long term management of the system must also be included. The issue of metal leaching from backfilled mine workings into groundwater must be regulated as a contingent liability.
  - Plans for long-term inspections and maintenance of engineered facilities.
  - Plans for mine infrastructure removal and surface reclamation.
  - Results of ongoing site specific reclamation research (also see s. 7.1.2 of this screening).
  - Cumulative results of ongoing humidity cell testing (commenced December 2005), including humidity cells of paste backfill.

- The continued development of a water quality model for flooded mine workings, including a consideration of water samples taken from paste backfill leachate during mine operations.
- Incorporation of technological developments in best management practices.
- Identification and evaluation of progressive reclamation that has been undertaken to date and ongoing reclamation planning.
- Plans for post-closure monitoring and maintenance.
- Plans, including specifications for hydraulic plugs required to block portals and ventilation shafts on closure; an analysis of surrounding wall rock and grouting requirements must be provided.
- Updated costing estimates for financial security, including a cost estimate for post closure monitoring, inspections and maintenance.

7.1.6.3 Financial Security

The Yukon government has recently undertaken the development of a mine reclamation and closure policy. A fundamental tenet of the policy is the requirement for mine owners to financially secure their developments for the cost of liability at any point in the life of the project. Other aspects of the policy pertain to requirements to regularly review security held to ensure that it accurately represents the cost of liability at the time. Financial Security will be required for this project as a means of ensuring reclamation, maintenance, monitoring and adaptive management programs are successfully implemented.

Mitigation

- As per the Yukon government's mine reclamation and closure policy, security held must reflect the cost of liability, including contingent liabilities, at any point in time, and any monitoring and maintenance and/or follow-up requirements in the post-closure phase of the project. Provision of financial assurance should also be included for care and maintenance purposes.

7.1.7 Land Use

Land Use issues affected by the project development are addressed in the context of Socio-Economic Issues, On Current Use of Lands and Resources for Traditional Purposes by Aboriginal Persons and Effects on Sustainable Use of Renewable Resources in sections 7.1.5, 7.2.4 and 7.3.2 of this screening respectively.

7.2 Effects of Environmental Changes

7.2.1 On Human Health

Potential project effects that may impact human health are through inhalation or ingestion of contaminants and consumption of country foods or water contaminated from project activities. A project's affect on the environment could also affect the emotional and spiritual well-being of people.

Discharge from the mine will be subject to water licence standards intended to prevent the discharge of unacceptable water into the food chain. Other quartz and water licence terms and conditions relating to spill response will further mitigate potential effects of the project on human health.

Mitigation

- The objective of mitigating the effects of the project on human health is accomplished by ensuring that appropriate discharge standards and spill response requirements are conditions of regulatory authorizations. Further regulatory requirements for progressive and final reclamation, follow-up programs including adaptive management, will mitigate the effects on human health resulting from the project's effects on environmental changes.

7.2.4 On Current Use of Lands and Resources for Traditional Purposes by Aboriginal Persons

The development of the Wolverine Project will render a small portion of land in the mine area unsuitable for the pursuit of traditional purposes by aboriginal persons. However, the disturbance will be temporary for much of the area. Decommissioning and reclamation of the project will ensure that the site is restored to a functioning ecosystem. Progressive and final reclamation and decommissioning will ensure that the area may be used for subsistence activities should the Kaska wish to pursue them in the project area.

Mitigation

- The objective of mitigating likely significant adverse environmental effects on traditional pursuits by aboriginal persons includes mitigation requirements for wildlife protection and reclamation obligations. The implementation of mitigation measures such as access restriction and other wildlife protection measures, progressive and final reclamation with ongoing follow-up program implementation into the post-closure period, backed by financial security, are intended to restore that the project area to the extent that it will be available for traditional pursuits by aboriginal persons should the Kaska wish to engage in such activities.

7.3 Effects in Relation to Other Factors

7.3.1 Cumulative Environmental Effects

Cumulative environmental effects are those effects that arise as a combination of direct project effects in combination with other projects and/or activities that have or will occur. The main 'past' project in the area is the construction of the Robert Campbell Highway in the 1950s and 60s. There has not been significant industrial development in the Finalyson area other than the Kudz ze Kayah Mine, which was licenced in the late 1990s but not yet developed. There is ongoing exploration for gems and metals in the Wolverine area. Seasonal winter haul routes through the spatial scope of the Wolverine project have been used to mobilize materials to the Wolverine site and a gem exploration site that is outside the spatial scope of this assessment. Hunting, trapping, fishing, gathering and recreational pursuits are common in the project locale. The Robert Campbell Highway transects the area.

Resource development projects that are expected to occur in the future are the Kudz ze Kayah project and ongoing exploration. Hunting, trapping, fishing, gathering and recreational pursuits, as well as continued use of the Robert Campbell Highway, can be expected to continue within the area scoped into this assessment.

The RAs have identified two particular VECCs which cumulative effects may affect in the context of the Wolverine Project: cumulative effects on wildlife; and cumulative effects on water and aquatic resources. Linear corridors are particularly detrimental to wildlife due to increased access leading to direct mortality (vehicle collisions), increased hunting pressures, increased predation and habitat fragmentation; specifically, woodland caribou are known to avoid a considerable area adjacent to linear corridors. Increased activity in the area may also lead to further human/bear encounters which may lead to bear mortality. Increased aircraft usage can have detrimental effects on wildlife, sheep and caribou in particular. Untreated discharge to surface waters from multiple sources could result in significant adverse cumulative effects.

