Volume 1 Annex V1-7 Type A Water Licence Applications

Package P4-8

Hope Bay Project Boston Water Management Plan

MAC RESOURCES

HOPE BAY PROJECT
BOSTON WATER MANAGEMENT PLAN

HOPE BAY, NUNAVUT

DECEMBER 2017

Hope Bay Project Boston Water Management Plan

Plain Language Overview:

This Water Management Plan (WMP; the Plan) describes the water management practices for the Hope Bay project at Boston.

The WMP outlines legislation and guidance relevant to the Plan, and describes the water management facilities. It also identifies various water management issues, and the mitigation measures which TMAC will implement during operations, closure and care and maintenance.

The Plan is intended primarily for use by TMAC and its contractors to ensure that best practices are employed throughout all water management activities associated with activities at Hope Bay, thus ensuring water licence conditions are met and minimal potential downstream environmental impacts occur.

Hope Bay, Nunavut

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Revisions

Revision #	Date	Section	Changes Summary	Author	Approver
0	December 2017	Entire Document	Initial Document	TMAC	TMAC

Contents

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Glossary

Term	Definition
AEMP	Aquatic Effects Monitoring Program
CCME	Canadian Ministers of the Environment
DOE	Department of Environment
ECCC	Environment and Climate Change Canada
GN	Government of Nunavut
INAC	Indigenous and Northern Affairs Canada
KIA	Kitikmeot Inuit Association
MHBL	Miramar Hope Bay Ltd.
MMC	Miramar Mining Corporation
MMER	Metal Mining Effluent Regulations
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
PCP	Pollution Control Pond
TIA	Tailings Impoundment Area
TMA	Tailings Management Area
The Plan	Water Management Plan
TMAC	TMAC Resources Inc.

1 Introduction

This *Boston Water Management Plan* (the Plan) has been prepared by TMAC Resources Inc. (TMAC) in accordance with various water licences held by TMAC associated with developments throughout the Hope Bay region.

The Plan is intended primarily for use by TMAC and its contractors to ensure that best practices are employed throughout all water management activities associated with the operation, closure and care and maintenance of the Boston Site, thus ensuring water licence conditions are met and minimal potential downstream environmental impacts occur.

This document outlines TMAC's approach to water management as it pertains to the Boston Site.

1.1 Relevant Legislation and Guidance

Table 1-1 provides a summary of federal and territorial regulations governing the Boston Water Management Plan and associated guidelines.

Table 1-1. List of federal and territorial regulations and guidelines governing the Hope Bay Project Boston Water Management Plan

Regulation	Year	Governing Body	Relevance
Nunavut Waters Regulations	2013	Nunavut Water Board	Licence for mining and milling undertaking to use water and deposit of waste in relation to the construction, operation, closure and reclamation.
Environmental Protection Act	1988	Government of Nunavut (GN), Department of Environment (DOE), Environmental Protection division	Legislation to authorize discharge of water
Environmental Rights Act	1988	GN, DOE, Environmental Protection division	Grants all residents the ability to launch an investigation
Metal Mining Effluent Regulation(MMER)	2002	Federal Department of Fisheries and Oceans & Environment Canada	Allows for the designation of a water body for the deposition of mine waste and outlines requirements for mine-related discharges.
Territorial Lands Act	1985	Indigenous and Northern Affairs Canada (INAC)	Crown lease and land use permit
Canadian Environmental Quality Guidelines	1999	Canadian Council of Ministers of the Environment (CCME)	Provides guidance on water quality for the protection of aquatic life; both freshwater and marine

1.2 Related TMAC Documents and Programs

Table 1-2 provides a summary of documents related to the Boston Water Management Plan.

