Volume 2 -

Erosion and Sediment Control Plan Framework

PINE POINT
MINING LIMITED

Erosion and Sediment Control 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 (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 EA Initiation Package	15 December 2020

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Abbreviations

Abbreviation	Definition
BMPs	Best Management Practices
Cominco	Cominco Ltd.
EA	Environmental Assessment
ESCP	Erosion and Sediment Control Plan
PPML	Pine Point Mining Limited
Osisko Metals	Osisko Metals Incorporated
Project	Pine Point Project

Units of Measure

Units	Definition
%	percent
km	kilometre
m	metre

1 INTRODUCTION

1.1 Background

Pine Point Mining Limited (PPML) is the sole proponent of the Pine Point Project (Project) and is a 100% owned subsidiary of Osisko Metals Incorporated (Osisko Metals). Pine Point is a brownfield site and the location of the historical Pine Point Mine managed by Cominco Ltd. (Cominco), operated between 1964 and 1988. In February 2018, Osisko Metals acquired PPML and became owner of the Project. PPML is proposing to re-open the Pine Point Mine site to mine mineralized material and produce concentrates of zinc and lead for shipment to independent smelters worldwide

1.2 Purpose

The Erosion and Sediment Control Plan (ESCP) Framework is a requirement of the Environmental Assessment (EA) Initiation Package (MVEIRB 2018). It is intended to provide a preliminary outline of approaches to managing the release of sediments to watercourses. The ESCP Framework is meant to provide a basis for PPML to engage with regulatory agencies and Indigenous communities and elicit feedback on planned sediment and erosion control practices for the Project. A complete ESCP will be submitted to the Mackenzie Valley Land and Water Board for approval following the EA, and will incorporate feedback obtained through the EA.

Erosion and sedimentation are naturally occurring processes of loosening and transporting soil through the action of wind, water, or ice, and the subsequent transport and deposition of sediment particles. Construction activities can result in increased erosion and sedimentation where soil surfaces are exposed to rainfall or snowmelt and runoff, or wind erosion and aerial sediment transport.

1.3 Project Contact

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1.4 Roles and Responsibilities

The Environmental Manager will be ultimately responsible for the success of this plan and approves all relevant policies and documents, auditing, action planning and the verification process. The Environmental Manager is responsible for the implementation of this plan including overall management of the plan, internal reporting, compliance, and adaptive management.

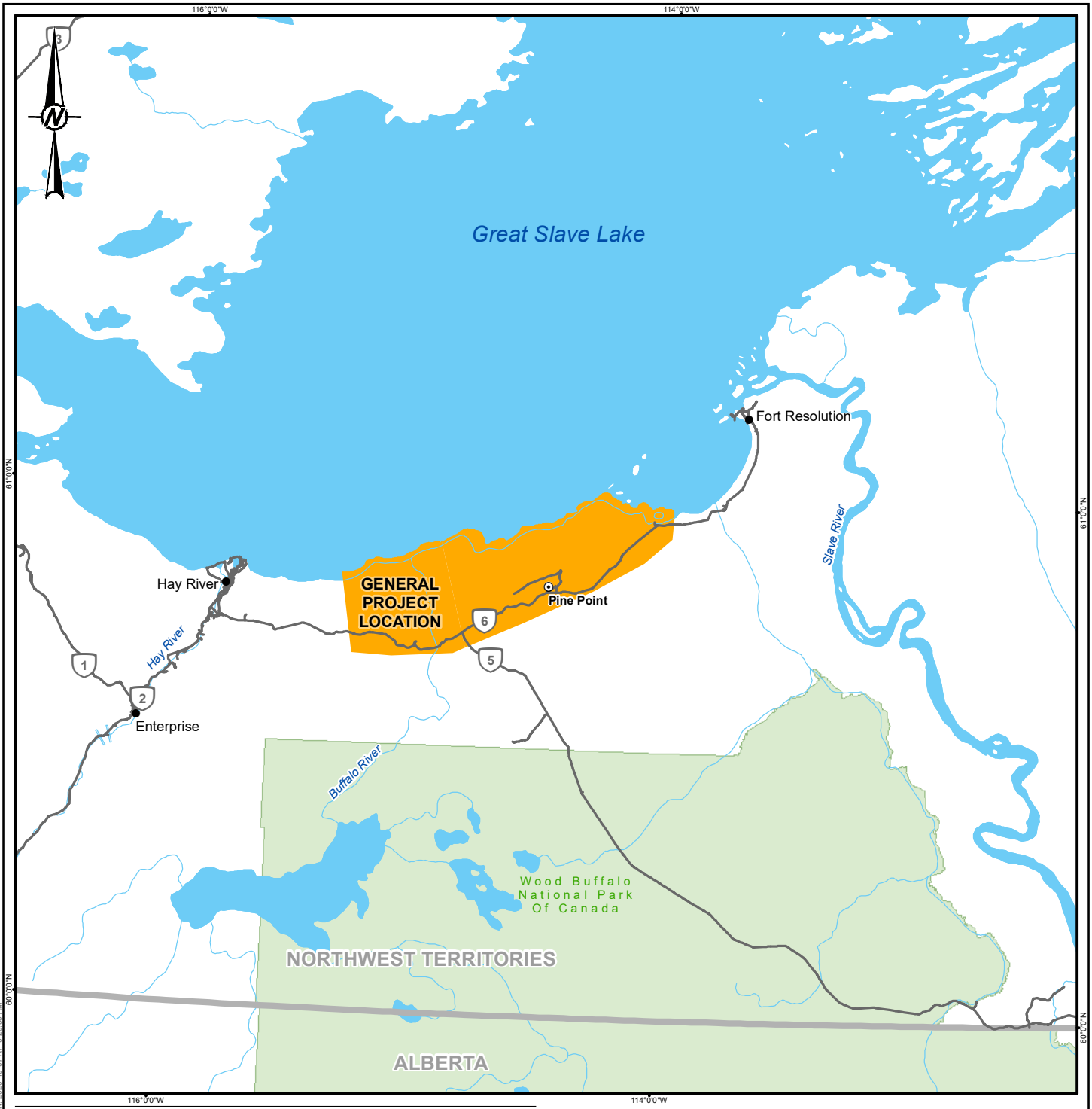
Other relevant personnel will be responsible for the effectiveness of this Plan by completing required training and supporting the implementation of and compliance to this Plan, as appropriate to their roles, as set out by this Plan.