The EAR contained a cumulative effects analysis for all identified VECCs. The findings generally indicated that likely significant adverse cumulative effects could be mitigated. Waste discharge to water is regulated under the *Waters Act*. Water Use Licences under the *Waters Act* will ensure that other projects that would deposit a waste into receiving waters, are licenced on a case by case basis to mitigate significant adverse cumulative effects on water and aquatic resources. The cumulative effects of ongoing and anticipated exploration programs will be mitigated by operating conditions of the Mining Land Use Regulation pursuant to the *Quartz Mining Act*, including requirements for reclamation. Seasonal winter haul routes are regulated pursuant to the Land Use Regulation of the *Territorial Lands Act* and/or the *Quartz Mining Act*, depending on whether they are on first

party mineral claims or not. Regulated winter haul routes leave minimal disturbances on the landscape that are not likely to contribute to significant adverse cumulative effects.

There are no Land Use Plans in effect, nor are there any anticipated to be in effect in the foreseeable future. There is not a Renewable Resource Council whose mandate includes the Wolverine area. As such, the RAs are of the view that a body must be established to track changes in the Finlayson Caribou Herd and provide impact assessors and wildlife managers with recommendations on how the herd may be protected and enhanced; this is further discussed in mitigation measures below.

Previous activities in the area other than the Campbell Highway include a long standing big-game outfitting concession, a small jade exploration site (Tuchitua Claims) southeast of the Wolverine Project area, traditional and recreational hunting and fishing as well as trapping. Mineral exploration has historically occurred throughout much of the study area, however other than on the Wolverine, Tuchitua and Kudz ze Kayah sites, the exploration was generally low intensity that did not require the use of heavy machinery thereby not contributing to significant adverse cumulative effects. No further linear developments are currently being proposed within the scope of this assessment.

The outfitting concession holder has expressed concern with the cumulative effects this project and other activity is having on wildlife populations and subsequently, the outfitting business. The outfitter has contended that the cumulative effects of mineral exploration activity are adversely impacting the outfitting business and submitted a request for compensation. The approach taken by the RAs while undertaking this screening has been to wherever possible, seek solutions to mitigate against likely significant adverse environmental effects rather than compensate for them. Regardless, the RAs have considered whether the compensation request constitutes an appropriate mitigation measure for the purpose of this screening. Based on input from the Yukon department of Environment, and in consideration of the robustness of the mitigation requirements of this screening, particularly in relation to wildlife, low level flight restrictions, road route selection, water management, reclamation, and the relatively short duration of the mine life, it is the view of the RAs that likely significant adverse cumulative effects are mitigated and compensation is not justified as a mitigation measure under the EAA; this determination does not preclude the possibility that compensation may be awarded pursuant to other statutes such as the *Waters Act*, or policies such as the Yukon department of Environment's Concession and Compensation Policy.

Mitigation

The mitigation identified under the Water Management (s.7.1.1) and Wildlife (s.7.1.3) sections of this screening report mitigate the direct effects of the

Wolverine Project but also contribute to the mitigation of the cumulative effects of this project in relation to other projects that have, or will occur within the scope of the assessment. Additional mitigation is identified below.

- The Yukon department of Environment has agreed to establish a working group comprising of RRDC representatives, wildlife biologists and other interested stakeholders such as the local outfitting concession holder and mining industry representatives, to track the changes in the Finlayson Caribou herd, and to make recommendations to impact assessment practitioners and Yukon government wildlife managers on how the cumulative effects on the herd may be mitigated and the herd otherwise enhanced.

- The Yukon department of Environment must continue educational campaigns targeting the mineral exploration industry and the Yukon aviation industry on best practices aimed at minimizing wildlife disturbance caused by low altitude flights.

7.3.2 Effects on Sustainable Use of Renewable Resources

The predominant use of renewable resources in the project area is for personal and commercial (outfitting) hunting, trapping, fishing and gathering. Mining activities will temporarily disrupt land based use of renewable resources in the area directly affected by the project. However, the disturbance will be temporary. Decommissioning and reclamation of the project, including complete road closure, will ensure that the site is restored to a functioning ecosystem that will once again be conducive to the sustainable use of renewable resources.

Mitigation

- The implementation of mitigation measures such as access restriction and other wildlife protection measures, progressive and final reclamation and ongoing follow-up program implementation into the post-closure period, backed by financial security, will ensure that the project area is once again suitable for sustainable use of renewable resources.

7.3.3 Effects of the Environment on the Project

The EAR considered the effects the environment may have on the project.

The Tintina Trench is a localized seismogenic zone. YZC chose a 10,000 year return design earthquake criteria for the tailings impoundment.

YZC also considered the effects of slides, avalanches, floods and extreme weather events in their EAR, concluding that the 10,000 year design return event criteria mitigated the potential effects of such events.

The EAR also contained an assessment of the effects of climate change on the project, particularly the degree to which changes in precipitation patterns could affect the project, particularly in the long term. YZC concluded that the 10,000 year design flood return event criteria incorporated the influences of climate change on the project, premised on the assumption that precipitation will increase by 90 to 275mm annually.

While YZC considered possible precipitation increases related to climate change in the 2005 EAR, further information and modelling on the possible effects of climate change evolves continuously. Given that the evolving nature surrounding the understanding of climate change and the fact that predictive models on the effects of climate change continually become more sophisticated, the effects of climate change on the project must continually be incorporated into event design analysis of the long term engineered components of the project throughout the life of the project, particularly to tailings dam lifts, until the implementation of an approved decommissioning plan.