Table 1-2: Relevant documents to the Boston Water Management Plan

Document Title	Year	Relevance
Waste Rock and Ore Management Plan	2017	Management of surface contact water
Domestic Wastewater Treatment Management Plan	2017	Management of treated effluent
Hope Bay Spill Contingency Plan	2017	Spill response procedures
Quarry Management Plan	2017	Water management at sumps in quarries
Hope Bay, Madrid-Boston Project, Boston Tailings Management Area Operations, Maintenance and Surveillance Manual	2017	Management of excess water from the tailings and associated contact water ponds
Quality Assurance and Quality Control Plan	2017	Sampling practices document that is reviewed and approved by the NWB
Groundwater Management Plan	2017	Management of groundwater
Water and Load Balance Model	2017	Identification of source terms, modelling results
Compliance Sampling – Water Samples (REF # ENV-SOP-EM-002)	2017	Procedures to be followed for sampling water quality within containment berms and sumps, planning and execution of compliant water discharge

1.3 Plan Management and Execution

This Plan is reviewed annually and updated as needed.

Personnel responsible for implementing and updating the Plan are identified in Table 1-3.

Table 1-3. Roles and responsibilities

Role	Responsibility
Mine General Manager	• Overall responsibility for and implementation of this management plan; • Provide the on-site resources to operate, manage, and maintain water management infrastructure, such as pipelines, diversion berms, lined ponds and holding tanks; • Provide input on modifications to design and operational procedures to improve operational performance.
Surface Manager (or designate)	• Conduct regular inspections of the water management facilities and audits of the maintenance records; • Responsible for tracking water movements between the various water management facilities, including from the pollution control ponds and sumps to the tailings impoundment area (TIA); • Maintain records of the source, disposition and volume of water transported/discharged; • Report irregularities identified during visual inspections to the VP Operations.
Environment Coordinator	• Review and update this management plan as required; • Monitor water quality in the ponds, TIA and discharge points; • Assess whether water quality samples have met applicable regulatory standards and guidelines; • Coordinate with the surface manager responsible for water movements between the various water management facilities to ensure compliance with all licence requirements; • Audit of water management tracking records and all associated required reporting.

2 Water Management Strategy

2.1 Water Management Objectives

The objectives of water management at the Boston Site are as follows:

- Minimize total volume of water which comes into contact with mining infrastructure by diverting non-contact runoff away from mining works;
- Capture and contain water which is deemed unsuitable for immediate discharge;
- Treat and dispose of water which cannot be discharged to meet water license requirements.

2.2 Water Classification

Water encountered at the Boston Site is classified into five categories based on the contact surface. Each type of water is managed separately to achieve the water management goals, outlined in Section 2.1. Table 2-1 presents the water classifications.

Table 2-1: Water Classification

Type	Contact Surface
Non-Contact Water	Undisturbed runoff, runoff from access roads and overburden piles, quarries, fuel facilities and landfills
Mine Water	Water which enters the underground workings
Contact Water	Runoff in contact with waste rock, ore stockpiles, tailings, and process water
Freshwater	Freshwater from lake
Treated Sewage water	Domestic sewage

2.3 Management Approach

Figure 1 presents a flow diagram of the water management approach for Boston Site. The following sections outline management and discharge strategy for each water classification.

2.3.1 Non-Contact Water

Best Management Practices (BMPs) will be put in place during construction of access roads and pads to ensure that sediment loading after initial material placement is controlled. This may include silt fences or coco matting around construction activities during the initial rainfall and snowmelt periods.

It is anticipated that increased sediment loading may occur in runoff from the overburden pile because of fine, naturally-occurring material. Runoff from the overburden pile will be captured in the non contact water pond. The all-weather road will act as a rock drain, providing storage for sediment removal prior to discharge south towards the tundra.

Runoff collected in individual quarries will be collected at the natural low point in each quarry area. If required, a sump may be constructed to improve containment of runoff at the based of the quarry. Excess water will be pumped to surface and tested against the discharge limits. Suitable water will be discharged to the tundra at an approved location.

A sump will be constructed at the natural low point in the landfarm, landfill and fuel facilities. Vacuum trucks will dewater the sump and either discharge to surface or truck the water to contact water pond #2, pending water quality results.

2.3.2 Contact Water

Contact water consists of tailings water, process water, waste rock and ore stockpile runoff. Process water is internally recycled in the Boston process plant, and excess water is sent to the water treatment plant.

Waste rock and ore stockpile runoff will be collected in two contact water ponds. Contact water pond #1 will collect runoff from the waste rock pile north of the Madrid-Boston all-weather road. The outflow from contact water pond #1 will be a pumping station directing contact water to contact water pond #2, and ultimately the water treatment plant.

Contact water pond #2 will be situated between Aimaokatalok and Stickleback lakes, and will capture runoff from the infrastructure pads containing the process plant and camp. Excess water from contact water pond #2 will flow over a spillway into the connected surge pond.

Contact water from the Boston TMA will be collected in three additional contact water ponds. Where possible, water from the contact water ponds will be used to supplement make up (and other industrial use) water.

The surge pond will be a lined facility, collecting contact water prior to treatment. Excess water from the contact water pond #1 and #2, as well as purge water from the process plant and excess water from the tailings ponds, will be pumped to the surge pond, which will have a pipeline directly to water treatment plant. Treated water will be discharged into Aimaokatalok Lake. Contact water collected in the surge pond may also be used as mill make-up water, or discharged to the tundra if water quality meets discharge requirements.

2.3.3 Mine Water

The Boston Mine will be completely within permafrost, and no groundwater interception is anticipated (SRK, 2017j). The management of any unplanned groundwater interception is presented in the Hope Bay Groundwater Management Plan (TMAC, 2017c).

2.3.4 Freshwater

Freshwater, including potable and raw water for industrial use (brine mixing, dust suppressant, and process makeup water), will be sourced from Aimaokatalok Lake via the water intake access road.

2.3.5 Treated Sewage Water

Domestic sewage will be treated on-site, and discharged either to the tundra or to Aimaokatalok Lake.

3 Facility Operations, Monitoring and Inspection

3.1 Overview

The mine facilities relevant to this water management plan are a combination of existing facilities and facilities that are planned for construction as part of the FEIS. Table 3-1 provides a summary of mine infrastructure relevant to this Water Management Plan.

Table 3-1: Facilities within the Mine Area and Associated Water Management Infrastructure

Facility	Reporting to
Waste Rock Pile	Contact Water Pond #1
Existing Camp Pad	Contact Water Pond #1
Overburden Pile	Non-Contact Water Pond
Landfarm	Aimaokatalok Lake or Contact Water Pond #2
Laydown Area	Contact Water Pond #2
Proposed Camp Pad	Contact Water Pond #2
Process Plant and Power Plant Pad	Contact Water Pond #2
Fuel Facility	Contact Water Pond #2
Water Treatment Plant	Aimaokatalok Lake
Quarries	Aimaokatalok Lake or Contact Water Pond #2

3.2 Contact Water Pond #1

Contact water pond #1 contains runoff from the waste rock stockpile and is contained against a contact water access road berm. The pond is unlined and is sized to contain the 100-year 24-hour rainfall event with the average daily maximum snowmelt. At the maximum level, the freeboard against the contact water access road berm is 1.3 m.

3.2.1 Operation

The pond should be operated at a near-empty level such that capacity is always available for the design rainfall and snowmelt events.

After an inflow event, resulting from snowmelt or a precipitation event, pumps should be activated to dewater contact water pond #1 to contact water pond #2. The maximum dewatering period is 14 days, based on the design capacity of the pond and pump. Should the pond water level approach the freeboard limit, dewatering should be immediately initiated via the pump and pipeline.

3.2.2 Monitoring

Water level in the pond should be measured weekly during the open water season, and more frequently during intensive rainfall or snowmelt periods.

The pumps should have in-line flow meters to quantify total discharge.

A water quality sample should be collected twice annually during operations; once during the spring snowmelt period and once during the regular open-water season. Further details on monitoring are presented in Section 4. If water quality meets the designed criteria for discharge, excess water may be discharged to tundra at an approved location.

3.2.3 Inspection

The contact water pond access road berm should be inspected by the Surface Manager on a regular basis to check for signs of seepage, erosion, slumping, or other signs of possible failure mechanisms.

Regular inspection along the dewatering pipeline will be performed by the Site Services department to check for signs of leaks.

An annual inspection of the containment berm will also be conducted as part of the Annual Geotechnical Inspection by the Engineer of Record (EOR). Results of the inspection are submitted with the applicable Water License Annual Report by March 31 of each year.

3.3 Contact Water Pond #2

Contact water pond #2 collects runoff from the infrastructure pads containing the process plant and camp, and is contained against a contact water access road berm. Other inflows to the contact water pond #2 include pumped flows from contact water pond #1, vacuum truck loads of water from quarries or landfill that do not meet discharge criteria, excess process water, and excess water collected from the TMA contact water ponds.

The pond is unlined and is designed to contain the 100-year 24-hour rainfall event as well as the average 24-hour snowmelt. Additional contingency is included for water treatment plant surge, equal to two days of the maximum predicted treatment rate. The maximum water level of the pond is 1.3 m below the berm crest.

At the maximum water level, the contact water pond #2 overtops through a spillway to the adjoining surge pond.

3.3.1 Operation

The contact water pond #2 is designed as an event pond and should be dewatered after each storm or snowmelt inflow. The pump in the contact water pond #2 should be activated once the inflow event is complete in order to maintain capacity for further events. The maximum dewatering period is 14 days, based on the design capacity of the pond and pump. Water in excess of the design capacity of the pond will spill into the surge pond via the engineered spillway.

3.3.2 Monitoring

Water level in the contact water pond #2 should be measured weekly during the open water season, and more frequently during intensive rainfall or snowmelt periods.

Discharge over the spillway should be quantified through a standard weir relationship, based on a continuous water level reading directly upstream of the spillway.

3.3.3 Inspection

The contact water pond access road berm should be inspected by the Surface Manager on a regular basis to check for signs of seepage, erosion, slumping, or other signs of possible failure mechanisms.

An annual inspection of the containment berm will also be conducted as part of the Annual Geotechnical Inspection by the Engineer of Record (EOR). Results of the inspection are submitted with the applicable Water License Annual Report by March 31 of each year.Surge Pond

The surge pond is a fully lined facility which acts as the main feed pond to the water treatment plant. Inflows to the surge pond occur as a result of overtopping from contact water pond #2, pumped flows from contact water pond #2, and purged flows from the water treatment plant during temporary maintenance.

The capacity of the surge pond is not based on hydrologic inflows from rain or snowmelt, as the catchment runoff for the surge pond is captured in contact water pond #2. The capacity is set to two times the daily average water treatment plant rate.

3.3.4 Operation

The surge pond is dewatered to the water treatment plant, which has a fluctuating operations rate. The operations rate of the plant will be equal to or greater than the sum of the dewatering rate and the overflow from the contact water pond #2 pump and spillway, respectively, such that total outflow is always greater than total inflow.

3.3.5 Monitoring

Water level in the surge pond should be measured weekly during the open water season, and more frequently during intensive rainfall or snowmelt periods.

The treatment plant feed pump will have in-line flow meter to quantify total inflow to the plant and total flow out of the plant.

A water quality sample will be collected in the pond on a monthly basis during discharge periods.

An additional water quality sample will be collected at the water treatment plant discharge. Further details on monitoring are presented in Section 4.

3.3.6 Inspection

The contact water pond access road berm should be inspected by the Surface Manager on a regular basis to check for signs of seepage, erosion, slumping, or other signs of possible failure mechanisms.

An annual inspection of the containment berm will also be conducted as part of the Annual Geotechnical Inspection by the Engineer of Record (EOR). Results of the inspection are submitted with the applicable Water License Annual Report by March 31 of each year.

3.4 TMA Contact Water Ponds

Contact water from the Boston TMA will be collected in three unlined contact water ponds, built in series. Ponds will be contained against lined access roads which will act as containment berms. Where possible, water from the contact water ponds will be used to supplement make up (and other industrial use) water. The ponds will be in-place during construction of the TMA through the final cover installation in closure. The maximum water level of the ponds are 1.3 m below the berm crest.

