



WOLVERINE MINE

TAILINGS STORAGE FACILITY

OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL

V2017-02

Prepared for Yukon Government

Energy, Mines and Resources QML-0006

Prepared by

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October 31, 2017

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**Acronyms****Units**

ERP	Surface Emergency Response Plan	%	percent
FS	Factor of safety	°C	degrees Celcius
KCB	Klohn Crippen Berger	g	Acceleration du to Earth's gravity (g-force: 1 g = 9.81 m/s <sup>2</sup> )
LFN	Liard First Nations		
LOM	Life-of-mine	h	hour
MAC	Mining Association of Canada	km	kilimetres
OMS	Operation, Maintenance and Surveillance	kVA	kilovolt amperes
		kW	kiloWatts
PGA	Peak ground acceleration	L/s	litres per second
QA/QC	Quality assurance/quality control	m	metres
QML	Quartz Mining Licence	m <sup>3</sup>	cubic metres
RRDC	Ross River Dena Council	m <sup>3</sup> /day	cubic metres per day
TSF	Tailings storage facility	masl	metres above sea level
YZC	Yukon Zinc Corporation	mm	millimetres
		Mm <sup>3</sup>	Million cubic metres
		t/m <sup>3</sup>	tonnes per metres cubed
		tpd	tonnes per day

# 1 Introduction

This Wolverine Mine Operation, Maintenance and Surveillance (OMS) Manual outlines requirements for the tailings storage facility at the Wolverine Mine during the temporary closure period. This OMS Manual is an update to the July 2010 OMS Manual, and meets the requirements of Quartz Mining License QML-0006 (QML) Part 13.3. It has been prepared by Yukon Zinc Corporation (YZC), with support from Klohn Crippen Berger Ltd. (KCB), and is consistent with the *CDA Dam Safety Guidelines* (Canadian Dam Association, 2013) and with *Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities* (The Mining Association of Canada, 2011). Supporting documents include:

- *Wolverine Project - Tailings and Infrastructure Design and Construction Plan* (KCB, 2009)
- *Wolverine Project – Starter Tailings Storage Facility – 2009 Civil Works Construction Summary Report* (KCB, 2010)
- *Wolverine Mine Tailings Storage Facility – Design Overview for Stage 2 Dam Construction* (KCB, 2012a)
- *Wolverine Stage 2 Expansion – Construction Record Report* (KCB, 2012b)
- *Quartz Mining License QML-0006* (Issued by Yukon Energy, Mines and Resources, December 5, 2006)
- *Type A Water Use Licence QZ04-065* (Issued by Yukon Water Board, October 4, 2007)
- *Wolverine Mine General Site Plan V2011-05* (YZC, 2011a)
- *Wolverine Mine Monitoring and Surveillance Plan V2011-03* (YZC, 2011b)
- *Wolverine Mine Wildlife Protection Plan V2009-01* (YZC, 2009)
- *Wolverine Mine Emergency Response Plan V2014-05* (YZC, 2014)

This OMS Manual provides a documented framework for actions, and a basis for measuring performance and demonstrating due diligence during the temporary closure phase of the Wolverine Mine. As per the OMS Manual guideline document (MAC, 2011), items covered in this Manual include:

- Roles and responsibilities of personnel assigned to OMS activities;
- Description of the facility, including site conditions, key components, regulatory requirements, and design criteria;
- Operation of the facility, including tailings transport and deposition, dam raising, water management, environmental protection, and documentation and reporting;
- Maintenance of the facility, including routine and event-driven maintenance, and documentation and reporting;
- Surveillance of the facility, including routine, event-driven and annual comprehensive inspections and documentation and reporting; and
- Emergency preparedness and response planning.

The OMS Manual covers operations of the tailings facility over the temporary closure period of the Mine. The document has been prepared primarily for use by the mine personnel who are responsible for the operation

and maintenance of the tailings facility. It contains information and instructions necessary to perform required activities.

## 1.1 Managing Change

The Tailings Facility OMS Manual will be reviewed and updated as required by the most senior manager at the Wolverine Mine, with support from the Environmental Consultant and the Health and Safety Manager. When updated, the OMS Manual will be reviewed by the Chief Operating Officer or designate, and submitted to Yukon Energy, Mines and Resources, and local authorities. The OMS Manual revisions may incorporate changes in facility design or performance, capacity, operational requirements, closure requirements, site management, roles and responsibilities, or regulations or reporting procedures.

Previous versions of the OMS Manual will serve as a record of construction and operations of the tailings facility, and will be accessible to all persons operating the facility, the Design Engineer and regulatory authorities. Table 1-1 summarizes the OMS revisions to date. The list of manual holders for the tailings facility OMS Manual is provided in Table 1-2. YZC will maintain a record of the location of each copy of the Manual and will ensure that all copies are updated, as and when required.

**Table 1-1 OMS Revision Summary**

Revision no.	Details	Date of issue
Version 2010-01	Issued following Starter Tailings Storage Facility 2009 Civil Works Construction	July 9, 2010
Version 2017-02	Issued for Temporary Closure	October 31, 2017

**Table 1-2 List of Manual Holders and Contact Information**

Copy No.	Name	Organization	Email address	Telephone no.
1.	Peter Mah	Chief Operating Officer Yukon Zinc Corporation	peter.mah@yukonzinc.com	604.682.5404
2.	Leigh Lackey	Health and Safety Manager, Yukon Zinc Corporation	leigh.lackey@yukonzinc.com	705.849.5755
3.	Paul Christman	Chief Mine Engineer, Yukon Energy, Mines and Resources	paul.christman@gov.yk.ca	867-667-8708
4.	Mary Maje	Ross River Dena Council	rrdyesaa@northwestel.net	867.969.2097
5.	Executive Assistant	Liard First Nation	lfnccexeasst@kaska.ca	867.536.7901
6.	Pamela Fines	Klohn Crippen Berger Ltd.	pfines@klohn.com	780.733.4592

## 2 Roles and Responsibilities

This section identifies the individuals having responsibility for the operation, maintenance and surveillance of the tailings facility. The assignment of responsibilities, training and managing change procedures are summarized herein. Staffing levels on site during temporary closure is limited to 3 to 4 people.

### 2.1 Assignment of Responsibilities

The main individuals associated with the tailings facility OMS are the Care and Maintenance Senior Supervisor and the Health and Safety Manager. Other supporting personnel include site staff trained in the operations of the tailings facility. Support external to YZC will be provided by KCB (Engineering Consultants) and the Environmental Consultant, and external reporting will occur to Yukon, Federal and First Nation Governments, as required.

Personnel responsible for OMS activities and emergency preparedness and response are listed in Table 2-1. Contact information for these key departments or individuals is provided at the beginning of this Manual.

The Health and Safety Manager or designate is responsible for all operations at the Wolverine Mine, including any decisions regarding the procedures to be carried out during an emergency. The Care and Maintenance Senior Supervisor is responsible for day-to-day operations, plus maintenance and monitoring requirements. The Care and Maintenance Senior Supervisor and Health and Safety Manager are responsible for ensuring that daily and monthly reports for maintenance, inspection and monitoring of the tailings facility are prepared. The acting Chief Operating Officer is also responsible for monitoring as per territorial and federal environmental permits, licences and regulations, with support from the environmental consultant listed below.

All site personnel and visitors on mine business are requested to be vigilant of visual indications of faulty performance of all aspects of the facility.

**Table 2-1 Responsibilities of OMS Personnel**

OMS Personnel	Name	Maintenance	Surveillance	Emergency Preparedness
Acting Chief Operating Officer	Peter Mah	✓	✓	✓
Health and Safety Manager	Leigh Lackey	✓	✓	✓
Care and Maintenance Senior Supervisor	Preston Vowk	✓	✓	✓
Environmental Consultant (support role)	Mary Mioska		✓	
Engineer(s) of record (support role)	Pamela Fines (KCB)	✓	✓	✓

### 2.2 Training

Training on the OMS manual will be provided by the Health and Safety Manager. The training will focus on operational aspects of the water reclaim system, seepage recovery system, operational improvements implemented, and a detailed review of planned maintenance and monitoring, as relevant to the temporary closure period.

### 3 Mine Overview

This section provides an overview of the Wolverine Mine including ownership, location, site context, facility components, regulatory requirements, basis of design and design criteria, construction history, current status and document control.

#### 3.1 Ownership

The Wolverine Mine is owned and operated by Yukon Zinc Corporation. YZC is committed to managing its business in a way that will contribute to and achieve a high level of environmental and safety performance, and to meeting the goal of continuous improvement.

#### 3.2 Site Overview

The Wolverine Mine, owned and operated by YZC, is a zinc-silver-copper-lead-gold underground mine, with on-site milling capabilities of 1,700 tpd to produce copper, lead, and zinc concentrates. The Wolverine Mine is located in the southeastern Yukon near the headwaters of the Wolverine Lake watershed within the Kaska Nation Traditional Territory (Figure 3-1). The original estimated life-of-mine (LOM) was nine years, based on a 4.3 Mt mineable reserve. Operations are targeted to restart in 2018. The site is accessed by aircraft or by vehicle on a 24 km long access road, which connects with the Robert Campbell Highway at km 190.



Figure 3-1 Location of the Wolverine Mine

Components of the Wolverine Mine include:

- Underground mine;
- Tailings Storage Facility (TSF);
- Seepage collection pond;
- Waste rock storage piles;
- Industrial complex, mill, and accommodations camp;
- Landfill;
- Airstrip; and
- Site access road.

YZC completed major site construction throughout 2009 and 2010. Mill commissioning commenced in 2011 and commercial production of 1,020 tpd or 60% of rate mill capacity over a 30-day period was achieved on March 1, 2012. Production first achieved 1,700 tpd in January 2013. In January 2015 YZC announced that it was temporarily shutting down operations at the Wolverine Mine due to unfavourable market conditions, putting the site in “Temporary Closure”. Most employees and contractors were laid off at this time and the mine was put into care and maintenance. Presently, all industrial activity has ceased at the site and the following care and maintenance conditions exist:

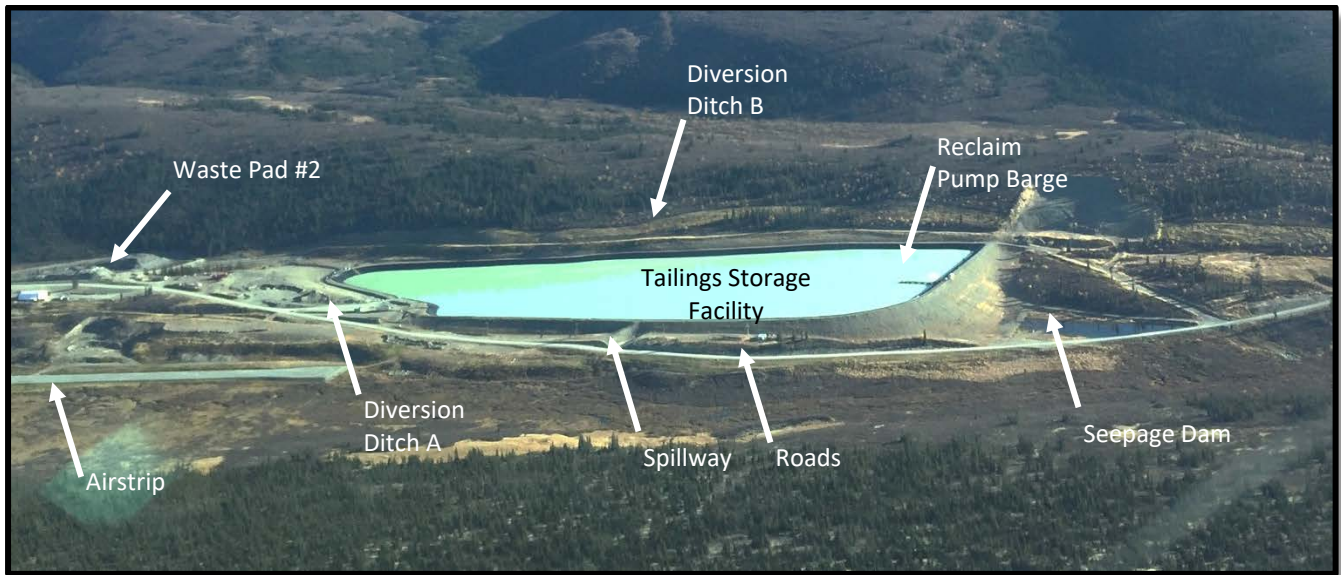
- The underground mine is closed and gated;
- The site access road is maintained only during the snow-free period;
- The airstrip is maintained to ensure year-round access;
- There are no industrial activities or processes occurring in the mill;
- No tailings are being produced;
- No waste or ore is being produced or added to existing waste storage areas or stockpiles;
- Energy consumption has been minimized through isolation of essential buildings and machinery and all buildings not in use have been locked off;
- Supply stockpiles, including reagents, have been consolidated, sold, and shipped off-site where possible; and
- Two crews of 3 people each are maintaining the site on 2-and-2 week rotations.

The project timeline from construction through to post-closure is provided in Table 3-1, with the original mine plan compared to the current scenario. There is currently 5+ years of minable reserves identified at the Wolverine Mine. The current scenario, with re-start of the mine in 2018, includes a five year temporary closure phase, with permanent closure initiated in 2025.

**Table 3-1 Wolverine Mine Timeline**

Year	Current Plan
2009 to 2010	Construction Phase
2011	Production Ramp-Up
2012	Year 1
2013	Year 2
2014	Year 3
2015	Mining Halted: Temporary Closure
2016	Temporary Closure
2017	Temporary Closure
2018	Operations Re-commence
2019 - 2024	Operations
2025 – 2028	Closure
2028+	Post-Closure

Arial views of the TSF area and industrial complex are shown in Figure 3-2 and Figure 3-3, respectively. Mine infrastructure remains in place during temporary closure.



**Figure 3-2 Tailings Storage Facility Layout**

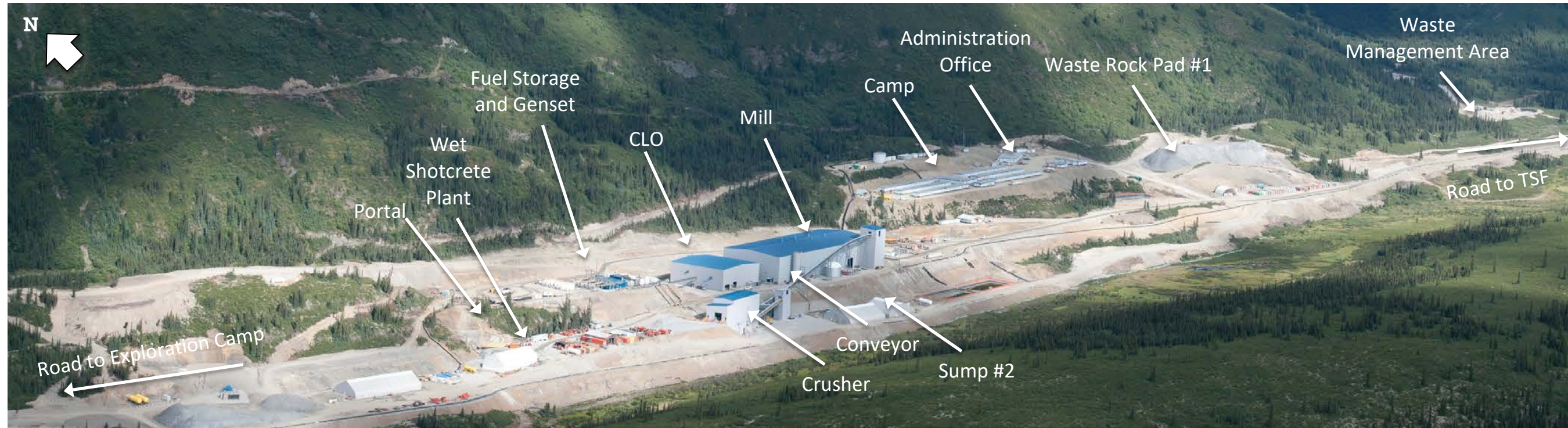


Figure 3-3 Industrial Complex Layout

### 3.3 Facility Overview

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 greatly reduces the potential for seepage of tailings water and the potential for groundwater contamination during operations, closure and at post-closure. The design of the tailings facility was based on field and laboratory investigations of the foundation conditions and considerations of geochemical characteristics of the tailings and supernatant water. The design incorporated the availability of local dam borrow materials, storage capacity requirements, site water balance, dam failure consequence rating, and earthquake and flood potential.

Water from the underground workings and contact water runoff from the industrial complex also reports to the tailings facility along with water discharging from the sewage treatment plant, land treatment facility, and waste rock storage facilities. The tailings facility operates with a positive water balance as no water is currently discharged from the TSF. A multi-stage water treatment plant is being designed to treat the excess water accumulating in the tailings impoundment. Excess water will consist predominantly of tailings process water, with lesser quantities of mine contact surface runoff, underground water, treated sewage effluent and direct precipitation. The water treatment system will produce effluent of acceptable water quality for discharge at a rate of up to 1,200 m<sup>3</sup>/day of direct tailings water.

Treated water will be directed to a retention pond or similar retaining structure to confirm suitability for discharge prior to release to Go Creek downstream of the airstrip (facilities and pipeline not yet designed).

All treated water from the Wolverine Mine will be discharged to Go Creek via the final discharge location. The tailings impoundment has sufficient capacity to store approximately two years of water discharged to the impoundment (i.e., early 2019). However, YZC has committed to installing the water treatment plant in spring 2018 to mitigate risk to the tailings storage facility.

### 3.4 Site Conditions

The Wolverine Mine is located in the Campbell Range, at the easternmost limit of the Pelly Mountains and abuts the broad Yukon Plateau to the north and east. The area consists of rolling, glacially scoured mountains with no significant peaks. Elevations on the property range approximately between 1200 and 1400 m. The main valleys are wide and U-shaped. Glacial till covers the majority of the lower lying valleys and there is significant infilling by post-glacial sediments.

Morainal deposits are found at lower to mid-elevation and in valley floors, and may contain a more complex assemblage of glacio-fluvial, colluvial and fluvial sediments. The main glacial soils in the vicinity of the tailings impoundment consist of up to 20 m of silty sand and gravel, with some larger cobbles. The area is underlain by bedrock strata generally paralleling the valley trend, i.e., striking in the direction of the valley. The bedrock consists of an inter-layered sequence of volcano-clastic (rhyolite and quartz feldspar) and carbonaceous/argillic sediments, overlain with basalt.

The project site elevation is approximately 1,350 masl and the area is cold, with a mean temperature of -4°C, a mean daily summer temperature of 16°C and a mean daily winter temperature of -25°C. Minimum temperatures can reach -37°C and maximum temperatures reach around 25°C. 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. Average rainfall is approximately 235 mm per year. Maximum wind speeds are less than 40 km/h and the annual average is 15 km/h.

Vegetation in the mine area ranges from open forest on lower elevation areas to dwarf shrub, herb, grass and lichen ecosystems at high elevations in the alpine. The majority of the mine site is within the subalpine zone, and the mine access road is mainly in the boreal highland zone with some subalpine zone incursions. These zones are dominated by open forests of sub-alpine fir, black and white spruce, and lodgepole pine. Willow and scrub birch are common in riparian areas, areas with recent fire history, and steeper upland areas.

The mine area and surroundings are rich in wildlife habitat. A variety of wildlife species live in or pass through the mine area. The mine area lies at the outer edge of the Finlayson Caribou herd range. Moose abound, as do small furbearers. Grizzly bears are occasionally seen.

The aquatic ecosystems in the Mine area are generally typified by cold, clear and clean water. Wetlands abound and many small ephemeral streams occur in the area. Waters in the upper drainage areas, with the exception of Little Wolverine and Wolverine Lakes, do not appear to support substantial fisheries. Wolverine Lake and Little Wolverine Lake have been designated Conservation Waters and are regulated as a barbless hook fishery (Yukon Territory Fishery Regulations C.R.C, c. 854. CANLii). Go Creek, Money Creek, Bunker Creek, Chip Creek and Putt Creek all have limited to no fisheries potential.

Surface water flows have an annual cycle with winter low flows from December through April, high flows during freshet beginning in late April and peaking in June, followed by a generally rapid post freshet drop in flows and a gradual decrease to winter low flow conditions.

Supporting field and analytical program data related to the site is provided in the reports listed in Section 1.

### 3.5 Facility Components

The structures and equipment that currently comprise the tailings facility are:

- Tailings impoundment;
- Underdrains;
- Diversion ditches A and B;
- Spillway;
- Seepage collection dam and water return system;
- Tailings pipeline and reclaim water pump barge, pumphouse and pipeline;
- Monitoring instrumentation;
- Roads; and
- Power supply.

The general arrangement for the as-constructed facility is shown in Drawing D-6001.

### 3.5.1 Tailings Impoundment

The tailings facility is a central water reservoir, allowing the collection of all process water, sewage treatment plant effluent, mine-contact surface runoff, precipitation, and underground water.

The tailings impoundment covers an area approximately 600 m long and 300 m wide. The current dam height is 26.5 m (elevation 1313.5 m). Based on as-built surveys, the calculated storage capacity of the impoundment, below spillway invert El. 1311.5 m, is 1,513,900 m<sup>3</sup>.

The tailings dam is a compacted homogeneous earthfill dam with an impervious geosynthetic 40 mil LLDPE liner. The liner covers the base of the tailings impoundment and the upstream face of the dam to the crest. A seepage collection dam downstream of the main dam allows for the return of seepage water.