1.5 Project Details

The Project is located in the South Slave Mining District, south of Great Slave Lake in the Northwest Territories (NWT), 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.

The Project will consist of open pit and underground mining for mineralized materials, construction and operation of up to three pre-concentration plants, construction and operation of a processing mill (or "concentrator"), storage and management of processed mineralized and waste materials, water management, construction and operation of ancillary support facilities including a camp for workers, and the shipping of zinc and lead concentrates to global markets. Further details are provided in the Project Description (Volume 1).

Maps indicating the Project footprint, infrastructure, storage locations of each hazardous material, probable spill locations and direction of flow on land and in water, catchment basins, locations of all response equipment, topography, approved disposal sites, and any other important on- or off-site features will be included when these details have been finalized.



LEGEND

- FORMER PINE POINT TOWN SITE
- POPULATED PLACE
- ALL-SEASON ROAD
- PARK/PROTECTED AREA
- WATERBODY
- GENERAL PROJECT LOCATION

0 25 50

1:1,250,000 KILOMETERS

REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. PARKS AND PROTECTED AREAS OBTAINED FROM CONSERVATION AREAS REPORTING AND TRACKING SYSTEM (CARTS), CANADIAN COUNCIL ON ECOLOGICAL AREAS, 2017.

PROJECTION: ALBERS CONIC EQUAL AREA

CLIENT
PINE POINT MINING LTD.

PROJECT
PINE POINT PROJECT

CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-07
DESIGNED	DC
PREPARED	BW / MM / JE
REVIEWED	DP
APPROVED	DP

TITLE
PROJECT LOCATION

PROJECT NO.	CONTROL	REV.	FIGURE
19125747		0	1

2 BEST MANAGEMENT PRACTICES SELECTION AND DESIGN

This section of the ESCP will outline the main Best Management Practices (BMPs) that will be considered and applied as appropriate during the Project. BMPs that may be relevant to the Project are outlined in the sections below.

2.1 Critical Areas

This section of the ESCP will describe the proposed land disturbances and construction activities associated with the Project. Where possible, information will be provided on locations where the land disturbance will occur in critical areas, in relation to the need for sediment and erosion control measures. Areas of disturbance on slopes, in areas of sand and fine-grained soils, and near waterbodies may be defined as critical areas.

2.2 Procedural Best Management Practices

Procedural BMPs are non-structural methods or procedures that can reduce erosion and sediment transport at a construction site. These include site management and scheduling practices that may use structural erosion or sediment control BMPs to achieve their goals. Commonly used procedural BMPs are provided in the following sections.