It is the determination of the RAs that the design criteria selected for the tailings management facility will mitigate against likely significant adverse environmental effects, yet follow-up is required to ensure that design criteria is based on the best available data.

Mitigation

The objectives of measures to mitigate the effects of the environment on the project are to ensure that the project is engineered to accommodate the best possible and up-to-date understanding of environmental processes that could affect the integrity of mine components.

- Follow-up programs must be in place to monitor environmental trends on-site and apply adaptive responses to situations where design criteria may need reconsideration in light of enhanced understandings or unexpected changes in weather patterns.

7.3.4 Effects of Possible Accidents and Malfunctions

Accidents or malfunctions that could lead to significant adverse environmental effects relate mainly to accidental spills or component malfunctions that lead to unauthorized discharges. Fuels, chemicals, tailings, ore, concentrate or non-compliant water could be released to the environment as a result of accidental discharge or malfunction.

The abandonment of the site by the proponent may be considered a possible malfunction. This possibility is mitigated by the collection and maintenance of financial security.

The EAR contained contingency plans to address the possibilities of deleterious substance releases resulting from accidental spills or malfunction, by project phase.

Mitigation

The objectives of accident and malfunction mitigation is to ensure that mine related components are designed and constructed to an appropriate standard and that should an accidental discharge occur, procedures are in place to respond and report on it as quickly and effectively as possible.

- Design criteria for mine components must be sufficient to prevent failures to the extent practicably possible.

- Accident, spill and malfunction contingency plans must be developed, submitted to regulators for review and approval and formalized as regulatory requirements, along with reporting requirements.

- The proponent must inform the RRDC and Liard First Nation of any release of deleterious substances arising from an accident or malfunction in the Yukon associated with this project.

8. Follow-up Program

A follow-up program is intended to verify the accuracy of the environmental assessment and to respond to unforeseen changes in the environment resulting from project activities. An effective follow-up program consists of four broad elements:

1. A monitoring program;
2. an evaluation of monitoring data;
3. a program to manage or otherwise respond and/or adapt to changes in environmental performance; and,
4. a reporting function to communicate the results of the follow-up program and related adaptive management implementation.

Adaptive management strategies recognize that the environmental management programs associated with a project must be flexible to respond to the findings of monitoring programs. This screening report is premised on the principle that the mitigation measures proposed are technically and economically feasible, but that adjustments to mitigation strategies may be required over time to adapt to an enhanced understanding of the projects' effects on the environment over time. Adaptive management concepts and practices are not intended to allow for the discount of current issues in favour of deferred future 'adaptive' responses. Financial security is intended to back follow-up programs and any associated adaptive responses.

Except where specified in regulatory authorizations, government does not normally specify how a proponent is required to adapt their approved environmental management plans to changes or unexpected occurrences in the receiving environment. Industry is encouraged to implement innovative adaptive management practices, under the assumption that such responses will be technically and economically feasible, consistent with the scope of regulatory authorizations, and not result in likely significant adverse environmental or cumulative effects in and of themselves. It is noted that periodic review and updating of regulatory instruments is possible when amendments are necessary; this allows for adaptive management considerations to be updated as determined appropriate.

8.1 Water Resources

8.1.1 Surface Hydrology

A comprehensive surface water flow monitoring and reporting program must be in place for all phases of the mine life from construction through post-closure. Detailed weather monitoring, including precipitation and evaporation, must also be in effect through all phases of the project. Prior to mine closure, water balance models must be updated based on data gathered over the mine life (site-specific field data and additional information on the effects of climate change); this information must be incorporated into closure upgrades for all engineered mine components, particularly for the TMF by ensuring that the 1:10,000 year analysis reliably supports the conservative design criteria.

Required adaptive responses include, but are not limited to project component modification to ensure that the design criteria analysis is reliably supported by field data.

8.1.2 Surface Water Quality

Detailed water quality monitoring, acute lethality testing and reporting programs must be in place through all phases of the project. The ongoing geochemical assessment (humidity cell) testwork[14] that commenced in December of 2005 must be summarized in annual reports for the preceding year, as must humidity cells on paste backfill once results are available. Sediment, benthos and periphyton must continue to be monitored over the life of the project and compared to baseline conditions to determine if further mitigative actions are required.

A program to quantify the assumptions made concerning paste backfill must be implemented during mine operations, after backfilling of stopes begins. Once paste backfilling of mined-out stopes commences, leachate from paste backfill must be collected, analyzed and reported on a regular basis. A program to assess the effects of underground water chemistry and other underground environmental factors on paste backfill, including paste deterioration, porosity changes and buffering capacity changes during the life of the mine must be implemented.

Adaptive responses include preventing surface discharges from mine workings, amending decommissioning and reclamation plans, modifying water treatment processes, including storage capacity upgrades, to ensure that discharge standards are met on a continual basis.

8.1.3 Hydrogeology

Hydrogeology monitoring and reporting must continue during all phases of the project from construction through post closure. In particular, an understanding of the groundwater flowpaths influenced by the underground workings must continue to be refined and further quantified. Flow volumes must also be monitored throughout the life of the project as they may affect metal loadings in the receiving environment once active water collection and treatment ceases. The proponent is further required to quantify any attenuating capacity in the soil horizons within the groundwater pathway below the underground workings.

A detailed plan to monitor groundwater quality in wells below the mine workings must be in place for all phases of the project, from construction through post-closure. This information must be reported to regulators.