3.4.1 Operation

Pumps will be in place at the most downstream pond, moving water to contact water pond #2 for treatment and discharge. Further details on pond operation and containment design are presented in the Boston TMA Operations, Maintenance and Surveillance Manual (TMAC, 2017g)

3.4.2 Monitoring

Water levels in each of the ponds should be measured weekly during the open water season, and more frequently during intensive rainfall or snowmelt periods.

The main pump and pipeline to contact water pond #2 should have in-line flow meter to quantify total flow collected and pumped for treatment.

A water quality sample will be collected twice annually during operations; once during the spring snowmelt period and once during the regular open-water season. Further details on monitoring are presented in Section 4. If water quality meets the designed criteria for discharge, excess water may be discharged to tundra at an approved location.

3.4.3 Inspection

Inspection details are summarized in the TMA Manual (TMAC, 2017g).

3.5 Non-Contact Water Pond

Runoff from the overburden pile will drain by gravity towards the Madrid-Boston all-weather road which will act as a flow-through structure for the non-contact water pond. Water will slowly filter through the road, depositing entrained sediments in the pond prior to discharge. The pond is sized to store the 100-year 24-hour duration rainfall event with the daily average snowmelt.

3.5.1 Operation

After a storm event, water will discharge through the flow through structure. No pumps will be required. An overflow culvert will cross the access road at the maximum operating level of the pond. The culvert will pass excess flow in case of clogging of the leaky dam and will prevent water from overtopping the access road.

3.5.2 Monitoring

Water level in the non-contact water pond should be measured after a storm event or snowmelt period.

Annual water quality samples will be collected during construction and operations. Further details on monitoring are presented in Section 4.

3.5.3 Inspection

The Madrid-Boston all-weather road berm should be inspected by the Surface Manager on a regular basis to check for signs of erosion, clogging, slumping, or other signs of possible failure mechanisms.

An annual inspection of the containment berm will also be conducted as part of the Annual Geotechnical Inspection by the Engineer of Record (EOR). Results of the inspection are submitted with the applicable Water License Annual Report by March 31 of each year.

3.6 Quarry Water Management

The quarries will be developed such that runoff drains to the low point and is confined within the quarry boundaries. Sumps will be constructed on an as-needed basis, depending on the geometry of the quarry. For further detail, reference the Quarry Management and Monitoring Plan (TMAC, 2017d).

3.6.1 Monitoring

After storm events or snowmelt, a sample of the ponded water will be collected. If the water quality is acceptable for discharge, care will be taken to ensure that discharged water does not enter fish bearing waters and that the pump discharge is positioned in a manner that minimizes erosion and siltation of the area downstream of the discharge.

In the event that the quarry water does not meet the discharge criteria, an inquiry of the cause of the noted exceedance will be conducted, and appropriate mitigation developed. Any non-compliant water that needs to be discharged would be transported to contact water pond #2 for treatment.

3.7 Landfarm Water Management

Water management at the landfarm facilities is self-contained and consists of a series of ponds. Operations and monitoring as well as inspection of landfarm water management infrastructure are described in the Hydrocarbon Contaminated Material Management Plan (TMAC, 2017h).

3.7.1 Monitoring

A water quality monitoring station will be situated at the landfarm sump. A sample will be collected prior to discharge. Details on water quality monitoring are presented in the Hydrocarbon Contaminated Material Management Plan (TMAC, 2017h).

3.8 Landfill Sump

A sump will be situated at the base of the landfill which will be dewatered by a vacuum truck.

3.8.1 Monitoring

After a storm event or snowmelt, a water sample will be collected. This water will be tested in the on-site laboratory prior to discharge. If water quality is within the required limits for discharge, the water will be discharged to the tundra at a location approved by the inspector, or else water will be discharged into the contact water pond #2.