2.3 Site Management

Site management refers to the housekeeping and mitigation that will reduce the likelihood of erosion and sediment transport. Site management strategies include:

- **Project Footprint Minimization** – Construction boundaries will be carefully demarcated to restrict vegetation removal and soil disturbance to active development sites. No vegetation will be removed and no machinery will be permitted outside of these locations.
- **Exposed Soil Minimization** – By minimizing the total disturbed soil area and the disturbed soil area at any time, the erosion potential is reduced, and the quantity of sediment control measures is reduced. Note that tree cutting and removal is not equated with soil disturbance; this activity can be done with minimal disturbance of the understory.
- **Site Access Management** – The site should be accessible from only a limited number of points. Main access roads should be maintained to minimize the tracking of material off site.

2.4 Stockpile Management

Stockpiles of rock, topsoil, or other materials that may cause seepage or erosion should not be located within 100 m of waterbodies (i.e., lakes, ponds, or watercourses). However, should there be layout constraints that limit the placement of stockpiles and minimum setback distances that are not practical, mitigation, such as silt fence or diversion berms around the stockpile, will be used for stockpiles located where risks of sedimentation are posed. Stockpiles of material susceptible to wind erosion should be protected where reasonable to do so.

2.5 Structural Best Management Practices

Structural BMPs are methods that can reduce erosion and sediment transport at a construction site. These BMPs require the construction and physical implementation of a design to mitigate erosion or sediment. Commonly used structural BMPs are provided in the following sections.

2.6 Surface Water Management BMPs

Water management BMPs include on site and off site measures, focusing on surface water management.

- **Use of Existing Drainage** – Existing watercourses tend to be well-vegetated and have natural rates of erosion. Discharges from the construction site containing levels of sediment that meet water quality discharge criteria should be conveyed to existing, undisturbed watercourses.
- A**ppropriate Design of Drainage Channels** – Drainage channels will be designed and approved by a registered professional engineer to ensure appropriate depths, slopes, cross-sections, and linings (armoured or vegetated).
- **Flow Isolation** – Clean water drainage from upstream areas should be diverted around the construction site, where there is a possibility of erosion and wherever practical, to reduce the quantity of water that must be managed on site. This can be achieved using the water management system.
- **Diversion around Construction Site** – Strategically placed diversion ditches can help direct water movement on site by reducing the total amount of water and reducing its interaction with erosion prone sites.

2.7 Erosion Control BMPs

Erosion control BMPs are intended for application to exposed soils/sediments where there is a need to reduce the potential for erosion due to wind, rain splash, or flowing water. Preventing erosion at the source reduces the amount of sediment that needs to be managed by downstream sediment control measures. Erosion can be controlled by protecting surfaces from runoff (exposed surface protection), or by reducing the quantity or velocity of flow (runoff control).

- **Riparian Zone Preservation** – Watercourse erosion potential is considerably reduced by preserving natural vegetation, to reduce runoff velocity and enhance infiltration.
- **Slope Texturing/Grading** – The accumulation of water and its movement over a large soil surface can cause erosion which can be exaggerated by a topography promoting high runoff velocity. Recontouring methods and roughening up the surface area can help to reduce the risk of erosion. Recontouring the soil surface can reduce erosion by shortening the length and decreasing the angle of the slope. Texturing of slopes, either by roughening the surface, tracking the surface, or installing grooves or benches, reduces the runoff velocity, traps sediment, and increases the infiltration of water into the soil.
- **Energy Dissipater** – Rock riprap, gabions, or sandbags can be installed at areas such as culvert outlets or drop structures to reduce flow velocities and protect against erosion. Dissipaters with high flow rates should be designed by a qualified professional.

- **Mulching** – Application of organic material or other normally biodegradable substances as a protection layer to the soil surface to minimize raindrop/runoff erosion, conserve a desirable soil moisture property for plant growth, and to promote seed germination and plant growth.
- **Prevention of Rut Development** – Depending on the characteristics of soil and moisture content, and prior to the establishment of engineered roads, temporary trails may be utilized. Prevention of the formation of ruts can reduce the potential for water channelling which increases water energy and potential for erosion. Actions like corduroy road construction can limit this impact prior to engineered road construction in some cases.

2.8 Sediment Control BMPs

Sediment control BMPs are intended for application to flowing water where the risk assessment indicates the need to retain mobilized sediment. It is advisable to install sediment control measures within the construction site, close to the sediment source; this reduces the quantity of water that must be managed and reduces the consequences of a failure. Sediment control can be accomplished by filtering or settling sediment-laden runoff water.

