WOLVERINE PROJECT

RECLAMATION AND CLOSURE PLAN

VERSION 2009-03

Prepared for:

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Vancouver, British Columbia

April 15, 2010

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1 Introduction

This Reclamation and Closure Plan (Plan) revises and updates approved Reclamation and Closure Plan 2008-02 (March 2008). It has been prepared to satisfy requirements contained within Quartz Mining License QML-0006 (QML-0006) pertaining to reclamation and closure of the Wolverine Project. Requirements of the Yukon Mine Site Reclamation and Closure Policy (January 2006) have also been considered in preparing cost estimates for decommissioning and closure.

This Plan incorporates requirements of QML-0006 and Type A Water Licence QZ04-065 for the project site as a whole, and Type B Water Licence QZ01-051 and Quartz Mining Land Use Approval LQ00140 for the temporary waste rock and ore storage facility.

As per QML-0006 Section 8.0, this document addresses care and maintenance of the site during any temporary closure and the decommissioning and reclamation of the site at final closure.

1.1 Glossary of Terms

As previously stated, the requirements of the QML-0006, Type A Water Licence (QZ04-065) and the Yukon Mine Site Reclamation and Closure Policy (January 2006) have been reviewed and incorporated into this Plan. For consistency in interpretation with the contents contained herein, the following terms are defined:

- **Decommissioning** - the period following the cessation of operations involving the removal of equipment from active service
- **Temporary Closure** - has been defined in *QML-0006* as (unless otherwise agreed to in writing by the Chief, Dept. of Energy, Mines and Resources):
    1. The cessation of development or production that extends for more than a continuous two week period; or
    2. Any closure after the start-up date where no ore is mined or ore or tailings milled for a period exceeding two consecutive months.
- **Closure or Permanent Closure**
    1. The period that in which decommissioning and reclamation activities are completed for the purpose of returning the mine site to pre-mining conditions (estimated to be a three year period for the Wolverine Project to meet water discharge standards in the tailings facility); Monitoring frequency is quarterly for groundwater sampling and monthly for surface water sampling during closure.
    2. As defined in QML-0006, where temporary closure exceeds three continuous years
- **Post Closure –** The period following closure where all reclamation activities are complete and the monitoring schedule frequency is reduced to annual assessments.

2 Project Description

The Wolverine Project is an underground mining project that will produce copper, lead and zinc concentrates. It is located in the south-eastern Yukon near the headwaters of the Wolverine Lake watershed within the Kaska Nation traditional territory (Figure 2-1). Site access is via air or a 26 km long all season access road that connects with the Robert Campbell Highway at km 190.

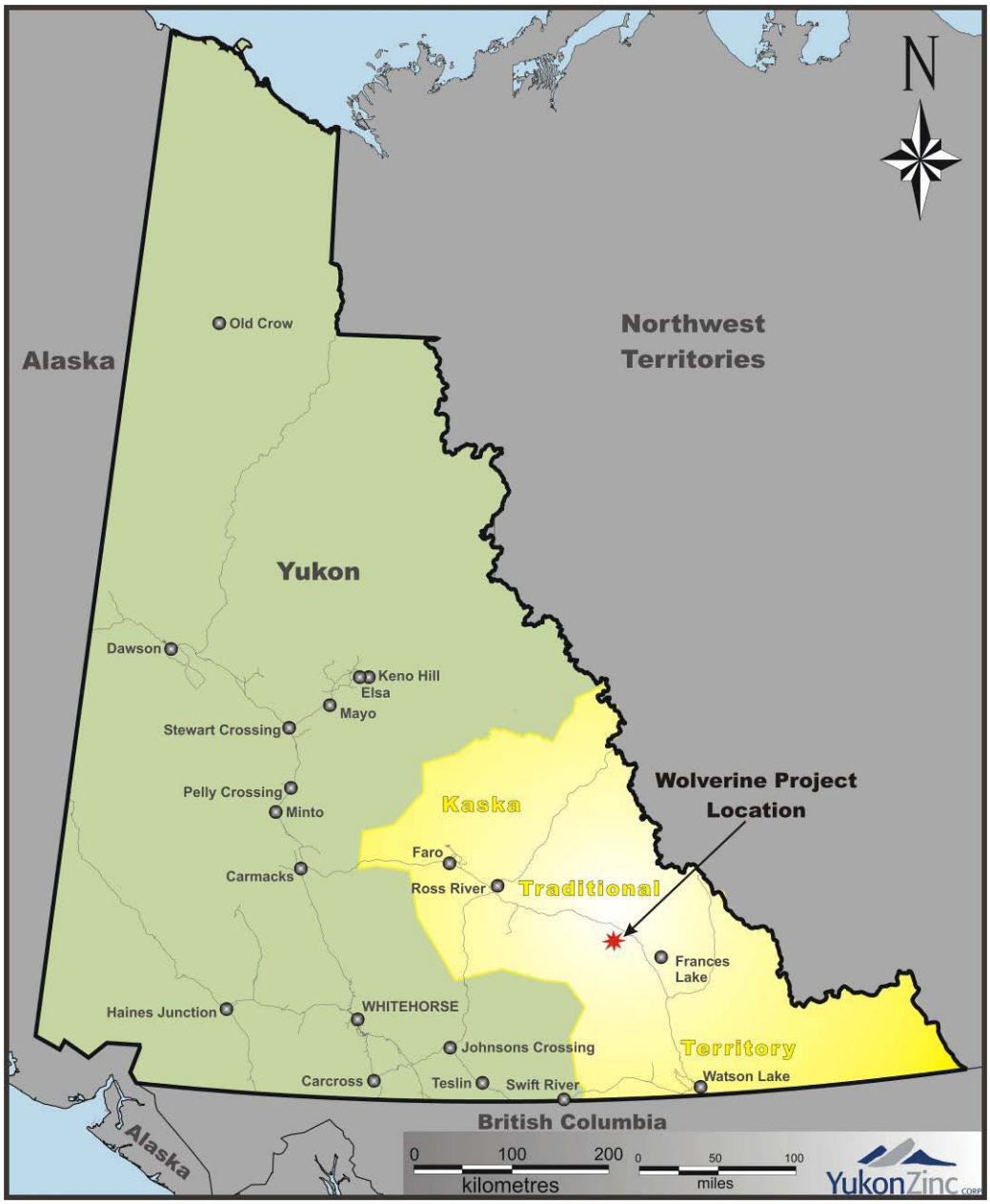


Figure 2-1: Location of the Wolverine Project within the Yukon and Kaska Nation Traditional Territory

The property, originally staked in 1973, was extensively explored over the past two decades. In early 2005, a *Type B Water Licence (QZ01-05)* and *Mining Land Use Permit (LQ00140)* were issued to allow for advanced exploration activities. Under these approvals, Yukon Zinc completed test mining and detailed infill diamond drilling programs. *Quartz Mining License QML-0006* and *Type A Water Licence QZ04-065*, to allow for the development and operation of the mine, were issued in December 2006 and October 2007, respectively.

The Wolverine Project area climate is cold with a mean daily summer temperature of 15ºC and a mean daily winter temperature of -25ºC. Precipitation falls fairly evenly throughout the year, predominantly as rain from May to September and snow for the balance of the year. The mean annual precipitation is 570 mm, with total

snowfall of less than 2 m. Maximum wind speeds are less than 40 km/hr and the annual average is 15 km/h. The project site elevation is approximately 1,350 masl.

The Wolverine Lake area is sparsely populated, but used for harvesting, gathering, and trapping by the Yukon Kaska - Ross River Dena Council (RRDC) and the Liard First Nation (LFN) members. In July 2005, YZC signed a Socio-Economic Participation Agreement with the RRDC, on behalf of the Kaska Nation, that provides a basis for participation by all Kaska Nation members in project exploration and development activities. This includes the review of environmental, social, and economic matters related to activities during all project phases including environmental assessment and permitting, operation, and reclamation.

The Wolverine Project has been planned and will be operated and reclaimed in accordance with the Kaska Socioeconomic Participation Agreement and the RRDC Traditional Knowledge Protocol Agreement as well as the Terrestrial Performance Standards outlined in *QML-0006* Schedule D (including terrain hazards, erosion control, re-vegetation, watercourses, contaminated soils, roads and trails, buildings and infrastructure, rock dumps, underground openings and workings, acid mine drainage concerns, tailings impoundment, and water control structures).

The overall project timeline from construction through to post closure is provided in Table 2-1. A summary of the operations phase infrastructure and activities is provided below. For additional information, please refer to Wolverine Project General Site Plan 2008-04 (February 2009).

Table 2-1: Wolverine Project Timeline

Project Period	Year(s)
Construction	***2009 to mid 2010***
Operations	***Mid 2010 - 2018***
Year 1	***2010***
Year 2	***2011***
Year 3	***2012***
Year 4	***2013***
Year 5	***2014***
Year 6	***2015***
Year 7	***2016***
Year 8	***2017***
Year 9	***2018***
Permanent Closure	***2019 to 2021***
Year 1 (Decommissioning)	**2019**
Year 2	**2020**
Year 3	**2021**
Post Closure	**2022-2028**

2.1 Operations Phase Summary

The project includes operation of an underground mine with surface ramp access to produce 1700 t/day of mill feed ore. Operations are scheduled to commence in mid 2010. The underground mine will ultimately extend from approximately 1345 masl, at the portal entrance, to 1090 masl at the bottom stope, with a main access ramp, evacuation shafts and a ventilation raise.

The main industrial complex area includes a process plant, crusher building, concentrate load-out building, maintenance and fuelling facilities, water diversion and collection infrastructure, sewage treatment plant, 246 man camp, laboratory, water treatment plant and office buildings. The camp consists of a kitchen, mess hall, food handling and, recreation room, and bunk rooms with laundry facilities. Power is supplied by diesel gensets and water is supplied from a local well. Figure 2-2, Figure 2-3 and Figure 2-4 provides a general site plan for the mine area operations; for the industrial complex area and tailings facility, respectively. The truckshop will not be constructed and operational until late 2011 and is therefore only included in the LOM cost estimate in Section 7.

Mine operation will require a workforce of approximately 150 who will live on-site in the self-contained camp. Water from the underground workings is pumped to the tailings facility and tailings slurry from the milling process will be pumped to the tailings facility for reuse and a portion of the tailings solids will be used in paste backfill operations. A water treatment plant is being designed to treat the excess tailings supernatant that will accumulate in the tailings facility. Pilot plant testing of the treatment process on actual tailings water is scheduled for 2010. Final design and plant construction of the water treatment plant is scheduled for 2011 to allow treatment of tailings water by 2012. All treated water from the Wolverine Project will be discharged to Go Creek.

Waste rock and ore from the mine will be stored temporarily on a waste rock pad during mine development. This material will subsequently be hauled underground to the mined-out stopes over a two year period (2010 to 2011) and encapsulated with paste backfill (a mixture of cement and mill tailings).

Metal concentrates will be trucked to the Robert Campbell Highway and then south through Watson Lake to the existing Stewart Bulk Terminal at Stewart, BC for transportation via ocean freighter to various smelters in Asia.

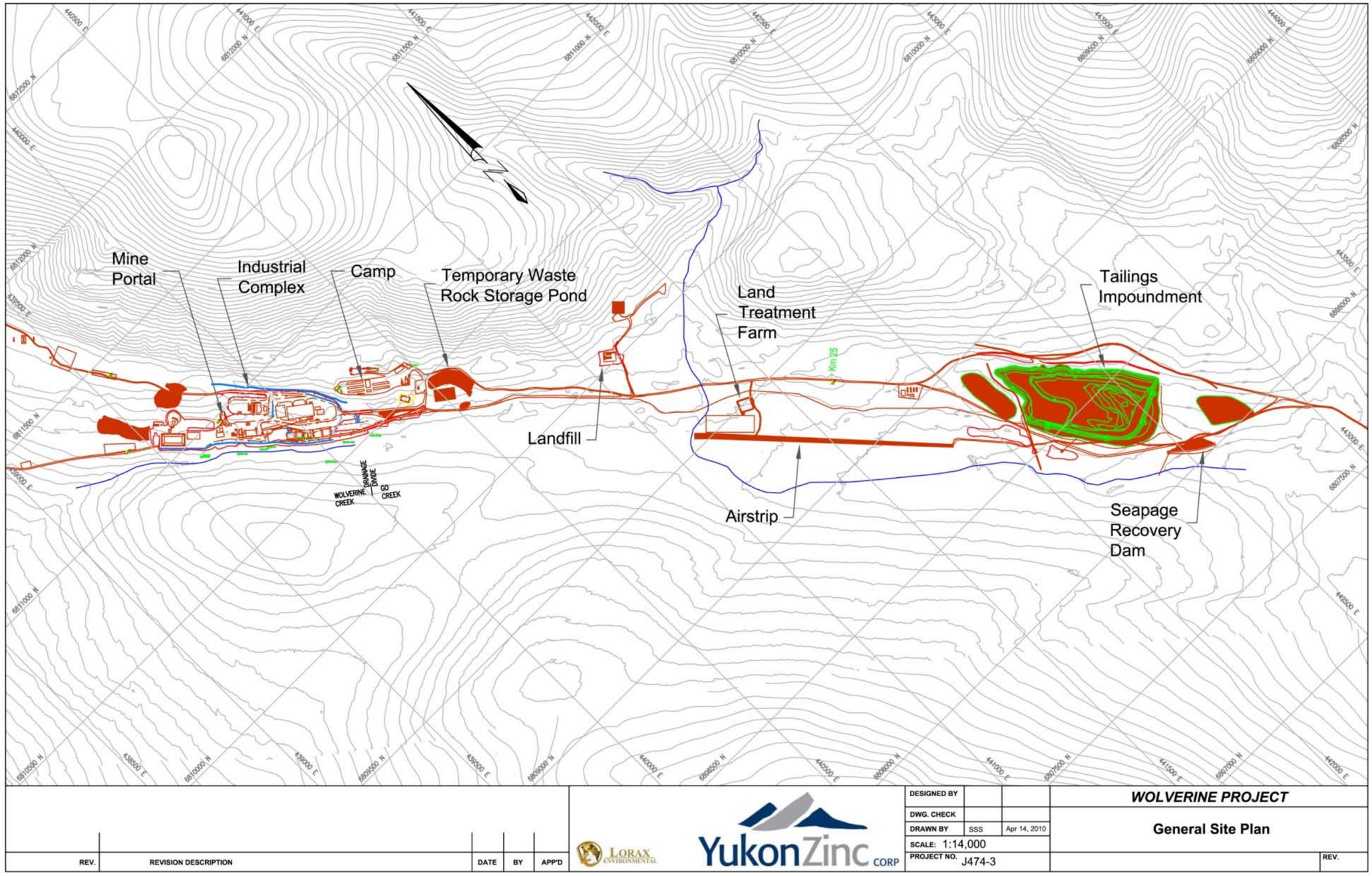
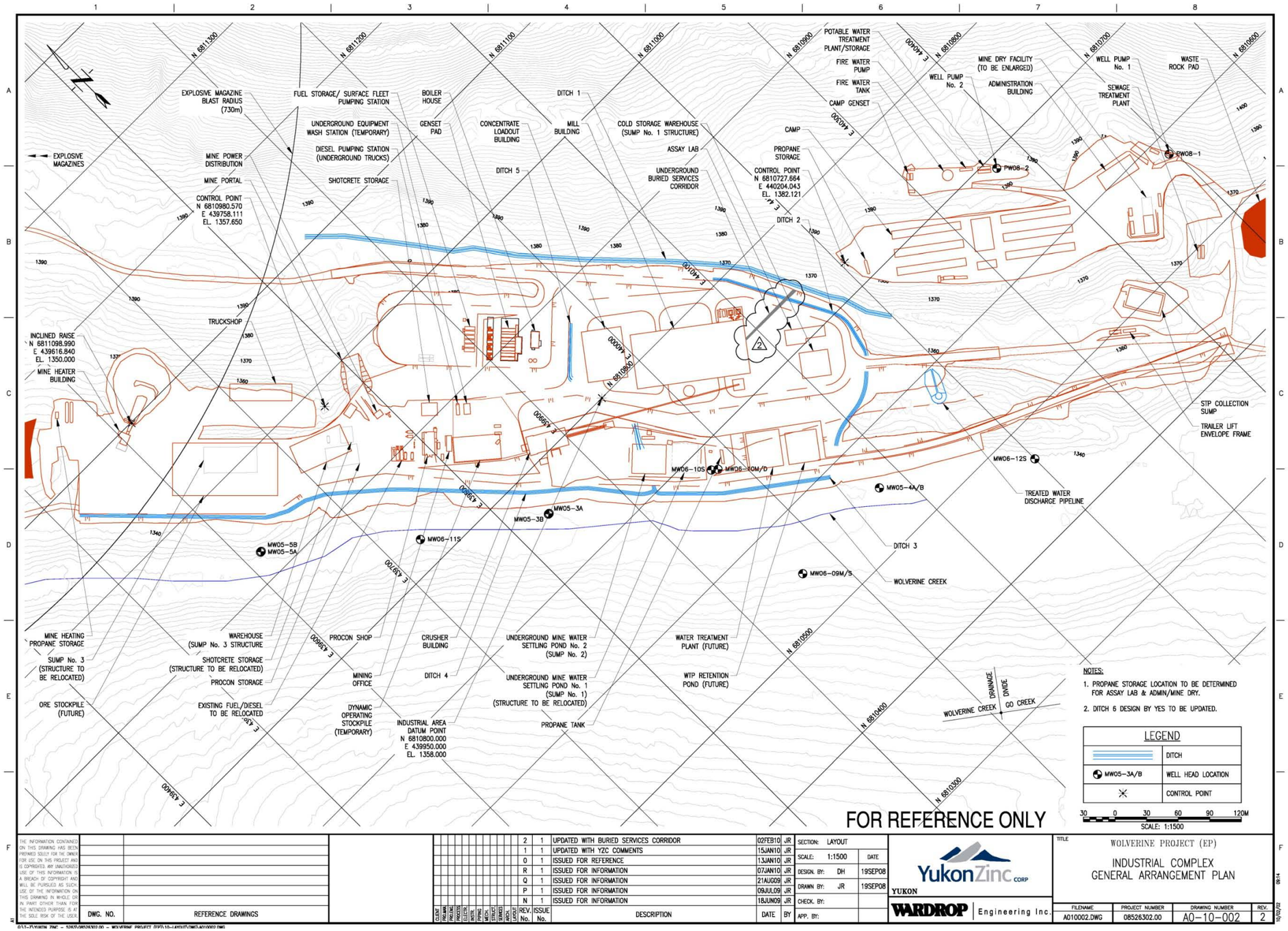


Figure 2-2: General Site Layout – Entire Area



DWG. NO.	REFERENCE DRAWINGS

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
2	1	UPDATED WITH BURIED SERVICES CORRIDOR	02FEB10	JR
1	1	UPDATED WITH YZC COMMENTS	15JAN10	JR
0	1	ISSUED FOR REFERENCE	13JAN10	JR
R	1	ISSUED FOR INFORMATION	07JAN10	JR
Q	1	ISSUED FOR INFORMATION	21AUG09	JR
P	1	ISSUED FOR INFORMATION	09JUL09	JR
N	1	ISSUED FOR INFORMATION	18JUN09	JR

SECTION: LAYOUT
SCALE: 1:1500 DATE
DESIGN. BY: DH 19SEP08
DRAWN BY: JR 19SEP08
CHECK. BY:
APP. BY:

YukonZinc CORP
YUKON
WARDROP | Engineering Inc.

TITLE
WOLVERINE PROJECT (EP)
INDUSTRIAL COMPLEX
GENERAL ARRANGEMENT PLAN

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A010002.DWG	08526302.00	A0-10-002	2

Figure 2-3: General Site Layout – Industrial Complex

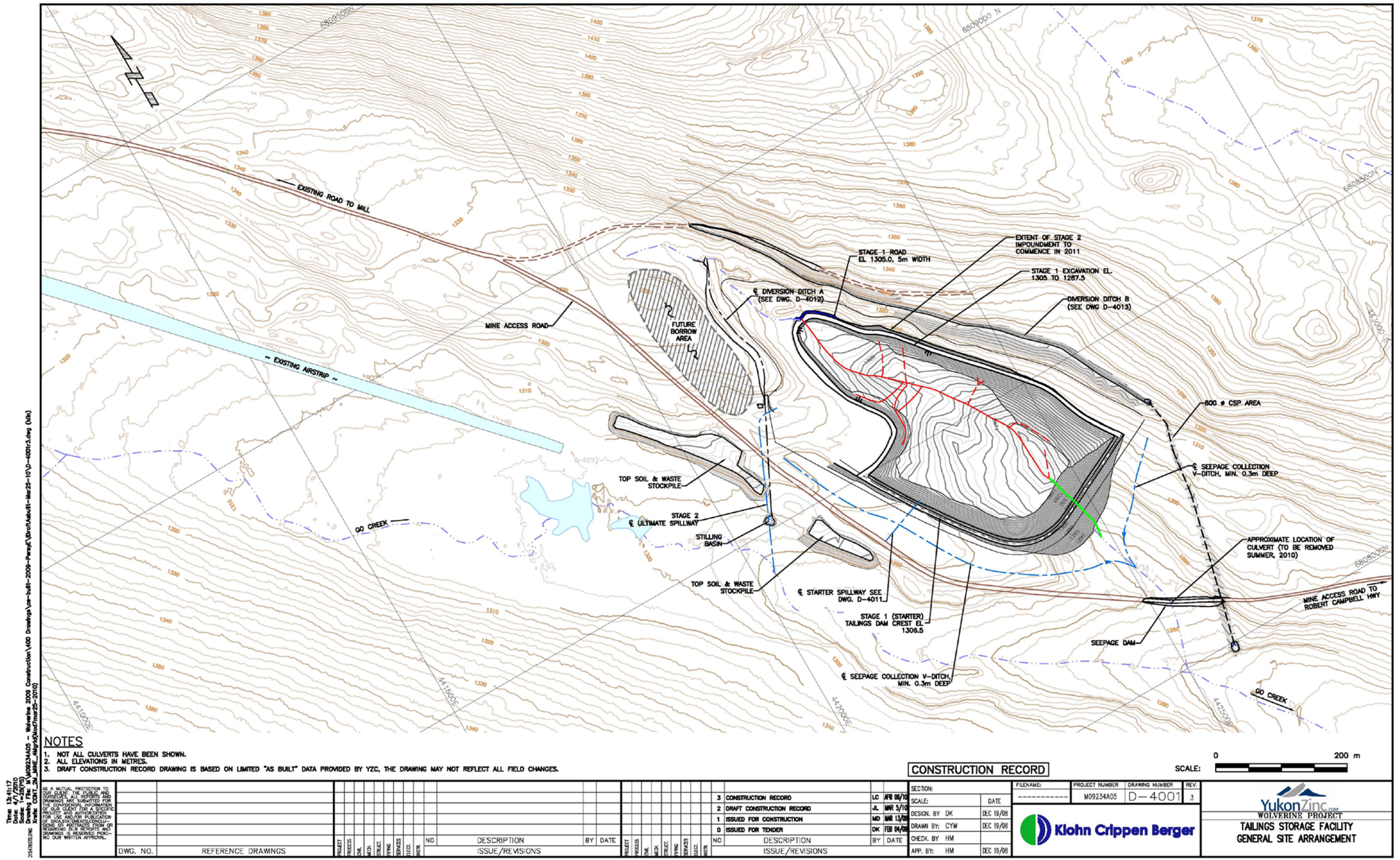


Figure 2-4: General Site Layout – Airstrip and Tailings Facility

3 Temporary Closure

This section describes activities required during a temporary closure period (see Section 1.1 for definition) according to QML-0006 Section 8.3. A temporary suspension of mining and processing activities could result when factors such as changing market conditions or mine related factors occur, and could be either a defined or indefinite period of suspension. A state of inactivity may evolve into a state of permanent closure if prevailing conditions for the resumption of operations are not favourable. QML-0006 also states that where temporary closure exceeds three continuous years, the site will be considered permanently closed and the final closure plans must be implemented.