3.9 Fuel Facility Water Management

Fuel facilities at Boston will include self-contained sumps.

3.9.1 Monitoring

After a storm event or snowmelt, a water sample will be collected at the Boston fuel facility sump. This water will be tested in the on-site laboratory prior to discharge. If water quality is within the required limits for discharge, the water will be discharged to the tundra at a location approved by the inspector, or else water will be discharged into one of the contact water ponds.

3.10 Sewage Treatment

Domestic sewage will be treated on-site. During construction and closure, the treated effluent will be discharged to the tundra off the water discharge access road. The discharge pipeline will consist of a series of diffusers, situated such that each stream will flow in a different direction at the top of the catchment. During operations, the treated sewage water will be mixed with effluent from the water treatment plant and discharged via the main discharge pipeline into Aimaokatalok Lake.

3.10.1 Monitoring

A monthly water quality sample will be collected during discharge periods at end-of-pipe.

During discharge to the tundra in construction and closure, additional monitoring will take place at the diffusers. Signs of erosion will be noted and mitigation measures will be implemented by realigning the diffuser pipeline or protecting erodible material.

3.11 Freshwater Intake

Domestic, industrial and potable water will be pumped from Aimaokatalok Lake at the water intake via the access road. The intake pipeline will follow the access road and will transition from shoreline to lakebed beneath a protective rock berm. The insulated heat-traced pipeline will be anchored to the lakebed beneath the rock berm until the lake depth is a minimum of 3 m year-round. The pipeline will continue along the lake bed until the lake depth is a minimum of 5 m year-round. At the pipeline inake, a fish screen will be installed to protect fish in the lake, as per the requirements of Department of Fisheries and Oceans (Department of Fisheries and Oceans, 1995).

3.11.1 Monitoring

A water quality sample will be collected on a monthly basis during active pumping periodsat the freshwater intake. Further details on monitoring are presented in Section 4.

An in-line flow meter will measure total water volume extracted from Aimaokatalok Lake.

3.11.2 Inspection

Regular inspection along the intake pipeline will be performed by the Site Services department to check for signs of leakage.

4 Detailed Monitoring Plan

4.1 Monitoring Objectives

The objective of the monitoring undertaken under this Plan is to:

- Comply with monitoring requirements outlined in applicable water licences, project certificates, and the *MMER*;
- Ensure water in the surge pond, and that directed to the water treatment plant are characterized to provide information for appropriate operation of the treatment facility;
- Ensure water being discharged to the environment meets the appropriate discharge limits;
- Ensure points of discharge to tundra are not negatively affected by pooling water or erosion; and
- Ensure tracking of water movement and volumes.

Monitoring is carried out in accordance with the Standard Operating Procedures. It is anticipated that the Boston Site will have similar monitoring requirements for associated facilities as per the existing Type A Water Licence Type A Water Licence 2AM-DOH1323

4.2 Discharge Criteria

Water samples from quarries, landfills, landfarms, non-contact water ponds, and contact water ponds will be collected and compared against discharge limits in Table 4.2, as required under MMER.

Table 4-1: Effluent limits during periods of discharge to tundra

Parameter	Units	*MMER*
pH		6 to 9.5
Total Suspended Solids	mg/L	15
Total Cyanide	mg/L	1
Arsenic	mg/L	0.5
Copper	mg/L	0.3
Lead	mg/L	0.2
Nickel	mg/L	0.5
Zinc	mg/L	0.5
Radium	Bg/L	0.37

If water quality samples meet the discharge limits, excess water will be discharged to the tundra at an approved location. All water which does not meet discharge limits outlined in Table 4-2 will be pumped to the contact water pond #2 and treated in the water treatment plant.

