# Volume 2 - Closure and Reclamation Plan Framework



# Closure and Reclamation Plan Framework for the Pine Point Project



# **Purpose**

This framework document is provided in support of the Mackenzie Valley Environmental Impact Review Board Environmental Assessment Initiation Package for the Pine Point Project (the Project). The intent of this document is to describe how this environmental management plan relates to the Project, what information will be provided as the Project develops, and to list applicable guidelines and standards. It was developed with the available Project information. This document is not intended for approval but is provided for review purposes and will be refined as the regulatory process proceeds.

# **Version History**

Pine Point Mining Limited is responsible for the distribution, maintenance, and updating of this document. Changes that do not affect the intent of the document will be made as required (e.g., phone numbers, names of individuals). The table below indicates the version of this document, and a summary of revisions made.

Revision #	Section(s) Revised	Description of Revision Issue Date	
0	-	Framework version for MVEIRB Initiation Package	15 December 2020



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# **Abbreviations**

Abbreviation	Definition
Cominco	Cominco Ltd.
CRP	Closure and Reclamation Plan
ICRP	Interim Closure and Reclamation Plan
NTPC	Northwest Territories Power Corporation
NWT	Northwest Territories
PPML	Pine Point Mining Limited
Project	Pine Point Project
WRSF	waste rock storage facility
ZnEq	zinc equivalent

# **Units of Measure**

Unit of Measure	Definition
%	percent
km	kilometre
ha	hectare
Mt	million tonnes
tpd	tonnes per day



#### 1 INTRODUCTION

This Closure and Reclamation Plan (CRP) framework has been developed by Pine Point Mining Limited (PPML) for the proposed Pine Point Project (Project). The Project is located on a brownfield site resulting from the Cominco Ltd. (Cominco) historical mining and milling activities. It is located in the Northwest Territories (NWT) within the South Slave Mining District, south of Great Slave Lake, approximately 175 km directly south of Yellowknife.

The CRP framework has been developed to support the Mackenzie Valley Environmental Impact Review Board Environmental Assessment (EA) Initiation Package for the Project. An updated CRP will be developed during the permitting phase of the Project, or potentially earlier if required, based on feedback through the EA process. The CRP that will be developed to support the Water Licence and Land Use Permit application will be submitted to the Mackenzie Valley Land and Water Board for review and approval. The CRP for permitting will incorporate relevant feedback and commitments made by PPML during the EA review process.

In addition, following the permitting phase of the Project, and upon receipt of the Water Licence and Land Use Permit, PPML will prepare an Interim Closure and Reclamation Plan (ICRP) that will include additional details to meet the requirements of the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (Closure Guidelines; MVLWB and AANDC 2013).

#### 1.1 Purpose and Scope

The CRP framework describes the conceptual plan for temporary or permanent closure of the Project. The general purpose of this CRP framework is to demonstrate the satisfactory closure and reclamation of the mine and to describe the likely residual risks to human health and the environment.

This CRP framework details closure plans for the Project only and does not include activities or monitoring associated with historical mining activities at or near the Project, outside of developments directly associated with the Project. Closure and reclamation planning is limited to construction camps, access roads, open pits, underground mine portals, overburden stockpiles, waste rock piles, tailings disposal areas, water management infrastructure and plant site constructed or used as part of this Project.

# 1.2 Closure Goal and Principles

The closure goal for the Project is similar to that shown in the Closure Guidelines (MVLWB and AANDC 2013) and comprises two parts to reflect the historical disturbance that has already been experienced by the site:

"For previously undisturbed areas, the goal is to return the affected areas of the site developed by the Project to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and human activities. Where areas of the Project have been previously disturbed through historical mining activities, the goal is to return the areas of the site affected by the Project to an equivalent environmental state that they were left by the Government of Canada prior to the Project."



Closure principles for the areas developed by the Project are reflective of the Closure Guidelines and include:

- physical stability
- chemical stability
- no long-term active care
- consideration of future use

#### 1.3 Closure and Reclamation Planning Team

PPML is a 100% owned subsidiary to Osisko Metals Incorporated. The PPML Project supervisor will ultimately be responsible for the success of the CRP during construction and operations and will approve relevant policies and documents, auditing, action planning, and the verification process. The PPML Project supervisor will be responsible for the implementation of the CRP including overall management of the plan, internal reporting, compliance and adaptive management. Other relevant personnel will also be responsible for the effectiveness of the CRP through completing required training, supporting implementation and remaining compliant with the CRP, as appropriate to their roles, as set out by the CRP.

#### **Project Contact**

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# 1.4 Engagement

The CRP will be refined based on engagement conducted throughout the EA process and future CRPs will continue to be influenced and guided by engagement with parties. Future engagement regarding the Project will be conducted according to the Engagement and Collaboration Framework (Volume 2).



#### 1.5 Regulatory Instruments for Closure and Reclamation

Closure of the Project may be subject to the federal and territorial legislation outlined in Table 1. An updated list will be included in future versions of the CRP during the permitting phase of the Project.

Table 1: Federal and Territorial Acts and Regulations Relevant to Closure and Reclamation

Federal	Territorial	
<ul> <li>Fisheries Act</li> <li>Arctic Waters Pollution Prevention Act and Regulations</li> <li>Mackenzie Valley Resource Management Act and Regulations</li> <li>Canadian Environmental Protection Act, 1999 and Regulations</li> <li>Canadian Navigable Waters Act</li> <li>Explosives Act and Regulations</li> <li>Transportation of Dangerous Goods Act and Regulations</li> <li>Canada Wildlife Act</li> <li>Species at Risk Act</li> </ul>	<ul> <li>Commissioner's Lands Act and Regulations</li> <li>Environmental Protection Act and Regulations</li> <li>Environmental Rights Act and Regulations</li> <li>Waters Act and Regulations</li> <li>Northwest Territories Lands Act and Regulations</li> <li>Safety Act and Regulations</li> <li>Mine Health and Safety Act and Regulations</li> <li>Scientists Act and Regulations</li> <li>Archaeological Sites Act and Regulations</li> <li>Wildlife Act</li> <li>Explosives Use Act and Regulations</li> <li>Species at Risk (NWT) Act</li> </ul>	

The CRP framework has been developed in consideration of applicable territorial guidelines, including:

- Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB and AANDC 2013)
- Northern Land Use Guidelines: Camp and Support Facilities (GNWT-Lands 2015a)
- Northern Land Use Guidelines: Access Roads and Trails (GNWT-Lands 2015b)
- Northern Land Use Guidelines: Pits & Quarries (GNWT-Lands 2015c)

#### 2 PROJECT ENVIRONMENT

A description of the existing environment is provided in the Description of Existing Environment for Pine Point Project (Volume 3, Section 3.0) and will be summarized here in future versions of the CRP (i.e., Atmospheric Environment, Physical [Terrestrial] Environment, Chemical Environment, and Biological Environment).

#### 3 PROJECT DESCRIPTION

The Project is composed of mining deposits using open pit and underground mining methods totalling approximately 39.1 million tonnes (Mt) of mineralized material. The planned processing capacity is 6,000 tonnes per day (tpd) ramping up to 11,250 tpd with an associated mine life of 10 years or longer. The Project will consist of open-pit and underground mining for zinc and lead, construction and operation of a processing mill (or "concentrator"), storage and management of



processed mineralized material and waste materials, water management, construction and operation of ancillary support facilities including a camp for workers, and the transportation of zinc and lead concentrates to established ports in Canada for global markets.

#### 3.1 Location and Access

The Project is located in the South Slave Mining District, south of Great Slave Lake in the Northwest Territories, approximately 175 km directly south of Yellowknife, 75 km east of Hay River, and 53 km southwest of Fort Resolution (Figure 1). It is located on a brownfield site resulting from Cominco's historical mining and milling operations and includes the historical town of Pine Point and associated working accommodations. The closest major transportation hubs are Yellowknife and Hay River. Access to the Project is presently via all-weather Highways 5 and 6. Further details are provided in the Project Description (Volume 1, Section 1.0).

