# Volume 2 -

# Mine Water Management Plan Framework

PINE POINT
MINING LIMITED

# Mine Water Management 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 |
|---|---|
| AEMP | Aquatic Effects Monitoring Program |
| EA | environmental assessment |
| Cominco | Cominco Ltd. |
| MVLWB | Mackenzie Valley Land and Water Board |
| NWT | Northwest Territories |
| PPML | Pine Point Mining Limited |
| SNP | Surveillance Network Program |
| Project | Pine Point Project |
| MWMP | Mine Water Management Plan |

# Units of Measure

| Units | Definition |
|---|---|
| % | percent |
| km | kilometre |

# 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 Mine Water Management Plan (MWMP) 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 water flow into, out from and within the Project footprint. The MWMP Framework is meant to provide a basis for PPML to engage with regulatory agencies and Indigenous communities and elicit feedback on planned water management activities and facilities for the Project. A complete MWMP will be submitted to the Mackenzie Valley Land and Water Board for approval following the EA, and will incorporate feedback obtained through the EA.

## 1.3 Objectives

The objective of the MWMP Framework is to provide an initial high-level outline of the MWMP for the Project to allow for engagement as part of the EA process and prior to applying for the Water Licence.

The overall objective of the MWMP will be to detail water management activities for the Project throughout all Project stages (i.e., construction, operations, closure, and post-closure). The MWMP will provide the necessary data to inform all stakeholders of the water management activities occurring related to the Project, and is one of the management plans that will be employed to make decisions on reducing the magnitude, frequency, and extent of effects on the environment.

## 1.4 Project Contacts

| | |
|---|---|
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## 1.5 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.

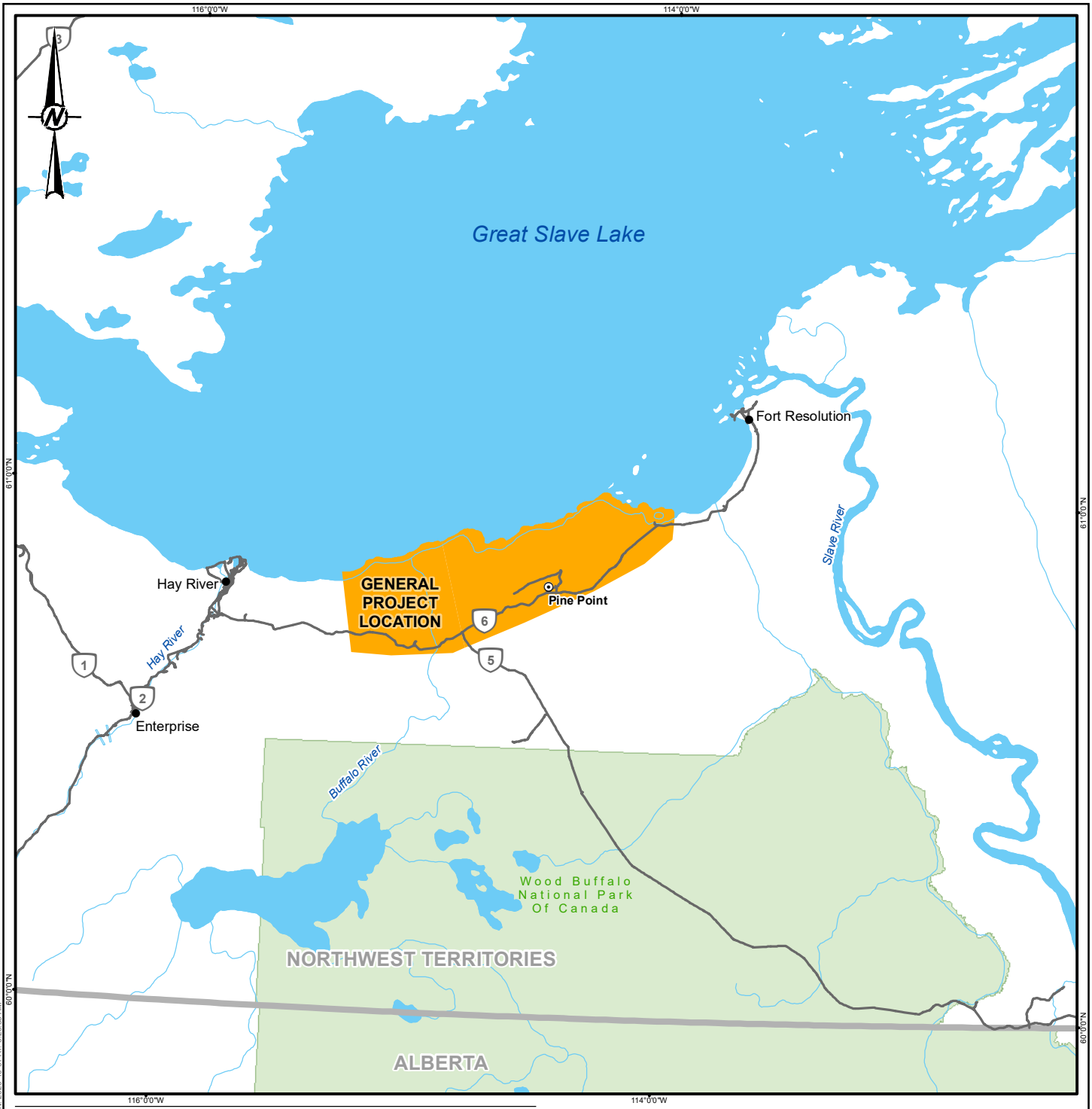
Other relevant personnel will be responsible for the effectiveness of this Plan by completing required training and supporting the implementation of and compliance to this Plan, as appropriate to their roles, as set out by this Plan.