The impoundment is designed to safely route the 1:10,000 year return period flood through the spillway located in the west flank of the dam. The design earthquake is a 1:10,000 return period, with a peak ground acceleration of 0.22 g. The minimum geotechnical factors of safety during operations are 1.5 for static stability and 1.1 for pseudo-static stability. Analysis of the impoundment liner leakage rate indicates a potential seepage rate of 10<sup>-5</sup> L/s. The negligibly low seepage rate provides a safety margin against the potential for long-term degradation of portions of the liner.

As mentioned above, the tailings facility operates with a positive water balance. A water treatment plant to treat excess water accumulating in the tailings impoundment is currently being designed. The facility is in temporary closure and no tailings are actively being deposited in the TSF.

Wolverine tailings are characterized as potentially acid generating. Therefore, the tailings will be kept saturated during operations and at closure, to eliminate the potential for acid drainage from the facility. The tailings closure strategy involves the placement of a low permeability cover material over the tailings solids.

### 3.5.2 Underdrains

A network of liner underdrains was installed underneath the liner to relieve artesian pressures during liner installation and during filling of the impoundment. The underdrains were constructed by excavating a trapezoidal trench into the foundation and are installed as shown in Drawings D-5002 and D-5009 and extended as shown on Drawing D-6001. The basin underdrains consist of slotted 240 mm HDPE drain pipes backfilled with drain gravel and then wrapped by a geotextile. Water travels through the underdrains to the upstream toe of the dam to two 200 mm HDPE solid pipes, which pass under the dam and then discharge to the Go Creek watershed. These pipes will be decommissioned by plugging or filling once sufficient tailings have been stored in the impoundment to overcome artesian uplift pressures on the liner.

### 3.5.3 Diversion Ditches

Diversion ditches A and B, which are detailed in Drawings D-6005 and D-5004, respectively, consist of open channel excavations with corrugated steel culverts in areas where ditch slopes are steeper than 2%. The ditch side slopes are typically 2H:1V.

Ditch A intercepts runoff from the catchment northwest of the tailings impoundment and conveys the runoff to Go Creek downstream of the airstrip. Ditch B intercepts runoff directly uphill (northeast) of the tailings basin and directs the flow, via a culvert, to Go Creek downstream of the seepage collection pond. Both ditches discharge first to a stilling basin to reduce discharge velocity into the creek. Design criteria for the diversion

ditches, including 100-year flood flows and mean annual and seasonal flows are provided in the *Wolverine Project Tailings and Infrastructure Design and Construction Plan* (KCB, 2009) and *Wolverine Stage 2 Construction Record Report* (KCB, 2012b).

### 3.5.4 Spillway

The spillway is designed to route flood water through the impoundment without overtopping the dam. The spillway inlet is a trapezoidal channel with a base width of 3 m and 2H:1V side slopes. The channel invert at the control section near the dam centerline is located 2.0 m below the dam crest level, as detailed in Drawing D-6004.

The spillway was excavated in 2012 through medium-dense to dense silty sand and gravel with cobbles. The spillway channel is lined with bedding filter material and rip rap.

### 3.5.5 Seepage Collection System

The seepage dam is approximately 2 m high, located along the alignment of the mine access road downstream of the tailings dam. The dam has a minimum crest elevation of 1286.0 m, as shown in Drawing D-5007. Flow into the collection pond is mainly due to precipitation and runoff from the tailings dam downstream slope and the immediate catchment area of the seepage pond. Negligible seepage contribution from the tailings impoundment is anticipated, but the system will function as a contingency measure in the event that seepage does occur. The seepage collection pond area upslope of the dam is approximately 60 m long by 40 m wide by 2 m deep. Collected water is pumped back to the tailings impoundment or released to the environment following confirmation of adequate water quality.

The spillway for the seepage collection dam consists of a culvert as shown on Drawing D-5007.

### 3.5.6 Tailings Pipeline and Water Reclaim Infrastructure

The tailings pipeline and water reclaim system are currently not in use during temporary closure. The tailings pipeline can be used to convey water from the underground to the tailings facility if the valves are set for water to be pumped that direction.

These facilities will either be decommissioned in permanent closure or undergo testing and maintenance prior to a restart of mining activities.

### 3.5.7 Roads

The mine access road runs along the south-west of the dam, and is intersected by both diversion ditches and the spillway. The access road is used to access the main industrial complex by concentrate haul trucks, passenger vehicles, supply vehicles and maintenance vehicles.

A 1350 m long by 5 m wide perimeter road that runs along the impoundment dam crest provides access for equipment and personnel. The perimeter road connects to the mine access road west of the spillway.

### 3.5.8 Power Supply

Power is supplied for the reclaim pump house and barge via overhead lines that parallel the site access road from the industrial complex. The transformer is 750 kVA rated pad mounted, and has a connected load of 250kW and a running load of 110kW.

## 3.6 Basis of Design and Design Criteria

The basis of design and design criteria of the tailings facility is detailed in the *Wolverine Project - Tailings and Infrastructure Design and Construction Plan* (KCB, 2009). The Mine tailings dam is designed to national standards, using the *Canadian Dam Association – Dam Safety Guidelines* (CDA, 2013). The main design criteria are summarized in Table 3-4.

The *Construction Plans* (KCB, 2009, 2012a) detail information pertaining to foundation conditions, climatic considerations, geological and geotechnical aspects, as well as operational requirements including capacity, tailings characteristics, water management, seepage modelling and control, operating parameters and closure requirements. Detailed plans for progressive reclamation and closure activities of the tailings facility are documented in the *Wolverine Mine Reclamation and Closure Plan V2016-05 V.2* (YZC, 2017).

**Table 3-2 Summary of Tailings Dam Design Criteria**

Item	Criteria
Storage Capacity: Tailings	2.03 Mt @ 1.6 t/m <sup>3</sup> = 1.267 Mm <sup>3</sup>
Flood Management during Operation: Diversion of upland catchment Flood storage in impoundment Flood discharge	1: 100 year peak flow 200 year return period (approx. 0.3 m of pond rise) + seasonal storage of water Exceeding 1:200 year peak flow, no dam overtopping during 1:10,000 year
Seismic Return Period During Operation and Closure	10,000 year return period (PGA = 0.22g)
Geotechnical Factors of Safety during operations: Static Pseudo-static, seismic coefficient = 0.125 (a = 0.125 g)	FS = 1.3 (end of construction) and FS = 1.5 (operational) FS = 1.1 (note FS = 1.0 required by CDA 2013)
Environment - Operations Tailings pond Allowable seepage flows out of impoundment	Saturated tailings to prevent acid rock drainage Effluent treated until water quality meets discharge limits Seepage < 0.5 L/s. Contaminated seepage from the TSF, if present, will be collected and pumped to tailings pond
Closure Flood Handling Diversion Ditches	Diversion ditches to be decommissioned 1:10,000 year return period routed peak flow

Item	Criteria
Spillway	FS = 1.5
Geotechnical stability Safety Factor Static	
Pseudo-static, seismic coefficient = 0.125 (a = 0.125 g)	FS = 1.15 (Seed, 1979) (note FS = 1.0 required by CDA 2013)
Geochemical stability	
Allowable Seepage	0.5 m minimum water cover to maintain saturation to prevent acid rock drainage. Seepage <0.5 L/s. Effluent treated until water quality meets discharge limits

### 3.7 Construction History

Construction of all facility components is complete. The *Wolverine Project – 2009 Civil Works Construction Summary report* (KCB, 2010), and the *Wolverine Project – Stage 2 Raise – 2012 Civil Works Construction Summary Report* (KCB, 2012b) provides as-built details pertaining to all works constructed to the end of 2012. A summary of the main construction aspects is provided below.

Construction completed to prepare for mining start-up included:

- Construction of a drainage channel through the valley and finger drains within the tailings basin area to improve dewatering of the area, in preparation for construction in the spring of 2009.
- Construction of Diversion Ditch A and Diversion Ditch B to reduce the quantity of water to be managed in the basin area during construction of the facility in 2009.
- Stripping of organic material from within the impoundment and dam footprint to allow an “early” construction start-up in 2009.
- Construction of the liner underdrains, with transfer pipes beneath the dam.
- Excavation of borrow from the impoundment interior for construction of the starter dam.
- Construction of the perimeter access road at El. 1305 m.
- Excavation of the starter dam spillway.
- Final grading and proof rolling of impoundment footprint in preparation for placement of the liner, including placement of geofabric in areas with “rough” foundation base.
- Placement and seaming of 40 mil LLDPE liner panels within the impoundment area and two panels of 80 mil LLDPE liner in the starter and ultimate reclaim pipeline locations.
- Anchoring of the liner in the dam crest and perimeter road in a 1.0 m deep trench.
- Placement of tailings delivery pipeline and water reclaim pipeline.
- Installation of power transmission lines from the industrial complex to the reclaim pump house and barge.
- Installation of water reclaim pump barge and associated electrical and civil works.

- 
- Collection of water in the pond (up to 65,000 m<sup>3</sup>) to provide enough water for operation of the pump barge, and process plant commissioning.
  - Completion of the seepage collection dam, including installation of the culvert spillway.
  - Installation of the pump in the seepage collection pond and pipeline to the tailings facility.
  - Installation of monitoring instrumentation.

Stage 2 construction activities included the following:

- Construction of the Stage 2 perimeter access road to El. 1313.5 m.
- Grading and proof rolling of the dam extension footprint.
- Placement and compaction of zoned fill to raise the dam crest.
- Placement of filter blanket.
- Realignment of Ditch A to accommodate Stage 2 construction.
- Extension of the liner underdrain system.
- Decommissioning of the starter dam spillway and construction of the Stage 2 spillway, including installation of rip rap and culverts under the perimeter access road.
- Extension of existing inclinometers.
- Preparation and placement of liner and construction of anchor trench for dam raise.
- Placement of panel of additional liner to form a surface for the water reclaim barge ramp.

## 4 Regulatory Requirements

The Wolverine Mine falls under the jurisdiction of both the Government of Canada and the Yukon Territorial Government. The major Yukon permits and approvals required for the Wolverine Mine include:

- A Quartz Mining License (QML-0006) under the Yukon Quartz Mining Act issued by Yukon Energy, Mines and Resources and approved by the territorial Minister responsible on December 5, 2006 (expires December 1, 2021)
- A Type A Water License QZ04-065 under the Yukon Waters Act issued by the Yukon Water Board and approved by the Executive Council Office Territorial Minister (received October 4, 2007, expires December 31, 2027).

The Quartz Mining License stipulates the process for approval of environmental protection plans and mine operations plans, conditions for temporary closure, reporting and inspection requirements, and financial security.

Specific authorizations granted under QML-0006 include road construction, mine operations, mill operations and tailings deposition. Schedule D of the license also stipulates how the mine will treat certain aspects, such as erosion control, re-vegetation, watercourses, contaminated soils, roads and trails, buildings and infrastructure, rock dumps, underground openings, stability of underground openings, acid mine drainage, tailings impoundment, and water control structures.

Environmental protection, site development, and mine operations plans under QML-0006 for the Mine include:

- General Site Plan V2011-05
- Waste Management Plan V2010-03
- Wildlife Protection Plan V2009-01
- Spill Contingency Plan V2009-02
- Heritage Resource Protection Plan V2007-01
- Monitoring and Surveillance Plan V2011-03
- Reclamation & Closure Plan V2016-07 Revised V.2
- Mill Operating Plan V2010-02 (not in use now due to Temporary Closure)
- Mine Operating Plan V2010-02 (not in use now due to Temporary Closure)
- Tailings and Infrastructure Design and Construction Plan V2009-02 (this OMS Manual is part of this Plan)
- Emergency Response Plan V2014-05

Water quality and effluent monitoring requirements for the Wolverine Mine are dictated by Type A Water Licence QZ04-065 for the temporary closure phase. An extensive water monitoring program for the Wolverine Mine exists and includes the monitoring of hydrology and water quality at 21 surface water locations and 14 groundwater locations in the Wolverine Creek, Go Creek and Money Creek watersheds. Water quality samples are also collected from the waste rock storage sump and, when excess tailings water discharge is required, samples will also be routinely collected from the tailings impoundment and water treatment retention pond. The *Wolverine Mine Monitoring and Surveillance Plan V2011-03* provides additional details with respect to site locations, sampling frequency and analytical parameters for monitoring.

## 5 Tailings Facility Operation

This OMS Manual outlines the operation for the tailings facility. The facility is not being operated in the traditional sense of a tailings TSF as the mine is in Temporary Closure. However, water is still reporting to the TSF and maintenance and surveillance is ongoing.

A typical operation flowchart is shown in Figure 5-1. The flowchart describes the performance review procedure that will be applied to each component of the facility to help ensure safe operation. The main operational aspects of the tailings facility include: water management and seepage collection system operation. As the planned water treatment is still in the design stage and construction has been completed, operation of the water treatment plant is not included herein.

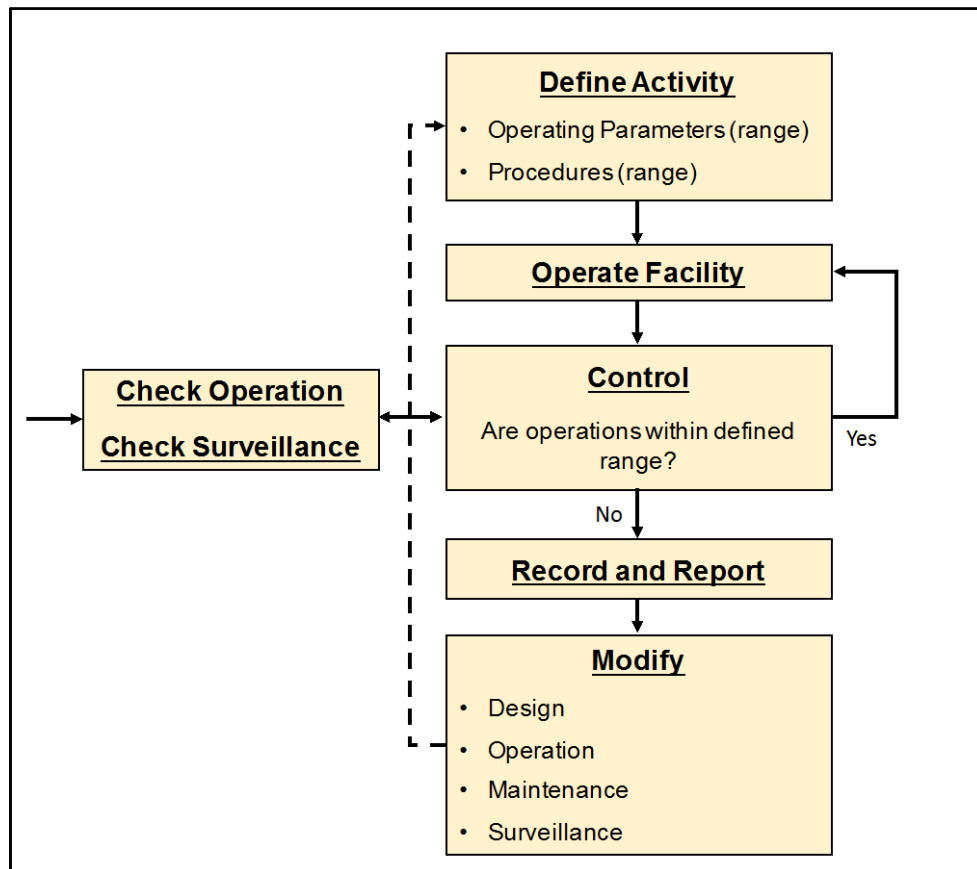


Figure 5-1 Typical Operation Flowchart

### 5.1 Tailings Deposition

Tailings deposition is not occurring during Temporary Closure.

### 5.2 Impoundment Water Management and Stage Storage Curve

The tailings facility is designed to provide for the following, based on the design criteria established in Table 3-4:

- minimum operational water volume for settling of solids and operation of pumps of 40,000 m<sup>3</sup>;

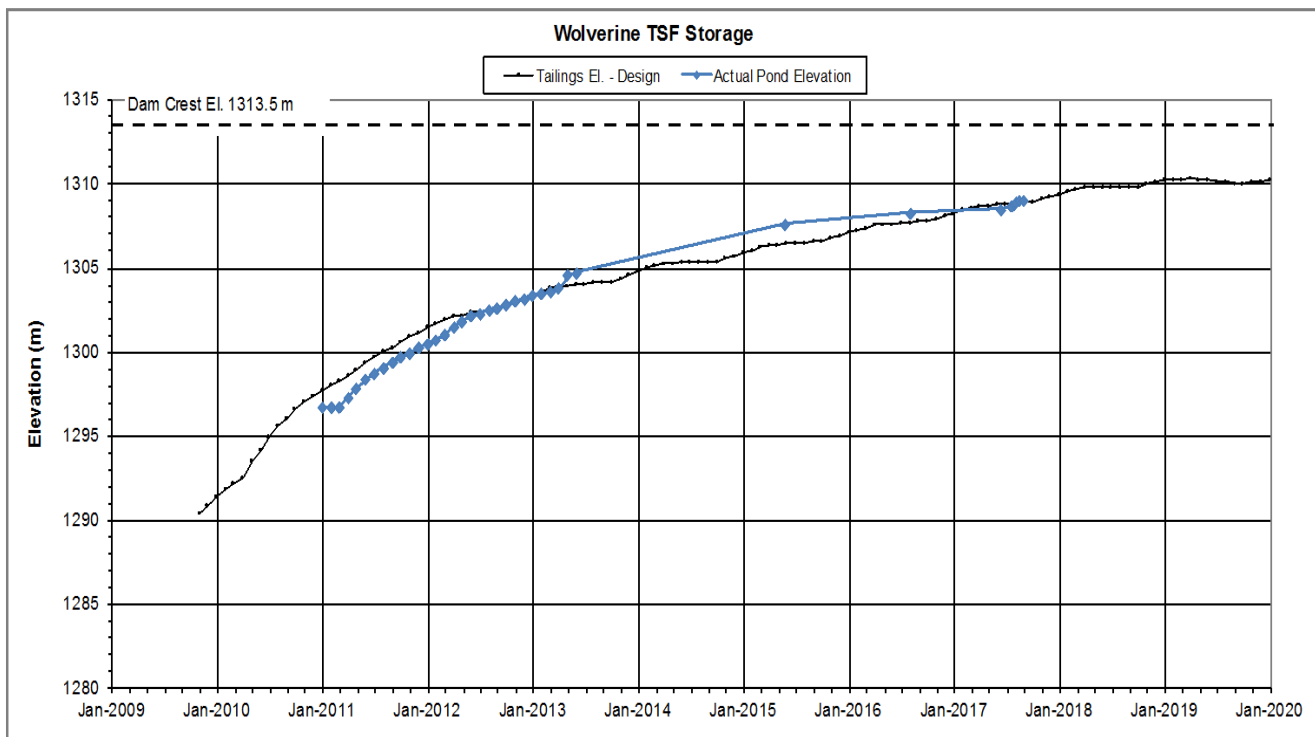
- seasonal storage of tailings for average conditions of 60,000 m<sup>3</sup>;
- 2 m of freeboard, which provides for routing of the 10,000-year return period flood event through the spillway (0.5 m depth) and 1.5 m of freeboard.

The tailings impoundment has a positive water balance and therefore it is desirable to minimize the flow of non-contact water into the impoundment to minimize water treatment requirements. Diversion Ditches A and B direct the majority of non-contact water away from the impoundment. Excess water accumulating in the impoundment will be stored until the water treatment plant is operational.

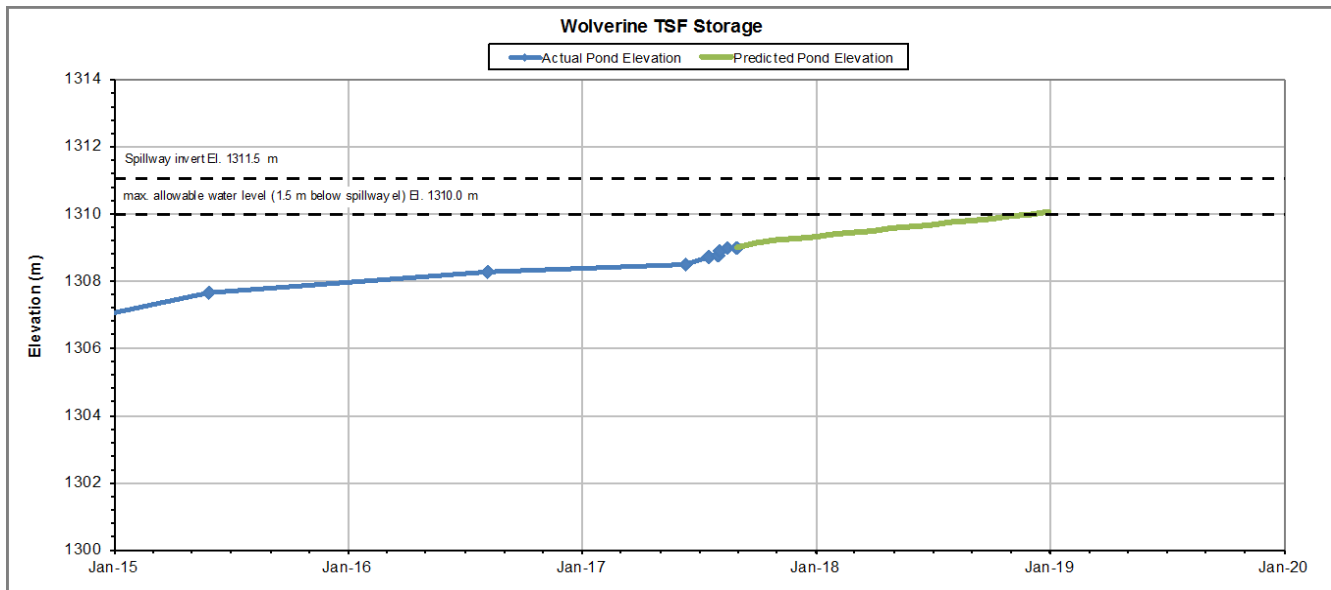
A spreadsheet with monthly water balance is maintained that tracks site precipitation and pond level rise which is used to calculate the water reporting to the TSF from the various sources on site. No tailings are currently being discharged and no water is being reclaimed so the record keeping is sufficient during temporary closure.