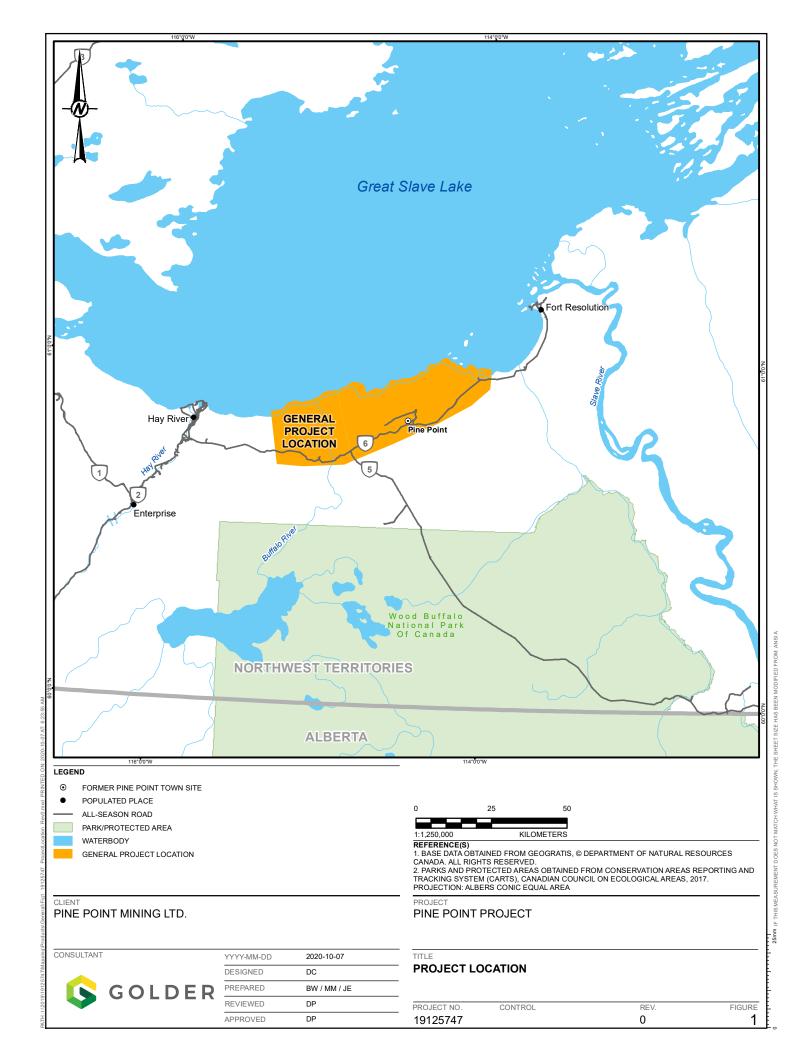
The mineral claims and mining leases that comprise the Project encompass a total of 46,553 ha including 106 mineral claims, 40 mining leases, and four surface leases.

#### 3.2 Project History

The first Pine Point lead-zinc deposit was discovered in 1898 by prospectors heading to the Klondike gold rush. Cominco began exploration at Pine Point in 1929, with test-pitting, drilling, and shaft sinking. In 1948, Cominco began major exploration work. In the early 1960s, Cominco advanced the project to construction, which included a railroad, hydroelectric dam, and a town where up to 2,000 people could live.

Cominco commenced large-scale mine production in 1964 based on a resource estimate of 21.5 Mt of identified mineralized material averaging 7.2% zinc and 4% lead. The mine eventually ramped up to a production rate of 10,000 tpd. The historical operation was an assemblage of 50 separate open pits and 2 underground deposits, lying along a 70 km trend. Cominco operated the historical mine between 1964 and 1987, producing 64 Mt of mineralized material grading 7.0% zinc and 3.1% lead from 52 deposits. This historical production illustrates that the mine is composed of several small deposits rather than one or a few large ones. The list of historical deposits illustrates that deposits varied between 49,000 tonnes and 17,500,000 tonnes of mineralized material, with an average of 1,300,000 tonnes of mineralized material. Grades during the Cominco era ranged from 4% to 21% zinc equivalent (ZnEq), with an average of 9.9% ZnEq. The Cominco concentrator eventually processed at a level of 10,000 tpd. The mining operation closed in 1987 and Cominco left significant lower grade mineral resources in the ground.

In the 2000s, the Project was purchased by Tamerlane Ventures Ltd. with the intent to mine the existing resource; however, due to poor metal prices, the Project did not proceed. Darnley Resources Bay Ltd. purchased the property in 2016 and continued with exploration. The Project was acquired by PPML in February 2018.





#### 3.3 Project Geology

A discussion of the site geology can be found in of the Description of Existing Environment for Pine Point Project (Volume 3, Section 3.0). A summary will be included here in future versions of the CRP.

#### 3.4 Project Summary

Processing facilities, the worker camp, and ancillary support structures will be located on previously disturbed land wherever practicable. It is expected that, where possible, historical open pits will be used to contain waste rock, tailings, and wastewater from future mining activities, thus minimizing new disturbance due to the Project.

The Project is divided into six zones. Appendix A (Project Mapbook) currently shows general locations for the Project. As the CRP evolves, maps will be developed to show what the site will look like following closure.

- East of Buffalo River:
  - East Mill Zone
  - North Zone
  - Central Zone
  - North-East Zone
  - N204 Zone
- West of Buffalo River:
  - West Zone

The main components of the Project are anticipated to include:

- Open pits. It is currently expected that 47 deposits from four zones (East Mill, Central, North, and N204) east of the Buffalo River will be mined as open pits, considering the deposit's size, shape, orientation, and proximity to the surface as well as economic parameters. A total of 32.5 Mt of mineralized material is expected to be mined via open pits.
- Underground mines. The West Zone (W1 Area) includes five underground workings mined by longhole methods with some stopes mined by the room and pillar method (less than 10%). Three deposits from the Central Zone (C1 Area) are anticipated to be mined by underground methods given their high strip ratio and good grades for a total of 6.6 Mt of mineralized material.
- Waste rock and overburden disposal areas. Waste rock and overburden will be stored in surface stockpiles, adjacent to the new open pits or underground mines. Waste rock will also be placed in nearby exhausted open pits in some cases. Waste rock and overburden that will not be used for infrastructure development or progressive reclamation and closure will be placed in piles adjacent to the pits, or in some cases, the waste rock will be placed in nearby



exhausted open pits. The total volume of waste rock produced over the life of mine is estimated at approximately 52 Mm<sup>3</sup>. Nearly all this waste will be dolomitized limestone. The total overburden volume is estimated to be about 50 Mm<sup>3</sup>, for excavation with topsoil separated for reclamation activities.

- **Tailings disposal areas.** Tailings disposal areas will be located within historical mined-out pits and new open pits after the completion of mining.
- Water management system. The water management system could include diversion and drainage ditches for surface water management, pumping stations, water supply, pumping and injection wells to manage subsurface water, sedimentation and polishing ponds, and other associated infrastructure.
- Process plant. Inclusive of pre-concentrator, crusher, grinding and flotation plant, thickeners, external conveyors, stockpiles, workshops, laydown areas and other installations necessary to operate the process plant.
- Power generation and distribution facility. Including transmission lines for power distribution, substations, and compressed natural gas and diesel generation plants.
- **Workers accommodation camp.** The camp is planned to accommodate approximately 230 to 250 workers during operations and peaking at 500 workers during construction
- Support and ancillary infrastructure. An explosives storage area, petroleum storage and
  distribution area, warehouses, a truck shop, administration offices, a mine "dry", and other
  support facilities and improvements to historical linear infrastructure, including access and
  haul roads, as well as power and communication lines, if necessary.

A site plan for the Project will be included in future versions of the CRP.

#### 4 PERMANENT CLOSURE AND RECLAMATION

#### 4.1 Definition of Permanent Closure

The following is the definition of permanent closure applied in this CRP framework:

"Permanent closure is the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining."

# 4.2 Permanent Closure and Reclamation Requirements

Closure planning is ongoing in accordance with the Closure Guidelines (MVLWB and AANDC 2013), Closure Planning is closely tied with mine planning. Closure activities for Project developments may include:

- demolition and removal of buildings, infrastructure, and mobile equipment
- removal of hazardous materials
- remediation of spills and contamination
- creation of stable long-term structures



- development of closure drainage features
- site contouring and decompaction
- placement of salvaged topsoil, where required to support revegetation activities
- revegetation of selected areas
- monitoring and maintenance of reclaimed landforms
- water quality monitoring

The CRP framework does not include the reclamation of historical mining components, which will not be used by the proponent from the historical operations unless explicitly stated herein.

Conceptual closure options for the Project components are provided below. Detailed closure options, objectives, and criteria for the Project components will continue to be advanced with additional details to be provided in future versions of the CRP, taking into account further Project design details and feedback received from potentially affected parties. Future versions of the CRP will also include discussion of the following for each Project component:

- selected closure activities and rationale for selection
- engineering works associated with selected closure activities
- predicted residual effects
- uncertainties
- post-closure monitoring, maintenance, and reporting
- contingencies

#### 4.2.1 Open Pits

Approximately 47 open pits are proposed to be constructed east of Buffalo River as part of the Project. Pits are planned to be mined using conventional open-pit mining techniques. Mineralized rock will be drilled and blasted and then collected using large shovels and trucks. Open pits will be developed in stages to provide the required material for optimized mill operations. Each year, mineralized material will be produced from one to twelve open pits, usually located within the same zone but sometimes located in two or more different mine working areas. As the Project is located on a historical brownfield site, some of the pit locations have already been disturbed through previous mining activities. In some instances, pits will be located on undisturbed areas.

Closure options for the open pits developed for the Project may include:

- backfilling of some pits with tailings capped by waste rock
- creation of pit lakes by allowing the pits to refill by natural water inflows and potentially supplemented with groundwater from nearby pits and/or diversion of surface water
- isolation of pits through the use of berms, fences, or some other mechanism



Reclamation options and selected activities for the pits that may have waste rock redeposited as part of Project activities are discussed in Section 4.2.3.

#### 4.2.2 Underground Mines

The process of removing the economically viable mineralization from the deeper deposits will require underground mining methods. This will begin through the development of underground ramps, which will also require overburden stripping. Deposits that are planned to be mined from underground are located in two zones: the West Zone (W1 Area), and the Central Zone (C1 Area).

In addition to closing off the surface openings, other closure options for the underground mines may include the following:

- allowing to fill with groundwater
- backfilling with waste rock

#### 4.2.3 Waste Rock Storage Facilities

It is currently anticipated that a total of 52 Mm³ of waste rock and 50 Mm³ of overburden will be generated over the duration of the Project. Where possible, the waste rock will be placed in nearby historical pits or in available proposed mined out pits. Where not possible, waste rock will be deposited in waste rock storage facilities (WRSFs). Closure activities for WRSFs will take into consideration the geochemical properties of the waste rock. Overburden will be stockpiled separately as a major part of it will be used during reclamation.

For WRSFs, options for closure activities may include:

- grading and contouring
- leaving waste as deposited
- capping with borrow material
- · covering with an engineered cover of locally available materials
- seeding or revegetation of selected areas

For waste rock that has been used to partly or completely fill a historical pit, options for closure activities may include:

- leaving waste rock as deposited
- capping with borrow material
- covering with an engineered cover of locally available materials

#### 4.2.4 Tailings Disposal Areas

Mineralized rock that is sent to the mill will undergo processing including grinding and flotation. After being processed through the flotation cells, the non-mineralized particles remaining in the slurry will be separated as tailings. These tailings will be discharged into a tailings thickener to recover water for recycling and to increase the percent solids before being pumped through a



pipeline for disposal into existing flooded pits, which will act as a tailings disposal area. Multiple locations are being evaluated for suitability as disposal areas. The tailings will fill the pits to a few metres below the bedrock surface.

Upon closure, the open pits used for tailings deposition will have been filled to ground surface with mineral sorter rejects and waste rock where necessary. The pits will be covered with stored overburden, if available, and contoured to restore the natural drainage.

This cover will limit direct access by terrestrial wildlife. Monitoring will occur and mitigations implemented as required to address the potential for acid rock drainage or any other water quality issues, and additional management measures will be implemented if there is found to be a concern.

#### 4.2.5 Water Management System

Water management systems for the Project will include infrastructure to:

- manage surface water runoff at the Project
- · dewater the pits and underground
- manage and process water by placing into nearby exhausted pits or reinjecting back into the aquifer
- produce potable water
- manage and process sewage
- supply, store, process (if required), and distribute potable water

Options for closure activities related to water management systems developed or used for the Project include:

- operation and maintenance of surface water management infrastructure during active closure
- decommissioning and removal of surface water management infrastructure, such as wells, pumping stations, pipelines, culverts / drainage channels, and sedimentation ponds
- decommissioning and removal of potable water treatment plant and sewage treatment system
- backfilling of ditches and collection ponds using overburden material
- restoration of natural drainage paths to the extent practical

#### 4.2.6 Support and Ancillary Infrastructure

Support and ancillary infrastructure that will be developed for the Project includes explosive and fuel storage, buildings for administration, camp, maintenance facilities, warehouse facilities, landfills, and linear infrastructure such as roads, water pipelines, tailings transportation pipeline, and powerlines.



The power required for the site will be a combination of Northwest Territories Power Corporation (NTPC) supplied power and local power production from compressed natural gas. Critical loads, such as the concentrator, pumping stations, and camp, will include local emergency diesel power generators if the main power from NTPC is offline.

Closure options for the support and ancillary infrastructure developed or used for the Project include the following activities or alternative closure options that may be agreed upon during engagement with parties:

- removal and proper disposal of hazardous materials
- demolition of buildings developed for the Project, and removal and appropriate disposal of materials
- removal of temporary structures and equipment used for the Project
- removal of linear infrastructure such as power lines, pipelines, and roads developed as part of the Project
- remediation of contaminated soil where required
- scarifying (e.g., recontouring and decompaction) and potential revegetation with native species in targeted disturbed areas
- covering of landfill facilities and other closure actions where applicable as recommended in guidelines (GNWT 2003, 2017; ECCC 2017).

#### 5 PROGRESSIVE RECLAMATION

#### 5.1 Definition of Progressive Reclamation

Progressive reclamation is defined as:

"Progressive reclamation takes place prior to permanent closure to reclaim components and/or decommission facilities that no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, minimize the duration of environmental exposure, and enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may provide valuable experience on the effectiveness of certain measures that might be implemented during permanent closure." (MVLWB and AANDC 2013).

# **5.2 Opportunities for Progressive Reclamation**

Progressive reclamation will be carried out whenever possible. At this point in time, opportunities for progressive reclamation cannot be specifically identified; however, opportunities for progressive reclamation may exist in areas as they are mined out, such as the reclamation of the open pits, adjacent rock piles and other infrastructure components in the vicinity. These opportunities will be identified and developed in subsequent versions of the CRP (i.e., potentially in the CRP developed for permitting, or in the ICRP developed following receipt of the Water Licence for the Project).



#### **5.3 Completed Progressive Reclamation**

Once the mine is operational, this section of the CRP will include documentation of the progressive reclamation conducted to date.

#### 6 TEMPORARY CLOSURE

In the event of temporary closure of the Project, mine components will placed under care and maintenance, whereby components are maintained as necessary to protect humans, wildlife, and the environment. Relevant environmental, access, and security monitoring, together with ongoing management and reporting, will be continued under temporary closure conditions.

#### 6.1 Temporary Closure Goal and Closure Objectives

Temporary closure goals and objectives will be provided in future versions of the CRP.

#### **6.2 Temporary Closure Activities**

The following activities will be implemented during times of temporary closure:

- Secure and restrict access to the Project, including buildings and other structures to authorized personnel only.
- Guard or block openings and post warning signs.
- Continue physical, chemical, and biological treatment, as well as monitoring programs according to water licences, land use permits, and land lease conditions to maintain compliance.
- Secure waste management systems.
- Conduct an inventory of chemicals and reagents, petroleum products, and other hazardous materials and secure appropriately or remove if required.
- Record fluid levels in fuel tanks and monitor regularly for leaks or remove from the Project.
- Store hazardous waste at an approved on-site waste management facility prior to shipping for off-site disposal to an appropriately registered receiving facility.
- Relocate explosives to the main powder magazine and secure, dispose of, or remove from the Project.
- Stabilize WRSFs, overburden stockpiles, tailings disposal areas, wastewater, and other containment structures as necessary, and maintain in an appropriate manner (including regular geotechnical inspections).
- Inspect drainage ditches and spillways and maintain regularly (e.g., seasonally depending on snow and ice accumulation and melting) during the closure period and include as part of geotechnical inspections.
- Inspect facilities and infrastructure regularly.



Keep the security deposit up-to-date.

Updates to activities undertaken during temporary closure will be provided in future versions of the CRP.

#### 6.3 Temporary Closure Monitoring, Maintenance, and Reporting

Once the mine is operational, this section of the CRP will document monitoring, maintenance, and reporting undertaken during temporary closure.

#### **6.4 Temporary Closure Contingency Program**

Contingency actions during temporary closure will be guided by the concept of adaptive management and geared toward supporting the temporary closure activities discussed in Section 6.1. Details regarding contingency actions that may be undertaken during temporary closure will be provided in future versions of the CRP.

#### 6.5 Temporary Closure Schedule

Future updates to this section will include:

- A description of the anticipated sequence of events that may lead to a temporary closure.
- Descriptions of temporary closure activities for each Project component.
- Charts or tables if the nature of activities is complex.
- For planned temporary closure, an estimate of how long the closure will last and the approximate end date of the closure period.

#### 7 INTEGRATED SCHEDULE OF ACTIVITIES

The preliminary life of mine schedule for the open pits can be viewed in the Project Description (Volume 1, Section 1.0). It is currently expected that the Project will enter into active closure in 2037. Additional details regarding the operational and closure schedule will be provided in future versions of the CRP.

#### 8 POST-CLOSURE SITE ASSESSMENT

Future versions of the CRP will include a description of how residual environmental impacts of the Project will be assessed once closure activities have been completed.

#### 9 FINANCIAL SECURITY

Once the Project is in the permitting phase, future updates to the CRP will include:

- An estimate of total liability associated with permanent closure of the Project, including postclosure monitoring programs and activities.
- A breakdown of costs associated with each component.



#### 10 REFERENCES

#### **Acts Cited**

#### **Federal**

- Arctic Waters Pollution Prevention Act. RSC 1985, c A-12. Last amended 7 August 2019. Available at https://laws-lois.justice.gc.ca/eng/acts/a-12/
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- Environmental Protection Act. RSNWT 1988, c E-7. Available at <a href="https://www.justice.gov.nt.ca/en/files/legislation/environmental-protection/environmental-protection.a.pdf">https://www.justice.gov.nt.ca/en/files/legislation/environmental-protection/environmental-protection.a.pdf</a>
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https://www.justice.gov.nt.ca/en/files/legislation/mine-health-and-safety/mine-health-and-safety.a.pdf

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# **Appendix A Project Mapbook**