## 1.6 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

| | |
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| DESIGNED | DC |
| PREPARED | BW / MM / JE |
| REVIEWED | DP |
| APPROVED | DP |

TITLE
**PROJECT LOCATION**

| PROJECT NO. | CONTROL | REV. | FIGURE |
|---|---|---|---|
| 19125747 | | 0 | 1 |

# 2 Water Management Approach

This section describes water management terminology, objectives and strategies of water management, proposed water management facilities, and the proposed water management approach through the different stages of the Project.

## 2.1 Definitions

**Mine water** will need to be managed and monitored on site. The following main sources of mine water are identified:

- Surface mine water:
  - Runoff from Project areas collected in diversions, drainage ditches, and sumps.
  - Runoff and seepage from waste rock storage facilities, overburden piles, tailings disposal areas, and other stockpiles or bermed storage cells.
- Open pit mine water:
  - Groundwater inflow and runoff into open pits.
- Underground mine water:
  - Groundwater inflow and runoff into the underground mining areas.

**Process water** is water used in processing of mineralized material, including crushing, pre-concentrating, and milling, and is the liquid component of slurry. Process water will be recovered for reuse in processing of mineralized material from tailings thickening ponds as much as practical. Tailings will be deposited in a disposal areas as a slurry.

**Natural runoff** is runoff water from natural catchments. Natural runoff will be diverted away from the Project area where practical.

**Discharge** is direct or indirect release of any mine water or waste to a surface water receiving environment (i.e., typically a watercourse or waterbody).

**Dewatering** is the removal of some or all water from a water source.

## 2.2 Water Management Objectives and Strategies

The objectives of water management are to enable safe and timely mining operations at the Project, while minimizing adverse effects to the aquatic receiving environment in terms of water quantity, water quality, and aquatic life. The MWMP will be compliant with the Project's Water Licence and will provide the appropriate safeguards in respect to the Project's use and discharge of water.

The following strategies are planned to achieve the objectives:

- To the extent practicable, minimize the quantity of water used for construction and operational purposes.
- To the extent practicable, minimize the quantity of mine water through management and monitoring.
- To the extent practicable, manage potential acid-generation and metals leaching of stored run of mine or waste material and associated runoff.
- To the extent practicable, intercept and divert runoff from natural catchments away from the Project.
- If required, plan for the discharge of mine water to meet regulatory requirements and be protective of the aquatic receiving environment.
- Use experience and data from operations at the historical Cominco mine and other similar open pit and underground mines to develop sound management plans.
- Implement monitoring plans throughout the various states of mine development to allow for development of adaptive management strategies, as required.

## 2.3 Water Management Facilities

The Project is located on a brownfield site that contains some former infrastructure (i.e., roads) and water management facilities (i.e., drainage ditches and open pits) that may be used for the Project, although additional water management facilities may be required during the construction, operations, and closure phases of the Project. The locations, specifics, and design criteria of water management facilities for the Project are being evaluated and will be determined during the design process. Once developed, this section will present the following:

- water management design basis
- a description of the main water management facilities
- considerations for potential changes in hydrologic conditions
- additional water management considerations for future stages of design

The following facilities are currently planned to be used for water management during all phases of the Project:

- **Existing Open Pits** – Water will be stored in existing pits, which may include excess water from tailings, mine dewatering, dust suppression, and drainage systems from the vehicle and machinery maintenance facilities.
- **Septic System or Sewage Treatment** – All sewage and greywater from offices, camp services, and other domestic sources will be transferred to a septic system or sewage treatment, designed to meet all regulatory requirements.
- **Potable Water Treatment Plant** – Potable water will be needed for camp services and human consumption during all stages of the mine.