The results of the actual and predicted accumulation of water and solids storage are presented in Figure 5-2, along with the stage storage elevation curve for the impoundment.

As water is accumulating in the TSF, monitoring of the water level in the TSF is conducted weekly to add to the water level monitoring conducted when the mine was in operation. Since December 2014, the pond elevation in the TSF has increased from 1307.1 m to 1309.0 m. Pumping from the underground adit started in June 2017 at an average 250 m<sup>3</sup>/day, which is consistent with historic inflow rates, which averaged 300 m<sup>3</sup>/day in 2012 through 2014. Figure 5-3 shows the historic and predicted pond levels based on site inflows.



**Figure 5-2 Stage Storage Curve for the Starter and Ultimate Tailings Impoundments**



**Figure 5-3 Historic and Forecasted Pond Level**

### 5.3 Seepage Collection System

To address the potential for seepage from the impoundment, a seepage collection system was constructed downstream of the main dam. The seepage collection system (shown on drawing D-5007) consists of two seepage collection ditches running along the toe of the dam, which report to a seepage pond contained behind a seepage dam. The mine access road forms the seepage dam, with crest elevation of 1286 m. A spillway pipe has been installed through the road. Water collected behind the dam is monitored for water quality, and pumped back into the tailings impoundment. Water that meets guidelines can be released to Go Creek.

### 5.4 Water Reclaim System

The reclaim system is currently inactive. During operations, tailings pond water is reclaimed back to the mill for the processing system. The reclaim pump is installed on a floating barge that is anchored in place, and has remained in place over the temporary closure period. The reclaim system will be used to pump water to the water treatment plant.

### 5.5 Environmental Protection

Protection of the aquatic environment has been incorporated into the design of the facility, through the selection of a dam classification criterion of Very High, plus the incorporation of an impermeable liner within the basin and the construction of a seepage collection dam downstream of the tailings dam. Monitoring conducted at surface water and groundwater well monitoring sites detailed in the *Wolverine Mine Monitoring and Surveillance Plan V2011-03* (YZC, 2011b). All sampling during the temporary closure period is to be conducted in accordance with A Licence QZ04-065 requirements.

Monitoring for waterfowl and shorebird in the tailings facility will be conducted during the fall and spring migration periods as per *Wolverine Project Wildlife Protection Plan V2009-01* (YZC, 2009).

## 5.6 Safety and Security

Access to the Wolverine Mine is only via air or via road from the Robert Campbell Highway. Road access is restricted by a locked gate, public access is not permitted.

Within the mine site, access to the tailings impoundment will be restricted to authorized employees, contractors and consultants.

All workers accessing or operating the facility will be trained and knowledgeable about workplace hazards at and near the tailings facility. Personal protective equipment will be worn and safe operating procedures will be followed at all times.

## 5.7 Reporting

Annual reporting is conducted as per Type A WUL QZ04-065 and QML-0006. During temporary closure these annual reports have been combined, and are submitted on or before February 27 of each year to the Yukon Water Board and to Yukon Government, Department of Energy, Mines and Resources. Annual reports contain summaries of:

- Environmental monitoring;
- Wildlife monitoring;
- Spill events;
- Climate recording including precipitation and temperature;
- Activities conducted throughout the year;
- Proposed activities for the subsequent year;
- Annual inspections and subsequent remedial actions for the site infrastructure, including the TSF; and
- Records of employment and expenditures in the Yukon.

## 6 Tailings Facility Maintenance

A general Maintenance Flowchart is shown in Figure 6-1. The flowchart describes a maintenance review procedure that should be applied to each component of the facility to help ensure safe operation. Components requiring maintenance include:

- Water reclaim, seepage collection pipelines, pumps and support facilities;
- Earthworks: dams, ditches, spillways; and
- Impoundment: liner.

Facility maintenance is the responsibility of the Health and Safety Manager. The Care and Maintenance Department must understand operating and maintenance manuals in order to assess whether design or performance standards are being achieved, complete routine or predictive maintenance tasks, and to adequately respond to event-driven maintenance requirements.

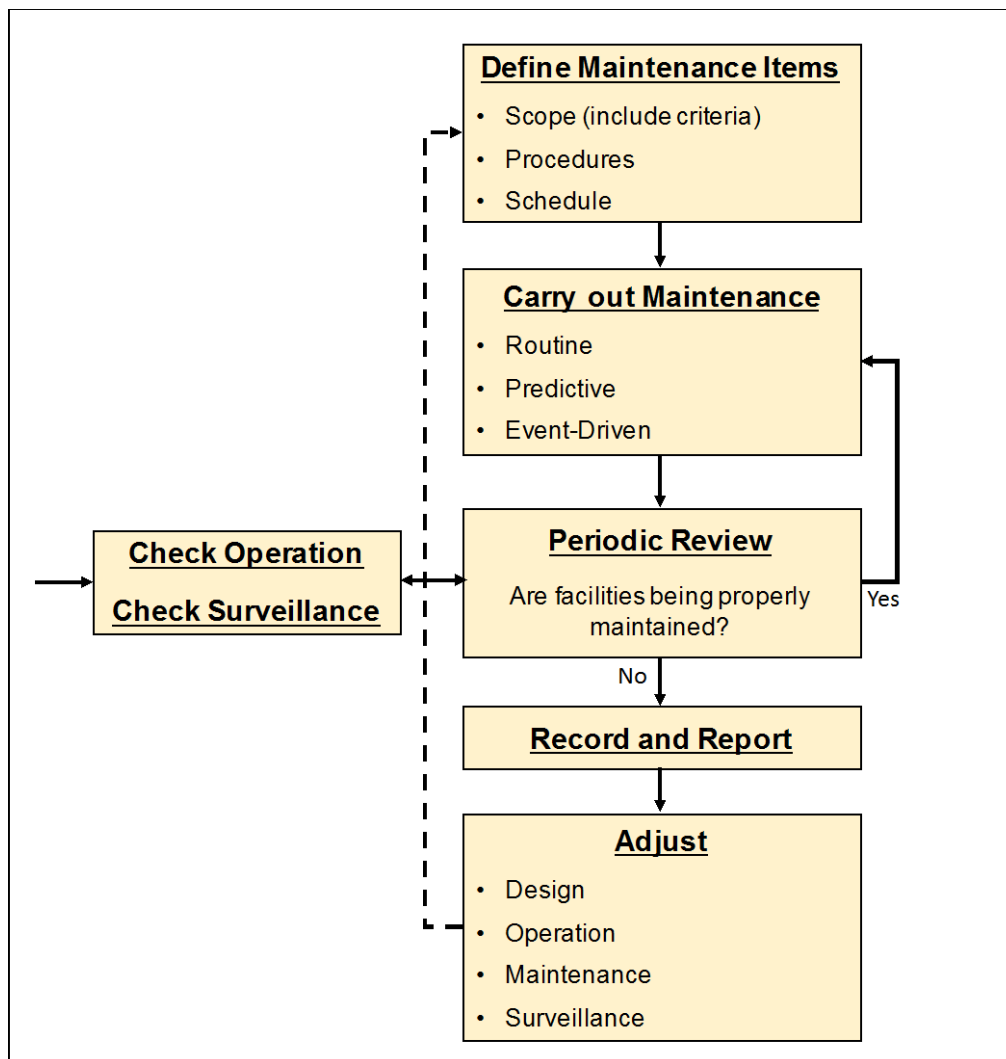


Figure 6-1 Maintenance Flowchart

## 6.1 Routine Maintenance

### 6.1.1 Tailings Dam, Liner, Diversion Ditches, Seepage Dam, and Spillways

Routine maintenance required for the tailings dam, liner, diversion ditches, seepage dam and spillways includes:

- Regularly check diversion ditches, spillways and culverts for accumulation of debris or sediment, or any other form of blockage, and remove if required.
- Visually inspect diversions, spillways, seepage collection dam and all ditches for cracking, bulging, slumping, and any other indications of slope movement. Any indications of slope movement shall be reported to a qualified geotechnical engineer.
- Perform regular performance tests on seepage pond pump.
- Re-grade the dam crest, as required, to prevent local ponding and direct surface runoff towards the pond.
- Repair erosion gullies, local slumps or slides in the dam face, diversion ditches or spillway channels.
- Repair liner sections if damaged by animals, equipment or other events. The geomembrane liner could be damaged by wildlife or ice movement during spring break-up. Therefore, the following will be available or in place for repairs:
  - A minimum of 10 m<sup>2</sup> of 40-mil LLDPE liner material and 10 rolls of “super” sealing tape. This tape is capable of being used in wet conditions or under water.
  - Care and Maintenance OMS personnel will be trained in proper fitting and taping of a liner patch.
  - Safe working procedures will be established for working on the “slippery” liner.

### 6.1.2 Geotechnical and Water Quality Monitoring Instrumentation

Maintenance of instrumentation is important to ensure that instruments are in good working order and provide reliable readings. All instruments will be clearly marked, identified and protected. Drawings and as-built information of the instruments will be kept current, including the location, installation depth and characteristics of the instruments. Routine maintenance includes calibration and repair of equipment used to read the instrumentation.

### 6.1.3 Tailings Delivery System

Maintenance of the tailings delivery system is not required as the system is not being used during Temporary Closure.

### 6.1.4 Water Reclaim System

Regular maintenance of the pump barge is not being used during Temporary Closure and maintenance is not required. Should the pump barge be instituted, required maintenance of the water reclaim system consists of:

- Inspecting major wear components; and

- Replacing worn parts as recommended by manufacturers.

## **6.2 Event-Driven Maintenance**

Potential event-driven maintenance items arising from pipeline leaks or breaks, earthquakes and floods are listed below.

### **6.2.1 Pipeline Leaks or Breaks**

- Inspect entire pipeline;
- Repair or replace affected components;
- Perform opportune and scheduled maintenance;
- Repair any collateral damage caused by a leak or break; and
- Reclaim any disturbed areas.

### **6.2.2 Earthquake Occurrence**

- Inspect dam and beach areas for sign of distress due to deformation;
- Inspect dam for signs of liquefaction (e.g. local sand boils, etc.);
- Measure freeboard for compliance with design requirements;
- Inspect toe area of dam for signs of deformation or piping of fines; and
- Inspect diversions ditches and spillway for sign of slumping or changes in geometry.

### **6.2.3 Flood Event**

- Measure freeboard for compliance with design requirements;
- Inspect dam, diversion ditches and spillways for signs of excessive erosion and repair; and
- Inspect seepage return system for adequacy.

## **6.3 Maintenance Schedule and Spare Parts**

All electrical and mechanical components will be inspected and maintained as per manufacturer's recommendation. A spare parts inventory will be maintained as recommended by equipment manufacturers and as required by the Owner.

## **6.4 Documentation**

Maintenance records of each component will be kept by the Health and Safety Manager and will include:

- Up-to-date logs of in-service equipment and facilities;
- Maintenance schedules;
- Maintenance history;

- 
- Inspection logs;
  - Repair reports including cost;
  - Frequency, cause of problems and planned mitigation;
  - Component reliability records;
  - Quality control records;
  - Photographs, videos of repair issues;
  - Inventory of spares, materials, tools and equipment; and
  - Critical spares list.

## 6.5 Reporting

A Maintenance Report will be prepared monthly by the Health and Safety Manager or designate and will include:

- Completed work;
- Updated maintenance log and schedule;
- Progress on partially completed work that has been halted for some reason;
- Items not requiring maintenance and why;
- New items or conditions requiring maintenance;
- Problems and possible solutions for items requiring greater than expected maintenance; and
- The cause of any neglected or late maintenance.

## 7 Surveillance

Regular surveillance is essential to ensure ongoing safety of the facility and to identify areas requiring maintenance before problems and safety concerns develop. Behaviour and performance of the facility are assessed visually and through monitoring of instrumentation.

A flowchart of the Surveillance process is shown in Figure 7-1. The flowchart describes a surveillance review procedure that will be applied to each component of the facility to help ensure safe and continued operation.

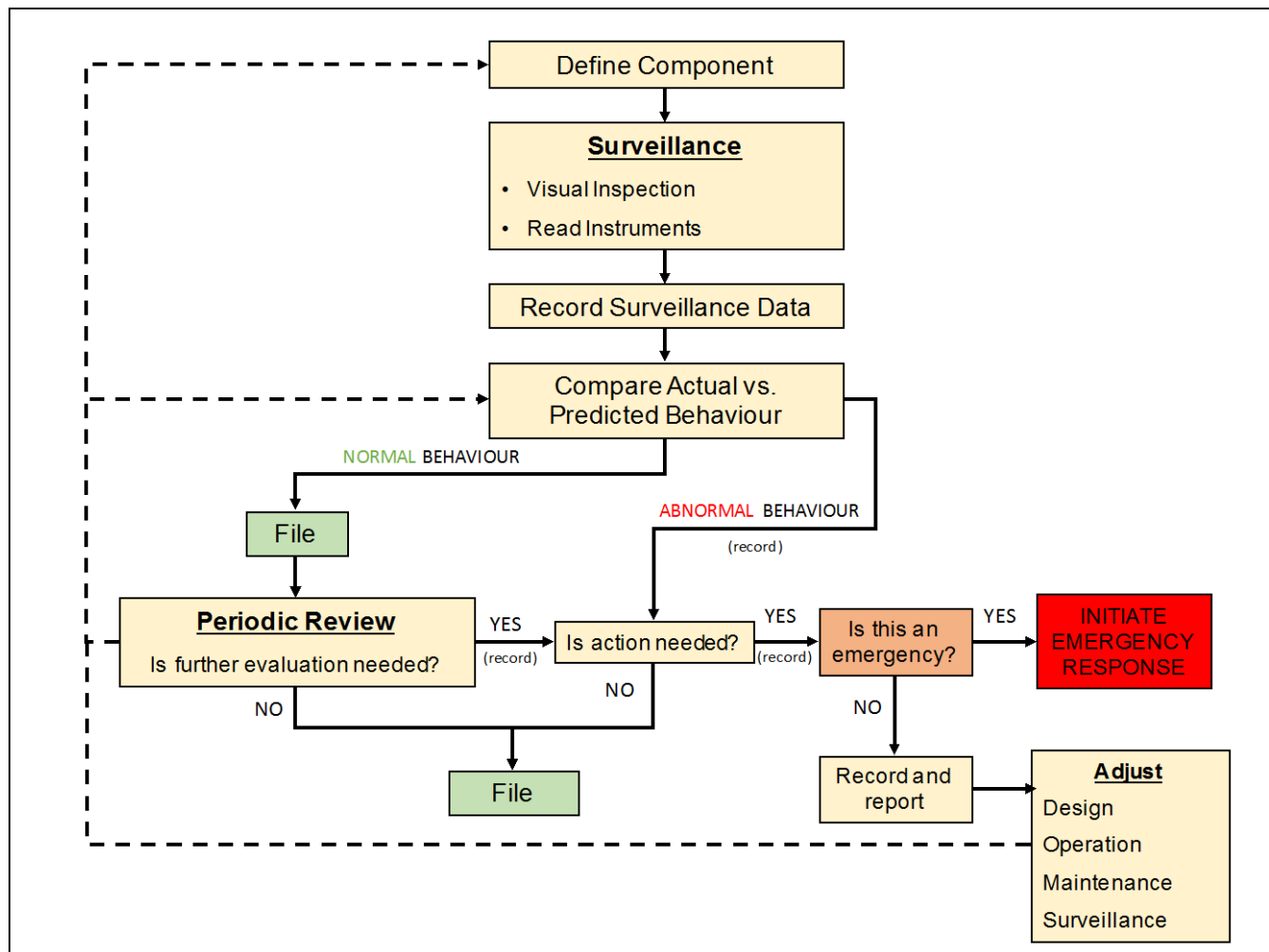


Figure 7-1 Surveillance Flowchart

### 7.1 Inspection Program

The purpose of an inspection program is to identify problems and/or unsafe conditions that are visually evident. Visual inspections are an integral part of proper maintenance and performance of monitoring programs for the tailings facility. Failure to correctly identify maintenance and repair items, or potential adverse behaviour, could result in unsafe conditions or lead to a failure of operating systems or cause an adverse environmental effect. Table 7-1 summarizes the surveillance requirements for the tailings facility. Environmental monitoring requirements are summarized in Section 7.2.3.

**Table 7-1 Surveillance Requirements for the Tailings Facility**

<b>Surveillance</b>	<b>Frequency</b>
<b><i>Routine Inspection</i></b>	
Dam and Liner	Min. Weekly
Diversion ditches	Min. Weekly
Seepage collection system	Min. Weekly
Spillways	Min. Weekly
Pipelines	Min. Weekly
<b><i>Annual Inspection</i></b>	Annually
<b><i>Event Driven Inspection</i></b>	Following unusual event
<b><i>Comprehensive Review</i></b>	Every 7 years & prior to decommissioning
<b><i>Tailings Pond Monitoring</i></b>	
Inflows, Outflows, Condition	Monthly
Topography	Annually
Bathymetry	Annually
<b><i>Instrumentation</i></b>	recorded daily, downloaded quarterly

### 7.1.1 Routine Inspections

Routine and/or regular visual inspections of the dam, liner, diversion ditches, seepage collection dam, spillways, pipelines, and pumping infrastructure will be carried out on an on-going basis as required but not less than weekly. Ideally the inspections should be performed and recorded by the same person(s) to ensure that relevant incremental changes are observed between each inspection. The visual inspections will be done for all components of the dam, including the crest, upstream and downstream slopes, abutments, the liner, the water reclaim system, pipelines and pipeline crossings, diversion ditches and spillways.

All observations will be formally documented on a weekly basis in the Tailings Facility Log Book. Some of the main features and conditions that the inspections will include are:

#### 1. Dam Safety

- Large settlement or subsidence of the dam crest or slopes;
- Cracks in the dam crest or slopes;
- Bulging on the downstream slope;
- Sinkhole on the crest, slope or tailings beach;
- Surface erosion, animal burrows or unusual vegetation patterns on the dam; or
- Changes in seepage conditions on the downstream slope or at the toe of the dam. This includes seepage rates, changes in coloration of seepage water or suspended solids, from either seepage exiting on the slopes or from the abutments.

#### 2. General

- Suspended solids, siltation or improper positioning of the reclaim system;
- Uplift or bulging of the liner;
- Tear or damage to the liner;

- Excessive ice or glaciated tailings build-up;
- Erosion of the diversion channels or spillways;
- Excessive seepage losses through the diversion ditches into the impoundment;
- Changes in alignment of power poles, and pipelines; or
- Wildlife occurrence that could potentially lead to an incident with either a liner tear or wildlife fatality.

### 7.1.2 Annual Inspections

Annual inspections are intended to be part of a more thorough review of the condition of the facility, and are carried out by a qualified engineer, experienced with the design and maintenance of the tailings facility.

The annual inspections will be conducted by July 1<sup>st</sup> and will include the following main items:

- Visual inspection of the facility by the engineer, including taking appropriate photographs of the observed conditions;
- Review of routine inspection records prepared by operating personnel in the past year;
- Review whether or not recommendations from previous year's inspection(s) have been addressed, and any incidents or actions arising from those previous recommendations;
- Review of instrumentation and monitoring data;
- Review of tailings deposition and water management operations of the facility including reconciliation of the annual water and mass balance. Review of pond levels (and depth) and freeboard, and reports of any incidents (and remedial measures) that may have occurred;
- An evaluation and interpretation of the structural performance of the dam and related components, and identify any potential safety deficiencies or recommended items that need to be addressed in the coming year;
- Review construction records, QA/QC data and as-built information on dam construction and beaching; and
- Evaluation of the OMS Manual to assess the need for updating.

The results of the inspection and review will be documented in a report that will be submitted to Yukon Energy, Mines and Resources 45 day post-inspection, as per QML-0006 requirements.

### 7.1.3 Event-Driven Special Inspections

Special inspections will be carried out if any of the following events occur:

- Unusual events such as an earthquake, large rainfall or avalanche;
- Unusual operating events such as rupture of a pipeline, particularly if on the slope or crest of the dam, sudden loss of pond water, sudden rapid rise of pond water;

- Unusual observations such as cracks, excessive settlements, sinkholes, large slope or foundation deformations, increased seepage, turbidity of seepage water; or
- Instrument readings that deviate from historical trends, or are within “alert” action levels (e.g. trigger levels).

Special inspections after unusual events are necessary to evaluate whether there has been any damage requiring correction, any safety measures or special operating procedures that need to be implemented, or if there is a need to initiate emergency procedures as described in Section 8.

#### **7.1.4 Comprehensive Dam Safety Review**

The Canadian Dam Association (CDA) Dam Safety Guidelines (2013) recommend a comprehensive dam safety review be carried out every 7 years during operations, prior to decommissioning and following closure.

The comprehensive review provides independent verification of:

- safety and environmental performance of the facility;
- adequacy of the surveillance program;
- adequacy of delivery of OMS requirements;
- design basis with respect to current standards and possible failure modes; and
- compliance with new engineering standards (including analysis to confirm if necessary).

## **7.2 Tailings Facility Monitoring**

Surveillance of the tailings facility includes monthly and annual monitoring of the impoundment, dam safety instrumentation monitoring, and environmental monitoring.

### **7.2.1 Tailings Impoundment Monitoring**

Tailings impoundment monitoring will be carried out by the Health and Safety Manager or designate on a monthly basis and more often if conditions change. The monthly monitoring will be recorded in the Tailings Facility Log Book and will include:

- Pond elevation is monitoring monthly via elevation marks on the liner adjacent to the pump barge ramp;
- Monthly totals of water pumped and trucked to the TSF;
- Tear or damage to the liner;
- Excessive ice or glaciated tailings build-up;
- Erosion of the diversion channels or spillways;
- Excessive seepage losses through the diversion ditches into the impoundment;
- Changes in alignment of power poles, and pipelines; and
- Wildlife occurrences.

A topographic survey and bathymetry survey of the tailings impoundment will be conducted annually. This data will be used for to reconcile the annual water balance and facility storage volumes described in Section 5.2.

### 7.2.2 Dam Safety Instrumentation and Data Review

Instrumentation installed in the dam is shown on Drawing D-5013. The instrumentation consists of:

- Two inclinometers which are now damaged and unreadable.
- Piezometers located in the dam downstream shell to monitor dam fill and foundation phreatic levels which are connected to dataloggers.
- Ten survey monuments located on the crest/downstream slope to monitor potential deformation which are surveyed by YZC staff each year.

The piezometers are connected to data loggers which collect readings twice daily. The instruments should be downloaded and processed quarterly and reported on as part of the annual report. Any modification to the monitoring frequency, if recommended, will be formally documented in the Annual Inspection Report. Instrumentation may be read more frequently if anomalous data is measured or if sudden changes in data or site conditions are observed. Spreadsheets to process the data are available on site. Graphs of the historical data are also available and will automatically update when new data is added to the spreadsheets. These graphs also include the trigger levels for the instruments.

The instrumentation and monitoring scheme should be sufficient to identify the onset of an instability problem. However, if signs of instability are detected, additional surveillance and remedial measures will be taken to safeguard the stability and integrity of the dam.

All recorded data will be plotted on a time scale. The plots will include the basic installation details of the instrumentation and preliminary “trigger” levels. Data will be assessed by the Engineer of Record who will report to the Health and Safety Manager, and the actions included in Section 7.4 will be taken.

### 7.2.3 Environmental Monitoring

The *Wolverine Mine Monitoring and Surveillance Plan V2011-03* (YZC, 2011b) summarizes the requirements for monitoring and surveillance required during operations of the Wolverine Mine. Monitoring requirements during the temporary closure phase are detailed in the *Reclamation and Closure Plan V2016-07.V2* (YZC, 2017). These Plans outlines monitoring programs to be conducted for surface water, groundwater, weather, and the tailings storage facility, plus engineering inspections and reclamation research programs as per QML-0006. Other programs including Environmental Effects Monitoring, sediment and aquatic life, and underground mine monitoring are also described. Table 7-2 summarizes the monitoring requirements for the Wolverine Mine through the temporary closure phase pertaining to the tailings facility requirements.

**Table 7-2: Summary of Monitoring and Surveillance Requirements for the Wolverine Mine**

Requirement	Data Logger Recording Frequency	Monitoring Frequency
<b>Water Monitoring</b>		
Surface WQ	-	Monthly/Daily during discharge
Surface flow	Hourly	Monthly
Acute lethality	-	Monthly during discharge
Groundwater WQ	-	Quarterly
Groundwater level	Hourly	Quarterly
<b>Weather Station</b>		
Snowpack	Every 10 minutes	Monthly
	-	End of March & April

**Engineering Inspection**

-

Annually

The *Wolverine Project Wildlife Protection Plan V2009-01* (YZC, 2009) summarizes the requirements for monitoring and surveillance of wildlife at and near the facility including during migration and winter periods.

### 7.3 Documentation

Documentation of surveillance activities will be maintained by the Health and Safety Manager as described in the preceding sections and will include recording of:

- Routine visual observations (departures from normal conditions);
- Instrumentation monitoring and testing;
- Analyses and evaluations; and
- Reviews.

Documentation will include, as a minimum, the following:

- Weekly routine inspection log;
- Monthly care and maintenance monitoring report;
- Monthly surveillance network monitoring report for submission to Yukon Water Board and Yukon Government, Department of Energy, Mines and Resources;
- Annual engineering inspection reports for submission to Yukon Energy, Mines and Resources; and
- Comprehensive dam safety report every 5 years.

Documentation will include a hard copy (paper) and electronic filing system for inspection reports, photographic and video records, incident reports, instrumentation readings, instrumentation plots, annual inspections and third-party reviews, so that they can be quickly retrieved for review and in case of an emergency.

### 7.4 Reporting

The Health and Safety Manager will review collected data records from facility monitoring and assess the need for maintenance activities or response. The reporting procedures for various levels of surveillance are summarized below.

#### 1. Performance meets design expectations

Data will continue to be plotted as recorded and documented in the quarterly instrumentation report and annual tailings facility report.

#### 2. Conditions may require adjustment to design, operation, maintenance or surveillance (yellow triggers)

Values for yellow trigger levels are included in the *Tailings Facility Monitoring – Monthly Instrumentation Report* form in Appendix A. The yellow level signifies a caution warning that requires action. The Health and Safety Manager will formally notify the Design Engineer and request

assessment of the data and to advise any remedial actions or potential modification of the trigger level. The frequency of monitoring should be increased to confirm the measurements and to assess if the rate of change is increasing, stabilizing, or decreasing.

### 3. Potential Emergency Response Alert (red triggers)

Values for red trigger levels are included in the *Tailings Facility Monitoring – Monthly Instrumentation Report* form in Appendix A. The red level signifies a response warning that requires action. The Mill Manager will immediately inform the following personnel, who will determine what immediate action should be taken and whether the emergency response plan outlined in Section 8 should be implemented:

- Site Care and Maintenance Staff;
- Design Engineer; and
- YTG Departments (Energy, Mines and Resources, Water Resources, Environment, etc.) and Environment Canada.

The Environmental Consultant is responsible for overseeing sample and data collection and analysis, and monthly reporting as per Water Licence QZ04-065 requirements to the Yukon Water Board and to Yukon Government. Data acquired from all environmental programs is compiled and reported annually in the QML-0006 and QZ04-065 Annual Report due February 28<sup>th</sup> of the subsequent year.

## 8 Tailings Facility Emergency Response Plan

Constructing, operating and maintaining systems to high standards, and by implementing continuous monitoring and surveillance programs to identify potential issues, will help to minimize the potential of an emergency event at the tailings facility. Nevertheless, major storm events or structural emergencies may create an emergency that must be handled. As a dam failure or passage of a major flood is not expected to result in the loss of life, a separate Emergency Preparedness Plan is not warranted. The Tailings Facility ERP will be distributed to personnel within YZC, interested government agencies and members of the local emergency response units that may become involved in case of an emergency.

The objective of the Tailings Facility Emergency Response Plan (ERP) is to ensure timely and appropriate response to emergencies, and compliance with applicable laws, industry standards, and legal codes of practice. This ERP covers only those emergency situations that could potentially pose a threat to the structural integrity of the tailings dam or result in the release of tailings materials and/or supernatant pond water into the surrounding environment. Refer to the *Wolverine Mine Surface Emergency Response Plan* for details pertaining specific Emergency Control Group duty cards for key response personnel, first aid procedures, and emergency response information pertaining to the general mine site.

The goals of this ERP are firstly to prevent the occurrence of emergencies and secondly to reduce the impact of emergencies, should they arise. In both cases, the ultimate goal is to protect:

- Human life and health;
- Social well-being of the local community and employees;
- Public infrastructure and company facilities; and
- Environment.

### 8.1 Effects of Inundation

The tailings facility is located in a remote area of the Yukon and, except for a campsite on Frances Lake, there are no major population centres or commercial or industrial activities downstream. In the event of an incident at the tailings impoundment, the discharge from the facility would enter Go Creek then Money Creek. Money Creek discharges into Frances Lake, which is located east of the mine about 40 km downstream of the tailings impoundment. The only significant infrastructure crossing along this flow path is the Robert Campbell Highway, which crosses over Money Creek just before the creek enters Frances Lake.

The estimated total storage volume of 1.35 Mm<sup>3</sup> at closure in the Wolverine tailings pond will comprise of approximately 1.27 Mm<sup>3</sup> of tailings and 0.08 Mm<sup>3</sup> of water. The expected peak flood outflow from the tailings pond occurring as a result of a dam breach was estimated using charts compiled by MacDonald and Monopolis (1984) and Wahl (1998), based on dam failure case studies. To estimate the peak discharge resulting from a potential breach at the Wolverine tailings dam, the following simplifying assumptions were made:

- The total storage volume was taken as 100% of the free water in the pond plus 30% of the stored tailings, based on data presented in USCOLD (1995); and
- The released tailings were assumed to behave the same as water.

The estimated peak outflow released from the dam is 1,850 m<sup>3</sup>/s, which is expected to attenuate as the flood wave travels downstream. The downstream flows were estimated using the attenuation charts prepared by Petrascheck and Sydler (1984) and the results are summarized in Table 8-1.

**Table 8-1 Estimated Dam Breach Flood Peaks Downstream of Tailings Dam**

Location	Distance from Dam (km)	Estimated Peak Flow (m <sup>3</sup> /s)
At Wolverine Tailings Dam	0	1,850
Confluence of Go Creek and Money Creek	5	1,670
Robert Campbell Highway and Frances Lake	40	1,100

As Table 8-1 indicates, little attenuation of the flow is expected by the time the flood peak reaches Money Creek. However, it is expected to decrease to about 60% of the original flow by the time the flood peak reaches the Robert Campbell Highway and Frances Lake. A comparison of the estimated flood peak resulting from a breach at the tailings dam with the natural stream flows indicates that the dam breach flood peak will be about 150 times the naturally expected 200-year peak flow in Go Creek above Money Creek. It will be about 10 times the naturally expected 200-year peak flow in Money Creek at the Robert Campbell Highway, thereby causing concern for a bridge washout.

The tailings released from the pond, as well as those left in the pond are expected to eventually become acid generating if left exposed to the atmosphere and would remain acid generating indefinitely until the oxidation process is complete. The potential environmental damage in that case could be substantial and could require recovery of all the tailings and construction of a new containment facility. Given the potential for release of relatively large flood and substantial environmental clean-up costs, the tailings impoundment is classified as a “high to very high” consequence facility, and has been designed accordingly (refer to *Wolverine Project - Tailings and Infrastructure Design and Construction Plan* (KCB, 2009) for details).

## 8.2 Emergency Situations and Response

Emergency situations at the tailings facility may include, but are not limited to, the following:

- Failure or suspect impending failure of the tailings dam;
- Slumping, sliding, cracking or bulging of the tailings dam;
- Rapid increase or unexplained cloudy appearance of seepage through the tailings dam and/or its foundation;
- Formation of sinkholes on the tailings beach or dam;
- Breakage of tailings pipelines, which may result in dam erosion and/or release of tailings slurry;
- Large earthquakes;
- Major storm events or flood; and
- Sabotage and other criminal activities.

All of these situations require site personnel to first be observant and recognize a potential emergency or unusual situation, then follow an established communication procedure and finally, respond appropriately. Particular attention will be given to inspecting and, where necessary, repairing the tailings facility following unusual or extreme events. Due to the remote location of the tailings facility, the response procedures and all necessary remedial action shall be the responsibility of the on-site personnel. The relevant government agencies and officials plus the Ross River Dena Council (RRDC) and Liard First Nation (LFN) will be notified as soon as practically possible.

The four levels of emergencies and general response guidelines are provided in Table 8-2 below.

**Table 8-2 Emergency Situations and Response Requirements**

<b>Emergency</b>	<b>Response Steps to be followed (see below)</b>
<b>Dam Breach</b> – large and uncontrolled release of water due to failure of the dam	Steps 1 to 5 inclusive
<b>Potential Dam Breach</b> – any condition that could result in dam failure and uncontrolled release of water	Steps 1 to 5 inclusive
<b>Floods or Hazardous Condition</b> – slumping of dam slopes, or significant seepage or springs	Steps 1 to 5 inclusive
<b>Earthquake</b> – an earthquake alert exists or if an earthquake is felt at the Mine	The Health and Safety Manager shall immediately direct dam inspection and take the following action:
- Severe or Significant Damage	Steps 3 to 5 inclusive
- Minor or No Damage	File Written Report

The following procedures should be followed in the event of an emergency:

**STEP 1** Respond to the incident, ensuring safety of yourself and others.

**STEP 2** Immediately notify by radio or direct communication your supervisor, and as appropriate:

- Health and Safety Manager, Leigh Lackey 705.849.5755
- Chief Operating Officer, Peter Mah 604.682.5404

**STEP 3** The Health and Safety Supervisor or Care and Maintenance Senior Supervisor, shall immediately engage the Emergency Control Group and contact the relevant off-site personnel, including Yukon Government Ministry Representatives and Regional Authorities (R.C.M.P), as necessary.

**STEP 4** The Health and Safety Supervisor will complete a brief status report describing the nature of the emergency and recommendations for immediate action. If there are any uncertainties regarding the nature of the emergency or actions to be taken, one of the following Klohn Crippen Berger Ltd. earthfill dam engineers shall be contacted for assistance:

- Pamela Fines Cell: 587-334-8094
- Harvey McLeod Office: 604-251-8454  
Cell: 604-671-8860

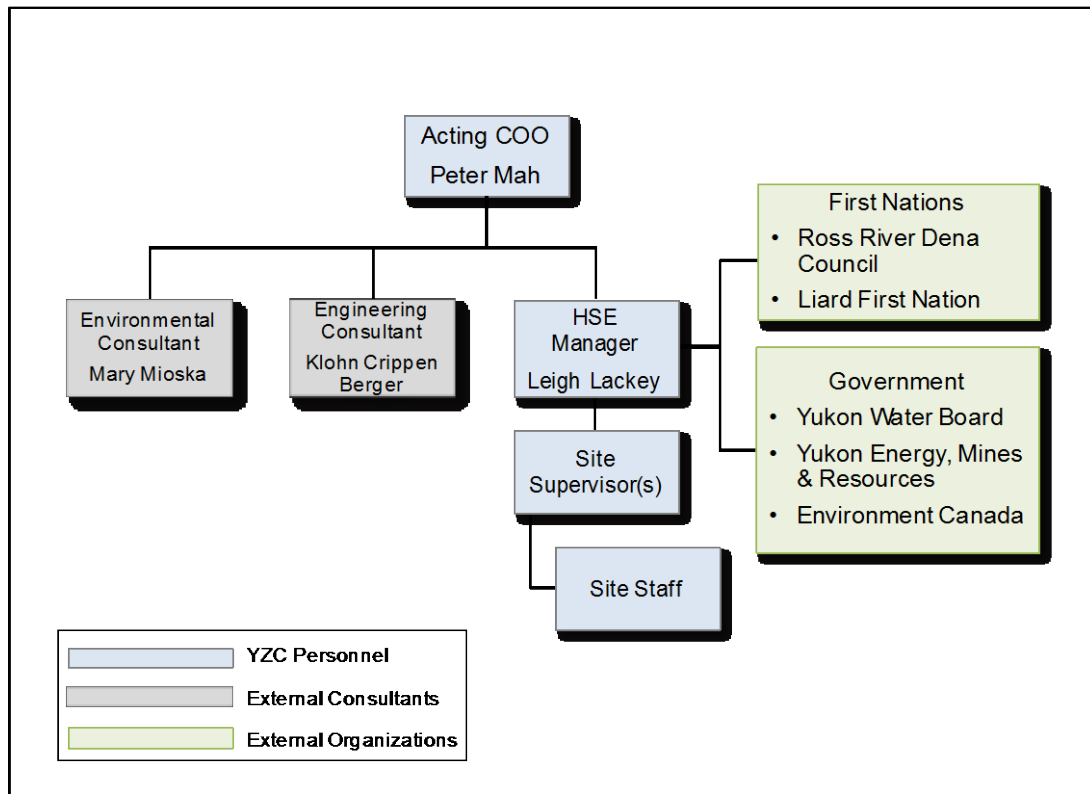
For all emergencies, instrumentation in the affected area will be downloaded or monitored and

assessed by YZC personnel, and forwarded to the design engineer(s) if necessary to determine specific remedial actions requirements.

**STEP 5** If the Health and Safety Supervisor or designate considers the emergency to be serious and urgent, then he will advise the following personnel on the status of the emergency and action to be taken:

- YZC Corporate Office 604-682-5404
- Yukon Highway Dept, Risk Management 867-667-5710
- RCMP, Watson Lake 867-536-5555
- Yukon Client Services and Inspections 867-456-3882
- Yukon Energy, Mines & Resources Inspector 867-667-3156
- Yukon Water Resources Inspector 867-456-3884
- Environment Canada Inspector 867-667-3470
- Department of Fisheries and Oceans 867-393-6722
- First Nations Governments 876-969-2097 (RRDC)  
867-536-7901 (LFN)

Lines of communication with the site and the responsibility to notify affected external stakeholders, including government agencies, local organizations, First Nations, and other individuals are illustrated in Figure 8-1.



**Figure 8-1 Internal and External Reporting Personnel**

Corporate personnel will be notified in the event of significant incidents on site, particularly events where external notification to government agencies or downstream-affected persons is necessary. During and after a significant event, it may be necessary to respond to questions and concerns by the regulatory agencies, media, general public, special interest groups, and others. The corporate office is responsible for this communication.

### **8.3 Actions to Prevent Tailings Dam Breach**

The following section covers those emergency situations that could potentially pose a threat to the structural integrity of the tailings facility or result in the release of tailings, tailings slurry, and/or supernatant pond water into the surrounding environment. To assist the mine in dealing with emergency situations threatening the tailings dam, this section describes the potential course of action that could be taken promptly to avert a dam breach.

Appropriate action could include:

- Controlled lowering of the tailings pond level via the reclaim line and/or by trenching through the spillway as described below; and
- Arresting or retarding dam internal erosion by backfilling any sinkholes with filter sand, backfilling any crest breach and placing an inverted filter blanket over the downstream affected area, as described below

#### **8.3.1 Lower Tailings Pond Level**

In the early stage of either a "piping" or overtopping scenario, the most effective action to reduce the threat of further development of the failure mechanism is to lower as fast as practical the level of water in the tailings pond upstream of the tailings dam.

The mine will request EMR and YTG Water Resources to declare a state of emergency, to allow YZC to release tailings pond water downstream of the tailings dam into Go Creek, thereby minimizing the potential risk of a more serious impact.

#### **8.3.2 Arrest or Retard Dam Erosion**

Once excess and/or murky seepage caused by internal erosion of the tailings dam is detected, additional actions can be taken to arrest the further development of the erosion, which could lead to piping failure of the dam. If sinkholes develop, they should be immediately filled with dam fill materials compatible with the internal zoning of the dam. If the sinkholes are located upstream of the dam, efforts should be made to prevent pond water from flowing into the sinkholes. This could be accomplished by placing additional earthfill in the surrounding area to block any potential access of pond water to the sinkholes, and/or discharging tailings materials to move the tailings beach/water contact further away from the sinkholes.

In the area where excess and/or murky seepage is exiting from the tailings dam toe, a weighted filter buttress berm should be promptly placed along the seepage exit area. The filter berm would allow free exit of seepage water without carrying away existing damfill and/or foundation materials. The filter berm is to be constructed of filter and drainage materials with progressively increasing particle size towards the berm outer surface.

As the dam freeboard decreases during a major hydrologic event, additional actions can be taken to arrest external erosion of the dam. Concurrent to lowering the tailings pond level, the existing dam crest should be raised by placing additional dam fill on the crest. While raising the crest uniformly across the entire dam, additional dam fill material should be placed in local areas where signs of weakening such as slope slumps, crest deformations and cracks are discovered.

In an event that an open channel begins to form on the dam crest, granular materials should be used to plug the channel. Materials of sufficient size and weight can be dozed into the breach from alternate side of the channel. As the channel is gradually being closed, the materials used to plug the channel should increase in size and weight to cope with the increasing flow velocity. After the channel is completely closed, additional fill material with sufficient fines should be placed upstream of the granular-fill plug in order to limit the seepage through the plug.

## **8.4 Training, Testing and Updating**

Training for personnel involved with tailings facility operations will be conducted to ensure familiarity with all elements of the operation, maintenance and surveillance of the facility, and the ERP. Training will focus on operational procedures, improvements planned for the tailings operation system, an overview of planned construction and maintenance activities, and a review of emergency response plans, specifically focussing on roles and responsibilities, dam breach prevention measures, and notification procedures

In addition to training, the ERP will be tested for effectiveness via a validation drill, and updates or amendments to the ERP completed as necessary to ensure adequacy.

## 9 References

- Canadian Dam Association. (2013). *Dam Safety Guidelines*. Canadian Dam Association.
- Government of Canada. (2011) Yukon Territory Fishery Regulations C.R.C, c. 854. CANLii.
- Klohn Crippen Berger Ltd. (2009). *Wolverine Project - Tailings and Infrastructure Design and Construction Plan*. Vancouver: Klohn Crippen Berger Ltd.
- Klohn Crippen Berger Ltd. (2010). *Wolverine Project – Starter Tailings Storage Facility – 2009 Civil Works Construction Summary Report*. Vancouver: Klohn Crippen Berger Ltd.
- Klohn Crippen Berger Ltd. (2012a). *Wolverine Mine Tailings Storage Facility – Design Overview for Stage 2 Dam Construction*. Vancouver: Klohn Crippen Berger Ltd.
- Klohn Crippen Berger Ltd. (2012b). *Wolverine Stage 2 Expansion – Construction Record Report*. Vancouver: Klohn Crippen Berger Ltd.
- MacDonald, T. C. and Monopolis, J. L. (1984) *Breaching Characteristics of Dam Failures*. Journal of Hydraulic Engineering, Vol. 110, No. 5, May.
- Mining Association of Canada. (2011). *Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities*. Ottawa: The Mining Association of Canada.
- Mougeot GeoAnalysis. (1996). *Surface Geology, Soils and Associated Interpretations Wolverine Lake Biophysical Surveys*. Mougeot Geoanalysis.
- Petrascheck, A.W. and Sydler, P.A. (1984) *Routing of Dam Break Flood*. Water Power & Dam Construction, July.
- Seed, H.B. (1979). *Considerations in the Earthquake-Resistant Design of Earth and Rockfill Dams*. Geotechnique, 293, 215-263.
- USCOLD. (1995). *Tailings Dam Incidents, United States Committee on Large Dams*. Nov 1995.
- Wahl, T. L. (1998). *Predicting Embankment Dam Breach Parameters - A Literature Review and Needs Assessment*, Dam Safety Research Report DSO-98-004, US Bureau of Reclamation, Dam Safety Office, July.
- YTG Energy, Mines and Resources. (2006). Quartz Mining Licence QML-0006. December 5, 2006. Whitehorse, YT, Canada.
- Yukon Water Board. (2007). Type A Water Use Licence QZ04-065. October 4, 2007. Whitehorse, YT, Canada.
- Yukon Zinc Corporation. (2009). *Wolverine Project Wildlife Protection Plan V2009-01*. Vancouver: Yukon Zinc Corporation.
- Yukon Zinc Corporation. (2010). *Wolverine Project Reclamation and Closure Plan V2016-05 V.2*. Vancouver: Yukon Zinc Corporation.

Yukon Zinc Corporation. (2011a). *Wolverine Mine General Site Plan V2011-05*. Vancouver: Yukon Zinc Corporation.

Yukon Zinc Corporation. (2011b). *Wolverine Mine Monitoring and Surveillance Plan V2011-02*. Vancouver: Yukon Zinc Corporation.

Yukon Zinc Corporation. (2016). *Wolverine Mine Site Emergency Evacuation Procedure*. Vancouver: Yukon Zinc Corporation.

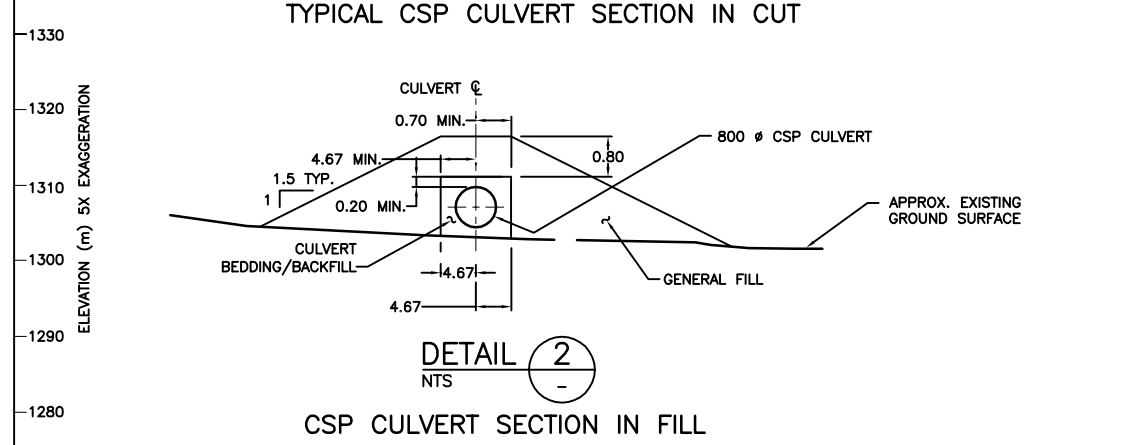
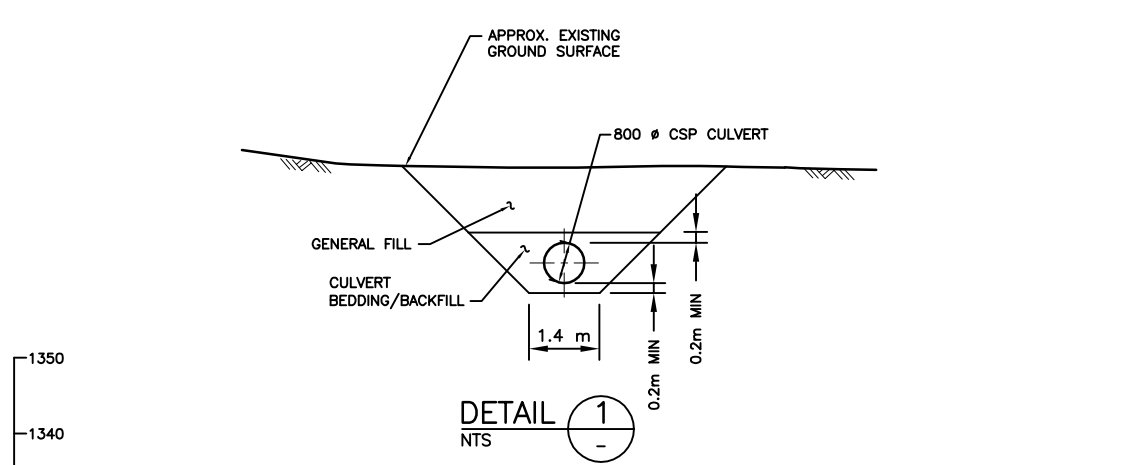
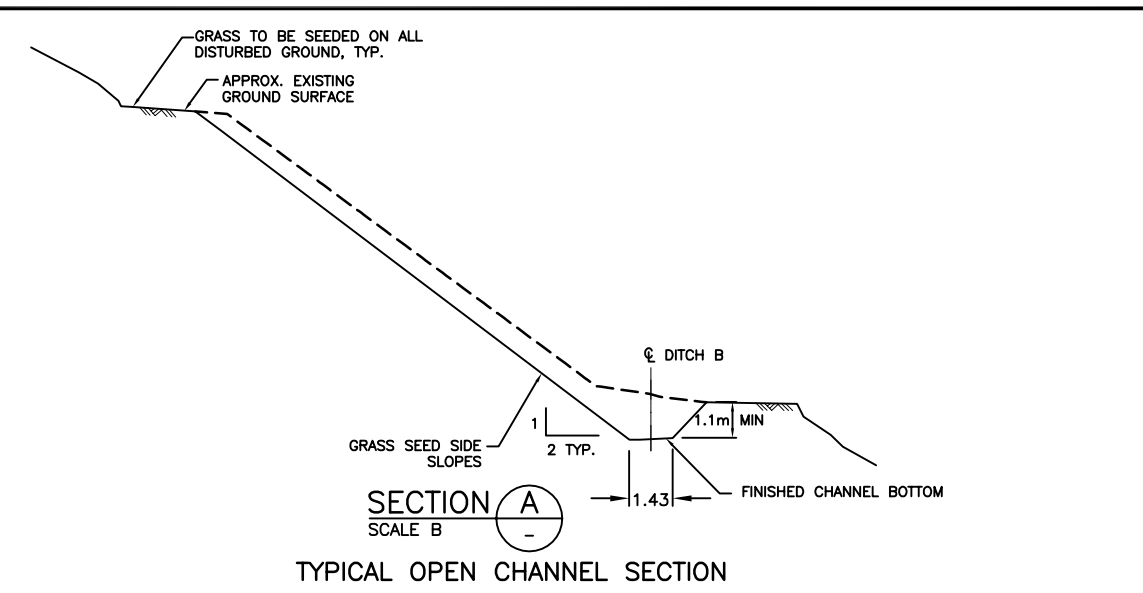
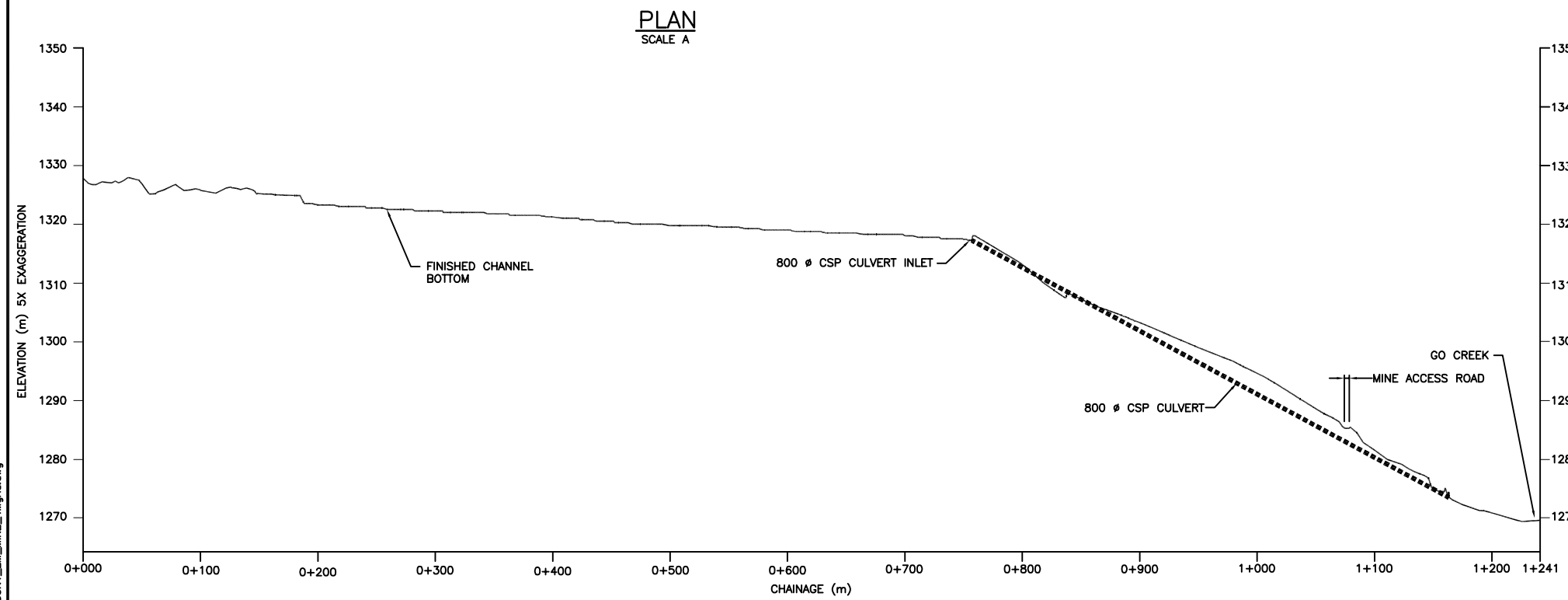
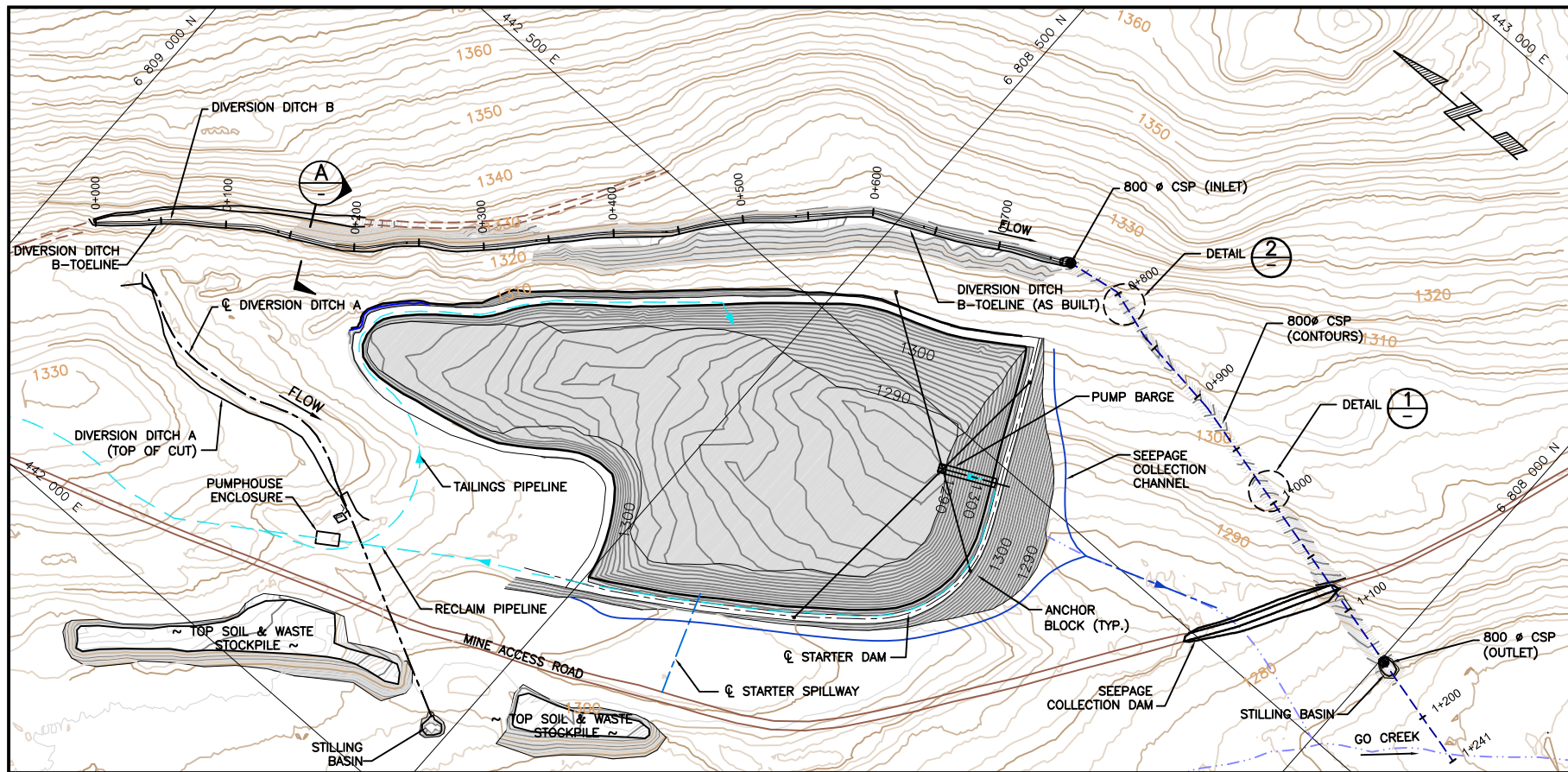
## Drawings

Drawing D-6001	Tailings Storage Facility General Arrangement
Drawing D-6002	Tailings Storage Facility Stage 2 Excavation and Fill Plan
Drawing D-6005	Tailings Storage Facility Diversion Ditch A Relocation Plan, Profile and Sections
Drawing D-5004	Tailings Storage Facility Diversion Ditch B Plan, Profile and Sections
Drawing D-6004	Tailings Storage Facility Stage 2 Spillway Plan, Profile and Sections
Drawing D-5007	Tailings Storage Facility Seepage Dam Plan, Profiles and Section
Drawing D-5009	Tailings Storage Facility Starter Impoundment Tailings Deposition Plan
Drawing D-5010	Tailings Storage Facility Ultimate Impoundment Tailings Deposition Plan
Drawing D-6003	Tailings Storage Facility Stage 2 Impoundment Excavation and Fill Sections and Details
Drawing D-5013	Tailings Storage Facility Instrumentation Plan
Drawing H5-13-101 to H5-13-107	Tailings and Reclaim Pipeline Routing – Sheets 1 – 7

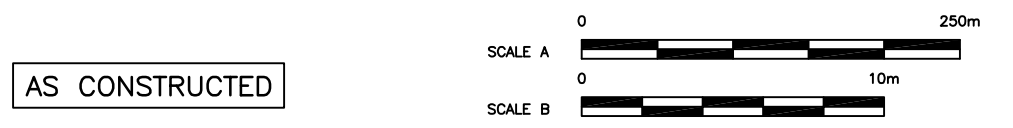








- NOTES:**
- FOR GENERAL SITE ARRANGEMENT SEE DWG. D-5001.
  - INVERT ELEVATIONS SHOWN ARE TO FINISHED CHANNEL BOTTOM.



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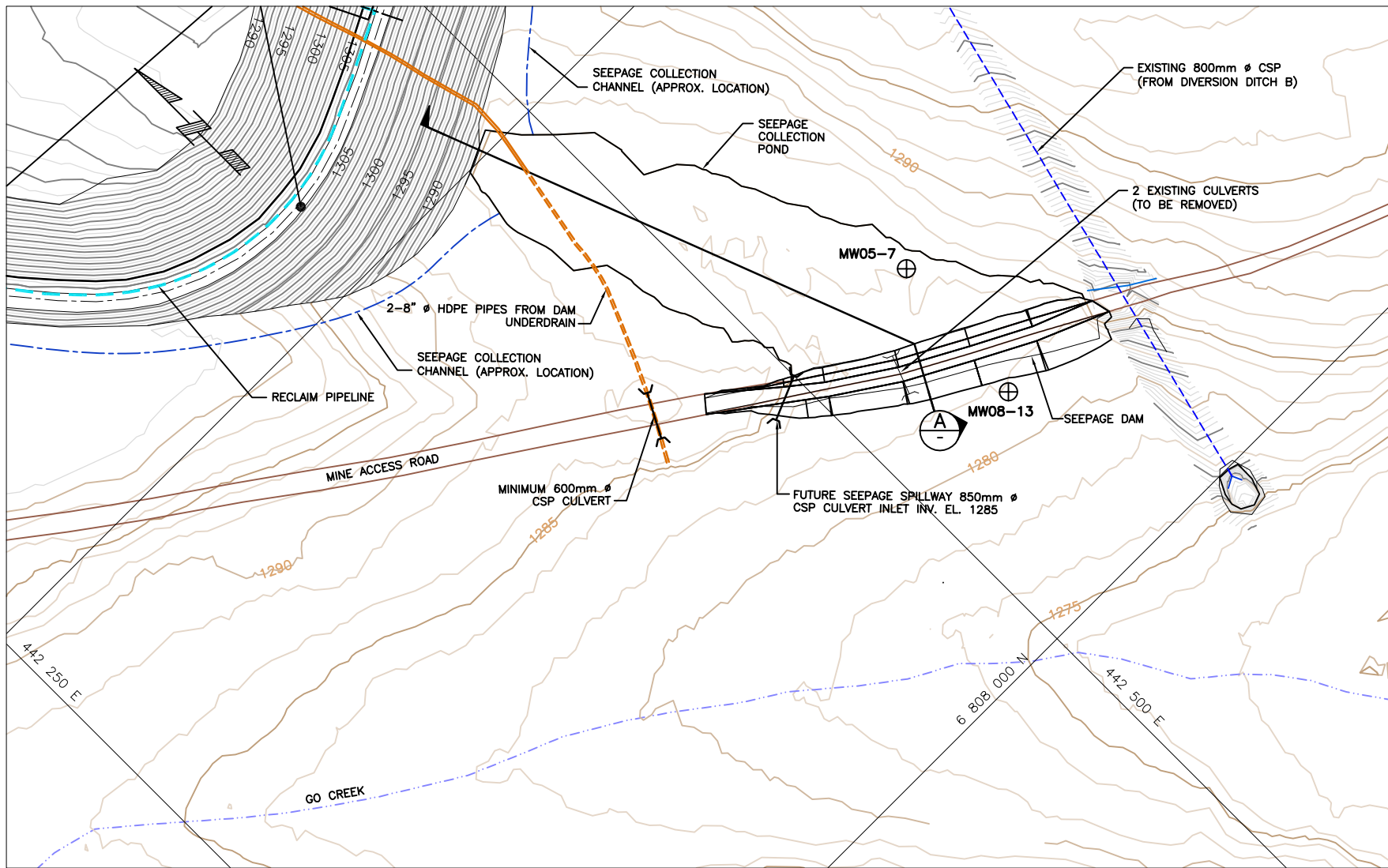
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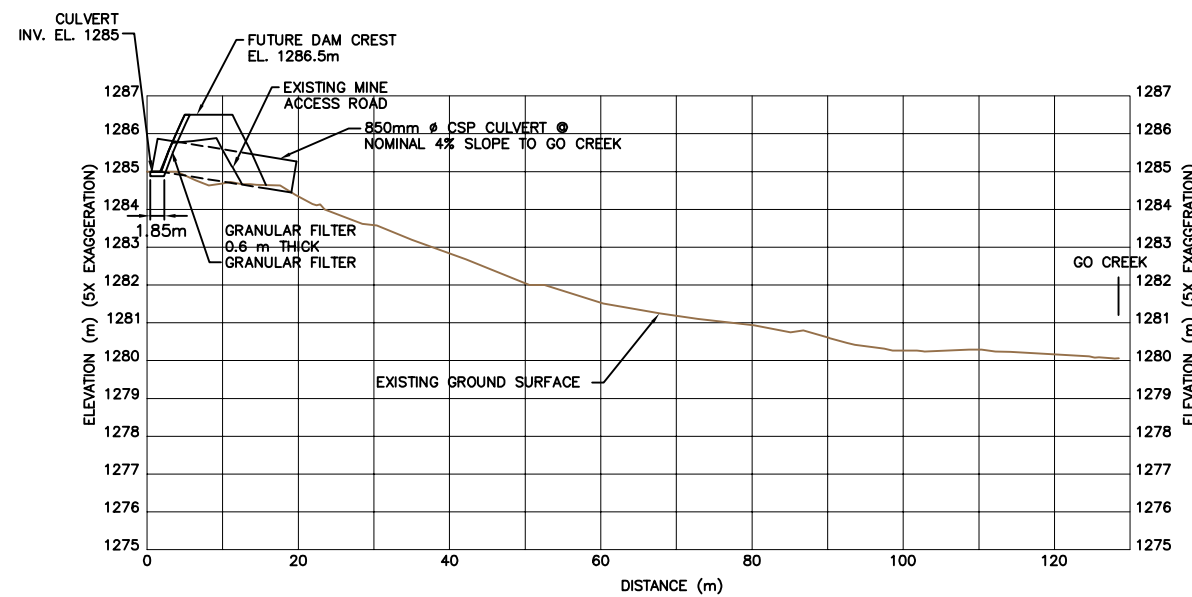


**WOLVERINE PROJECT**  
**TAILINGS STORAGE FACILITY**  
**DIVERSION DITCH B**  
**PLAN, PROFILE AND SECTIONS**





PLAN  
SCALE A



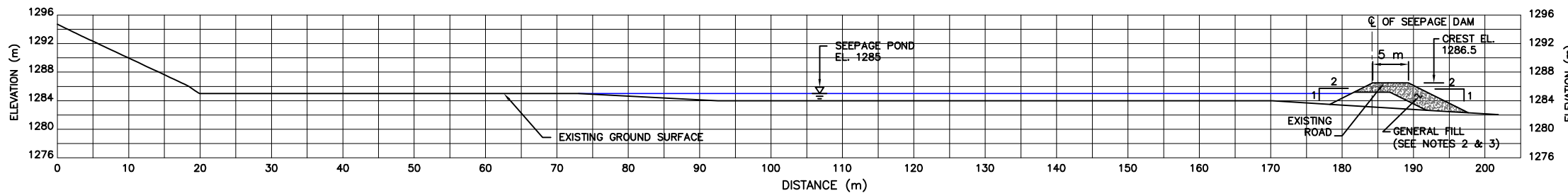
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LEGEND

- ROADS
- CREEK
- DIVERSION OR COLLECTION DITCH, SPILLWAY
- DAM UNDERDRAIN PIPES (EXISTING)
- MW05-7
- GROUNDWATER MONITORING WELL (MW08-13) TO BE RELOCATED DOWNSTREAM

NOTES

1. RECORD ISSUE DRAWING IS BASED ON LIMITED "AS BUILT" DATA PROVIDED BY YZC, THE DRAWING MAY NOT REFLECT ALL FIELD CHANGES.
2. ALL LOOSE AND ORGANIC MATERIALS SHALL BE REMOVED, AND THE FOUNDATION SHALL BE PROOFROLLED WITH 6 PASSES WITH A 10 TON VIBRATORY ROLLER, AS DIRECTED BY THE ENGINEER. ALL FOUNDATION AREAS SHALL BE DRY AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT OF GENERAL FILL OR LINER.
3. GENERAL FILL TO CONSIST OF WELL-GRADED SILTY SAND AND GRAVEL BORROWED FROM IMPOUNDMENT EXCAVATION. FINER GENERAL FILL SHALL BE PLACED TOWARDS THE UPSTREAM SLOPE AS WELL AS ADJACENT TO THE GLACIAL TILL ZONE (STAGE 2 CONSTRUCTION) AND COARSER MATERIAL SHALL BE PLACED TOWARDS THE DOWNSTREAM SLOPE. MATERIAL SHALL BE PLACED IN 300 mm THICK LOOSE LIFTS, WATERED AS REQUIRED, AND COMPACTED TO 95% OF STANDARD PROCTOR DENSITY.



SECTION A  
SCALE B

NOT FOR CONSTRUCTION



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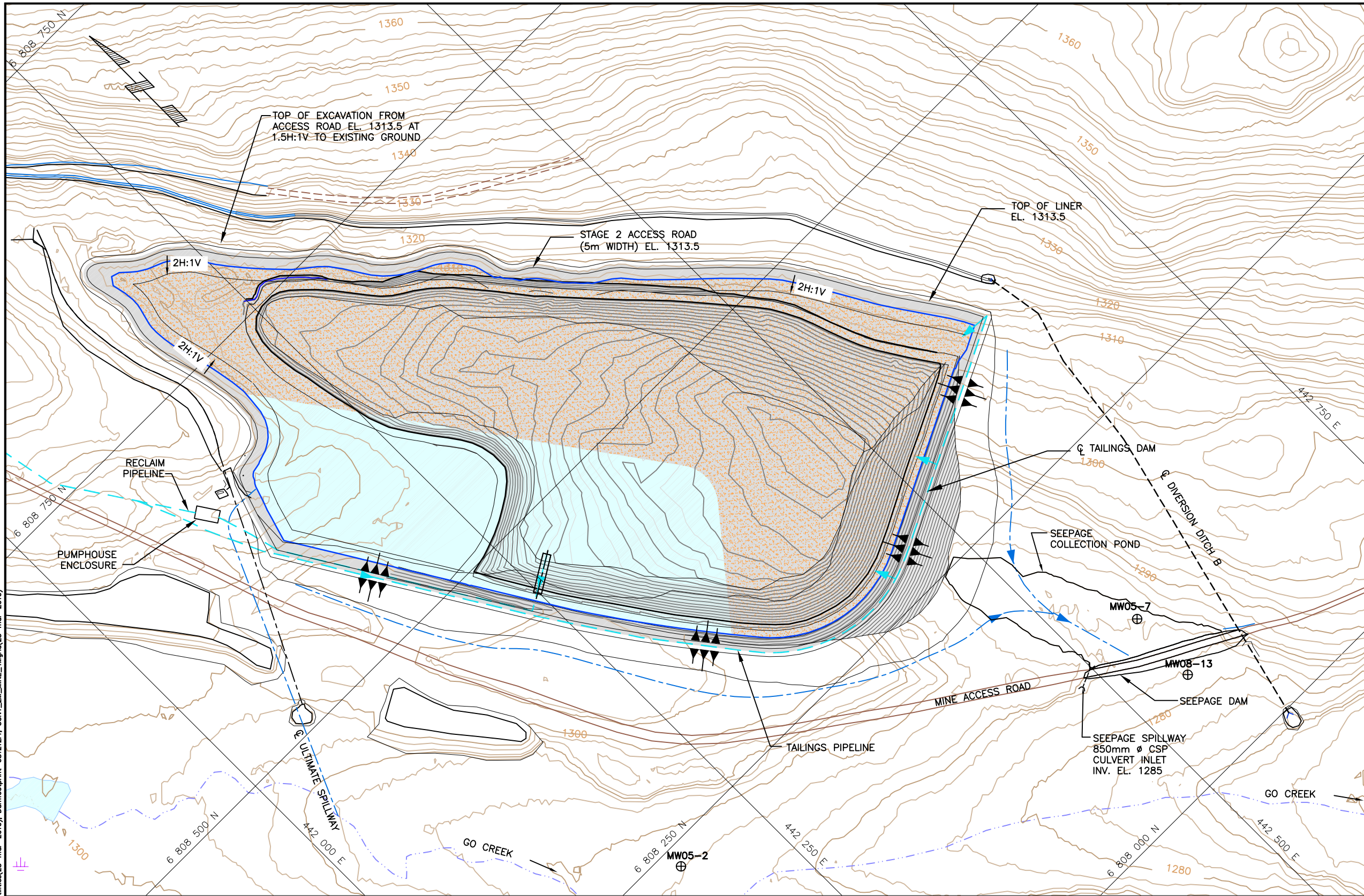
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WOLVERINE PROJECT  
 TAILINGS STORAGE FACILITY  
 SEEPAGE DAM  
 PLAN, PROFILES AND SECTION





**LEGEND**

- ROADS
- - - CREEK
- - - DIVERSION OR COLLECTION DITCH, SPILLWAY
- LINER
- SATURATED TAILINGS
- DECANT WATER POND OVERLYING TAILINGS
- ⊕ MW05-7 EXISTING GROUNDWATER MONITOR WELL

**NOTES**

- TAILINGS TO BE SPIGOTTED FROM DAM TO FORM POND AT NORTH/WEST END.

**NOT FOR CONSTRUCTION**



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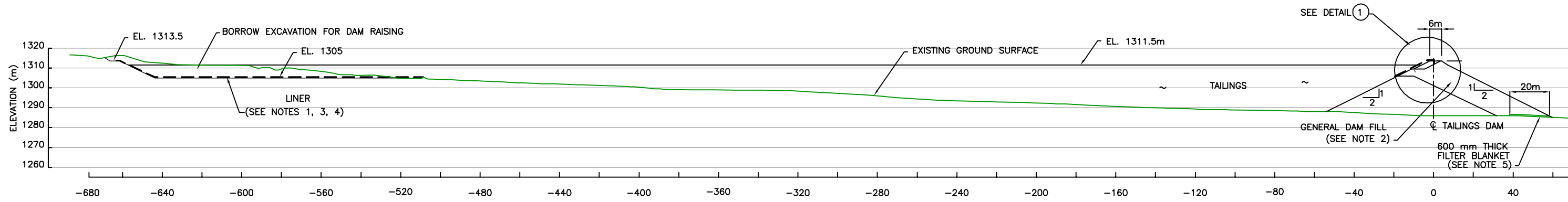
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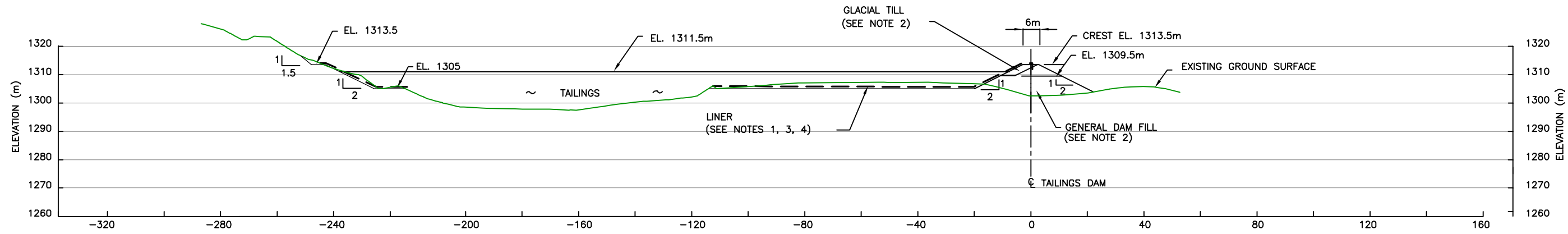
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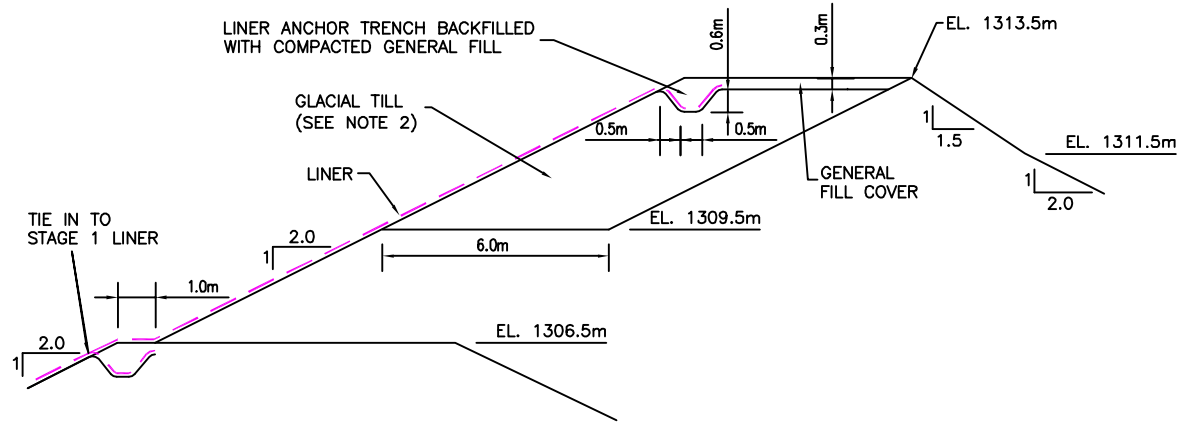
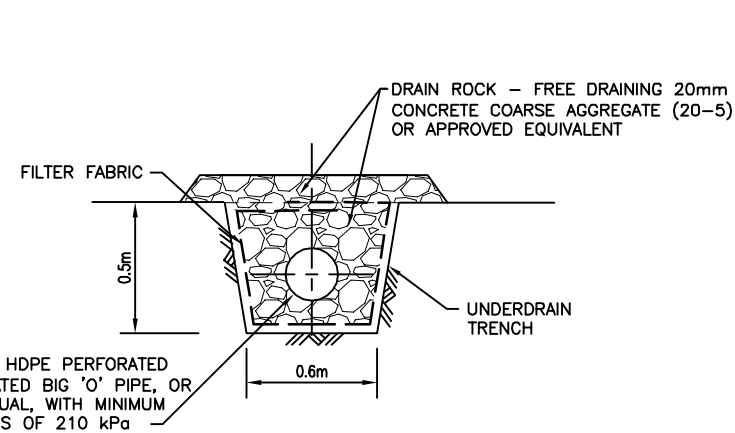
**WOLVERINE PROJECT**  
 TAILINGS STORAGE FACILITY  
 ULTIMATE IMPOUNDMENT  
 TAILINGS DEPOSITION PLAN



SECTION A  
SCALE A 2



SECTION B  
SCALE B 2



DETAIL 1 LINER ANCHOR TRENCH  
NTS

NOTES

- ALL LOOSE AND ORGANIC MATERIALS SHALL BE REMOVED, AND THE FOUNDATION SHALL BE PROOFROLLED WITH 6 PASSES WITH A 10 TON VIBRATORY ROLLER, AS DIRECTED BY THE ENGINEER. ALL FOUNDATION AREAS SHALL BE DRY AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT OF GENERAL FILL OR LINER.
- GENERAL FILL TO CONSIST OF WELL-GRADED SILTY SAND AND GRAVEL BORROWED FROM IMPOUNDMENT EXCAVATION. FINER GENERAL FILL SHALL BE PLACED TOWARDS THE UPSTREAM SLOPE AS WELL AS ADJACENT TO THE GLACIAL TILL ZONE AND COARSER MATERIAL SHALL BE PLACED TOWARDS THE DOWNSTREAM SLOPE. MATERIAL SHALL BE PLACED IN 300 mm THICK LOOSE LIFTS, WATERED AS REQUIRED, AND COMPACTED TO 97% OF STANDARD PROCTOR DENSITY. GLACIAL TILL TO COMPRISE OF LOW PERMEABILITY FILL WITH A FINES CONTENT > 20% PASSING THE 75 MICRON SIEVE SIZE.
- LINER FOUNDATION AREAS AND SLOPES SHALL BE PROOFROLLED WITH A SMOOTH DRUM COMPACTOR. ALL AREAS WITH COARSE ANGULAR MATERIALS SHALL BE COVERED WITH LINER BEDDING AS DIRECTED BY THE ENGINEER.
- LINER SHALL CONSIST OF A 60mil LLDPE OR EQUIVALENT, AS APPROVED BY THE ENGINEER. LINER SHALL BE ANCHORED IN THE DAM CREST IN A 0.6m DEEP TRENCH, BACKFILLED WITH COMPACTED FILL. QA/QC PROGRAM FOR THE LINER TO BE APPROVED BY THE ENGINEER.
- FILTER BLANKET TO CONSIST OF 40mm MINUS WELL-GRADED SAND AND GRAVEL LESS THAN 3% PASSING THE 75 MICRON SIEVE SIZE.



ISSUED FOR CONSTRUCTION

Date: 2/23/2012  
 Scale: 1=6(P/S)  
 Project: M:\OR\M09234A06 - Wolverine - 2011 Detailed Design\400 Drawings\400-6003.dwg (location)  
 User: ProcsStamp

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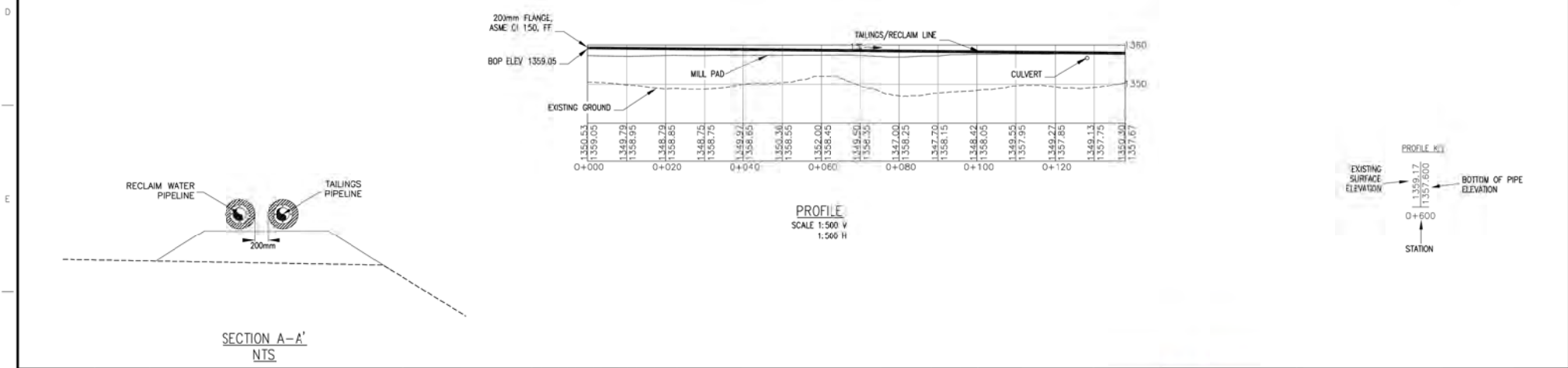
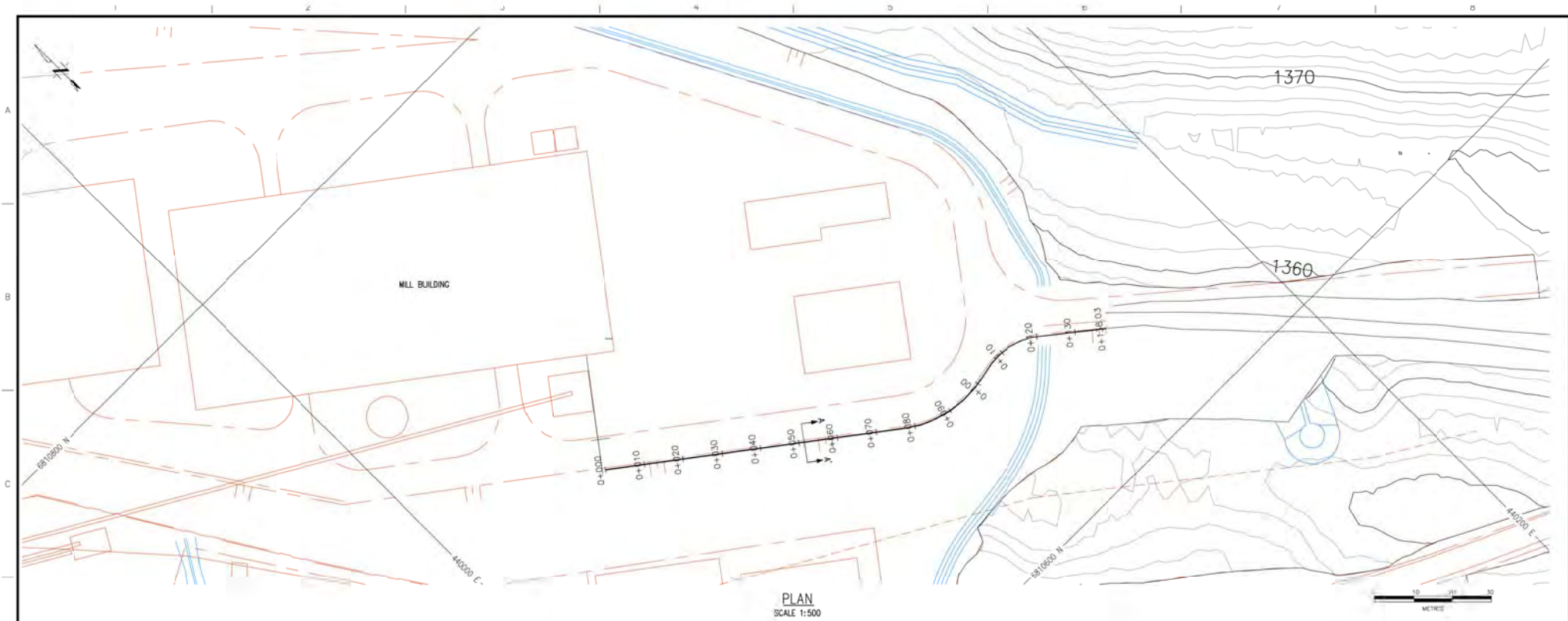
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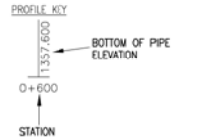
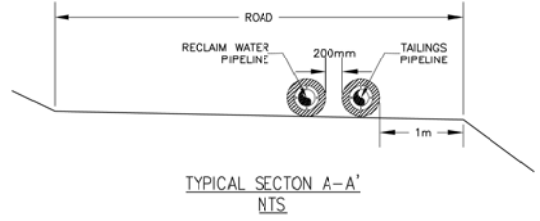
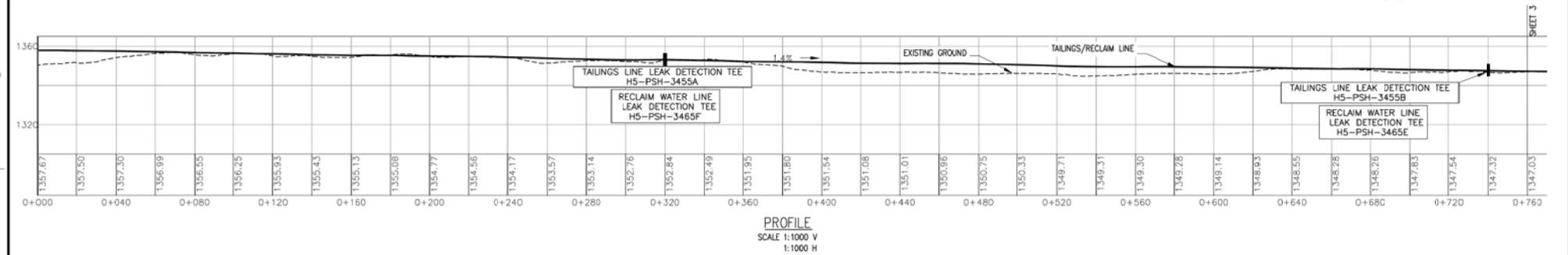