Adaptive responses include implementation of the bio-pass contingency measures to ensure that metals contamination from underground works does not adversely affect water quality and aquatic habitat in Wolverine Creek and little Wolverine Lake.

[14] This humidity cell testwork must continue until mine regulators authorize its discontinuence.

8.2 Wildlife

The proponent is required to accurately monitor and report on all interactions in the Yukon between the project and caribou, moose, bear and sheep, from the mine site, along the haul route to the British Columbia border. Particular attention to wildlife (including waterfowl) interactions with the tailings management facility is required during the operating and any temporary closure periods.

Adaptive responses include, but are not limited to the lowering of speed limits and additional fencing requirements in the mine area.

8.3 Reclamation and Temporary Closure

The RAs strongly encourage the practice of progressive reclamation for components of the workings that are exhausted over the course of the project or are otherwise no longer required to accommodate continued mining or associated activities. The annual report to regulators must detail all progressive and ongoing reclamation that occurred during the preceding year. Programs to monitor the effectiveness of reclamation measures must be developed and implemented subject to regulatory review and approval.

The results of programs to monitor the effectiveness of progressive reclamation measures, as well as measures taken to address unexpected reclamation developments must also be detailed in annual reports.

Efforts taken to implement requirements in order to maintain the temporary closure status of the site in good standing must be substantiated in the annual report. Adaptive responses include but are not limited to works required to maintain the physical integrity of mine components and assets, both moveable and immovable.

9. Determination of Significance

The RAs have determined the level of significance of this project on VECCs by taking five parameters into account: duration (years), geographic extent based on specified drainages, frequency, reversibility (%) and magnitude. For each parameter, descriptors were identified based upon a range of effect on the parameter (Table 9.1). The descriptors used were very low, low, moderate, high and very high. The descriptors were numerically ranked from 0 to 4 respectively for all but reversibility which was ranked in reverse order.

The analysis of the significance of effects is based on residual effects after the implementation of mitigative measures. Mitigation measures are intended to lessen the effect of the project on selected VECCs.

The significance of the adverse effect is determined based on an overall ranking descriptor. The overall ranking for each effect was obtained by summing the numerical ratings for each parameter for the project component under consideration. Effects with an overall ranking of 11 or more out of 20 are determined to be significant.

Magnitude is more challenging to quantify than the other four parameters. The magnitude of an adverse environmental effect refers to the degree of severity. Minor or inconsequential effects may not be significant, but effects that are major or catastrophic will be significant. The magnitude of an adverse effect is also dependant on the individual VECC and the particular nature of the receiving environment in question.

Table 9.1

Level of Significance	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Magnitude**
4	Frances Lake	Permanent	Continuous	Very low (1-40%)	Very Large *90% change in VECC function.*
3	Wolverine and Little Wolverine Lakes and drainages	More than 10 years	Common *occurs on regular basis 50% or more of time or chronically over several years.*	Low (40-60%)	Large 50-90% *change in VECC function.*
2	Local: Wolverine Creek, Go/Money Creeks	1 -10 years	Uncommon *occurs irregularly.*	Moderate (60-75%)	Medium 10-50% *change in VECC function.*
1	Spot effect	Less than 1 year	Rare *occurs less than 10% of the time.*	High (75-100%)	Minimal *less than 10% change in VECC function.*
0	None	None	None	None	None

Table 9.2 Analysis of Significance of Environmental Effects

VECC	Development	Effect	Mitigation *	Significance of Effects						Significant (Y/N)
				Duration	Geographic	Frequency	Magnitude	Reversibility	Overall Rating	
Surface Water Quality and aquatic habitat	TMF	Elevated levels of metals/selenium	Discharge criteria, Regulatory approval of TMF design details prior to construction, placement of impermeable liner.	4	2	1	1	1	9	N
	Workings	Elevated levels of metals/selenium	Water treatment during operations, source controls to minimize oxidation, hydraulic bulkheads at closure.	4	2	1	1	1	9	N
Groundwater Quality	Workings	Elevated levels of metals/selenium	Water treatment during operations. Bio-pass system closure contingency. Hydraulic bulkheads on portals at decommissioning.	4	1	2	1	2	10	N
	TMF	Elevated levels of metals/selenium	Regulatory approval of TMF design details prior to construction, placement of impermeable liner.	4	1	1	1	2	9	N
Wildlife	All	Disturbed areas, habitat fragmentation, wildlife disruption (noise, etc.), increased site access for hunters.	Reclamation/Revegetaion, site restriction, wildlife agreement, road reclamation, no hunting camp, etc.	3	2	2	1	2	10	N
Traditional/Heritage Resources	All	Disturbance of heritage	Education of mine employees on laws prohibiting disturbance to heritage resources, cultural awareness training requirement.	3	1	2	1	2	9	N
Socio-Economic Issues	As a result of environmental changes from Project.	Disturbance of commercial and subsistence resource extraction activities in Project area.	Mitigation measures to protect wldlife and aquatic resources, including access restriction.	2	1	2	2	1	8	N
	On communities of Watson Lake and Ross River	Disturbance of community life resulting from Project.	Socio-economic Participation Agreement between Proponent and Kaska as represented by RRDC.	1	1	2	2	1	7	N
Ambient Air Quality	All	Increased air emmissions, greenhouse gases	Best Management Practices for energy conservation and equipment maintenance	3	2	3	1	1	10	N
Terrain, Surficial Geology, Soils	All	Physical instability	Licence requirements for physical stability, progressive reclamation.	1	1	1	1	1	5	N
Vegetation	All	Loss of habitat, invasive species	Progressive reclamation utilizing native species, best management practices to avoid introduction of invasive species	1	1	1	1	1	5	N
Land Use	All	Loss of opportunity to pursue other consumptive and non-consumptive activities in area.	Water management, wildlife mitigation and reclamation requirements.	1	1	1	1	1	5	N

TMF = Tailings Management Facility

* Refer to section 7 of this report for detailed description of mitigation requirements.