Closure activities for a temporary shutdown have been planned to ensure that all safety and environmental standards are achieved. During a temporary closure, YZC intends to be a responsible steward of the site and demonstrate its commitment to re-opening the site by continuing to:

- Ensure physical and chemical stability of the site;
- Monitor and maintain buildings and facilities;
- Maintain the site and main access roads;
- Maintain security and access protocols;
- Dewater the mine to prevent flooding of the underground workings;
- Collect site runoff from the industrial complex and waste rock pad; and
- Operate and maintain water management structures and treatment facilities to ensure no uncontrolled discharges occur.

Therefore, surface facilities will only be accessible to YZC personnel, or designated representatives, and equipment and facilities will remain essentially intact on site.

3.1 General Requirements

Measures that will be taken during a temporary closure period include:

- Mining equipment will be left in no load condition. All surface equipment not required for site maintenance or operating activities during this period will be stored in appropriate areas.
- Depending on the anticipated closure period, chemicals or reagents that are deemed to have short shelf life will be returned to suppliers/manufacturers, and those chemicals that cannot be returned will be disposed of in a proper manner as per manufacturer's requirements.
- If required, a fuel distribution agent or a waste management contractor will pump the contents of storage tanks. Tanks that will not be reused will be removed and offered for sale or scrap, following appropriate procedures and protocols.

3.2 Access and Security

The mine access road will be kept open with restricted access and monitored on a regular basis. The access control gates located at km 0.1 and km 0.49 will be locked closed, but will not be manned, unless deemed necessary from periodic inspections. Figure 3-1 provides details on the main operational and temporary closure access control gates.

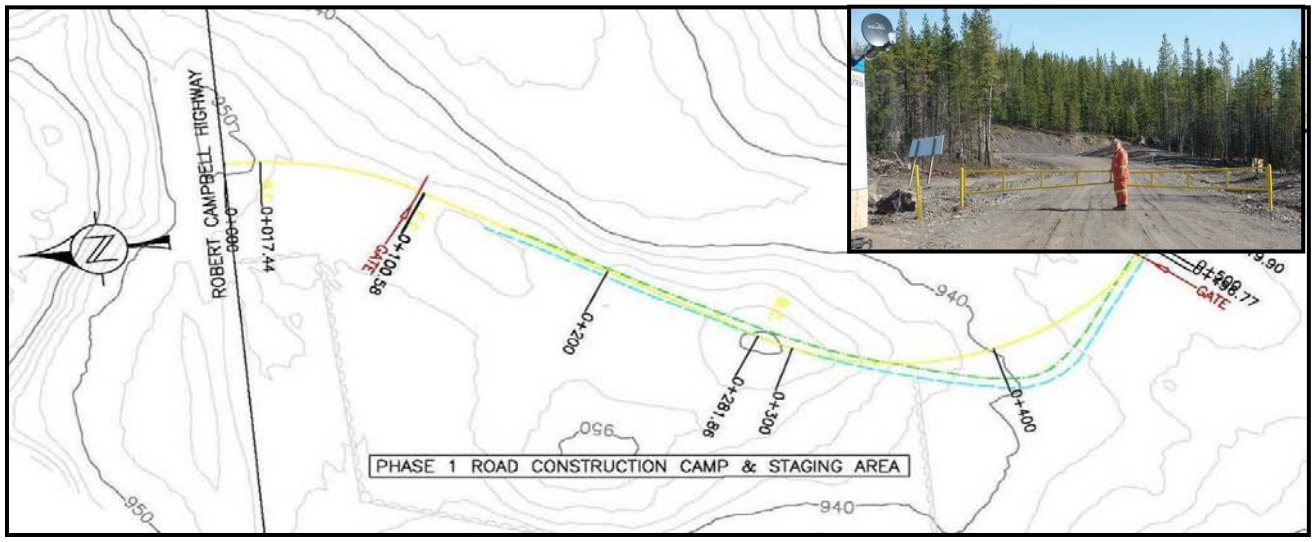


Figure 3-1: Mine Access Road Control Gates at km 0.1 (picture) and km 0.49

3.3 Underground Workings

Three temporary closure considerations apply to the Wolverine mine:

- ensure public safety and protection of wildlife
- prevent flooding of the mine to maintain the integrity of the workings, and
- prevent uncontrolled discharge of groundwater at the portal.

The portal will be gated to restrict access to the mine when access is not routinely required. Water collected in levels in underground sumps will be pumped to surface sumps and subsequently to the tailings facility. The following infrastructure and equipment will remain operational or onsite to support water management activities:

- main access road and onsite roads;
- light duty vehicles;
- tailings and reclaim pipelines and pumps;
- fuel storage facility;
- water treatment plant;
- power generating facility with adequate capacity to power the water pumping systems, and camp;
- small maintenance workshop; and
- communication system.

3.4 Monitoring and Management Activities

During temporary closure regular inspections will be conducted of fuel storage tanks for leakage to ensure they are operating according to the applicable regulations and permits/licenses. Structures such as the waste rock pad, water collection sumps, diversion and collection ditches, tailings facility, pipeline and roadside ditches and culverts will also be inspected to ensure physical stability and integrity. All stockpiles of contaminated soil, and waste rock and ore are located on impermeable liners at the land treatment facility and at the waste rock pad, respectively. As both areas were designed for these purposes, environmental risk is minimal. Nevertheless, monitoring will be conducted to ensure that all runoff is captured and treated as necessary.

Water management activities during temporary closure will consist of dewatering of the underground workings, and collection of surface runoff from the temporary waste rock and ore storage facility, land farm and the industrial complex area. Water treatment will be conducted as per the *Wolverine Project Water Management and Treatment Plan*, which is updated as necessary and submitted to the Yukon Water Board under *Type B Water Licence QZ01-051*. Depending on when the period of temporary closure occurs and the capacity of the tailings facility, treatment may not be required during the closure period.

Surface water quality and flow monitoring will be conducted on selected surface water sampling stations as illustrated in Table 3-1. For additional information with respect to station locations and parameters, refer to General Site Plan 2008-04 Appendix B.

Table 3-1: Selected Surface Water Quality Monitoring Stations – Temporary Closure

Station	Watershed	Frequency
W82	*Wolverine Creek*	monthly
W9		monthly
L1	*Little Wolverine Lake*	monthly
W31	*Go Creek*	monthly
W80		monthly
W80	*Go Creek*	daily during discharge
Retention Pond		daily during discharge
W22	*Money Creek*	monthly
W71	*Access Road Route*	monthly
W72		monthly
W73		monthly

Groundwater quality monitoring will be conducted quarterly on all monitoring well installations.

All wastes will be handled, stored, managed and disposed of in a proper manner as outlined in the *Wolverine Project Waste Management Plan Version 2009-02 (January 2010)*. The primary sources will include domestic waste and other minor waste streams.

3.5 Temporary Closure Cost Estimate

An estimate of the annual temporary closure costs for the Wolverine project is presented in Table 3-2. The cost estimate includes a contingency of 10%. Several assumptions have been used to develop the

estimate including personnel requirements, maintenance and security, environmental monitoring and water treatment requirements

On-site personnel required during temporary closure to conduct general maintenance and operation tasks, as well as water treatment and monitoring activities, include a site manager, an environmental technician and a ticketed underground mine foreman who will be on shift rotations to ensure coverage. For temporary closure, corporate involvement will be required and inclusion of third party closure personnel has not been assumed. In addition, support staff is not required during temporary closure as the tasks and activities are not extensive. Specialist personnel, such as mechanics or electricians would be onsite on an as needed basis.

The water treatment cost estimate has been developed assuming an excess water balance of approximately 184,200 m^3 to be treated over a six month period during the year. The water accumulating in the tailings facility has been calculated assuming average climate conditions as well as an assumed 10.8 m^3/h (~3 L/s) from mine dewatering activities that would continue during the temporary closure.

Table 3-2: Annual Temporary Closure Cost Estimate

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Organization, Security and Overhead						
Site Manager		Management	months	12	$ 8,800	$ 105,600
Underground Mine Foreman		Management	months	12	$ 10,500	$ 126,000
Corporate		Management and oversight	L.S.			$ 20,000
Camp Cost[1]		per person day	days	1095	$ 85	$ 93,075
Security		Responsible for security and camp	months	12	$ 6,000	$ 72,000
Vehicle for security and manager		light-duty vehicle	months	24	$ 1,400	$ 33,600
Flights		Bi-monthly	flights	24	$ 1,000	$ 24,000
site maintenance costs		maintenance,supplies	months	12	$ 1,000	$ 12,000
	Sub Total					**$ 486,275**
Compliance Monitoring and Reporting						
Environmental Monitor		responsible for sampling and monitoring	months	12	$ 6,000	$ 72,000
Water Quality Analytical		Surface water	samples	102	$ 400	$ 40,800
Water Quality Analytical		Groundwater	samples	96	$ 270	$ 25,920
Water Quality Analytical		Monitoring of treatment discharges	samples	370	$ 400	$ 148,000
Hydrological Monitoring			L.S.			$ 10,000
External Consulting Services			L.S.			$ 20,000
Geotechnical Inspections			annual	1	$ 25,000	$ 15,000
	Sub Total					**$ 331,720**
Water Treatment of Excess Tailings Water						
Biotreatment of excess tailings water		Annual treatment volume	m^3	184,200	$ 0.40	$ 73,680
	Sub Total					**$ 73,680**
				10% Contingency		**$ 89,168**
		Total				**$ 980,843**

1: Camp person days calculated assuming 3 persons for 365 days

Based on the plans presented herein, the total annual cost of temporary closure is estimated at approximately $980,843 including contingency.

As required by *QML-0006* (Paragraph 8.3 h), temporary closure for a period of three years is approximately $2,943,000 including contingency (noting that as stated previously, temporary closure is considered to be permanent closure after a three year continuous period).

4 Reclamation and Closure Research Programs

Yukon Zinc Corporation will initiate two onsite research programs in 2010, including a Reclamation Research Program and pilot testing of the Biopass treatment system. Research programs will commence in 2010 and are summarized below.

4.1 Reclamation Research Program

The overall goal of the Reclamation Research Program at the Wolverine Project is to prepare the site so that the vegetation returns to a state as near as possible to that in existence prior to mining activities. The primary objectives of land reclamation and re-vegetation will be to provide short and long term erosion control, to ensure land use compatible with surrounding lands, and to leave the area as a self-supporting ecosystem. The program will focus on establishing test plots and documenting re-vegetation for progressive reclamation and for closure. Proposed areas of research include the following activities:

- investigate the availability of natural seed or the availability of productive seed material from local surroundings;
- undertake vegetation trials using native plant species;
- undertake clean borrow material investigations to determine potential sources of inert, non acid generating material for tailings facility closure;
- inventory all organic stockpile areas created during the exploration and construction periods to determine the availability of soils for reclamation cover;
- assess nutrient level deficiencies in the available soils to determine necessary amendments; and
- determine appropriate seed mixes, fertilization and growth media through experimental test plots.

YZC will work with consultants, Kaska First Nation and other technical groups to address potential environmental constraints and issues of concern for the overall site. Reclamation plans will be revised to ensure that the land is restored to a productive state for alternate future uses.

The seed mixtures and performance standards used to measure re-vegetation success proposed at this early stage are described below.

4.1.1 Seed Requirements and Re-vegetation Performance Standards

Seed will originate from western Canada, the Yukon and/or Alaska and will meet purity and germination requirements (certification provided from an accredited lab), including:

- Species must not exceed the following limits for noxious weeds per 25 grams: 0 primary, 5 secondary, 25 total, and 0 sweet clover;
- Minimum percent of pure living seed must be 70%.

YZC proposes to use both the roadside and slope seed mixtures in the test plots (Table 4-1).

Table 4-1: Wolverine Project – Custom Seed Mixtures

Use	Common Name *Species*	% in Mixture	Application Rate
Roadside	Violet wheat grass *Agropyron violaceum*	40	30 kg/ha
	Slender wheat grass *Agoropyron pauciflorum*	10	
	Tickle Grass *Agrostis scabra*	5	
	Sheep Fescue *Festuca ovina*	20	
	Arctic Fescue *Festuca saximontana*	25	
Slope	Violet wheat grass *Agropyron violaceum*	50	40 kg/ha
	Fowl Blue grass *Poa palustris*	10	
	Tickle Grass *Agrostis scabra*	5	
	Tufted Hair Grass *Deschampsia caespitosa*	10	
	Arctic Fescue *Festuca saximontana*	25	

Re-vegetation success in the test plots will be measured against specific criteria such as cover rate, productivity, and period to attain a self-sustaining condition. The direct application of cover and productivity rates will be evaluated, including consideration of the vegetation cover requirements for reducing erosion. Table 4-2 provides re-vegetation performance standards, as suggested by Environment Canada1, for evaluating the success of re-vegetation efforts and for estimating the need for further re-vegetation efforts. These standards will be confirmed as part of the research program. The standards will be applied on a per area basis and will include a time component, recognizing that the long-term performance of re-vegetation will only be confirmed by evaluation in successive years.

Table 4-2: Conceptual Revegetation Success Rate Performance Standards

Revegetation Success Rate on a Unit Area	Cover Rate*	Productivity**	Time (yrs) Self-Sustaining***
0	<50%	<50%	< 2 years
10%	50% to 80%	50% to 80%	2 years
25%	50% to 80%	50% to 80%	5 years
60%	50% to 80%	50% to 80%	10 years
100%	50% to 80%	50% to 80%	15 years
25%	>80%	>80%	2 years
70%	>80%	>80%	5 years
100%	>80%	>80%	8 years

Notes: * Percentage of some specified leaf area index
** Percentage of productivity in surrounding terrain
*** no addition of fertilizer or seed

[1] Environment Canada, letter from Eric Soprovich to Arlene Kyle, Re: *Wolverine Project Plans (Various) (Versions 2006-01),* July 24, 2006

Monitoring reports will be submitted to the regulatory agencies, the Kaska and the communities of interest as required to obtain feedback on the success of the reclamation research program.

4.2 Biopass Pilot Testing

Reclamation of the mine underground workings involves the construction of hydraulic plugs (Section 6.3.2) within the decline to prevent the discharge of water from the underground workings via the mine portal and subsequently to Wolverine Creek. There does however, remain the possibility that the hydraulic plugs will not be completely effective at preventing discharge of mine-affected water from the portal. Accordingly, a contingency system was developed conceptually to address this potential risk and is further being validated through more detailed research and on-site testing.

A passive biological treatment system (termed Biopass) has been selected as a viable option for treating the expected low volumes (e.g. ~ 1 L/s) of mine-affected portal discharge and the development and design of the system is an important reclamation program focus during the early years of the mine operation.

Development and testing of the Biopass has been initiated and a significant component of the program will be completed as part of a Master of Science thesis over the next two years. The program is being completed at Royal Roads University, with supervision provided by Dr. Jack Adams of the University of Utah. The M.Sc. thesis will involve laboratory characterization of the hydraulic and physio-geochemical properties of site organic material as well as field testing of the system design. The site field testing is scheduled to commence within the period of 2010 to 2011 once more representative underground mine water is available. Results of efforts undertaken to test the Biopass system will be incorporated into the next revision of the Reclamation and Closure Plan (due December 2011). Program summaries will also be provided in the *A Licence QZ04-065* and *QML-0006* annual reports.

More details on the conceptual design of the Biopass system are provided in Section 6.3.4.

5 Progressive Reclamation

The preferred approach to returning the site to a productive land-use state is to conduct progressive reclamation throughout the life of the project. Areas that will be considered for progressive reclamation include:

- Construction phase laydown areas;
- footprints where temporary structures and redundant components were located;
- borrow sites;
- the downstream face of the tailings dam; and
- selected areas along access corridors.
- Wherever possible, concurrent reclamation of disturbed areas will occur throughout the operational phase of the mine.

At the end of the summer construction season in 2009, several exposed areas have been seeded. The success of this seeding will be monitored in spring-summer of 2010 and a plan and implementation schedule for a reclamation research program will be developed based on the early results of this seeding program. Monitoring locations will include randomly allocated plots located within representative areas.

5.1 Mine Access Road

The all-weather access road is scheduled for completion in late 2010. Detailed progressive reclamation plans for borrow sites, staging area and/or cut and fill slopes will be prepared following completion of the road as-built drawings.

5.2 Tailings Facility

A detailed progressive reclamation plan with implementation schedule for the dam face, ditches, pipeline corridors and disturbed areas will be prepared in late 2010 following completion of facility construction and as-built drawings. Reclamation of the dam slopes will be required to limit erosion through the establishment of a self-sufficient vegetation community on the dam. Upon completion of the ultimate dam, topsoil will be placed on the roughly 2.5 ha of dam face prior to hydroseeding.

5.3 Temporary Waste Rock and Ore Storage Facility

The Temporary Waste Rock and Ore Storage Facility was constructed in 2005 (Phase 1) and extended in fall 2007 (Phase 2) to accommodate test mine and pre-production development rock generated in 2005 and 2009, respectively (Picture 5-1).

Picture 5-1: Phase 1 and Phase 2 Depositional Areas on HDPE and clay-lined Waste Rock Pad (June 2009)

The facility will be progressively reclaimed during the operations phase, with the ore being processed through the mill in 2010 and the waste rock being placed underground and used as backfill during the period of 2010 to 2011 The following reclamation steps will be undertaken in operating Years 2 to 3 once all waste rock has been returned to underground stope voids:

- The granular till and clay components of the pad liner will be hauled to underground, and encapsulated with paste backfill.
- The geo-synthetic components of the Enviro Liner will be cut into manageable segments, then hauled underground, and encapsulated with paste backfill.
- The sump will be backfilled with fine-grained materials.
- The waste rock pad site will be recontoured, covered with stockpiled topsoil and organic stripping, and re-vegetated.

Closure of the pad at the end of use is shown in Figure 5-1 and Figure 5-2.

Costs associated with the first three steps have been included in the Existing Condition closure cost estimate for the Project (Section 7). Assuming the waste rock storage pad is decommissioned in Year 2, additional progressive reclamation costs (as described in the last bullet) are included in the Year 2 and LOM cost estimates.