- **Re-injection Wells** – These wells are currently being evaluated as an alternative underground disposal method for groundwater withdrawn from the vicinity of open pits and underground mining areas. This groundwater will be pumped into re-injection wells and returned to the existing underground aquifer from which it originated.
- **Drainage Ditches** – The existing network of drainage ditches will be used when possible and maintained, modified or expanded, as required.
- **Pumping and Pipeline Systems** – Where required, pumps and pipelines will be installed for the purposes of water transfer for water management.
- **Water Management Ponds or Sumps** – Where required, water management ponds or sumps will be constructed to manage and store water for treatment or transfer.
- **Water Storage Lagoons** – Where required, water storage lagoons will be used as an alternative temporary storage location prior to treatment when mine water does not meet water quality discharge criteria for direct discharge to the environment.
- **Dry Sumps** – Where required, dry sumps will be constructed to provide emergency water storage.
- **Outfall** –If mine water discharge is required, an engineered outfall will be employed to mitigate scour and erosion when discharging into the surface water receiving environment.

The location and specifications of these water management facilities are being evaluated and will be determined during the design process.

## 2.4 Water Management Stages

The mine development plan for the Project is comprised of the following stages. Some stages may overlap (i.e., progressive reclamation and closure) whenever practical.

- **Construction** – when activities are mainly focused on the construction of infrastructure needed for production mining and processing and associated water management facilities.
- **Operations** – when activities are mainly focused on open pit and underground mining to produce mineral concentrates.
- **Closure** – occurs following completion of mining, when activities are mainly focused on reclaiming the areas affected by the Project, including the open pits and underground mine areas that were used for the Project.
- **Post-closure** – is the period after closure, when activities are mainly focused on monitoring, as required.

Currently, the duration of each development stage and the planned water management activities, including timing of construction of water management facilities, specific facility type, and location, are under evaluation.

# 3 Water Balance

Once mine development studies and planning has progressed (i.e., expected pit and underground dewatering and seepage, timing and concurrence of mining activities, planned milling throughput, and the number of workers on site during different development stages) and additional local hydrological and hydrometeorological data have been collected, a water balance model will be developed to inform the design of proposed water management infrastructure over the life of the mine from construction, operations, into closure. The water balance will determine the capacity of existing pits, and whether an operational mine water discharge will be required.

For preliminary discussion, the following water uses and sources of water that may be discharged have been identified and are presented without quantities in Table 1.

**Table 1: Preliminary List of Potential Water Demands and Water to be Released/Discharged**

| Water Demand | Stage of Mine | | |
|---|---|---|---|
| | Construction | Operations | Closure/Post-closure |
| Dust Suppressant | ✓ | ✓ | ✓ |
| Camp Facilities | ✓ | ✓ | ✓ |
| Vehicle Maintenance and Washing | ✓ | ✓ | ✓ |
| Concrete Mixing | ✓ | ✓ | ✓ |
| Emulsion Mixing | - | ✓ | - |
| Milling | - | ✓ | - |
| **Water that may be Discharged** | **Construction** | **Operations** | **Closure/Post-closure** |
| Camp Facilities | ✓ | ✓ | ✓ |
| Vehicle Maintenance and Washing | ✓ | ✓ | ✓ |
| Surface Mine Water | ✓ | ✓ | ✓ |
| Open-Pit Mine Water | ✓ | ✓ | - |
| Underground Mine Water | ✓ | ✓ | - |
| Process Water | ✓ | ✓ | - |
| Surface Water Runoff | ✓ | ✓ | ✓ |
| Waste Rock Storage Facilities | ✓ | ✓ | ✓ |

# 4 Water Quality

A site water quality model will be developed based the final design of water management facilities and with additional water quality data to be collected. The water quality model will be developed to project water quality concentrations at relevant discharge sources during the life of the mine, particularly for operations when there is the potential for mine-related discharges into the receiving environment.

# 5 Mine Water Monitoring and Adaptive Management

The water balance and water quality models described in the previous sections will be based on data from field investigations conducted to date and from the experience of other northern projects in similar environments. Water quantity and quality monitoring during construction and operations will verify the modelled water quantity and quality predictions and compare against adaptive management thresholds, and assess the performance of the adaptive management strategies.