**Yukon Zinc Corporation**  
**Wolverine Project**  
 TAILINGS STORAGE FACILITY  
 STAGE 2 IMPOUNDMENT EXCAVATION AND FILL  
 SECTIONS AND DETAILS

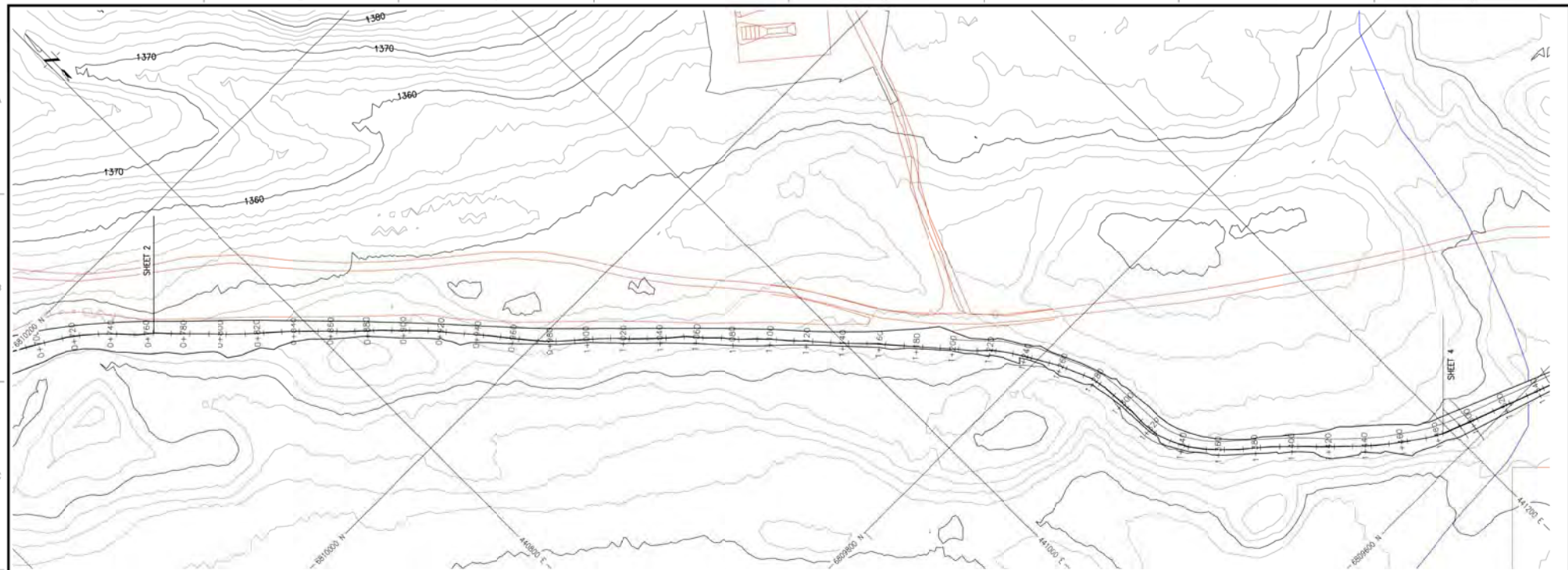




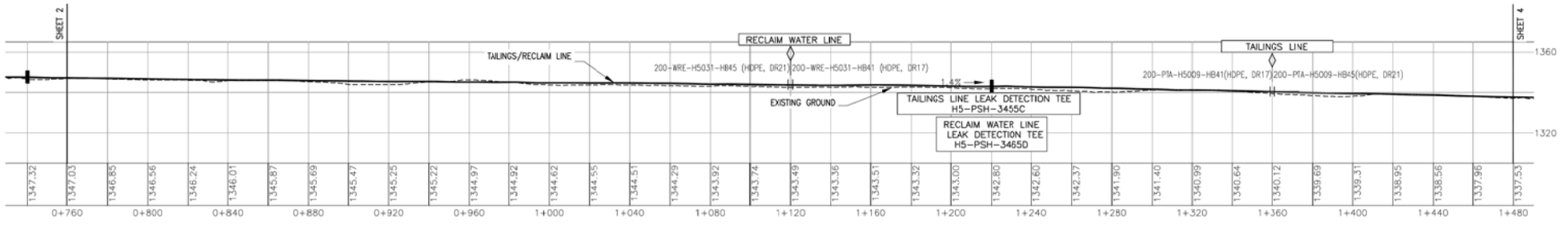
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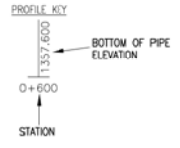
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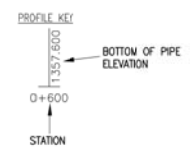
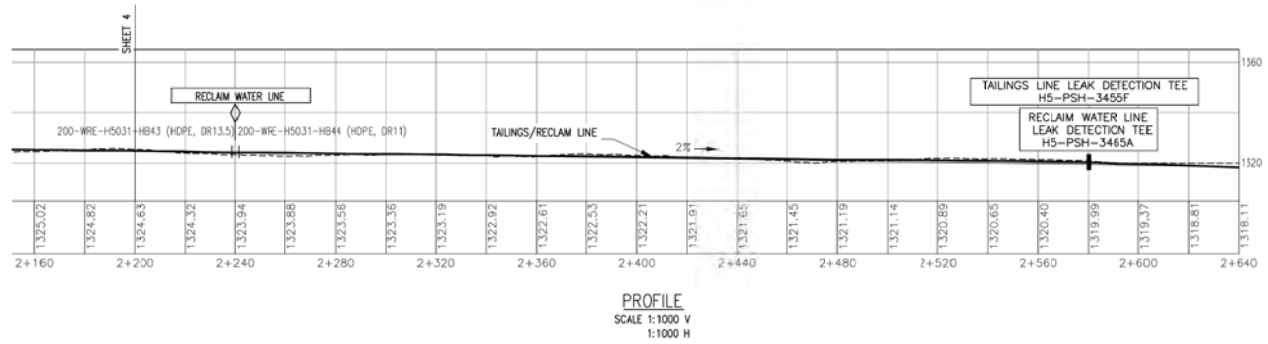
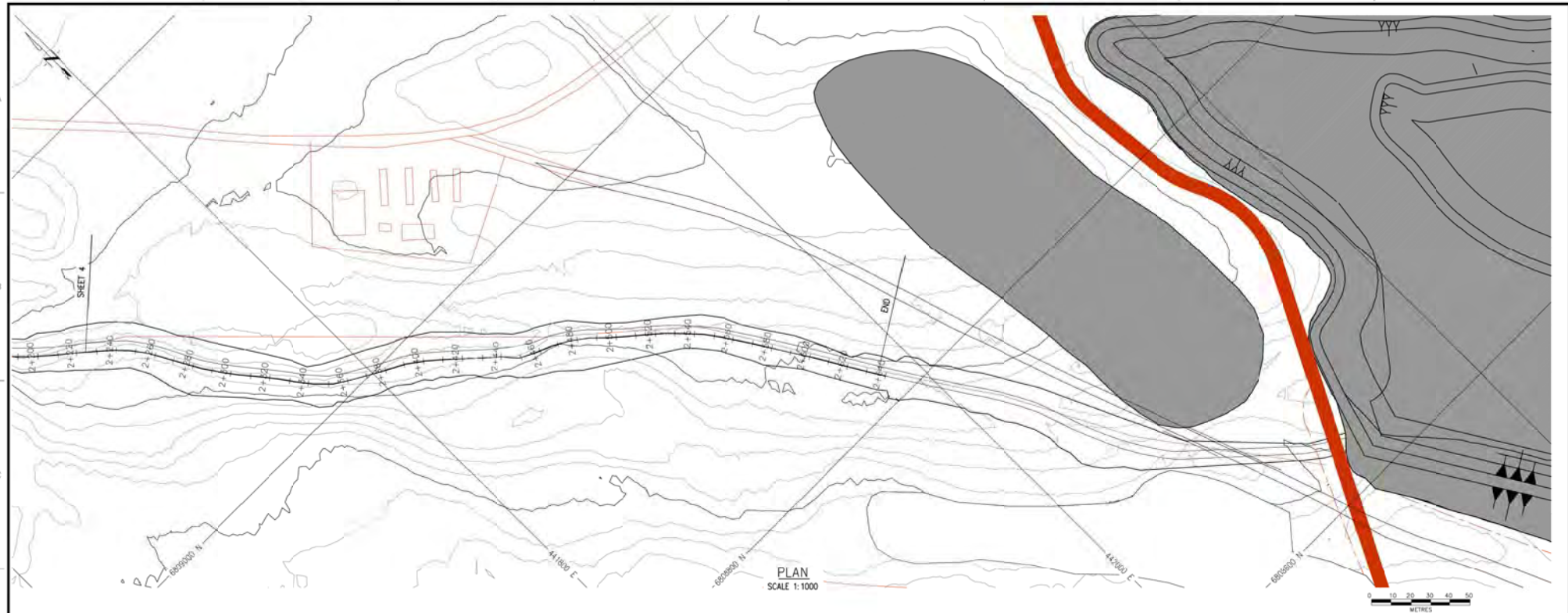
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NOTE:  
SEE H5-13-102 FOR TYPICAL CROSS SECTION

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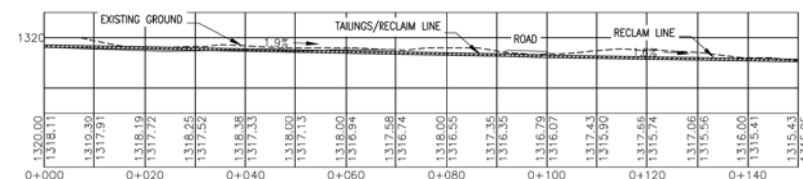


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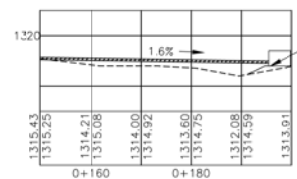
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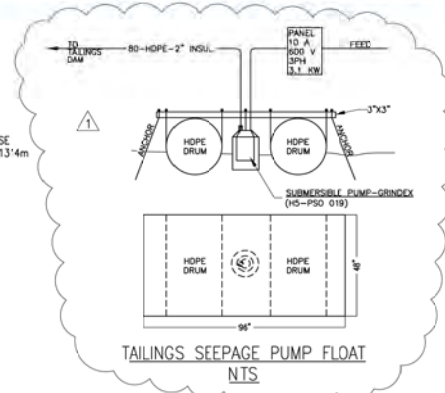
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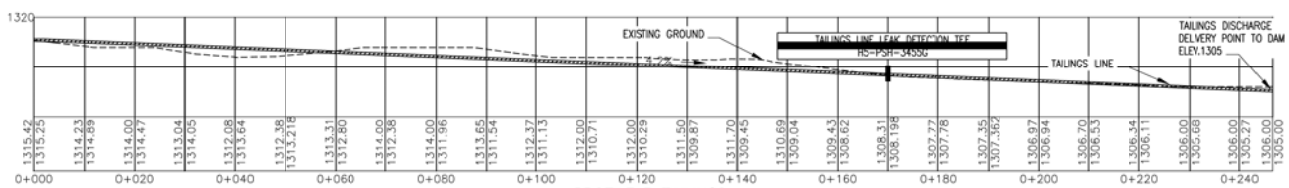
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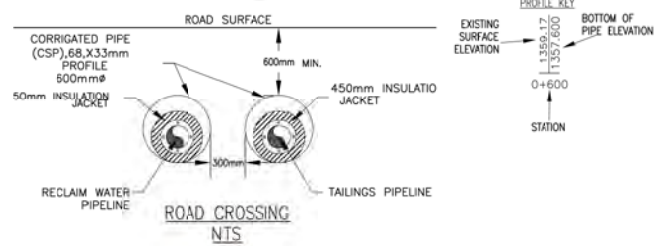
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TAILINGS SEEPAGE PUMP FLOAT  
NTS



PROFILE 3 TAILINGS  
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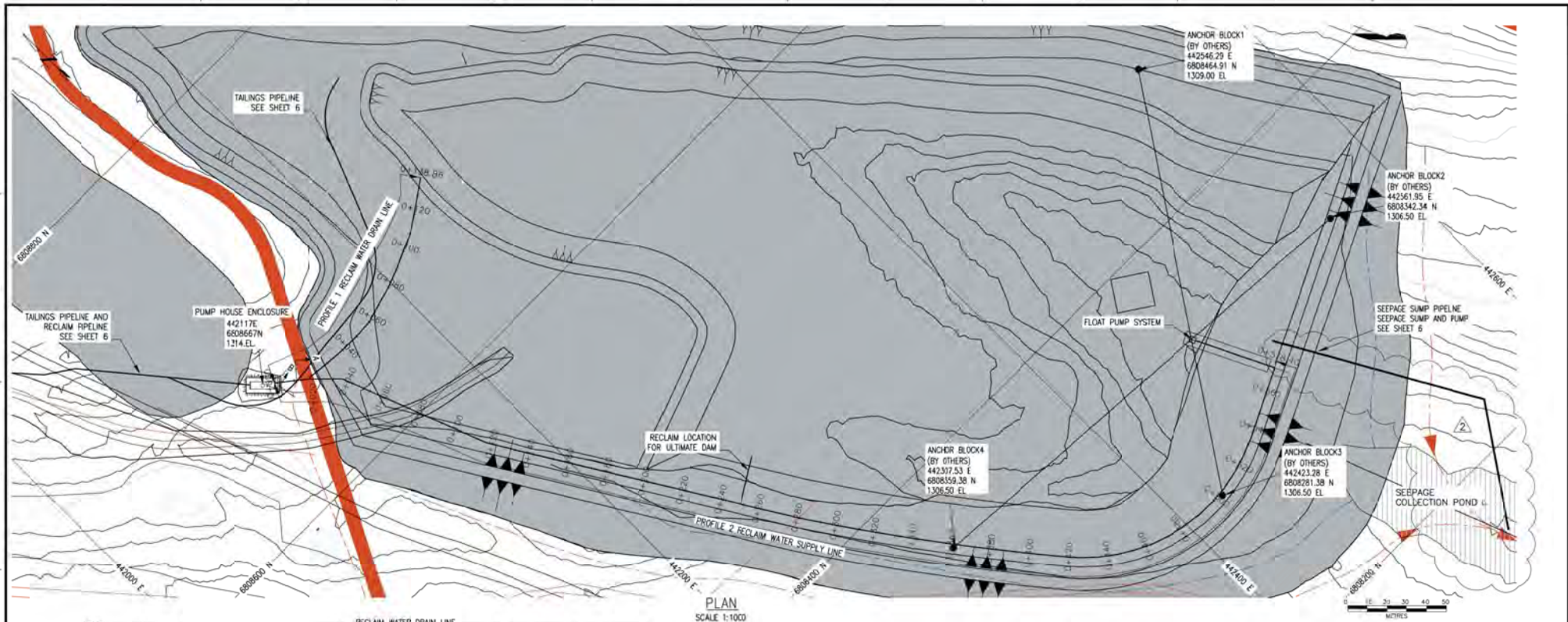
ROAD CROSSING  
NTS

THE INFORMATION CONTAINED ON THIS DRAWING HAS BEEN PREPARED SOLELY FOR THE OWNERS USE ON THIS PROJECT AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF WARDROP Engineering Inc. A BREACH OF COPYRIGHT AND WILL BE PURSUED AS SUCH. USE OF THE INFORMATION ON THIS DRAWING IN WHOLE OR IN PART OTHER THAN FOR THE INTENDED PURPOSE IS AT THE SOLE RISK OF THE USER.	DWG. NO.	REFERENCE DRAWINGS
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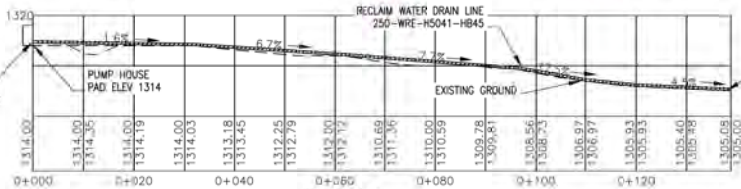
DATE	REV. No.	ISSUE No.	DESCRIPTION
21MAY10	1	1	ISSUED FOR CONSTRUCTION-SEEPAGE PUMP DETAIL
22OCT09	0	1	ISSUED FOR CONSTRUCTION
09OCT09	B	1	ISSUED FOR APPROVAL

SECTION: PPING	SCALE: AS SHOWN	DATE: 10AUG09
DESIGN BY: MW	DRAWN BY: MW	CHECK BY: AF
DATE BY: JMcA		

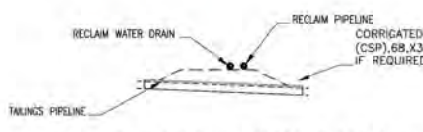
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TAILINGS AND RECLAIM PIPELINE PIPELINE PROFILE SHEET 6 OF 7			
FILENAME: H513106.DWG	PROJECT NUMBER: 08528302.00	DRAWING NUMBER: H5-13-106	REV: 1



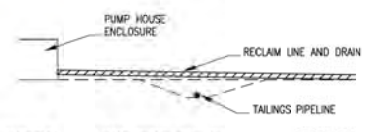
PLAN  
SCALE 1:1000



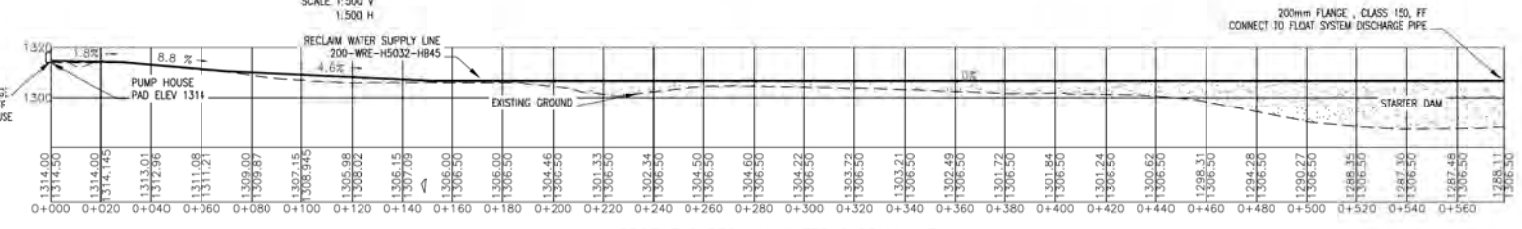
PROFILE 1  
RECLAIM DRAIN PIPELINE  
SCALE 1:500 V  
1:500 H



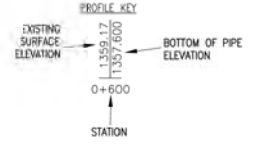
TYPICAL TAILING PIPELINE CROSSING SECTION A



TYPICAL TAILING PIPELINE CROSSING SECTION B



PROFILE 2 RECLAIM WATER SUPPLY LINE  
SCALE 1:1000 V  
1:1000 H



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DWG. NO.	REFERENCE DRAWINGS

REV.	ISSUE	DATE	BY	APP.
2	1	ISSUED FOR CONSTRUCTION-SEEPAGE PUMP LOCATION	21MAR10 SV	
1	1	ISSUED FOR CONSTRUCTION-HOLD REMOVED	25FEB10 SV	
0	1	ISSUED FOR CONSTRUCTION	22OC09 AF	
A	1	ISSUED FOR APPROVAL	09OC09 JPR	

SECTION: PPING  
SCALE: AS SHOWN  
DATE: 10AU09  
DESIGN BY: MW  
DRAWN BY: MW  
CHECK BY: AF  
APP. BY: JMCA

WARDROP Engineering Inc.

TITLE WOLVERINE PROJECT (EP) TAILINGS AND RECLAIM PIPELINE PIPELINE PROFILE SHEET 7 OF 7			
FILENAME H513107.DWG	PROJECT NUMBER 08528302.00	DRAWING NUMBER H5-13-107	REV. 2

## **Appendix A      Inspection Report Forms**

- **Weekly Visual Inspection Checklist**
- **Monthly Impoundment Monitoring Report**
- **Monthly Instrumentation Report**
- **Environmental Incident Report Form**
- **Spill Report Form**

## **Inspection Guidelines**

The **First Rule** of inspection is that **changed conditions are important**.

Below are general guidelines for inspection the Wolverine Project tailing facility dams, spillways, and supporting infrastructure. The list should be reviewed for each dam and spillway.

### **Dam Crests**

- Cracks running along the crest of a dam are evidence of slumping or slope instability
- Cracks across the crest of the dam are evidence of differential settlement
- Settlement and particularly differential settlement is easy to see. Settlement is serious if the freeboard is reduced. Freeboard is the vertical distance between dam crest elevation and the water level.
- Trees should not be allowed to grow on a dam. Tree roots cause disturbance and tend to seek water. When the tree dies, the roots rot, leaving a pipe through a structure which can cause failure.

### **Upstream slope**

- Sloughing may be indicative of slope instability and/or inadequate erosion protection.
- Depressions and sinkholes may indicate internal erosion (piping) of material through the dam. If an upstream depression (sinkhole) is noted, you should check for signs of piping (dirty discharge) along the downstream toe of the dam.
- Shoreline erosion adjacent to the upstream face of a dam should be noted, as this may require remediation and/or erosion protection.

### **Downstream slope**

- Soft zones and sand boils along the toe of a dam are evidence of a developing quick condition, which can progress to piping and internal erosion and eventually lead to a wash-out failure.
- Dirty, sediment laden seepage water is evidence of piping and internal erosion.
- Increased seepage rates and/or new areas of seepage are a sign that an adverse change has taken place within a dam.
- Bulging on the lower part of a slope may be the result of slope instability, slumping, frost deterioration and/or lateral spreading.
- It is essential to ensure that drains are free-flowing and not blocked with sediment or precipitates, as this can adversely affect the stability of the dam.
- Animal holes in a dam can create a pipe through the structure, and could cause an internal wash-out failure.

### **Spillways**

- Spillways should be free of obstructions and in good working order. The condition of spillways is particularly important because plugging can cause an unwanted increase in water level and the possible overtopping of a dam crest.

**WOLVERINE PROJECT  
Tailings Facility Monitoring  
Weekly Visual Inspection Report**

Date _____	Weather _____
Pond Elevation _____ m	<b>Weekly Totals:</b> Mill Tailings Input _____ m <sup>3</sup> Reclaim to Mill _____ m <sup>3</sup>

Infrastructure	Status		Comments or Concern
	OK	Concern	
<b>1) Main Dam</b>			
a) Crest	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) South outer slope	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) South liner slope	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) West outer slope	<input type="checkbox"/>	<input type="checkbox"/>	_____
e) West liner slope	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) East liner	<input type="checkbox"/>	<input type="checkbox"/>	_____
g) Impoundment bottom	<input type="checkbox"/>	<input type="checkbox"/>	_____
h) Dam perimeter road	<input type="checkbox"/>	<input type="checkbox"/>	_____
i) Surface erosion	<input type="checkbox"/>	<input type="checkbox"/>	_____
j) Under drains	<input type="checkbox"/>	<input type="checkbox"/>	_____
<b>2) Tailings Discharge</b>			
a) Spigot Outlet(s)	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Pipeline	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Tailings Beach	<input type="checkbox"/>	<input type="checkbox"/>	_____
<b>3) Reclaim System Infrastructure</b>			
a) Reclaim Pipeline	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Pump Barge	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Pump House	<input type="checkbox"/>	<input type="checkbox"/>	_____
<b>4) Dam Spillway</b>			
a) Inlet	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Outlet	<input type="checkbox"/>	<input type="checkbox"/>	_____

## WOLVERINE PROJECT Tailings Facility Monitoring Weekly Visual Inspection Report

Infrastructure	Status		Comments or Concern
	OK	Concern	
<b>5) Diversion Ditches</b>			
a) Diversion Ditch A	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Diversion Ditch A Culvert	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Diversion Ditch A Stilling Basin	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Diversion Ditch B	<input type="checkbox"/>	<input type="checkbox"/>	_____
e) Diversion Ditch B Culvert	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Diversion Ditch B Stilling Basin	<input type="checkbox"/>	<input type="checkbox"/>	_____
<b>6) Seepage Return</b>			
a) Dam	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Pump System	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Spillway	<input type="checkbox"/>	<input type="checkbox"/>	_____
Operator _____		Signature _____	
Supervisor/Manager _____		Signature & Date _____	

Pictures Taken? Y  N

Photo Sheet Attached? Y  N

**Special Remarks #1**

- a. Date of Survey: \_\_\_\_\_
- b. Elevation in meters: \_\_\_\_\_
- c. Estimated Volume in cubic meters (m<sup>3</sup>): \_\_\_\_\_

1. Brief on Mill Operation: \_\_\_\_\_

2. Brief on maintenance: \_\_\_\_\_

3. Other significant Water source to Pond: \_\_\_\_\_

4. Pond water depth at the barge in feet: \_\_\_\_\_

5. Under drains flow (m3/hr): \_\_\_\_\_ ; Ditch "A" flow rate (m3/hr): \_\_\_\_\_ ; Ditch "B" flow rate (m3/hr): \_\_\_\_\_

**WOLVERINE PROJECT**  
**Tailings Facility Monitoring**  
**Weekly Visual Inspection Report**

<p><b>Photo 1:</b></p>	<p><b>Photo 2:</b></p>
<p><b>Photo 3:</b></p>	<p><b>Photo 4:</b></p>

**WOLVERINE PROJECT**  
**Tailings Facility Monitoring**  
**Weekly Visual Inspection Report**

<p><b>Photo 5:</b></p>	<p><b>Photo 6:</b></p>
<p><b>Photo 7:</b></p>	

**WOLVERINE PROJECT  
Tailings Facility Monitoring  
Monthly Impoundment Monitoring Report**

Month _____	Avg. Daily Temp. _____
-------------	------------------------

<b>Mill Record Data:</b>	
Total Monthly Tailings Deposition _____	Dry Tonnes
Average Monthly Tailings % Solids _____	%
Total Monthly Tailings Slurry Volume _____	m <sup>3</sup>
Total Monthly Reclaimed Water Volume _____	m <sup>3</sup>

<b>Site Measurements:</b>	
Date of survey _____	Pond Elevation _____ m
	Estimated volume _____ m <sup>3</sup>
Total Monthly Precipitation _____	mm
Total Monthly Underground Input _____	m <sup>3</sup>
Total Monthly STP Effluent Input _____	m <sup>3</sup>
Total Monthly Industrial Complex Runoff Input _____	m <sup>3</sup>
Total Volume from Seepage collection pond to Facility _____	m <sup>3</sup>
Average Monthly Under drain Flow Rate _____	L/s
Average Monthly Ditch A Flow Rate _____	L/s
Average Monthly Ditch B Flow Rate _____	L/s
Total Monthly Volume Discharged from Water Treatment _____	m <sup>3</sup>
Depth of Water at Reclaim Barge _____	ft
See page 3 to Annotate Pond Diagram	
Pictures Taken? Y <input type="checkbox"/> N <input type="checkbox"/>	Photo Sheet Attached? Y <input type="checkbox"/> N <input type="checkbox"/>



**WOLVERINE PROJECT  
Tailings Facility Monitoring  
Monthly Impoundment Monitoring Report**

**Special Remarks:**

1.

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2.

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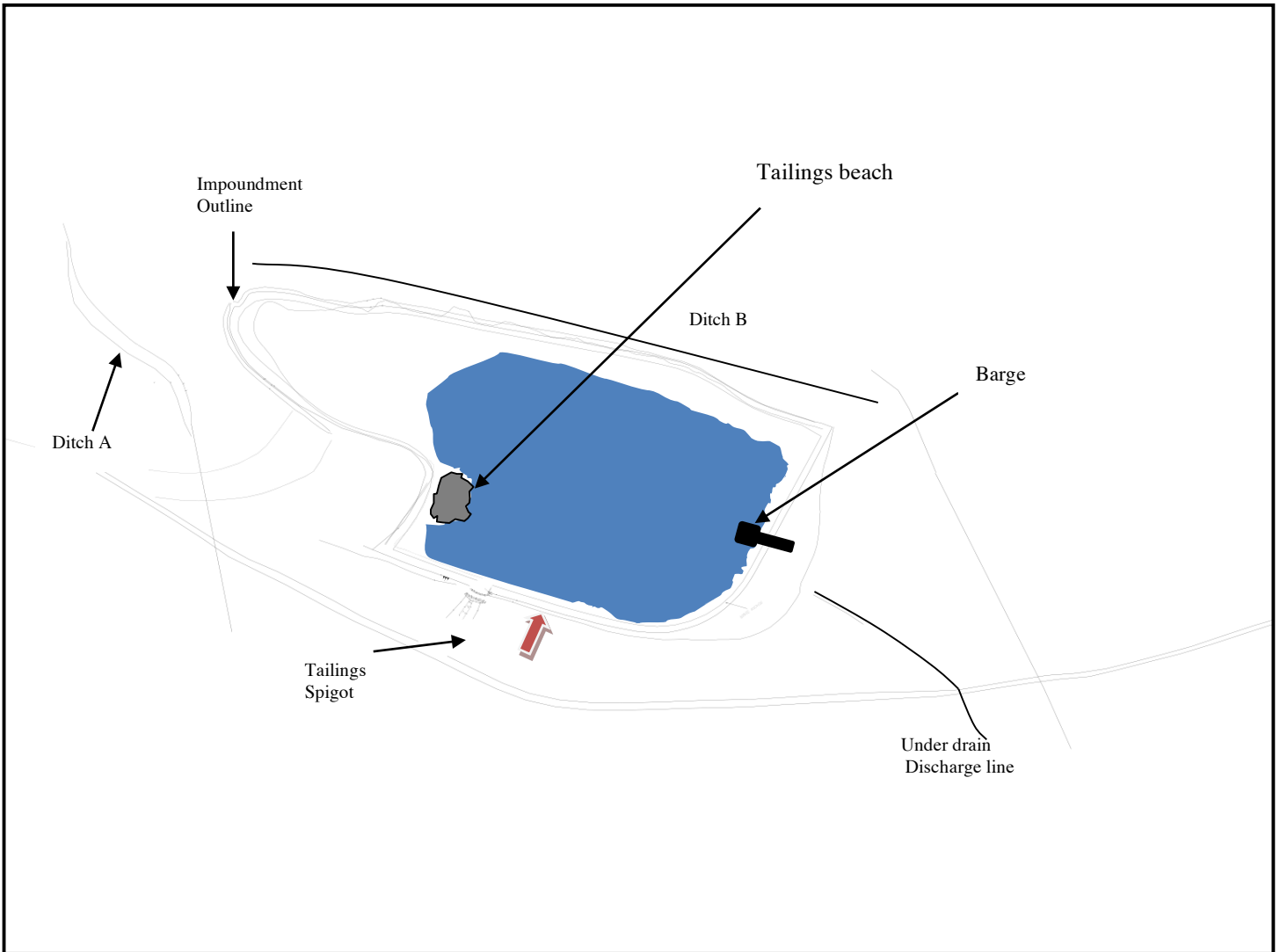
3.

---

## WOLVERINE PROJECT Tailings Facility Monitoring Monthly Impoundment Monitoring Report

Sketch to Include:

- Pond area
- Ice area
- Tailings spigot points
- Tailings beaches
- Reclaim barge location



Operator \_\_\_\_\_

Signature \_\_\_\_\_

Supervisor/Manager \_\_\_\_\_

Signature & Date \_\_\_\_\_

**WOLVERINE PROJECT  
Tailings Facility Monitoring  
Monthly Impoundment Monitoring Report**

<b>Photo 1:</b>	<b>Photo 2:</b>
<b>Photo 3:</b>	<b>Photo 4:</b>

**WOLVERINE PROJECT**  
**Tailings Facility Monitoring**  
**Monthly Impoundment Monitoring Report**

<p><b>Photo 5:</b></p>	<p><b>Photo 6:</b></p>
<p><b>Photo 7:</b></p>	



# WOLVERINE PROJECT

## Tailings Facility Monitoring

### Monthly Instrumentation Report

Date \_\_\_\_\_ Time \_\_\_\_\_

Instrument	ID	Download	File name	Elevation (m)		Preliminary Trigger Level		Comments
				Base or 'tip'	Ground or dam fill	Yellow (caution)	Red (alert)	
Inclinometer	IN10-01					>75 mm	>400 mm	Not required during temporary closure
	IN10-02							
Piezometer	P10-01	<input type="checkbox"/>				>4 m above foundation	>7 m above foundation	
	P10-02	<input type="checkbox"/>						
	P10-03	<input type="checkbox"/>						
	P10-04	<input type="checkbox"/>						

Instrument	ID	Elevation (m)		Preliminary Trigger Level	Comments
		Ground or dam fill			
Survey Pins	SP10-01			>75mm	
	SP10-02				
	SP10-03				
	SP10-04				
	SP10-05				
	SP10-06				
	SP10-07				
	SP10-08				
	SP10-09				
	SP10-10				

Operator _____	Signature _____
Supervisor/Manager _____	Signature & Date _____

Pictures Taken? Y  N

Photo Sheet Attached? Y  N

See Over for Further Comments? Y  N



## WOLVERINE PROJECT ENVIRONMENTAL INCIDENT REPORT FORM

**For an incident not involving a spill, or wildlife incident fill out ALL boxes below. For an incident involving a spill or wildlife incident, fill out only the white boxes, and attach the corresponding Wolverine Project Spill Report Form, or Wolverine Project Wildlife Incident Report Form.**

<b>1</b>	DATE OF INCIDENT: MM/DD/YYYY	TIME OF INCIDENT: 00:00 HRS
<b>2</b>	LOCATION OF INCIDENT:  GPS CO-ORDINATES:	SITE CONDITIONS (TEMPERATURE, WIND, GROUND PERMEABILITY ETC.):
<b>3</b>	NATURE OF THE INCIDENT:  <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">           SPILL: <input type="checkbox"/> YES <input type="checkbox"/> NO            IF YES, REFER TO WOLVERINE PROJECT SPILL REPORT FORM         </div> <div style="width: 45%;">           WILDLIFE INCIDENT: <input type="checkbox"/> YES <input type="checkbox"/> NO            IF YES, REFER TO WOLVERINE PROJECT WILDLIFE INCIDENT REPORT FORM         </div> </div>	
<b>4</b>	CAUSE OF THE INCIDENT:	
<b>5</b>	IMMEDIATE CORRECTIVE ACTIONS TAKEN:	
<b>6</b>	RECOMMENDATIONS FOR IMPROVEMENTS/PREVENTATIVE MEASURES:	
<b>7</b>	ADDITIONAL COMMENTS (use additional sheet if necessary):	
<b>8</b>	COMPANY/CONTRACTOR INVOLVED:	FRONT LINE SUPERVISOR:
<b>9</b>	NAME OF YZC ONSITE SUPERVISOR(S) AT THE TIME OF INCIDENT:	

10 REPORTING SEQUENCE:  
FIRST OBSERVER:

\_\_\_\_\_

NAME COMPANY

REPORTED TO:

\_\_\_\_\_

NAME COMPANY REPORT TIME

REPORTED TO ENVIRONMENTAL DEPARTMENT:

\_\_\_\_\_

TO WHO BY WHOM TIME

REPORTED TO MINE MANAGER:

\_\_\_\_\_

TO WHO TIME

<b>Photo 1:</b> Date (MM/DD/YY) Description of photo	<b>Photo 2:</b> Date (MM/DD/YY) Description of photo
<b>Photo 3:</b> Date (MM/DD/YY) Description of photo	<b>Photo 4:</b> Date (MM/DD/YY) Description of photo

<b>1</b>	DATE OF SPILL:	TIME OF SPILL:
<b>2</b>	LOCATION OF SPILL:	SITE CONDITIONS (TEMPERATURE, WIND, GROUND PERMEABILITY ETC.):
<b>3</b>	SAFETY HAZARDS (FIRE, FUMES, EXPLOSIVE SUBSTANCE, ETC.):	
<b>4</b>	TYPE OF PRODUCT SPILLED: OIL <input type="checkbox"/> GASOLINE <input type="checkbox"/> DIESEL <input type="checkbox"/> OTHER <input type="checkbox"/> _____ QUANTITY RELEASED (IN LITRES):	
<b>5</b>	CAUSE OF THE SPILL (E.G., BROKEN HOSE, VEHICLE ACCIDENT):	
<b>6</b>	ACTIONS TAKEN TO DATE TO CONTAIN, RECOVER OR DISPOSE OF THE SPILLED PRODUCT AND CONTAMINATED MATERIALS:	
<b>7</b>	ENVIRONMENTAL RISK (DESCRIBE DISTANCE TO NEAREST WATER BODY, SENSITIVE HABITAT, ETC.): LOW <input type="checkbox"/> MEDIUM <input type="checkbox"/> HIGH <input type="checkbox"/> Nearest water body which is about 150 m west of spill.	
<b>8</b>	SAMPLES TAKEN:	
<b>9</b>	SUBSEQUENT ACTIONS REQUIRED TO CONTAIN, RECOVER OR DISPOSE OF THE SPILLED PRODUCT AND CONTAMINATED MATERIALS:	
<b>10</b>	RECOMMENDATIONS FOR IMPROVEMENTS/PREVENTATIVE MEASURES:	
<b>11</b>	COMPANY/CONTRACTOR INVOLVED:	FRONT LINE SUPERVISOR :
<b>12</b>	NAME OF YZC ONSITE SUPERVISOR(S) AT THE TIME OF SPILL:	<b>13</b> IS THE SPILL REPORTABLE AS PER TABLE 3 IN SPILL CONTINGENCY V2009-02? YES <input type="checkbox"/> NO <input type="checkbox"/> IF YES, FILL OUT BOX 15. IF NO, STOP AFTER BOX 14.
<b>14</b>	<b>INTERNAL REPORTING SEQUENCE:</b> FIRST OBSERVER:  <hr style="border: 0; border-top: 1px solid black; margin: 10px 0;"/> <div style="display: flex; justify-content: space-around; width: 100%;"> <span>NAME</span> <span>COMPANY</span> </div>	

	<p>REPORTED TO:</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%; text-align: center;">NAME</td> <td style="width: 35%; text-align: center;">COMPANY</td> <td style="width: 20%; text-align: right;">Date Time</td> </tr> </table> <p>REPORTED TO ENVIRONMENTAL DEPARTMENT:</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%; text-align: center;">TO WHO</td> <td style="width: 35%; text-align: center;">BY WHOM</td> <td style="width: 20%; text-align: right;">Date Time</td> </tr> </table> <p>REPORTED TO YZC MANAGEMENT (MGM OR ALTERNATE):</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%; text-align: center;">TO WHO</td> <td style="width: 35%; text-align: center;">BY WHOM</td> <td style="width: 20%; text-align: right;">Date Time</td> </tr> </table>	NAME	COMPANY	Date Time	TO WHO	BY WHOM	Date Time	TO WHO	BY WHOM	Date Time						
NAME	COMPANY	Date Time														
TO WHO	BY WHOM	Date Time														
TO WHO	BY WHOM	Date Time														
<b>15</b>	<p><b>EXTERNAL REPORTING SEQUENCE:</b></p> <p>REPORTED TO 24-HOUR YUKON SPILL HOTLINE (867) 667-7244:</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%; text-align: center;">BY WHOM</td> <td style="width: 30%; text-align: center;">SPILL REPORT #</td> <td style="width: 20%; text-align: center;">TO WHO</td> <td style="width: 20%; text-align: right;">DATE/TIME</td> </tr> </table> <p>REPORTED TO FIRST NATIONS:</p> <p>1) ROSS RIVER DENA COUNCIL</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%; text-align: center;">BY WHOM</td> <td style="width: 35%; text-align: center;">TO WHO</td> <td style="width: 20%; text-align: right;">DATE/TIME</td> </tr> </table> <p>2) LIARD FIRST NATION, JIMMY WOLFTAIL (867) 536-2912:</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%; text-align: center;">BY WHOM</td> <td style="width: 35%; text-align: center;">TO WHO</td> <td style="width: 20%; text-align: right;">DATE/TIME</td> </tr> </table> <p>REPORTED TO YUKON GOVERNMENT - CLIENT SERVICES (867) 456-3882:</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%; text-align: center;">BY WHOM</td> <td style="width: 35%; text-align: center;">TO WHO</td> <td style="width: 20%; text-align: right;">DATE/TIME</td> </tr> </table> <p>DETAILED WRITTEN REPORT TO YWB, EMR, ENVIRONMENT CANADA AND RRDC &amp; LFN (REQUIRED WITHIN 10 DAYS OF SPILL):</p> <hr/> <table style="width: 100%; border: none;"> <tr> <td style="width: 65%; text-align: center;">DATE SUBMITTED</td> <td style="width: 35%; text-align: center;">BY WHOM</td> </tr> </table>	BY WHOM	SPILL REPORT #	TO WHO	DATE/TIME	BY WHOM	TO WHO	DATE/TIME	BY WHOM	TO WHO	DATE/TIME	BY WHOM	TO WHO	DATE/TIME	DATE SUBMITTED	BY WHOM
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BY WHOM	TO WHO	DATE/TIME														
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BY WHOM	TO WHO	DATE/TIME														
DATE SUBMITTED	BY WHOM															

<b>Photo 1 (YYY/MM/DD):</b>	<b>Photo 2 (YYY/MM/DD):</b>
<b>Photo 3 (YYY/MM/DD):</b>	<b>Photo 4 (YYY/MM/DD):</b>