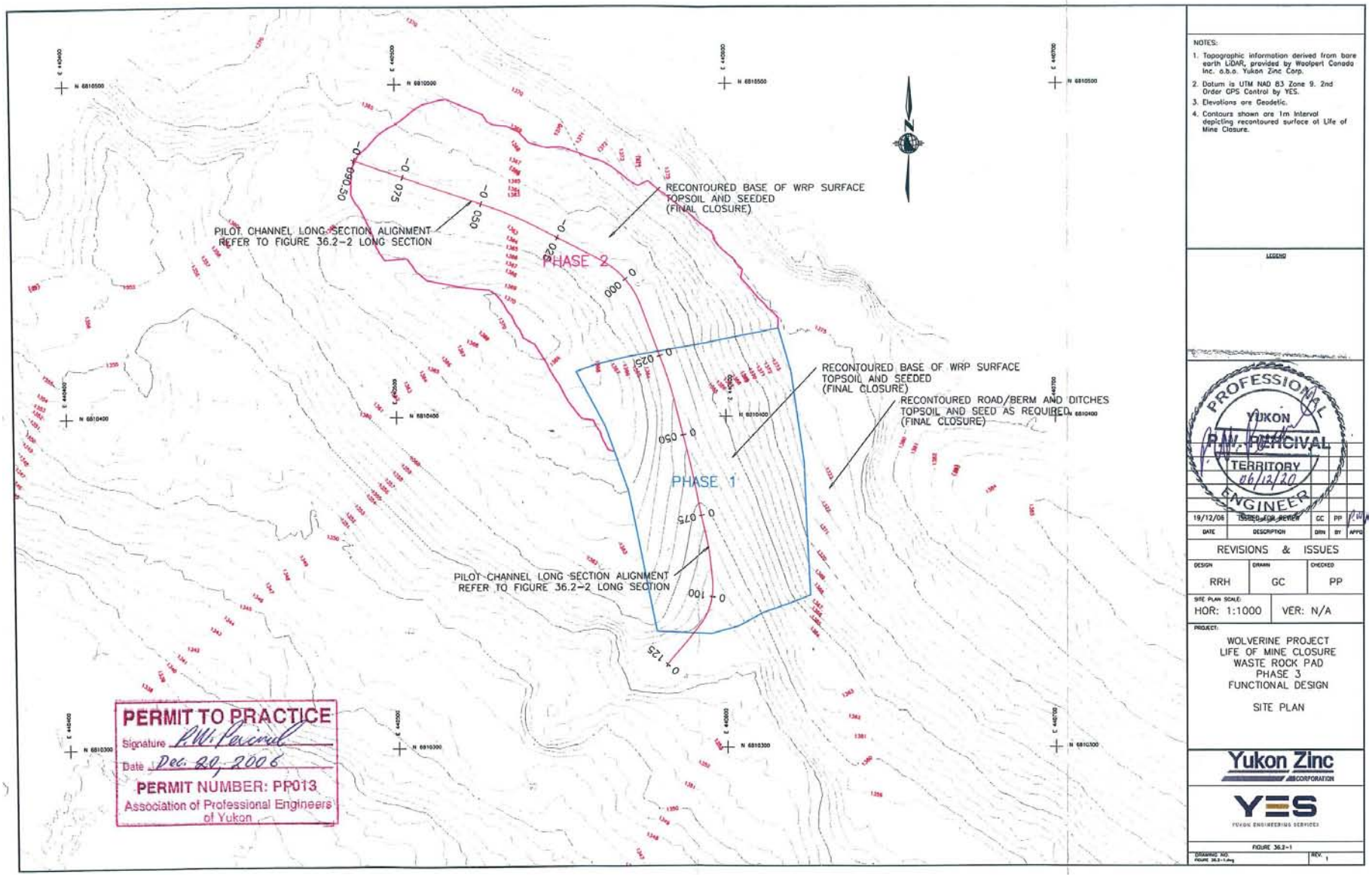


Figure 5-1: Closure of the Waste Rock Pad – End of Use Closure Conditions

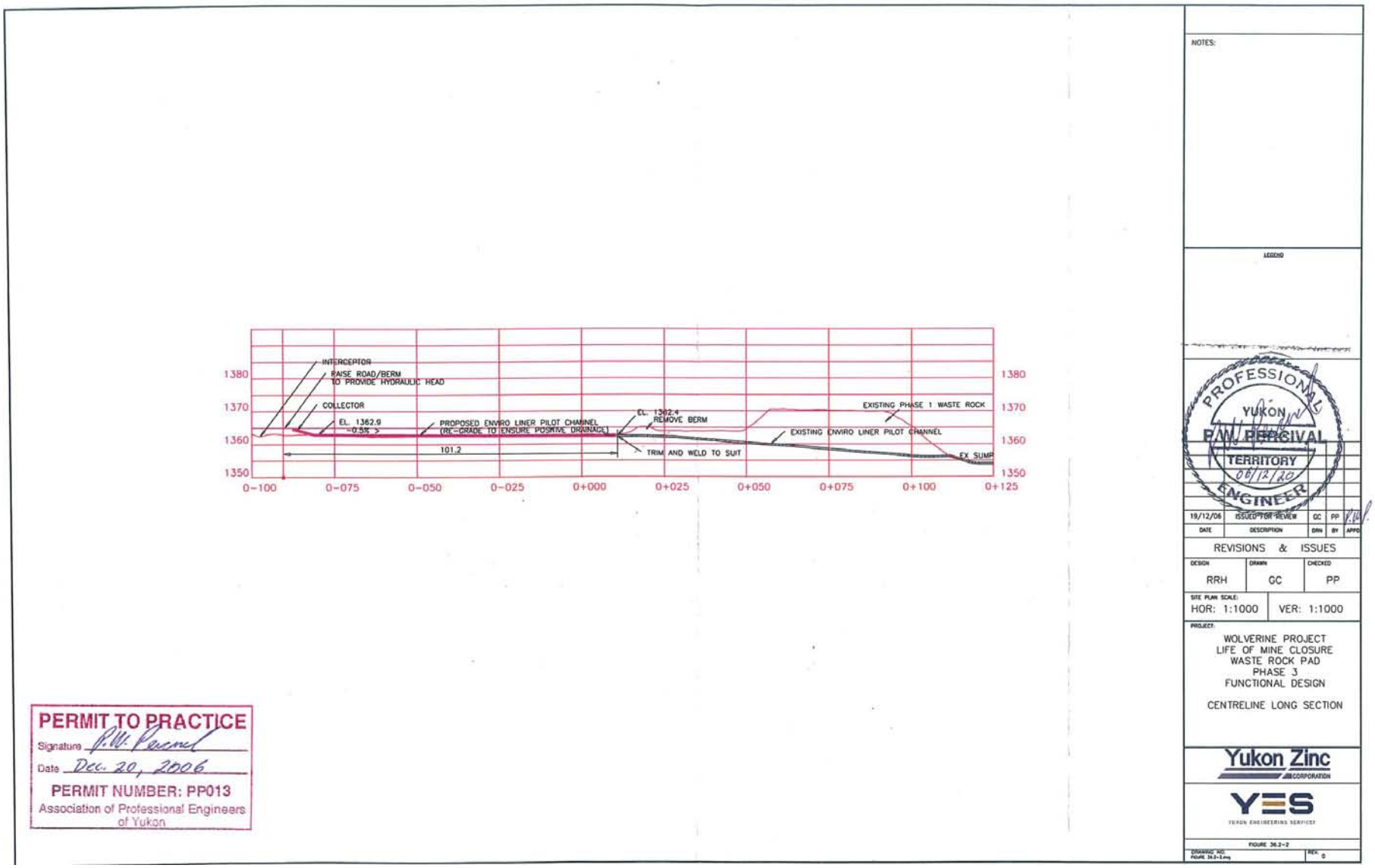


Figure 5-2: Closure of the Waste Rock Pad – End of Use Closure Conditions Cross-Section through Centreline

6 Decommissioning and Closure Phase Activities

6.1 Introduction and Overview

During the operations phase, additional information will be collected from site-specific research and environmental monitoring and testwork in order to continually develop a comprehensive closure plan that will be cost effective, and environmentally and technologically feasible. To ensure that reclamation activities have the greatest chance for success, the results from the reclamation research programs described in Section 4 will be incorporated into the plan.

The timing of facility closures is dependent on a number of factors including the purpose of the facility and its future use and environmental considerations. Site decommissioning activities are anticipated to commence during the final stages of operations after Year 9. Table 6-1 provides a list of anticipated activities that will be required during the decommissioning and closure period. Decommissioning of the waste rock pad is not included as these activities are scheduled for Year 4.

A number of personnel will be required onsite to implement the various decommissioning, closure and reclamation tasks. The water treatment plant will remain in operation to treat excess water accumulating in the tailings facility during the early closure phase until pond water meets discharge criteria. The following infrastructure and equipment will remain operational or onsite to support water treatment plant operations:

- onsite roads to the camp, industrial complex, tailings facility and airstrip;
- main access road and associated light duty vehicles;
- discharge pipelines and pumps;
- fuel storage facility;
- power generating facility with adequate capacity to power the water treatment plant, pumping systems, and camp
- small maintenance workshop;
- reagent storage facility;
- communication system.

During decommissioning and the early closure period, the soils will be tested for contaminants in all areas where ore, concentrate, waste rock, solid wastes, special wastes, fuel and chemicals were stored or handled at the site. If contamination is found, the contaminated soil will be removed from the area and either temporarily disposed of in the land treatment farm near the airstrip or hauled directly offsite to an approved facility. The selected disposal method will be in accordance with the Yukon Environment Act and Contaminated Sites Regulation, and Special Waste Regulation.

Once infrastructure is removed, slopes will be stabilized by contouring and leveling to provide land forms which conform to the surrounding terrain and provide suitable seedbeds. Erosion features will be minimized on re-sloped surfaces, runoff will be diverted away from steep slopes, and settling ponds and diversion ditches will be used as necessary.

Table 6-1: Activities Associated with the Decommissioning and Closure Phases

Component	First Year of Closure and Decommissioning	Year 2 to Year 3 of Closure and Decommissioning Phase
Mine workings	Install hydraulic plugs as main ramp is backfilled to stratify underground water Cement/grout ventilation opening Install portal barrier	
Industrial complex area	Dismantle and remove mill building and supporting infrastructure, including buried tanks, pipes and underground services Cover concrete foundations with overburden and re-vegetate Market mining and mill equipment Transport explosive and cap magazines offsite Deactivate most gensets leaving adequate power for the camp and water treatment facility Conduct remediation programs Recontour, replace organic layer and seed disturbed areas Remove freshwater pond	Construct portal discharge ditch to Biopass Remove site runoff collection ditches once area is reclaimed and vegetated Remove remaining gensets and transmission lines once all activities are complete Remove demolition waste or dispose of in authorized landfill. Remove all hazardous waste from site Market and dispose of all assets once support for water treatment and reclamation activities are no longer needed
Tailings facility	Dismantle tailings discharge pipeline and dispose of in tailings facility Decommission diversion ditches A and B Cover tailings with 0.5 m coarse inert material (CIM) during winter	Cover tailings with 0.5 m CIM (winter placement) Dismantle tailings reclaim line only after water quality in pond meets criteria Remove seepage dam
Water treatment plant	In use for treatment of excess water from tailings facility	Decommissioned only after tailings pond water meets discharge criteria
Camp	Remove modular components not required to support ongoing activities.	Progressively remove all buildings Market sewage treatment plant Decommission and seal water wells
Airstrip[i]	Will not be decommissioned	Will not be decommissioned
Onsite and access road	In use for removal of material and import of supplies; road access and traffic control maintained	Access and traffic controls in place until the end of the closure period; road route deactivated and reclaimed once water treatment is no longer required
Land treatment farm		Use soil in reclamation activities if deemed remediated; haul offsite if contaminated
Landfill, incinerator, waste storage areas		Remove incinerator from site Close landfill and storage areas by contouring, capping and seeding

6.2 Estimated Areas of Disturbance at Life-of-Mine

Estimated areas of disturbance were calculated from Figure 2-3 and Figure 2-4. Specific areas of disturbance for the Wolverine project are summarized in Table 6-2, and the total estimated area of disturbance for the Project is approximately 98.4 ha.

Table 6-2: Summary of Estimated Areas of Disturbance at Life of Mine

Mine Area/Component	Subtotal Area (ha)	Total Estimated Area (ha)
Industrial Complex		**23.84**
Mill, Admin., Truck Shop, Portal, Ponds	*14.52*	
Diversion Ditches	*0.5*	
Organic Stockpiles	*2.35*	
Accommodation Camp and STP	*2.75*	
Waste Rock Storage	*1.32*	
Concrete Batch Plant	*0.45*	
Explosives Magazine	*0.1*	
Land Treatment Farm	*0.4*	
Landfill	*1.45*	
Tailings Management Facility		**27.7**
Impoundment	*16.6*	
Dam Face	*2.4*	
Diversions	*0.5*	
Seepage Recovery Dam	*0.8*	
Tailings Lines Corridor	*3.4*	
Organic Stockpile and Borrow Area	*4*	
Access Road		**37.5**
Mine Site and Tailings Haul Roads		**7.0**
Exploration Roads		**2.4**
TOTAL ESTIMATED DISTURBANCE		**98.4**

6.3 Portal and Underground Workings

6.3.1 Mine Backfill

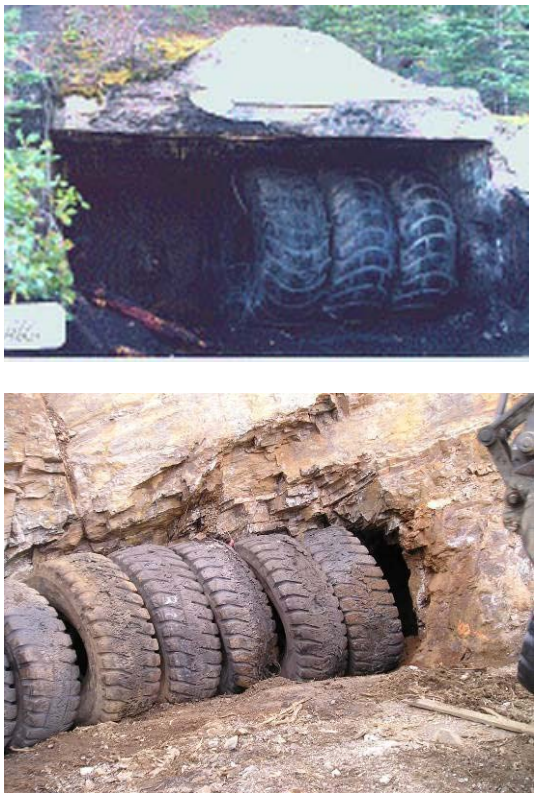
Throughout operations, backfill of the mine stopes will occur. Near the end of the mine life, when mining along the main decline, paste backfill of the decline will also occur. The backfill serves

primarily as structural support for the mining operation but has an added benefit of limiting exposure of mine walls to oxidative conditions.

In addition to backfill, the mine openings must also be stabilized. Two closure considerations apply to the mine openings and workings at the Wolverine Project:

- ensure public safety and protection of wildlife; and
- limit portal discharge of groundwater.

To ensure public safety, all openings exposed to the surface will be capped or blocked. The portal will be sealed off by a barrier constructed of tires and earthen material. The main barriers will consist of used heavy machinery tires, a technique used in Alberta and British Columbia[2] (Picture 6-1: Large haulage truck tires inserted within an adit opening and Picture 6-2: The site is then backfilled to provide a barrier and media for seeding). The tires would be inserted into the opening by an excavator and subsequently covered with coarse riprap and finer material and organics to allow for seeding.



Picture 6-1: Large haulage truck tires inserted within an adit opening

Picture 6-2: The site is then backfilled to provide a barrier and media for seeding

[2] N. Tribe & Associates Ltd Geological Consultants. Mining Subsidence Consultants. Information from: http://members.shaw.ca/nta/nltribe/. Accessed November 20, 2009.

6.3.2 Hydraulic Plugs

Preventing or greatly limiting the potential for discharge of groundwater from the mine workings is an important focus of the Wolverine Project closure plan. While most of the underground mine workings will contain paste backfill, it will be necessary to install hydraulic plugs at strategic locations within the main access ramp. A conceptual plan of the parallel plugs is provided in Figure 6-1. The purpose of the plugs is to stratify the water within the mine workings, so that only meteoric water is present in the upper part of the main ramp. Plug location must be carefully selected with regard to the mechanical and hydraulic characteristics of the rock, and a detailed knowledge is necessary for detailed design.

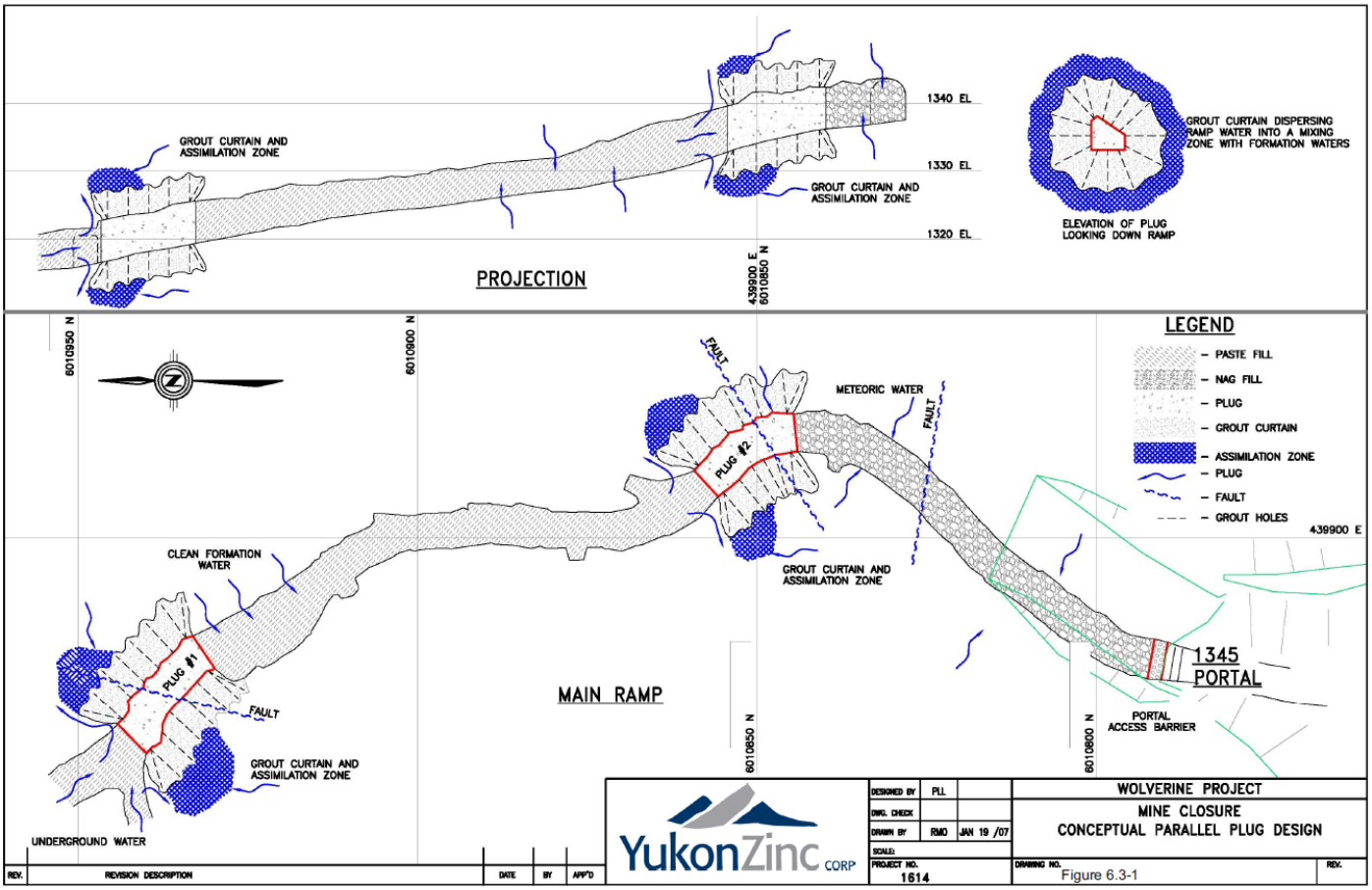


Figure 6-1: Mine Closure Conceptual Parallel Plug Design

The ventilation opening will also be plugged with a concrete plug to minimize the potential for groundwater discharge and prevent public or wildlife safety hazards.

Some portal discharge is expected at closure. Monitoring data from the upper reaches of the underground test mine indicates that there is a likelihood that water stratified in the upper portions of the ramp may be of acceptable quality to directly discharge to the environment. In the event that this water is of poorer quality than expected, a contingency measure will be in place. Specifically, YZC will construct a drainage ditch from the portal to the Biopass biotreatment system as a contingency

measure in the event of unexpectedly poor quality water passively discharging from the portal. Details pertaining to the Biopass system are provided in Section 6.3.4 below.

6.3.3 Underground Water Quality Predictions

The quality of groundwater following the flooding of mine workings has been an important focus of the Wolverine Project. AMEC Earth & Environmental (AMEC) has developed an underground water quality model utilizing the static and kinetic geochemical testing database for mine rock types at Wolverine. The primary objective has been to develop predictions of water quality of flooded mine workings at closure. A detailed assessment and prediction was updated in November 2007 and included in Wolverine Project Reclamation and Closure Plan V2008-02 (Appendix B). No modifications to the underground water quality predictions have occurred and a summary of key predictions are presented herein.

At Wolverine, backfilling of completed mining areas will occur throughout the life of the operation. Paste backfill, using cemented tailings, will be the dominant backfill material with lesser quantities of mined waste rock. The mine access ramp and ventilation raise will have their surfaces shotcreted to enhance structural stability.

At mine closure, hydraulic plugs will be installed (Section 6.3.2) and the backfilled underground workings will be permitted to flood with groundwater. The chemical composition of the flooded mine water will be the result of chemical mass loadings from three different sources:

1. constituents in groundwater;
2. accumulated weathering products on exposed mine rock surfaces; and
3. accumulated weathering products on exposed cemented backfill surfaces.

Groundwater that floods the mine will dissolve the soluble weathering products accumulated on the exposed surfaces of mine rock and backfill. Estimates of the accumulated weathering products on the mine surfaces are based on the humidity cell tests with mine rock, ore and paste backfill. Measured release rates from humidity cells with the six major rock types are used for non-ore bearing rock surfaces to develop mass loading estimates.

Mass loadings to the total water volume in the flooded mine are estimated by scaling mass loadings ($mg/m^2/wk$) derived from humidity cell tests to the estimated surface area exposed in the flooded mine. The weathering products are assumed to accumulate on the mine surfaces throughout the mine operation without losses due to ongoing leaching. Ultimately the water quality of the mine water is estimated by dissolving the total mass (mg) of accumulated weathering products in the total volume of groundwater (L) that has flooded the mine.

The chemical composition of the mine water has been modeled with the geochemical equilibrium model MINTEQ to develop estimates of chemical composition of the groundwater following flooding of the mine workings.

The predicted metal release rates were incorporated into the underground water quality model to evaluate the potential impacts due to rate changes. A summary of the predicted water quality for groundwater at closure in the mine workings is provided in Table 6-3.

Table 6-3: Predicted Concentrations of Key Parameters in Groundwater in Mine Workings at Closure

Parameter	Predicted Concentration (mg/L)
Sulphate	238
Aluminum	0.64
Antimony	0.07
Arsenic	0.06
Cadmium	0.24
Copper	0.033
Iron	1.16
Lead	0.12
Molybdenum	0.009
Nickel	0.016
Selenium	0.38
Silver	0.088
Zinc	7.7

6.3.4 Contingency Water Management and Treatment

Closure planning includes a contingency plan for mitigating the potential for poor quality groundwater, originating in the underground workings, discharging into Wolverine Creek. A portion of the groundwater that contributes to the flow in Wolverine Creek is naturally elevated in zinc, cadmium and selenium. For the treatment of metals and selenium in groundwater that contributes to Wolverine Creek, a passive biological treatment system (termed Biopass) is being developed and tested. The Biopass system represents passive biological treatment where dissolved metals are precipitated as metal sulphides and dissolved selenium (selenate, selenite) is reduced to solid phase elemental selenium through microbial reduction.

The Biopass system will be constructed in the Wolverine Creek channel along the stretch of the creek (e.g. 400 m long) that could potentially receive groundwater with high selenium and other metal concentrations derived from mine water (Figure 6-2). Clean water in Wolverine Creek, upstream of the Biopass channel, will be diverted along the western margin of Wolverine Creek in a lined channel and re-introduced into Wolverine Creek in the lower reach that is not adversely affected by poor quality groundwater.

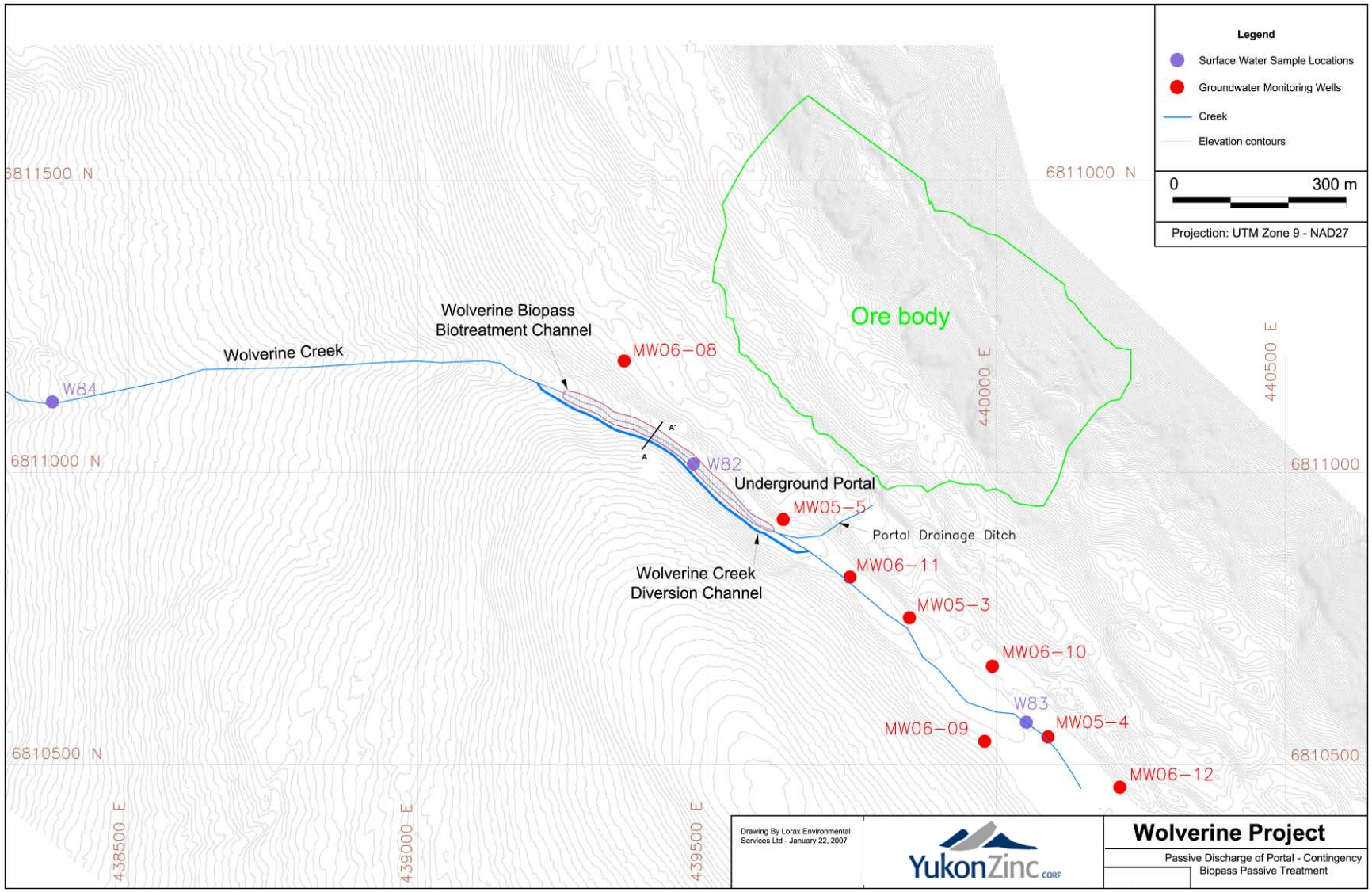


Figure 6-2: Location of Biopass Biotreatment System in Wolverine Creek

The Biopass will be approximately 2.5 m deep and 3 m wide and will collect groundwater that naturally discharges to Wolverine Creek (Figure 6-3). Deep groundwater that does not enter into Wolverine Creek will flow towards Little Wolverine Lake where no impacts to water quality are predicted to occur. The excavated channel that intercepts groundwater will be filled with an organic substrate to support the sulphate reducing bacteria and microrganisms that reduce dissolved selenium to solid phase elemental selenium. Organic materials that are being tested as substrate amendments include mixtures of mushroom compost, manure, alfalfa, sawdust or straw, along with natural peats in the area. Overlying the organic substrate is a gravel layer (0.15 m) that facilitates (lateral) drainage of the upward flowing treated effluent. The drainage layer overlying the organic substrate is sealed at the top by an impermeable geomembrane liner that limits exchange of water and gas with the overlying cover (0.25 m) of topsoil to protect the liner. Rainfall and surface runoff that infiltrates into the cover layer is collected in lateral sand drains and removed to prevent water saturation of the topsoil cover.

The groundwater that discharges into the more permeable organic substrate is biologically treated while moving in a down-slope direction. Collected groundwater will flow upwards and through the organic substrate where treatment will occur. Before joining the non-diverted section of Wolverine Creek, the Biopass system will merge into a french drain that discharges into Wolverine Creek. While the water exiting from the Biopass system is expected to be depleted of oxygen, this water will be combined with the diverted well-oxygenated water from upper Wolverine Creek. Moreover, this combined flow will then traverse steep terrain for approximately a kilometer before reaching the mouth of Wolverine Creek and is expected to be fully oxygenated in this fish-bearing reach.

The groundwater discharge rates that can be treated will depend on the porosity of the organic substrate layer and the total length of the Biopass. For example, by using a Biopass with a total length of 400 m, it will be possible to treat groundwater at discharge rates of approximately 2 L/s; groundwater discharge rates in the treatment area are expected to be on the order of 0.5 L/s to 1 L/s, following installation of the hydraulic plugs in the portal.

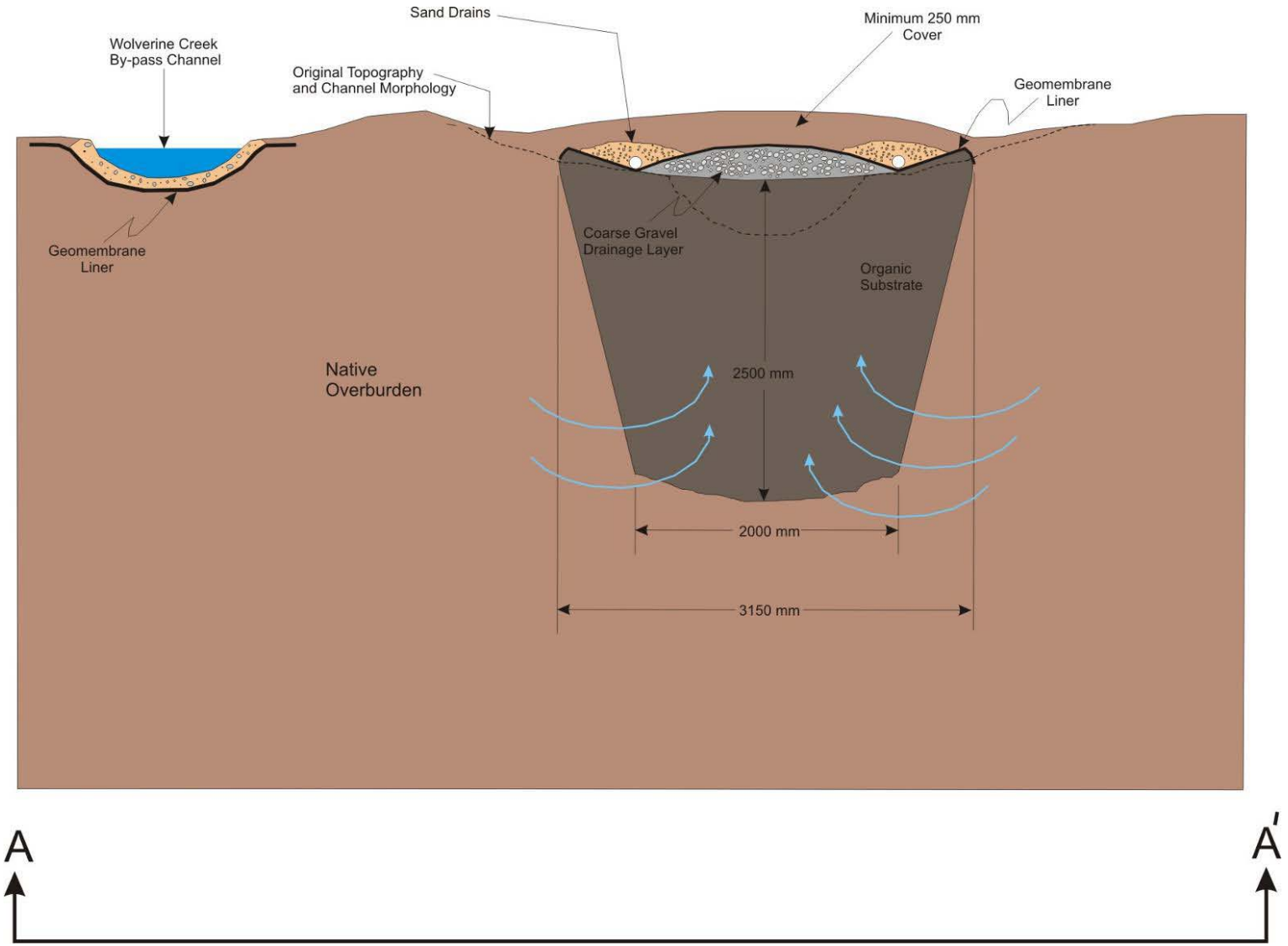


Figure 6-3: Cross-Section along Wolverine Creek Illustrating Biopass Design and Diversion Channel

6.3.5 Reclamation

Limited residual reclamation activity will be required in the areas immediately adjacent to the mine workings and the portal apron. Soil placement and reseeding of these areas are largely addressed as part of the industrial complex reclamation. Minor reclamation and revegetation along the discharge channel corridor from the portal to Wolverine Creek will be performed.

6.4 Industrial Complex Infrastructure

Closure issues related to infrastructure include public health and safety, site stabilization, aesthetics, and restoration of disturbed lands. The industrial complex buildings (mill, crusher, concentrate load out, offices, and assay lab) and facilities will be decommissioned in stages, with the water treatment plant supporting infrastructure removed last.

By the end of the closure period (post water treatment) all materials from industrial complex buildings will be completely removed with the exception of concrete foundations, which will be buried *in situ*.

Equipment with marketable value will be sold, and the remaining assets will be disposed of through demolition and salvage contracts. In the event that it is uneconomical to remove non-hazardous materials from the site, such material will be buried in the landfill.

Following demolition and dismantling of the industrial complex area, approximately 15 ha of area will require soil placement and reseeding. Closure costing has assumed recontouring of the area followed by placement of 250 mm of salvaged topsoil.

6.4.1 Power Generation Infrastructure

During the initial closure stage, power requirements will be reduced and only those generators required for ongoing activities will remain operational to support the water treatment plant, pipeline pumps and auxiliary facilities. Excess gensets will be deactivated and removed from the site. Power poles and distribution lines to facilities no longer in use will be salvaged or buried in the landfill.

At the end of the closure phase when water treatment is no longer required, the remaining gensets will be removed from the site, and the distribution lines will be re-spooled for salvage or buried in the landfill if in poor condition. Poles will be removed and if the poles are treated with a preservative such as creosote, the contaminated portion of the poles will be disposed of in accordance with Yukon Special Waste Regulations.

6.4.2 Explosives and Magazines

Unused explosives and detonation devices will be checked for condition and either returned to the supplier for credit, shipped to another third party user, or destroyed through appropriate procedures. In all cases the explosives will be handled, transported and disposed of in compliance with the Explosive Act. The explosives magazines will be returned to the supplier or to a third party.

6.4.3 Fuel Storage Tank Area

Fuels and lubricants will be required during the initial 3-year closure phase. Additional fuels will only be provided on an as-needed basis with the objective of reducing the inventory of remaining fuels during the initial closure phase. Fuels remaining at the end of the active closure phase will be either returned to the original supplier or possibly sold to a third party user. All tanks will be emptied of their contents in accordance with the Yukon Environment Act. Excess fuel storage tanks will be hauled away for salvage.

Propane tanks used for underground heating will be removed by a qualified contractor once underground operations cease. Associated fuel delivery lines will be removed and disposed of in an appropriate manner.

6.4.4 Equipment

All fixed and mobile equipment with marketable value will be removed from the underground mine workings and sold. Materials without any marketable value, which are non hazardous, such as piping, wood, and concrete, etc., will be left in place. Electric installation cables will be left in place unless it is determined that they contain hazardous materials. Equipment that cannot be sold or is deemed to be hazardous will be disposed of in a proper manner.

6.4.5 Industrial Reagents and Hazardous Products

Chemicals, reagents and hydrocarbon products will be consumed as mine operations are brought to a close. Any remaining materials will be removed from the mine site and returned to the original supplier for credit and reuse, or sold to a third party user subject to the appropriate regulatory requirements. For specialized products, disposal options may include disposal through a licensed waste disposal firm. It is anticipated that such material will be small in volume.

6.4.6 Water Management Structures

Drainage structures within the industrial complex footprint (Collection Ditches 2, 3 and 5) consist of open channels to transport storm water to a collection pond (Sump #2) which is ultimately pumped to the tailings impoundment during operations (Figure 2.1-1). The Collection Ditches are lined with geomembrane to controlled seepage. The Collection Ditches and Sump #2 will be decommissioned following the removal of all industrial complex structures. Liners will be removed and the ditches and sump backfilled with coarse material.

The primary surface water management ditch (Ditch 1, Figure 2.1-1), upgradient of the industrial complex to convey non-contact surface runoff around the facility, will also be decommissioned once infrastructure footprints and collection ditches have been reclaimed.

6.4.7 Miscellaneous Materials

All salvageable material will be sold and removed from the site. Material that has no scrap value will be disposed of in the landfill site. Materials will be examined to ensure that all hazardous materials have been removed for proper disposal.

6.5 Tailings Facility Area

The general arrangement of the tailings impoundment at life of mine is illustrated in Figure 6-4. Decommissioning, reclamation and closure requirements for the tailings facility and supporting infrastructure are provided below. Reclamation of the downstream dam face will be completed as part of the progressive reclamation program.

6.5.1 Tailings Impoundment

Ore processing will result in a total of 4.07 M tonnes of tailings over the life of mine, with approximately 50% stored within the tailings impoundment. Process effluent from the grinding and flotation circuits is also stored in the tailings impoundment where a significant portion (>90%) of it is recycled back to the process plant.

The tailings comprise a sand-silt mixture with a relatively low permeability. Static testing (acid base accounting) of composite tailings samples indicated that the tailings contain significant quantities of sulphide-sulphur and lesser quantities of neutralization potential. As such, Wolverine tailings are characterized as potentially acid generating. Kinetic testing of two tailings samples in laboratory humidity cells have been ongoing for over 225 weeks each. Although static testing indicates the tailings samples to be ultimately acid generating, humidity cell samples have not gone acid to date. For closure planning purposes, tailings are assumed to be potentially acid generating and closure mitigation strategies have focused on eliminating the potential for tailings oxidation within the impoundment.

To prevent oxidation of the tailings solids and subsequent acid generation, the tailings impoundment has been designed to be a water retaining structure underlain with an impermeable liner. This design permits the tailings to remain completely saturated, both during operations and at closure, and will eliminate the potential for acid drainage from the facility. Moreover, the liner construction also greatly reduces the potential for seepage of tailings water and the concomitant potential for groundwater contamination occurring both during operations, closure and at post-closure. The tailings closure strategy involves the placement of an inert cover material over the tailings solids and the maintenance of a water cover over the entire facility to provide a stable cover for the tailings and reduce the potential for remobilization and resuspension of tailings solids from wind induced wave action. YZC currently proposes to quarry coarse inert material (CIM) for use in covering the tailings. The borrow location for this CIM will be evaluated and full acid rock drainage testing (e.g. acid-base accounting and shake flask testing) will be performed to confirm there is no potential for acid generation and/or metal leaching from the material.

Upon cessation of operations, the CIM cover will be placed over the surface of the tailings in two lifts. During the first winter of the closure period, a 0.5 m thick layer of CIM will be placed on the ice within the tailings pond. As the ice melts, the material will gradually settle over top of the submerged tailings. The objective is to place the cover with minimal disturbance to the tailings interface. Following complete settling of the material, an underwater survey will be conducted to ensure adequate cover over the tailings. During the second winter, a second 0.5 m thick layer of material will be laid over the ice to complete the 1.0 m material cover.

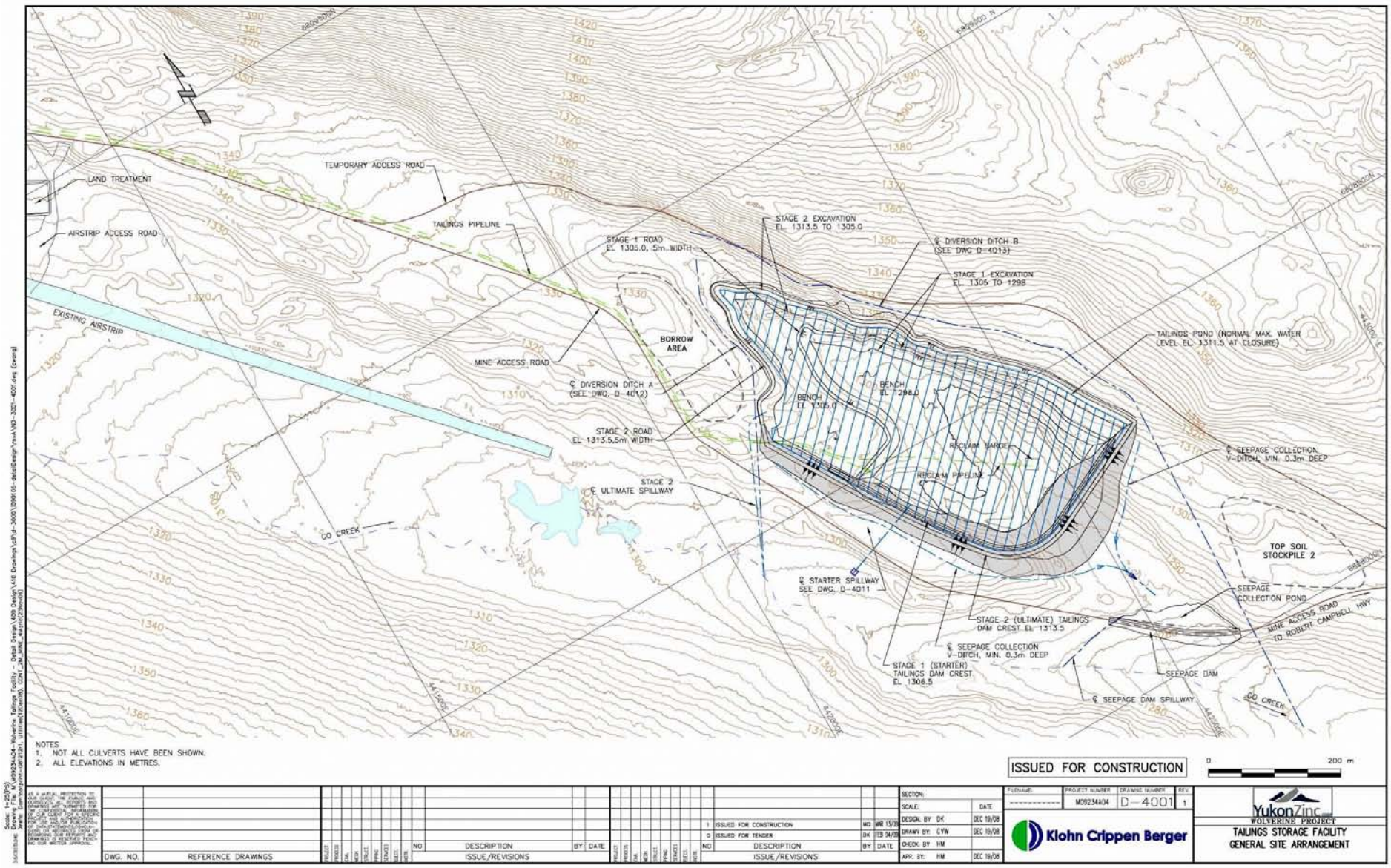
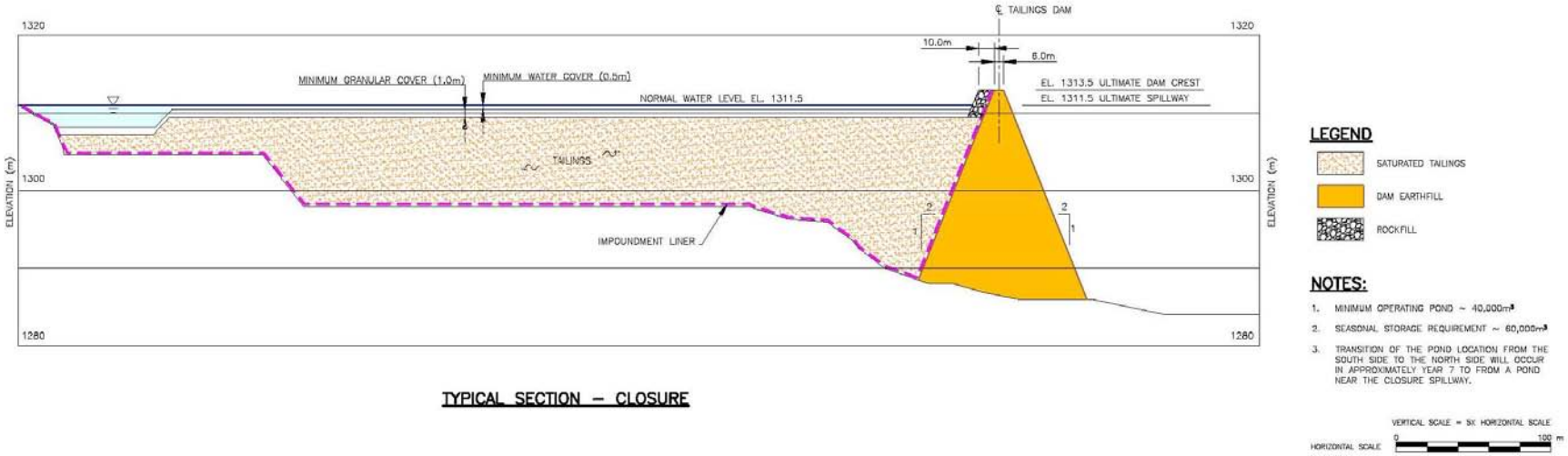


Figure 6-4: Issued for Construction Tailings Facility General Arrangement

Ultimately, the tailings facility will be closed as a saturated deposit with a combined cover of 1.5 m over the tailings consisting of the approximately 1.0 m of material and 0.5 m of water (Figure 6-5).

The potential effects of climate change have been evaluated and duly considered in the design and closure management of the tailings impoundment. Wide-ranging precipitation conditions (e.g. 100-year dry and 100-year wet) were evaluated in water balance modeling for the facility in support of this plan. Continued monitoring of site meteorological conditions (e.g. precipitation and evaporation) will also provide the necessary supporting data to ensure all tailings design criteria for extreme events, including climate change, are adequate and comprehensive.

Figure 6-6 provides the final closure configuration for the tailings impoundment.



TYPICAL SECTION – CLOSURE

Figure 6-5: Typical Section through Tailings Impoundment at Closure

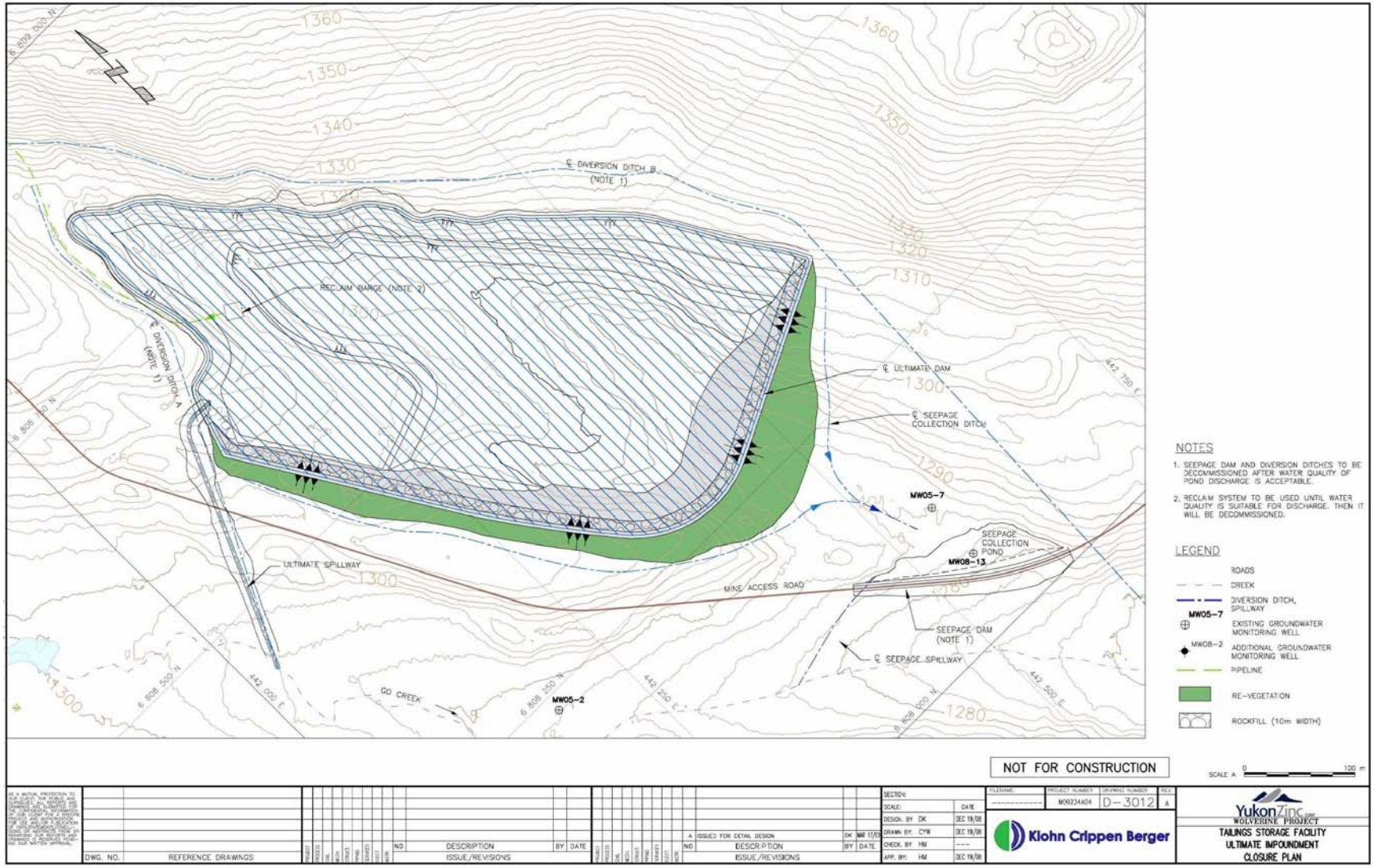


Figure 6-6: Final Closure Configuration of the Tailings Facility

6.5.2 Water Quality at Closure and Treatment Requirements

During closure, the dominant inflow to the tailings impoundment water balance is runoff originating from the tailings area as a result of decommissioning of diversion ditches and the absence of tailings discharging into the facility. During the initial three years following closure, excess tailings water will be treated through the water treatment plant and water levels in the impoundment will be maintained below the spillway elevation of 1311.5 m.

At cessation of operations, approximately 80,000 m3 of tailings water will be held in the impoundment. Upon removal of the diversion ditches associated with the tailings facility, annual inflows of runoff and precipitation to the facility are expected to be on the order of 170,000 m3. Accordingly, roughly two tailings water volume replacements are expected to occur for each year. By the end of year-3 closure, approximately 5 to 6 complete volume replacements would have occurred with clean runoff water. The impoundment water quality should return to near 'baseline' conditions following treatment and removal of the excess water at closure and upon replenishing the pond with fresh water from annual inflows of clean runoff. As such, the anticipated 3-year closure treatment phase is dictated by the time required to flush tailings influenced water from the impoundment to achieve overflow water quality below discharge limits. The tailings impoundment will be closed as a 'wet" facility with a water cover over the tailings and a permanent spillway to manage discharge as well as flood flows through the impoundment.

Because the tailings are to be covered with approximately 1 m of cover material, diffusion of tailings porewater to the overlying water column will be attenuated.

As previously discussed, the water treatment plant will remain in operation to treat the tailings facility overflow water during the early phases of closure. The following infrastructure and equipment will remain operational or onsite to support water treatment plant operations:

- onsite roads to the camp, water treatment plant, tailings facility, and airstrip
- Retention pond associated with water treatment plant
- main access road
- light duty vehicles
- reclaim and discharge pipelines and pumps
- fuel storage facility
- power generating facility with adequate capacity to power the water treatment plant, pumping systems, and camp
- small maintenance workshop
- laboratory for analysis and reagent storage facility
- communication system

The water treatment plant and seepage dam will be decommissioned when the effluent quality from tailings facility is in compliance with Type A Water Licence QZ04-065 requirements and suitable for passive discharge to the receiving environment.

Long-term groundwater quality beneath the tailings impoundment following closure is expected to remain at baseline conditions owing to the fact that the tailings facility is completely lined.

6.5.3 Water Management Structures

6.5.3.1 Pipelines

Once the mill is no longer operational, the tailings and water reclaim pipelines will be dismantled and disposed of in the tailings impoundment. The tailings pipeline will be removed and disposed of within the tailings impoundment prior to the cover material being added in Year 1 of closure. The reclaim pipeline will be removed and disposed of offsite once water treatment is no longer required (Year 3 of closure). The pipeline corridor will be seeded as the pipelines are removed and barren ground exposed.

6.5.3.2 Diversion Ditches

Diversion Ditches A and B (see Figure 6.5-3) will be decommissioned and clean runoff will be permitted to enter directly into the tailings impoundment to facilitate the replacement of tailings-affected water with clean runoff. Ditches will be backfilled and recontoured consistent with the original topography. Disturbed areas along the ditch alignments will be revegetated.

6.5.3.3 Spillway

The spillway on the tailings impoundment will not be removed at closure as this structure serves as the natural overflow of the impoundment once tailings water is of acceptable quality for direct discharge. Routine maintenance of the spillway will be required to ensure that the structure can freely transport water. It is expected the majority of maintenance will be required prior to the onset of the snowmelt period.

6.5.3.4 Seepage Recovery Dam

Once the tailings impoundment water quality is of acceptable discharge water quality, the seepage recovery dam will be decommissioned in conjunction with access road closure activities, and the dam is formed by a section of the road. The dam will be recontoured and material spread out to blend in with the existing topography. The disturbed area will be seeded.

6.5.4 Dam Safety and Monitoring

The tailings dam is designed with a minimum factor of safety of 1.15 for the Maximum Credible Earthquake. Consequently, the main concerns with dam safety on closure are associated with erosion of the dam or blockage of the spillway. Accordingly, a long term care and maintenance plan will be prepared to confirm that erosion is not occurring and that the spillway is clear. Measures to mitigate these potential concerns include the following:

- The downstream slope of the dam will be revegetated during the operations phase to minimize erosion.
- 10 m wide neutral rockfill will be placed adjacent to the upstream crest of the dam. The rockfill will keep the “free water” away from the dam crest, further reducing the potential for water release even with a significant erosion event.
- The ultimate dam spillway, located at the end of the impoundment away from the dam, will consist of an excavated channel lined with large riprap with discharge

capacity for the routed peak flow resulting from the 10,000-year rainfall plus snowmelt event.

The physical and seepage conditions in the dam and area directly downstream of the dam will be monitored during closure as follows:

- Routine: visual monitoring by mine personnel every second month until safe long term trends are indicated
- Intermediate: visual monitoring by the site dam engineer and annual review of monitoring data and dam performance by the design engineer
- Comprehensive: Dam safety review by dam engineer prior to decommissioning and otherwise routinely every 5 years (even after decommissioning); and
- Special Reviews: site visit and review of monitoring data are required after the occurrence of any potentially damaging events (e.g., floods, earthquakes) or unusual observations (e.g., cracks, sinkhole formation).

Details pertaining to these monitoring requirements as well as the monitoring of inclinometers, piezometers, survey monuments, climate conditions, pond level and groundwater wells will be included in the Tailings Facility Operation, Maintenance and Surveillance Manual currently in preparation.

6.5.5 Water Quality Monitoring

Water quality monitoring of the tailings facility and excess water discharge during the ice-free months represents the most significant closure monitoring requirement of the Wolverine Project.

During the first three years of closure, the tailings pond will be monitored monthly for water quality. During discharge periods of May to October, daily monitoring of the discharge quality at the retention pond and at the compliance point W80 in Go Creek will occur. The total analytical load for water quality monitoring of the tailings facility and treatment system is on the order of 1140 samples over the initial three year closure period

Once tailings pond water is demonstrated to be routinely within permitted discharge limits, bi-annual monitoring of the tailings impoundment is proposed during the ice-free period for the next 4 years as a confirmatory measure.

6.6 Temporary Waste Rock and Ore Storage Facility

In 2006, Yukon Engineering Services assessed a number of closure scenarios for the waste rock pad. Assuming that material on the pad is not placed within the mine as planned, the design parameters derived from that assessment remain valid for the closure of the waste rock pad:

- Maximum allowable slope – 3H:1V;
- Ore will be hauled back underground;
- The waste rock will be overlain by 1000 mm thick clay cap blanket and 2000 mm thick granular till cover (both compacted to 90% Modified Proctor with 2% of optimum moisture content), and 150 mm-300 mm topsoil and vegetative layer;
- Collection ditches to transport runoff from the waste rock pad to the existing (south) sump and a future (north) sump until the pad is vegetated; and
- An interceptor ditch to intercept natural runoff from the higher ground surrounding the pad, returning it to natural downstream drainage courses.

Prior to the placement of the capping material, the ore will be removed and hauled underground, and the pad will be re-contoured to a dome shape with a final grade of 3H:1V on all the side slopes. The waste rock will be compacted and the surface smoothed by heavy equipment to facilitate shedding of surface water. Berms and/or lined energy-absorbing-runoff channels will be constructed to minimize infiltration and erosion. To minimize the generation of future acid rock drainage, as well as limit infiltration into the pile, the domed waste will have a clay layer cap of approximately 1.0 m thickness. The clay layer will serve to limit diffusion of oxygen into the pile as well as provide a low permeability barrier for infiltration and promote the shedding of clean surface runoff water. Typically, these systems are designed to limit infiltration to values less than 10% of net precipitation. Assuming the project area receives net precipitation of approximately 165 mm/yr, successful cover performance would produce pad seepage rates at less than 0.05 L/s or less than 170 m^3 of seepage water per annum.

To protect the clay from freeze-thaw effects (e.g. development of vertical shrinkage cracks), a frost protection layer is needed. This frost cover will consist of the locally abundant granular till material. Finally, the stockpiled topsoil and organic material will be spread over the capped pad. The surface of the organic material will then be seeded to re-establish a vegetation cover, with the seed mix designed to minimize attraction of wildlife.

All surface water draining towards and from the engineered cover system will be collected in perimeter “collection” ditches immediately outside of the toe of the capping material. The perimeter ditches will flow by gravity into the sumps where, if needed, this water will be treated before finally being discharged to natural drainage just southeast of the pad. As soon as it has been established that these flows do not (or no longer) require treatment, the sumps will be filled with the locally available till-like material and re-vegetated.

Reclamation may also include the installation of passive sediment retention systems such as hay bales or activated carbon to ensure there are no sediment or metal releases down slope towards Go Creek. A water management plan will be implemented to ensure the success of the passive system. The management plan will include inspections of the pad and its appurtenances during scheduled site inspections for three years after decommissioning and reclamation.

6.7 Mine Access Road

During mine access road design, Yukon Engineering Services assessed road closure requirements based on completion of the Phase 2 road. The closure requirements will be reviewed upon completion of the Phase 2 road construction (Q3 2010) and as-built drawings. Closure of the access route will involve both access control during the initial closure phases and decommissioning and access control when the road is no longer required.

6.7.1 Access Control

During the initial closure phase (year 1 to year 3) access to the site via the all weather road will be controlled on a 24-hour basis. Gates located at km 0.1 and km 0.49 (see Figure 3.2-1) will be locked to prevent vehicular access from the Robert Campbell Highway.

Once all decommissioning activities have been completed and use of the access road is no longer required, another access control gate will be installed near km 14. This location has been selected on a 10% ascending gradient, some 3 km north of the glacio fluvial plateau that separates the upper Money Creek and Go Creek drainages. The location will deny access to highway vehicles, all terrain vehicles and snowmobiles, should they proceed along the reclaimed road corridor from the highway.

6.7.2 Access Road Decommissioning and Closure

Road closure will involve the removal of the culverts and drainage structures and decommissioning of the roadbed. The roadbed will be contoured and rounded throughout its length, and will include the following activities:

- In smaller cuts and fills, ditches will be filled in, and the soils shaped to match the surrounding topography.
- In large cuts and fills, the embankment or excavation footprint will be reshaped to a lesser extent, but all slopes will be flattened or rounded to better suit the surrounding terrain.
- Organic stripping materials placed at the toe of fills during the original construction phase, will be re-contoured along the downhill side to act as a sediment filter, and to re-establish vegetation.
- Surfaces of gradients less than 25% will be scarified (using scarifiers on bulldozers, excavators and graders) to better accept seeding.

All culverts, bridges, and drainage structures will be removed and disposed of off-site at an appropriate location. The following activities are planned:

- trenches resulting from the removal of culverts will be swaled or contoured to match the surrounding terrain;
- where warranted due to fine grain soils, erosion protection will be installed within the remaining swales, to a point where the reclaimed watercourse meets with its original path in undisturbed soil;
- ditch blocks will be removed;

- where ditches are to be left intact (some steeper sections) existing ditch erosion protection may be left in place; and
- the Bunker Creek bridge (km 10.25) will be removed, and the abutments will be excavated to the level of the rip-rap placed during construction.

All remaining borrow sources will be stabilized and contoured to prevent surface erosion, then seeded as per the guidelines developed from the Reclamation Research Program.

6.8 Camp

Portions of the modular camp facilities will be progressively removed as onsite personnel requirements decrease. Facilities will remain for care and maintenance staff and for reclamation crews and monitoring crews until all closure objectives have been met.

Once all closure activities have been completed, remaining modular structures will be removed. Sewage treatment facilities will also be decommissioned and salvageable material removed from site. The water supply wells will be decommissioned once the potable water treatment and camp facilities are no longer required. The pump houses and the buried distribution system will be removed for salvage and or if deemed appropriate, the distribution system will remain in situ to minimize subsequent surface disturbance associated with removal. Water wells will be backfilled throughout their entire length with a combination of concrete and grout, and the top 5 m will be completely cemented.

Following decommissioning, the camp area will be recontoured, soil growth medium will be placed and the area seeded.

6.9 Waste Management Areas

Waste management areas include the landfill, special waste storage pad, solid waste storage area, and land treatment facility (Figure 6-7).

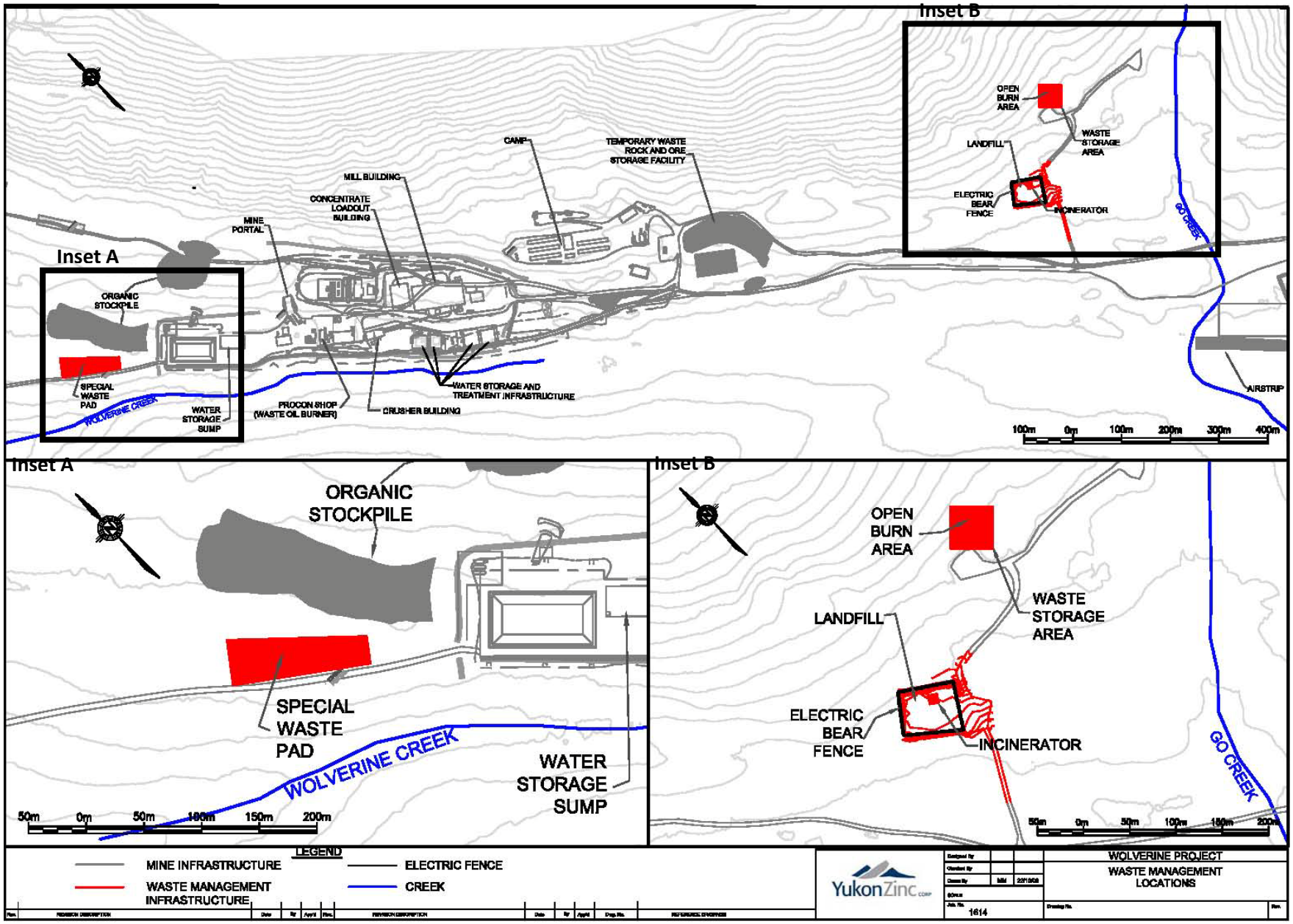


Figure 6-7: Location of Special Waste Storage Area, Landfill and Incinerator, and Waste Storage and Open Burn Area

6.9.1 Landfill and Waste Storage Areas

Decommissioning and demolition activities will generate some non-hazardous waste material that will be disposed of in the landfill area. Waste that cannot be buried in the landfill will be temporarily stored at the solid waste or special waste storage areas prior to transportation for disposal offsite. At the end of closure activities, the landfill and storage areas will be covered with a 250 mm thick layer of compactable soil material and graded to encourage the shedding of water. The sites will then be seeded.

6.9.2 Land Treatment Facility

Soils present in the land treatment facility during the final year of operation will be tested to determine if material is acceptable for use in reclamation programs around the industrial complex. If the soil is found to contain residual contamination that does not permit use in reclamation, the soil in the land treatment farm will be hauled off site to an approved facility.

6.10 Closure Manpower

A number of personnel will be required onsite to implement the various decommissioning, closure and reclamation tasks. The majority of these activities will be undertaken on a seasonal basis (May–October) and directed by an onsite manager. A caretaker will remain onsite following seasonal closure of the site.

The work force requirements for the decommissioning or initial closure period (Year 1 to Year 3) and the late closure phases (Year 4 to Year 10) are provided in Table 6-4.

Table 6-4: Site Decommissioning, Closure and Reclamation Work Force Requirements

Personnel	Decommissioning Period Year 1 to Year 3	Late Closure Period Year 4 to Year 10
Project Manager (Corporate)	1	1
Project/Mine Engineer	1	
Environmental Coordinator	1	1
Site security	1	
Construction Supervisor	1	
Equipment Operators	2	1
Mechanics/Welders/Electricians	2	
General Labourers	2	1
Camp Support Staff	2	
Total Seasonal	**12**	**3**
Total Off-Season (Caretaker)	**1**	

7 Reclamation and Decommissioning Cost Estimates

Decommissioning and closure costs for implementing the Wolverine Project closure plan have been prepared for the following periods: current site status at the end of construction (Exisiting Condition as of June 2010), end of Year 2 of Operations (at December 2011) and Life of Mine (LOM) at end of 2019.

The cost summaries provided below includes costs associated with project shutdown, the decommissioning of facilities and support infrastructure, reclamation activities, and compliance and reclamation monitoring. The estimated cost is based on the following assumptions, rationale and information:

- No salvage value is included in the estimate;
- No discounting has been included in the estimate;
- Reclamation costs are based on the cost of having the work completed by a third party contractor;
- Unit rates for equipment for dry conditions were obtained from Government of Yukon Third Party Equipment Rental Rates (2009/2010) and focused on contractors and rates published out of Ross River and Watson Lake. In addition, rates presented by Yukon Engineering Services and currently known lease/contractor rates have been applied where applicable. A summary of the unit rates employed in the cost evaluation is provided in Table 7-1.
- Costs associated with closure monitoring and in particular surface water quality and groundwater quality analytical are based on current costs incurred by the Company. The number of samples for analysis over the total closure period are based on monitoring requirements set forth in Water Use Licence QZ04-065 and Yukon Zinc Corporation's Application submission for Water Use Licence QZ04-065 (January 2007).
- Contingencies, ranging from 10% to 15%, have been included in the cost estimate for each closure component based on the level of uncertainty in the assessment and the degree of risk associated with each component.
- Decommissioning, reclamation and closure (including post-closure) phases are assumed to be phased out within a ten-year period after cessation of mining;
- The closure phase water balance for the tailings facility will have a net positive balance and the water will require treatment before being discharged to Go Creek for an estimated 3-year period. No funds for treatment have been allocated beyond the closure phase;
- Closure water treatment costs have been estimated from similar operating biological reduction water treatment systems with a minimum of 10 years operating cost experience. The water treatment costs range from $0.07/m3 to $0.39/m3 (Dr. Jack Adams, pers. comm.). For the Wolverine Project, closure water treatment costs of $0.40/m3 have been assumed, and
- Non-acid generating fill and rock will be available within the project area for closure activities.

Table 7-1: Unit Rates for Closure Cost Estimates

Equipment	Rate	
	Hourly	Monthly
Cat D8H Dozer	$200	
Volvo A35 Articulated Haul Truck	$200	
Compactor - Cat CS563 84"	$135	
Cat 325 BL Excavator/Hoe	$170	
Cat 14G grader	$185	
Cat 980 Loader	$175	
Drill Rig	$190	
Cat 320 Excavator + Hammer	$170	
Crane 30 ton	$130	
Light-duty vehicle		$1,400
Labourer	$50	
Tradesman	$80	
Site Supervisor	$90	
Design Engineer	$130	
Project Engineer	$140	
Project Manager		$8,800
Camp Labourer		$4,000
Site Caretaker		$6,000
Environmental Monitor		$6,000

Contractor Unit Rates; Misc Costs	Units	Cost
Excavation of Soil in Stockpile	m^3	$3
Supply and place geotextile	m^2	$12
Load, haul and place soil cover	m^3	$5
Load, haul and place Tailings Cover	m^3	$7
Load, haul and place rock cover, organics, granular till and clay	m^3	$8
Drill, Blast and Haul Rip Rap	m^3	$14
Place Rip Rap	m^3	$14
Camp Costs	day/person	$85
Surface water quality analyses	sample set	$400
Groundwater quality analyses	sample set	$270
Water Treatment Cost	m^3	$0.40
Revegetation Seed Mix	kg	$12
Fertilizer	kg	$0.80
Hydroseeding	ha	$3,000
Seed and Fertilizer Application	ha	$2,000
Concrete	m^3	$85
Erosion barrier	per linear km	$1,500

A summary and comparison of the estimated costs to implement the reclamation and closure plans described above are presented in Table 7-2 for the Existing Condition, Operations Year 2, and LOM. Detailed cost breakdowns are provided in Appendix A for LOM and Appendix B for the Existing Condition and Year 2 closure cost scenarios.

Table 7-2: Summary of Estimated Costs to Execute Decommissioning, Closure and Reclamation Plans for the Existing Condition, Year 2 and LOM Closure Scenarios

	Existing		Year 2		LOM	
Work Item Description	Sub-Total Costs	Total Costs	Sub-Total Costs	Total Costs	Sub-Total Costs	Total Costs
Mine Workings		$ 447,993		$ 447,993		$ 447,993
1345 Portal Barrier and Ventillation Raise	$ 80,659		$ 80,659		$ 80,659	
Installation of Hydraulic Plugs in Access Ramp	$ 185,800		$ 185,800		$ 185,800	
Installation of Hydraulic Plug in Ventilation Raise	$ 123,100		$ 123,100		$ 123,100	
15% Contingency	$ 58,434		$ 58,434		$ 58,434	
Tailings Management System		$ 460,069		$ 1,822,210		$ 1,822,210
Reclaim Tailings Dam Face	$ 200,500		$ 36,250		$ 36,250	
Reclaim Seepage Recovery Dam	$ 14,800		$ 14,800		$ 14,800	
Decommission Diversion Ditches	$ 26,960		$ 22,960		$ 22,960	
Remove Tailings and Reclaim Pipelines	$ 147,800		$ 147,800		$ 147,800	
Cover Tailings with Coarse Inert Material (CIM)			$ 1,139,000		$ 1,139,000	
Water Treatment and Plant Decommissioning	$ 10,000		$ 223,720		$ 223,720	
15% Contingency	$ 60,009		$ 237,680		$ 237,680	
Infrastructure		$ 1,507,845		$ 1,219,725		$ 1,224,015
Mill Concentrator Buildings	$ 457,945		$ 578,215		$ 578,215	
Temporary Waste Rock Storage Area	$ 427,343		$ 35,146		$ 24,046	
Power Supply - Gensets	$ 54,880		$ 54,880		$ 54,880	
Reclaim Site Diversions	$ 38,400		$ 38,400		$ 38,400	
Water Supply and Ponds	$ 56,050		$ 56,050		$ 56,050	
Accomodation Camp	$ 39,500		$ 39,500		$ 39,500	
Explosive Magazine	$ 5,200		$ 5,200		$ 5,200	
Miscellaneous Buildings and Structures	$ 113,550		$ 113,550		$ 113,550	
Industrial Reagents and Fuels	$ 65,000		$ 65,000		$ 65,000	
Spill Cleanup	$ 12,900		$ 17,900		$ 32,900	
Demolition Overheads	$ 100,000		$ 105,000		$ 105,000	
10% Contingency	$ 137,077		$ 110,884		$ 111,274	
Access Road		$ 694,419		$ 694,419		$ 694,419
Lower road grade and slope stabilization	$ 88,300		$ 88,300		$ 88,300	
Remove culverts	$ 119,500		$ 119,500		$ 119,500	
Bunker Creek rehabilitation	$ 77,000		$ 77,000		$ 77,000	
Reclaim spoil and borrow areas	$ 212,250		$ 212,250		$ 212,250	
Maintenance and barriers	$ 51,500		$ 51,500		$ 51,500	
Engineering and surveying	$ 54,855		$ 54,855		$ 54,855	
10% Contingency	$ 60,341		$ 60,341		$ 60,341	
Reclamation and Revegetation		$ 131,450		$ 131,450		$ 131,450
Exploration Road and Trails	$ 21,500		$ 21,500		$ 21,500	
Mine Site and Tailings Haul Roads	$ 98,000		$ 98,000		$ 98,000	
10% Contingency	$ 11,950		$ 11,950		$ 11,950	
Site Management and Monitoring		$ 1,530,581		$ 3,997,981		$ 3,997,981
Organization, Security and Overhead	$ 686,050		$ 1,580,975		$ 1,580,975	
Document Control	$ 36,000		$ 55,200		$ 55,200	
Compliance Monitoring and Reporting	$ 384,760		$ 1,516,200		$ 1,516,200	
Closure Maintenance			$ 100,000		$ 100,000	
Wolverine Creek Biopass Contingency	$ 224,130		$ 224,130		$ 224,130	
15% Contingency	$ 199,641		$ 521,476		$ 521,476	
Estimated Total Closure Costs		$ 4,772,357		$ 8,313,777		$ 8,318,067

Each closure cost scenario provides detailed costing associated with the following mine components:

- Mine workings
- Tailings management system
- Infrastructure
- Access road
- Reclamation and revegetation; and

- Site Management and Monitoring.

Estimated total closure costs for the LOM scenario are approximately $8.3 million, with the most significant costs being associated with Site Monitoring and Maintenance (~$4.0 million), closure of the tailings facility (~$1.8 million), and infrastructure decommissioning (~$1.2 million).

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Appendix A: Detailed Closure Cost Estimates - LOM

Mine Workings - LOM

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
1345 Portal Closure						
Plug portal and ventillation raisewith tires		Cat 325 Hoe	hrs	30	$ 170	$ 5,100
Place waste rock cap over tires		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		A35 Articulated haul truck	hrs	40	$ 200	$ 8,000
Supply broken rock at base of plug and discharge channel riprap		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		A35 Articulated haul truck	hrs	40	$ 200	$ 8,000
Construct rock drain at base of plug		Cat 325 Hoe	hrs	10	$ 170	$ 1,700
Supply fill to seal discharge channel		Cat 325 Hoe	hrs	10	$ 170	$ 1,700
		A35 Articulated haul truck	hrs	20	$ 200	$ 4,000
Construct lined open channel for discharge from portal to biopass system; 300 m length		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		Compactor	hrs	10	$ 135	$ 1,350
Stabilize and vegetate area around channel		Seed and Fertilize	ha	0.09	$ 2,000	$ 180
Labour for channel construction		Labourer	hrs	30	$ 50	$ 1,500
Labour to assist with placing tires & cap		Labourer	hrs	80	$ 50	$ 4,000
Design of rock drain and channel (Engineering)		Engineering	hrs	40	$ 130	$ 5,200
Interim Portal Discharge Treatment		water treatment (1 L/s x 2 years)	m^3	63072	$ 0.40	$ 25,229
Supervision to design & install tires and cap		Supervision	hrs	50	$ 90	$ 4,500
	Sub Total					**$ 80,659**
Install Hydraulic Plugs in Access Ramp						
Drill and grout		grouting 10 m into wall; 20 m length x 2 plugs	hours	300	$ 190	$ 57,000
Install concrete plugs		20 m length x 5 m x 5 m x 2 plugs	m^3	1000	$ 85	$ 85,000
Labour for plug installation		Labourer	hours	300	$ 50	$ 15,000
Engineering		Design of plugs	hours	60	$ 130	$ 7,800
Supervision		Project engineer	hours	150	$ 140	$ 21,000
	Sub Total					**$ 185,800**
Install Hydraulic Plug in Ventillation Raise						
Install concrete plug		75 m length x 4 m x 4 m x 1 plug	m^3	1200	$ 85	$ 102,000
Labour for plug installation		Labourer	hours	150	$ 50	$ 7,500
Engineering		Design of plug	hours	40	$ 130	$ 5,200
Supervision		Project engineer	hours	60	$ 140	$ 8,400
	Sub Total					**$ 123,100**
				15% Contingency		**$ 58,434**
		Total				**$ 447,993**

Tailings Management Area - LOM

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Reclaim Tailings Dam Face						
Load Haul and Place topsoil		Area of 25000 m^2 with 0.25 m depth	m^3	6250	$ 5	$ 31,250
Revegetate		Seed and Fertilize	ha	2.5	$ 2,000	$ 5,000
Sub Total						**$ 36,250**
Reclaim Seepage Recovery Dam						
Seepage Dam Regrade		Cat D8 Dozer regrade and contour	hours	16	$ 200	$ 3,200
Load Haul and Place topsoil		Area of 8000 m^2 with 0.25 m depth	m^3	2000	$ 5	$ 10,000
Revegetate		Seed and Fertilize	ha	0.8	$ 2,000	$ 1,600
Sub Total						**$ 14,800**
Decommission Diversion Ditches						
Decommission Diversion Ditches A&B		Cat D8 Dozer regrade and contour	hours	60	$ 200	$ 12,000
Decommission Diversion Ditch B		Excavator for steep slopes	hours	20	$ 170	$ 3,400
Revegetate and Stabilize		Seed and Fertilize area 1.56 km x 5 m	ha	0.78	$ 2,000	$ 1,560
Remove 4 - 800 mm Culverts		Uncovering and removal	Ea.	4	$ 1,500	$ 6,000
Sub Total						**$ 22,960**
Remove Tailings Pipeline (3 km)						
Remove Pipeline		Cat 325 hoe	hrs	150	$ 170	$ 25,500
		A35 Articulated haul truck	hrs	150	$ 200	$ 30,000
		Labour	hrs	300	$ 50	$ 15,000
Seeding and Fertilizer Application			ha	1.7	$ 2,000	$ 3,400
Sub Total						**$ 73,900**
Remove Reclaim Pipeline (3 km)						
Remove Pipeline		Cat 325 hoe	hrs	150	$ 170	$ 25,500
		A35 Articulated haul truck	hrs	150	$ 200	$ 30,000
		Labour	hrs	300	$ 50	$ 15,000
Seeding and Fertilizer Application			ha	1.7	$ 2,000	$ 3,400
Sub Total						**$ 73,900**
Cover Tailings with Coarse/Inert Material (CIM)						
Load Haul and Place CIM		Place and level CIM on ice in winter	m^3	145,000	$ 7	$ 1,015,000
Load Haul and Place Rockfill		Erosion control on dam face	m^3	15,000	$ 8	$ 120,000
Revegetate CIM stockpile area		Seed and Fertilize	ha	2	$ 2,000	$ 4,000
Sub Total						**$ 1,139,000**
Water Treatment of Excess Tailings Water						
Biotreatment of excess tailings water		Treatment for 3 years; ~170,000 m^3/yr	m^3	510,000	$ 0.40	$ 204,000
Decommissioning and Dismantling of water treatment plant		Labour	hours	230	$ 50	$ 11,500
Dismantle WTP infrastructure - Industrial Complex		Cat 325 hoe	hours	30	$ 170	$ 5,100
		Crane	hours	24	$ 130	$ 3,120
Sub Total						**$ 223,720**
				15% Contingency		**$ 237,680**
		Total				**$ 1,822,210**

Note: Water treatment cost includes power supply and amendments. Estimated water treatment cost for closure of $0.4/$m^3$

Infrastructure Decommissioning - LOM

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Mill-Concentrator, Admin and Truck Shop						
Remove salvageable equipment		General Labour	hours	1152	$ 50	$ 57,600
		Trades Labour	hours	1128	$ 80	$ 90,240
Dismantle Building - Manpower		General Labour	hours	1152	$ 50	$ 57,600
Dismantle Building - Manpower		Trades Labour	hours	576	$ 80	$ 46,080
Dismantle Building - Equipment and Loading		Cat 325	hours	160	$ 170	$ 27,200
		Crane	hours	80	$ 130	$ 10,400
Concrete Demolition		Excavator with Hammer	hours	80	$ 170	$ 13,600
Misc. Supplies & Tools		Misc.	L.S.	L.S.		$ 10,000
Scrap haul to landfill		A35 Articulated haul truck	hours	208	$ 200	$ 41,600
Reslope and contour and bury		Cat D8	hours	80	$ 200	$ 16,000
Load, Haul and place topsoil		Area of 145244 m^2 x 0.25 m depth	m^3	36311	$ 5	$ 181,555
Revegetate, seed and fertilize		Seed and Fertilize	ha	13.17	$ 2,000	$ 26,340
	Sub Total					**$ 578,215**
Temporary Waste Rock Storage Area						
Load, Haul and place topsoil		13285 m^2 x 0.25 m	m^3	3,321	$ 5	$ 16,606
Regrade and contour		Cat D8	hours	24	$ 200	$ 4,800
Revegetate		Seed and Fertilize	ha	1.32	$ 2,000	$ 2,640
	Sub Total					**$ 24,046**
Power Supply - Gensets						
Remove salvageable equipment		General Labour	hours	180	$ 50	$ 9,000
		Trades Labour	hours	108	$ 80	$ 8,640
Salvage and remove powerline and poles			L.S.	L.S.		$ 25,000
Dismantle Building - Manpower		General Labour	hours	96	$ 50	$ 4,800
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Equipment		Cat 325	hours	12	$ 170	$ 2,040
		Crane	hours	12	$ 130	$ 1,560
	Sub Total					**$ 54,880**
Reclaim Site Diversions						
Decommission 1500 m of diversion ditches		Cat 325 hoe	hours	150	$ 170	$ 25,500
Remove culverts 1000 mm		3 x 1000 mm	L.S.	3	$ 1,500	$ 4,500
Remove culverts 600 mm		5 x 600 mm	L.S.	5	$ 1,500	$ 7,500
Revegetate, seed and fertilize		1.5 km x 3 m	ha	0.45	$ 2,000	$ 900
	Sub Total					**$ 38,400**
Water Supply and Pond						
Remove salvageable equipment - pipeline/pumps and tank		General Labour	hours	24	$ 50	$ 1,200
		Trades Labour	hours	24	$ 80	$ 1,920
Remove pipeline and haul to tailings or underground		A35 Articulated haul truck	hours	8	$ 200	$ 1,600
		Cat 325	hours	8	$ 170	$ 1,360
Decommission water supply wells		fill with concrete	Ea.	2	$ 2,000	$ 4,000
Misc. Supplies & Tools		Misc.	L.S.	L.S.		$ 500
Remove freshwater pond		Cat 325	hours	12	$ 170	$ 2,040
		General Labour	hours	12	$ 50	$ 600
Backfill with coarse material			m^3	7000	$ 5	$ 35,000
Load, Haul and place topsoil		Area 90 m x 60 m x 0.25	m^3	1350	$ 5	$ 6,750
Revegetate, seed and fertilize		90 m x 60 m	ha	0.54	$ 2,000	$ 1,080
	Sub Total					**$ 56,050**

Infrastructure Decommissioning - LOM (continued)

Accomodation Camp and STP						
Remove salvageable material		General Labour	hours	108	$ 50	$ 5,400
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Manpower		General Labour	hours	48	$ 50	$ 2,400
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Equipment and Loading		Cat 325	hours	16	$ 170	$ 2,720
Remove sewage treatment plant		Labour	hours	24	$ 50	$ 1,200
Misc. Supplies & Tools			L.S.			$ 1,000
Scrap haul to landfill		A35 Articulated haul truck	hours	20	$ 200	$ 4,000
Reslope and contour		Cat D8	hours	48	$ 200	$ 9,600
Revegetate, seed and fertilize		Seed and Fertilize	ha	2.75	$ 2,000	$ 5,500
	Sub Total					**$ 39,500**
Explosive Magazines						
remove from site			L.S.			$ 5,000
Revegetate area		Seed and Fertilize	ha	0.1	$ 2,000	$ 200
	Sub Total					**$ 5,200**
Miscellaneous Buildings and Structures						
Remove salvageable equipment		General Labour	hours	216	$ 50	$ 10,800
		Trades Labour	hours	216	$ 80	$ 17,280
Remove salvageable equipment		Cat 980 loader	hours	150	$ 175	$ 26,250
Dismantle Building - Manpower		General Labour	hours	216	$ 50	$ 10,800
		Trades Labour	hours	216	$ 80	$ 17,280
Dismantle Building - Equipment and Loading		Cat 325	hours	40	$ 170	$ 6,800
		Crane	hours	8	$ 130	$ 1,040
Concrete Demolition		Excavator with Hammer	hours	40	$ 170	$ 6,800
Reslope, contour & bury		Cat D8	hours	60	$ 200	$ 12,000
Misc. Supplies & Tools		Misc.	L.S.			$ 2,500
Scrap haul to landfill		A35 Articulated haul truck	hours	10	$ 200	$ 2,000
	Sub Total					**$ 113,550**
Industrial Reagents Fuels and Waste						
Industrial Reagents		remove from site	L.S.			$ 25,000
Fuels		remove from site	L.S.			$ 20,000
Wastes		remove from site	L.S.			$ 20,000
	Sub Total					**$ 65,000**
Spill Cleanup						
Concentrator haul out			L.S.			$ 15,000
Other building site spill clean up			L.S.			$ 15,000
Reclaim Landfill area		Seed and Fertilize	ha	1	$ 2,000	$ 2,000
Reclaim landfarm area		Seed and Fertilize	ha	0.45	$ 2,000	$ 900
	Sub Total					**$ 32,900**
Demolition Overhead						
Supervision		Supervision	hours	1,000	$ 90	$ 90,000
Office/Admin Costs		Contracts oversight	Year	3	$ 5,000	$ 15,000
	Sub Total					**$ 105,000**
				10% Contingency		**$ 111,274**
		Total				**$ 1,224,015**

All Weather Access Road - LOM

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Decommission and Reclaim Access Road						
Lower road grade		remove excess materials to adjacent areas including borrow areas to stabilize against erosion - Grader	Hrs	100	$ 185	$ 18,500
		Cat 325 hoe	Hrs	140	$ 170	$ 23,800
		A35 Articulated haul truck	Hrs	140	$ 200	$ 28,000
Stabilize side slopes		Flatten minor roadside cut banks/fill slopes with Cat 325	Hrs	80	$ 170	$ 13,600
culverts 600-800 mm		Work includes uncovering, removal to offsite for re-use, resloping banks and amoring wetted section	Each	61	$ 1,500	$ 91,500
Culverts >2400		Work includes uncovering, removal to offsite for re-use, resloping banks and amoring wetted section	Each	2	$ 4,000	$ 8,000
Culvert Crossing restoration work		Minor restoration work, installation of environmental protection measures	L.S.	1	$ 20,000	$ 20,000
Bunker Creek Bridge Removal		Removal of bridge complete with bin-wall, resloping of banks	L.S.	1	$ 75,000	$ 75,000
Bunker Creek habitat restoration		Restoration of habitat in riparian zone and re-seeding	L.S.	1	$ 2,000	$ 2,000
Scarify road surface		To encourage re-vegetation (25 km x 15 m) Cat D8	Ha	37.5	$ 2,000	$ 75,000
Reclaiming Spoil Piles		Restoration of spoil piles containing excess organics from road construction - Cat 325	Km	25	$ 1,000	$ 25,000
Borrow Sources-stabilize slopes		Stabilize the slopes of the excavations - Cat D8	Hrs	40	$ 200	$ 8,000
Borrow Sources-S&F flat sources		Using ATV mounted applicator for seed and fertilizer	Ha	15	$ 2,000	$ 30,000
Borrow Sources Hydroseeded		Apply hydro-seed to steeper slopes (>1V:4H slope)	Ha	5	$ 3,000	$ 15,000
Corridor re-vegetate-broadcast S&F		Using ATV mounted applicator for seed and fertilizer including staging area	Ha	44.5	$ 2,000	$ 89,000
Maintenance S&F-after 1 year		Assume coverage of 50% with seed & fertilizer alone	Ha	44.5	$ 1,000	$ 44,500
Permanent barrier at highway		Trenching and barricading using natural materials in the area, to dissuade casual access	L.S.	1	$ 3,500	$ 3,500
Permanent barrier at Km 14		Barricading to provide ultimate barrier to more interior access	L.S.	1	$ 3,500	$ 3,500
						$ 573,900
Engineering 5%		For major components, particularly removal of bridge				28,695
Surveying 5%		For final as-builts of new contours and stream crossings				28,695
				10% Contingency		**63,129**
		Total				**$ 694,419**

Remaining Land Reclamation - LOM

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Exploration Road and Trails and Stockpile Footprints						
Stabilize Slopes - Erosion Barrier		Unit Cost Basis	km	8	$ 1,500	$ 12,000
Revegetate, seed and fertilize - roads		Seed and fertilize	ha	2.4	$ 2,000	$ 4,800
Revegetate, seed and fertilize - stockpiles		Seed and Fertilize	ha	2.35	$ 2,000	$ 4,700
Sub Total						**$ 21,500**
Mine Site and Tailings Haul Roads						
Lower road grade		remove excess materials to adjacent areas including borrow areas to stabilize against erosion - Grader	hours	60	$ 185	$ 11,100
		Cat 325 hoe	hours	80	$ 170	$ 13,600
		A35 Articulated haul truck	hours	80	$ 200	$ 16,000
stabilize slopes - erosion barriers		Cat 325 hoe	hours	40	$ 170	$ 6,800
Culvert removal		uncover, remove and stabilize	Ea.	15	$ 1,500	$ 22,500
Scarify		Cat D8	hours	70	$ 200	$ 14,000
Revegetate, seed and fertilize		Seed and Fertilize	ha	7	$ 2,000	$ 14,000
Sub Total						**$ 98,000**
				10% Contingency		**$ 11,950**
		Total				**$ 131,450**

Site Management and Monitoring - LOM

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Organization, Security and Overhead						
Pre closure planning and organization		Management	months	6	$ 8,800	$ 52,800
Site Manager		Management	months	36	$ 8,800	$ 316,800
Camp Cost[1]		labour	days[1]	5795	$ 85	$ 492,575
Site caretaker		Responsible for security and camp; general maintenance	months	36	$ 6,000	$ 216,000
pre closure site environmental assessment		contract	L.S			$ 75,000
post closure environmental cleanup confirmation		contract	L.S			$ 75,000
vehicles for security and manager		light-duty vehicle	months	72	$ 1,400	$ 100,800
site maintenance costs		general maintenance	year	3	$ 10,000	$ 30,000
Flights		Bi-monthly	flights	72	$ 1,000	$ 72,000
miscellaneous office/supply/costs		miscellaneous	year	10	$ 15,000	$ 150,000
	Sub Total					**$ 1,580,975**
Document Control						
document reviews and storage		miscellaneous	monthly	120	$ 200	$ 24,000
final as built drawings		manhours	hours	240	$ 130	$ 31,200
	Sub Total					**$ 55,200**
Compliance Monitoring and Reporting						
Environmental Monitor		responsible for sampling and monitoring	months	48	$ 6,000	$ 288,000
Water Quality Analytical (Closure Phase Yr 1 to Yr 3		Surface water quality analytical	samples	1770	$ 400	$ 708,000
		Groundwater quality analytical	samples	72	$ 270	$ 19,440
Water Quality Analytical (Post-Closure Phase Yr 4 to Yr 10		Surface water quality analytical	samples	126	$ 400	$ 50,400
		Groundwater quality analytical	samples	168	$ 270	$ 45,360
Hydrological Monitoring			L.S.			$ 15,000
EEM Monitoring requirements			annual	3	$ 30,000	$ 90,000
External Consulting Services			L.S.			$ 50,000
Geotechnical Inspections Closure Phase			annual	3	$ 25,000	$ 75,000
Geotechnical Inspections Post-Closure Phase			annual	7	$ 25,000	$ 175,000
	Sub Total					**$ 1,516,200**
Closure Maintenance						
Tailings Closure Spillway		twice per year maintenance	annual	10	$ 10,000	$ 100,000
	Sub Total					**$ 100,000**
Wolverine Creek Biopass Contingency						
Construction of Biopass Channel		Cat 325 hoe	hrs	60	$ 170	$ 10,200
Construction of diversion channel		Cat 325 hoe	hrs	80	$ 170	$ 13,600
Placement of liner in channel		Labour and materials	m	600	$ 200	$ 120,000
Source, haul and place organics		400 m x 2.5 m x 2.6 m	m^3	2600	$ 8	$ 20,800
Organics and fill placement		Labour	hrs	432	$ 50	$ 21,600
Engineering, Construction Management and Survey Control		15% of capital cost				$ 27,930
Maintenance		twice per year for 5 years	bi-annual	10	$ 1,000	$ 10,000
	Sub Total					**$ 224,130**
				15% Contingency		**$ 521,476**
		Total				**$ 3,997,981**

1: Camp-person days: assumed 12 persons for 6 months in Year 1; 6 persons for 6 months in Year 2; 4 persons for 6 months in Year 3 and 1 Caretaker for 365 days for 3 years for Years 4 to 10, 3 persons for 30 days per year during sampling and monitoring

Appendix B: Detailed Closure Cost Estimates – Existing Condition and Year 2

Mine Workings - Existing Condition

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
1345 Portal Closure						
Plug portal and ventillation raisewith tires		Cat 325 Hoe	hrs	30	$ 170	$ 5,100
Place waste rock cap over tires		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		A35 Articulated haul truck	hrs	40	$ 200	$ 8,000
Supply broken rock at base of plug and discharge channel riprap		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		A35 Articulated haul truck	hrs	40	$ 200	$ 8,000
Construct rock drain at base of plug		Cat 325 Hoe	hrs	10	$ 170	$ 1,700
Supply fill to seal discharge channel		Cat 325 Hoe	hrs	10	$ 170	$ 1,700
		A35 Articulated haul truck	hrs	20	$ 200	$ 4,000
Construct lined open channel for discharge from portal to biopass system; 300 m length		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		Compactor	hrs	10	$ 135	$ 1,350
Stabilize and vegetate area around channel		Seed and Fertilize	ha	0.09	$ 2,000	$ 180
Labour for channel construction		Labourer	hrs	30	$ 50	$ 1,500
Labour to assist with placing tires & cap		Labourer	hrs	80	$ 50	$ 4,000
Design of rock drain and channel (Engineering)		Engineering	hrs	40	$ 130	$ 5,200
Interim Portal Discharge Treatment		water treatment (1 L/s x 2 years)	m^3	63072	$ 0.40	$ 25,229
Supervision to design & install tires and cap		Supervision	hrs	50	$ 90	$ 4,500
	Sub Total					**$ 80,659**
Install Hydraulic Plugs in Access Ramp						
Drill and grout		grouting 10 m into wall; 20 m length x 2 plugs	hours	300	$ 190	$ 57,000
Install concrete plugs		20 m length x 5 m x 5 m x 2 plugs	m^3	1000	$ 85	$ 85,000
Labour for plug installation		Labourer	hours	300	$ 50	$ 15,000
Engineering		Design of plugs	hours	60	$ 130	$ 7,800
Supervision		Project engineer	hours	150	$ 140	$ 21,000
	Sub Total					**$ 185,800**
Install Hydraulic Plug in Ventillation Raise						
Install concrete plug		75 m length x 4 m x 4 m x 1 plug	m^3	1200	$ 85	$ 102,000
Labour for plug installation		Labourer	hours	150	$ 50	$ 7,500
Engineering		Design of plug	hours	40	$ 130	$ 5,200
Supervision		Project engineer	hours	60	$ 140	$ 8,400
	Sub Total					**$ 123,100**
				15% Contingency		**$ 58,434**
		Total				**$ 447,993**

Tailings Management Area - Existing Condition

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Reclaim Tailings Dam and Liner						
Puncture liner			hours	8	$ 190	$ 1,520
Dam face regrade over liner		Cat D8 Dozer regrade and contour	hours	60	$ 200	$ 12,000
Load Haul and place topsoil		Area of 130000 m^2 with 0.25 m depth	m^3	32500	$ 5	$ 162,500
Revegetate		Seed and Fertilize	ha	13	$ 2,000	$ 26,000
	Sub Total					**$ 200,500**
Reclaim Seepage Recovery Dam						
Seepage Dam Regrade		Cat D8 Dozer regrade and contour	hours	16	$ 200	$ 3,200
Load Haul and place topsoil		Area of 8000 m^2 with 0.25 m depth	m^3	2000	$ 5	$ 10,000
Revegetate		Seed and Fertilize	ha	0.8	$ 2,000	$ 1,600
	Sub Total					**$ 14,800**
Decommission Diversion Ditches						
Decommission Diversion Ditches A&B		Cat D8 Dozer regrade and contour	hours	80	$ 200	$ 16,000
Decommission Diversion Ditch B		Excavator for steep slopes	hours	20	$ 170	$ 3,400
Revegetate and Stabilize		Seed and Fertilize area 1.56 km x 5 m	ha	0.78	$ 2,000	$ 1,560
Remove 4 - 800 mm Culverts		Uncovering and removal	Ea.	4	$ 1,500	$ 6,000
	Sub Total					**$ 26,960**
Remove Tailings Pipeline (3 km)						
Remove Pipeline		Cat 325 hoe	hrs	150	$ 170	$ 25,500
		A35 Articulated haul truck	hrs	150	$ 200	$ 30,000
		Labour	hrs	300	$ 50	$ 15,000
Seeding and Fertilizer Application			ha	1.7	$ 2,000	$ 3,400
	Sub Total					**$ 73,900**
Remove Reclaim Pipeline (3 km)						
Remove Pipeline		Cat 325 hoe	hrs	150	$ 170	$ 25,500
		A35 Articulated haul truck	hrs	150	$ 200	$ 30,000
		Labour	hrs	300	$ 50	$ 15,000
Seeding and Fertilizer Application			ha	1.7	$ 2,000	$ 3,400
	Sub Total					**$ 73,900**
Water Treatment of Accumulated Tailings Water						
Treatment of storage tailings water		Treatment of accumulated water in the tailings impoundment from underground dewatering and surface runoff. Assumed to be treated using existing ferric sulphate treatment system	m^3	40,000	$ 0.25	$ 10,000
	Sub Total					**$ 10,000**
				15% Contingency		**$ 60,009**
		Total				**$ 460,069**

Infrastructure Decommissioning - Existing Condition

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Mill-Concentrator and Admin						
Remove salvageable equipment		General Labour	hours	770	$ 50	$ 38,500
		Trades Labour	hours	750	$ 80	$ 60,000
Dismantle Building - Manpower		General Labour	hours	770	$ 50	$ 38,500
Dismantle Building - Manpower		Trades Labour	hours	385	$ 80	$ 30,800
Dismantle Building - Equipment		Cat 325	hours	110	$ 170	$ 18,700
		Hammer/Impactor	hours	55	$ 170	$ 9,350
		Crane	hours	40	$ 130	$ 5,200
Misc. Supplies & Tools		Misc.	L.S.	L.S.		$ 10,000
Scrap haul to landfill		A35 Articulated haul truck	hours	140	$ 200	$ 28,000
Reslope and contour and bury		Cat D8	hours	55	$ 200	$ 11,000
Load Haul and place topsoil		Area of 145244 m^2 x 0.25 m depth	m^3	36311	$ 5	$ 181,555
Revegetate, seed and fertilize		Seed and Fertilize	ha	13.17	$ 2,000	$ 26,340
	Sub Total					**$ 457,945**
Temporary Waste Rock Storage Area						
Load Haul ore to underground		4,200 m^3 of ore to be placed underground	m^3	4,200	$ 5	$ 21,000
Excavate, Haul and Place Clay Cap		Place 1 m thick clay cap on waste rock (13285 m^2)	m^3	13,285	$ 8	$ 106,280
Excavate, Haul and Place Granualar till		Place 2 m of granular till on clay cap	m^3	26,570	$ 8	$ 212,560
Compaction of till		Compactor	hours	80	$ 135	$ 10,800
Load Haul and place topsoil		13285 m^2 x 0.25 m	m^3	3,321	$ 5	$ 16,606
Regrade and contour		Cat D8	hours	24	$ 200	$ 4,800
Engineering and Survey Control		15% of capital	L.S			$ 52,657
Revegetate		Seed and Fertilize	ha	1.32	$ 2,000	$ 2,640
	Sub Total					**$ 427,343**
Power Supply - Gensets						
Remove salvageable equipment		General Labour	hours	180	$ 50	$ 9,000
		Trades Labour	hours	108	$ 80	$ 8,640
Salvage and remove powerline and poles			L.S.	L.S.		$ 25,000
Dismantle Building - Manpower		General Labour	hours	96	$ 50	$ 4,800
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Equipment		Cat 325	hours	12	$ 170	$ 2,040
		Crane	hours	12	$ 130	$ 1,560
	Sub Total					**$ 54,880.00**
Reclaim Site Diversions						
Decommission 1500 m of diversion ditches		Cat 325 hoe	hours	150	$ 170	$ 25,500
Remove culverts 1000 mm		3 x 1000 mm	L.S.	3	$ 1,500	$ 4,500
Remove culverts 600 mm		5 x 600 mm	L.S.	5	$ 1,500	$ 7,500
Revegetate, seed and fertilize		1.5 km x 3 m	ha	0.45	$ 2,000	$ 900
	Sub Total					**$ 38,400**
Water Supply and Pond						
Remove salvageable equipment - pipeline/pumps and tank		General Labour	hours	24	$ 50	$ 1,200
		Trades Labour	hours	24	$ 80	$ 1,920
Remove pipeline and haul to tailings or underground		A35 Articulated haul truck	hours	8	$ 200	$ 1,600
		Cat 325	hours	8	$ 170	$ 1,360
Decommission water supply wells		fill with concrete	Ea.	2	$ 2,000	$ 4,000
Misc. Supplies & Tools		Misc.	L.S.	L.S.		$ 500
Remove freshwater pond		Cat 325	hours	12	$ 170	$ 2,040
		General Labour	hours	12	$ 50	$ 600
Backfill with coarse material			m^3	7000	$ 5	$ 35,000
Load Haul and place topsoil		Area 90 m x 60 m x 0.25	m^3	1350	$ 5	$ 6,750
Revegetate, seed and fertilize		90 m x 60 m	ha	0.54	$ 2,000	$ 1,080
	Sub Total					**$ 56,050**

Infrastructure Decommissioning - Existing Condition (continued)

Accomodation Camp and STP						
Remove salvageable material		General Labour	hours	108	$ 50	$ 5,400
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Manpower		General Labour	hours	48	$ 50	$ 2,400
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Equipment		Cat 325	hours	16	$ 170	$ 2,720
Remove sewage treatment plant		General Labour	hours	24	$ 50	$ 1,200
Misc. Supplies & Tools			L.S.			$ 1,000
Scrap haul to landfill		A35 Articulated haul truck	hours	20	$ 200	$ 4,000
Reslope and contour		Cat D8	hours	48	$ 200	$ 9,600
Revegetate, seed and fertilize		Seed and Fertilize	ha	2.75	$ 2,000	$ 5,500
	Sub Total					**$ 39,500**
Explosive Magazines						
remove from site			L.S.			$ 5,000
Revegetate area		Seed and Fertilize	ha	0.1	$ 2,000	$ 200
	Sub Total					**$ 5,200**
Miscellaneous Buildings and Structures						
Remove salvageable equipment		General Labour	hours	216	$ 50	$ 10,800
		Trades Labour	hours	216	$ 80	$ 17,280
Remove salvageable equipment		Cat 980 loader	hours	150	$ 175	$ 26,250
Dismantle Building - Manpower		General Labour	hours	216	$ 50	$ 10,800
		Trades Labour	hours	216	$ 80	$ 17,280
Dismantle Building - Equipment		Cat 325	hours	40	$ 170	$ 6,800
		Crane	hours	8	$ 130	$ 1,040
Concrete Demolition		Cat 325	hours	40	$ 170	$ 6,800
Reslope, contour & bury		Cat D8	hours	60	$ 200	$ 12,000
Misc. Supplies & Tools		Misc.	L.S.			$ 2,500
Scrap haul to landfill		A35 Articulated haul truck	hours	10	$ 200	$ 2,000
	Sub Total					**$ 113,550**
Industrial Reagents Fuels and Waste						
Industrial Reagents		remove from site	L.S.			$ 25,000
Fuels		remove from site	L.S.			$ 20,000
Wastes		remove from site	L.S.			$ 20,000
	Sub Total					**$ 65,000**
Spill Cleanup						
Other building site spill clean up			L.S.			$ 10,000
Reclaiim Landfill area		Cover and revegetate	ha	1	$ 2,000	$ 2,000
Reclaim landfarm area		Cover and revegetate	ha	0.45	$ 2,000	$ 900
	Sub Total					**$ 12,900**
Demolition Overhead						
Supervision		Supervision	hours	1,000	$ 90	$ 90,000
Office/Admin Costs		Contracts oversight	Year	2	$ 5,000	$ 10,000
	Sub Total					**$ 100,000**
				10% Contingency		**$ 137,077**
		Total				**$ 1,507,845**

All Weather Access Road - Existing Condition

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Decommission and Reclaim Access Road						
Lower road grade		remove excess materials to adjacent areas including borrow areas to stabilize against erosion - Grader	Hrs	100	$ 185	$ 18,500
		Cat 325 hoe	Hrs	140	$ 170	$ 23,800
		A35 Articulated haul truck	Hrs	140	$ 200	$ 28,000
Stabilize side slopes		Flatten minor roadside cut banks/fill slopes with Cat 325	Hrs	80	$ 170	$ 13,600
culverts 600-800 mm		Work includes uncovering, removal to offsite for re-use, resloping banks and amoring wetted section	Each	61	$ 1,500	$ 91,500
Culverts >2400		Work includes uncovering, removal to offsite for re-use, resloping banks and amoring wetted section	Each	2	$ 4,000	$ 8,000
Culvert Crossing restoration work		Minor restoration work, installation of environmental protection measures	L.S.	1	$ 20,000	$ 20,000
Bunker Creek Bridge Removal		Removal of bridge complete with bin-wall, resloping of banks	L.S.	1	$ 75,000	$ 75,000
Bunker Creek habitat restoration		Restoration of habitat in riparian zone and re-seeding	L.S.	1	$ 2,000	$ 2,000
Scarify road surface		To encourage re-vegetation (25 km x 15 m) Cat D8	Ha	37.5	$ 2,000	$ 75,000
Reclaiming Spoil Piles		Restoration of spoil piles containing excess organics from road construction - Cat 325	Km	25	$ 1,000	$ 25,000
Borrow Sources-stabilize slopes		Stabilize the slopes of the excavations - Cat D8	Hrs	40	$ 200	$ 8,000
Borrow Sources-S&F flat sources		Using ATV mounted applicator for seed and fertilizer	Ha	15	$ 2,000	$ 30,000
Borrow Sources Hydroseeded		Apply hydro-seed to steeper slopes (>1V:4H slope)	Ha	5	$ 3,000	$ 15,000
Corridor re-vegetate-broadcast S&F		Using ATV mounted applicator for seed and fertilizer including staging area	Ha	44.5	$ 2,000	$ 89,000
Maintenance S&F-after 1 year		Assume coverage of 50% with seed & fertilizer alone	Ha	44.5	$ 1,000	$ 44,500
Permanent barrier at highway		Trenching and barricading using natural materials in the area, to dissuade casual access	L.S.	1	$ 3,500	$ 3,500
Permanent barrier at Km 14		Barricading to provide ultimate barrier to more interior access	L.S.	1	$ 3,500	$ 3,500
						$ 573,900
Engineering 5%		For major components, particularly removal of bridge				28,695
Surveying 5%		For final as-builts of new contours and stream crossings				28,695
				10% Contingency		**63,129**
			Total			**$ 694,419**

Remaining Land Reclamation - Existing Condition

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Exploration Road and Trails and Stockpile Footprints						
Stabilize Slopes - Erosion Barrier		Unit Cost Basis	km	8	$ 1,500	$ 12,000
Revegetate, seed and fertilize - roads		Seed and fertilize	ha	2.4	$ 2,000	$ 4,800
Revegetate, seed and fertilize - stockpiles		Seed and Fertilize	ha	2.35	$ 2,000	$ 4,700
	Sub Total					**$ 21,500**
Mine Site and Tailings Haul Roads						
Lower road grade		remove excess materials to adjacent areas including borrow areas to stabilize against erosion - Grader	hours	60	$ 185	$ 11,100
		Cat 325 hoe	hours	80	$ 170	$ 13,600
		A35 Articulated haul truck	hours	80	$ 200	$ 16,000
stabilize slopes - erosion barriers		Cat 325 hoe	hours	40	$ 170	$ 6,800
Culvert removal		uncover, remove and stabilize	Ea.	15	$ 1,500	$ 22,500
Scarify		Cat D8	hours	70	$ 200	$ 14,000
Revegetate, seed and fertilize		Seed and Fertilize	ha	7	$ 2,000	$ 14,000
	Sub Total					**$ 98,000**
				10% Contingency		**$ 11,950**
			Total			**$ 131,450**

Site Management and Monitoring - Existing Condition

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Organization, Security and Overhead						
Site Manager		Management	months	14	$ 8,800	$ 123,200
Camp Cost[1]		labour	days	3690	$ 85	$ 313,650
Site caretaker		Security and camp; general maintenance	months	14	$ 6,000	$ 84,000
post closure environmental cleanup confirmation		contract	L.S			$ 20,000
vehicles for security and manager		light duty vehicle	months	48	$ 1,400	$ 67,200
site maintenance costs		general maintenance	year	2	$ 10,000	$ 20,000
Flights		Bi-monthly	flights	28	$ 1,000	$ 28,000
miscellaneous office/supply/costs		miscellaneous	year	2	$ 15,000	$ 30,000
	Sub Total					**$ 686,050**
Document Control						
document reviews and storage		miscellaneous	monthly	24	$ 200	$ 4,800
final as built drawings		manhours	hours	240	$ 130	$ 31,200
	Sub Total					**$ 36,000**
Compliance Monitoring and Reporting						
Environmental Monitor		responsible for sampling and monitoring	months	14	$ 6,000	$ 84,000
Water Quality Analytical (2 Years)		Surface Water	samples	432	$ 400	$ 172,800
		Groundwater	samples	48	$ 270	$ 12,960
Hydrological Monitoring			L.S.			$ 15,000
External Consulting Services			L.S.			$ 50,000
Geotechnical Inspections Closure Phase			annual	2	$ 25,000	$ 50,000
	Sub Total					**$ 384,760**
Wolverine Creek Biopass Contingency						
Construction of Biopass Channel		Cat 325 hoe	hrs	60	$ 170	$ 10,200
Construction of diversion channel		Cat 325 hoe	hrs	80	$ 170	$ 13,600
Placement of liner in channel		Labour and materials	m	600	$ 200	$ 120,000
Source, haul and place organics		400 m x 2.5 m x 2.6 m	m^3	2600	$ 8	$ 20,800
Organics and fill placement		Labour	hrs	432	$ 50	$ 21,600
Engineering, Construction Management and Survey Control		15% of capital cost				$ 27,930
Maintenance		twice per year	annual	10	$ 1,000	$ 10,000
	Sub Total					**$ 224,130**
				15% Contingency		**$ 199,641**
		Total				**$ 1,530,581**

Mine Workings - Year 2

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
1345 Portal Closure						
Plug portal and ventillation raisewith tires		Cat 325 Hoe	hrs	30	$ 170	$ 5,100
Place waste rock cap over tires		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		A35 Articulated haul truck	hrs	40	$ 200	$ 8,000
Supply broken rock at base of plug and discharge channel riprap		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		A35 Articulated haul truck	hrs	40	$ 200	$ 8,000
Construct rock drain at base of plug		Cat 325 Hoe	hrs	10	$ 170	$ 1,700
Supply fill to seal discharge channel		Cat 325 Hoe	hrs	10	$ 170	$ 1,700
		A35 Articulated haul truck	hrs	20	$ 200	$ 4,000
Construct lined open channel for discharge from portal to biopass system; 300 m length		Cat 325 Hoe	hrs	20	$ 170	$ 3,400
		Compactor	hrs	10	$ 135	$ 1,350
Stabilize and vegetate area around channel		Seed and Fertilize	ha	0.09	$ 2,000	$ 180
Labour for channel construction		Labourer	hrs	30	$ 50	$ 1,500
Labour to assist with placing tires & cap		Labourer	hrs	80	$ 50	$ 4,000
Design of rock drain and channel (Engineering)		Engineering	hrs	40	$ 130	$ 5,200
Interim Portal Discharge Treatment		water treatment (1 L/s x 2 years)	m^3	63072	$ 0.40	$ 25,229
Supervision to design & install tires and cap		Supervision	hrs	50	$ 90	$ 4,500
	Sub Total					**$ 80,659**
Install Hydraulic Plugs in Access Ramp						
Drill and grout		grouting 10 m into wall; 20 m length x 2 plugs	hours	300	$ 190	$ 57,000
Install concrete plugs		20 m length x 5 m x 5 m x 2 plugs	m^3	1000	$ 85	$ 85,000
Labour for plug installation		Labourer	hours	300	$ 50	$ 15,000
Engineering		Design of plugs	hours	60	$ 130	$ 7,800
Supervision		Project engineer	hours	150	$ 140	$ 21,000
	Sub Total					**$ 185,800**
Install Hydraulic Plug in Ventillation Raise						
Install concrete plug		75 m length x 4 m x 4 m x 1 plug	m^3	1200	$ 85	$ 102,000
Labour for plug installation		Labourer	hours	150	$ 50	$ 7,500
Engineering		Design of plug	hours	40	$ 130	$ 5,200
Supervision		Project engineer	hours	60	$ 140	$ 8,400
	Sub Total					**$ 123,100**
				15% Contingency		**$ 58,434**
		Total				**$ 447,993**

Tailings Management Area - Year 2

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Reclaim Tailings Dam Face						
Load Haul and Place topsoil		Area of 25000 m^2 with 0.25 m depth	m^3	6250	$ 5	$ 31,250
Revegetate		Seed and Fertilize	ha	2.5	$ 2,000	$ 5,000
Sub Total						**$ 36,250**
Reclaim Seepage Recovery Dam						
Seepage Dam Regrade		Cat D8 Dozer regrade and contour	hours	16	$ 200	$ 3,200
Load Haul and Place topsoil		Area of 8000 m^2 with 0.25 m depth	m^3	2000	$ 5	$ 10,000
Revegetate		Seed and Fertilize	ha	0.8	$ 2,000	$ 1,600
Sub Total						**$ 14,800**
Decommission Diversion Ditches						
Decommission Diversion Ditches A&B		Cat D8 Dozer regrade and contour	hours	60	$ 200	$ 12,000
Decommission Diversion Ditch B		Excavator for steep slopes	hours	20	$ 170	$ 3,400
Revegetate and Stabilize		Seed and Fertilize area 1.56 km x 5 m	ha	0.78	$ 2,000	$ 1,560
Remove 4 - 800 mm Culverts		Uncovering and removal	Ea.	4	$ 1,500	$ 6,000
Sub Total						**$ 22,960**
Remove Tailings Pipeline (3 km)						
Remove Pipeline		Cat 325 hoe	hrs	150	$ 170	$ 25,500
		A35 Articulated haul truck	hrs	150	$ 200	$ 30,000
		Labour	hrs	300	$ 50	$ 15,000
Seeding and Fertilizer Application			ha	1.7	$ 2,000	$ 3,400
Sub Total						**$ 73,900**
Remove Reclaim Pipeline (3 km)						
Remove Pipeline		Cat 325 hoe	hrs	150	$ 170	$ 25,500
		A35 Articulated haul truck	hrs	150	$ 200	$ 30,000
		Labour	hrs	300	$ 50	$ 15,000
Seeding and Fertilizer Application			ha	1.7	$ 2,000	$ 3,400
Sub Total						**$ 73,900**
Cover Tailings with Coarse/Inert Material (CIM)						
Load Haul and Place CIM		Place and level CIM on ice in winter	m^3	145,000	$ 7	$ 1,015,000
Load Haul and Place Rockfill		Erosion control on dam face	m^3	15,000	$ 8	$ 120,000
Revegetate CIM stockpile area		Seed and Fertilize	ha	2	$ 2,000	$ 4,000
Sub Total						**$ 1,139,000**
Water Treatment of Excess Tailings Water						
Biotreatment of excess tailings water		Treatment for 3 years; ~170,000 m^3/yr	m^3	510,000	$ 0.40	$ 204,000
Decommissioning and Dismantling of water treatment plant		Labour	hours	230	$ 50	$ 11,500
Dismantle WTP infrastructure - Industrial Complex		Cat 325 hoe	hours	30	$ 170	$ 5,100
		Crane	hours	24	$ 130	$ 3,120
Sub Total						**$ 223,720**
				15% Contingency		**$ 237,680**
		Total				**$ 1,822,210**

Note: Water treatment cost includes power supply and amendments. Estimated water treatment cost for closure of $0.4/$m^3$

Infrastructure Decommissioning - Year 2

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Mill-Concentrator, Admin and Truck Shop						
Remove salvageable equipment		General Labour	hours	1152	$ 50	$ 57,600
		Trades Labour	hours	1128	$ 80	$ 90,240
Dismantle Building - Manpower		General Labour	hours	1152	$ 50	$ 57,600
Dismantle Building - Manpower		Trades Labour	hours	576	$ 80	$ 46,080
Dismantle Building - Equipment and Loading		Cat 325	hours	160	$ 170	$ 27,200
		Crane	hours	80	$ 130	$ 10,400
Concrete Demolition		Excavator with Hammer	hours	80	$ 170	$ 13,600
Misc. Supplies & Tools		Misc.	L.S.	L.S.		$ 10,000
Scrap haul to landfill		A35 Articulated haul truck	hours	208	$ 200	$ 41,600
Reslope and contour and bury		Cat D8	hours	80	$ 200	$ 16,000
Load, Haul and place topsoil		Area of 145244 m^2 x 0.25 m depth	m^3	36311	$ 5	$ 181,555
Revegetate, seed and fertilize		Seed and Fertilize	ha	13.17	$ 2,000	$ 26,340
	Sub Total					**$ 578,215**
Temporary Waste Rock Storage Area						
Remove pad liner		Cat 325 hoe	hours	30	$ 170	$ 5,100
Haul liner to underground		Haul truck/mine truck	hours	30	$ 200	$ 6,000
Load, Haul and place topsoil		13285 m^2 x 0.25 m	m^3	3321.25	$ 5.00	$ 16,606
Regrade and contour		Cat D8	hours	24	$ 200	$ 4,800
Revegetate		Seed and Fertilize	ha	1.32	$ 2,000	$ 2,640
	Sub Total					**$ 35,146**
Power Supply - Gensets						
Remove salvageable equipment		General Labour	hours	180	$ 50	$ 9,000
		Trades Labour	hours	108	$ 80	$ 8,640
Salvage and remove powerline and poles			L.S.	L.S.		$ 25,000
Dismantle Building - Manpower		General Labour	hours	96	$ 50	$ 4,800
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Equipment		Cat 325	hours	12	$ 170	$ 2,040
		Crane	hours	12	$ 130	$ 1,560
	Sub Total					**$ 54,880**
Reclaim Site Diversions						
Decommission 1500 m of diversion ditches		Cat 325 hoe	hours	150	$ 170	$ 25,500
Remove culverts 1000 mm		3 x 1000 mm	L.S.	3	$ 1,500	$ 4,500
Remove culverts 600 mm		5 x 600 mm	L.S.	5	$ 1,500	$ 7,500
Revegetate, seed and fertilize		1.5 km x 3 m	ha	0.45	$ 2,000	$ 900
	Sub Total					**$ 38,400**
Water Supply and Pond						
Remove salvageable equipment - pipeline/pumps and tank		General Labour	hours	24	$ 50	$ 1,200
		Trades Labour	hours	24	$ 80	$ 1,920
Remove pipeline and haul to tailings or underground		A35 Articulated haul truck	hours	8	$ 200	$ 1,600
		Cat 325	hours	8	$ 170	$ 1,360
Decommission water supply wells		fill with concrete	Ea.	2	$ 2,000	$ 4,000
Misc. Supplies & Tools		Misc.	L.S.	L.S.		$ 500
Remove freshwater pond		Cat 325	hours	12	$ 170	$ 2,040
		General Labour	hours	12	$ 50	$ 600
Backfill with coarse material			m^3	7000	$ 5	$ 35,000
Load, Haul and place topsoil		Area 90 m x 60 m x 0.25	m^3	1350	$ 5	$ 6,750
Revegetate, seed and fertilize		90 m x 60 m	ha	0.54	$ 2,000	$ 1,080
	Sub Total					**$ 56,050**

Infrastructure Decommissioning - Year 2 (continued)

Accomodation Camp and STP						
Remove salvageable material		General Labour	hours	108	$ 50	$ 5,400
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Manpower		General Labour	hours	48	$ 50	$ 2,400
		Trades Labour	hours	48	$ 80	$ 3,840
Dismantle Building - Equipment and Loading		Cat 325	hours	16	$ 170	$ 2,720
Remove sewage treatment plant		Labour	hours	24	$ 50	$ 1,200
Misc. Supplies & Tools			L.S.			$ 1,000
Scrap haul to landfill		A35 Articulated haul truck	hours	20	$ 200	$ 4,000
Reslope and contour		Cat D8	hours	48	$ 200	$ 9,600
Revegetate, seed and fertilize		Seed and Fertilize	ha	2.75	$ 2,000	$ 5,500
	Sub Total					**$ 39,500**
Explosive Magazines						
remove from site			L.S.			$ 5,000
Revegetate area		Seed and Fertilize	ha	0.1	$ 2,000	$ 200
	Sub Total					**$ 5,200**
Miscellaneous Buildings and Structures						
Remove salvageable equipment		General Labour	hours	216	$ 50	$ 10,800
		Trades Labour	hours	216	$ 80	$ 17,280
Remove salvageable equipment		Cat 980 loader	hours	150	$ 175	$ 26,250
Dismantle Building - Manpower		General Labour	hours	216	$ 50	$ 10,800
		Trades Labour	hours	216	$ 80	$ 17,280
Dismantle Building - Equipment and Loading		Cat 325	hours	40	$ 170	$ 6,800
		Crane	hours	8	$ 130	$ 1,040
Concrete Demolition		Excavator with Hammer	hours	40	$ 170	$ 6,800
Reslope, contour & bury		Cat D8	hours	60	$ 200	$ 12,000
Misc. Supplies & Tools		Misc.	L.S.			$ 2,500
Scrap haul to landfill		A35 Articulated haul truck	hours	10	$ 200	$ 2,000
	Sub Total					**$ 113,550**
Industrial Reagents Fuels and Waste						
Industrial Reagents		remove from site	L.S.			$ 25,000
Fuels		remove from site	L.S.			$ 20,000
Wastes		remove from site	L.S.			$ 20,000
	Sub Total					**$ 65,000**
Spill Cleanup						
Other building site spill clean up			L.S.			$ 15,000
Reclaim Landfill area		Seed and Fertilize	ha	1	$ 2,000	$ 2,000
Reclaim landfarm area		Seed and Fertilize	ha	0.45	$ 2,000	$ 900
	Sub Total					**$ 17,900**
Demolition Overhead						
Supervision		Supervision	hours	1,000	$ 90	$ 90,000
Office/Admin Costs		Contracts oversight	Year	3	$ 5,000	$ 15,000
	Sub Total					**$ 105,000**
				10% Contingency		**$ 110,884**
		Total				**$ 1,219,725**

All Weather Access Road - Year 2

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Decommission and Reclaim Access Road						
Lower road grade		remove excess materials to adjacent areas including borrow areas to stabilize against erosion - Grader	Hrs	100	$ 185	$ 18,500
		Cat 325 hoe	Hrs	140	$ 170	$ 23,800
		A35 Articulated haul truck	Hrs	140	$ 200	$ 28,000
Stabilize side slopes		Flatten minor roadside cut banks/fill slopes with Cat 325	Hrs	80	$ 170	$ 13,600
culverts 600-800 mm		Work includes uncovering, removal to offsite for re-use, resloping banks and amoring wetted section	Each	61	$ 1,500	$ 91,500
Culverts >2400		Work includes uncovering, removal to offsite for re-use, resloping banks and amoring wetted section	Each	2	$ 4,000	$ 8,000
Culvert Crossing restoration work		Minor restoration work, installation of environmental protection measures	L.S.	1	$ 20,000	$ 20,000
Bunker Creek Bridge Removal		Removal of bridge complete with bin-wall, resloping of banks	L.S.	1	$ 75,000	$ 75,000
Bunker Creek habitat restoration		Restoration of habitat in riparian zone and re-seeding	L.S.	1	$ 2,000	$ 2,000
Scarify road surface		To encourage re-vegetation (25 km x 15 m) Cat D8	Ha	37.5	$ 2,000	$ 75,000
Reclaiming Spoil Piles		Restoration of spoil piles containing excess organics from road construction - Cat 325	Km	25	$ 1,000	$ 25,000
Borrow Sources-stabilize slopes		Stabilize the slopes of the excavations - Cat D8	Hrs	40	$ 200	$ 8,000
Borrow Sources-S&F flat sources		Using ATV mounted applicator for seed and fertilizer	Ha	15	$ 2,000	$ 30,000
Borrow Sources Hydroseeded		Apply hydro-seed to steeper slopes (>1V:4H slope)	Ha	5	$ 3,000	$ 15,000
Corridor re-vegetate-broadcast S&F		Using ATV mounted applicator for seed and fertilizer including staging area	Ha	44.5	$ 2,000	$ 89,000
Maintenance S&F-after 1 year		Assume coverage of 50% with seed & fertilizer alone	Ha	44.5	$ 1,000	$ 44,500
Permanent barrier at highway		Trenching and barricading using natural materials in the area, to dissuade casual access	L.S.	1	$ 3,500	$ 3,500
Permanent barrier at Km 14		Barricading to provide ultimate barrier to more interior access	L.S.	1	$ 3,500	$ 3,500
						$ 573,900
Engineering 5%		For major components, particularly removal of bridge				28,695
Surveying 5%		For final as-builts of new contours and stream crossings				28,695
				10% Contingency		**63,129**
		Total				**$ 694,419**

Remaining Land Reclamation - Year 2

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Exploration Road and Trails and Stockpile Footprints						
Stabilize Slopes - Erosion Barrier		Unit Cost Basis	km	8	$ 1,500	$ 12,000
Revegetate, seed and fertilize - roads		Seed and fertilize	ha	2.4	$ 2,000	$ 4,800
Revegetate, seed and fertilize - stockpiles		Seed and Fertilize	ha	2.35	$ 2,000	$ 4,700
Sub Total						**$ 21,500**
Mine Site and Tailings Haul Roads						
Lower road grade		remove excess materials to adjacent areas including borrow areas to stabilize against erosion - Grader	hours	60	$ 185	$ 11,100
		Cat 325 hoe	hours	80	$ 170	$ 13,600
		A35 Articulated haul truck	hours	80	$ 200	$ 16,000
stabilize slopes - erosion barriers		Cat 325 hoe	hours	40	$ 170	$ 6,800
Culvert removal		uncover, remove and stabilize	Ea.	15	$ 1,500	$ 22,500
Scarify		Cat D8	hours	70	$ 200	$ 14,000
Revegetate, seed and fertilize		Seed and Fertilize	ha	7	$ 2,000	$ 14,000
Sub Total						**$ 98,000**
				10% Contingency		**$ 11,950**
		Total				**$ 131,450**

Site Management and Monitoring - Year 2

Work Item Description		Description	Units	Quantity	Unit Cost	Total Cost
Organization, Security and Overhead						
Pre closure planning and organization		Management	months	6	$ 8,800	$ 52,800
Site Manager		Management	months	36	$ 8,800	$ 316,800
Camp Cost[1]		labour	days[1]	5795	$ 85	$ 492,575
Site caretaker		Responsible for security and camp; general maintenance	months	36	$ 6,000	$ 216,000
pre closure site environmental assessment		contract	L.S			$ 75,000
post closure environmental cleanup confirmation		contract	L.S			$ 75,000
vehicles for security and manager		light-duty vehicle	months	72	$ 1,400	$ 100,800
site maintenance costs		general maintenance	year	3	$ 10,000	$ 30,000
Flights		Bi-monthly	flights	72	$ 1,000	$ 72,000
miscellaneous office/supply/costs		miscellaneous	year	10	$ 15,000	$ 150,000
	Sub Total					**$ 1,580,975**
Document Control						
document reviews and storage		miscellaneous	monthly	120	$ 200	$ 24,000
final as built drawings		manhours	hours	240	$ 130	$ 31,200
	Sub Total					**$ 55,200**
Compliance Monitoring and Reporting						
Environmental Monitor		responsible for sampling and monitoring	months	48	$ 6,000	$ 288,000
Water Quality Analytical (Closure Phase Yr 1 to Yr 3		Surface water quality analytical	samples	1770	$ 400	$ 708,000
		Groundwater quality analytical	samples	72	$ 270	$ 19,440
Water Quality Analytical (Post-Closure Phase Yr 4 to Yr 10		Surface water quality analytical	samples	126	$ 400	$ 50,400
		Groundwater quality analytical	samples	168	$ 270	$ 45,360
Hydrological Monitoring			L.S.			$ 15,000
EEM Monitoring requirements			annual	3	$ 30,000	$ 90,000
External Consulting Services			L.S.			$ 50,000
Geotechnical Inspections Closure Phase			annual	3	$ 25,000	$ 75,000
Geotechnical Inspections Post-Closure Phase			annual	7	$ 25,000	$ 175,000
	Sub Total					**$ 1,516,200**
Closure Maintenance						
Tailings Closure Spillway		twice per year maintenance	annual	10	$ 10,000	$ 100,000
	Sub Total					**$ 100,000**
Wolverine Creek Biopass Contingency						
Construction of Biopass Channel		Cat 325 hoe	hrs	60	$ 170	$ 10,200
Construction of diversion channel		Cat 325 hoe	hrs	80	$ 170	$ 13,600
Placement of liner in channel		Labour and materials	m	600	$ 200	$ 120,000
Source, haul and place organics		400 m x 2.5 m x 2.6 m	m^3	2600	$ 8	$ 20,800
Organics and fill placement		Labour	hrs	432	$ 50	$ 21,600
Engineering, Construction Management and Survey Control		15% of capital cost				$ 27,930
Maintenance		twice per year for 5 years	bi-annual	10	$ 1,000	$ 10,000
	Sub Total					**$ 224,130**
				15% Contingency		**$ 521,476**
		Total				**$ 3,997,981**

1: Camp-person days: assumed 12 persons for 6 months in Year 1; 6 persons for 6 months in Year 2; 4 persons for 6 months in Year 3 and 1 Caretaker for 365 days for 3 years for Years 4 to 10, 3 persons for 30 days per year during sampling and monitoring