4.3 Inspections

Routine visual inspections of all water management structures will be completed by site staff to determine whether the facilities are operating as designed and to assess maintenance requirements. Facility inspections are carried out following significant rain events and throughout the annual snowmelt period. Annual geotechnical inspections of all engineered facilities are carried out by the engineer of record. During construction activities, daily visual inspections and inspections after significant rain events, including those associated with freshet, are completed to:

- Monitor for signs of erosion and implement mitigation measures to prevent entry of sediment to any water body;
- Integrity of all piping and other water conveyance structures;
- Signs of erosion or water pooling occurring during high flow periods;
- Volumes of water in the contact water ponds;
- Geotechnical integrity of contact water berms; and
- Integrity of erosion protection at point of discharge to the tundra.

Any irregularities identified during the visual inspection will be recorded and relayed to the VP Operations and/or the Engineer of record for the facility in order to ensure corrective action can be implemented.

4.4 Documentation and Reporting

All monitoring data compiled will be documented and reported as prescribed under the water licence, MMER, or otherwise. Any data not explicitly requiring monthly reporting under the Water Licence will be reported in the existing Annual Reports to the NWB. These reports will include but are not limited to:

- An assessment of data to identify areas of non-compliance with regulated discharge parameters;
- A summary of all water inputs to the water treatment plant, water treatment plant discharges and discharges to tundra; and
- Annual review of the water balance and water quality predication model.

Water management facility inspection and operations records will be retained on site and available for review upon request.

An Annual Geotechnical Inspection Report will be submitted to the NWB annually.

A Construction Monitoring Report will be prepared in applicable years and submitted to regulators where required. The report will include but is not limited to the following:

- A summary of all inspections conducted during construction; and
- Updated “As-built” drawings of the constructed infrastructure.

4.4.1 Record Keeping

Records of operation and maintenance are required to evaluate the effectiveness of the operation of all water management structures. Daily records include the following information:

- Volume, quality and discharge location of any effluent moved between facilities or discharged to environment; and
- Details of any construction or maintenance undertaken at site.

Record sheets and daily operations or inspection logs are maintained with the Site Surface Operations and Environmental Departments.

Results of sampling are reported to the NWB in conjunction with Annual Reporting.

4.4.2 Monitoring

Continuous monitoring of Aimaokatalok water levels will occur under the Aquatic Effects Monitoring Program (AEMP).

Non-contact and contact water ponds will have permanent staff gauges to allow for visual monitoring of water accumulations in each pond. Weekly staff gauge readings converted to volumes will be recorded in for each pond.

All volumes of water movements will be monitored with flow meters, tracked by truck load, or otherwise quantified as appropriate during the transfers. These include, but are not limited to, movements from:

- Discharges to tundra;
- Transfers between contact water ponds;
- Transfers to the water treatment plant; and
- Water treatment plant effluent to Water Discharge Pipeline and into Aimaokatalok Lake, and

Water quality in the ponds and discharge points will be monitored in accordance with Table 4.2 herein, the Water Licence and MMER where applicable. Confirmation of compliance will be required prior to discharging any water from facilities, as applicable. The Environmental Department is responsible for water quality monitoring and compliance reporting.

5 Closure and Care and Maintenance

5.1 Water Management at Closure and Post-Closure

At closure, all ponds will be dewatered to the water treatment plant. Waste rock piles will be removed and placed as backfill in the underground, and the underlying pads will be revegetated. The Boston TMA will be covered. Runoff from contact water ponds #1 and #2, as well as the ponds downstream of the TMA and the non-contact water pond, will be monitored during the initial precipitation events after reclamation to ensure water is acceptable for discharge. All ponds will then be dewatered and decommissioned.

Post-Closure sampling will be described in the Final Closure Plan and at the time of water licence renewal.

5.2 Care and Maintenance Options

Should the project be placed into Care and Maintenance, contact water will continue to be pumped to the water treatment plant and discharged to Aimaokatalok Lake. Monitoring will continue as described above and as required under the MMER.

6 References

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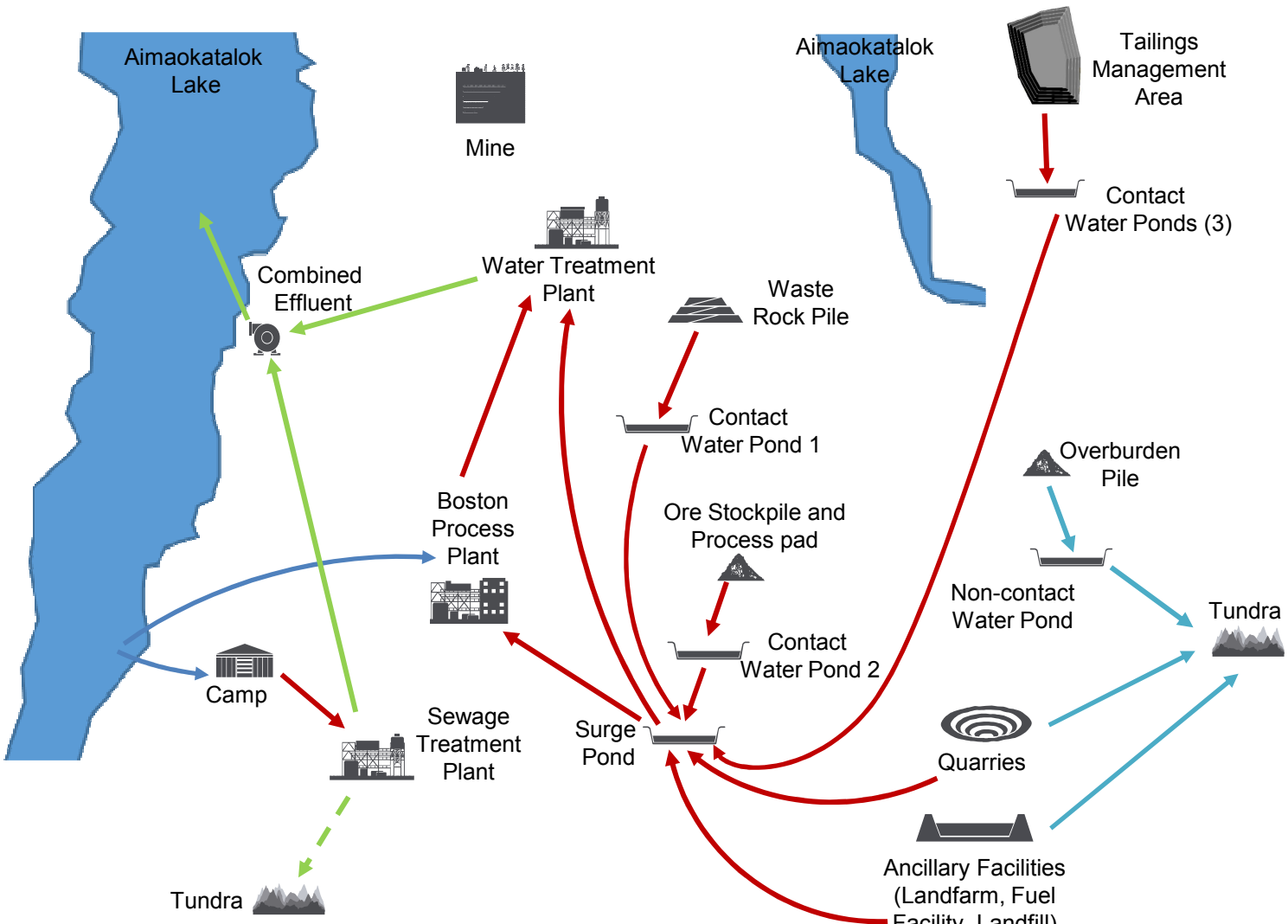
Figures



Legend

- Treated Water (Operations)
- Non-contact Water
- Freshwater
- Contact Water
- Mine Water
- Treated Water (Closure and Construction)

srk consulting

TMAC RESOURCES

Boston Water Management Plan

Boston Flow Diagram

Job No: 1CT022.013

Filename: HopeBay_WaterMgmtSchematics_20171121_1CT022-012_sab_ajb_CH_sst.pptx

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Date:	Approved:	Figure:
Nov. 2017	SAB	1