10. Conclusions and Determination of the Responsible Authorities

It is the determination of the Responsible Authorities that taking into account the implementation of mitigation measures and follow-up, the project is not likely to cause significant adverse environmental effects.

Environmental Assessment Act determination:

16(1)a
subject to subparagraph (c)(iii), where, taking into account the implementation of any mitigation measures that the responsible authority considers appropriate, the project is not likely to cause significant adverse environmental effects, the responsible authority may exercise any power or perform any duty of function that would permit the project to be carried out and shall ensure that any mitigation measures that the responsible authority considers appropriate are implemented;

Authorization:

Original signed by R. Holmes, September 21, 2006

_____ _____

Robert Holmes Date
Director, Mineral Resource Branch
Energy, Mines and Resources

Original signed by J. O'Farrell, September 21, 2006

_____ _____

Jeff O'Farrell Date
Director, Development Assessment Branch
Executive Council Office

References

Canadian Parks and Wilderness Society, letter from Theresa Gulliver to Derek Fraser, Re: *CPAWS-Yukon comments on Draft Wolverine Screening Report for Yukon Zinc Corporation's Wolverine Project*, 18 August 2006.

Environmental Protection, Environment Canada, letter from Benoit Godin to Derek Fraser, Re: *Wolverine Project – Environmental Assessment Report – Review Comments*, 16 December 2005.

Environmental Protection, Environment Canada, letter from Benoit Godin to Derek Fraser, Re: *Wolverine Project – EAR responses to Public and Regulatory Reviews – comments*, 11 April 2006.

Fisheries and Oceans Canada, letter from Steve Gotch to Paul Scott, Re: Federal Coordination for Wolverine Project – Fisheries and Oceans Canada Change in Status from Regulatory Authority (RA) to Expert Federal Authority (FA), 21 December 2004.

Fisheries and Oceans Canada, letter from Sandra Orban to Derek Fraser, Re: *Response to EAA Request for Project Review for Assessment of Mitigation Proposed for the Project*, 16 December 2005.

Gartner Lee Limited, *Wolverine Project Description Report*, November 2004.

Jacques Whitford Ltd., *Yukon Zinc Corporation Wolverine Project Yukon Territory Environmental Assessment Report Aquatic Resources Addendum*, March 2006.

Liard First Nation, letter from Laurie Allen to Derek Fraser, Re: *Wolverine Mine project Draft Screening Report – Consultation*, 28 August 2006.

Natural Resources Canada, letter from Iannick Lamirande to Derek Fraser, Re: *Wolverine Environmental Assessment Review*, 16 December 2005.

Natural Resources Canada, letter from Iannick Lamirande to Derek Fraser, Re: *Wolverine Environmental Assessment Review*, 04 April 2006.

Ross River Dena Council (YESA – Lands and Resources), letter from Testloa Smith to Derek Fraser, Re: *Review of Wolverine Project Description – Your letter of 19 November 2003 to Chief Jack Caesar*, 16 December 2004.

Ross River Dena Council (YESA – Lands and Resources), letter from Testloa Smith to Derek Fraser, Re: *Review of Yukon Zinc Corporation's EAR for the Wolverine Project*, 24 January 2006.

Ross River Dena Council, prepared by Denzena Consulting, Re: *Ross River Dena Council and Liard First Nation Review of the Environmental Assessment for the Wolverine Project*, 10 July 2006.

Smith, C.A.S., Meikle, J.C., and Roots, C.F. (editors). *Ecoregions of the Yukon Territory: Biophysical properties of Yukon landscapes*. Agriculture and Agri-Food Canada, RARC Technical Bulletin No. 04-01, Summerland, British Columbia, 2004.

SRK Consulting, technical memorandum from Diana Sollner to Derek Fraser, Re: *Wolverine Environmental Assessment Review*, 06 December 2005.

SRK Consulting, technical memorandum from Michael Royle to Derek Fraser and Robert Holmes, Re: *Review of February 2006 Response to Public and Regulatory Review of the EAR, Wolverine Project*, 13 April 2006.

SRK Consulting, e-mail from Michael Royle to Derek Fraser, Re: *Wolverine* (May 11th submission), 24 May 2006.

SRK Consulting, e-mail from Stephen Day to Derek Fraser, Re: *Wolverine Final Comments* , 24 May 2006.

Teslin Outfitters Ltd., letter from Ken Reeder to Derek Fraser, Re: *Expatriate Resources' Wolverine Project*, 20 December 2004.

Teslin Outfitters Ltd., letter from Ken Reeder to Derek Fraser, Re: *Yukon Zinc Corporation ("YZ") – Wolverine Lake Mine Project (the "Project") and related Environmental Assessment Report ("EAR")*, 16 December 2005.

Yukon Zinc Corporation and AXYS Environmental Consulting Ltd., *Environmental Assessment Report*, October 2005.

Yukon Zinc Corporation et. al, *Environmental Assessment Report, Response to Public and Regulatory Reviews*, February 2006.

Yukon Zinc Corporation and Lorax Environmental, *Yukon Zinc Corporation Response to Clarification Requirements Arising from Technical Review of YZC's EAR Response to Public and Regulatory Reviews*, 11 May 2006.

Yukon Zinc Corporation and Lorax Environmental, *Yukon Zinc Corporation Follow-up Response to Issues Raised in May 24th Conference Call*, 22 June 2006.

Yukon Department of Environment, letter from Randy Lamb to Derek Fraser, Re: *Wolverine EAR Deficiency Comments from Environment Yukon, Regarding Parks, Wildlife and Air Quality*, 05 December 2005.

Yukon Department of Environment, letter from Morris George to Derek Fraser, Re: *Water Resources Input Form for Project Description Undergoing Environmental Assessment and Permitting*, 15 December 2005.

Yukon Department of Environment - Water Resources Branch, letter from Richard Janowicz to Kevin McDonnell, Re: *Wolverine Project Environmental Assessment Report*, 20 December 2005.

Yukon Department of Environment, *Yukon Zinc Wolverine Addendum Report Review*, 03 April 2006.

Yukon Department of Environment – Water Resources Branch, *WR Input Form for Project Descriptions Undergoing Environmental Assessment and Permitting - Wolverine EAR (revised)*, 03 April 2006.

Yukon Department of Environment – Water Resources Branch, letter from J.R. Janowicz to Kevin McDonnell, Re: *Wolverine Project Environmental Assessment Report – Response to Public and Regulatory Reviews*, 17 April 2006.

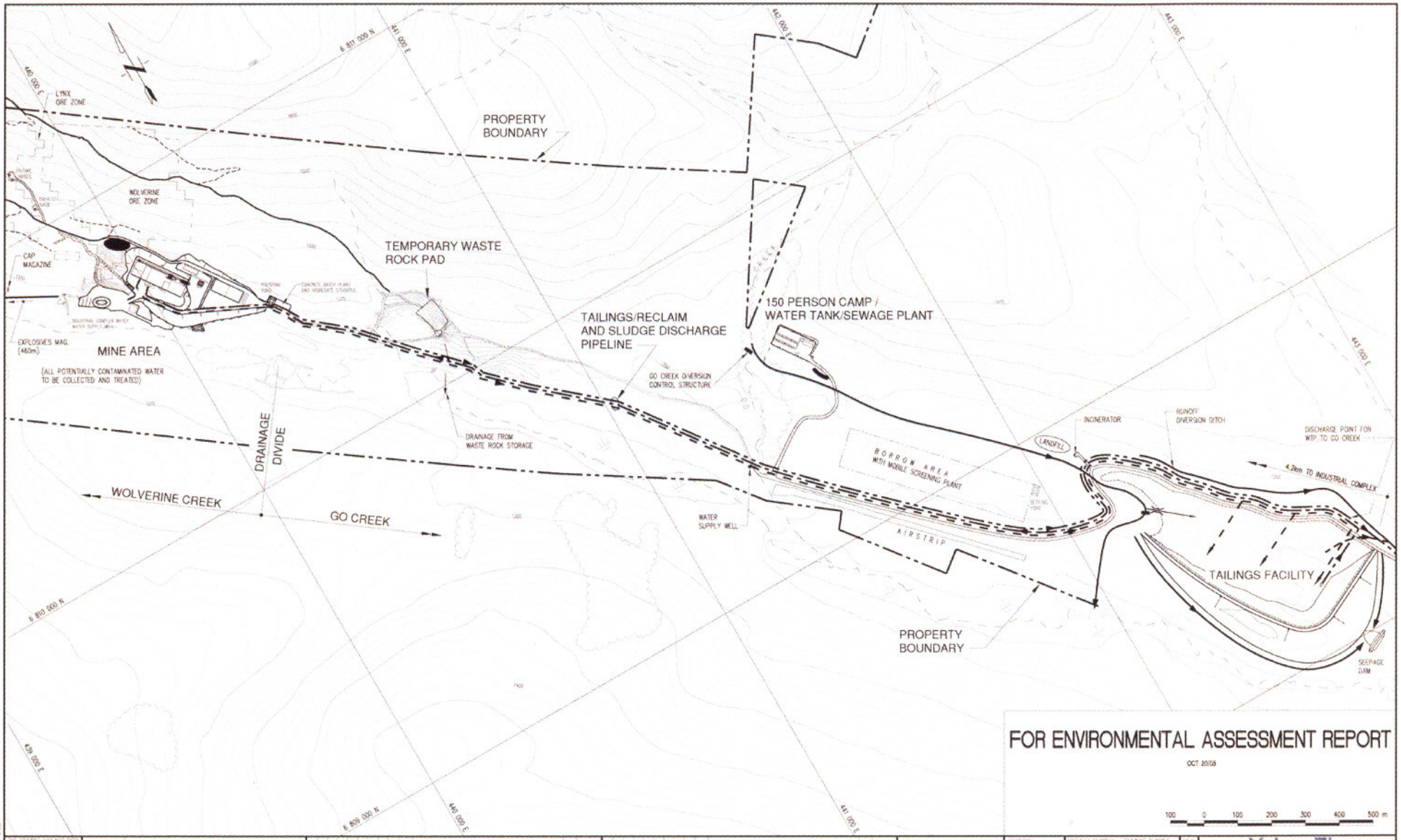
Yukon Department of Tourism and Culture, letter from Cathryn Paish to Derek Fraser, Re: *Wolverine Project Environmental Assessment Report*, 16 December 2005.

Yukon Executive Council Office, *Information Guidelines for the Preparation of an Environmental Assessment Report for Yukon Zinc Corporation's Proposed Wolverine Project*, 07 March 2005.

Yukon Conservation Society, letter from Tracy Boyes to Derek Fraser, Re: *YCS Comments on the Environmental Assessment Report for Yukon Zinc Corporation's proposed Wolverine Project*, 19 December 2005.

Yukon Conservation Society, letter from Tracy Boyes to Derek Fraser, Re: *YCS Comments on the Environmental Assessment Report for Yukon Zinc Corporation's proposed Wolverine Project*, 03 April 2006.

Yukon Conservation Society, letter from Karen Baltgalis to Derek Fraser, Re: *Yukon Conservation Society's Response to the Draft Screening Report for Yukon Zinc Corporation's Wolverine Project*, 16 August 2006.



NO	DESCRIPTION	BY	DATE
A	ISSUED FOR ENVIRONMENTAL ASSESSMENT REPORT ON 05/10/20		

SECTION	CIVIL	
SCALE	1:5000	DATE
DESIGN BY		
DRAWN BY	D.L.N.	JULY 05
CHECK BY	JS	SEPT. 05
APP. BY	---	---

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Yukon

Yukon Zinc

WOLVERINE PROJECT

Figure 2-1

Site Component Overview

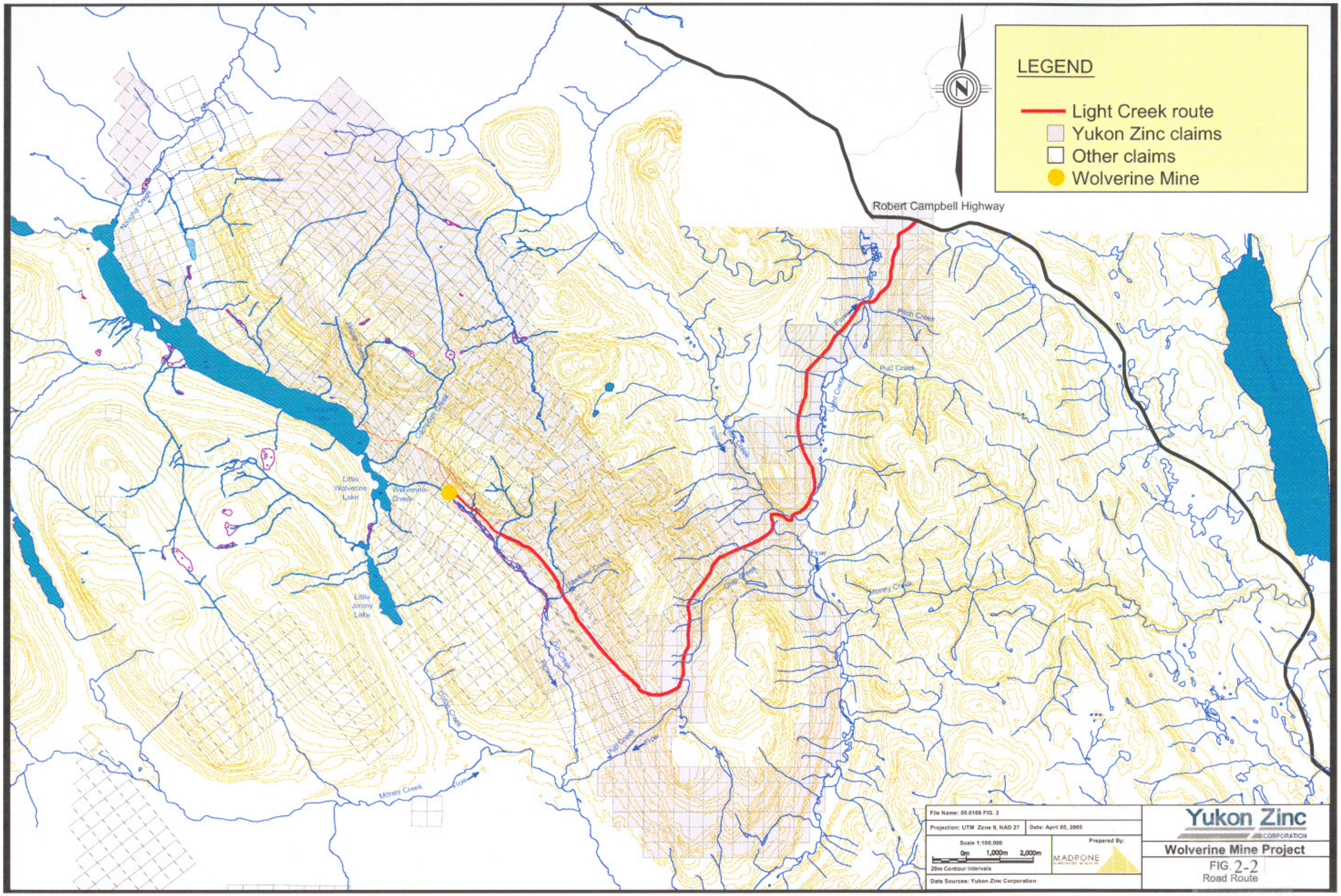
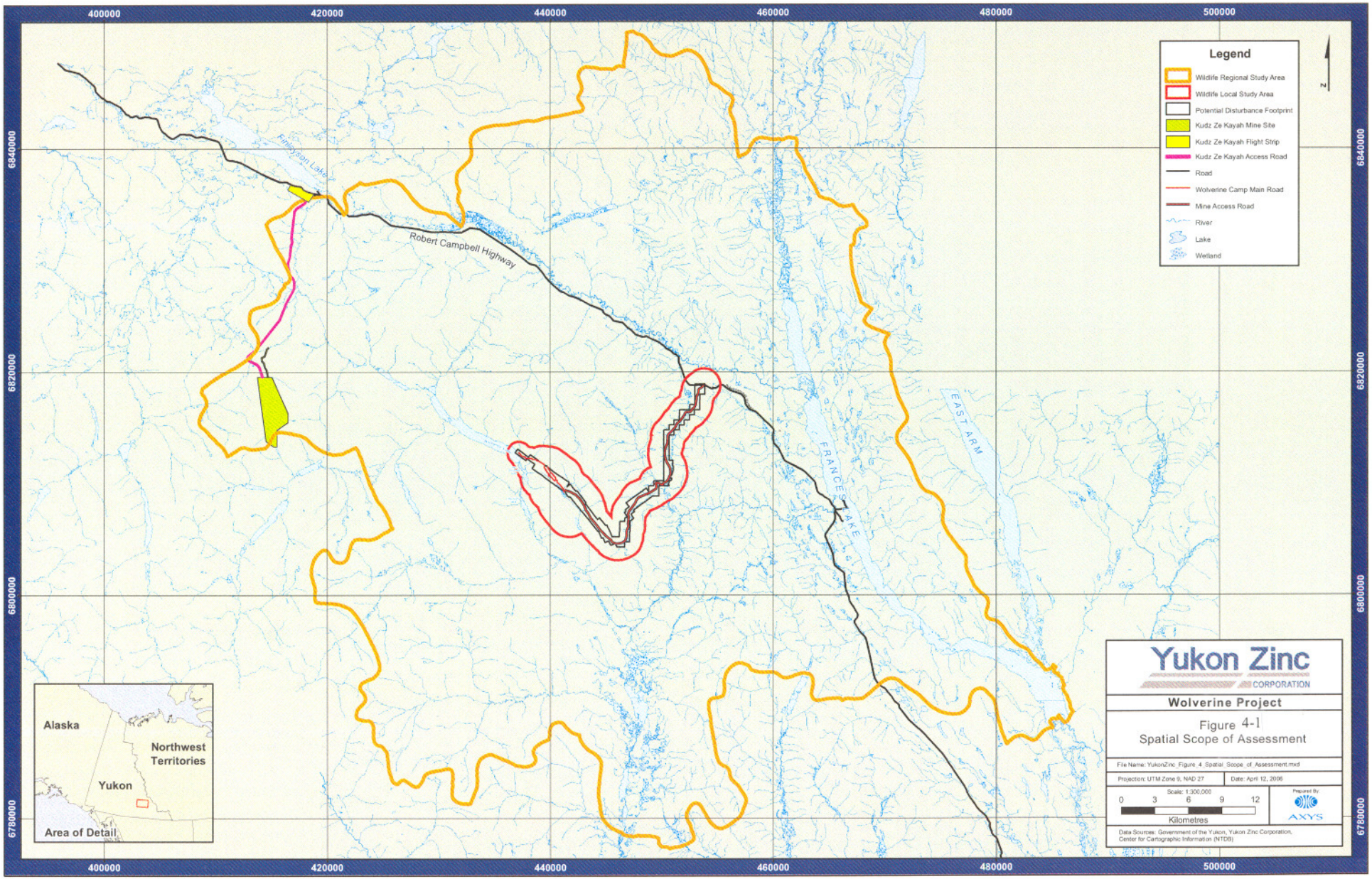


FIG. 2-2
Road Route


400000
420000
440000
460000
480000
500000
6840000
6820000
6800000
6780000
Legend
Wildlife Regional Study Area
Wildlife Local Study Area
Potential Disturbance Footprint
Kudz Ze Kayah Mine Site
Kudz Ze Kayah Flight Strip
Kudz Ze Kayah Access Road
Road
Wolverine Camp Main Road
Mine Access Road
River
Lake
Wetland
N
Robert Campbell Highway
Finlayson Lake
FRANCES LAKE
EAST ARM
Alaska
Northwest Territories
Yukon
Area of Detail
Yukon Zinc
CORPORATION
Wolverine Project
Figure 4-1
Spatial Scope of Assessment
File Name: YukonZinc_Figure_4_Spatial_Scope_of_Assessment.mxd
Projection: UTM Zone 9, NAD 27
Date: April 12, 2006
Scale: 1:300,000
0 3 6 9 12
Kilometres
Prepared By:
AXYS
Data Sources: Government of the Yukon, Yukon Zinc Corporation, Center for Cartographic Information (NTDB)

Appendix 1: Acronyms and Abbreviations

ARD	Acid Rock Drainage
ASL	Above Sea Level
DMS	Dense Media Separation
EAA	The (Yukon) *Environmental Assessment Act*
EAR	Environmental Assessment Report
ECO	Executive Council Office of Yukon government
EMR	Yukon Department of Energy, Mines and Resources
HDS	High Density Sludge
LFN	Liard First Nation
Mt	Million Tonnes
PAG	Potentially Acid Generating
RA	Responsible Authority under the *Environmental Assessment Act*
RRDC	Ross River Dena Council First Nation
TMF	Tailings Management Facility
VECC	Valued Ecosystem and Cultural Component
The Project	The Wolverine Mine Project
Water Board ('the Board')	Yukon Water Board
Water Licence	Water Use Licence issued pursuant to the *Waters Act*
Quartz Mining Licence	Licence to hard-rock mine issued pursuant to the *Quartz Mining Act*