This section provides a summary of the proposed mine water monitoring, a brief summary of the proposed conceptual receiving environment monitoring program and aquatic response framework, and a description of possible adaptive management concepts. Details of the monitoring plans related to water management (e.g., the Aquatic Effects Monitoring Program [AEMP] and associated response framework and Surveillance Network Program [SNP]) will be finalized through the permitting process.

## 5.1 Mine Water Monitoring

Monitoring stations will be established to monitor the water quantity and quality of the mine water at the site associated with Project activities. This monitoring is generally associated with the SNP. The objective of this monitoring is to verify assumptions made in the development of the site water balance and water quality models, the EA, and to trigger targeted adaptive management strategies where required to meet environmental protection objectives. Data collected as part of this monitoring program are made available through the Mackenzie Valley Land and Water Board (MVLWB).

The monitoring would be initiated at the construction stage of the Project and will continue through closure and post-closure. Specific details of the program will differ across the Project phases to best reflect current mine activities and potential effects. Once additional details are available, this section will provide a summary of the key components of the monitoring program for the Water Licence review process.

### 5.1.1 Construction

During construction, site monitoring would consist of SNP monitoring, as well as regular inspection of the performance of diversions of natural runoff, road culverts, and erosion and sediment control features that will be installed as part of the implementation of best management practices. Inspections during freshet and other high runoff events will also be completed. Inspections of water management facility performance will continue throughout the construction phase. Some monitoring specific to construction activities will be carried out. The details of this monitoring will be developed as more detailed design information is available and finalized during the regulatory process.

### 5.1.2 Operations

During the operations stage, mine water monitoring under the SNP will be an important part of overall mine water management for the Project. The details of this monitoring will be developed as detailed design information becomes available and finalized during the regulatory process.

### 5.1.3 Closure

During closure, SNP monitoring, monitoring specific to Project closure activities, such as, back-flooding, sediment and erosion control measures, removal of facilities, reclamation activities and other closure procedures, will be carried out. The details of this monitoring will be developed as detailed design information becomes available and finalized during the regulatory process

### 5.1.4 Post-Closure

Monitoring for physical and chemical stability and maintenance of the facilities reclaimed for the Project will be required after closure and into post-closure until closure objectives and criteria are satisfactorily demonstrated. The schedule and program for monitoring and maintenance will be developed through the Interim Closure and Reclamation Plan to be developed in the regulatory process. The post-closure monitoring program will use the monitoring programs from the operations and closure stages of the proposed Project as a basis and will be adapted to meet post-closure needs. The details of this monitoring will be developed as detailed design information becomes available and finalized during the regulatory process.

## 5.2 Receiving Environment Monitoring Program and Aquatic Response Framework

Monitoring will be conducted in the aquatic receiving environment downstream of the proposed Pine Point Mine as per the AEMP that will be conducted under the Water Licence for the Project. This will be a seasonal program that is reported on annually, as per the established practice as defined by the MVLWB. An aquatic response framework will also be developed to allow for an adaptive management approach.

Depending on final Project design and the outcome of the EA, it is anticipated that the AEMP will include the monitoring components of hydrology, water quality, and fish health. Locations of monitoring in the aquatic receiving environment and reference areas will be determined during the AEMP design process and will be part of a separate monitoring plan. An AEMP framework is provided in Volume 2.

## 5.3 Adaptive Management

Throughout all phases of the mine life, PPML is committed to implementing effective adaptive management strategies, where applicable. Data collected as part of the monitoring program will be used to assess the need for adaptive management. Adaptive management strategies may involve improvement or modifications of environmental management plans (such as the MWMP), or temporary use of the contingency allowances included in the design of water management facilities.

The water management structures will be designed to provide for contingency (e.g., minimum operational freeboard for water retaining structures, and safety factor included in the design of the pumping systems), which allows accommodating unexpected hydrologic and operational conditions, as required. Potential adaptive management measures range in scale from construction of additional diversion structures, increasing pumping capacity, increasing water treatment capacity, increasing mine water storage capacity to implementing adjustments to the water management strategies.

Further details on the adaptive management measures applied to specific water management facilities will be developed during the design process. Adaptive management measures will also include water quantity, water quality, and other strategies related to changing water conditions on site.

# 6 References

MVLWB and AANDC (Mackenzie Valley Land and Water Board and Aboriginal Affairs and Northern Development Canada). 2013. Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories. Accessed March 2020. Available at https://mvlwb.com/sites/default/files/documents/wg/WLWB_5363_Guidelines_Closure_Reclamation_WR.pdf

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 Project Maps

Maps will be provided in a subsequent version showing planned water management infrastructure at various development stages.