- **Natural vegetation** – Runoff can be slowed through surface vegetation and trapped by infiltration or by settling as the flow velocity reduces within the vegetation.
- **Silt fencing** – A permeable fabric barrier installed vertically on support posts typically along contours to capture and filter sediment laden sheet flow runoff. It causes water to pond allowing sediment to settle out as water filters through fabric. It also entraps and minimizes coarse sediment from sheet flow or overland flow from entering waterbodies. It serves as a perimeter control for sediment transport and deposition. Alternative barriers of equivalent performance may also be used.
- **Runoff Ponds/Sediment Traps** – Low height dam enclosure for impoundment of sediment laden runoff, sedimentation of silt size particles, and release of treated runoff. They can be constructed by excavating a pond or building embankments above the original ground surface. Sediment traps can be used at the outlet of diversion ditches and at the outlet of any structure that carries sediment-laden runoff, promoting settlement of sediment prior to releasing water into downstream watercourses.

2.8.1 Dust Suppression

Water will be applied to specific locations as necessary during dry periods to increase soil cohesion.

3 INSPECTIONS, MAINTENANCE, AND REPORTING

An inspection program is required to quickly identify and correct any erosion and sediment control hazards and to ensure that structural BMPs are working as intended. This will be completed through a system of inspections, maintenance, and reporting. Additional details regarding inspections, maintenance, and reporting will be provided in subsequent versions of the ESCP when additional Project details are available.

3.1 Inspections

During construction, inspections will be done during periods of snow melt including freshet, as well as after significant precipitation events. Compliance with BMPs will also be evaluated during inspections. All inspections will be documented using a field form (see Appendix A for an example) and a photo log. If an erosion and sediment control measure is observed to be inadequate for the task it was designed to achieve, the measure will be adjusted or replaced. If changes are made due to inadequate performance of a measure, the changes will be brought to the attention of the Lands Inspector. Any non-conformance with the ESCP that is identified as a result of an inspection will result in the development of a corrective and/or preventive action plan.

3.2 Maintenance

Maintenance requirements for the erosion and sediment control measures are broken down by BMP type and shown with the associated inspection requirements in Table 1. The inspection for each BMP type is to occur before forecasted significant precipitation events and after significant runoff events.

Table 1: Erosion and Sediment Control Maintenance Requirements

BMP	Inspection/Maintenance Requirement
Silt Fence, checkdams, sediment traps	• Sediment shall be removed once upstream sediment accumulates to a depth 1/3 height of the silt fence • Inspect staking and if keyed into soil correctly • If damage is discovered, it shall be repaired as soon as possible
Perimeter and diversion berms	• If damage is discovered, it shall be repaired as soon as possible
Flow dissipaters	• Inspect for evidence of scouring, accumulation of sediment • If damage is discovered, it shall be repaired as soon as possible
Erosion control blankets	• Inspect staking and if there are any voids underneath • If damage is discovered, it shall be repaired as soon as possible
Slope Protection and Stockpiles	• Inspect for evidence of scouring, gullies or channeling • If damage is discovered, it shall be repaired as soon as possible

3.3 Reporting

An annual performance report and any changes to the ESCP will be included in the Water Licence Annual Report to the Mackenzie Valley Land and Water Board.

4 ADAPTIVE MANAGEMENT

Adaptive management is a structured, iterative process of decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. The policies and recommended mitigation measures described in this ESCP framework have been developed based on other northern mining project BMPs and will be further detailed in subsequent versions of the plan as additional Project details are available. A review process is required to ensure effectiveness and to incrementally improve performance of BMPs and site-specific erosion and sediment control measures. The ESCP is a living document, hence site conditions and lessons learned during implementation of erosion and sediment control measures at the Project site will be incorporated in subsequent versions of the ESCP.

5 REFERENCES

MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2018. Draft EA Initiation Guidelines for Developers of Major Projects. Accessed March 2020. Available at http://reviewboard.ca/file/1132/download?token=c5tFrEqL

Appendix A Example Erosion and Sediment Control Inspection Form

INSPECTION AND MAINTENANCE FORM

Construction Site Location: ______________________ Contractors on Site: ______________

Heavy Equipment on Site: ______________________ Construction Activities on Site: ______________

Date: ______________________ Current Weather: ______________

Date of Last Inspection: ______________________ mm of rain in last 24hr: ______________

Type of Measure (BMP)	Location on Site	General Condition	General Performance	Maintenance Required	Type of Maintenance Required	Site Manager Notified	Date Repairs to be Completed By
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	
		Poor / Fair / Good	Poor / Fair / Good	Y / N		Y / N	

Notes:

Inspector's Name: Inspector's Signature: