OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

AGNICO EAGLE

REVISION 8

HOPE BAY, NUNAVUT

MARCH 2025

Operations, Maintenance and Surveillance Manual: Hope Bay Doris Tailings Impoundment Area

Plain Language Overview:

This Tailings Impoundment Area (TIA) Operation, Maintenance and Surveillance Manual (OMS Manual) is also known as the Tailings Management Plan. This OMS Manual describes how AEM is managing and monitoring the tailings impoundment area, including the impoundment dams, tailings and water pump and pipeline systems. This document describes how tailings deposition will be carried out during operations and demonstrates how AEM will ensure the TIA remains safe during pe. This document should be read in conjunction with the latest North Dam and South Dam monitoring Standard Operating Procedures (SOPs).

Hope Bay, Nunavut

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Revisions

Revision #	Date	Section	Changes Summary	Author	Approver
0	June 2016	Entire Document	Initial Document	SRK	TMAC
1	August 2016	Entire Document	References added	SRK	TMAC
		Section 1.5, Table 3	List updated		
		Section 2.1, Table 4	List updated		
		Section 3.3.5, 3.10	Added contingency pumping for excess mine water		
		Section 3.4.3, Section 3.8, Table 6	Removed optionality of constructing Interim Dike; Added construction timing of Interim Dike		
		Section 4.4	Added approval process for alternate chemical dust suppressants		
		Section 4.5	Reference water management during Care and Maintenance		
		Section 5.3.1	Added Figure 12 pertaining to shoreline protection measures		
		Section 6.4, 6.5.4	Added tailings geochemical monitoring		
		Section 6.5.3	Referenced TIA water quality monitoring		
		Section 7	List updated		
		Figures	Added new Figure 12 and renumbered remaining Figures 13 through 17		
		Appendix A	Included appendix information previously omitted		
2	November 2017	Entire Document	Changes made to account for Phase 2 TIA requirements	SRK	TMAC
3	August 2020	Entire Document	Document format updated. Updates post construction of the Phase 1 South Dam. Report still accounts for Phase 2 requirements. Updates to meet new Mining Association of Canada (MAC) guidelines.	SRK	TMAC
4	February 2022	Entire Document	Updated to include AEM Governance of Critical Infrastructure , change of ownership, TARP levels	AEM	AEM

5	April 2022	Section 3.6	Updated Spillway and Interim Dike section for activities as listed in the Care and Maintenance Plan	AEM	AEM
6	March 2023	Entire Document	Updated structure of document to reflect incorporation into the Dam Safety Management System. Updated the DEP. Linked OMS to ERP Updated contact information. Updated with new TIA infrastructure.	AEM	AEM
7	March 2024	Entire Document	Updated to include the construction of the Interim Dike, updated water elevation TARPs, links to updated ERP and updated contact information.	AEM	AEM

Revision # and Date	**Section Updated**	**Summary of Update**	**Updated By**
Rev 8, March 2025	Section 1.1	Added EOR to list of reviewers	BJ
	Section 1.1	Added “construction of new facilities” to trigger review and updates	BJ
	Sections 2.1,2.2	Updated responsibilities and contact information for defined roles	BJ
	Section 3.5	Added “Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities, V 2.1 (2021)” to the list of relevant legislation and guidance	BJ
	Section 3.11	Added specific reference to Dam Emergency Plan and removed repeated information.	BJ
	Section 4.1	Updated section to reference ERP stored at external location to the OMS manual. Updated section to include description of where paper copies of the DEP and ERP are located on site.	BJ
	Table 4-3	Updated Timeline definition for changing TARP level back to GREEN	BJ
	Table 4-4	Added a column for the Interim Dike	BJ
	Section 4.5.1	Added text to reference thermal TARPs alongside water elevation TARPs	BJ
	Section 5.1	Added mitigation options	BJ
	Section 5.2	Added note that deposition plan to be updated prior to resuming operations	BJ
	Section 5.4	Added a section for North Dam active cooling system	BJ
	Section 5.5	Added some text regarding dust suppression mitigation options	BJ
	Section 5.12.1	Added note to draw water levels down before freeze-up at the Interim Dike	BJ

	Section 6.1	Added text to the description of maintenance scope	BJ
	Section 6.2, 6.3	Updated “Scope” and “Persons Responsible” sections	BJ
	Section 6.3	Updated “Scope” and “Persons Responsible” sections	BJ
	Section 7.5	Updated section name to match the name for the Annual Inspection that occurs each year. (“DSI” changed to “AGI”)	BJ
	Section 7.8	Updated Interim Dike monitoring criteria. Future updates of this document will include a separate SOP document for the Interim Dike.	BJ
	Section 8	Updated section to reference ERP stored at external location to the OMS manual. Updated section to include description of where paper copies of the DEP and ERP are located on site.	BJ
	Appendix E	Added O&M manual for active cooling system installed in 2024	BJ

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Useful Definitions

AEM	Agnico Eagle Mines
AEP	annual exceedance probability
ARD	acid rock drainage
CDA	Canadian Dam Association
AGI	annual geotechnical inspection
DSR	dam safety review
EOR	engineer of record
FEIS	final environmental impact statement
FSL	full supply level
GCL	geosynthetic clay liner
IDF	inflow design flood
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
KIA	Kitikmeot Inuit Association
MAAT	mean annual air temperature
MAC	Mining Association of Canada
MAP	mean annual precipitation
MAR	mean annual runoff
MMDER	Metal and Diamond Mining Effluent Regulations
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
OMS	operations, maintenance and surveillance
PAG	potentially acid generating
PGA	peak ground acceleration
PMF	probable maximum flood
ROQ	run-of-quarry
SOP	standard operating procedures
SRK	SRK Consulting (Canada) Inc.
TIA	tailings impoundment area
TMA	tailings management area
TMS	tailings management system
TMAC	TMAC Resources Inc.
TPD	tonne per day
WAD	weak acid dissociable
WMMP	wildlife monitoring and management plan

1 Introduction

This operations, maintenance, and surveillance (OMS) manual is for the Doris Tailings Impoundment Area (TIA). It was prepared by SRK Consulting (Canada) Inc. and is updated by Agnico Eagle Mines Limited (AEM) and in accordance with various water licences held by AEM and associated with developments throughout the Hope Bay region.

Objectives

This manual outlines the framework and procedures AEM and its contractors use to ensure:

- operation, maintenance, surveillance of the TIA are carried out safely,
- best practices for minimizing potential environmental impacts and liabilities with respect to the Doris TIA are followed, and
- the water licence conditions are met.

Structure

This document is structured to function as a standalone manual that provides guidance on all aspects of the operation, maintenance and surveillance of the Doris TIA. It incorporates Industry Standards as well as AEM Corporate Standards and Policies on Tailings and Water Management. This document plays a critical role in the Dam Safety Management System (DSMS) at Hope Bay.

Note: In the event of a new water licence or an existing licence amendment, only the portions of this manual pertaining to that licence will need to be revised in this TIA OMS Manual.

Contents

In addition, this manual defines and describes the

- roles and responsibilities of personnel assigned to the TIA;
- procedures and processes for managing change;
- key components of the TIA;
- procedures required to operate, monitor performance , and maintain the TIA to ensure that it functions in accordance to its design, meets regulatory and corporate policy obligations, and links to emergency planning and response; and
- requirements for analysis and documentation of the performance of the TIA.

1.1 Managing Updates

When to Update

The procedures required to operate and maintain the TIA can change in response to changes in site conditions or changes to mining operations. Because this manual is a controlled document, it is a "living document" that will be updated to reflect those changes.

Annual Updates

This manual will be reviewed annually as required by the AEM governance policy for critical infrastructure (AEM 2020), with input from appropriate AEM site staff, and based on recommendations from

- the Engineer of Record (EOR)
- The Responsible Person (RP)
- The Design Engineer (DE)
- The Hope Bay Independent Review Board (IRB)
- Third party Dam Safety Review (DSR)

Other Update Triggers

Revisions or updates can be triggered by activities such as

- changes in dam classification,
- operational performance,
- New facility construction
- personnel or organizational structure,
- mine ownership,
- regulatory or social considerations, and
- life cycle or design philosophy.

Update Procedure

Updates to this OMS manual are carried out annually as follows:

Step	Action
1	The Responsible Person (RP) or an individual designated by the RP is to submit proposed changes to the EOR for review and authorization.
2	If changes are related to TIA design elements as stipulated in Section 3 (specifically 3.10), submit them to the DE and EOR for review and approval.
3	The RP is responsible to communicate any changes that are going to be made to this OMS by e-mail to the control copy distribution list; for all areas regardless of if they fall under the 'design' or 'operation' categories.

4	Once approved, incorporate changes into the manual. Revisions to the OMS are to be clearly documented in the revision control table (found at the beginning of this OMS). Once revisions have been made, the updated versions are to be distributed to all parties listed in Section 2.1 and placed on Intelex. Out-of-date materials are to be removed and archived.

Control Copy Locations and Responsibility

Copies of this manual are available at these locations. The latest version is available on Intelex.

Copy Location	Position
Site Incident Command Center	H&SGeneral Supervisor
External	Design Engineer (SRK)

Digital Control Copy

A digital control version of this OMS (pdf) is uploaded by AEM to the following server location: W:\Environment\Emergency, Spill and WRT Response. The digital version is only considered “controlled” at this one online location.

Uncontrolled Copies

Printed or electronic copies of the OMS Manual found at other locations will be considered uncontrolled versions.

1.2 Related Documents

The documents below should be used in conjunction with this manual.

Operating Procedures	• **North Dam Monitoring: Standard Operating Procedures – Revision 4 (2024)** – North Dam Monitoring Standard Operating Procedures (SOP) • **South Dam Monitoring: Standard Operating Procedures – Revision 1 (2024)** – South Dam Monitoring Standard Operating Procedures (SOP) • For Interim Dike Operating Procedures see Section 4 and Section 7.8
Emergency Planning and Dam Safety Management System	• **Emergency Response and Crisis Management Plan (ERP) (2024)** – Describes Incident Command System and actions relating to all surface emergencies. • **Dam Emergency Plan (2024)** – Describes emergency response related to TIA components. See Appendix F. • **Trigger Action Response Plans (2024)** – Details trigger values and associated actions for TIA monitoring and monitoring instrumentation. See Appendix G. *See section 4 for a detailed overview of the DSMS.*
Design Documentation	**Preliminary Tailings Dam Design (2007)** – North Dam design documentation (SRK 2007) **North Dam As-Built Report (2012)** – North Dam as-built documentation (SRK 2012) **Doris Tailings Impoundment Area Interim Dike Filter Trade-off Study (2016)** – Memo clarifying the purpose of the Interim Dike and a trade-off study of two different filter designs (SRK 2016). Interim dike not part of Phase 2 plans. **Doris Tailings Management System Phase 2 Design, Hope Bay Project (2017)** – Report documents TMAC's proposed changes to currently permitted TMS to accommodate additional volume of tailings produced as part of Phase 2 development (SRK 2017b) **Engineering Drawings for the South Dam – Phase 1 (2017)** – South Dam – Phase 1 Issued For Construction Engineering Drawings **Doris Tailings Management System Phase 2 Design (2017)** – Report overviews the Phase 2 design of the Doris Tailings Management System and Facility (SRK 2017b). **South Dam Design Report (2019) –** formal documentation for the South Dam design (SRK 2019b) **South Dam Phase 1 As-Built Report (2019)** – South Dam as-built documentation (SRK 2019a) **Doris TIA – 2022 Interim Dike** – Design report for Interim Dike (SRK 2022b) •
Environmental	**Climate and Hydrological Parameters Summary Report (2017 and 2022)** – Climate and hydrological parameters and analysis for the Doris and Boston sites (SRK 2017c). An updated climate study was completed in April 2022 (SRK 2022c).

Water Management	**Doris and Madrid Water Management Plan (2023)** – Describes the water management procedures including discharge from the TIA and associated water quality criteria (AEM 2022) **Groundwater Management Plan (2022)** – Describes the groundwater inflow predictions and associated management procedures for handling this water (AEM 2022) **Groundwater Inflow and Quality Model (2015)** – Describes results of hydrogeological modeling to estimate the potential quantity and quality of groundwater flow into the mine (SRK 2015c). An informal groundwater inflow audit was completed in 2022 (reporting is currently in progress) **Site-Wide Water and Load Balance (2023)** – Water and load balance to evaluate water management needs and predict water quality at the Project and downstream receptors (SRK 2022)
Tailings and Waste Management	**Doris North Project Tailings Management System Design (2015)** – South Dam and Interim Dike design and tailings management plan (SRK 2015a) **Geochemical Characterization of Tailings from the Doris Deposits and FEIS Characterization (2015)** – Geochemical characterization of the tailings to be deposited into the TIA (SRK 2015b) **Hope Bay Waste Rock and Ore Management Plan (2023)** – Management plans for waste rock and ore at the Hope Bay project sites (AEM 2023b)

2 Roles and Responsibilities

2.1 Governance and Individual Responsibilities

Agnico Eagle is committed to the protection of the public, the environment and its personnel. The company has developed a governance policy for its critical infrastructure to ensure their management in an appropriate and responsible manner (AEM 2020). The primary elements of the policy are:

- The development of specific roles with specific responsibilities;
- Regular and consistent reporting;
- Accountability at all levels, from operations to corporate;
- The use of Best Available Technology (BAT) and Best Applicable Practices (BAP); and
- The use of a risk-based approach to manage the risks associated with critical infrastructure

The persons responsible for operations, maintenance, surveillance, emergency preparedness, and emergency response along with the governance policy are listed below and in Appendix A, which also provides the site management structure.

Accountable Executive Officer (AEO)	As emphasized by MAC (2019), the accountability for decisions related to tailings management rests with the Owner's Board of Directors or Governance Level. The Board of Directors or Governance Level is expected to designate an Accountable Executive Officer (AEO) for tailings management. More specifically, the following responsibilities are assigned to the AEO: • Needs to be aware of key outcomes of water management risk assessment and of how these risks are being managed • Has accountability and responsibility for putting in place appropriate management structure • Assign responsibility and appropriate budgetary authority for tailings management • Define the personnel duties, responsibility and reporting relationships, supported by job description and organisational charts to implement the tailings management system through all stages in the facility life cycles • Provide assurance to AEM and its Community of Interest that tailings are managed responsibly
Mine General Manager	• Identify the scope of work and budget requirement for all aspects of tailings management • Approve budget for operations, maintenance, and surveillance related activity • Establish an organisational structure with Roles and Responsibilities that meets the Governance Standard on Critical Infrastructure

	• Identify and retain a Responsible Person (RP) • Liaise with independent reviewer (IRB) as required
General Superintendents and Supervisors	Ensure the OMS responsibilities delegated to the departments they oversee are carried out as described in this section of the OMS Manual
Engineer of Record (EoR)	The function of EoR is to support AEM in ensuring that mine waste and water management infrastructure are designed and operated properly. The owner, in assuring that these facilities are safe, has the responsibility to identify and retain an EoR, who provides technical direction on behalf of the owner. Having an EoR for mine waste and water infrastructure is recognized as one of the best practices for responsible management of mine waste and water management facilities. In accordance with the AEM Governance Policy for Critical Infrastructure, the EoR is an employee of AEM. The EoR's responsibilities include: • Support and give technical advice to the RP and the AEO on geotechnical and operational challenges • Participate if possible, in Annual geotechnical inspections and associated reports for tailings facilities that include retention structures/dams • Verify if the Tailings Impoundment Area (TIA), waste rock storage facility (WRSF), and Water Retaining Infrastructures are designed and are operating in accordance with the best standards in the industry and the AEM corporate standards • Verify if the waste and water management plans are developed and followed to ensure safety of the operation and the business; • Review and provide agreement on the procedural documents related to waste and water management (including OMS, ERP and TARP); • Be available for the Independent Review Board (IRB); • Participate in IRB meetings and assist the RP in their preparation if required; • Participate in the facility's risk assessments; • Be available to participate in dam safety reviews; • Identify other internal or external professionals (such as hydrogeologists, geologists, hydrologists, etc.) to provide their support when required; • Propose a schedule of site visits and required meetings during the course of the year.
Design Engineer (DE)	Engineer Responsible for the design and annual inspection of the facilites. At Hope Bay, the DE plays an important role in the management of critical infrastructure. • Advise on contemplated changes to the structure operation • Advise on structure performance and mitigation work as required

	• Present during independent review board meeting to provide input and context on the structure performance
Responsible Person	The Responsible Person(s) identifies the scope of work and budget requirements (subject to final approval) for all aspects of tailings management, including the Engineer of Record (EoR), and will delegate specific tasks and responsibilities for aspects of tailings management to qualified personnel." The RP is directly responsible for the management of critical infrastructure on a specific site with the objective of compliance with the Governance. The management of critical infrastructure includes design, construction, operation and closure. The RP may delegate specific tasks and responsibilities for aspects of tailings management to qualified personnel (MAC 2017). • Ensure the implementation and sustainability of the Governance model at the site level; • Management of critical infrastructure, as well as appurtenant structures that may affect the critical infrastructure; • The management of personnel, budget and external resources for the critical infrastructure (external resources include the Design Engineer (DE), Independent Review Board (IRB) and any other necessary consultants/contactors); • Close collaboration with the EoR and communication with the Design Engineer and Independent Review Board); • Preparation for, and coordination of, IRB meetings and site visits; • Preparation for, and coordination of, annual geotechnical inspections; • Responding to, and implementation of, the recommendations of the IRB; • Annual review and update of the OMS Manual in collaboration with the EoR; • Continued application of the requirements of the OMS; • In collaboration with the EoR, preparation of an annual report on the status of the critical infrastructure; • Management of all documents and data related to design, construction, operation, closure, surveillance and monitoring in a secure, accessible and permanent manner; • Revise and update the OMS Manual to reflect as-built conditions and any other changes. Review and update the OMS manual into Intelex. Maintain up to date distribution list of the OMS Manual
Site Geotechnical Engineer	The Site Geotechnical Engineer (may be an EIT) is designated by the RP and is responsible for specific tasks and responsibilities for aspects of tailings management that are delegated by the RP. The Site Geotechnical Engineer

works closely with the RP and EOR. At Hope Bay the responsibilities of the Site Geotechnical Engineer (EIT) include:

- Support the implementation and sustainability of the Governance model at the site level;
- Management of critical infrastructure, as well as appurtenant structures that may affect the critical infrastructure;
- Support the management of personnel, budget and external resources for the critical infrastructure (external resources include the Design Engineer (DE), Independent Review Board (IRB) and any other necessary consultants/contactors);
- Close collaboration with the EoR and communication with the Design Engineer and Independent Review Board;
- Preparation for, and coordination of, IRB meetings and site visits;
- Preparation for, and coordination of, annual geotechnical inspections;
- Responding to, and implementation of, the recommendations of the IRB;
- Annual review and update of the OMS Manual in collaboration with the EoR and RP;
- Continued application of the requirements of the OMS;
- In collaboration with the EoR, preparation of an annual report on the status of the critical infrastructure;
- Management of all documents and data related to design, construction, operation, closure, surveillance and monitoring in a secure, accessible and permanent manner;
- Review, revise and update the OMS Manual to reflect as-built conditions and any other changes. Review and update the OMS manual into Intelex. Maintain up to date distribution list of the OMS Manual
- Ensure that required maintenance work (predictive, preventive and corrective) is identified and carried out on the earthwork and instrumentation system in collaboration with the Site Services Department
- Ensure the surveillance of the structures as required in the OMS Manual (visual inspection and instrument monitoring) is carried out
- Ensure that the surveillance data is reviewed and analyzed to evaluate dike performance with respect to design parameters
- Ensure surveillance of the structures is carried out as required in the OMS Manual (visual inspection and instrument monitoring)

Independent Review Board (IRB)

Independent Review Boards are a mechanism to obtain independent, expert commentary, advice, guidance and where appropriate, recommendations to assist owners/operators in identifying, understanding, and managing risks associated with TSF, WRSF, WSF, HLF and water-retaining infrastructures. The

	Independent Reviewer(s) does not have decision-making authority. Accountability and responsibility for decisions rests with AEM. • Review mine waste management strategy (including tailings and waste rock storage facilities); • Review water management infrastructure designs and performance (including water retaining infrastructures); • Review on-going construction works and monitoring data; • Comment on implementation progress of proposed mine waste management improvement measures; • Provide opinions and guidance to the operation on the physical integrity, safety, behavior, and performance of the confinement systems for mine waste and water retaining infrastructures; and • Comment on management systems, emergency preparedness and overall management approach of the different mine waste management facilities and water retaining infrastructures.
Process Operations Superintendent (Not applicable during Care and Maintenance)	The Process Plant Department is the owner of the process plant. They work in close collaboration with the other stakeholder to ensure the success of tailings management. The Process Plant Superintendent is in charge of the Process Plant and ensure that: • The Process Plant team as sufficient resource (qualified workforce, material, budget, training) to fulfill the OMS obligation defined in this manual • A structure is in place that define the R&R, qualification, training requirement and a staffing strategy to fulfill the obligation of the OMS Manual • The process plant operates and maintains the infrastructure required to produce and transport (i.e pump) the tailings to tailings impoundment area • The process plant tracks the parameters and characteristics of the tailings produced to ensure that targets are reached • The process plant operates the reclaim water system and tracks the water consumption to ensure that targets are reached • The process plant stops the transport of tailings if required in case of upset or emergency condition
Environment Superintendent or designate	The Environment Superintendent and designates in the Hope Bay Environment Department, ensures compliance with Environment Regulations and the Water Licenses and is the owner of the water & tailings management infrastructures outside of the process plant. The Environment Superintendent is responsible for reporting and liaison with the NIRB, NWB, NGO's and other government agencies. The Environment Superintendent ensures that:

	• The Environment team has sufficient resources (qualified workforce, material, budget, training) to fulfill the OMS obligations defined in this manual • A structure is in place that defines the R&R, qualification, training requirement and a staffing strategy to fulfill the obligation of the OMS Manual • Environment review monitoring data for compliance with Water License and regulations and to determine dike performance with respect to design parameters • Site Geotechnical Engineer has required support
Energy and Infrastructure (E and I) and I Superintendent or designate	The E and I Department has the workforce and equipment to manage road, electricity and dewatering at the Hope Bay Site. They fulfill the planning done in collaboration with the Environment team to ensure the fulfilment of the OMS requirement. The E and I Superintendent is in charge of the Site Services Department and ensure that: • The Site Services team has sufficient resources (qualified workforce, material, budget, training) to fulfill the OMS obligation defined in this manual • A structure is in place that defines the R&R, qualification, training requirement and a staffing strategy to fulfill the obligation of the OMS Manual • Site Services maintain access to the structure and tailings management systems. This include making road repairs, controlling dust and managing snow and water. • Site Services install, operate, maintain and monitor all the components of pumps and piping system associated with water management. They also perform operation, maintenance and surveillance work on the piping system. This work is planned in collaboration with the Environment Department. • Update and maintain a list of operational pumping equipment • Install, operate, maintain and monitor all the components of pumps and piping system associated with water management. They also perform operation, maintenance and surveillance work on the piping system. The Site Services Department has the workforce and equipment to maintain mobile equipment and pumps. They fulfill maintenance of some of the mechanical equipment component of the dewatering dike as requested by the Site Services department. The Site Services Superintendent is in charge of the Site Services Department and ensure that: • Ensure preventive, predictive and corrective maintenance is carried out regularly on pumping equipment related to water management as requested by Site Services

	• Keep records of maintenance performance on pumping equipment
Health and Safety Superintendent or designate	The Health and Safety Department is responsible to update and manage the site wide emergency response plan. The Health and Safety Superintendent is in charge of the Health and Safety Department and ensure that: • The emergency response plan is updated and is aligned with the OMS manual • The trigger to raise an emergency defined in the OMS manual and the communication pathway to do so is understood and aligned with the ERP
Water Management Specialist	TBD

2.2 Contact Information

Environment and Critical Infra VP / Accountable Executive Officer	Michel Julien |michel.julien@agnicoeagle.com 416-947-1212 x3738 514-244-5876
Engineer of Record (EoR)	Thomas Lepine (Active) | thomas.lepine@agnicoeagle.com 418-473-8077 Matthew Brenner (transition planned in Summer 2025) | Matthew.brenner@agnicoeagle.com 416-947-1212
Design Engineer	John Kurylo | jkurylo@srk.com 604-235-8541 Peter Luedke | pluedke@srk.com
Site Geotechnical Engineer	Brennan Jay (EIT)| brennan.jay@agnicoeagle.com 819-759-3555 x 4600207
Independent Review Board	Bill Horne | bill.horne61@gmail.com Henri Sangam | henri.sangam@geomino.com
Mine General Manager	Marc-Olivier Vachon | marc-oliver.vachon@agnicoeagle.com 819-759-3555 x 4600104 819-763-0187

Lab & metallurgy Superintendent (currently inactive)	TBD 819-759-3555 x 4600101
General Superintendent Mining	Philemon Desrochers-Gagnon | philemon.desrochers@agnicoeagle.com 819-759-3555 x4600155
Environment Superintendent (Responsible Person)	Cyril Jenkins | cyril.jenkins@agnicoeagle.com 819-759-3555 x4600102 819-856-1823
Ensergy and Infrastructure Superintendent	Dave Fuller | dave.fuller@agnicoeagle.com 819-759-3555 x4600131
Health and Safety Coordinator	Morgan Hjorth | morgan.hjorth@agnicoeagle.com 819-759-3555 x4600123

2.3 Communications, Reporting and Tracking

Communication Procedures	It is extremely important that monitoring and management policies are communicated to all parties involved with the site maintenance and surveillance. The Responsible Person must ensure that all the issues, concerns, or incidents are reported promptly in accordance with this OMS manual or applicable management plans. The Responsible Person must ensure clear, concise, and consistent communication so that emergency preparedness and response plans are effective, and the public is kept aware of possible hazards associated with the site, of its maintenance, and of its surveillance programs.
Documentation	The surveillance and inspection reports are prepared under the supervision of the Site Geotechnical Engineer and reviewed by a qualified person. After being reviewed, records of all surveillance and inspection activities are kept on file for future reference.
General Guidance	See Section 1.1 for additional details on the Control Copy Locations and Responsibility' for the OMS manual.
Document Control	All reports of activities completed relevant to the operation, maintenance or surveillance of the Doris TIA must be submitted to the Responsible

	Person who will then notify the EOR and specialist consultants if further assessments are required. It is the responsibility of the Site Geotechnical Engineer to ensure the following documents are securely stored and accessible to personnel involved in implementing requirements found in this OMS Manual: • As-built documentation related to the site • Records of maintenance activities • Previous site inspection summary reports • Record of staff training • Relevant incident reports
Inspections, Reporting and Tracking	Observations made during general and geotechnical inspections must be recorded in field books or on digital tablets or computers. For hardcopy documents, digital scans of the used pages of the field books must be stored on corporate drives and available to the team. Unless completely digitized, copies of field notes or field books must be stored at a designated location when not in use. It is the responsibility of: • Any personnel visiting the site to report any observed issues that require maintenance or repairs to the Responsible Person • The geotechnical inspector to prepare and properly file a memorandum for each geotechnical inspection, describing the observations made during the site visits, as well as any recommendations for maintenance activities to be completed. Electronic copies of the geotechnical inspections and maintenance events should be submitted to the Responsible Person no later than 90 days following the completion of the inspection or maintenance event or immediately in the case of serious concerns. The reports must include: • Tabular summaries of all data generated • A description of any restoration or reclamation work carried out (or since the previous inspection) • Results of any studies associated with restoration and reclamation • A report on any inspection of site in accordance with water license requirements • Any other details requested by the Site Geotechnical Engineer or Responsible Person or the EoR.
Tailings Spills and Pipeline Repairs	All tailings line repairs, spills or leaks of any tailings line must be documented and reported to the Responsible Person. This reporting should include:

- A description of the repair or damage
- Photos of the location
- A coordinate (or a figure mark-up) to show the location of the repair or damage

Hard copies of all documents produced in the reporting and tracking process must be stored on AEM computer systems in a location accessible to the team. All hard copy documents must be scanned and turned into electronic records at least annually.

2.4 Competencies and Training

Objectives	Relative to carrying out operations, maintenance, and surveillance activities for the TIA, AEM ensures site personnel: have a clear understanding of and adequate competency for their roles and responsibilities, receive appropriate training, and are kept abreast of updates to this manual. **Note:** Procedures for meeting these objectives follow.
Role-Specific Competencies	AEM works to ensure personnel have the tailings management experience specific their job descriptions prior to appointment (especially those identified in Section 2.1); participate, if necessary, in training to remedy any deficiencies in competency (such as online tailings management courses offered by Edumine or conferences); and receive on-the-job training for relevant tasks such as those outlined in appropriate standard operating procedures (SOPs).
Site Orientation	All personnel involved in operational tailings management are required to receive a site orientation that provides them with an understanding of the general TIA management principles and visual indications of the TIA performance. During periods of Care and Maintenance, the site orientation may take the form of a field orientation delivered by the Responsible Person or designate.
On-going OMS Training	During periods of tailings deposition, AEM develops and requires personnel involved in tailings management to attend a detailed, annual site-specific TIA orientation and training module based on this manual and • if necessary, following the annual geotechnical inspection (DSI), a workshop conducted by the site

geotechnical engineer that focusses on findings of the inspection.

During care and maintenance, the annual training is?? adapted to a more informal format that is appropriate based on the level of risk presented by the TIA and associated structures.

3 Tailings Facility Description

3.1 Project Summary

Location

The Hope Bay Project (the Project), owned and operated by AEM, is found 705 km northeast of Yellowknife, 153 km southwest of Cambridge Bay in Nunavut Territory, and east of Bathurst Inlet (Figure 1).

Mineralization Areas

Hope Bay is a gold mining, exploration and milling undertaking that consists of three distinct areas of known mineralization with extensive exploration potential and targets (Figure 2), including : Doris, Madrid, and Boston.

Project Phases*

Phase 1: Doris Project

Currently being carried out under an existing water licence
When the mine is in operation, includes mining activities and infrastructure development

Phase 2: Madrid-Boston Project

License issued December 2018
includes mining and infrastructure
Madrid and Boston located 10 and 60 km due south of Doris, respectively (SRK 2017a)

*Sites are in care and maintenance now with a focus on exploration. It should be noted that AEM is in the process of updating the mine plan. Once finalized, the OMS manual will be updated according to the new mine plan.

Processing Methods

Ore processing includes cyanidation and flotation methods, with two separate streams of tailings being produced, both captured under the tailings management system (TMS).

Cyanidation Tailings

Cyanidation tailings are detoxified (cyanide destruction) then filtered and blended with waste rock then returned underground as backfill.

Flotation Tailings

Floatation tailings are produced at the Doris processing facility and deposited in the Doris TIA.

Tailings Deposition

Phase 1

Phase 1 TMS (SRK 2015b) design realizes subaerial deposition of about 2.5 Mt of tailings into the Doris TIA. This area was a natural lake (Tail Lake), which is listed on Schedule 2 of the MDMER.

Phase 2

Phase 2 development expands the TIA to accommodate 18 Mt of tailings (Figure 3).

TIA

To ensure environmental containment, the TIA is impounded through three dams: North Dam, South Dam, and West Dam (Figure 3).

North Dam

functions as a water retaining dam
constructed in 2012 (SRK 2012) as a water retaining frozen core dam

South and West Dams*

have tailings deposited against their upstream face to keep the Reclaim Pond away from the structures (Figure 3)
designed as frozen foundation rock fill dams incorporating a geosynthetic clay liner (GCL)
Phase 1 of the South Dam was constructed in 2018 (SRK 2019a)

*South Dam is part of Phase 1 and will be raised as part of the Phase 2 development. The West Dam is a new structure. As of this version of this OMS, the West Dam has not yet been constructed.

TIA Closure Process

The TIA current closure procedure has three core stages.

Stage	Description
Isolation Cover	The TIA will be closed by applying a 0.3 m quarry rock isolation cover that mitigates tailings dust and prevents tailings contact with terrestrial wildlife.
Water Discharge	Once the cover is applied, water discharge from the TIA must meet environmental discharge criteria, as demonstrated in the water quality modeling (SRK 2017a).
North Dam Breach	When water quality is confirmed, the North Dam will be breached, thus returning the natural outflow to its pre-mining elevation.

3.2 Project History Highlights

Exploration

1964

Work at the Project site began. The first exploration focused on showings at Ida Point, Ida Bay, and Roberts Lake to the north. Three exploration companies continued work until exploration drilling started.

1992

Drilling led to the first site infrastructure at Boston in the form of an exploration camp on the northeastern shores of Aimaokatalok Lake.

1996 -1997

Underground development was carried out at Boston to extract a bulk sample.

1999

Exploration drilling expanded to Madrid and Doris. A new exploration camp was constructed on the eastern shore of Windy Lake.

2006

The project certificate (NIRB No. 003) was obtained to start a mine at Doris.

2007

The water licence (2AM-DOH0713) for Doris was issued.

Construction

2007

Construction began but slowed as the Project transitioned in ownership.

2010

Construction resumed.

2011

Construction of the North Dam starts (until spring)

2012

Construction of the North Dam finished.

The Project was placed in care and maintenance before starting commercial production.

2013

Another ownership change happened, which resulted in recommencement of construction, with planned commercial production scheduled for early 2017.

2016

The water license was amended for the Doris Project (2AM-DOH1323 – Amendment 1).

2018

Construction of Phase 1 of the South Dam

The current water license was amended for the Doris Project (2AM-DOH1335 – Amendment 2).

2019

Ongoing development at the Doris North, as well as the Madrid areas.

2022

The project was placed in care and maintenance following an ownership change.

2023

Construction of the Interim Dike. Construction of early works to support the transition to the new mine plan.

2024

Continued early works construction. New portal developed at Madrid North.

3.3 Site Conditions

Climate

Mean Annual Air Temperature

For the period 1991 to 2020, the mean annual air temperature is estimated to be

−11.1°C at the Doris Site

Wind at Doris and Boston

predominately a west wind direction at Doris and west-northwest at Boston
highest wind speeds between December to April, with a predominant westerly wind direction (general site trend)
velocity subsides with a tendency to be on the East-West axis but with no predominant direction otherwise from May to October (site trend)
westerly in November and December (general site trend)

Precipitation

97.4 mm mean annual rainfall for both Doris and Boston
182.4 mm mean annual snowfall (snow water equivalent, corrected for undercatch)
279.5 mm estimated mean annual precipitation (water equivalent)

Lake Evaporation Estimation

284 mm/year at Doris
291 mm/year at Boston

Reference: (SRK 2017c, SRK 2022d)

Permafrost

The Project is in a region of the Canadian Arctic that is underlain by continuous permafrost with the following parameters:

570 m estimated continuous permafrost depth (SRK 2017a)
–8°C near surface temperature
0.5–1.0 m thick typical active layer, depending on surface ground conditions (SRK 2015a)

Regional Geology

Bathurst Block

The Project area is in the faulted Bathurst Block, forming the northeast part of the Slave Structural Province, a geological sub-province of the Canadian Shield.

Archean Hope Bay Greenstone Belt

The region is underlain by a late Archean Hope Bay Greenstone belt that is

7-20 km wide,
more than 80 km long in a north-south direction, and
made up of mafic meta-volcanic (meta-basalts) and meta-sedimentary rocks that are bound by Archean granite intrusive and gneisses.

Greenstone Package

The Greenstone packages

were deformed during multiple events and
is transected by major north-south trending shear zones.

Note: The zones appear to exert a significant control on the occurrence of mineralization, particularly where major flexures are apparent and coincident with anti-forms (SRK 2015a).

Hydrology

The TIA is in a sub-basin of the Doris Lake drainage basin.

The catchment naturally drains northwest towards Doris Lake.
Flows are consistent with all drainage basins within the Project area.
Peak flows occur during freshet.
The mean annual runoff (MAR) volume from this basin is 640,000 m^3 (SRK 2017a).

Hydrogeology

Groundwater Flow

Groundwater flow in a continuous permafrost environment is limited to shallow seasonal flow that takes place within the active layer and deep groundwater flow that

takes place below the permafrost and in taliks (permafrost free zones) under larger water bodies and
has elevated salinity, since the groundwater is ancient trapped seawater (connate water).

Relative to Mining

The Doris Mine includes mining in permafrost, as well as mining in the Doris Lake talik.

Peak groundwater inflow to the mine is predicted to be 3,000 m^3/day. Typical flows are approximately 1,600 m^3/day.
This water will be managed via the TIA and/or direct discharge to the ocean (SRK 2015c, 2017a).
If predicted mine inflow exceeds 3,000 m^3/day, the excess inflow will be temporarily stored in designated areas of the mine or pumped to the TIA. Excess pump capacity will be available to divert excess flow to the TIA (TMAC 2017b).

Talik

The TIA hosts a talik; however, it is not known whether it is an open or closed talik. The permafrost free zone is expected to decrease as tailings freeze-back occurs (SRK 2015a).

3.4 Communities of Interest (COI) Perspectives

The Hope Bay project and corresponding TIA are in a remote area of the Kitikmeot Region; the western part of Nunavut and the central part of the Canadian Arctic. Access to site is done almost entirely via plane but could also be access via boat in the summer or over ice in the winter. Most project impacts in Nunavut are predicated for the Kitikmeot region, that benefits from the location of the Hope Bay project in the region (TMAC 2017d).

As outlined in the Final Environmental Impact Statement (FEIS) (TMAC 2017d) the project development along the Hope Bay Belt cannot be done in isolation. Many partnerships are required and AEM has been supported in its development goals by meaningful partnerships with two major Inuit organizations, Nunavut Tunngavik Inc. (NTI) and the Kitikmeot Inuit Association (KIA). The NTI is the partner organization that coordinates and manages Inuit responsibilities set out in the Nunavut Agreement. NTI holds the surface title and mineral rights to Inuit-Owned Lands (IOL) in Nunavut, including the surface rights over the entire Hope Bay Property and mineral rights over selected portions of the Property. The KIA administers the surface rights and the Inuit Impact and Benefits Agreement (IIBA) associated with AEM's activities at the Property. The Kitikmeot Inuit Association (KIA) and AEM will continue to share in existing and future benefits through partnerships and agreements already in place including the Framework Agreement, the Inuit Impact Benefits Agreement (IIBA) and the Commercial Lease. Both organizations fill important roles on behalf of Inuit and they ensure, along with AEM, that the existing Framework Agreement and other, future agreements as required, will provide continued social and economic benefits for Nunavummiut, Nunavut and Canada, while effective stewardship of the land is maintained.

As outlined in AMEC (2005), the region has seven communities. The Kitikmeot communities would be most impacted (beyond the immediate personnel on site) from the TIA and Hope Bay project as a whole. Cambridge Bay is the largest and is the regional centre and transportation hub. Kugluktuk, the second largest community, is situated 450km south west of Cambridge Bay. Gjoa Haven, Taloyoak and Kugaaruk are located in the eastern part of the Region. The two smallest communities, Bathurst Inlet and Umingmaktok, south of Cambridge Bay, are the nearest communities to the TIA. Bathurst Inlet is approximately 150 km southwest and Umingmaktok is approximately 75 kms west-southwest from the TIA.

As outlined in FEIS Land Use volume, the Hope Bay Project has the potential to have an adverse effect on commercial land and resource use, and on local land use activities and knowledge. Commercial land users are mainly those engaged in the tourism industry (lodge operators, tour guides). Inuit (i.e., local land users) engaged in land use and harvesting activities depend on the land and environment to support their livelihoods. Traditional knowledge informs the ways in which Inuit engage with the land and environment and is continually evolving in response to changing landscapes. Because of the physical presence of the Project, changes to levels of noise, dust, and visual aesthetics—and potential changes to the abundance, distribution and quality of animals and plants that are harvested—the Project has the potential to adversely affect land use. Land use interests that are not associated with traditional activities, such as non-commercial land use (e.g., recreational use by southerners), are considered to

occur as a commercial land use in conjunction with lodge operators and tour guides and is assessed as such. Therefore, non-commercial land uses are not considered further (TMAC 2017d).

3.5 Relevant Legislation and Guidance

Jurisdiction	Government of Canada and Kitikmeot Inuit Association
Governing Bodies	Authorities involved with permitting and regulating the design, construction, operation, maintenance, surveillance, and closure of the tailings impoundment area include the following groups: Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Kitikmeot Inuit Association (KIA) Nunavut Impact Review Board (NIRB) Nunavut Water Board (NWB) Workers Safety and Compensation Commission Chief Mines Inspector (per the Mine Health and Safety Act) and its associated regulations (Government of Nunavut, 1995)
Regulating Authorities	Use of the TIA is authorized by the following: Doris North Project NIRB Project Certificate No. 003 (NIRB 2006) Doris North Project Type A Water Licence 2AM-DOH1335 – Amendment No. 2 (NWB 2018) KIA Commercial Lease #KTCL#313D001 (KIA 2015) Schedule 2 of the Metal and Diamond Mining Effluent Regulations (MDMER)
Governance of Manual's Contents	**Agnico Eagle Mines Ltd (AEM)** Corporate standard on the Governance of Critical Infrastructure (AEM 2020) **Canadian Dam Association (CDA)** Dam Safety Guidelines (CDA 2013) – Guidance related to design and operation of dams Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams (CDA 2014) – Guidance related to design, operation and closure of tailings dams **Mining Association of Canada (MAC)** A Guide to the Management of Tailings Facilities, V3.2 (2021) – Guidance related to the management of Tailings Facilities Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities, V 2.1 (2021) **Nunavut Water Board (NWB)** Audit and Assessment of Tailings Facilities (2011) – Guidance for audit and inspection of tailings facilities

Water License No: 2AM-DOH1335, Amendment No.2, Doris North Project, Nunavut (2018) – License to operate. Expires March 30, 2035. License updated December 7, 2018 with approval of amendment

3.6 Facility Components

North Dam

The North Dam impounds Reclaim Pond and was designed as a water retaining structure with the following parameters:

central frozen core with secondary upstream GCL
construction from local quarry rock consisting of processed fines for core, 150 mm nominal sized transition material, and run of quarry (ROQ) outer shell
key trench equipped with 12 horizontal thermosyphon evaporators to ensure frozen foundation conditions (SRK 2007, 2012, 2013, 2015a)

Note: The North Dam has been in place since 2012. Design parameters are provided in Section 3.10 and Figure 4.

South Dam

The South Dam is a frozen foundation dam consisting of

a compacted rock fill with an upstream GCL keyed into the permafrost overburden foundation.
Note: As of 2018 the entire key trench of the South Dam (Phase 1 and 2) had been constructed, along with the minimum thermal protection over these sections. Above the original ground elevation, the minimal thermal protection over the key trench as well as the Phase 1 GCL and bulk rockfill are in place.

Construction Material

Construction materials are sourced from local rock quarries and include ROQ material and different grades of processed material attained through crushing and screening (SRK 2015a, SRK 2019b).

Tailings Deposition

Tailings are deposited as a beach from the face of the South Dam. At all times a minimum 100m long beach is planned to be maintained. In Phase 2, to accommodate the increased tailings quantities, the South Dam will be raised by 8 m in a downstream configuration to reach a crest elevation of 46.0 m.

Note: Design parameters in Section 3.10 and Figure 5.

West Dam

The West Dam is planned to be a frozen foundation dam with a key trench and GCL liner keyed into permafrost.

Note: As of 2022 the West Dam was not required for tailings containment and has therefore has not been constructed.

	Construction Material Construction material consists of: bedding, transition, and ROQ material and granular fill produced on site from approved local quarries **Note:** Complete geological, mineralogical and geochemical details of these quarry sites are documented in SRK (2007, 2008). **Tailings Deposition** West Dam is planned to be constructed in a single raise and is about 470 m long with a maximum height of 5 m (crest elevation 46.0 m). **Note:** Design parameters in Section 3.10 and Figure 6.
Temporary Water Filled Portable Dam	In summer 2022, and temporary water-filled portable dam (Aquadam) was constructed within the TIA footprint to segregate different streams of contact water on site. As of 2023 the Aquadam has been decommissioned.
Interim Dike	In 2023 a more robustly engineered structure, the Interim Dike, was constructed as a replacement for the Aquadam, with an identical function and a design life of 3-5 years. The Interim Dike is designed to: be a homogeneous ROQ rock-fill dike with a GCL liner, layer of compacted tailings, used as a method of segregating waste streams and managing water quality within the TIA. be constructed within the confines of the TIA directly on the existing deposited tailings without dewatering the TIA; Not interfere with the originally planned tailings deposition philosophy.
Emergency Overflow Channel	An operational emergency overflow channel was originally designed for the TIA at the North Dam, but was not required due to the freeboard of the North Dam being adjusted to account for an inflow design flood (IDF) of probable maximum flood (PMF). Following any updated IDF requirements, the emergency overflow channel will be constructed prior to or concurrent with the resumption of tailings production with support from the EOR and design engineer.
Tailings Deposition System	Tailings with an initial solids content of about 38% are pumped to the TIA via a heat-traced and insulated pipeline. Daily production rates are variable expected between 1,200 TPD (first year) to an allowance of up to 4,000 TPD (dependent on the mine life). **Deposition** Deposition is subaerial using single point spigots, start from the crest of the South and West dams to create beaches that push the supernatant water away from these structures, and Once these beaches are created, the spigot points will be moved to the east flank of the TIA, where deposition should begin from elevation 49.5 m.

Note: If saline water (such as from the underground) is deposited behind the Interim Dike into the TIA then this should be preferential deposited towards the center of the facility (i.e. away from the South Dam crest and upstream of the primary North Dam pond).

Note: As the site is presently in a period of Care and Maintenance no tailings deposition is occurring.

Note: Prior to the resumption of tailings production, the existing tailings deposition plan will be reviewed and updated.

Reclaim Water System

Source and Method

Reclaim water (for re-use in the Process Plant during operations) is drawn

from the TIA Reclaim Pond,
through submerged suction lines feeding a low-suction head pump installed in an on-shore enclosure location at the Reclaim Pond.

The pipeline is

heat traced and insulated, and
follows the Secondary Road from the Reclaim Pond to the Doris mill.

Reclaim Pond Capacity

The Reclaim Pond will reduce in size over the life of the Project. The Reclaim Pond will have enough capacity to allow year-round reclaim water to be drawn from the TIA, including under ice conditions in the winter. Near the end of the Project's life, the pond will be reduced in size such that increased volumes of fresh make-up water and more TIA discharge will be required, and the full supply level (FSL) may have to be lowered to accommodate the IDF.

The construction of an Emergency Overflow Channel near the North Dam will mitigate the risk to the North Dam associated with the reduced size of the reclaim pond.

Discharge Setting

Water in the Reclaim Pond will continue to be managed via active pumping to the TIA / Roberts Bay Discharge System in accordance with TIA operating criteria until the closure environmental discharge criteria can be met at which time, the water in the Reclaim Pond will be pumped down to its pre-mining elevation of 28.3 m and the North Dam will be breached.

TIA Discharge System

Source and Method

In accordance with its approvals, the TIA water is discharged year-round to Roberts Bay (subject to meeting water quality requirements) via a discharge pump that is located adjacent to the reclaim pump and pumps water along a pipeline following the same route as the reclaim water pipeline.

The TIA discharge water may be co-disposed (blended) with Doris Mine underground flows and may be treated in the Effluent Water Treatment Plant (operational in June 2023) and is pumped along an overland pipeline to the Robert Bay Outfall Structure and continues along the submarine pipeline to the Roberts Bay diffuser.

3.7 Construction Timing

North Dam

Construction of the North Dam was carried out during the winter months of 2010/2011 and 2011/2012 by an experienced earthworks contractor with rigorous quality control. Quality assurance was carried out by SRK (SRK 2012).

South Dam

Construction started on the South Dam (Phase 1) in 2018. Excavation and backfill of the key trench for both Phase 1 and Phase 2 was completed during winter of 2018. This was done

to thwart issues caused by thawing of the soft overburden soils and
to ensure that a thermal blanket is completed to protect the permafrost in the foundation.

Bulk fill of the Phase 1 portion of the South Dam was done during the late winter to spring of 2018. The Phase 2 bulk fill can now be completed during any season.

West Dam

Excavation of the West Dam key trench must be completed in the winter. Bulk fill can be completed during any season. The West Dam has yet to be built (as of 2024).

Aquadam and Interim Dike

The Aquadam was installed in June 2022. The Aquadam was decommissioned in June 2023 following the completion of the Interim Dike construction.

Construction of the Interim Dike began in January 2023 and the bulk of the earthworks was completed by June 2023. Monitoring instrumentation was installed in November 2023. SRK and the Site Geotechnical Engineer performed quality assurance for key phases of the construction.

3.8 Tailings Properties

Tailings properties consist of geotechnical characteristics and geochemistry described below.

Tailings Geotechnical Characteristics

Several campaigns of tailings geotechnical testing have been carried out since 2003. Definitive geotechnical design data for the Project with respect to tailings properties are provided below.

Parameter	Value
Specific gravity	2.85
% Fines (<0.075 mm)	65%
% Silt	52%
% Clay	13%
Void ratio (e) – slurried tailings	1.2
Void ratio (e) – drystack tailings	0.6
Deposited dry density (tonnes/m^3) – slurried tailings	1.30

Tailings Geochemistry

Phase 1 of the Project includes deposition of flotation tailings from the Doris deposit whereas Phase 2 includes the Doris, Madrid and Boston deposits. Based on the mine schedule, tailings from the Madrid South deposit is scheduled to be on the surface of the TIA at closure. The geochemical characterization programs for tailings and process water from Doris, Madrid North, Madrid South and Boston are documented in SRK 2015b and SRK 2017e.

Flotation tailings from all deposits are classified as non-Potential Acid Generating (PAG) with sulphur content highest for Madrid North, which was higher than Boston and Doris (which are roughly equivalent), which were typically higher than Madrid South. Pyrite was the primary sulphide mineral in all tailings types from all deposit areas.

The pH of all humidity cell tests of flotation tailings remained neutral to alkaline for the duration of the tests. Arsenic leaching is the primary metal leaching concern for both Madrid North and Boston and was highest for Madrid North flotation tailings. Arsenic leaching was not related to tailings type, sulphide content or arsenic content.

Process water from the mill is a mixture of flotation and detoxified tailings process water and is discharged to the TIA. A comparison of the mixed tailings process waters for Doris, Madrid North, Madrid South[1] and Boston metallurgical samples were roughly equivalent with the following exceptions:

Arsenic levels for Madrid North and Boston were approximately two orders of magnitude higher than Doris, with concentrations from Madrid North slightly higher than Boston.

Madrid North and Boston were higher than Doris for the following parameters: sulphate, antimony (Boston only), chromium, selenium (Madrid North only), and vanadium (Boston only).
Doris had the highest levels of manganese.
Cyanide is a reagent additive that is part of the milling process thus explaining the presence of total and WAD cyanide in the detoxified tailings process water only. Decreases in total and weak acid dissociable (WAD) cyanide were observed over the duration of both the oxic and anoxic tests indicating degradation of residual cyanide in the samples. Ammonia is a degradation product of cyanide thus explaining the elevated ammonia levels.

[1] Where Boston is an analog for Madrid South.

3.9 Dam Hazard Classification

The dams associated with the TIA area consist of:

- **North Dam**
- **South Dam**
- **West Dam (not constructed)**

The North, South, and West Dams were assigned a dam hazard classification in accordance with the CDA (2013) dam safety guidelines.

Dam Class	North Dam	South Dam	West Dam
Population at Risk	significant	significant	significant
Loss of Life	significant	significant	significant
Environmental and Cultural Values	high	high	high
Infrastructure and Economics	low	low	low
Overall Hazard Classification	high	high	high

- **Interim Dike** – The Interim Dike is not classified as a dam, as it is located entirely within the footprint of the existing TIA, and any loss of containment of the structures would pose no safety or environmental risk.

3.10 Overall TIA Design Criteria and Parameters

The basis of design, design criteria, and design parameters for the TIA outlined below (SRK 2017f).

Description	North Dam	South Dam	West Dam
Secondary Seepage Barrier	GCL	GCL	GCL
GCL Deployment Slope	2.5H:1V	3H:1V (4H:1V for the raise)	3H:1V
Crest Centerline Length	220 m	515 m	470 m
Maximum Height	11.0 m	14.0 m	5.0 m
Final Crest Elevation	37.5 m	46.0 masl	46.0 masl
Initial Crest Elevation	n/a	n/a	n/a
Core/GCL Elevation	35.0 m	45.0 m	45.0 m
Full Supply Level	See section 4.5	44.5 masl	44.5 masl
Normal Operating Water Level	See section 4.5		
Total Freeboard	3.3 m	1.5 m	1.5 m
Hydraulic Freeboard	1.8 m	0.5 m	0.5 m
Thermal Protection above Frozen Core	2.5 m	n/a	n/a
Settlement and Allowance Foundation thaw of 1 m (partial thaw) Foundation thaw of 7 m (full thaw)	1 m	 0.47-0.67 m 2.45-3.85 m	 0.40-0.60 m 2.03-3.43 m
Deformation Allowance (Total Strain due to Creep)	<2%	n/a	n/a
Crest Width	13 m	10 m	10 m
Upstream Structure Slope	6H:1V	4H:1V	4H:1V
Downstream Structure Slope	4H:1V	2H:1V	2H:1V
Key Trench Depth	Varies	4.0 m	4.0 m
Key Trench Upstream Slope	0.5H:1V	2H:1V	2H:1V
Key Trench Downstream Slope	0.5H:1V	1H:1V	1H:1V
Dam Hazard Classification	HIGH	HIGH	HIGH
Design Life: Active use period as water retaining structure Design basis as active water retaining structure Active use period as solids retaining structure Design basis as solids retaining structure Total life until breach	 17 years 22 years 22 years	 17 years 25 years	 17 years 25 years
Tailings Production Rate (current mine plan)	1,200 tpd for first year; 2,400 tpd for next 2 years; 3,600 tpd for remaining mine life except last year of mining when production rate drops to 2,400 tpd		
Production Life	17 years		

Description	North Dam	South Dam	West Dam
Tailings Solids Content	35% solids (by weight) initially, increasing to 65%	37.5% solids (by weight)	37.5% solids (by weight)
Tailings Specific Gravity	2.85		
Deposited Tailings Dry Density	1.3 t/m^3(1)		
Ice Entrainment Allowance: Percentage of tailings capacity By volume	 20% 2.4 Mm^3		
Tailings Beach Slope: Subaerial tailings Sub-aqueous tailings	 1.0% 1.0%		
Annual Exceedance Probability (AEP) for Risk Based IDF	1/2475 (0.0004)		
AEP for Standards Based IDF	1/3 between 1/1000 and the Probable Maximum Flood (PMF)(1)		
Static Stability Factor of Safety Long-term (Drained Conditions)	1.3 during construction 1.5 during operation and closure 1.2 to 1.3 partial or rapid drawdown		
Stability Factors of Safety (Pseudo-Static)	1.0 during earthquake		
AEP for Earthquake Design Ground Motion	1.2 post earthquake		
Peak Ground Acceleration (PGA)	0.060g(2)	0.036g	0.043g
Mean Annual Air Temperature Climate Change	+6.8°C up to year 2100		
Thermal Design Freezing Point Depression Tailings Overburden Frozen core	 n/a -8°C -2°C	 0 to -1°C -2°C n/a	 0 to -1°C -2°C n/a
Seepage Allowance	78 m^3/day	50 m^3/day	<1 m^3/day

Notes:
(1) Value based on experiential engineered judgement.
(2) A peak ground acceleration for a 1/2475 return period was not available at the time of design of the North Dam, and therefore the PGA of 0.06 g was selected based on published data for Kugluktuk. This is further described in SRK (2007).

3.11 Dam Break Analysis

The Hope Bay Dam Emergency Plan includes details covering hypothetical dam breach scenarios for the purposes of emergency planning. The Dam Emergency Plan can be found in Appendix F.

3.12 Water Management

Contact Water

All site contact water is pumped or trucked to the TIA.

Underground Water

Saline underground water (i.e., mine water) may be pumped to the TIA or Roberts Bay at an expected maximum rate of 3,000 m^3/day (SRK 2015c). Saline water pumping to the TIA should be limited as much as practical / when possible to assist with maintaining lower operating levels in the TIA.

	Note: Standby pump capacity should be available on site in the event of mine water inflows greater than 3,000 m^3/day, wherein excess mine water may be pumped to the TIA.
Mill Water	During operations, mill make-up water is drawn from the Reclaim Pond to the extent possible.
Excess Water	Year round (any season) as long as the site water quality requirements (Mining and Diamond Mining Effluent Regulations - MMDER) are met. Any excess water in the TIA during operations should be discharged to Roberts Bay for ocean discharge. Prior to discharge to Roberts Bay, all water must meet MDMER limits (SRK 2017a and TMAC 2017a).
Non-Contact Water	There are no non-contact surface water diversions upstream of the TIA. The TIA is in an isolated catchment, and the benefits of any diversions are outweighed by the relative cost and complexity of constructing them.
General Guidance	A site wide water and load balance, including the TIA, has been developed for the Project and forms the basis for the water management plan (SRK 2017a and AEM 2023a). The water and load balance is validated annually.

3.13 Tailings Facility Performance

All data collected as part of the dam monitoring SOPs, currently the North Dam data (SRK 2022) and South Dam data (SRK 2022) are uploaded monthly onto the site TIA web portal / viewer.

The Environmental and Geotechnical Data Management and GIS Map Viewer System is found online at: https://maps.srk.com/HopeBay/

When initially accessing the site, personnel will need to register as a new user. This can be requested through the web link show above. Once access is set up, currently managed through SRK, a confirmation email is sent to the user.

Note: if a user does not receive a confirmation access email then they should check their junk mailbox. If it does not appear in this location, then they should email the Design Engineer and re-request access to the online portal and GIS viewer.

As of the end of 2024 the following information was available, and updated monthly, on the web portal:

North Dam	• Ground temperature cables • Inclinometer data • Datalogger battery levels and temperatures • Survey Monitoring

South Dam	• Ground temperature cables • Survey Monitoring • Aerial satellite photos of tailings deposition (Sentinel-2 data)
TIA Reservoir	• TIA-2 water level • TL-1 water quality

Relevant documents related to the TIA as listed in section 1.2, such as this OMS, the design reports, as-built reports, annual inspections, and SOPs are also available on the web portal for reference.

In addition, ongoing data reviews are completed jointly by the Design Engineer and Site Geotechnical Engineer. Data review are complete on a monthly basis at a minimum. A detailed annual review of all performance data is completed as part of the annual geotechnical inspection.

4 Dam Safety Management System

Definition	The Dam Safety Management System (DSMS) is a system of related operational documents and that defines the safe operation and management of the North Dam and South Dam at the Doris TIA. The Doris TIA OMS Manual is a part of the DSMS, its function with respect to other key documents is outlined in Section 4.1 below.
Objectives	• Act as a prescriptive framework of documents that can be referenced by site staff to support the safe and effective management and operation of the dams • The documents work together to define the approach to dam safety at Hope Bay
Components	The key documents comprising the DSMS include: • Hope Bay Doris TIA OMS Manual • Doris TIA Trigger Action Response Plan • Dam Monitoring Standard Operating Procedures • Hope Bay Project Dam Emergency Plan • Hope Bay Project Emergency Response and Crisis Management Plan

4.1 TIA Dam Safety Management System Key Documents

The function of each document is described in Table 4-1 below. The relationship and references between the documents are outline in Figure 4-1 below.

Table 4-1 – DSMS Key Document Definitions

Document	DSMS Function
Hope Bay Doris TIA OMS Manual (this document)	• Main operational document for the Doris TIA

	• Defines the Dam Safety Management System framework for Hope Bay • Contains (as Appendices) or references other key DSMS documents such as the DEP (see below)

Doris TIA Trigger Action Response Plan	• Appendix G of the Hope Bay TIA OMS Manual
	• Defines the conditions and thresholds corresponding to each trigger level for the North Dam, South Dam, and the TIA Reclaim Pond Water Elevation
	• Defines initial actions to be taken for operational trigger levels:
	  ○ Green: Normal Operating Conditions
	  ○ Yellow: Early Warning Conditions
	  ○ Orange: Corrective Action Conditions
	  ○ Red: Emergency/Uncontrolled Condition
	• Specific conditions and thresholds are defined for instrumentation data readings, as well as visual observations from inspections.

Dam Monitoring Standard Operating Procedures	• Appendix H of the Hope Bay TIA OMS Manual • Describe in detail the requirements and procedures for dam monitoring under normal operating (Green) conditions
Hope Bay Project Dam Emergency Plan	• Activates in the event of an emergency at any of the dams on site. • Appendix F of the Hope Bay TIA OMS Manual • Further defines the initial response to an emergency condition at the dams (Red Trigger Level). • Includes the personnel, equipment and communication systems available to respond to an emergency situation at the dams. • Is linked the Hope Bay Project ERP
Hope Bay Project Emergency Response Plan	• Stored on Hope Bay server (W:\Procedures and Policies\01. Safety\300x - ERT\Plan) and physical hardcopies located in the admin boardroom and goehub. • Activates in the event of an emergency on site. • Defines the initial response to an emergency. • Includes the personnel, equipment and communication systems available to respond to an emergency situation.

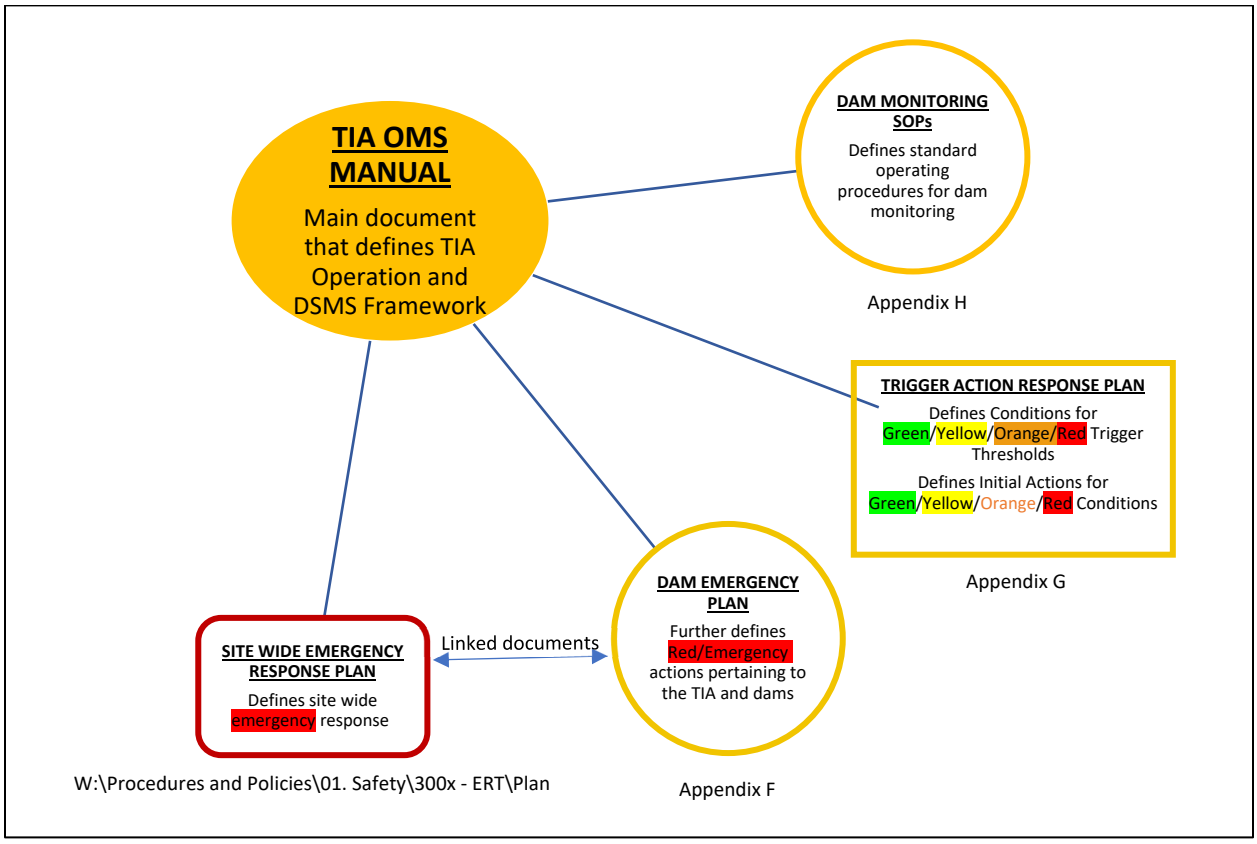

Figure 4-1 – DSMS Document Relationships

4.2 Trigger Action Response Plan Levels

The Trigger Action Response Plan defines the initial actions to be taken in response to specific conditions observed at the TIA and dams. The Trigger Action Response plan includes detailed thresholds for each Green/Yellow/Orange/Red Conditions observed or recorded at the Dams and TIA. Table 4-2 provides encompassing definitions for each of the trigger levels for the Hope Bay Project.

The complete Trigger Action Response Plan be found in Appendix G.

Table 4-2 – Definition of Trigger Levels

Trigger Level	Condition	Definition
Green	Normal Operating Condition	Maintain normal operating procedures.
Yellow - Level 1	Early Warning Condition	Areas of concern identified - Requires further investigation to determine **requirements for increased monitoring**
Orange - Level 2	Corrective Action Condition	High Risk Situation - Requires mitigation actions or operational controls to prevent an emergency situation from developing. **Implement Level 2 Actions.**
Red - Level 3	Critical Condition	Emergency Situation - Immediate threat to health and safety or environment that is uncontrollable through operational controls or mitigation actions. **Implement the site wide Emergency Response Plan and/or Dam Emergency Plan**

4.3 DSMS Communication and Decision Making

Figure 4-2 illustrates the communication and decision processes used when the threshold criteria are met and when pre-defined actions need to be implemented. Table 4-3: Communication Procedure to Change TARP Level indicates the communication procedure to follow when changing the TARP level.

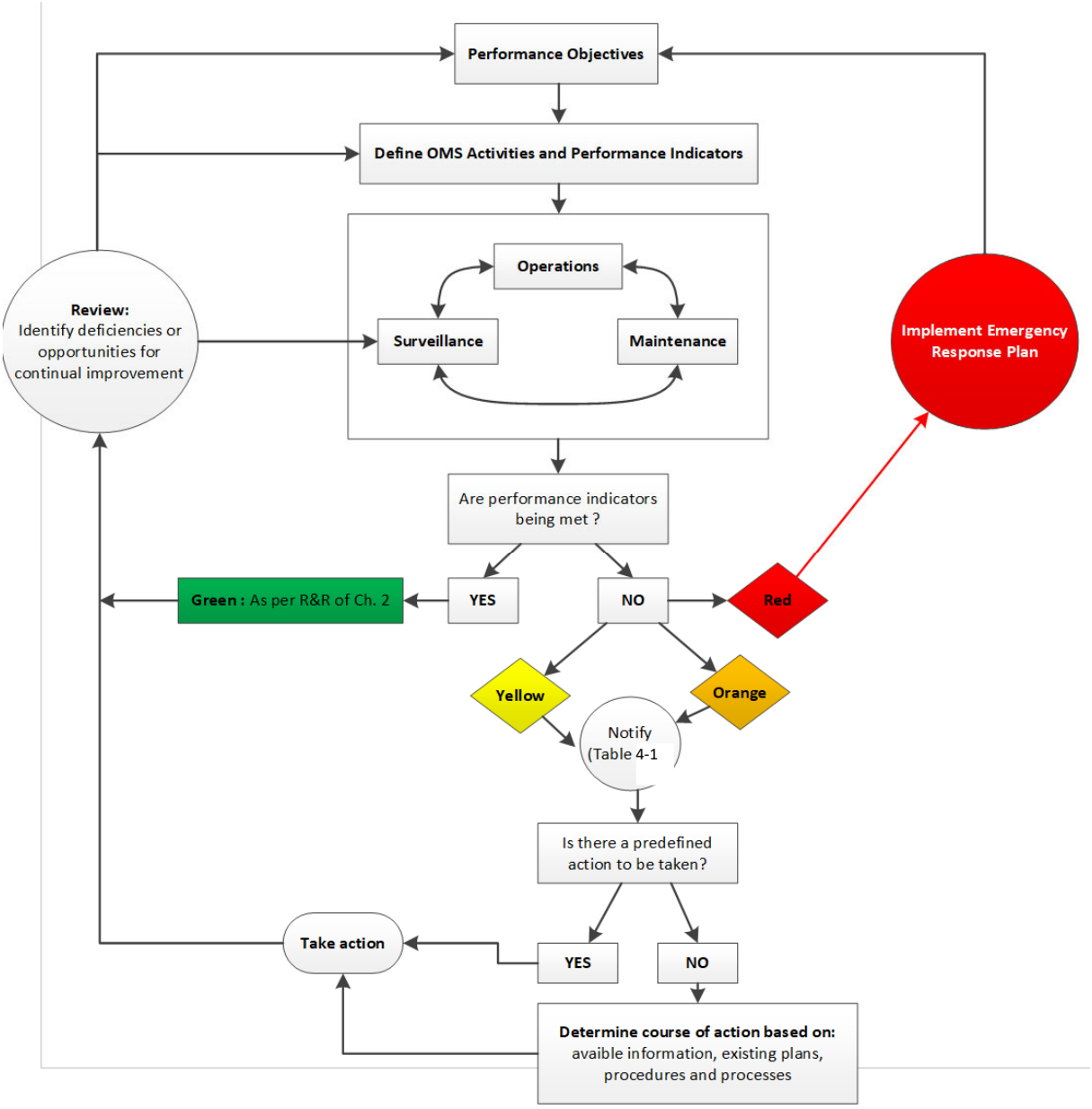

Figure 4-2: Communication and Decision Process for Water Management Infrastructure TARP

Table 4-3: Communication Procedure to Change TARP Level

Category	Notify	Timeline	Method of Communication
Green	On-Site team → Responsible person → • Independent Review Board • Designer • General Manager • EOR • AEO	Elevated TARP levels can be returned to GREEN after two consecutive weeks of GREEN TARP conditions	Phone Call and E-mail to inform on status change. RP and EOR must agree to change status Brief memo sent by e-mail to officialise TARP change

Category	Notify	Timeline	Method of Communication
Yellow	On-Site team → Responsible person → • EOR	Within 24 hours of the TARP level condition being met	Phone Call and E-mail to inform on status change. RP and EOR must agree to change status. If RP can't be joined the on-site team will try to contact these people in this order: Site Geotechnical Engineer, EOR, AEO
	Responsible person → • Independent Review Board • Design Engineer • General Manager • EOR • Process Plant Superintendent	Within 72 hours of the TARP level change	Brief memo sent by e-mail to officialise TARP change Meeting to be set to explain situation if required
	EOR → • AEO	Within 1 week of TARP level change	Left to the EOR discretion
Orange	On-Site team → Responsible person → • EOR	Immediately upon discovering TARP level triggers change	Phone Call, E-mail and meeting to inform on status change. If RP can't be joined the on-site team will try to contact these people in this order : Site Geotechnical Engineer, EOR, AEO
	Responsible person → • Independent Review Board • Design Engineer • General Manager • EOR • AEO • Health & Safety Superintendent • Process Plant Superintendent	Within 24 hours of the TARP level change	Brief memo sent by e-mail to officialise TARP change Meeting to be set to explain situation
RED	On-Site team → Emergencies Response Team Once an emergency is declared refer to the ERP. Emergency response is out of scope of this document	Immediately when the emergency is discovered. If there is currently a risk to Env or Health and Safety	Emergency – Emergency Emergency and road channel Or at Emergencies 911
		Immediately when the emergency is discovered. If there is imminent risk to Env or Health and Safety	Phone call to ERT coordinator (103) & Health and Safety Superintendent

4.4 North Dam and South Dam Operating and Monitoring Criteria

The operating criteria for the North Dam and South are defined by the Trigger Action Response Plan, and the Dam Monitoring Standard Operating Procedures.

Operational Document	Location (within TIA OMS manual)
North Dam Monitoring SOP	Appendix H
North Dam Trigger Action Response Plan	Appendix G, Table 1
South Dam Monitoring SOP	Appendix H

South Dam Trigger Action Response Plan	Appendix G, Table 2

Table 4-4 below summarizes the instrumentation and visual monitoring completed at the North and South Dam. The Dam monitoring SOPs (Appendix H), provide details of dam monitoring procedures.

Table 4-4 – Dam Monitoring Summary

Monitoring Component	Monitoring Frequency	North Dam	South Dam	Interim Dike
Visual Walkover Inspections	Weekly	Yes	Yes (Monthly during care and maintenance)	Monthly
Deformation Survey Monitoring	Monthly (May to November)	Yes	Yes	As required by the SGE
Inclinometer Deformation Monitoring	Monthly	Yes	No	No
Ground Temperature Cable Thermal Monitoring	Continuous/Monthly	Analog Thermistors Continuous Logging, Monthly Download and Data Review	Digital GTCs Continuous logging and satellite transmission, monthly Data Review	Spot readings (monthly or as required by the SGE)
TIA Reclaim Pond Water Elevation	Continuous/Daily	Yes	No	Saline water storage water elevation collected via GPS survey as required by the SGE

4.5 TIA Operating Criteria and Freeboard Requirements

4.5.1 TIA Water Reclaim Pond Operating Criteria and Thresholds

Water Elevation and Thermal Performance Indicators

In general, the water level in the TIA should be kept as low as possible to reduce the thermal loading and frozen core and frozen foundation of the North Dam. Along with the risk of overtopping due to a sudden inflow, thermal performance is an equally or more important risk indicator for the North Dam. When evaluating the performance of the North Dam, the water elevation TARPs should be read in conjunction with the thermal performance TARPS, which can be found in Appendix G Table .

The operating criteria for the TIA water reclaim pond elevation is presented in Table 4-5 below. The water reclaim elevation criteria are also included in the Trigger Action Response Plan (Appendix G, Table 3).

The Hope Bay Water Management Plan (AEM 2023a) provides an overview of the site wide water management strategy.

Table 4-5 – TIA Water Reclaim Pond Operating Criteria and Thresholds

Structure	Freeboard to crest (m)		Maximum tailings elevation (m)	Operational Water level (m)			Corrective Action Level (m)	Critical Condition Level (m)
	Tailings	Water		Minimum (MinOWL)	Normal (NOWL)	Maximum (MOWL)		
North Dam	N/A	2.0	N/A	30.0	<34.0	34.0 – 34.5	34.5 – 35.0	>35.0
South Dam	1.5	N/A	33.5	N/A	N/A	N/A	N/A	N/A
Water El. TARP Level*	N/A				Green	Yellow	Orange	Red
Response	N/A			Stop TIA dewatering activities	Standard operations	Inform stakeholders (**Table 4-3**) Refer to TARP (Appendix G)	Immediately take action to stop increase and lower water level. Inform stakeholders (**Table 4-3**)	Trigger ERP and DEP (Section 8)

4.5.2 North Dam and South Dam Freeboard Requirements

North Dam

The North Dam is operated as a water retaining dam with the parameters indicated below.

Component	Elevation (m)
crest elevation	37.5
top of frozen core and geosynthetic clay layer	35.3
Maximum normal operating water level	34.0
total freeboard	3.7
normal freeboard	1.5

Note: These freeboard numbers include a 1 m allowance for dam deformation (SRK 2015a). Total freeboard also includes required area to store a storm volume at least 1/3 between 1/1000 and the PMF (see Section 3.10).

South and West Dams

The South and West Dams are not water retaining structures with the parameters indicated below.

Component	Elevation (m)
crest elevation – Phase 1 (current elevation) crest elevation – Phase 2	38.0 44.5
top of geosynthetic clay liner – Phase 1 (current elevation) top of geosynthetic clay liner – Phase 2	36.5 45.0
normal operating water level	34.0
freeboard	1.5

Note: Tailings beaches along the upstream slope of these dams creates a final topography that free-drains towards the Reclaim Pond ensuring no water will pond adjacent to these structures. Tailings deposition discharges from points located near the dam crest. The tailings level at the South and West dam is designed to be above the normal operating water level (which is governed by the elevation of the North Dam).

5 TIA Operations

Definition

At Hope Bay, operations is the group of tasks required at the mine site to ensure the necessary actions are taken to keep the site facilities and processes working safely. It includes the process of managing many intermediate and long-term activities in and around the mine site to facilitate the production of a mineral product. In the case of this manual, operations are the activities around the TIA done to ensure appropriate TIA performance while facilitating the TIA use for waste and water management. "Operations" as used in this document also applies to required activities that occur during periods where there is no active tailings deposition to the TIA. Related documents and SOPs are reference in section 1.2 of this manual.

Objectives

The operational objectives for the Doris TIA are to implement controls that enable the facility to operate within its intended design and meet performance targets during care and maintenance, operations, closure, and post-closure.

Components

Operation of the TIA involves the following periods.

Periods	Description
Operation	During periods of tailings production, tailings slurry will be subaerially deposited into the TIA and water from the Reclaim Pond will be simultaneously recovered.
At Closure	Water in the Reclaim Pond will continue to be discharged directly to Roberts Bay until water quality in the TIA meets Doris Creek water quality discharge criteria as listed in the water licence (SRK 2017a). Once criteria are met, the North Dam will be breached and exposed tailings surface will be covered with a run-of-quarry rock cover, and the Interim Dike (if constructed) will be lowered to match the cover elevation (SRK 2015a).
Care and Maintenance and Active Closure	During care and maintenance and active closure, the following will be maintained and monitored to ensure their performance within stipulated design and operating limits: • North, South, and West Dams • Interim Dike • tailings feed pipelines • reclaim water pipelines

	• discharge pipeline
Post-Closure	After a period of post-closure confirmatory monitoring, site presence will cease. **Note:** Triggers for determining cessation of post-closure monitoring will be determined by AEM as part of future closure plan updates and will be submitted to the NWB for approval.

Components Operating Outside Parameters

TIA components operating outside of design or performance parameters will be investigated and remedied by one or more of the following actions:

- conducting appropriate maintenance
- modifying surveillance methods
- revising operational procedures
- implementing remedial measures revisiting the design

5.1 TIA Operating Criteria and Performance Indicators

The following section describes several key performance indicators for the TIA. Section 4 – Dam Safety Management System and Appendix G, Trigger Action Response Plan should also be referenced with respect to TIA operating criteria.

Deformation, Cracks and Seepages – North Dam

Trigger

Excessive thaw of foundation

See Section 4 – Dam Safety Management System, for comprehensive outline of operating criteria.

Operational and Preventative Maintenance

Maintain lowest possible water level in TIA.
Ensure thermosyphons are operational.
Maintain core at −2°C and foundation at −8°C.
Ongoing review of thermistor, inclinometer and survey information

Possible Mitigation Strategies

Clear snow off dam face during winter.
Install white poly material to dam face during summer.
Construct coarse rock convection berm at downstream toe.
Convert thermosyphons to active thermosyphons.
Activate active cooling system (See Appendix E)
Construct upstream berm.

Deformation, Cracks and Seepages – South and West Dams	**Trigger** Excessive thaw of foundation See Section 4 – Dam Safety Management System, for comprehensive outline of operating criteria. **Operational and Preventative Maintenance** Maximize beach development from dam. Maintain lowest possible water level in TIA. Maintain foundation at −2˚C. Implement seepage pump-back system. Ongoing review of thermistor, and survey information **Possible Mitigation Strategies** Flatten downstream dam slope. Construct downstream toe berm Clear snow at downstream toe during winter. Construct coarse rock convection berm at downstream toe. Retrofit dam with vertical thermosyphons.
Water Balance	**Trigger** Reclaim water shortage **Operational and Preventative Maintenance** Manage annual discharge to maintain minimum required operating water level. See section 4.5 for operational water level and freeboard requirements **Possible Mitigation Strategies** Increase make-up water demand from Doris Lake.
	Trigger Excessive water inventory See Section 4 – Dam Safety Management System, for comprehensive outline of operating criteria. **Operational and Preventative Maintenance** Manage discharge to not exceed normal operating water level water level. **Possible Mitigation Strategies** Increase discharge capacity. Increase/modify water treatment (if / as required)
Load Balance	**Trigger** Reclaim water shortage **Operational and Preventative Maintenance**

	Manage annual discharge to maintain minimum required operating water level. **Possible Mitigation Strategies** Increase make-up water demand from Doris Lake
	Trigger Excessive inventory or poor water quality **Operational and Preventative Maintenance** Manage discharge to not exceed maximum required operating water level. **Possible Mitigation Strategies** Increase discharge capacity (if possible) Increase water treatment (if / as required) Increase residence / storage time in TIA (may vary seasonally)
Tailings Deposition (during operations)	**Trigger** Improper beach development **Operational and Preventative Maintenance** Survey existing beaches and used data to recalibrate deposition modeling to develop new deposition plan. Track tailings beach development with satellite surveys (e.g. Sentinel-2) **Possible Mitigation Strategies** Add additional spigot points as required by the revised deposition plan. Relocation tailings preferentially to upstream face of South and West dam
Reclaim pump failure	**Trigger** Wear and tear, improper pump operation, operating pump outside design range **Operational and Preventative Maintenance** Inspect and maintain pumps **Possible Mitigation Strategies** Reconfigure pumps Relocate reclaim pump pad Install backup pumps
Pipeline Freezing – Tailings, Reclaim, and Discharge	**Trigger** Winter period pump stoppage **Operational and Preventative Maintenance** Maintain minimum flow velocities of 1 m/sec. Heat tracing and insulation of pipelines. Mobile backup pumps

	Drain line when not in use **Possible Mitigation Strategies** Installation of secondary pipeline(s). Complete repairs of any damaged insulation in summer (pre-winter)
Pipeline Breakage or Leakage – Tailings, Reclaim, and Discharge	**Trigger** Fatigue, corrosion, or accident **Operational and Preventative Maintenance** Implement visual inspection procedure. Establish barricades where appropriate. Provide secondary containment in high risk areas. **Possible Mitigation Strategies** Stop pumping and implement site spill response plan.
Pipeline Sanding Up – Tailings	**Trigger** Pump stoppage for extended periods **Operational and Preventative Maintenance** Mobile backup pumps. Flush pipeline immediately following pump stoppage. **Possible Mitigation Strategies** Installation of secondary pipeline. Dismantling affected section of pipeline and flushing or replace.
Tailings Dust	**Trigger** Wind and equipment traffic **Operational and Preventative Maintenance** Minimize use of equipment on tailings beaches. Apply water to tailings surface **Possible Mitigation Strategies** • Apply chemical dust suppressants as appropriate. Implement physical mitigation strategies to reduce dust
Animal Access	**Trigger** Terrestrial mammals entering TIA area **Operational and Preventative Maintenance** Implement Wildlife Monitoring and Mitigation Plan (WMMP). **Possible Mitigation Strategies** Refer to WMMP.

People Safety	**Trigger** Uninformed people accessing TIA area **Operational and Preventative Maintenance** Conduct site specific orientation and training. **Possible Mitigation Strategies** Implement access controls through signs and road barricades. Promote awareness, through training and information sessions and site inductions on site. Require all vehicles do radio 'call-ins' / checks when entering the Tail Lake Road from camp.

5.2 Tailings Transport and Deposition (During Operations)

Deposition

During operation periods deposition should be subaerial using single point spigots and placed as follows.

Step	Placement
1	Place tailings starting from the crest of the South and West Dams. **Note:** The placement should create beaches that push the supernatant water away from the dams. Tailings deposition is expected to result off the dam crests during the non-ice-covered months (e.g. summer to fall)
2	After the beaches are created, move the spigot points to the east and west flank of the TIA. **Note:** This should create a long, even tailings surface that slopes toward the North Dam and ensures the is displaced towards the north away from the south dam. Deposition at locations upstream of the South and West Dam crest is expected to be done during the colder months when ice is apparent on the TIA reservoir (e.g. winter and spring). This is done to allow for the tailings beach to cool over the winter to better protect the frozen foundations, and to avoid excessive spigot movement in the winter that may lead to increased ice entrainment.

Double-Walled Pipeline Placement

As an added environmental protection measure against spill containment, the pipeline must be double-walled at the following locations (SRK 2015a):

where the pipeline crosses Doris Creek at the Doris Creek bridge and

at the three locations along the Doris to Windy all-weather road between Madrid North and the Doris North TIA (SRK 2017d).

Staged Tailings Deposition

A series of plans showing the staged tailings deposition for from the projected end of 2020 and then for the end of the active tailings deposition (end of Phase 2) is presented in SRK (2020). This is based on latest bathymetry data and updated tailings deposition plans. Updated tailings stage storage curves are to be generated annually and incorporated into the operational water and load balance tool to track tailings storage capacity, and plan for annual spigot deposition point moves as directed by the design engineer.

The most recent update of the deposition plan occurred in April 2021, prior to the cessation of tailings deposition in October 2021 (SRK 2021).

The stage storage data for the Doris TIA as of the start of 2020 is approximately as follows:

Lower Elevation (m)	Upper Elevation (m)	Volume (m^3)	Cumulative Volume (m^3)	Plan Area (m^2)
19.5	22	0	0	0
22	23	27,000	27,000	53,000
23	24	178,000	178,000	203,000
24	25	440,000	440,000	310,000
25	26	816,000	816,000	429,000
26	27	1,295,000	1,295,000	524,000
27	28	1,860,000	1,860,000	605,000
28	29	2,509,000	2,509,000	690,000
29	30	3,243,000	3,243,000	770,000
30	31	4,061,000	4,061,000	874,000

31	32	5,042,000	5,042,000	1,057,000
32	33	6,169,000	6,169,000	1,185,000
33	34	7,417,000	7,417,000	1,307,000
34	35	8,785,000	8,785,000	1,418,000
35	36	10,257,000	10,257,000	1,528,000
36	36.75	11,434,000	11,434,000	1,609,000

Deposition Planning Compliance

At the end of each month, the recorded tailings deposition performed must be validated against the performance indicator in the table above to verify if the deposition is on track. This compliance analysis is documented monthly in the SRK monthly dashboards.

It should be noted that the deposition plan and performance indicators will be updated prior to resuming operations.

5.3 Ongoing Construction

Ongoing construction at the TIA is managed in accordance with water license requirements governing the construction of water or mine waste management structures.

Any construction projects at the TIA are to be carried out such that the operation of the TIA is not impacted by the construction works. If this is not possible, interim operating documents and criteria will be developed for the impacted period.

5.4 North Dam Active Cooling System

In July 2024, an active cooling system was installed to retrofit the existing passive thermosyphons. The plan is for the active cooling system to be turned on in April or May each year, and operated until November.

The SGE in collaboration with the DE will determine the specific dates each year to turn the system on and off (based on site climate data). The E and I Superintendent will be responsible for executing the powering on and off of the system and will be part of the communication plan. See Appendix E for the Operations and Maintenance Manual for the active cooling system.

5.5 Dust Management

Control Measures

The tailings deposition plan was developed, as far as practical, to minimize the area of exposed inactive tailings surface that may be prone to dusting. Nevertheless, when needed, application of environmentally suitable chemical dust suppressants should be applied annually in general, applied more frequently if needed as discharge locations change, and reviewed on an ongoing basis to ensure at-risk areas are adequately covered.

Dust may become particularly prevalent during long periods without fresh tailings deposition. Consider applying water to tailings or covering exposed tailings with snow during winter to mitigate windblown dust generation.

Note: Appendix B provides a comprehensive assessment of possible dust management practices for the tailings surface.

Control Products

While the effectiveness of dust suppression fluctuates depending on how deposition points vary during the winter season, dust should be controlled using packed snow when available and practical, chemical suppressants, and water cannons to wet areas of concerns when other methods prove temporarily ineffective.

Note: Attachment C contains details on the product that has been outlined as preferred by AEM. Use dust suppression products is permitted upon receipt of approval from the Nunavut Water Board.

5.6 Water Management

Contact Water

In addition to tailings slurry, the following sources of mine contact water may be pumped to the TIA during operations:

- underground mine water
- pollution control pond water
- sedimentation pond water
- landfill sump water
- bulk fuel storage sump water
- treated sewage effluent
- other industrial water collected from various locations (Figure 10)

Supernatant Water

Drains into the TIA Reclaim Pond and reclaimed for use in mill operations

Excess Water

If in…	then excess water discharges to Roberts Bay…
operations	year round
care and maintenance	year round

Note: Site specific water quality requirements (MMDER) must be met before any discharge. See water management plan (AEM 2023a)

General Guidance

Complete water management procedures are provided in the Water Management Plan (SRK 2017a, AEM 2023a) and the Site Wide Water Management Tool.

5.7 Site Access and Security

Access

The Doris project is accessed by air via an all-weather air strip and water via a barge sealift resupply in Roberts Bay annually during the open water season.

Security

Access to the TIA is restricted to authorized

- employees,
- contractors, and
- consultants.

Note: All workers accessing the facility are trained and knowledgeable about hazards at and near the TIA.

5.8 Environmental Protection

Aquatic and terrestrial Environment

Protection of the aquatic and terrestrial environment was incorporated into the design of the facility through

- Trigger Action Response Plan (Appendix G)
- selection of a dam classification criterion,
- dust management system,
- water management planning,
- the incorporation of an low-permeabilityliner within the North, South and West Dams, and
- secondary pipeline containment along the extent of the Doris Creek crossing and along the creek crossing form Madrid North to the Doris TIA along the all-weather access road.

References: SRK 2015a, 2015d, 2017d and TMAC 2016.

General Guidance	Environmental protection is achieved through the continued implementation of measures outlined in this OMS Manual and related operational documents and management plans.

5.9 Freeboard Requirements and Operating Levels

Freeboard requirements and operating water levels are a key part of the TIA Dam Safety Management system and are outlined in Section 4.5.

Freeboard and operating water levels for the Interim Dike are outlined in Section 5.11.

5.10 Communication and Decision Making

Operational communication and decision making will be carried out in accordance with the Roles and Responsibilities outlined in Section 2.1 and 2.3, and the decision making and communication process outlined in Section 4.3.

5.11 Closure Overview

The overall objectives of the conceptual closure and reclamation plan are to leave the site in a manner safe for humans, wildlife, and the environment that meets future land use goals. This will be done by establishing stable chemical and physical conditions and ensuring the future use and aesthetics of the site following reclamation meet the requirements of Indigenous, Federal and Territorial governments, landowners, local communities and regulatory authorities.

The tailings surface will be covered with a nominal waste rock cover of 0.3 m thickness. The function of the cover is to prevent dust and to minimize direct contact by terrestrial wildlife. Once the water quality in the Reclaim Pond has reached the required discharge criteria, the North Dam will be breached as originally intended for Phase 1. The TIA once breached will discharge into Doris Lake which in turn discharges into Doris Creek.

The TIA will only contain flotation tailings which are non-PAG with abundant neutralization potential and thus buffering capacity. Although several metals in the tailings solids occur at concentrations more than crustal abundances, many of these metals are associated with sulphides and as such will primarily partition into the detoxified tailings which means they will not be of concern in the TIA.

Long-term humidity cell tests indicate that after the initial flushing of the samples, an increased tendency for neutral pH metal leaching may develop, with arsenic being of concern. The TIA water and load balance (SRK 2017a) suggests that possible neutral metal leaching does not pose a limitation in ensuring that the water quality in the TIA meet site specific closure water quality criteria, and therefore no infiltration reduction cover is required on the exposed tailings surface. The tailings surface will, however, be susceptible to wind erosion with the resultant effect of dust exposure. Similarly, although the tailings surface is landscaped to allow free drainage, the tailings are susceptible to hydraulic erosion, which will mobilize tailings towards the Reclaim Pond with a resultant increase in total suspended solids.

The tailings cover that functions to prevent wind and water erosion will be constructed over the entire tailings surface. The minimum thickness of cover that can practically be placed over the tailings surface would be about 0.3 m thick, and therefore the cover design has been set at 0.3 m thick ROQ material.

5.12 Interim Dike Operating Criteria

The Interim Dike is operated as water management infrastructure with the purpose of segregating saline underground mine water from the rest of the TIA.

The Interim Dike is fully contained within the TIA, such that any uncontrolled release of impounded water would not result in any impacts to safety or the environment.

The Interim Dike is equipped with an emergency spillway with the capacity to pass the PMF.

5.12.1 Operational Water Levels

General Guidance

In general, the water level in the Interim Dike should be kept as low as possible to reduce the thermal loading and hydraulic gradients on the dike and tailings foundation.

Each year prior to freshet (May-June), reduce water level in the Interim Dike to as low as practical to provide inventory for anticipated freshet inflows. Water levels will need to be drawn down to as low as practical the previous year, prior to freeze-up.

	Interim Dike Operational Water Levels (masl)		
	Normal (NOWL)	**Maximum (MOWL)**	**Emergency Spillway**
Elevation	34.0	34.3	>=34.3
Freeboard (Dike Crest)	1.0 m	0.7 m	0.7 m
Freeboard (Spillway)	0.3 m	-	-
Description	Target maximum water level under normal operating conditions	Emergency spillway invert elevation	Emergency spillway will control water elevation at 34.3 masl.
Action	Normal Operations	Take action to reduce water level to NOWL	Take action to stop spillway flow. Then, inspect spillway for erosion and carry out maintenance in accordance with Section 6.2 as required.

6 Maintenance

Definition	Maintenance is an ongoing process of activities to maintain (uphold) the proper function of the TIA, thereby ensuring compliance with safety regulations. Ongoing maintenance can consist of items such as housekeeping, small repairs and regular inspection of the dam structures and proper operation of all components linked to the TIA. Good maintenance habits can lead to early detection of deficiencies, help reduce the risk of failures, and extend the useful life of the dams, dikes and TIA system as a whole.
Objective	The objective of the maintenance program is to ensure all TIA components operation according to their performance criteria by carrying out routine and preventative maintenance (such as to address minor settlement) and event-driven maintenance (such as after a large storm event)
Components	The Doris TIA components that require maintenance include the pipeline systems, including the ocean discharge system and North Dam, South Dam, and West Dam (not yet constructed), and the Interim Dike

6.1 Pipeline Systems Maintenance

Scope	Routine and preventative maintenance should be carried out on pumps, pipelines, drain outlet pipes, valves, and flow and hour meters. The type and frequency of maintenance shall be appropriate to the operational status of the pipeline systems.
Person(s) Responsible	E and I Superintendent
Frequency	Varies by component (see below)
Documentation	Maintenance records for each component are communicated to the E and I Superintendent, kept by maintenance and include the following: • up-to-date logs of in-service equipment and facilities • maintenance schedules • maintenance history • inspection logs • repair records • frequency and cause of problems, and planned mitigation • component reliability records

	• photographic evidence of repairs • inventory of spares, material, tools, and equipment • critical spares list
Reporting	Hard copies of all documents produced in the reporting and tracking process should be stored at the project safe-keeping location. All hard copy documents must be scanned and turned into electronic records at least annually. All electronic documents must be saved on a safe computer or network drive.
Pumps	Maintain pumps (including seals, controls, instrumentation, and electrics) per the manufacturer's specifications.
Pipelines	Flush pipelines completely with fresh water every six months (or as needed). Pressure test pipelines to check for leaks annually.
Drain Outlet Pipes	Monitor drain outlet pipes during drainage. **Important!** If a flow rate drop-off is detected, flush the pipe using hydraulic cleaning equipment.
Valves	Maintain isolating and check valves per the manufacturer's specifications.
Flow and Hour Meters	Service flow and hour meters annually, recalibrating them to the manufacturer's specifications.

6.2 Dam and Dike Maintenance

Scope	Dam maintenance needs shall be determined after completion of the annual geotechnical inspection (Section **Error! Reference source not found.**). However, ongoing maintenance of instrumentation, the foundations, downstream toe, and thermosyphons can be expected to be required each year.
Person(s) Responsible	Responsible Person, Site Geotechnical Engineer, E and I Superintendent
Frequency	Annually or as required
Documentation	As-built survey pick-up and a written and document event log (outlining the approach taken for any maintenance as well as the element and location) will be required. If fill materials are placed, then volume estimated (truck counts and as-built surveys before and after) should be completed.

Reporting	A record of all maintenance activities should be kept on site and reviewed at least annually by the Site Geotechnical Engineer. For any notable earthworks, or areas where maintenance is done over a larger special extent, (e.g. to clean up a tailings spill, fill placement for buttressing or crack repair etc…) the EOR must be notified and as-built survey pick-ups must be completed.
General Guidance	The annual geotechnical inspection reports (as performed by the EOR and/or design engineer) must be consulted for examples of past maintenance and for general guidance.
Instrumentation	Repair or replace worn, damaged, or defunct instrumentation as needed and recalibrate.
Foundations	**Background** Thermal modeling for the dams has shown that although the dam core and its foundation will remain frozen, the upstream and downstream foundations will gradually thaw and lead to settlement of those sections of the dam. **Maintenance** Based on the findings of the DSI, areas that have undergone settlement may have to be repaired by adding more fill (SRK 2007, 2013, 2015a).
Downstream Toe	**Background** Snow drifts on the downstream toe of the dams must be managed or prevented as the snow cover will result in an insulating effect on the downstream toe, which may lead to more rapid thaw of the downstream foundation. **Maintenance** To maximize dam performance beyond what the thermal modelling may suggest, clear snow regularly from this area.
Thermosyphons	Inspect thermosyphons visually for performance deficiencies. If needed, recharge with CO_2 if needed and repair or replace any damaged radiator fins (SRK 2013). See Appendix E of the Operations and Maintenance Manual for the active cooling system.

6.3 Event-Driven Maintenance

Scope	The TIA must be inspected after unusual or extreme events such as heavy rainfall (exceeding 20mm per 24 hrs),

	wind storms (wind speeds > 100 km/hr), flooding or exceedance of the full supply level, severe icing, rapid snowmelt, or earthquakes.
Person(s) Responsible	Responsible Person, Site Geotechnical Engineer, E and I Superintendent
Frequency and Timing	After unusual or extreme events
Documentation	Records for all event driven maintenance must be summarized in a deliverable format similar to what is required for the visual site inspections (Section 7.1).
Reporting	For event-driven maintenance, the EOR must be notified to ensure maintenance activities and plans are appropriate to uphold the design integrity of the TIA components. As-built surveys will be required to be gathered before and after any even-driven maintenance. All digital files along with notes and photos of the maintenance work performed should be submitted to the EOR for review.
General Guidance	Review the design criteria (Section 3.10) to better understand what triggers the need for event-driven maintenance. **Important!** To a large extent, the judgement of persons responsible on site governs specific event-driven maintenance. When in doubt contact the Site Geotechnical Engineer, Environmental Superintendent and/ or the EOR for additional guidance or clarification.

7 Surveillance

Definition

Surveillance is the process of gathering information through visual inspections, monitoring performance, safety audits, and data collection.

Objectives

The objectives of the Doris TIA surveillance program are to:

- regularly monitor the operational performance of the TIA and its components,
- consistently report observations,
- regularly review and interpret surveillance data, and
- inform preventative maintenance by generating qualitative and quantitative surveillance information.

Components

The surveillance elements for the Doris TIA includes

- visual site inspections,
- instrumentation monitoring (thermal, deformation, and water balance),
- tailings geochemistry monitoring when in operations,
- water quality monitoring,
- annual geotechnical inspections, and
- dam safety reviews.

Data Management

Staff performing inspections and collecting monitoring data must complete the following actions to manage monitoring data.

Step	Action
1	Back up all monitoring data electronically.
2	Scan manual notes and save together with raw and transposed data.
3	Immediately following collection, qualified staff shall review data to: confirm integrity of the instrumentation and ensure the TIA is performing to expectations and monitoring guidelines specified in the dam surveillance SOPs.

The RP or designate is responsible for ensuring that the ongoing monitoring as documented in the dam surveillance SOP is carried out. If determined necessary, the Environmental Superintendent may consult with the EOR to complete a safety inspection outside of the routine annual AGI.

7.1 Visual Site Inspections

Scope	Visual inspections must be carried out on the TIA structures including dams, dikes, pump stations, pipelines, and spigots.
Person(s) Responsible	Qualified person under the direction of the Site Geotechnical Engineer or designate
Frequency	Weekly or as specified in Section 4.4 and Dam monitoring SOPs
Documentation	All inspections and observations are recorded in the appropriate site logbooks or recorded electronically
Reporting	As directed by the Environmental Superintendent and Site Geotechnical Engineer personnel will be trained and assigned to complete ongoing weekly visual inspection. **Reporting Notable Changes** Notify the Site Geotechnical Engineer and/or EoR immediately after any inspection where notable changes to any of the TIA facilities outside of normal operating criteria are observed. If changes are noted at the North or South Dams, or the TIA water level, follow the notification procedure in accordance with the Trigger Action Response Plan for the TIA (See Section 4 and Appendix G). The Site Geotechnical Engineer and EOR shall, in consultation with operations staff, assess the situation and develop any actions plans deemed appropriate. **Annual Reporting** In accordance with the relevant water licences, visual site inspection information (along with instrumentation monitoring information) shall be included in the annual geotechnical inspection report and submitted no later than March 31 each year (submitted as part of the annual water license requirements).
General Guidance	A monitoring checklist is presented in the dam surveillance.
All Structures	Visually inspect all TIA structures, taking note of • any signs of settlement, • water levels drops which are unaccounted for , • signs of seepage, and • Sinkholes, cracking or other surface changes • any signs of damage or vandalism to instrument clusters.
Dams	Monitor creep deformation (in accordance with Dam monitoring SOPs) within the North Dam and South Dam, as these structures may be susceptible to creep deformation and or thermal degradation of the

foundations (all dams) or core (specifically for the North Dam) in the long term.

Pump Stations

Inpsecting staffare to complete the following actions when visually inspecting pump stations.

Step	Action
1	For each pump, verify whether it is operating properly, hours operated, and discharge and suction pressures.
2	Check for leaks and spillages.
3	Confirm oil levels for all pumps.
4	Inspect water pump seals on tailings pumps.
5	Note alarms and messages.

Pipelines

Inspecting staff are to complete the following actions when visually inspecting pipelines.

Step	Action
1	For each pipeline, verify whether it is operating properly, hours operated, flowmeter data, and operating pressures along each pipeline.
2	Check for leaks and spillages.
3	Note hazards along pipeline route.
4	Verify where tailings deposition has taken place (i.e. within the past 24 hours).
5	Note alarms and messages. **Example:** Malfunction of electric heat tracing cable inside the pipeline during freezing temperatures.

Spigots

Stringent monitoring of the two spigots situated on the east flank of the TIA is required during operations since both spigots are above the crest elevation of the South Dam.

	Important! Spigot elevations are typically lower than the crest elevation of containment structures.

7.2 Instrumentation Monitoring

Scope	Instrumentation monitoring is carried out on the North, South dams (both constructed), and West Dam (when constructed) and include thermal, settlement, and other general deformation monitoring such as inclinometers, deep survey monitoring points, and surficial survey monitoring points, and thermal monitoring of the tailings profile to confirm tailings freeze-back assumptions.
Person(s) Responsible	Qualified person under the direction of the Site Geotechnical Engineer
Frequency and Timing	As specified in section 4.4
Documentation	Consult latest North Dam and South Dam monitoring Standard Operating Procedures (SOP) documents for additional details and inspections forms.
Reporting	**Monthly Instrumentation Review** Under supervision of the Site Geotechnical Engineer, conduct a monthly instrumentation review and communicate any changes in data that may suggest and impact to the performance of the structures. Currently, monthly instrumentation reviews are conducted jointly by the DE (SRK Consulting) and the Site Geotechnical Engineer.
General Guidance	Additional guidance on the required instrument monitoring (how to perform and frequency) is presented in the dam surveillance SOPs (Appendix H).
North Dam	The locations of North Dam monitoring instruments are shown in Figures 11 to 14.
South Dam	The locations of South Dam monitoring instruments are shown in Figure 15.
Interim Dike	The locations of the Interim Dike monitoring instruments are shown in Figure 16.

7.3 Tailings Geochemistry Monitoring

Background	To be completed during operational periods. Flotation tailings geochemical characterization testing has confirmed that due to the high neutralization potential and low sulfur content, acid rock drainage potential is considered

	low; however, there is potential for neutral pH metal leaching, particularly for arsenic (SRK 2015b and SRK 2017e).
Scope	Sample collection for the preparation of a monthly composite sample that will be analysed for • total metals by aqua regia digestion followed by ICP finish, • total sulphur by Leco furnace, and • direct measurement of total inorganic carbon.
Person(s) Responsible	Coordination through Environment Superintendent
Frequency	Weekly during operations
Documentation	Sampling and testing results and analysis presented in annual waste rock, quarry and tailings monitoring reports.
Reporting	In accordance with the relevant water licences, an annual geochemical monitoring report should be submitted no later than March 31 each year.
General Guidance	Recent annual waste rock, quarry and tailings monitoring reports (SRK 2020d)

7.4 Water Quality Monitoring

Scope	TIA Water quality is monitored at compliance station TL-1 at the Reclaim Water pump station. Ongoing review of water quality trends and a comparison to MDMER limits are completed each year. In additional to the above, weekly sampling and geochemical analysis of any North Dam or South Dam toe seepage is to be completed when present.
Person(s) Responsible	Coordination through Environment Superintendent
Frequency	Monthly (minimum) Water quality monitoring for the TIA is described in the Doris and Madrid Water Management Plan (AEM 2023a). Seepage typically sampled during ice free / summer months (around June to October) if present.
Documentation	Monthly water quality reports prepared by AEM

Reporting	In accordance with the relevant water licences, data should be presented as part of annual reporting.
General Guidance	Water quality monitoring for the TIA is described in the Doris and Madrid Water Management Plan (AEM 2023a).

7.5 Annual Geotechnical Inspection

Scope	The annual geotechnical inspection is a physical surveillance of the TIA including North and South Dams, and Interim Dike.
Person(s) Responsible	The engineer of record and/or design engineer —or another qualified professional engineer authorized by the engineer of record—must complete the inspection.
Frequency and Timing	The annual geotechnical inspection shall be carried out • annually • within the summer (ice free) months.
Documentation	Records of annual inspections and detailed review of monitoring data by the engineer of record —or another qualified professional engineer authorized by the engineer of record— presented in a TIA Annual Geotechnical Inspection report (AGI). These are submitted annually and are a permit requirement for the project.
Reporting	The design engineer and/or engineer of record shall prepare a detailed annual geotechnical inspection report that includes their findings and recommendations on the performance of the dams and accounts for • review and analysis of collected monitoring data • inspection observations. **Note:** The report should be delivered within 90 days of inspection to Agnico (Responsible Person) so any maintenance and mitigation can be carried as early as possible and to meet submission requirement to NWB.
General Guidance	See recent annual geotechnical inspections for additional details (SRK 2024a).
Significant Concerns	Any areas of significant concern shall be immediately communicated to AEM at the time of the annual geotechnical inspection.

7.6 Dam Safety Review

Scope	The dam safety review is a physical surveillance of the Doris TIA with a focus on the North, South, and West Dams. This systematic assessment shall consider all aspects of the Doris TIA's design, construction, maintenance, operation, processes, and systems affecting its safety. **Note:** This review should use state-of-practice principles as opposed to when those used when the facilities were designed.
Person(s) Responsible	An independent third party must complete the inspection.
Frequency	The dam safety review shall be carried out every seven years (in accordance with CDA guidelines) in addition to the annual geotechnical inspection. **Key Date:** The next dam safety review should be completed in 2028.
Documentation	Records of the dam safety review must be documented in a stand-alone dam safety review report.
Reporting	An independent third party professional engineer will prepare a detailed report that documents a complete systematic review and evaluation, of all aspects of design, construction, operation, maintenance, and surveillance, and other relevant processes and systems affecting a dam, to evaluate the design criteria with current standards, operational compliance with design intent, stability and functionality of the dam, and to identify appropriate remedial measures (if / as applicable).
General Guidance	See Mining Association of Canada (MAC) 'A Guide to the Management of Tailings Facilities' (2021) and the Canadian Dam Association (CDA) 'Dam Safety Review Technical Bulletin' (2016)
Significant Concerns	Any areas of significant concern shall be immediately communicated to engineer of record and AEM at the time of the dam safety review.

7.7 Independent Review Board Meeting

Scope	The Independent Review Board (IRB) shall meet to discuss the following topics • Site visit of all infrastructure covered by the scope of the IRB, in accordance with AEM's governance policy for the management of critical infrastructure • Review of on-going construction works and monitoring data; • Comment on implementation progress of proposed mine waste management improvement measures;

	• Provide opinions and guidance to the operation on the physical integrity, safety, behavior, and performance of the confinement systems for mine waste and water retaining infrastructures; and • Comment on management systems, emergency preparedness and overall management approach of the different mine waste management facilities and water retaining infrastructures.
Person(s) Responsible	The Site Geotechnical Engineer will organize the meeting
Frequency	A meeting will be held annually, typically following the site visit. During periods of Care and Maintenance, the site visit may be conducted every 2 years.
Documentation	Presentation material and meeting notes
Reporting	The IRB will submit a report following their observation and recommendation following each meeting. The Site Geotechnical Engineer will ensure that an action plan is developed to address the recommendation and will transmit the report and the action plan to the EOR.
General Guidance	See Agnico's Governance for Critical Infrastructure (AEM 2020) – Terms of Reference for IRB
Significant Concerns	Any areas of significant concern shall be immediately communicated to engineer of record and AEM at the time of the IRB annual visit and/or meeting.

7.8 Interim Dike Monitoring

This section details the monitoring program requirements for the Interim Dike.

Monitoring Method	Frequency	Documentation Notes
Visual Walkover Inspections	Weekly (June to November) Monthly (December to May)	Completed inspection forms and photos shall be saved here: W:\Environment\Inspections – Completed\TIA Interim Dike
Deformation Survey Monitoring	As required – starting in May and continuing until snow covers the structure.	Send completed survey data to: hopebaymonitoring@srk.com pluedke@srk.com
Ground Temperature Cable Thermal Monitoring	Monthly (May to November) Monthly (December to April)	Save ground temperature data here: W:\Environment\Compliance Program Data\Geotechnical\TIA GTC Spot Readings
SWS Pond Water Elevation	Monthly (ice free months) Frequency may be increased at the discretion of the Site Geotechnical Engineer and/or EoR	Send monitoring data to the site geotechnical engineer Brennan.jay@agnicoeagle.com

8 Emergency Management

Objectives

The TIA emergency management procedures below have two key objectives:

avoid injury or death of persons working on or near the TIA, and prevent or minimize environmental damage.

Emergency Response Plan	This section outlines links with the site Emergency Response and Crisis Management Plan (ERP) and the Dam Emergency Plan (DEP). The ERP and the DEP area stand-alone plans and are complimentary to this OMS document. The DEP can be found in Appendix F of this document, and the ERP can be is stored on Hope Bay server (W:\Procedures and Policies\01. Safety\300x - ERT\Plan). Physical hardcopies of both plans are located in the admin boardroom and goehub. As outlined in the Dam Safety Management System (See Section 4), the ERP and DEP are to be activated/consulted during emergency conditions at the TIA and Dams (including Red TARP conditions). The ERP and procedures are provided in Appendix E and include information on the following: • Activation of the ERP • AEM Crisis management plan • Different levels of emergencies • Organization and job responsibilities, and contact information • Emergency response equipment • Communication systems • Emergency measures for The Mine General Manager and Site Health and Safety Coordinator is responsible for updating the ERP as deemed practical; this includes small tasks such as updating the contact lists as necessary. Revisions should be issued to all affected agencies identified as document holders (as a minimum everyone outlined in Section 2.1). It is the responsibility of all personnel visiting the site to ensure personal and worker safety. In cases of injuries, medical help must be called. If safe to do so, personnel on site may attend to injured person and, if qualified, administer first aid.
Dam Emergency Plan	The Dam Emergency Plan (Appendix F) addresses dam specific emergencies at Hope Bay. The Dam Emergency Plan is a standalone document that is a part of the Doris TIA DSMS as outlined in Section 4.

8.1 Activation of an Emergency Response

Emergency response is activated following the activation of the HOP-HSS-PRO-3001 Code 1. The procedure is triggered when an employee contacts the Incident Commander (IC) by pushing the Red Button on any radio, Calls 460-0911, or in person.

The Incident Commander acknowledges that this situation requires triggering an Emergency Response. From there, ERT will be dispatched, Manager on Duty contacted, and the On-site Emergency Management and Corporate Crisis Management Teams may be triggered if the situation requires it as per the incident commanders assessment and in collaboration with the Manager on Duty.

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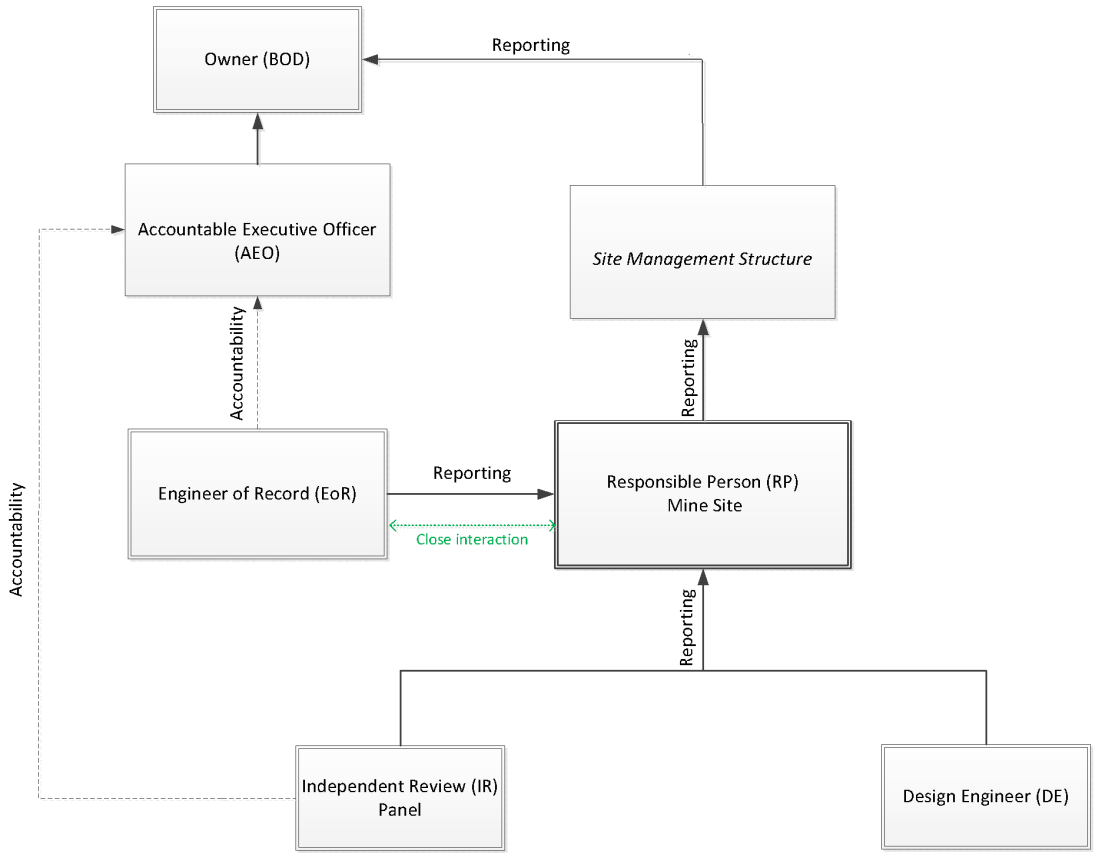
AGNICO EAGLE

OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix A: AEM Governance Structure

AEM Governance Structure (AEM 2020)



OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix B: Tailings Area Dust Control Strategy for Doris TIA

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Memo

To:	Project File	**Client:**	TMAC Resources Inc.
From:	Iozsef Miskolczi, PEng	**Project No:**	1CT022.004
Reviewed By:	Maritz Rykaart, PhD, PEng	**Date:**	December 13, 2016
Subject:	Hope Bay Project: Tailings Area Dust Control Strategy for Doris TIA		

1 Introduction

The Hope Bay Project (the Project) is a gold mining and milling undertaking of TMAC Resources Inc. The Project is located 705 km northeast of Yellowknife and 153 km southwest of Cambridge Bay in Nunavut Territory, and is situated east of Bathurst Inlet. The Project comprises of three distinct areas of known mineralization plus extensive exploration potential and targets. The three areas that host mineral resources are Doris, Madrid, and Boston.

The Project consists of two phases; Phase 1 (Doris project), which is currently being carried out under an existing Water Licence, and Phase 2 which is in the environmental assessment stage. Phase 1 includes mining and infrastructure at Doris, while Phase 2 includes mining and infrastructure at Madrid and Boston located approximately 10 and 60 km due south from Doris, respectively.

Two tailings storage areas are planned for Phase 2. The existing Doris tailings impoundment area (TIA) will be expanded, and a new Boston tailings management area (TMA) will be developed. The Doris TIA tailings deposition will consist of subaerial tailings deposition, while the Boston TMA will be comprised of filtered tailings developed as a dry-stack. This memo is addressing dust management strategies for the Doris TIA.

Two tailings streams will be produced; flotation tailings, comprising approximately 92-94% of the overall volume, and detoxified leach tailings (following cyanidation, and subsequent cyanide destruction), comprising about 6-8% of the overall volume. Only flotation tailings will be deposited in the Doris TIA. The detoxified leach tailings will be filtered, mixed with mine waste rock and used for underground mine backfill.

Upon closure, the tailings surface of the Doris TIA will be covered with a nominal waste rock cover of about 0.3 m thick. The function of the cover is to prevent dust and to minimize direct contact by terrestrial animals. Once the water quality in the Reclaim Pond has reached the required discharge criteria, the North Dam will be breached allowing the TIA to return to its pre-mining elevation of 28.3 m.

Throughout the operational phase, portions of the tailings surface will be exposed, and sufficiently inactive such that they would dry out and pose a dusting risk. This memo describes alternative dust management strategies that have been considered and presents the rationale for selection of the preferred strategy.

2 Definition of Dust

2.1 Fugitive Dust

Fugitive dust is particulate matter suspended in air by wind action and human activities. Within the Doris TIA, tailings will be deposited by hydraulic placement of a tailings slurry which does not generate any fugitive dust. Fugitive tailings dust will however be generated during the period when the tailings closure cover is being constructed.

2.2 Aeolian Dust

Aeolian dust is defined as particles that are transported as suspended load due to wind action on a surface. Although tailings are discharged wet, the surface eventually dries out as a result of evaporation or freezing of the tailings surface. As a result, at any given time, large areas of the tailings surface would expose dry tailings. Aeolian tailings dust is expected because the Project site is prone to high winds and the moderate surrounding topography does not offer effective protection from wind.

3 Typical Dust Control Methods

3.1 State of Practice

Dust control from operating and closed tailings impoundments is a significant concern in the mining industry, and as a result, the state of practice is quite advanced. There are three primary dust control strategies for fugitive and aeolian dust from exposed tailings areas: natural dust control, physical dust control and chemical dust control. Natural dust control specifically relies on maximizing the benefits offered by nature in the form of precipitation (rain and snow). While highly effective, these benefits are opportunistic and may not always be available at the times when it may be needed.

Physical dust control is by far the most effective strategy, as it relies on creating a physical barrier, such as a cover, that would preclude dusting. This may however not be a cost efficient strategy for an operating tailings impoundment, since any interim cover would occupy space within a tailings impoundment that would otherwise be required for tailings.

Chemical dust control relies on modification of the tailings surface that generates the dust. The effectiveness of this method is temporary, but its application is typically simple, making it a very good alternative for managing dust from an operating tailings impoundment.

The sections that follow provide a detailed description of all the dust control methods that are currently being used in the industry, with a specific focus towards their potential applicability for this Project.

3.2 Natural Methods

3.2.1 Snow Cover

If early in the fall season, wet snow falls directly on the exposed tailings surface and subsequently freezes, it will remain in place all winter protecting the tailing surface from dusting. Snow that falls later in the season is typically drier and more powdery and it tends to be subject to wind transport and redistribution (drifting). This means that portions of the tailings surface will become exposed and opportunity for dust release increases. This is exacerbated by the fact that during the winter the tailings surface gets extremely dry as a result of freezing, making it highly susceptible to dusting.

To maximize the potential benefits offered by snow as a natural dust control method, any snow that does fall on the tailings surface can be track compacted in areas where the tailings surface is trafficable. By mechanically compacting the snow, it will stay in place longer and will melt at a much slower rate in the spring, extending the useful life of the snow as a dust control method.

It is however important to minimize the amount of tailings that gets deposited over the compacted snow. If the compacted snow does not melt during the subsequent summer season due to the insulating blanket of the overlying tailings, ice lenses within the tailings impoundment are created which result in a loss of tailings storage space and possible instability.

There is sufficient snowfall at the Project site that this dust control method could be effectively used. In addition, there is a requirement at the Project site for snow removal in specific areas. Snow that is removed could be hauled to the TIA and used specifically for the purpose of creating a compacted snow cover over any temporarily inactive tailings surface areas. Due to the temporary nature of this dust control method, it will not be a complete solution, but would be a practical and complementary method.

3.2.2 Ice Cover

Similar to compacted snow, an ice cover will remain in place for the duration of the winter and thus temporarily mitigate dust migration. Ice cover on exposed tailing surfaces can be achieved by various methods, including ponding water during freezing weather and mechanical placement of ice blocks imported from a different source (contact water ponds).

Water can be held back in specified locations and retained there during the shoulder seasons when freezing weather will create an ice cap. Once the ice cap is achieved the open water beneath the ice can be drained off, leaving an ice cap.

The ice cap can also be created mechanically by loading ice from contact water ponds (or fresh water streams) into haul trucks and dumping the ice on the tailings surface.

Similar to compacted snow, care must be taken to ensure that the amount of tailings deposited over an ice cover is limited to avoid entraining long-term ice in the TIA.

There are several contact water ponds throughout the Project site all of which must be managed such that they are normally empty. Contact water ponds are; therefore, unable to provide a reliable source of water to use to create an ice cover. Fresh water cannot be readily hauled to

the TIA to create an ice cover as the use of fresh water is governed by the Water License (2AM-DOH1323); therefore, creating an ice cover for dust control is not considered a viable practical alternative for application at the Project.

3.3 Physical Methods

3.3.1 Water – Surface Wetting

Water is by far the most common temporary dust control measure used in areas where water shortage is not of concern. The exposed surface is wetted up, preventing particles from becoming airborne. Since the water rapidly evaporates (in a matter of hours or days), it needs to be reapplied at a frequent interval to be effective. The surface wetting can be done using a conventional water truck, a water cannon fitted to a water truck, or a stationary sprinkler system. Naturally this dust control method is only applicable during non-freezing periods of the year.

For the Project, water could readily be obtained from the Reclaim Pond or can be hauled via water truck from other site contact water ponds. The tailings surface is however not expected to be trafficable in the short term and the only viable means of frequent tailings wetting would be via a water cannon, or a sprinkler system. While both of these methods are viable, the short useful life of every wetting cycle makes this a very labor intensive dust control method which is not preferred. This method will however be reserved as a last line of defence should any of the other dust control methods prove to be ineffective.

3.3.2 Water – Flooding

Flooding the tailings surface will naturally preclude any dust concerns. This is however not a viable strategy for the Project since the objective is to place tailings subaerially. At Doris, TIA portions of the tailings may be seasonally flooded as the water level in the Reclaim Pond rises; however, the water level will be managed such that a perpetual water cover will not be present.

3.3.3 Permanent Dry Cover

The most effective permanent dust control system is a permanent physical dust cover. Typically this is in the form of a layer of soil, or other suitable readily available cover material. This is however not practical until the tailings surface has reached its final elevation. In order to facilitate placement of a final dust cover as expediently as possible, any tailings deposition plan should be designed taking into consideration all opportunities for progressive reclamation.

In the context of the Doris TIA, the tailings deposition plan provides limited opportunity for progressive reclamation during the early Project life. This is predominantly driven by the surface topography and as a result there are no practical means to improve the design. The only viable permanent dust cover would be geochemically suitable waste rock, or quarry rock. Since all the Project waste rock is designated for use as structural underground backfill, only quarry rock can be considered a viable source for a permanent dust cover. While this will be the final closure dust control method, it is not considered a viable method during the operational phase of the Project.

3.3.4 Sacrificial Dry Cover

In extreme cases, nominal sacrificial covers such as a layer of sand or gravel are used to manage tailings dust when the final tailings surface has not yet been reached, but the period until tailings

deposition might resume at any particular spot may be extensive. When tailings deposition eventually returns to the covered area, these materials are not removed and tailings deposition proceeds to overtop the sacrificial cover. This can be very cost intensive and will only be practical if the tailings surface is readily trafficable.

There are no suitable natural sacrificial cover materials readily available at the Project site. Gravel could be produced from quarry rock; however, at great cost. This is therefore not considered a viable dust control strategy for the Project TIA.

3.3.5 Biodegradable Cover

Biodegradable material such as hay, wood mulch or sewage treatment sludge can be applied over exposed tailings surfaces to mitigate dust for a limited period (i.e. requiring occasional reapplication). Naturally this option is only economically viable if the organic source is readily available. The tailings surface must also be sufficiently trafficable to allow equipment to spread these materials. As these materials biodegrade and dry out, they themselves become prone to being part of the dust hazard.

There is no viable source of biodegradable materials at the Project site, and therefore this is not considered a viable dust control strategy for the Project.

3.3.6 Wind Barriers

A wind barrier (aka windbreak or shelterbelt) is a physical structure used to reduce the wind speed, which will reduce tailings from being re-mobilized from the TIA. Typically, a wind barrier consists of one or more rows of trees or shrubs. Trees and shrubs don't grow at the Project site (at least not to the size where they would be effective wind barriers), therefore, any wind barriers would have to be engineered structures. The efficiency of wind barriers is also a function of wind speed, and often, at very high wind speeds, wind barriers can fail since it is simply not cost effective to design and build these structures to withstand large wind velocities. As well, wind barriers only work effectively over a very narrow range of wind directions. Multiple wind barriers would need to be installed to cover all of the Project's prevalent wind directions so as to provide a comprehensive dust management system for the TIA.

Given the very high wind speeds and the multiple wind directions, experienced at the Project's TIA, engineered wind barriers are not be considered a viable dust control strategy for the Project's TIA.

3.3.7 Vegetation

Revegetating an exposed tailings surface is a very effective way to mitigate dust. In an arctic setting such as at the Project site, this is not a practical option since the growth season is simply too short to allow for rapid onset of effective vegetation. In addition, the tailings material may not be amenable to supporting vegetation without the addition of supplemental nutrients, which might preclude establishment of natural successional vegetation species. This is therefore not a viable dust control method for the Project.

3.4 Chemical Methods

3.4.1 Salt (Calcium Chloride)

"Salted" sand will not freeze at temperatures above -10˚C, and can be spread in a thin layer over exposed frozen tailings surfaces during the shoulder seasons when frost penetration is enough to support the spreader truck (or other suitable spreader mechanism). The calcium chloride in the sand acts to melt the frost on the exposed tailing surface and stops the fine particulate dust particles from becoming airborne.

There are no sources of sand at the Project site, requiring that both sand and salt would have to be imported at great cost. As runoff occurs from the tailings surface, the salt will dissolve reducing the efficiency; however, since this mitigation method is best used during freezing conditions this risk is limited. However, during freshet the salt is washed off towards the Reclaim Pond which results in an increased salt load to the TIA, which may limit the use of TIA reclaim water to the mill. This is therefore not a viable dust control strategy for the Project TIA.

3.4.2 Chemical Suppressants

There are many environmentally safe commercial chemical dust suppressants on the market. Although originally developed for other forms of fugitive dust management, they are routinely used for dust control on tailings surfaces. These products work in different ways, but principally they all either chemically bind dust, or alternately facilitate towards development of a crust to prevent particles from separating and becoming airborne.

The chemical suppressants are normally supplied in concentrated liquid form in containers of various sizes. They are typically water based and are diluted before application at a ratio of about nine parts water to one part suppressant. The solution is applied by means of a spray cannon mounted on a modified water truck, but can also be done via hand held sprayers. The application rate is typically about four liters per square metre.

Chemical suppressants have a useful life which is dependent on the concentration applied and local weather conditions. Normally, products are applied at a concentration which would render a useful life of approximately one year.

Of all the dust control methods, chemical suppressants offer the greatest flexibility for application at the Project TIA. The concentrated liquid can be shipped to site on an annual basis and solution can be mixed an applied on site as required. The relatively long useful life limits the amount of effort that needs to be exerted and therefore makes the dust control method practical.

4 Dust Control Procedures for Tailings

The primary dust control measures of the Project site tailings facilities will be the use of environmentally suitable chemical dust suppressants. The application of these suppressants will be reviewed on an ongoing basis to ensure that any areas that may be at risk will be adequately covered. Generally, annual application of chemical suppressants will be applied; however it is recognized that more frequent applications may be required as discharge locations are changed throughout any year.

In addition to chemical dust suppressants, natural dust control in the form of packed snow when available will be used as far as practical. Again, the effectiveness will vary on a year by year basis depending on how deposition points vary for any given winter season.

Finally, if for any reason, any of the above dust control methods prove to be temporally ineffective, a suitable water cannon will be available to allow for dust suppression in the form of spraying of the areas of concern.

AGNICO EAGLE

OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix C: AEM Preferred Dust Control Product

Dust Stop Municipal Blend

100% Environmentally Friendly Non-Corrosive, Non–Toxic Cost Competitive Dust Control

Dust Stop Municipal Blend (DSMB) is a formula consisting of natural organic ingredients specifically engineered for all types of unpaved roads. Applicable to any soil type, it is applied using standard equipment and techniques. DSMB was designed to provide an environmentally friendly, non-corrosive and cost-competitive replacement for calcium and magnesium chloride. DSMB is not adversely affected by heavy rains or long periods of dry weather and has no adverse effect on the environment or vehicles, due to its non-corrosive properties.

- **Significantly reduces long term maintenance costs**
  - » Reduced need to grade treated roads
  - » Reduction in watering requirements
- **Non-corrosive and environmentally friendly**
  - » Will not cause rust on vehicles or application equipment
  - » No adverse impact on roadside vegetation
- **Increased water resistance resulting in better performance in all weather conditions**
  - » Reduction in maintenance requirements as a result of wet weather
  - » Does not get slippery when wet
- **Long lasting results**
- **Cost Competitive with chlorides**
- **DSMB treated roads show improved engineering properties**

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Dust Stop Municipal Blend

100% Environmentally Friendly Non-Corrosive, Non–Toxic Cost Competitive Dust Control

- **Haul Roads**
- **Access/Secondary Roads**
- **Logging Roads**
- **Construction Sites**
- **Parking Lots**
- **Back Lanes and Trails**
- **Tarmacs, Runways & Helipads**
- **Erosion Control**

Testimonial

"We have recently applied Cypher Environmental's new Dust Stop Municipal Blend (DSMB) product on La Verendrye Road within the municipality. DSMB was advertised to be competitive with chlorides in terms of cost and effectiveness and so far has performed well and exhibited excellent properties during and after rain. The product has stood up to the elements very well thus far, with several periods of rain and hot, dry and windy weather."

Grant Baker, Public Works Manager,
Rural Municipality of MacDonald, Manitoba

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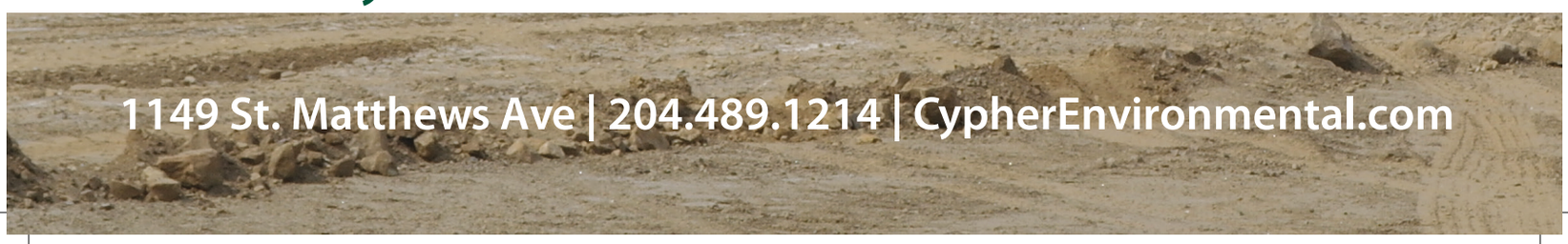


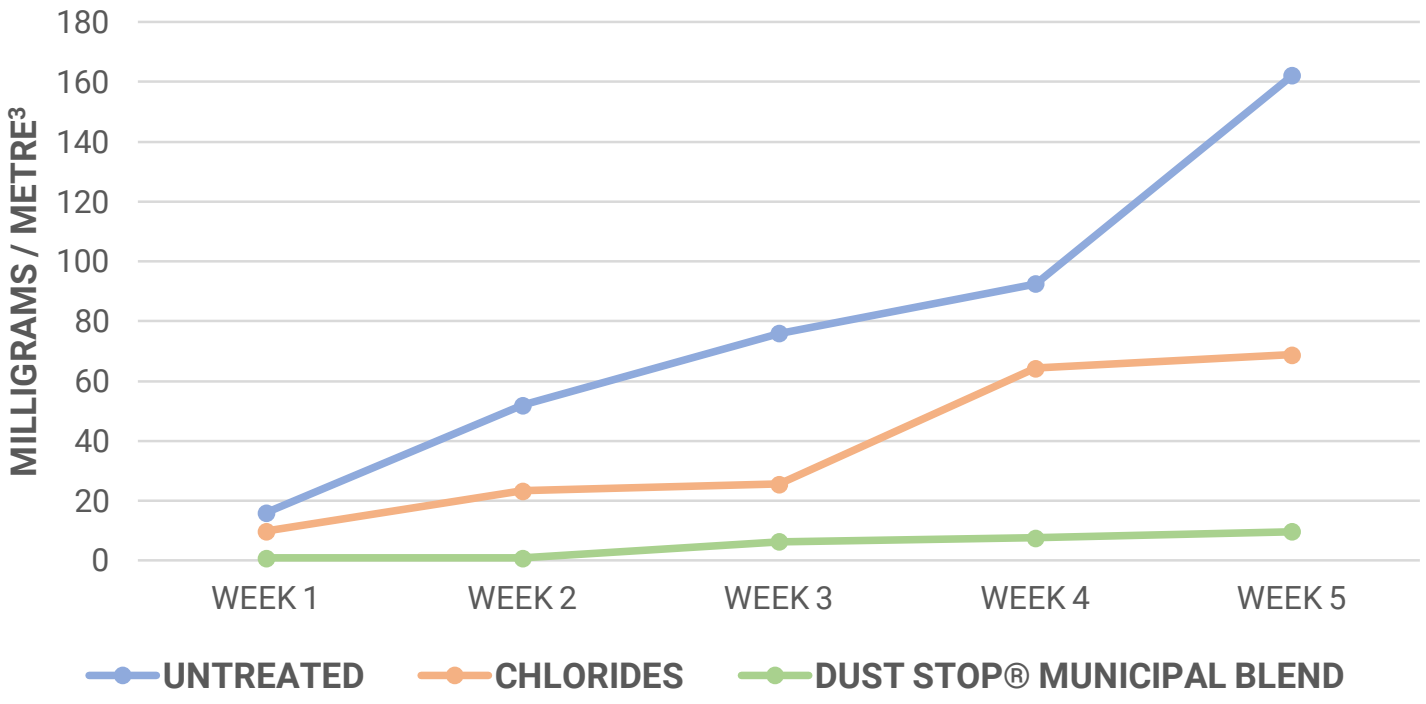
Superior dust control.

DUST STOP®
MUNICIPAL BLEND

REDUCE DUST POLLUTION BY UP TO 90% WITH DUST STOP® MUNICIPAL BLEND.

In order to measure the effectiveness of the dust control properties of Dust Stop® Municipal Blend, data was collected from a Turnkey® Dust Mate environmental dust detector during a series of controlled road tests over the period of several weeks. The Dust Mate Remote Vehicle Probe was installed on the wheel-well of our company vehicle, and dust concentration data was collected while controlling the speed of the vehicle and the elapsed time of each test. This data was collected on three road surface types on the same stretch of road (Untreated, Chlorides & Dust Stop® Municipal Blend) under the same conditions. These conditions included direction of travel, speed of travel, wind speed, wind direction, temperature, road conditions and traffic frequency.

AERIAL DUST CONCENTRATION



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Dust Stop Municipal Blend – How It Works

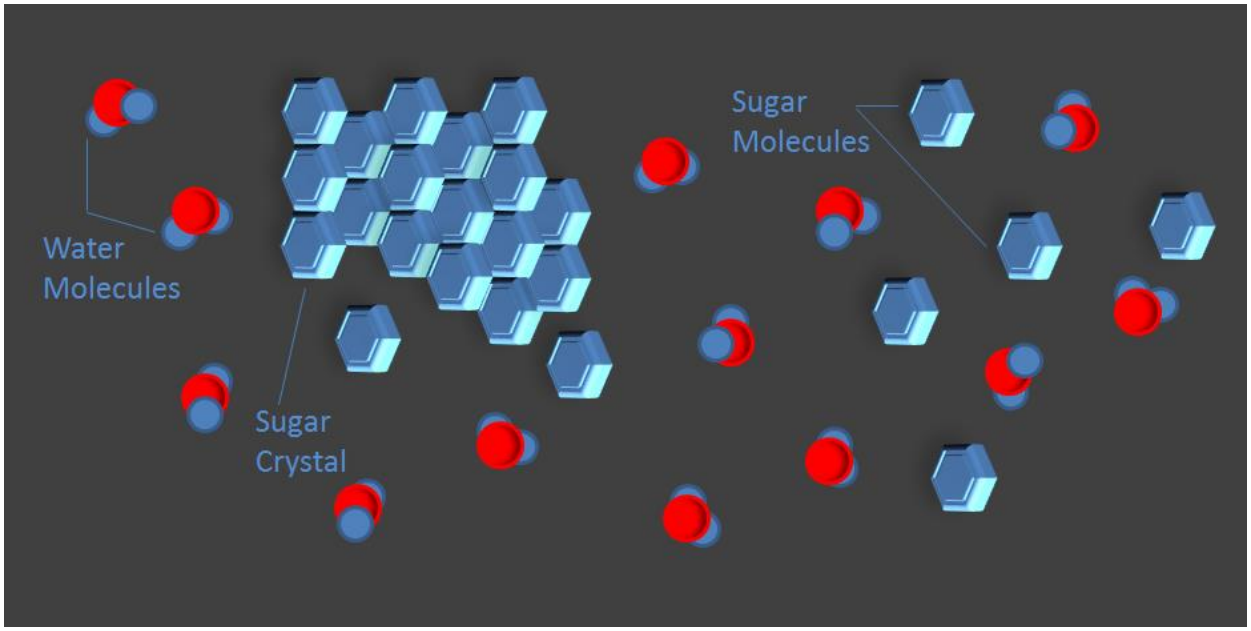
Introduction

Dust Stop Municipal blend contains three main constituents; sugars, starches, and minerals. These components are all commonly found in nature and play a big role in our everyday lives. Sugar is the universal term for sweet, short-chain, soluble carbohydrates that are primarily composed of the elements carbon, hydrogen, and oxygen. Sugars can be derived from multiple sources; simple sugars are called monosaccharides and include glucose (also known as dextrose), fructose, and galactose. Granulated sugar which is most customarily used in the food industry is sucrose, also known as a disaccharide.

The building blocks of Sugar- Greatest binding influence in DSMB

Hydrogen bonding is the greatest contributing factor to sugar's stickiness. When sugars are crystalline in structure they are unable to stick to other molecule but can be easily dispensed or poured. When a liquid such as water is added to crystalline sugar, the formerly strong oxygen-hydrogen bonds will begin to degrade and cause the newly available hydrogen atoms to seek out other materials to bind to.

Available hydrogen atoms have an opportunity to stick to the closest surfaces, some will be attracted to the hydrogen molecules in the liquid, and some will bind with another available hydrogen or oxygen atom present in the sugar. This bonding action results in the sticky nature of sugar. When the bonds in sugar are broken there is more opportunity for the molecules to grab onto whatever they're in contact with, including other sugar molecules and surrounding particles. The new bonds are more secure because there are so many of them. Therefore, it's harder to pull them apart.



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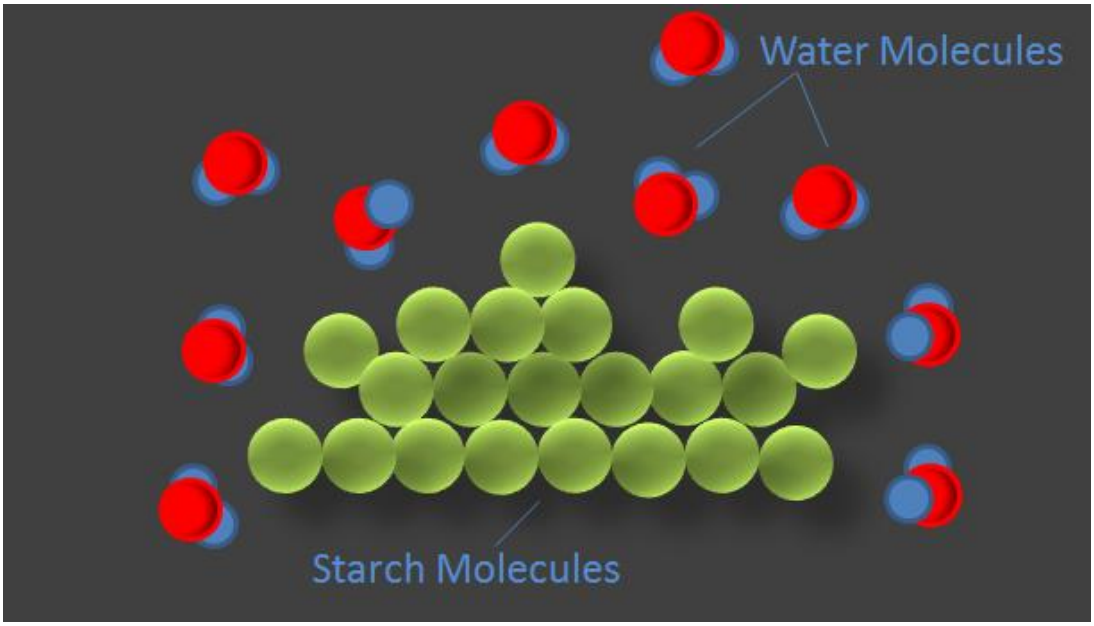
Starches and Minerals

Starch is a term with the following meanings “strong, stiff, strengthens, stiffen". Starches are comprised of polymeric carbohydrates consisting of a large number of glucose units joined by glycosidic bonds. They are insoluble in cold water and alcohol due to two types of molecules: the linear and helical amylose and the branched amylopectin. The minerals incorporated in DSMB are not unlike starches, due to their strong chemical makeup they are insoluble in water and have the opportunity to form bonds with other available molecules providing further strength and durability when applied. The bonds fashioned between the minerals, starches and sugars are, in most cases, stronger than the bond that would be formed between these components and water. Consequently, they are less likely to be dissolved or run of with the application of water.



How DSMB works

The unique blend of materials utilizes the functional properties of sugars, starches, and minerals allowing DSMB to bind and harden any loose particulate matter, decreasing dust on surfaces. DSMB is applied in a diluted form; water evaporates from the product as it dries. Dust control is achieved during this process as the high-viscosity, naturally adhesive material traps loose particulate.

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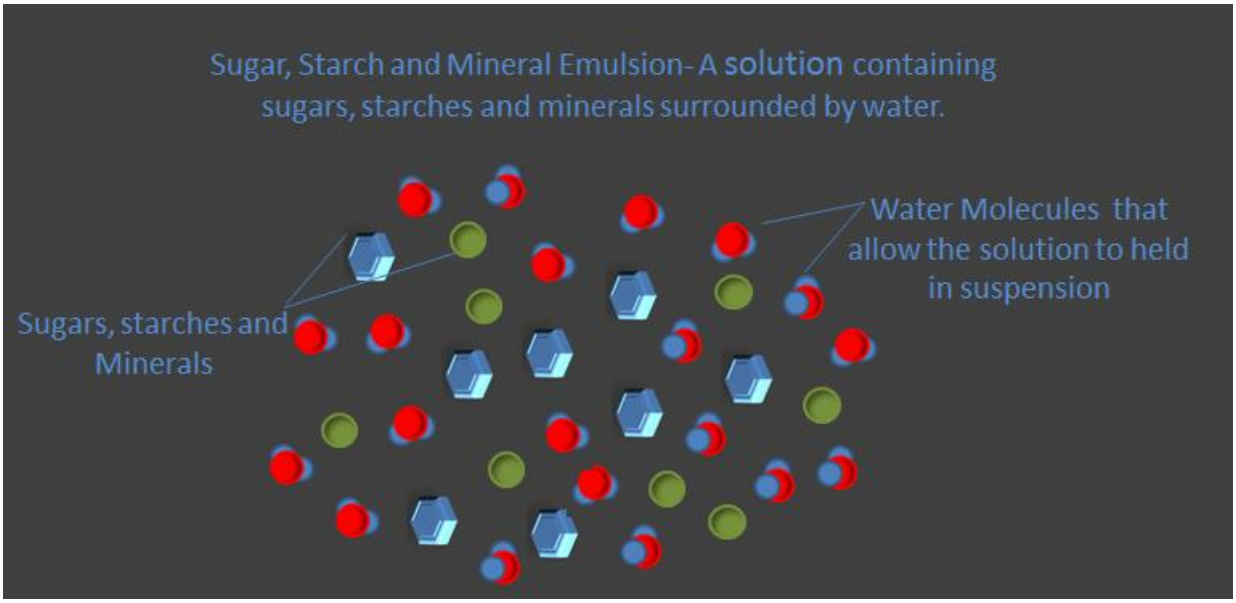
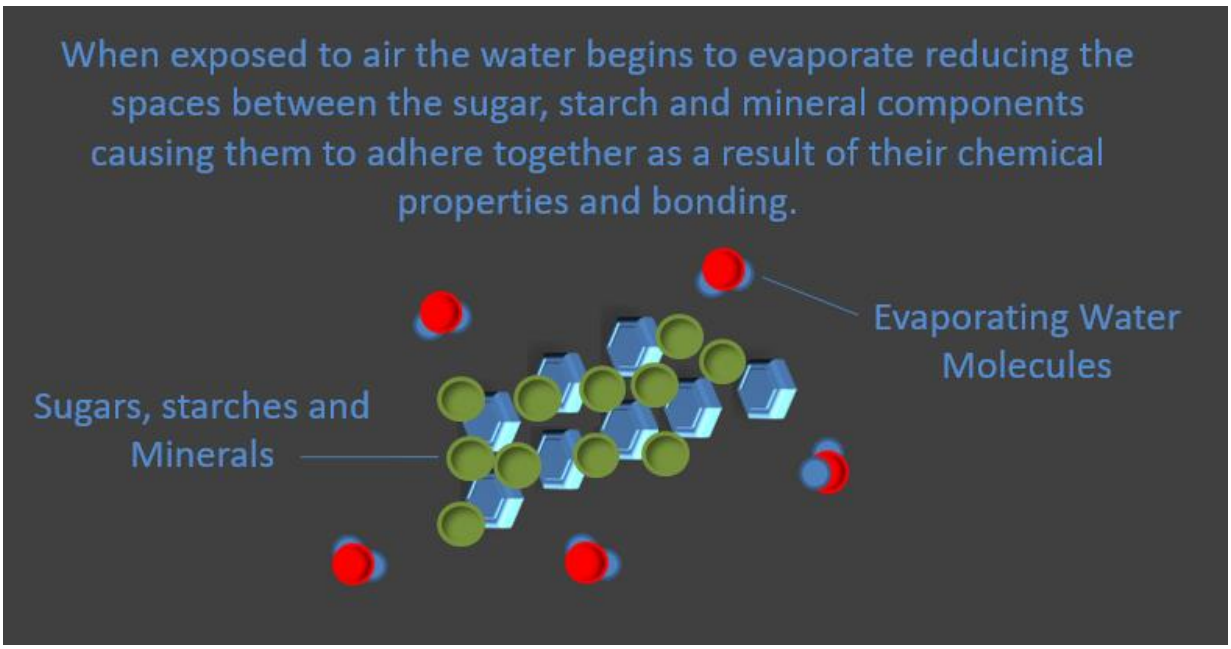
1) Water is added to the highly concentrated product allowing for suspension of the active inputs; sugars, starches, and minerals.



2) As water evaporates, the molecules bind together to form a cohesive matrix.



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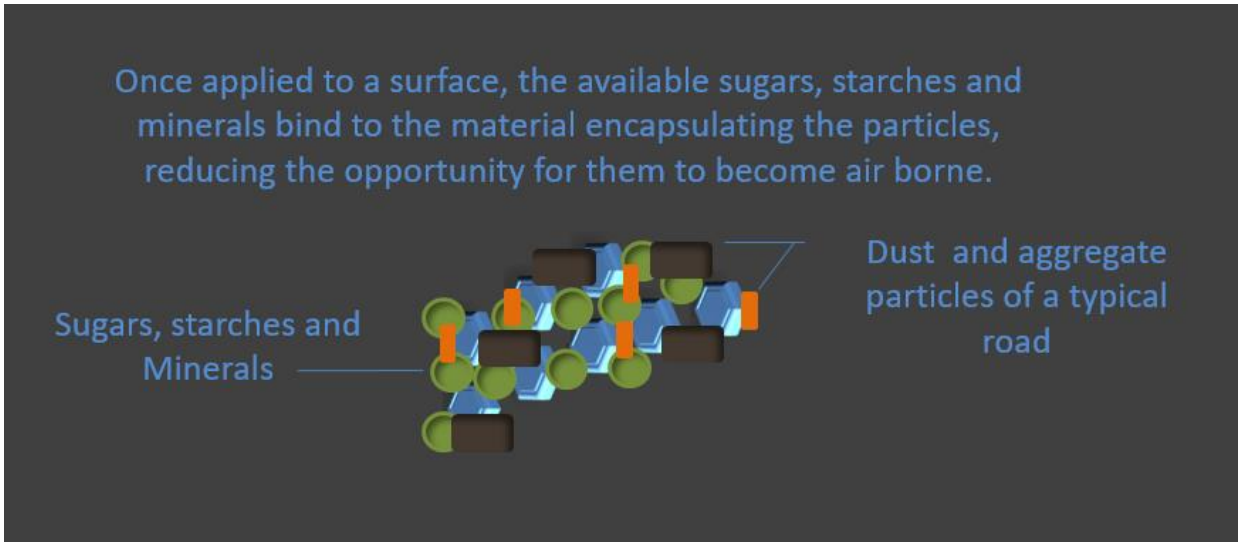
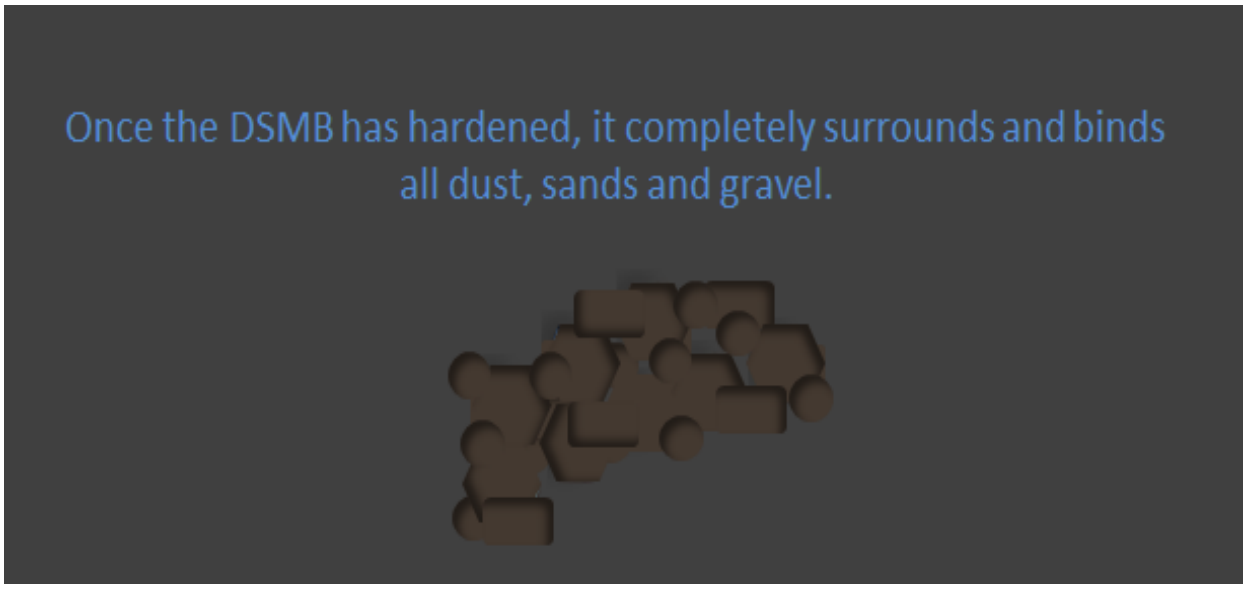
3) The newly formed matrix will now function to attract and bind the loose soil, dust or other particulates that may otherwise become air born and create dust.



4) Over time; as more water evaporates, the solution becomes firm and durable preventing any of the encapsulated dust generating material from becoming air born.



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The product's unique blend of materials also functions to reduce road surface issues in the rain or in wet conditions. The incorporated sugars compete for water making it less available to bind with other soil molecules while providing some minimal structural support and added road stability. The insoluble mineral component forms a bond with the sugar molecules creating some means of insolubility and will have less of a chance to run off in wet conditions. Once wet, the product will re-set once road surfaces dry, re-binding any loose materials. For these reasons, DSMB is not adversely affected by heavy rain, yet very effective and long lasting in dry weather, with no adverse effects on the environment or vehicles using the road due to its non-corrosive properties.

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DUST STOP MUNICIPAL BLEND (DSMB)

FREQUENTLY ASKED QUESTIONS

1) Why use Dust Stop Municipal Blend for dust suppression on your roads?

Dust Stop Municipal Blend should be used on your roads because it is a non-corrosive and environmentally friendly alternative to chlorides. Dust Stop Municipal Blend is not only environmentally friendly and non-corrosive, but also highly effective on a variety of road and material types, applied using standard techniques and equipment, and does not run-off or get sticky in the rain. Products such as various oil based emulsions and chloride based products (magnesium chloride / calcium chloride) have been used in the past for dust suppression at the expense of the environment (Canadian Environmental Protection Act 1999-link below), none of which is a concern for Dust Stop Municipal Blend. The product is based on organic sugar and starch ingredients, as well as a proprietary mineral compound, providing effective dust control with no adverse impact on the environment.
http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/psl2- lsp2/road_salt_sels_voirie/index-eng.php#a02

2) What is the difference between Dust Stop Municipal Blend and other products on the market?

Dust Stop Municipal Blend is specifically designed as a non-corrosive and environmentally friendly alternative to other dust control products such as magnesium chloride, calcium chloride, offering superior road dust control results. Dust Stop Municipal Blend is very cost-competitive with road salts, while being able to very effectively eliminate unwanted fugitive dust from unpaved roads of any soil type. While road salts are minimally effective, they are hygroscopic by nature, meaning they require moisture, which they attract to the road, to be effective, and are therefore not effective during long periods of dry weather, and can also run-off in the rain. Dust Stop Municipal Blend is not hygroscopic, so it is not burdened with the same issues road salts have during prolonged dry periods, or wet weather. The concentrated liquid formulation is easily mixed with several parts water prior to its application, allowing it to be easily transported and applied with standard water trucks. Once the solution is sprayed on the road and allowed to dry, immediate dust control results will be achieved. In comparison to other dust control products mentioned above, Dust Stop Municipal Bend requires a reduced application frequency further reducing application and maintenance costs.

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3) What is Dust Stop Municipal Blend made of?

Dust Stop Municipal Blend's proprietary formula is composed of an environmentally friendly blend of sugars, starches and minerals. Dust Stop Municipal Blend utilizes these main inputs in a concentrated liquid form to produce a very effective dust control product that is applicable to almost any material type.

4) How does Dust Stop Municipal Blend work?

The unique blend of materials utilizes the functional properties of sugars and starches allowing DSMB to bind and harden any loose particulate matter, decreasing dust in road surfaces. The product's unique blend of materials also functions to reduce road surface issues both during and after rain. The incorporated sugars compete for water making it less available to bind with other soil molecules, while providing some minimal structural support and added road stability. The product will re-set once road surfaces dry, re-binding any loose materials. For these reasons, DSMB is not adversely affected by heavy rain, yet very effective and long lasting in dry weather, with no adverse effects on the environment or vehicles using the road due to its non-corrosive properties.

5) What are the benefits of Dust Stop Municipal Blend?

Dust Stop Municipal Blend has numerous benefits associated with its use as a dust control product. Dust Stop Municipal Blend is supplied in concentrated liquid form, allowing for easier transportation as well as application. The ingredients in the product provide stability to the road surface that decrease maintenance requirements and significant dust reduction. The unique blend of materials utilizes the functional properties of sugars and starches allow DSMB to bind and harden any loose particulate matter, decreasing dust on road surfaces. These materials function to reduce road surface issues in both dry and wet conditions. Once wet, the product has the ability to re-set once the road surface becomes dry, re-binding any loose materials. Due to the specific blend of sugars and starches, it will rejuvenate with moisture allowing it last longer than other products on the market, yet not run-off in the rain. For these reasons application and maintenance costs can be reduced. Dust Stop Municipal blend is non corrosive, will not cause corrosion to equipment or vehicles and does not have any harmful effects to roadside vegetation making it safe to use in sensitive environmental areas.

6) What kinds of roads is Dust Stop Municipal Blend applicable for?

Dust Stop Municipal Blend is an effective dust control product on any unpaved roads or surfaces requiring dust suppression and temporary soil stabilization. Dust Stop Municipal Blend is effective on municipal roads, secondary roads, county roads, mine haul roads, access roads, runways, helipads, parking lots, driveways and a wide range of other applications that require dust suppression or temporary stabilization such as tailings piles, stockpiles, erosion control and open haulage situations.

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7) How do you apply Dust Stop Municipal Blend?

Dust Stop Municipal Blend is applied with standard road construction equipment and can be applied topically or mixed into the top layer of the road material. The first step involved in the application of Dust Stop Municipal Blend is to determine the area of the road / surface that you will be treating. Once you determine this you can calculate the amount of water and Dust Stop Municipal Blend that is required (please communicate with your local representative who will help you figure out the best application rate for your requirements). The next step in the application of the product is to add the Dust Stop Municipal Blend with water prior to the application of the product. Always add the water to the water truck prior to the Dust Stop Municipal Blend. Once the pre-determined amount of water is added to the truck, add the pre-determined amount of Dust Stop Municipal Blend. Once the product is added to the water truck it can immediately be sprayed on the road surface. Once the product is applied you will notice dust control results immediately, however traffic should stay off of the road until the product has time to dry (drying time can vary depending on the climatic conditions on the day of application, in many cases is around 1 hour on a warm day).

If mixing the product into the road surface, the addition of a road grader and rubber wheeled compactor needs to be added to the project. Generally performed during routine maintenance, the DSMB can be mixed into the soil once the top layer has been loosened to repair potholes and wash boarding. The prescribed mixture of water and DSMB should be applied evenly and lightly mixed into the soil prior to shaping and compacting. Shaping of the road surface is still important to ensure that water is quickly evacuated away from the road surface. Additional details and specifics can be discussed with your Cypher representative.

8) What happens to Dust Stop Municipal Blend when it rains?

There are no long term effects on Dust Stop Municipal Blend if it is subjected to rain. Dust Stop Municipal Blend contains a blend of soluble sugars, starches, and an insoluble mineral component that once cured are able to hold their strength in the presence of water. For these reasons, DSMB is not adversely affected by heavy rain, yet very effective and long lasting in dry weather, with no adverse effects on the environment or vehicles using the road due to its non-corrosive properties.

9) Is Dust Stop Municipal Blend effective during long periods of dry weather?

Yes, Dust Stop Municipal Blend is an effective dust control product during long periods of dry weather. One reason Dust Stop Municipal Blend is so effective in dry weather is that, unlike chloride-based products, it is not hygroscopic so it does not rely 100% on the ambient moisture in the atmosphere to work. The product derives its main efficacy through the hardening and binding power of its ingredients, which forms a physical barrier over the surface of the road, binding the dust particles down and providing long term dust control results.

10) Is Dust Stop Municipal Blend effective on all material types?

Yes, Dust Stop Municipal Blend is an effective dust control product on almost any material type. Dust Stop Municipal Blend will bond to any solid material it is exposed to, it will incorporate any particles it touches into the film once it cures. Therefore, almost any soil type can be treated with Dust Stop Municipal Blend. However, the application rate of Dust Stop Municipal Blend that is recommended may vary slightly depending on the material being treated.

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11) How long will Dust Stop Municipal Blend last?

Dust Stop Municipal Blend is a seasonal dust control solution, designed to reduce the frequency of treatments compared to other dust control methods, such as chlorides. Some variables that will affect the longevity of an application would be the application rate used, type of material, wet/rainy conditions, type and amount of traffic and climatic conditions. The application rate will have an effect on the longevity of dust control results you see; the stronger you apply Dust Stop Municipal Blend the longer it will last. Some Dust Stop Municipal Blend users apply it at rates that are much less concentrated and on a more frequent basis, therefore in essence making these applications maintenance doses and allowing for a more cost-effective long-term use of the product.

12) Will Dust Stop Municipal Blend have any adverse effects on the vehicles used to apply it?

No, Dust Stop Municipal Blend will not have any adverse effects on either the vehicles used to apply the product or the vehicles using the road. Dust Stop Municipal Blend has a pH that is almost neutral which is why it will have no corrosive effect on any vehicles it comes into contact with, or any damaging effect to road side vegetation. In fact, Dust Stop Municipal Blend 's use as a dust control product will eliminate harmful dust from having an abrasive effect on the moving parts of the vehicles traveling on the Dust Stop Municipal Blend treated roads therefore reducing their associated maintenance requirements. It is unlike corrosive and toxic products such as chlorides, it will not cause irreversible long term damage to equipment and vehicles.

13) Why use a dust control product?

Dust control should be used to minimize the risks involved with the generation and movement of dust particles emanating from any trafficked unpaved surfaces. Dust also represents the fines that are the essential binders that maintain the strength and stability of an unpaved surface, and help to lock down the aggregate road. It is estimated that for every vehicle traveling one mile of unpaved roadway once a day, every day for a year, one ton of dust is deposited along a corridor extending 500 feet out on either side of the road. This dust poses a threat to human health through inhalation into the lungs, as well as a threat to the safety of the people using the road due to the reduced visibility caused by the thick clouds of dust. The creation of dust is also quite costly because it represents significant annual losses in fine soil material and can cause damage via abrasion to moving parts of the vehicles traveling on the road. Applying a dust suppressant / dust control product, such as Dust Stop Municipal Blend, will help to minimize these threats and provide a much safer, healthier road environment.

Additional information can be found at www.cypherenvironmental.com. For questions, contact your regional distributor or Cypher Environmental Ltd.'s head office at info@CypherEnvironmental.com.

Cypher Environmental Ltd.
1149 St. Matthews Avenue
Winnipeg, MB R3G 0J8 Canada

(204) 489-1214
info@cypherenvironmental.com
www.cypherenvironmental.com

DUST STOP LIQUID CONCENTRATE (DSLC) QUESTIONNAIRE DEFINITIONS

Cypher environmental prides itself in providing a customized approach to every project; we know that no two projects are the same, understanding the variables such as size, project type, material type, traffic frequency and traffic type are paramount to providing the best solution.

A significant amount of time and effort is placed on providing the best solution for the issue of dust control based on the circumstances of a particular project. Areas such as dimensions of the project are easily determined while others such as traffic type and traffic frequency are somewhat subjective. In order to provide some framework for understanding these terms, Cypher provides the following reference information:

Road Type:

Mine Haul	– A crude road built to facilitate the movement of people, equipment, and/or materials along the route of a job. – A road built to carry heavily loaded trucks (60-450 ton) at a good speed; the grade is limited and usually kept to less than 17% of climb. – Truck haulage cost amounts to between 30 and 50 per cent of total surface mining costs and up to 60 per cent of total forestry operation costs. The savings from appropriate design, construction and maintenance of haulage roads and utilization of the most suitable materials is thus significant.
Access Road	– A road providing a means of entry into a region or approach to another road, site or project; usually exposed to heavy traffic (not as significant as a haul road). – A road that provides access to a specific destination, as to a main highway or to a property that lies within another property.
Secondary Road	– A road supplementing a main road, usually wide enough and suitable for two-way, all-weather traffic at moderate or slow speeds (lighter vehicles than an access road).
Parking Lot	– A cleared unpaved area that is intended for parking vehicles, these surfaces can be exposed to additional shear forces not found on other road types due to static shear (static wheel forces when steering while stopped).
Erosion Control	– Is the practice of preventing or controlling wind or water erosion in agriculture, land development, coastal areas, river banks and construction. – Effective erosion controls are important techniques in preventing water pollution, soil loss, wildlife habitat loss and human property loss.

Tailings Pile	– Any static pile of material that is not exposed to vehicle or foot traffic. – Also includes storage piles.

Material Type:

The **Material Type** is a reflection of the size of the dominant aggregate particles in a road / soil, starting at the small end of the scale; Well Compacted Fines and getting larger as we reach the High Gravel Content end of the scale.

Sandy	– Granular material. – Finer than gravel and coarser than silt. – Particles range in diameter between 0.0625 mm to 2mm.
Well Compacted Fines	– High clay / silt content. – Cohesive soils (clay / silt) that are dense and tightly bound together.
Light Gravel Content	– Fine Sized / Dirty Gravel (more fines). – This is small (4–8 mm) particulate gravel.
Medium Gravel Content	– Medium Sized / Less Dirty (less fines). – This is medium (8-16 mm) particulate gravel.
High Gravel Content	– Coarse Gravel (Little to No Fines – difficult to compact) – This is larger (16-32 mm) particulate gravel.

Traffic Frequency:

The area i.e. dimensions of the surface are easily determined while other variables such as traffic type and traffic frequency are somewhat subjective. In order to provide some framework for understanding these terms, Cypher provides the following reference information:

Traffic Frequency	**Per hour**	**Per 8 hour**	**Per 12 hour**	**Per 24 hour**
Low	1 – 10	1 – 80	1 – 120	1 – 240
Medium	10 – 25	80 – 200	200 – 300	240 – 600
High	> 25	> 200	> 300	> 600
Constant	– Traffic that exceeds the 25 vehicles per hour and remains at a steady state for extended periods. Generally, traffic numbers are averages over a long period, encompassing high and low traffic periods. Constant traffic indicates regular passage of vehicles at stable intervals for long periods (e.g. every 2 minutes for 24 hours a day).			
Tailings Pile	– Any static pile of material that is not exposed to vehicle or foot traffic. – Also includes storage piles			

Traffic Type:

Traffic Type	Vehicle Weight (tons)	Vehicle Weight (kg)	Vehicle Weight (lbs)
Heavy	> 100	> 100,000	> 220,463
Medium	22 – 100	22,000 – 100,000	48,500 – 220,462
Light	< 22	< 22,000	< 48,500
Tailing Pile	– Any static pile of material that is not exposed to vehicle or foot traffic. – Also includes storage piles.		

Average Traffic Speed:

This represents the speed at which the majority of vehicles will travel on the road. Choose "Tailings Pile" for any projects that will not receive any traffic.

**Note that these definitions are for general familiarity; all roads will have a mixture of various sized aggregates in them but will have a visible maximum aggregate size that we are referring to here. If you are uncertain about the category of a road, a picture of the surface should be emailed to your Cypher representative for clarification.
**This information is provided as a guide only, specifics of the project should be discussed with your Cypher representative to clarify individual project details.

Dust Stop Municipal Blend

SECTION 1: IDENTIFICATION

Product Name:	Dust Stop Municipal Blend
Synonyms:	DSMB
CAS Number:	See Section 3
Product Use:	A water-based nonhazardous, environmentally friendly and biodegradable liquid used for dust control on roads
Manufacturer/Supplier:	Cypher Environmental Ltd.
General Information:	WHMIS Classification: Not Controlled
Address:	Cypher Environmental Ltd. 1149 St. Matthews Ave. Winnipeg Manitoba R3G 0J8 Canada
Emergency Number:	Tel: (204)-489-1214 Fax: (204)489-7372

Section 2: HAZARD IDENTIFICATION

Health Environmental Physical:	Biodegradable
Acute Toxicity:	Non- Toxic, pathogen free.
Skin/Eye Corrosion:	Contact with skin may result in mild irritation.
Mutagenicity/ Carcinogenicity/Devel opmental:	Non-mutagenic and non-carcinogenic Based on available information, none of the ingredients in Dust Stop Municipal Blend are regulated nor listed as potential cancer agents by Federal OSHA, NTP or IARC.
Reproductive/Develop mental:	Not Determined
Target Organ Toxicity (Repeated):	Not Determined
Toxicity:	Non-Toxic, pathogen free

GHS Label:

Signal Word: DANGER!

Hazard Statements:

WHMIS HAZARD RATING INFORMATION	FLAMMABILITY	HEALTH	REACTIVITY
0-Minimal 1-Slight 2-Moderate 3-Serious 4-Severe	0	1	0

Section 3: COMPOSITION / INFORMATION ON INGREDIENTS

Unique Identifiers

INGREDIENTS (Complex mixture)	% by weight	CAS NO.
Water	5-10	-
Proprietary Anionic Polyelectrolyte Additive	Proprietary	CAS Listed
Proprietary Additive	Proprietary	CAS Listed
Reduced Sugars	Proprietary	CAS Listed
Silicates and Carbonates	Proprietary	Mixture

* Based on available information, none of the ingredients in Dust Stop Municipal Blend are regulated nor listed as potential cancer agents/hazardous by Federal OSHA, NTP or IARC.

Section 4: FIRST AID MEASURES

Eye: A slight eye irritant.

Skin: Contact with skin may result in mild irritation, rinse with plenty of water.

Inhalation and Ingestion: Considered non-harmful by all exposure routs , if breathing is difficult remove to fresh air.

Signs and Symptoms of Exposure: None. Ingestion may cause mild nausea or diarrhea.

Section 5: FIRE FIGHTING MEASURES

Suitable Extinguisher Media:	Treat the same as water
Fire Fighting Procedures:	Isolate fire area and deny unnecessary entry, Soak thoroughly with water to cool and prevent re ignition. Cool surroundings with water to localize fire zone. Hand held carbon dioxide or dry chemical hazard may result from forceful application of fire extinguishing agents. Do not enter fire area with out protective equipment.

Section 6: ACCIDENTAL RELEASE MEASURES

PPE:	Eye: Safety goggles Respirator: Not applicable Clothing: Regular on-Site clothing
Emergency Procedures:	In case of accidental spill or discharge, take up and containerize for disposal according to state and local regulations. This product displays ultimate biodegradability under both aerobic and anaerobic conditions and if spilled should not cause any adverse short or long term environmental impacts. Ventilation requirements as normal
Methods and Materials For Containment and Cleaning Up:	For smaller spills, Wash contaminated area with water and flush into sewage system or any other disposal system. For large spills, soak up with sand or sweeping compound and dispose at solid waste

Section 7: HANDLING AND STORAGE

Handling: **Keep container closed when not in use. If container is being stored for extended periods, provide minimal to moderate agitation every few weeks ensuring re-homogenization of product.**

Storage:

Storage Temperature (Degrees C/F)
Minimum: 10°C (50°F)
Maximum: 20-25°C (68-77°F)
Application Temperature:
Minimum: 10°C (50°F)
Maximum: 57°C (135°F)
Optimum Working Temperature Range:
18-45°C (64-113°F)
*Store product in an area that is not exposed to direct sunlight and in an environment within the conditions stated above.

Section 8: EXPOSURE TO CONTROLS AND PERSONAL PROTECTION

OSHA PEL's:	Not Applicable
Exposure Limits:	Dust Stop Municipal Blend presents no health hazards to the user, other than mild eye and skin irritancy.

Engineering Controls:

	No specific engineering controls needed, it is recommended to handle concentrated product in a well ventilated area
PPE:	
Eye Protection:	Safety goggles, avoid eye contact or exposure to concentrated amounts of product
Skin Protection:	Regular on-Site clothing , rinse from skin when exposed to product
Respiratory Protection:	Respirator: Not applicable, ventilation as normal

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Flashpoint:	Not flammable; not combustible
Auto Ignition:	None
Boiling Point:	>100°C
Melting Point:	Liquid
Freezing Point:	<0°C
Vapor Pressure:	Not Determined
Miscibility with water:	Miscible in all proportions
Solubility in Water:	Soluble
Lower and Upper Flammability Limits:	Not flammable
Specific Gravity:	1.24 @ 25 °
Density:	1.4 g/cm^2 @ 25 °
pH:	9.19
Ultimate Biodegradability:	DOC reduction >90% after 28 days
Appearance:	Brown slightly viscous liquid
Odor:	Sweet organic odor
Composition:	A blend of carbohydrates, water-soluble polymers, and solid mineral.

Section 10: STABILITY AND REACTIVITY

Stability/ Incompatibility:	Stable for a minimum of two years when stored in proper conditions (see above section 7)
Hazardous Reactions/Decomposition Products	Not determined
Reactivity:	Not determined
Chemical Stability:	Stable
Conditions To Avoid:	Storage above 50°C (120°F) or below 0°C (32°F). Avoid contact with strong oxidizing and reducing agents.
Incompatible Materials:	None
Hazardous Decomposition Products:	Not determined, None

Section 11: TOXILOGICAL INFORMATION

Signs, Symptoms of Over Exposure and First Aid Treatment:

Eye Contact: Reddening may develop. Immediately rinse the eye with large quantities of cool water. Continue 10-15 minutes or until material has been removed. Be sure to remove contact lenses, if present, and lift upper and lower lids during rinsing. Get medical attention if irritation persists.

Skin Contact: Minimal effects, if any. Rinse skin with water. Rinse shoes and launder clothing before reuse.

Swallowing: Essentially non-toxic. Product may cause a slight laxative condition. Give several glasses of water to dilute if swallowed. Do not induce vomiting. If stomach upset persists, consult a physician.

Inhalation: Non-toxic. Prolonged exposure to product in a mist form (not recommended) could cause a mild irritation of the nasal passages and throat. Remove to get fresh air. Get medical attention if irritation persists.

Section 12: ECOLOGICAL INFORMATION

Bio Accumulative Potential:	The product exhibits ultimate biodegradability under anaerobic conditions as defined by US EPA methods (40 CFR part 796.3180).

Section 13: DISPOSAL CONSIDERATIONS

See section 6

Section 14: TRANSPORTATION INFORMATION

This product is non-toxic, transport in conditions described in section 7 above.
INTERNATIONAL AIR TRANSPORTATION ASSOCIATION: this product is not regulated by IATA, when shipped internationally.

Section 15: REGULATORY INFORMATION

SARA/TITLE III – CERCLA List of Hazardous Substances and Reportable Quantities (40 CFR 304.4): This product **does not** contain an ingredient(s) listed as a hazardous ingredient for Emergency Release Notification under section 304.

SARA/TITLE III – List of Extremely Hazardous Substances for Emergency Planning and Notification (40 CFR 300 & 305): This product **does not** contain an ingredient(s) listed as an extremely hazardous substance (EHS) for Emergency Planning under sections 301-303 and for Emergency Release Notification under section 304.
SARA/TITLE III – List of Toxic Chemical subject to Release Reporting (Community Right to Know) (40 CFR 372): This product **does not** contain an ingredient(s) listed as a toxic chemical for Annual Release Reporting Requirements under section 313.

Section 16: OTHER INFORMATION

Date of SDS Preparation:	August 2016
Original or Revised Copy:	Last Updated August 2016 **Reasonable care has been taken to ensure information and advice contained in this data sheet is accurate at the time of printing. However, Cypher Environmental Ltd. Accepts no liability for any loss or damages suffered as a consequence of reliance on the information contained herein.**
Changes Made to Original SDS:	
Disclaimers:	Please contact the supplier for application instructions, the application rate/procedure may fluctuate depending on specific uses of product and applications.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

SMI, Inc.

12219 SW 131 Avenue
Miami, Florida 33186-6401 USA

Phone: (305) 971-7047
Fax: (305) 971-7048

Attn: Adrianne Veters
Cypher Environmental Ltd
1149 St Matthews Ave 2nd Floor,
Winnipeg, MB R3G 0J8
Canada

Date: 29-Sep-2017

SMI/REF: 1707-047

Product: **DUST STOP MUNICIPAL BLEND** *(received 07-Aug-2017)*

Dilution: As received and 10% by volume

BOEING D6-17487 REVISION T

Exterior and General Cleaners and Liquid Waxes, Polishes and Polishing Compounds

Sandwich Corrosion Test	Conforms
Acrylic Crazing Test	Conforms
Paint Softening Test	Conforms
Hydrogen Embrittlement Test	Conforms

Respectfully submitted,

Patricia D. Viani, SMI, Inc.

Sandwich Corrosion Test : Specimen preparation, testing, and interpretation shall be in accordance with ASTM F1110 using the following materials and with the following exceptions:

a. Reagents and materials exception:
   (1). Clad 7075-T6 aluminum alloy in accordance with QQ-A-250/13 (AMS 4049 or AMS-QQ-A-250/13 optional) (2024-T3 Alclad specimens are neither required nor optional.)
   (2) Bare 7075-T6 aluminum alloy in accordance with QQ-A-250/12 (AMS 4045 or AMS-Q-A-250/12 optional) anodized in accordance with BAC 5019 or MIL-A-8625, Type I.
   (3) Anodize shall be sealed. (2024-T3 nonclad specimens are neither required nor optional).
   (4) Distilled or deionized water may be used in place of ASTM F1193, Type IV reagent grade water for control specimens.
   (5) The filter paper may be Whatman No. 5 or equivalent in place of Whatman GFA glass fiber paper.

b. Procedure exceptions:
   (1) The filter paper strips shall be 1 by 3 inches and shall be placed in the center of the sandwiched specimens.
   (2) Each sandwich specimen shall be held together with waterproof tape, with no more than 1 piece of tape (maximum width 0.75 inch) on each of two opposite edges.

c. Interpretation of result exceptions:
   (1) Leaching or lightening of the chromate sealed anodize coating shall not be cause for rejection.
   (2) Deposits or residues from the material being tested that are not products of corrosion of the test panel surface shall not be cause for rejection.
   (3) Special procedure for evaluation of fire extinguishing foams and liquids.

   Panels with very light darkening or staining, which have no obvious metal attack or pitting, may be swabbed (cotton-tipped swabs or cotton gauze) with a 0.26 mole/liter sulfuric acid solution and re-examined. If the coloration is substantially removed and there is no evidence of metal attack or pitting, the condition shall not be cause for rejection. (The 0.26 mole/liter sulfuric acid solution can be prepared by adding 1.5 cc of concentrated sulfuric acid (SG = 1.84) to 100 cc of distilled or deionized water.

   (4) Panels shall have a rating of 1 (no more than 5 percent of the surface area shall be corroded) or better in accordance with ASTM F 1110. The preferred method of determining the corroded area is by using image analysis. Other means approved by the purchaser may be substituted.
   (5) Any corrosion in excess of that shown by the control group shall be cause for rejection.

Sandwich Corrosion Test :continued

	Bare 7075-T6 (AMS 4045) Anodized per BAC 5019 (chromate seal) or MIL-A-8625 Type I with Dichromate Seal	Clad 7075-T6 Aluminum (AMS 4049)
CONCENTRATE	**1**	**1**
DILUTE	**1**	**1**
CONTROL	1	1

Result Conforms

Acrylic Crazing Test:

The material being tested shall not craze, crack, or etch acrylic test specimens when tested in accordance with ASTM F 484 using Type C (stretched acrylic plastic in accordance with MIL-P-25690) stressed to an outer fiber stress of 4500 psi.

Type C (MIL-P-25690) ***Concentrate: No crazing, cracking or etching.***
Dilute: No crazing, cracking, or etching.

Result Conforms

Paint Softening Test Procedure:

a. Testing shall be in accordance with ASTM F502 using the following coating systems.
   (1) BMS 10-79, Type II primer applied in accordance with BAC5882 plus BMS 10-60, Type II enamel in accordance with BAC5845.
   (2) BMS 10-79, Type III primer applied in accordance with BAC5882, plus BMS 10-100 coating in accordance with BAC5797.

b. Three specimens conforming to Section 12a.(1) and three specimens conforming to Section 12a(2) shall be used for each test condition.

c. The material being tested shall not produce a decrease in film hardness greater than two pencils, or any discoloration or staining.
   NOTE: Slight darkening of the BMS 10-100 surface is acceptable.

Concentrate: *Paint system 1: ≤ 1 pencil hardness change after 24 hour post-exposure dry time.*
Paint system 2: ≤ 1 pencil hardness change after 24 hour post-exposure dry time.

Dilute: *Paint system 1: ≤ 1 pencil hardness change after 24 hour post-exposure dry time.*
Paint system 2: ≤ 1 pencil hardness change after 24 hour post-exposure dry time.

Result Conforms

Hydrogen Embrittlement Test:

Hydrogen Embrittlement testing shall be in accordance with ASTM F 519 using cadmium plated Type 1a.2, Type 1c, or Type 2a specimens. All requirements of ASTM F519 for specimens, preparation, testing, and reporting shall apply. Type 1a.2 specimens shall meet the requirements of D6-4307.

Specimens: Type 1c, cadmium plated per MIL-STD-870.
(45% load, 150 hours, notched immersed for the duration, room temp.)

Concentrate:	***#1:***	***No failure occurred within 150 hours.***
	#2:	***No failure occurred within 150 hours.***
	#3:	***No failure occurred within 150 hours.***
	#4:	***No failure occurred within 150 hours.***
Dilute:	***#1:***	***No failure occurred within 150 hours.***
	#2:	***No failure occurred within 150 hours.***
	#3:	***No failure occurred within 150 hours.***
	#4:	***No failure occurred within 150 hours.***

Result Conforms

Cypher Environmental Ltd.
ATTN: Teaghan Wellman
1149 St. Matthews Avenue
2nd Floor
Winnipeg Manitoba R3G 0J8

Date Received: 03-FEB-17
Report Date: 10-FEB-17 13:06 (MT)
Version: FINAL

Client Phone: 204-489-1214

Certificate of Analysis

Lab Work Order #: L1886901

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Judy Dalmaijer
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1886901-1 40L OF 0.25% DUST STOP Sampled By: CLIENT on 03-FEB-17 Matrix: LIQUID							
Miscellaneous Parameters							
Trout Bioassay LC50	See attached.					03-FEB-17	R3649799

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
TROUT-LC50-WP	Water	Trout Bioassay LC50	EPS 1/RM/13, EPS 1/RM/9

Certified, disease-free rainbow trout (Oncorhynchus mykiss) are exposed to several concentrations of a sample including full strength, under static conditions in order to estimate the median lethal concentration (LC50) - the concentration of the sample in water that is estimated to be lethal to 50% of the test organisms within a 96-hour exposure period.

Samples with excessive salinity (reported as conductivity greater than 13700 µmhos/cm) discharging into marine waters will require alternate testing.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Rainbow Trout Bioassay Test Report - LC50

Sample ID:	L1886901-1

Summary Results

96-hour LC50 v/v (%):	Non-Lethal
95% Lower Confidence Interval (%):	n/a
95% Upper Confidence Interval (%):	n/a
Method of Calculation:	n/a
Confirmed by Graph:	n/a

Sample Information

Sample Origin:	Cypher Environmental
Sample Description:	40L of 0.25% Dust Stop
Sampling Date and Time:	03-Feb-17
Sampling Method:	Grab
Sampled By:	Not Provided
Container(s) Description:	2 x 20L polyethylene pails without liners
Sample Volume:	40L
Date and Time Received:	03-Feb-17 14:40
Transit Irregularities:	None
Storage Temperature (˚C):	n/a

Test Information

Test Organism:	Oncorhynchus mykiss
Test Description:	Acute, 96-hour, Static, LC50
Reference Method(s):	EPS 1/RM/13, 2nd Ed. Dec. 2000, with 2007 and 2016 amendments, Environment Canada EPS 1/RM/9, May 1996 with May 2007 amendments, Environment Canada
Performed By:	AGJ
Starting Date and Time:	03-Feb-17 16:45
Deviations from Reference Method:	None

Initial Parameters

Observations

Colour:	Dark Brown					
Odour:	Mild					
Turbidity:	High					
Solids:	High					
Hardness (mg/L):	2.5	mL Titration Solution/	10	mL of Sample x 1000 =	250	
Alkalinity (mg/L):	1.4	mL Titration Solution/	10	mL of Sample x 1000 =	140	
Temperature (°C):	14.4	Thermometer		S/N 91154465		
Dissolved Oxygen (mg/L):	6.15	YSI Dissolved Oxygen Meter		S/N 15M102668		
Conductivity (µS/cm):	696	VWR Portable Conductivity Meter		S/N 51071543		
pH (5.5-8.5 pH units):	8.86	VWR SympHony pH Meter		S/N D01908		
pH Adjustment:	Not Adjusted					
pH Adjustment Procedure:	n/a					

Pre-Aeration

Aeration Time (min):	30					
Sample Test Concentration (v/v):	0.250%	0.125%	0.063%	0.031%	0.016%	0%
Aeration Rate (5.5-7.5 mL/min/L):	6.1 ± 0.2	6.1 ± 0.2	6.1 ± 0.2	6.1 ± 0.2	6.1 ± 0.2	6.1 ± 0.2
xygen (D.O.) Before Pre-Aeration (%):	75.7	n/a	n/a	n/a	n/a	93.4
Average D.O. After Pre-Aeration (%):	83.2	n/a	n/a	n/a	n/a	96.3

Test Organism Data

Lot Number:	11/01/17 T3
Weekly Mortality Preceeding Test (%):	0
Sample Size:	10

Conditions Common to All Concentrations During Test

Source of Holding/Dilution Water:	Dechlorinated UV Treated City of Winnipeg Tap Water
Container Description:	20 L Polyethylene Pail with Liner
Aeration Method:	Compressed air bubbled through silica-glass air diffuser
Aeration Rate (5.5-7.5 mL/min/L):	(as set during pre-aeration above)
Test Solution Volume (L):	20
Test Solution Depth (cm):	34
Number of Test Organisms per Container:	10
Loading Density (g/L):	0.23

Conditions During Test

Concentration (% v/v)	Temperature (˚C) (15 ± 1˚C)					Dissolved Oxygen (mg/L)					pH (pH units)				
	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h
0	14	n/a	n/a	n/a	14	9.81	n/a	n/a	n/a	9.72	7.51	n/a	n/a	n/a	7.68
0.016	14	n/a	n/a	n/a	14	9.93	n/a	n/a	n/a	9.66	7.58	n/a	n/a	n/a	7.38
0.031	14	n/a	n/a	n/a	14	9.79	n/a	n/a	n/a	9.59	7.61	n/a	n/a	n/a	7.42
0.063	14	n/a	n/a	n/a	14	9.43	n/a	n/a	n/a	9.57	7.84	n/a	n/a	n/a	7.52
0.125	14	n/a	n/a	n/a	14	8.52	n/a	n/a	n/a	9.37	8.18	n/a	n/a	n/a	7.52
0.25	14	n/a	n/a	n/a	14	6.78	n/a	n/a	n/a	7.21	8.86	n/a	n/a	n/a	7.36

Conc. (% v/v)	Conductivity (µS/cm)	Number of Fish Dead				Number of Fish Stressed			
	0h	24h	48h	72h	96h	24h	48h	72h	96h
0	332	n/a	n/a	n/a	0	n/a	n/a	n/a	0
0.016	355	n/a	n/a	n/a	0	n/a	n/a	n/a	0
0.031	394	n/a	n/a	n/a	0	n/a	n/a	n/a	0
0.063	452	n/a	n/a	n/a	0	n/a	n/a	n/a	0
0.125	546	n/a	n/a	n/a	0	n/a	n/a	n/a	0
0.25	700	n/a	n/a	n/a	0	n/a	n/a	n/a	0

Control Fish Information at End of Test

Mean Fork Length (mm):	38
Lower Range Fork Length (mm):	36
Upper Range Fork Length (mm):	40
Mean Wet Weight (g):	0.47

Mortality and Stressed Behaviour Information

Conc. (% v/v)	Mean Number of Fish at End of Test		Mean Rate of Fish at End of Test (%)	
	Dead	**Stressed**	**Dead**	**Stressed**
0	0	0	0	0
0.016	0	0	0	0
0.031	0	0	0	0
0.063	0	0	0	0
0.125	0	0	0	0
0.25	0	0	0	0

Median Lethal Concentration Results for Multi-Concentration Tests

LC50:	Non-Lethal
LC50 Lower 95% Confidence Limit:	n/a
LC50 Upper 95% Confidence Limit:	n/a
Statistical Method:	n/a

Note: Non-lethal = 0 mortality

Reference Toxicant Test Results

Reference Toxicant:	Zinc Sulfate
Date Reference Toxicant Initiated:	26-Jan-17
Recent 96h Reference Toxicant Test LC50 (mg/L Zinc):	0.33
Lower 95% Confidence Limit (mg/L Zinc):	0.23
Upper 95% Confidence Limit (mg/L Zinc):	0.46
Historic Geometric Mean LC50 (mg/L Zinc):	0.64
Lower 95% Confidence Limit (mg/L Zinc):	0.27
Upper 95% Confidence Limit (mg/L Zinc):	1.51
Method of Calculation:	Stephan LC50 Program, Probit
Confirmed by Graph:	Yes

Sublethal Biological Effects

No sublethal biological effects observed.

Observations/Comments

No toxicity observed.

10- 231632

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

L1886901

Page ____ of ____

Report To	**Report Format / Distribution**	**Service Request:** (Rush subject to availability - Contact ALS to confirm TAT)
Company: Cypher Environmental	Standard: X Other (specify):	Regu
Contact: Teaghan Wellman	Select: PDF X Excel Digital Fax	Priorit
Address: 1149 St. Matthews Ave	Email 1: teaghan@cypherenvironmental.com	Emer
	Email 2:	Same
Phone: 204-489-1214 Fax:		
Invoice To Same as Report ? (circle) Yes or (No) (if No, provide details)	**Client / Project Information**	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) (Yes) or No	Job #:	
Company: Cypher Environmental	PO / AFE:	
Contact: Maureen Sutherland	LSD:	
Address: 1149 St. Matthews Ave		
Phone: 204-489-1214 Fax:	Quote #:	
Lab Work Order # (lab use only)	**ALS Contact:**	**Sampler:**

Contact Lee Ann for Test.

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Number of Containers
	40L of 0.25% Dust Stop.	2/3/17		liquid	2.

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
				Feb 3/17	2:40p	29 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

THE RURAL MUNICIPALITY OF MACDONALD

October 7, 2016

To Whom It May Concern:

We have recently applied Cypher Environmental's new Dust Stop Municipal Blend (DSMB) product to on La Verendrye Road within the municipality. The site runs off the Perimeter Highway west, between Wilkes Avenue and McGillivray Blvd. and is a very heavily trafficked road. DSMB was advertised to be competitive with chlorides in terms of cost and effectiveness and so far has performed well and exhibited excellent properties during and after rain. The product has stood up to the elements very well thus far, with several periods of rain and hot, dry and windy weather.

We were also pleased with the great customer support, including both remotely and on-site assistance during the application of the product. We continue to see more than satisfactory results and are happy with the dust and erosion control provided.

We look forward to future projects involving Cypher Environmental.

Sincerely,

Grant Baker
Public Works Manager
Rural Municipality of MacDonald
161 Mandan Drive
Sanford, Manitoba, Canada
R0G 2J0
Phone: 204-736-2214
Email: gbaker@rmofmacdonald.com
www.rmofmacdonald.com

August 22, 2017

To Whom It May Concern:

We have recently applied Cypher Environmental's new Dust Stop Municipal Blend (DSMB) product to on Victor Avenue within the municipality. DSMB was advertised to be competitive with chlorides in terms of cost and effectiveness and so far has performed well and exhibited excellent properties during and after rain. The product has stood up to the elements very well thus far, with periods of rain and hot, dry and windy weather.

We were also pleased with the great customer support, including both remotely and on-site assistance during the application of the product. We continue to see more than satisfactory results and are happy with the dust and erosion control provided.

We look forward to future projects involving Cypher Environmental.

Sincerely,

Rick Gamble
Mayor
Village of Dunnottar
PO Box 321
Matlock, Manitoba, Canada
R0C 2B0
Phone: 204-389-4962
Email: info@dunnottar.ca
www.dunnottar.ca

AGNICO EAGLE

OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix D - Figures

Original figure produced by SRK consulting (May 2016), updated by Agnico (March 2024).

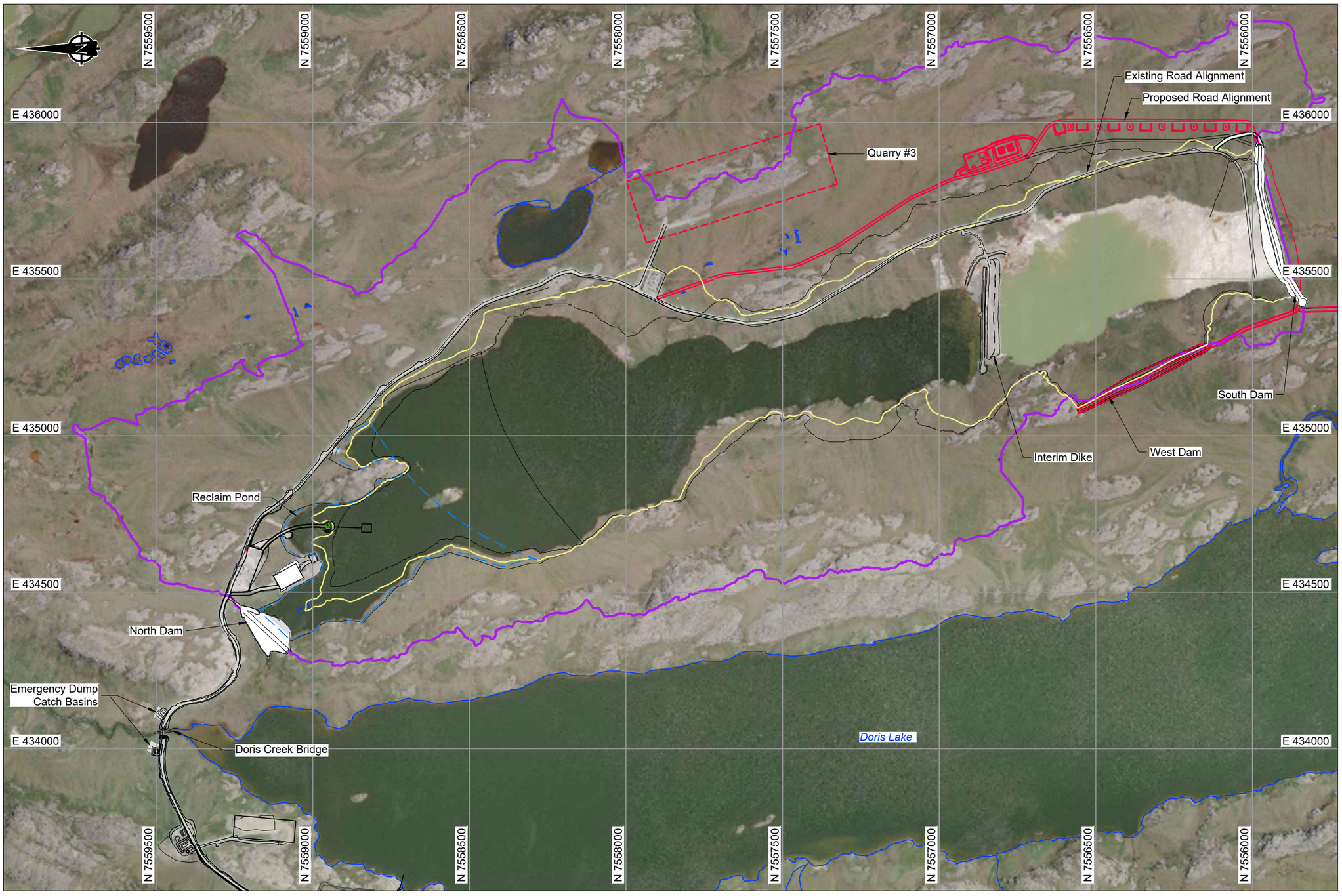
AGNICO EAGLE

HOPE BAY PROJECT

DORIS TIA OMS MANUAL

Site Location Plan

DATE:	APPROVED:	FIGURE:
March 2024	BJ	1



LEGEND

- Existing Infrastructure
- Proposed Infrastructure
- Quarry
- Ultimate Reclaim Pond Extent
- Ultimate Tailings Extent
- Watershed Boundary

NOTES

1. All units are in meters unless otherwise specified.

REFERENCES

NAD83 UTM Zone 13.
NAD83 CSRS UTM Zone 13.
Maxar (Vivid) imagery from ESRI World Imagery, July 18, 2023.
Tailings Beach survey collected by drone LiDAR in August 2021, data provided by client.

0m 100 200 300 400 500

Original figure produced by SRK Consulting (June 2020), updated by Agnico (March 2024).

AGNICO EAGLE

Doris TIA

DORIS TIA OMS MANUAL

Site General Arrangement

DATE:	APPROVED:	FIGURE:
March 2024	BJ	2

N 7560000
N 7559000
N 7558000
N 7557000
N 7556000

Doris Creek Bridge
Secondary Road
North Dam
Existing Road Alignment
Doris Camp
Reclaim Pond
Doris Connector Vent Raise and Acess Road
Doris Central Vent Raise and Access Road
Planned Quarry #3
DORIS LAKE
Proposed Road Alignment
Doris-Windy Road
West Dam
South Dam
OGAMA LAKE

E 434000
E 435000

0m 100 200 300 400 500 600

NOTES

1. Contours shown at 0.5m Intervals.
2. NAD 83 UTM Zone 13

LEGEND

- Proposed Tailings Facility
- Proposed Dam/Dikes
- Existing Facilities
- Existing Doris Camp
- Proposed Road Realignment

AGNICO EAGLE

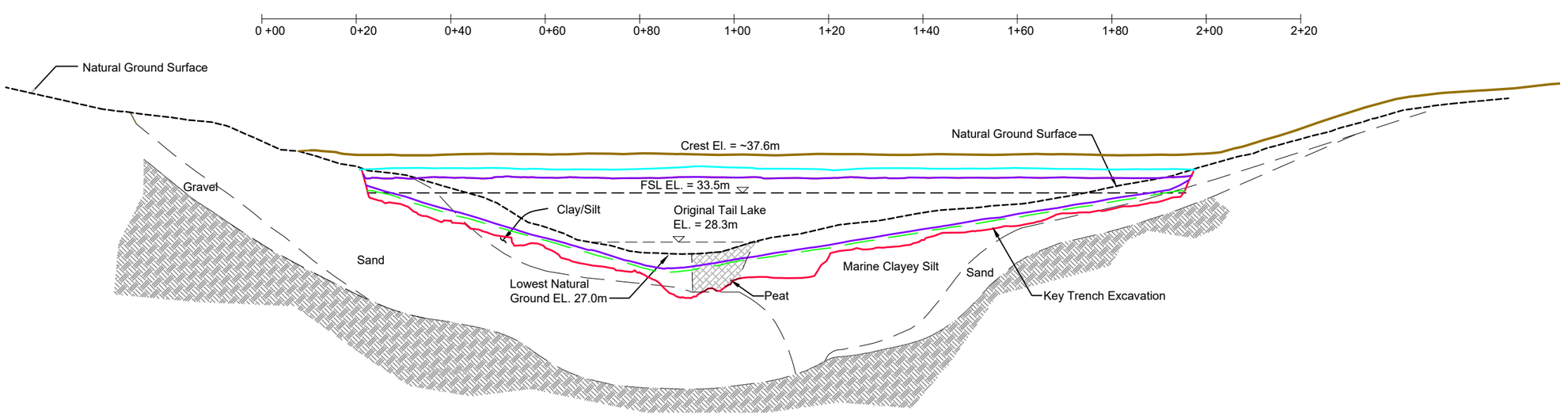
HOPE BAY PROJECT

DORIS TIA OMS MANUAL

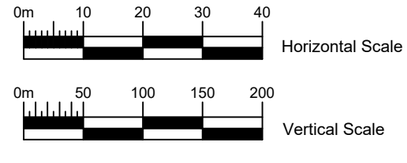
TIA Site Overview (End Phase 2)

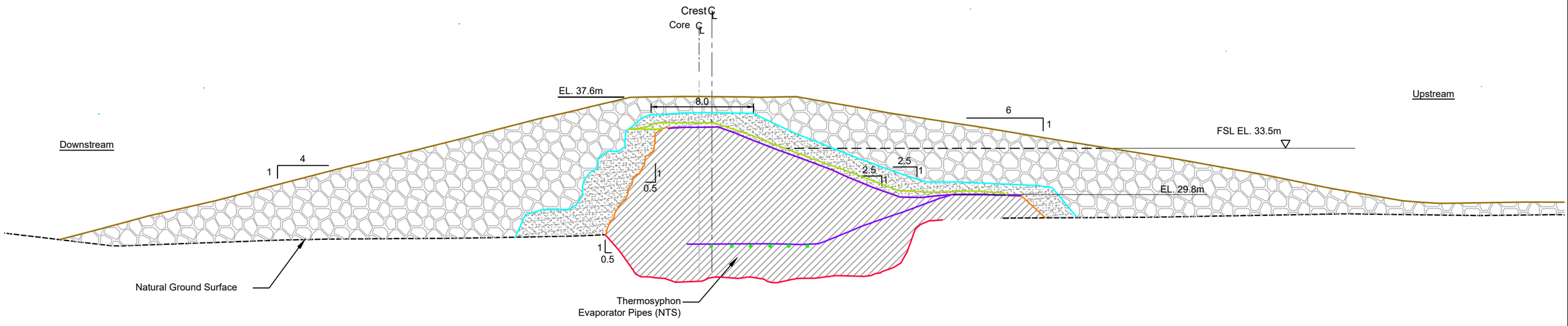
DATE:	APPROVED:	FIGURE:
March 2024	BJ	3

Original figure produced by SRK Consulting (May 2018), updated by Agnico (March 2024).

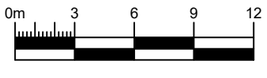


SECTION ALONG NORTH DAM CREST CENTERLINE





NORTH DAM TYPICAL SECTION



LEGEND

- Natural Ground
- Stratigraphic Boundary
- Core Material
- Transition Material
- Run of Quarry (ROQ)
- Surfacing Material
- Bedrock
- Peat
- Thermosyphon Evaporator Pipe (NTS)
- Geosynthetic Clay Liner (GCL)
- Core Material
- Key Trench
- GCL Cover Material
- Transition Material
- ROQ Material
- Thermosyphon Evaporator Pipes
- Thermosyphon Evaporator Pipes

NOTES

1. The subsurface geology has been extrapolated from a series of geotechnical investigations consisting of drill holes, auger holes and shallow test pits. Bedrock contact and geological unit contacts are therefore likely to vary somewhat.

REFERENCES

Diagram Source: 2021 Annual Geotechnical Inspections (SRK 2022)

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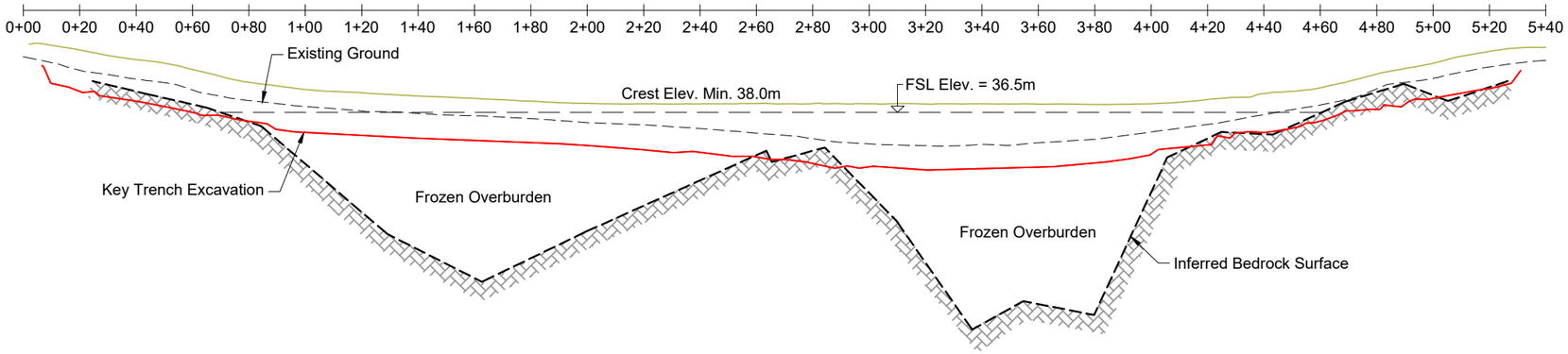
Doris TIA

DORIS TIA OMS MANUAL

North Dam Foundation Conditions and Typical As-Built Section

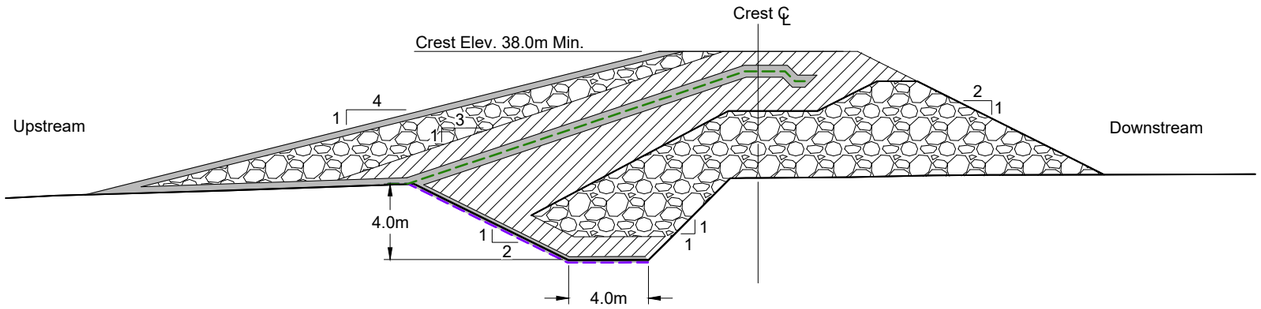
DATE:	APPROVED:	FIGURE:
March 2024	BJ	4



SECTION ALONG
SOUTH DAM CREST CENTERLINE

0m 20 40 60 80 Horizontal

0m 10 20 30 40 Vertical



SOUTH DAM TYPICAL SECTION

0m 3 6 9 12

LEGEND

- Thermistor Bead Location
- Lower GCL Liner
- Upper GCL Liner
- Bedding Material
- Transition Material
- Run of Quarry Backfill

NOTES

1. Topographic and as-built contour data from the terrain model was provided by the Client.
2. All units shown are in meters unless otherwise stated.

REFERENCES

Diagram Source: 2021 Annual Geotechnical Inspections (SRK 2022)

Original figure produced by SRK Consulting (March 2020), updated by Agnico (March 2024).

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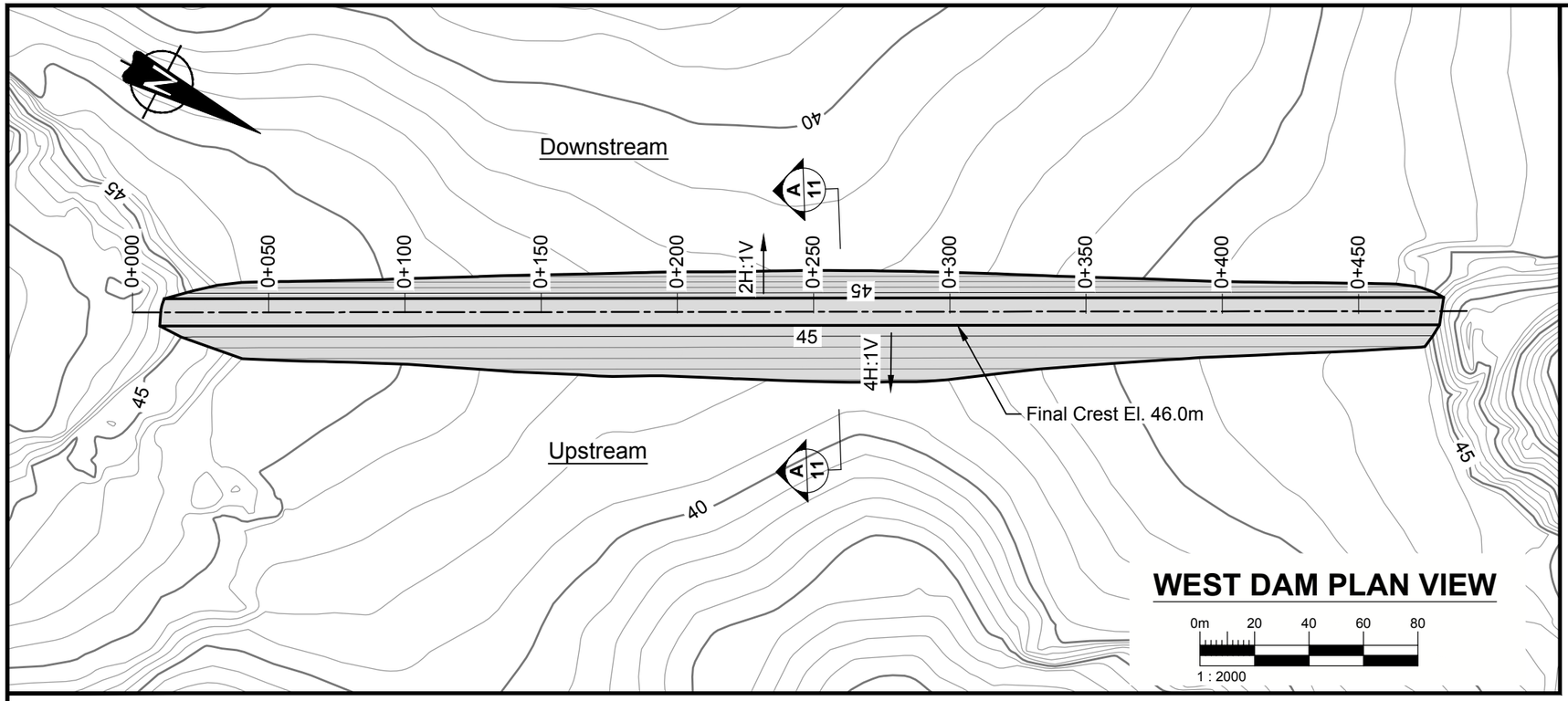
Doris TIA

DORIS TIA OMS MANUAL

South Dam Foundation Conditions and Typical As-Built Section

DATE:	APPROVED:	FIGURE:
March 2023	BJ	5



WEST DAM PLAN VIEW

0m 20 40 60 80

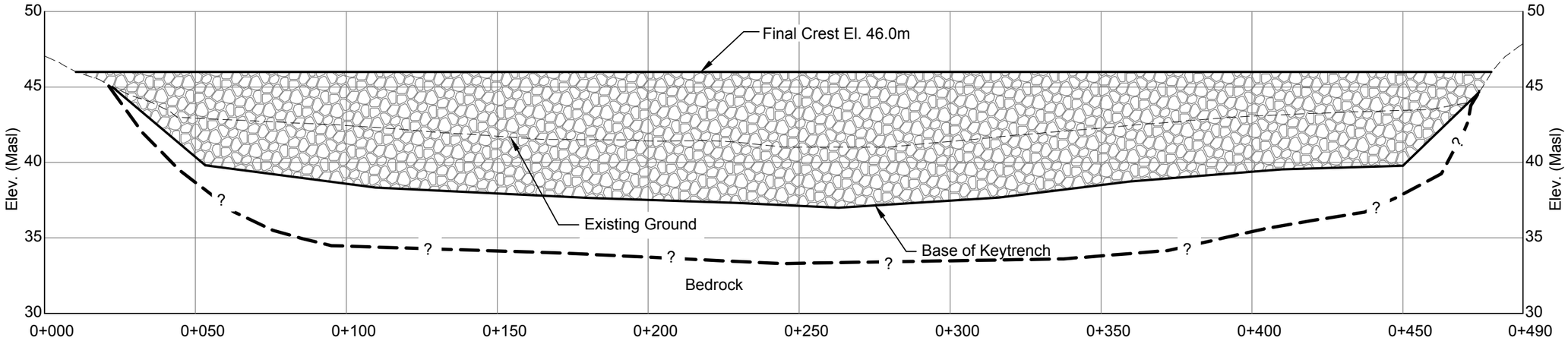
1 : 2000

LEGEND

- Natural Ground
- Approximate Stratigraphic Boundary
- Run of Quarry (ROQ)

NOTES

1. All dimensions and elevations are in meters unless stated otherwise.
2. The subsurface geology has been extrapolated from a series of geotechnical investigations. Bedrock contact and geological unit contacts are therefore likely to vary somewhat during final excavation.



WEST DAM PROFILE

5x EXAGGERATION

0m 10 20 30 40 50 60

Horizontal Scale

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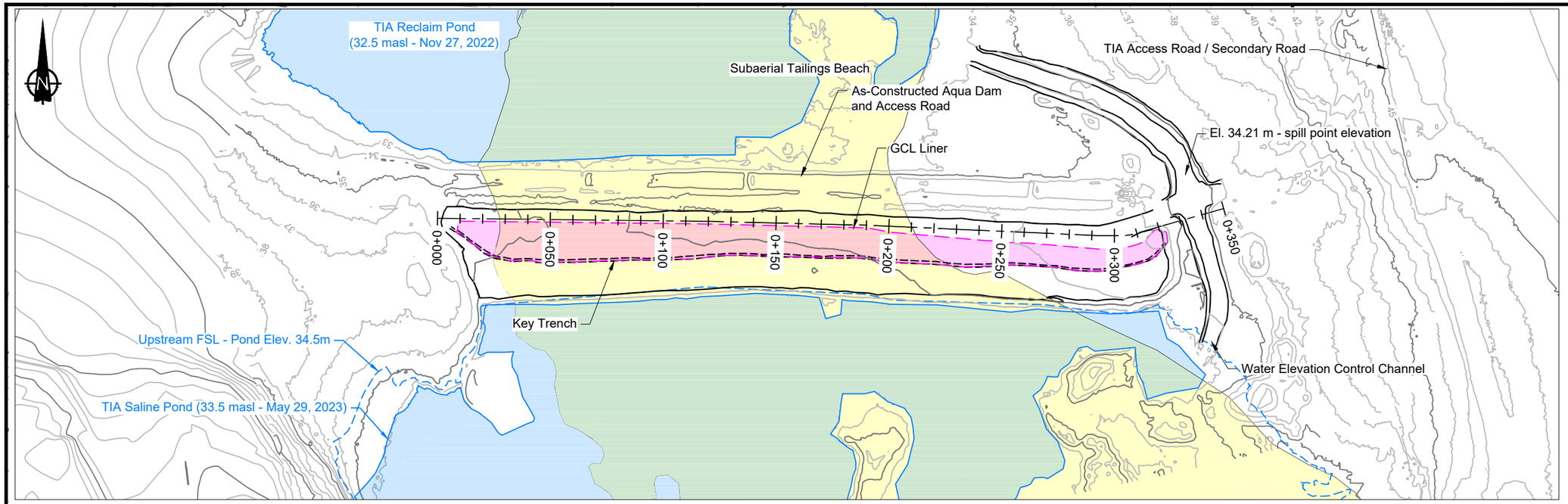
HOPE BAY PROJECT

DORIS TIA OMS MANUAL

West Dam

Plan and Profile

DATE:	APPROVED:	FIGURE:
March 2024	BJ	6



Interim Dike Plan View

0m 20 40 60 80

LEGEND

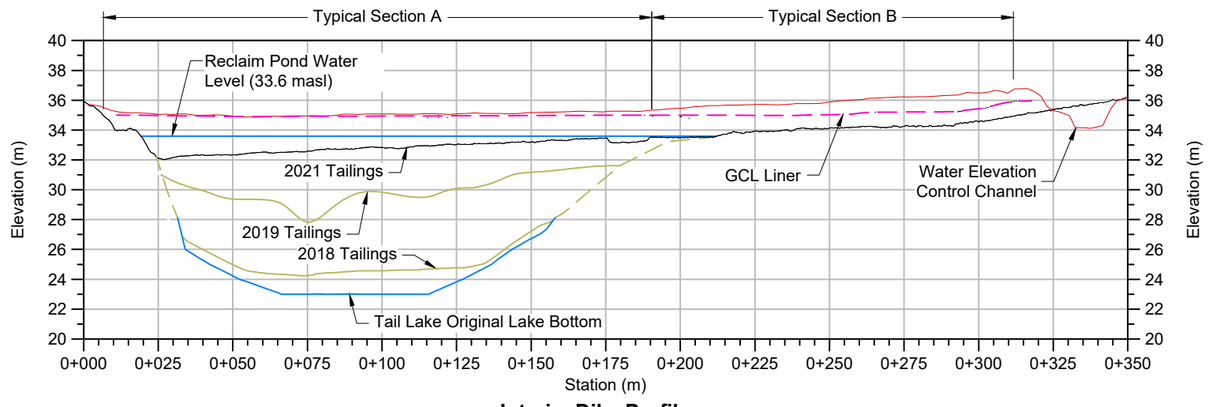
- As-Constructed
- TIA Reclaim Pond Water Level
- Upstream Full Supply Level (Elev. 34.5m)
- Geosynthetic Clay Liner
- Subaerial Tailings Beach
- Shallow Submerged Tailings Beach

NOTES

1. Contours are shown at 1.0 m intervals.
2. All units are in meters unless otherwise specified.
3. The GCL shown in the drawings is an estimated extent based on the other survey information and site observation. No GCL survey was provided in the turnover package from the construction surveyor. Installation was witnessed by SRK representatives.

REFERENCES

NAD83 UTM Zone 13.
Record Surveys made from - Drone Survey provided by client. File name: "IRB 29052023_dsm_10cm.laz" and additional survey provided by client 20230608 and 20230829. File names: "AB-ROM.txt" and 230829_AB IRB_south toe dam.dwg



Interim Dike Profile

0m 4 8 12 16 Vertical

0m 20 40 60 80 Horizontal

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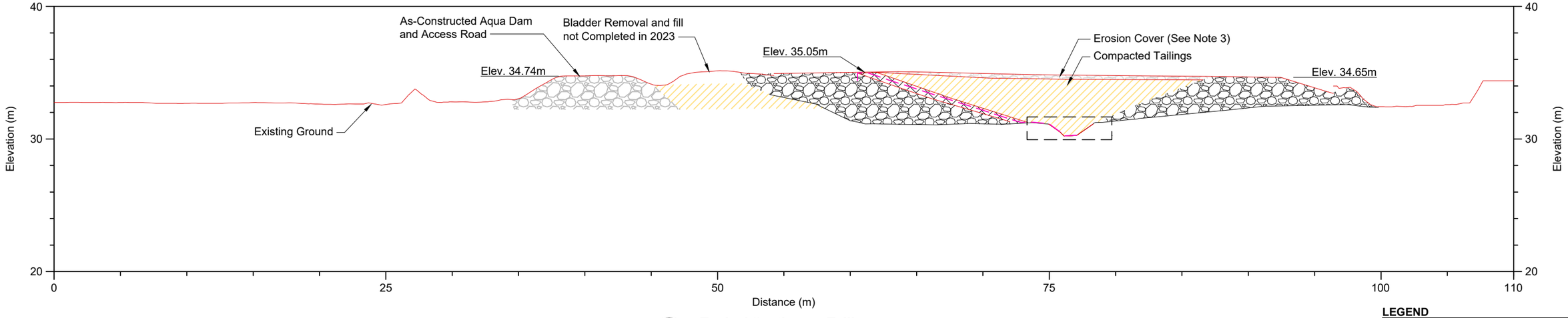
HOPE BAY PROJECT

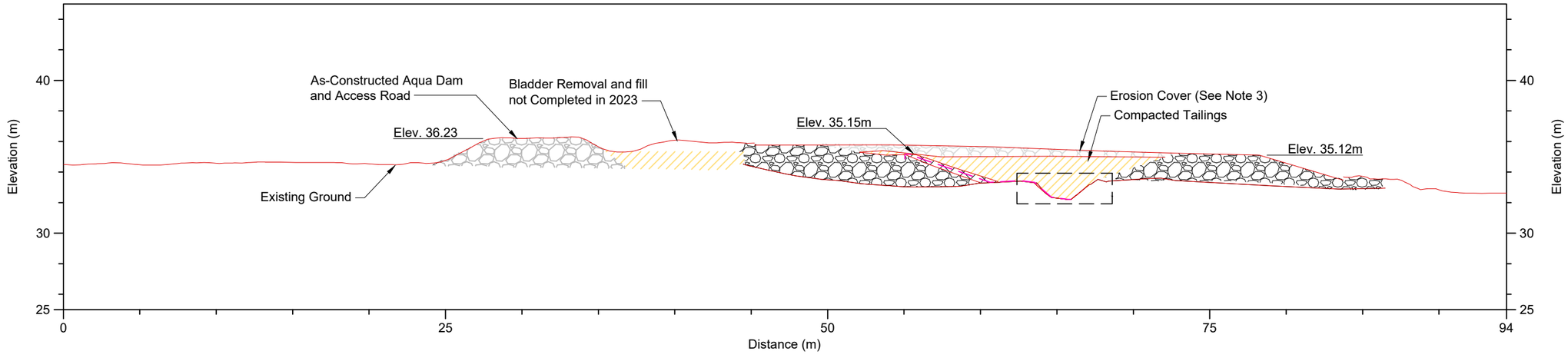
DORIS TIA OMS MANUAL

Interim Dike Plan and Profile

DATE:	APPROVED:	FIGURE:
March 2024	BJ	7



Typical Section on Tailings



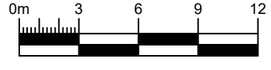
Typical Section on Overburden

LEGEND

- Geosynthetic Clay Liner
- Bedding / Transition Material
- Compacted Tailings
- Erosion Cover (ROQ)
- Waste Rock Fill

NOTES

1. All units are in meters unless otherwise specified.
2. The GCL shown in the drawings is an estimated extent based on the other survey information and site observation. No GCL survey was provided in the turnover package from the construction surveyor. Installation was witnessed by SRK representatives.
3. No survey provided for top of compacted tailing, transition to Erosion Cover is inferred.



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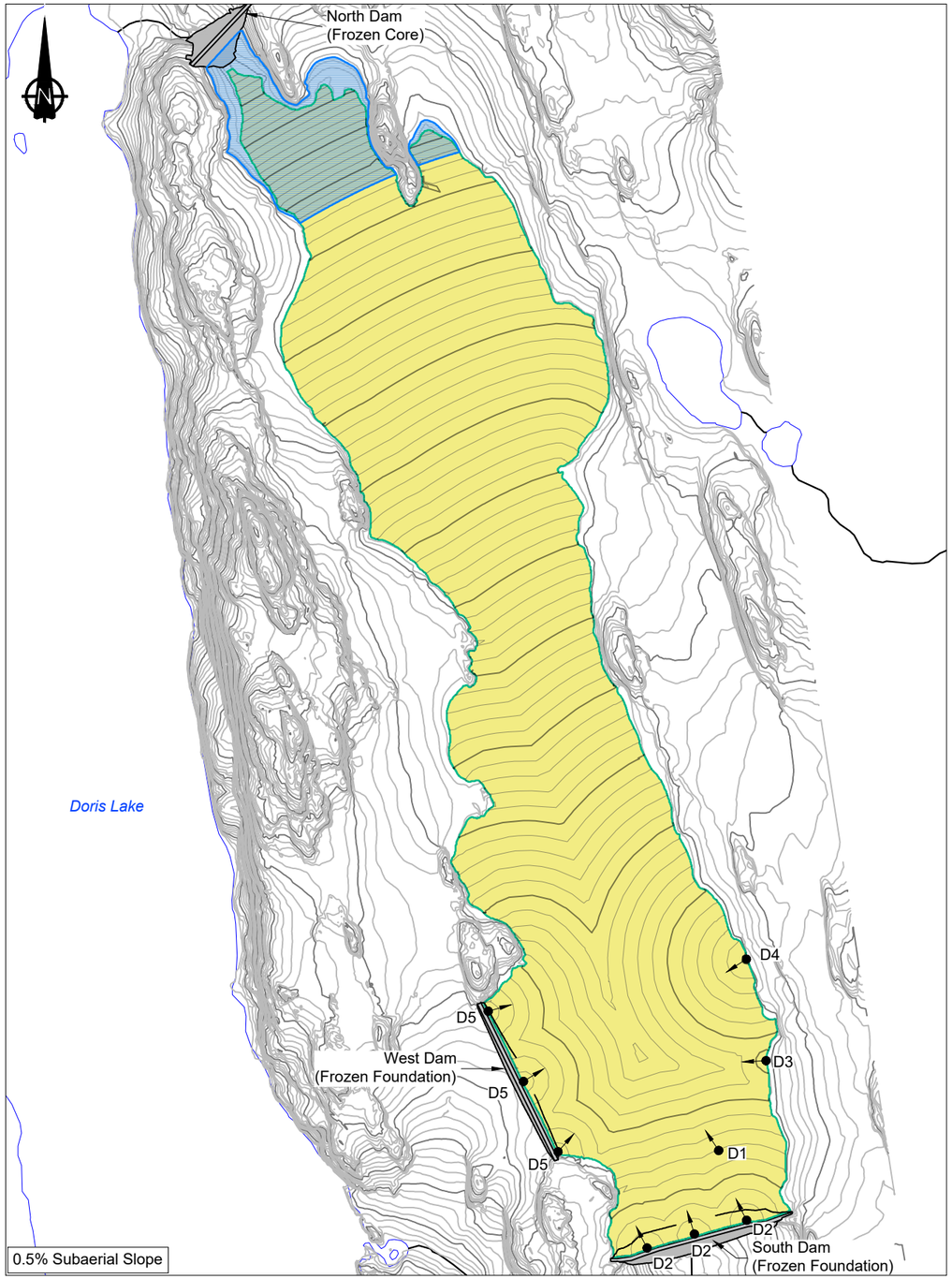
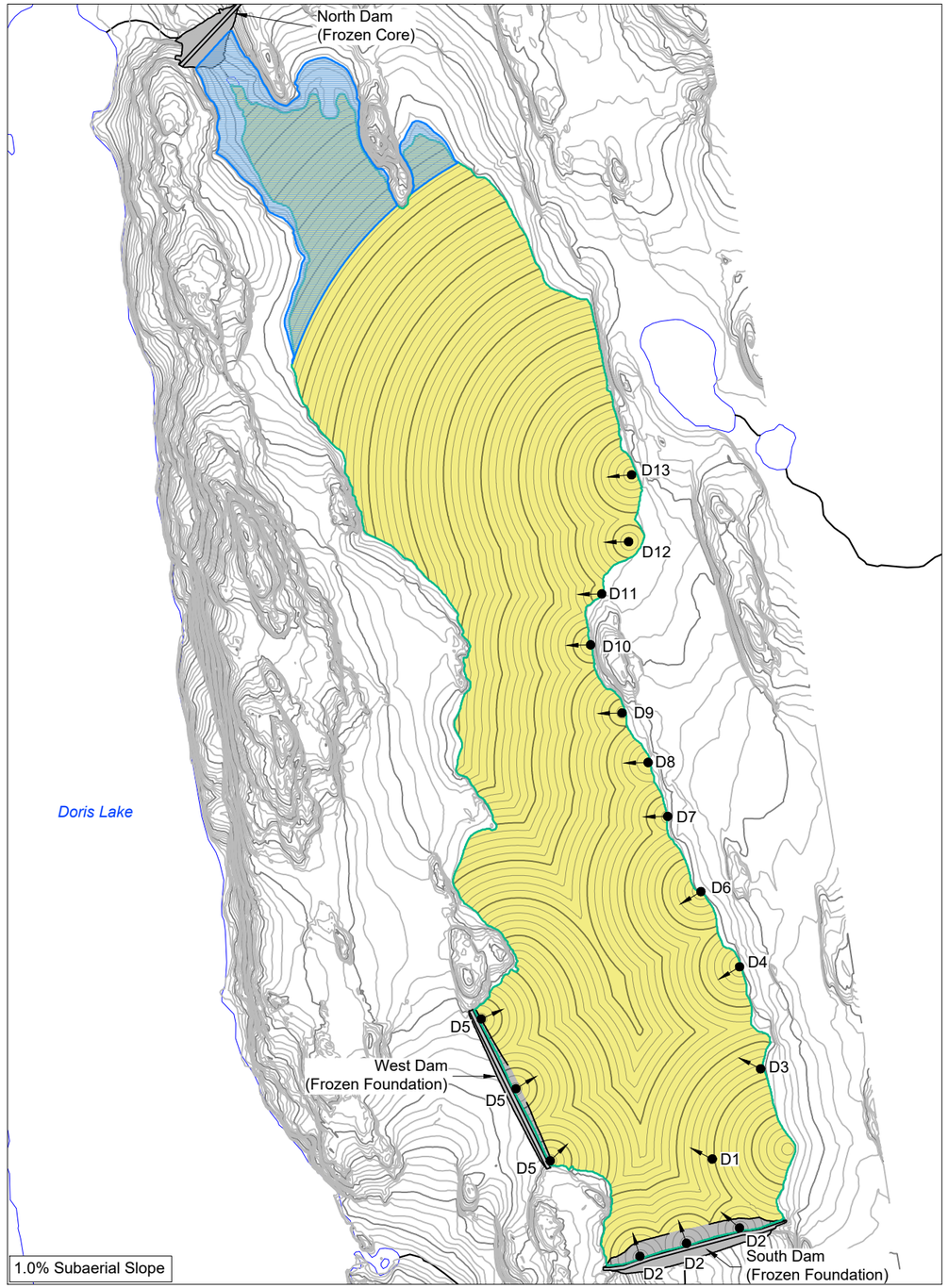
HOPE BAY PROJECT

DORIS TIA OMS MANUAL

Interim Dike Typical Sections

DATE:	APPROVED:	FIGURE:
March 2024	BJ	8





LEGEND

- Spigot Location
- Deposited Tailings

NOTES

1. Deposition durations are approximate and were based on the Mine Plan average production rates provided by TMAC Resources.
2. A deposited tailings dry density of 1.3t/m³ was used.
3. All tailings volumes presented include ice entrainment at 20% of production.
4. Dam elevations shown were assumed constant throughout deposition.
5. Total storage requirements includes Madrid and Boston Tailings (Tailings 11.6Mm³ + Ice Entrainment 2.3Mm³).

REFERENCE

NAD83 UTM Zone 13.

0m 3 6 9 12

Note:
Final tailings beach slope will be based on operation. Tailings beach will be somewhere between 0.5% and 1% slope; based on latest as-built survey and operations data (as of December 2019).

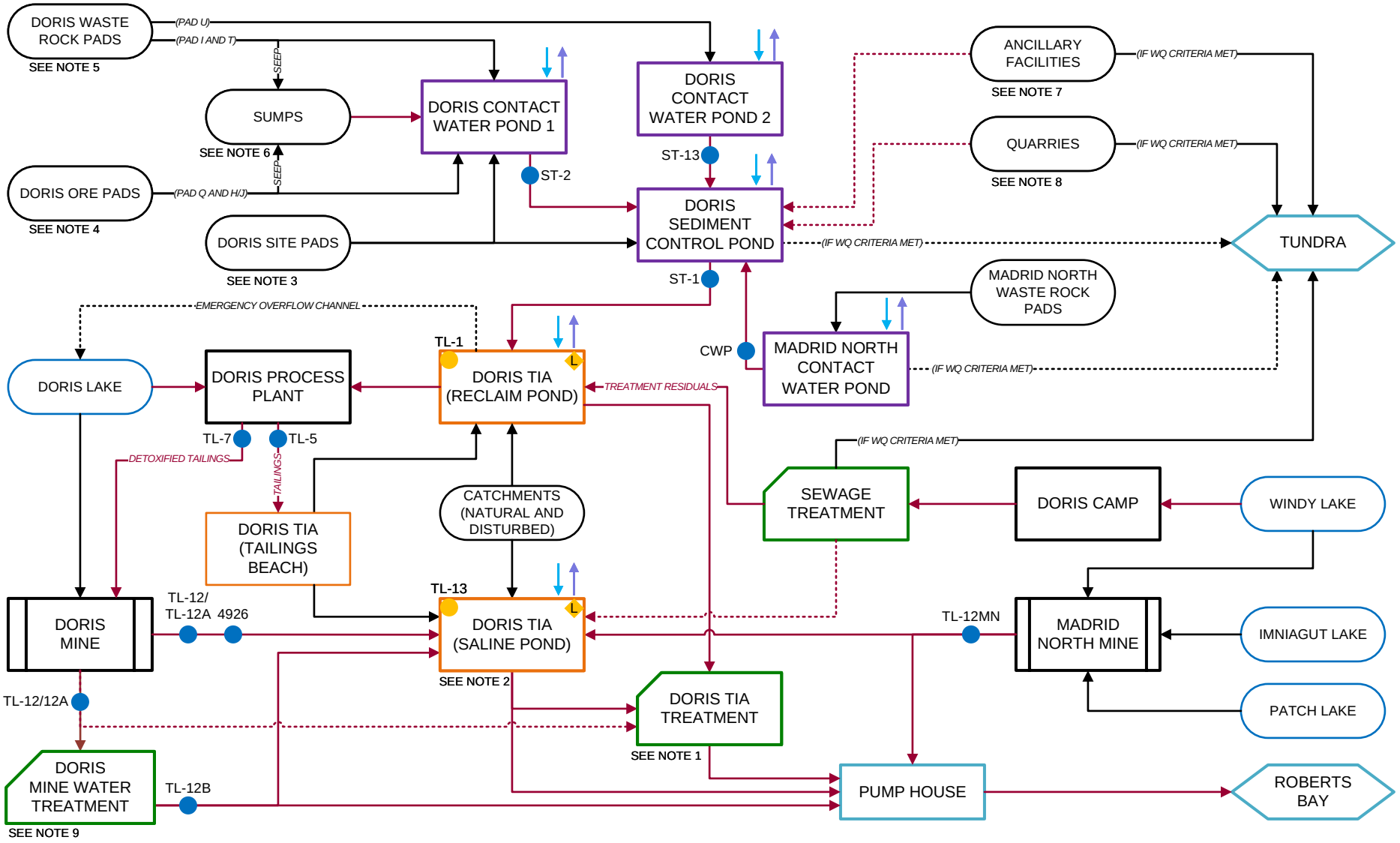
AGNICO EAGLE

Doris TIA

DORIS TIA OMS MANUAL

Planned Tailings Deposition
(Phase 1 & Phase 2) - End of Mine

DATE:	APPROVED:	FIGURE:
March 2023	BJ	9



NOTES

1. TSS TREATMENT IMPLEMENTED JULY, 2022, VIA BAG FILTER. SOLE FEED OF DORIS MINE WATER, SALINE POND OR TIA. TREATMENT RESSIDUALS FOR DORIS MINE WATER AND SALINE POND DEPOSITED INTO SALINE POND, FOR TIA DEPOSTIED IN TIA.
2. DORIS TIA SALINE POND LOCATED AT THE SOUTH TAILINGS BEACH; SEGREGATED FROM THE MAIN TIA USING AN AQUADAM UNTIL MAY 2023 THEN REPLACED WITH A ROCK EMBANKMENT.
3. DORIS SITE PADS INCLUDE SITE BUILDINGS, INFRASTRUCTURE, AND LAYDOWNS.
4. DORIS ORE PADS Q AND H/J.
5. DORIS WASTE ROCK PADS T AND I. PAD U TO BE CONSTRUCTED 2024.
6. SUMPS 1, 2, AND 3 USED TO COLLECT SEEPAGE.
7. ANCILLARY FACILITIES INCLUDE FUEL TANK FARM, LANDFARM, AND LANDFILL.
8. ACTIVE WATER MANAGEMENT FOR QUARRIES A, B, AND D. QUARRIES E, AI, AND 5 TO BE DEVELOPED STARTING 2023.
9. TREATMENT RESIDUALS PREVIOUSLY DEPOSITED IN SCP, NOW DEHYDRATED.

LEGEND

FLOW TYPES
- CONTROLLED
- GRAVITY/PASSIVE
- CONTINGENCY
- PRECIPITATION/EVAPORATION

MONITORING STATIONS
- FLOW AND WQ DATA USED AS INPUT
- WQ USED FOR CALIBRATION
- WATER LEVEL USED FOR CALIBRATION

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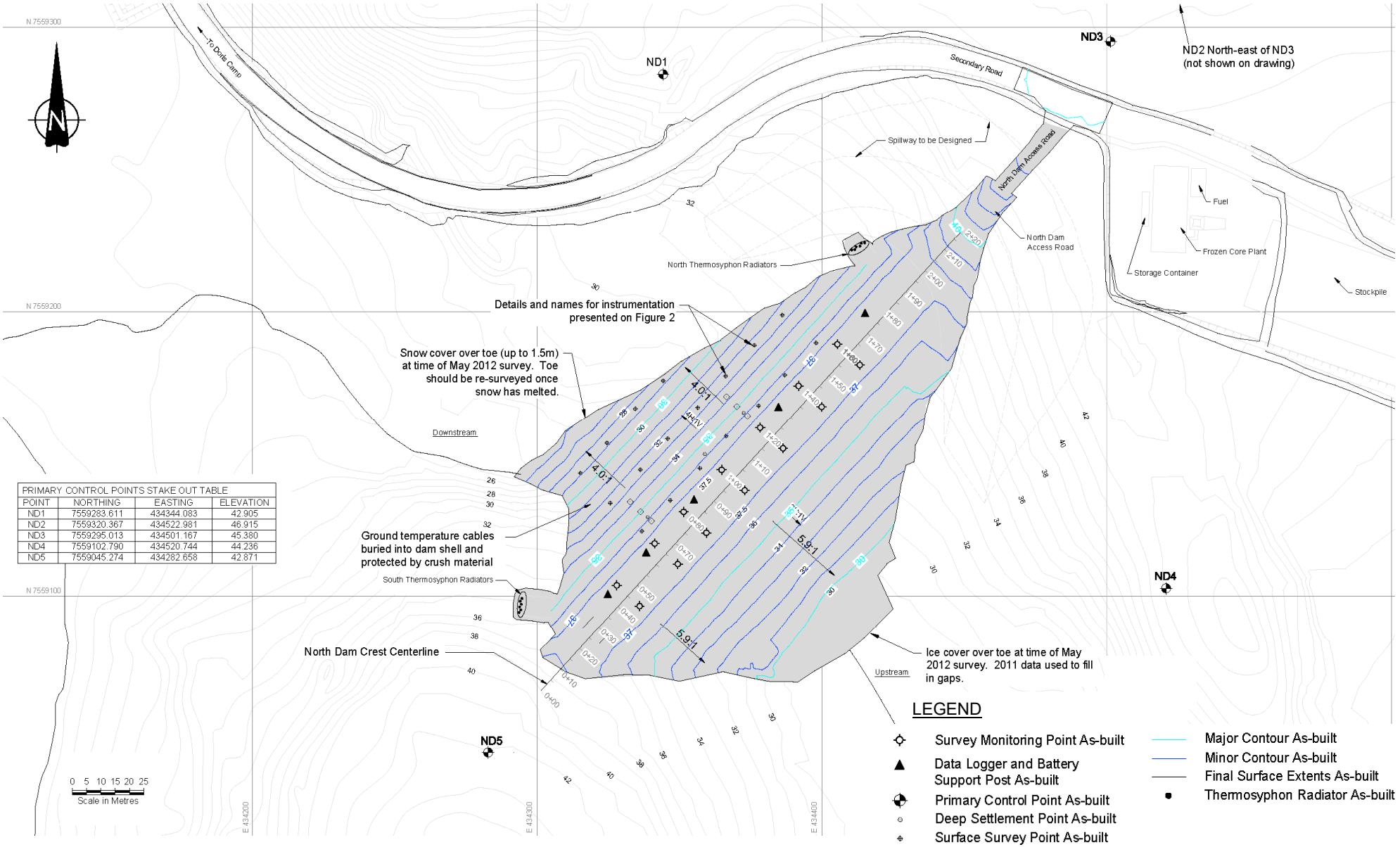
Doris TIA

DORIS TIA OMS MANUAL

Schematic of TIA Water Management

Date:	Approved:	Figure:
March 2024	BJ	10

Original figure produced by SRK Consulting (March 2024), adapted by Agnico (March 2024).



PRIMARY CONTROL POINTS STAKE OUT TABLE			
POINT	NORTHING	EASTING	ELEVATION
ND1	7559283.611	434344.083	42.905
ND2	7559320.367	434522.981	46.915
ND3	7559295.013	434501.167	45.380
ND4	7559102.790	434520.744	44.236
ND5	7559045.274	434282.658	42.871

LEGEND

- Survey Monitoring Point As-built
- Data Logger and Battery Support Post As-built
- Primary Control Point As-built
- Deep Settlement Point As-built
- Surface Survey Point As-built
- Inclinometer Location As-built
- Major Contour As-built
- Minor Contour As-built
- Final Surface Extents As-built
- Thermosyphon Radiator As-built

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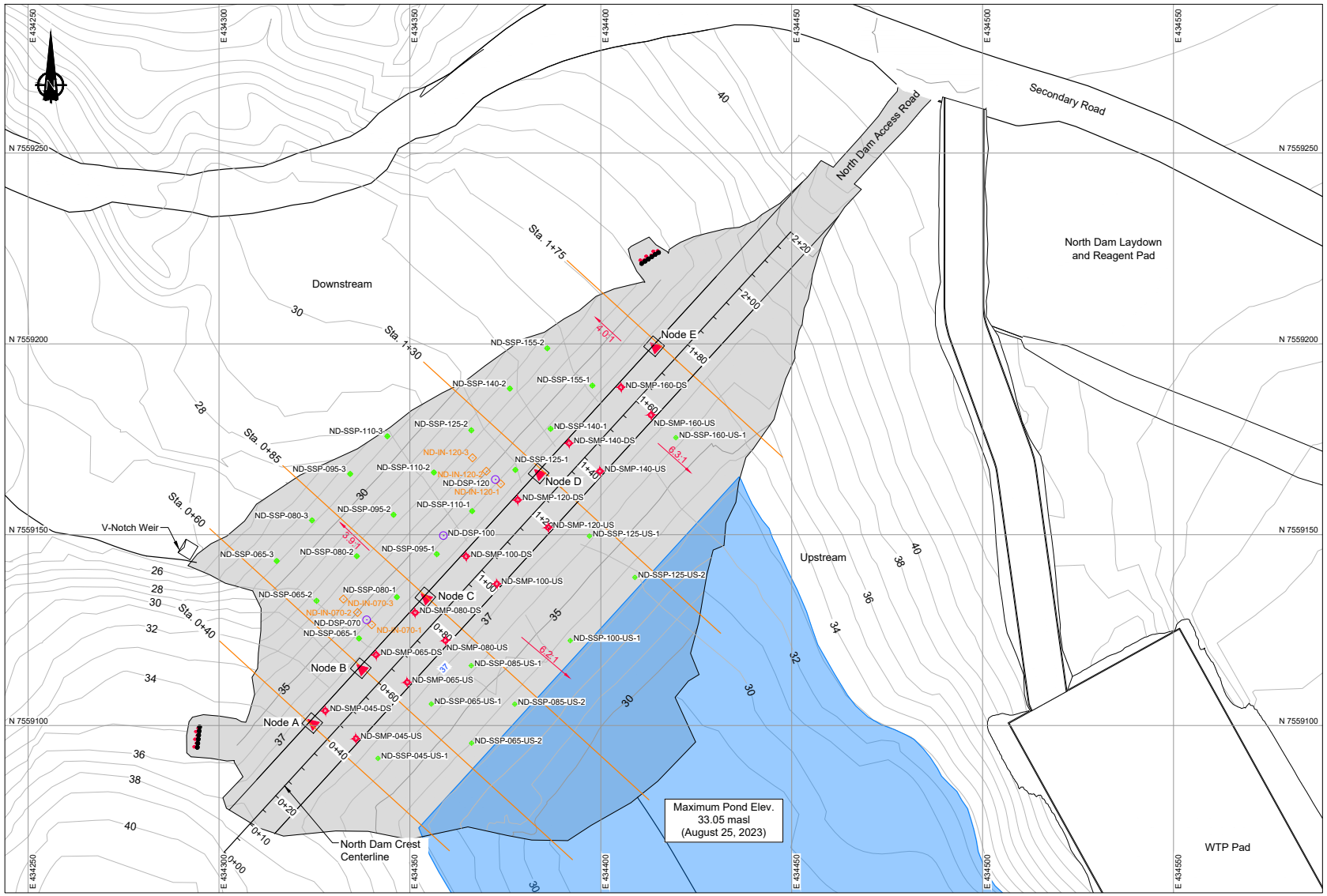
HOPE BAY PROJECT

DORIS TIA OMS MANUAL

North Dam General Arrangement and Primary Control Points

Date:	Approved:	Figure:
March 2024	BJ	11

Original figure produced by SRK Consulting (May 2016), updated by Agnico (March 2024).



LEGEND

- Survey Monitoring Point (Crest)
- Deep Settlement Point
- Surficial Survey Point
- Inclinometer Location
- Datalogger Node
- Thermosyphon Radiator
- Full Supply Level (Elev. 33.5 masl)

NOTES

1. Topographic contour data was provided by the Client. As-Built contour data for the terrain model was provided by the Contractor.
2. Contours shown at 1.0 m intervals.

REFERENCES

NAD83 UTM Zone 13.

Original figure produced by SRK Consulting (March 2024), adapted by Agnico (March 2024).

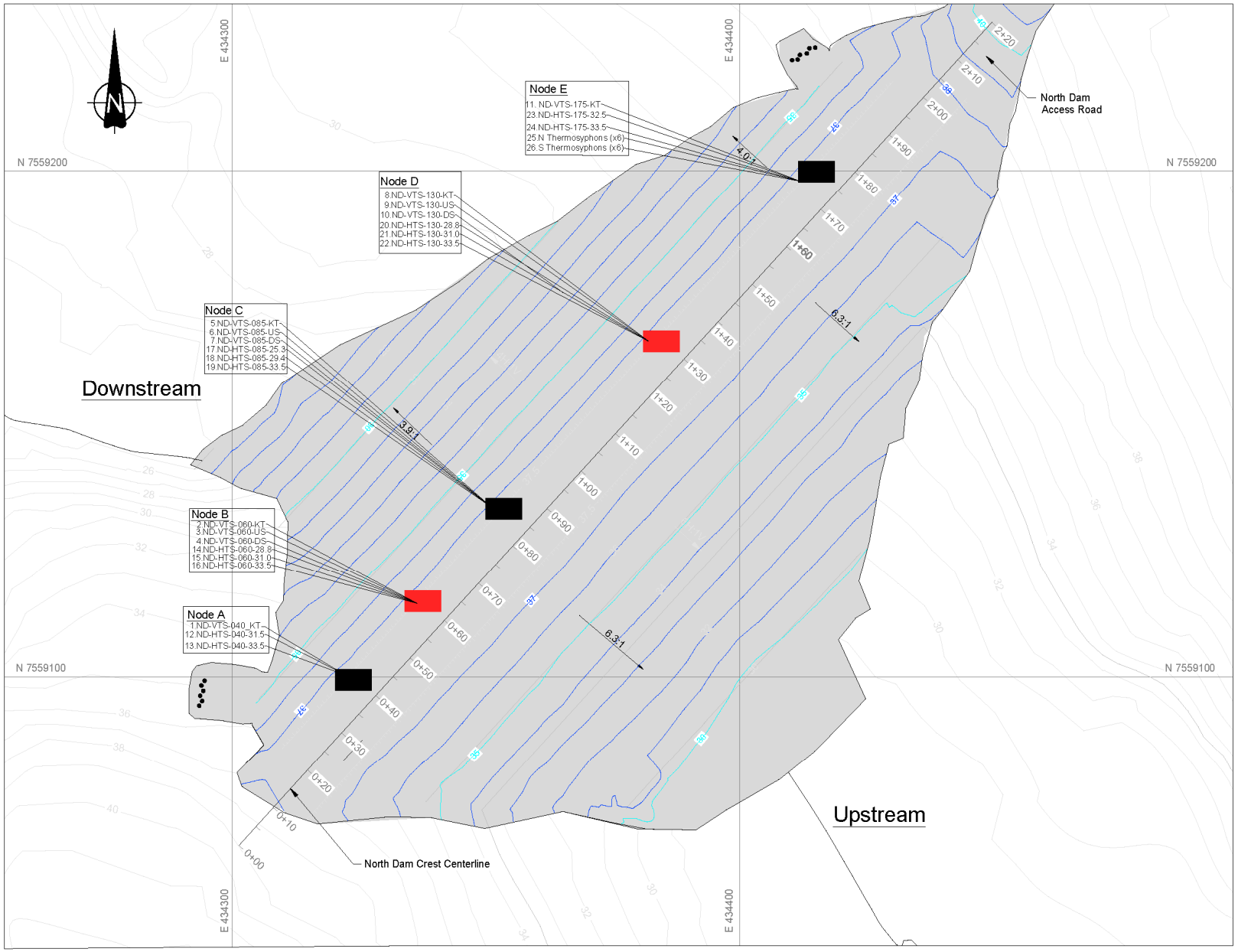
AGNICO EAGLE

HOPE BAY PROJECT

DORIS TIA OMS MANUAL

North Dam Instrumentation Layout

Date:	Approved:	Figure:
March 2024	BJ	12



LEGEND

- Major Contour As-built (5m)
- Major Contour As-built (1m)
- Final Surface Extents As-built
- Thermosyphon Radiator As-Built

Note: the two weatherproof enclosures which house the data loggers are shown in red.

AGNICO EAGLE

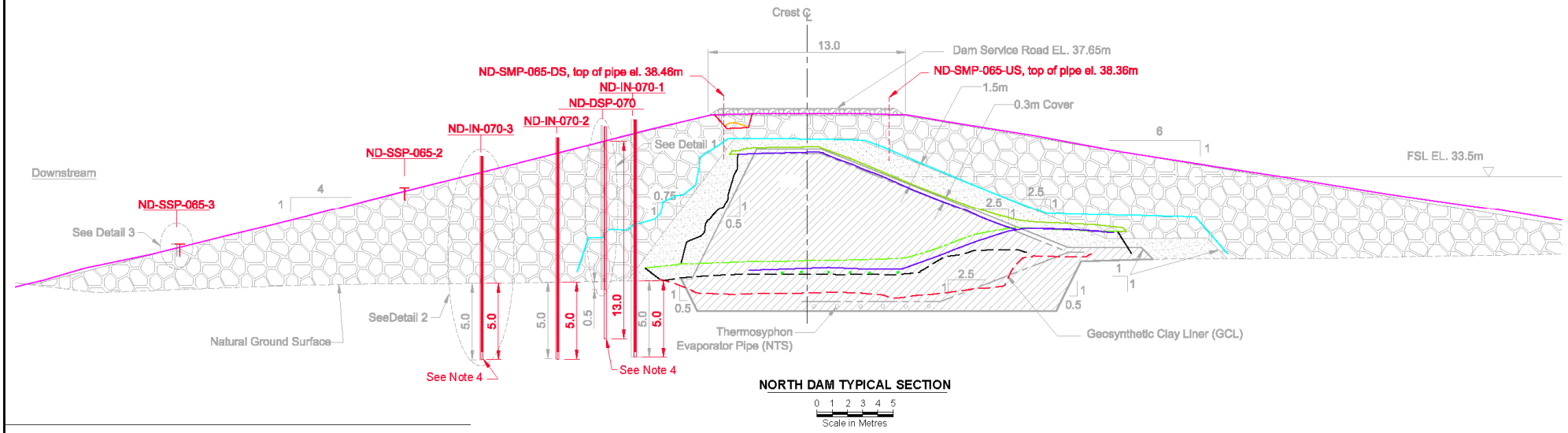
HOPE BAY PROJECT

DORIS TIA OMS MANUAL

North Dam Ground and Thermosyphon Temperature Cable Locations

Date:	Approved:	Figure:
March 2024	BJ	13

Original figure produced by SRK Consulting (May 2016), updated by Agnico (March 2024).



NORTH DAM TYPICAL SECTION

0 1 2 3 4 5
Scale in Metres

- Core Material
- Transition Material
- Run of Quarry (ROQ)
- Surfacing Material
- Bedrock
- Peat

- GCL As-built
- Core Material As-built
- Core Material (2011) As-built
- Levelling Course (Core Material) As-built
- Instrumentation Trench Cover As-built
- Key Trench / Instrumentation Trench As-built
- GCL Cover Material As-built
- Transition Material As-built
- ROQ Material As-built
- Thermosyphon Evaporator Pipes As-built

Example of as-built instrumentation installed on the downstream of dam.

AGNICO EAGLE

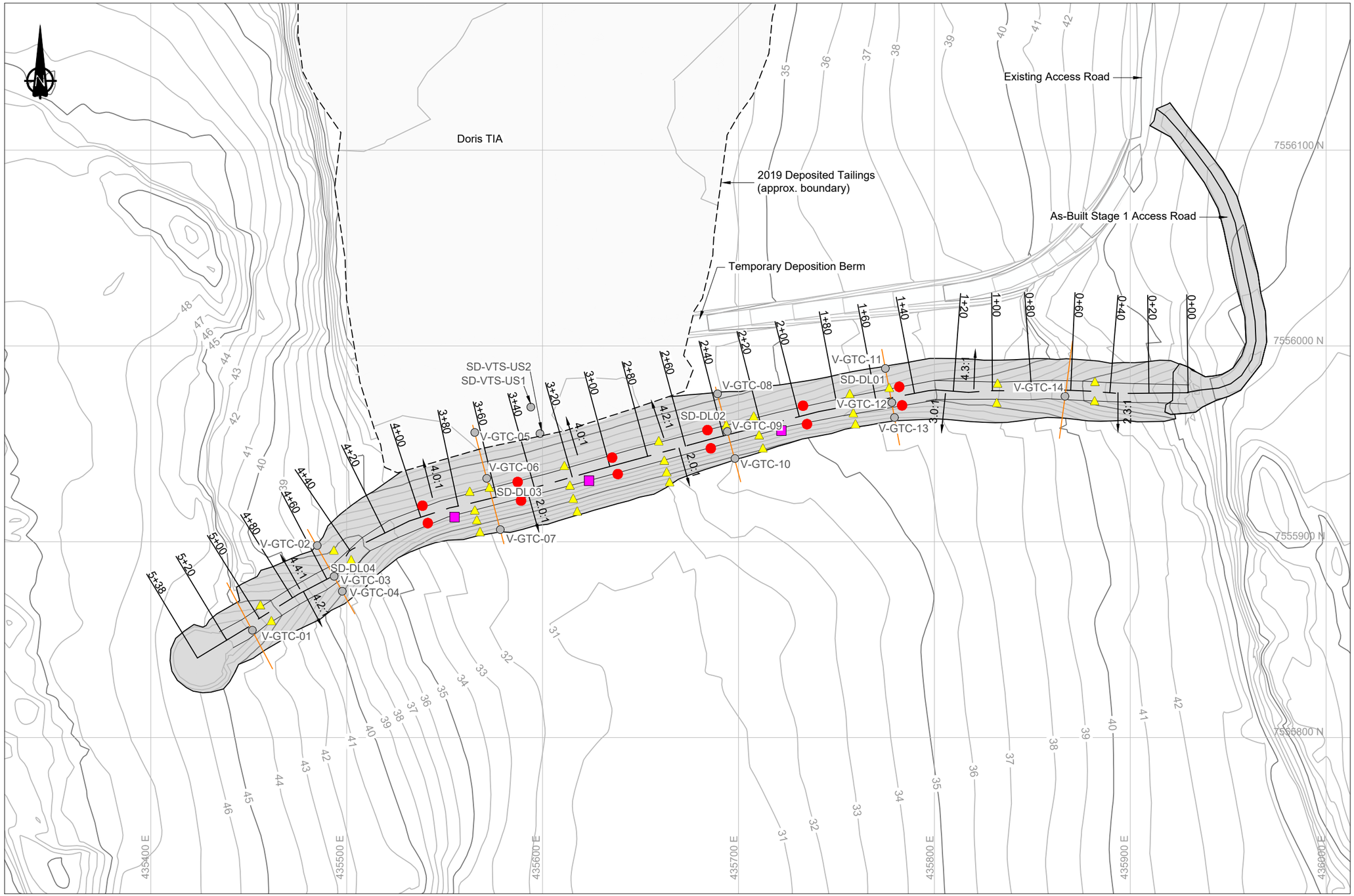
HOPE BAY PROJECT

DORIS TIA OMS MANUAL

North Dam Deformation Monitoring Instrumentation Layout

Date:	Approved:	Figure:
March 2024	BJ	14

Original figure produced by SRK Consulting (May 2016), updated by Agnico (March 2024).



LEGEND

- As-Built Survey Monitoring Point
- Design Surface Monitoring Point
- Design Deep Settlement Point
- Datalogger Location
- Vertical Ground Temperature Cable

NOTES

1. Topographic and As-built data was provided by the Client
2. Contours shown at 1.0m interval.
3. All units shown are in meters unless otherwise stated.

REFERENCES

NAD83 UTM Zone 13.

Original figure produced by SRK Consulting (April 2020), updated by Agnico (March 2024).

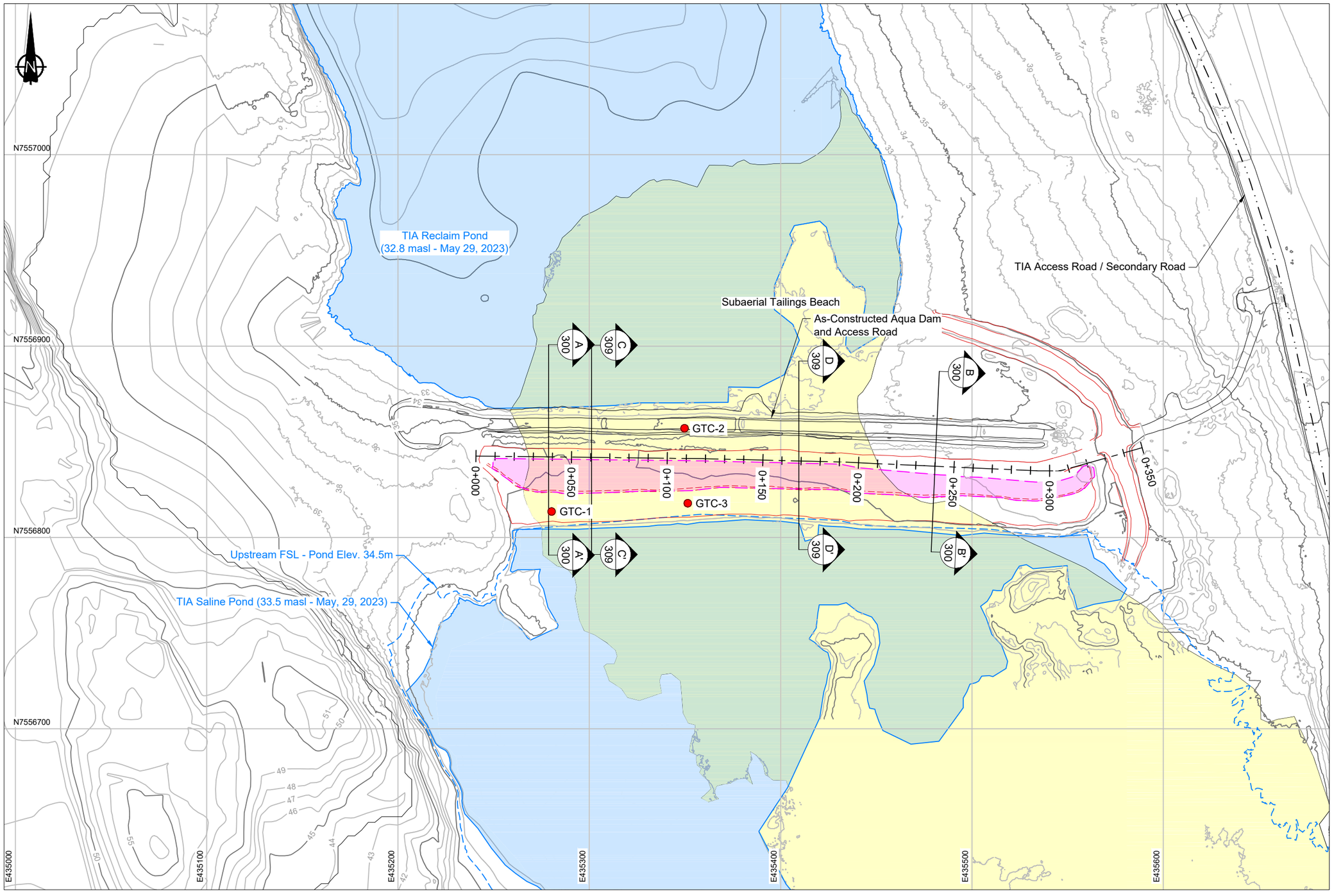
AGNICO EAGLE

Doris TIA

DORIS TIA OMS MANUAL

South Dam General Arrangement and Instrumentation

DATE:	APPROVED:	FIGURE:
March 2024	BJ	15



LEGEND

- As-built Ground Temperature Cable
- TIA Reclaim Pond Water Level
- Upstream Full Supply Level (Elev. 34.5m)
- Geosynthetic Clay Liner
- Subaerial Tailings Beach
- Shallow Submerged Tailings Beach

NOTES

1. Contours are shown at 1.0 m intervals.
2. All units are in meters unless otherwise specified.
3. GTC-2 was installed in 2022 following construction of the Aquadam berm, GTC-1 and GTC-3 were installed in November 2023.

REFERENCES

NAD83 UTM Zone 13.
Record Surveys made from - Drone Survey provided by client. File name: "IRB 29052023_dsm_10cm.laz" and additional survey provided by client 20230608 and 20230829. File names: "AB-ROM.txt" and 230829_AB IRB_south toe dam.dwg

GTC INSTALLATION LOCATIONS

ID	Northing	Easting
GTC-1	7556844.49	435284.39
GTC-2	7556863.13	435322.19
GTC-3	7556841.48	435439.74

Original figure produced by SRK Consulting (Feb 2024), adapted by Agnico (March 2024).

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HOPE BAY PROJECT

DORIS TIA OMS MANUAL

Interim Dike Thermistor Locations

DATE:	APPROVED:	FIGURE:
March 2024	BJ	16

AGNICO EAGLE

OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix E – O&M Manual for Active Cooling

ARCTIC FOUNDATIONS OF CANADA

A Division of Encompass Inc.

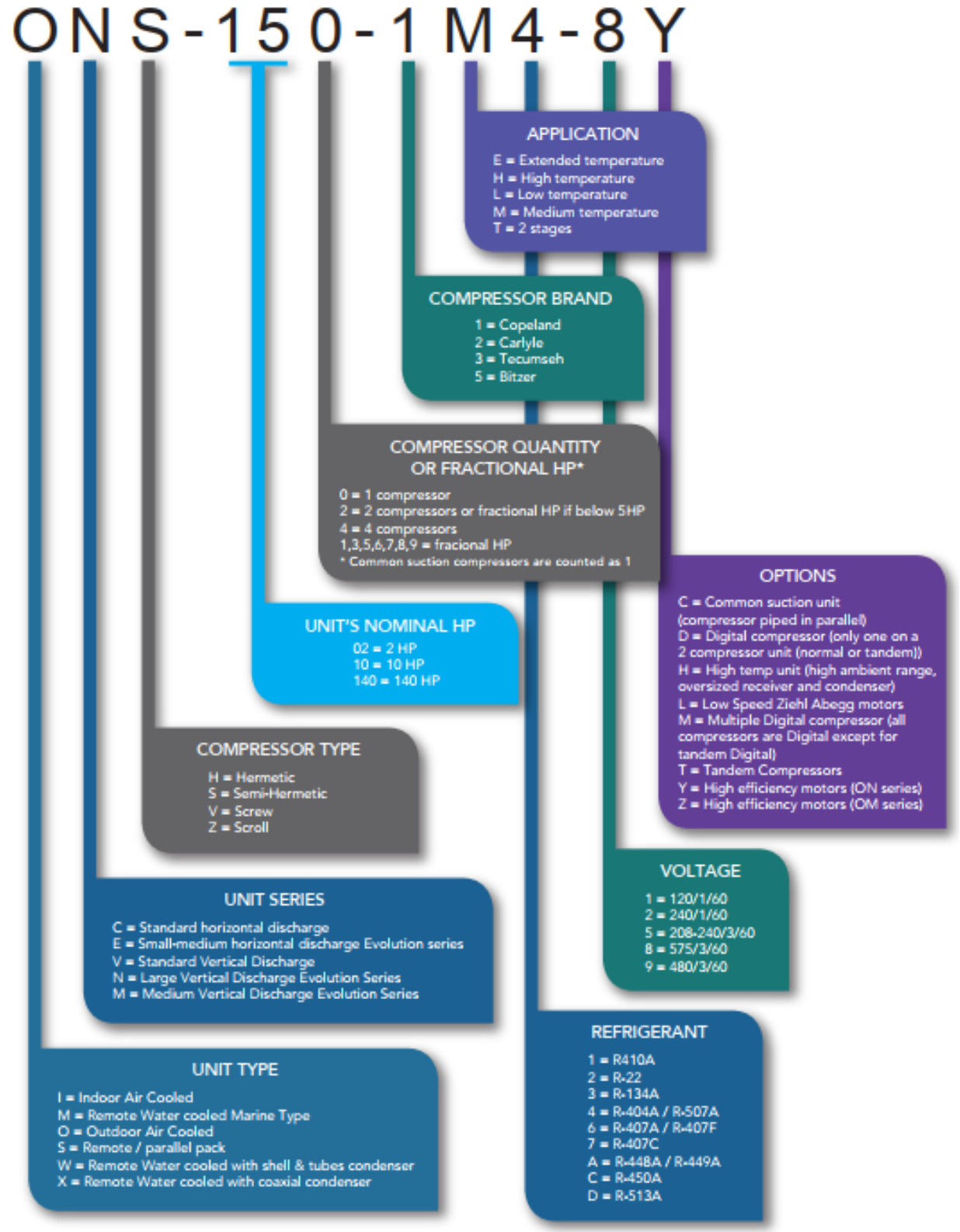
Operation & Maintenance Manual

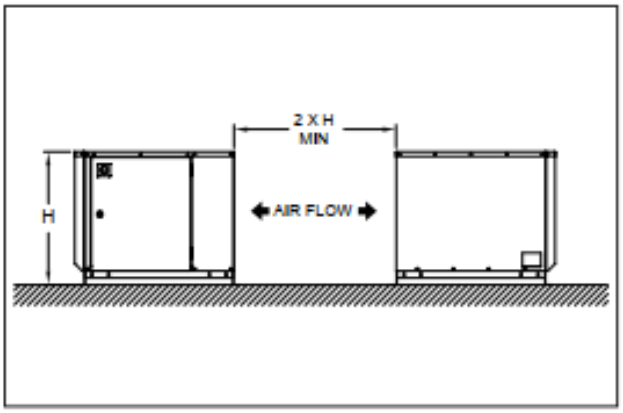
Agnico Eagle Mines Ltd.

Project: **Hope Bay, North Dam – Active Cooling Conversion**

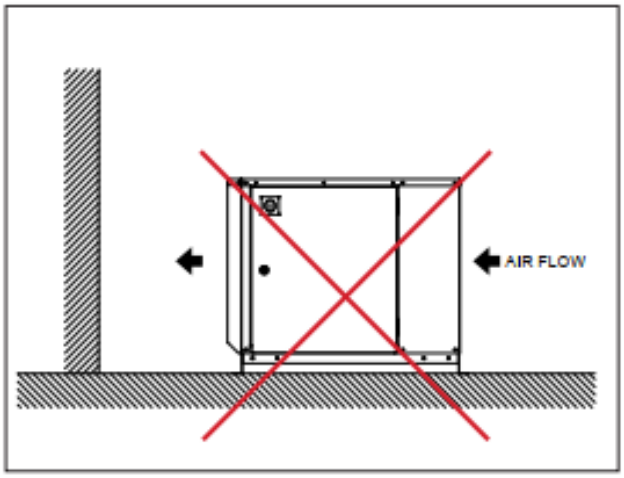
CONDENSER MODEL NO. OEZ-100-1LA-8

CU NOMENCLATURE

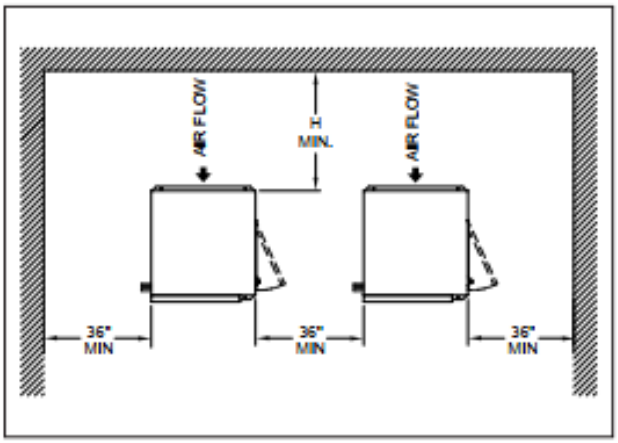




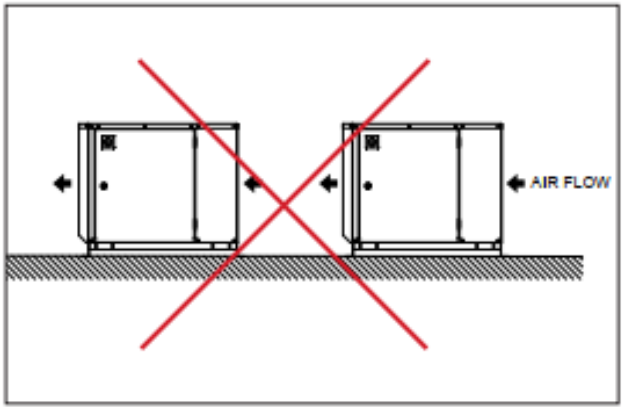
Proper OE(X) mounting arrangement



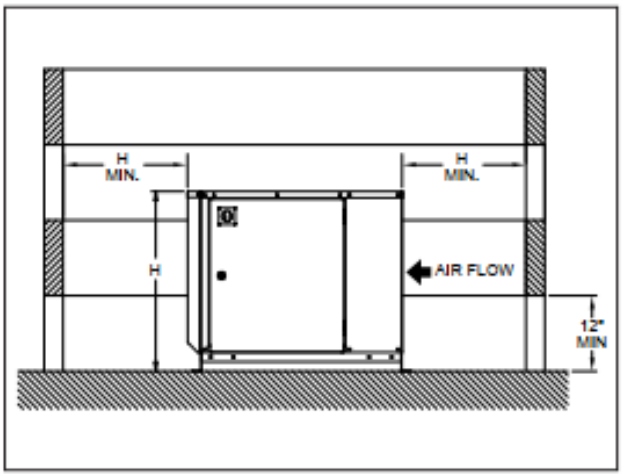
Improper OE(X) mounting arrangement



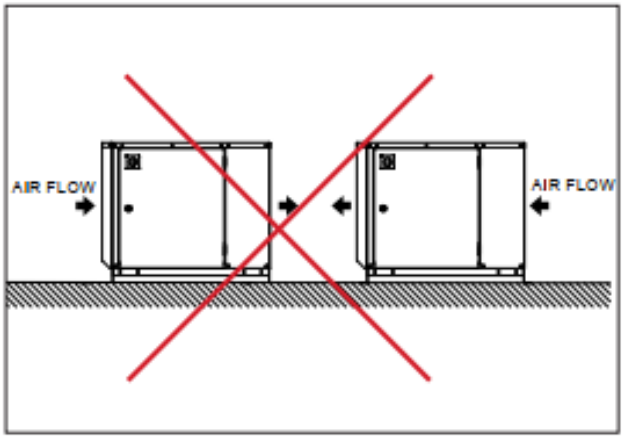
Proper OE(X) mounting arrangement



Improper OE(X) mounting arrangement



Proper OE(X) mounting arrangement



Improper OE(X) mounting arrangement

PROJECT OBJECTIVE

The Objective of this Conversion is to enhance the sub-grade cooling ability of Passive Thermosyphon system. By installing Active cooling, the probes have the ability to provide cooling during the summer season.

The intended use of this system is to keep the frozen core within original design specifications. As such, the timing for start and stop points should be determined in conjunction with the SRK design team while factoring in monitoring data and ambient temperatures.

Questions related to service or operating condition of the system can be directed to Arctic Foundations of Canada.

WINTER SHUTDOWN

Turn **PUMP DOWN** switch (Fig. 1) inside the right vent panel to the **OFF** position. If the unit is still running after 1-3 minutes the unit should shut off. Leaving the main disconnect (Fig. 2) in the ON position will only keep the trace heaters on. If shutdowns are to be for a long period of time, the main disconnect should be switched into the OFF position.

SUMMER STARTUP

Turn main disconnect (Fig. 2) to the **ON** position and leave for 12-24 hours to allow trace heaters to warm up. After 12-24 hours turn the **PUMP DOWN** switch (Fig. 1) to the **ON** position. Unit will now start up as needed.

Figure 1.

Figure 2.

SERVICE

System operating temperature, oil level, and system pressure should be checked and recorded periodically to ensure stable system operation. For any help, tips, and

questions pertaining to the condensing unit, refer to the troubleshooting chart.

Sight glass shown in Figure 3, should be clear. If bubbles are seen in sight glass this could indicate low refrigerant charge. **Check only when unit is Running.**

IMPORTANT: Disconnect all power before servicing

INPECTION

After one day of operation, check for any abnormal vibration in the unit.

IMPORTANT: Compressor hold-down bolts should be checked periodically and re-tightened if necessary.

Figure 3.

CLEANING

It is recommended that all condensers and evaporators of a refrigeration system be checked periodically for dirt accumulation. Grease and dust must be removed from fans, fan guards and drain pans.

Occasional cleaning of finned surfaces can be done by first dusting off the fins, then cleaning with a mild detergent and a warm water spray.

The inner face of the condenser coil may be cleaned through the access panel on the side of the units or by removing the fan guards.

IMPORTANT: Do not use alkaline or acid solution as it will damage the coils. The detergent must be completely rinsed before stopping the cleaning operation.

FAN MOTORS

Fan motors are permanently lubricated and thermally protected for service-free operation. An automatic internal thermal protection could be triggered if the coil is blocked. If the motors are inoperative, check the supply voltage at the motor leads before attempting any maintenance and service.

One fan will always be on when unit is running. Additional 2 condenser fan motors are set at 60°F and 85°F operating temperature (Fig. 6). Control fuses for condenser fans can be found in Electrical Panel (4, & 5). **CAUTION ELECTRICAL PANEL IS 600V. Main disconnect (Fig. 2) should be shut off when opening and working in electrical panel.**

The motors can start on the automatic thermal protector at any time.

Figure 4.

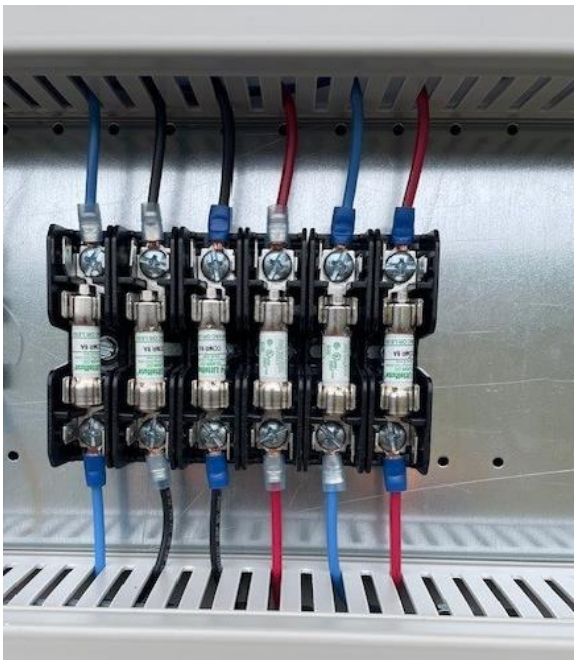


Figure 5.

Figure 6.

ADDING OIL

If oil is needed, allow the system to pump down.

1. Turn off all power to the unit.

2. Close the suction and discharge valves at the compressor.

3. Partially unscrew the filler hole pipe plug. Allow pressure to bleed before totally removing the plug. (The filler hole is located just above and to the left of the crankcase sight glass on most compressors.)

4. Add compressor manufacturer-approved oil through the filler hole. **Be sure oil has not been** exposed to air or other contaminants.

5. Replace and tighten filler hole pipe plug.

6. Re-open the compressor suction and discharge valves.

7. Restart the unit.

SCROLL COMPRESSOR

Oil level must be maintained at 1/8 to 1/2 full (Copeland compressor) as indicated on the sight glass. If oil level is low, add Manufacturer approved oil to the compressor. Do not over fill. Check oil level 2 hours and 2 days after the addition of oil.

Excessive oil quantity in a system may lead to liquid slugging and compressor damage.

A well-balanced unit should not require any additional oil after a week of operation. If the level does not stabilize, there is an oil logging problem. Check all piping for proper installation. Correct any defect that would prevent the oil from coming back. Remove excess oil if the level goes over 3/4 full sight glass.

<u>RECOMMENDED POE OIL FOR ALL HFC REFRIGERANTS</u>

Copeland Compressor: Copeland Ultra 22CC, Copeland 3MA, Mobil EAL ARTIC 22CC, ICI (Virginia KMP) EMKERATE RL 32CF.

Compressor diagnostic panel can be seen in Figure 7**.** Compressor contactor (Fig 8.) should be pulled in when unit is running ***CAUTION 600V*.**

See reference chart for any required troubleshooting.

Figure 7.

Figure 8.

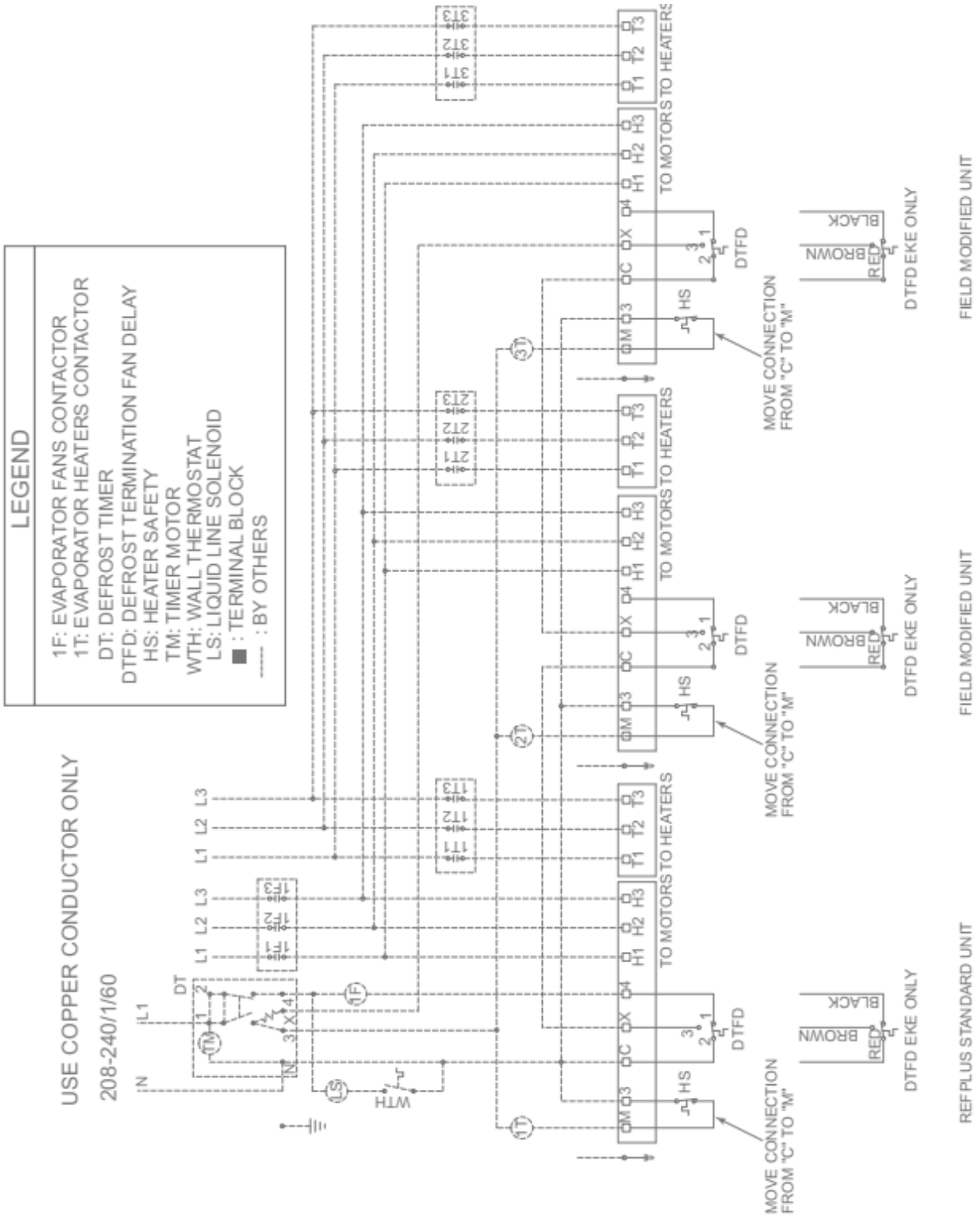
TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSES	POSSIBLE CORRECTIVE STEPS
Compressor will not run	1. Main switch open. 2. Fuse blown. 3. Thermal overloads tripped. 4. Defective contactor or coil. 5. System shut down by safety devices. 6. No cooling required. 7. Liquid line solenoid will not open. 8. Motor electrical trouble. 9. Loose wiring.	1. Close switch 2. Check electrical circuits and motor winding for shots or grounds. Investigate for possible overloading. Replace fuses after fault is corrected. 3. Overloads are automatically reset. Check unit closely when unit comes back on line. 4. Repair or replace defective parts. 5. Determine type and cause of shutdown and correct it before resetting safety switch. 6. None. Wait until unit calls for cooling. 7. Repair or replace coil. 8. Check electrical circuits and motor for open windings. Also check for a short circuit or motor burn out. 9. Check all wire junctions. Tighten all terminal screws.
Compressor is noisy or vibrating	1. Flooding of refrigerant into crankcase. 2. Improper piping support on suction, discharge or liquid line. 3. Worn compressor. 4. Scroll compressor rotation reversed.	1. Check setting of expansion valves. 2. Relocate, add or remove hangers. 3. Replace. 4. Rewire for phase change.
High-discharge pressure	1. Non-condensables in system. 2. System overcharges with refrigerant. 3. Discharge shutoff valve partially closed. 4. Fan not running. 5. Head pressure control setting. 6. Dirty condenser coil.	1. Remove the non-condensable. 2. Remove excess refrigerant. 3. Open valve. 4. Check electrical circuit. 5. Adjust control setting. 6. Clean condenser coil.
Low-discharge pressure	1. Faulty condenser temperature regulation. 2. Suction shut-off valve partially closed. 3. Insufficient refrigerant in system. 4. Low suction pressure. 5. Variable head pressure valve.	1. Check condenser control operation. 2. Open valve. 3. Check for leaks. Repair and add charge. 4. See corrective steps for low suction pressure. 5. Check valve setting.
High-suction pressure	1. Excessive load. 2. Expansion valve (TXV & EEV) overfeeding.	1. Reduce load or add additional equipment. 2. Regulate superheat. Check remote bulb (temp. and pressure).
Low-suction pressure	1. Lack of refrigerant. 2. Evaporator dirty or iced. 3. Clogged suction line or compressor suction gas strainers. 4. Clogged liquid line filter dryer. 5. Expansion valve (TXV & EEV) under-feeding. 6. Condensing temperature too low.	1. Check for leaks. Repair leak and add charge. 2. Clean evaporator. 3. Replace cartridge(s). 4. Replace liquid line filter dryer cartridge or filter dryer. 5. Regulate superheat. Check remote bulb (temp. and pressure). 6. Check means for regulating condensing temperature.

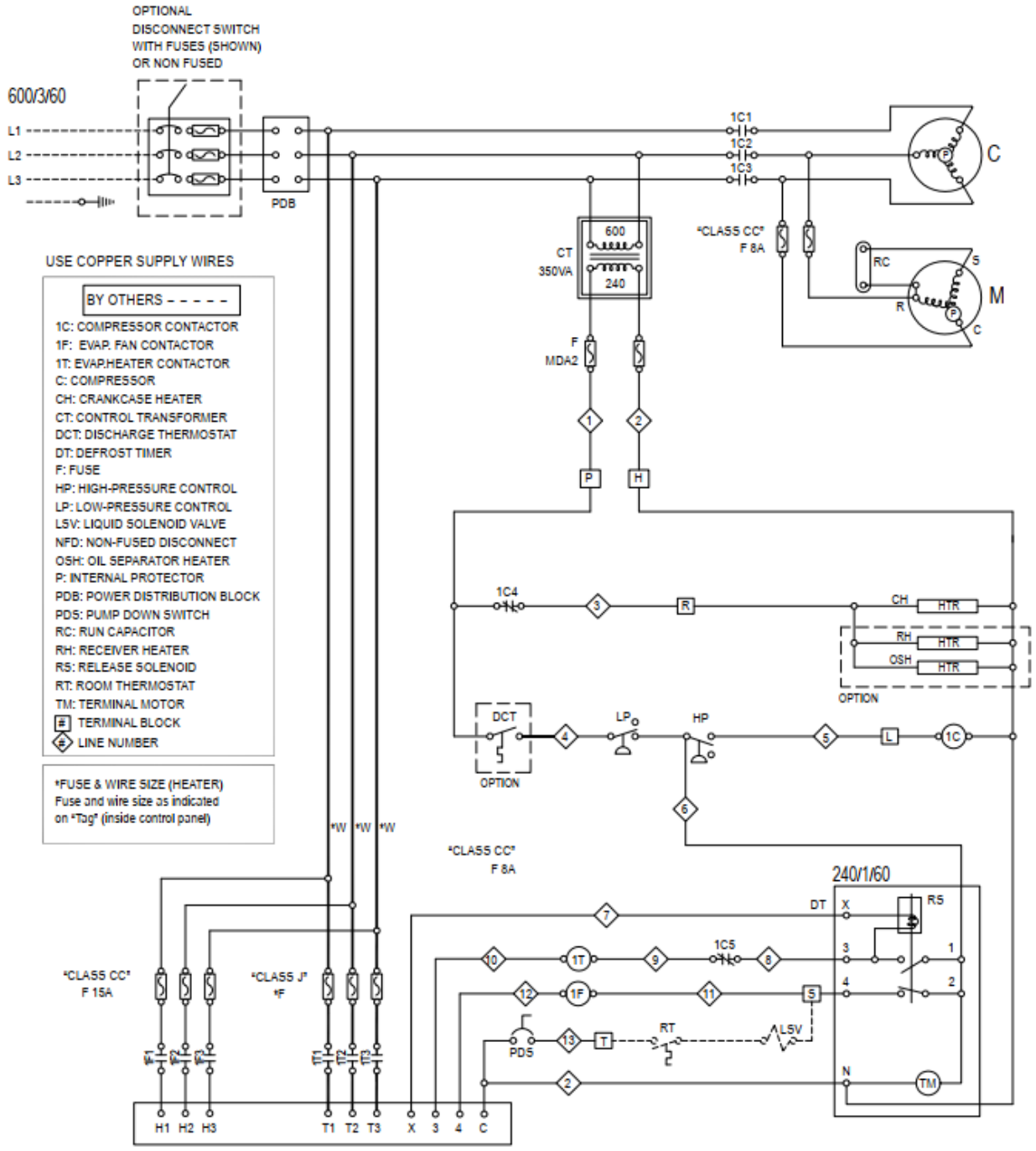
PROBLEM	POSSIBLE CAUSES	POSSIBLE CORRECTIVE STEPS
Low or no oil pressure	1. Clogged suction oil strainer. 2. Excessive liquid in crankcase. 3. Low oil pressure safety switch defective. 4. Worn oil pump. 5. Low oil level. 6. Crankcase oil filter is dirty or clogged. Oil pressure sensor is dirty. 7. Loose fitting on oil lines. 8. Pump housing gasket leaks.	1. Clean. 2. Check crankcase heater. Reset expansion valve for higher superheat. Check liquid line solenoid valve operation. 3. Replace oil pressure safety switch. 4. Replace oil pump. 5. Add oil. 6. Clean crankcase oil filter or sensor. 7. Check and tighten system. 8. Replace gasket.
Compressor loses oil	1. Lack of refrigerant. 2. Excessive compression ring blow-by. 3. Refrigerant flood-back. 4. Improper piping or traps.	1. Check for leaks and repair. Add refrigerant. 2. Replace valve plate. 3. Maintain proper superheat at compressor. 4. Correct piping.
Compressor thermal protector switch open	1. Operating beyond design conditions. 2. Discharge valve partially shut. 3. Blown valve plate gasket. 4. Dirty condenser coil. 5. Overcharged system.	1. Add facilities so that conditions are within allowable limits. 2. Open valve. 3. Replace gasket. 4. Clean coil. 5. Reduce charge.

REPLACEMENT PARTS

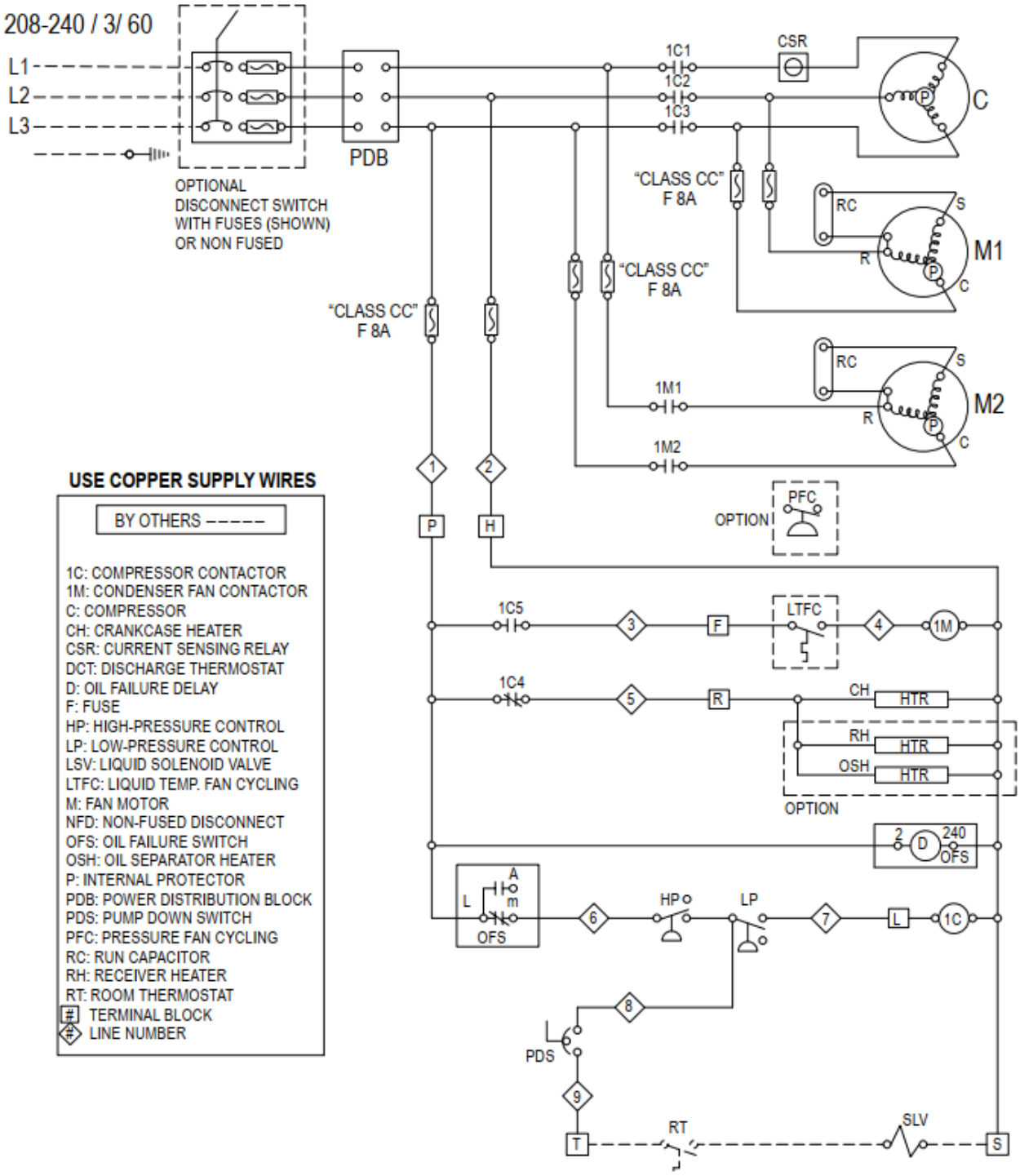
Download the parts manual at http://refplus.com/en/parts-services/



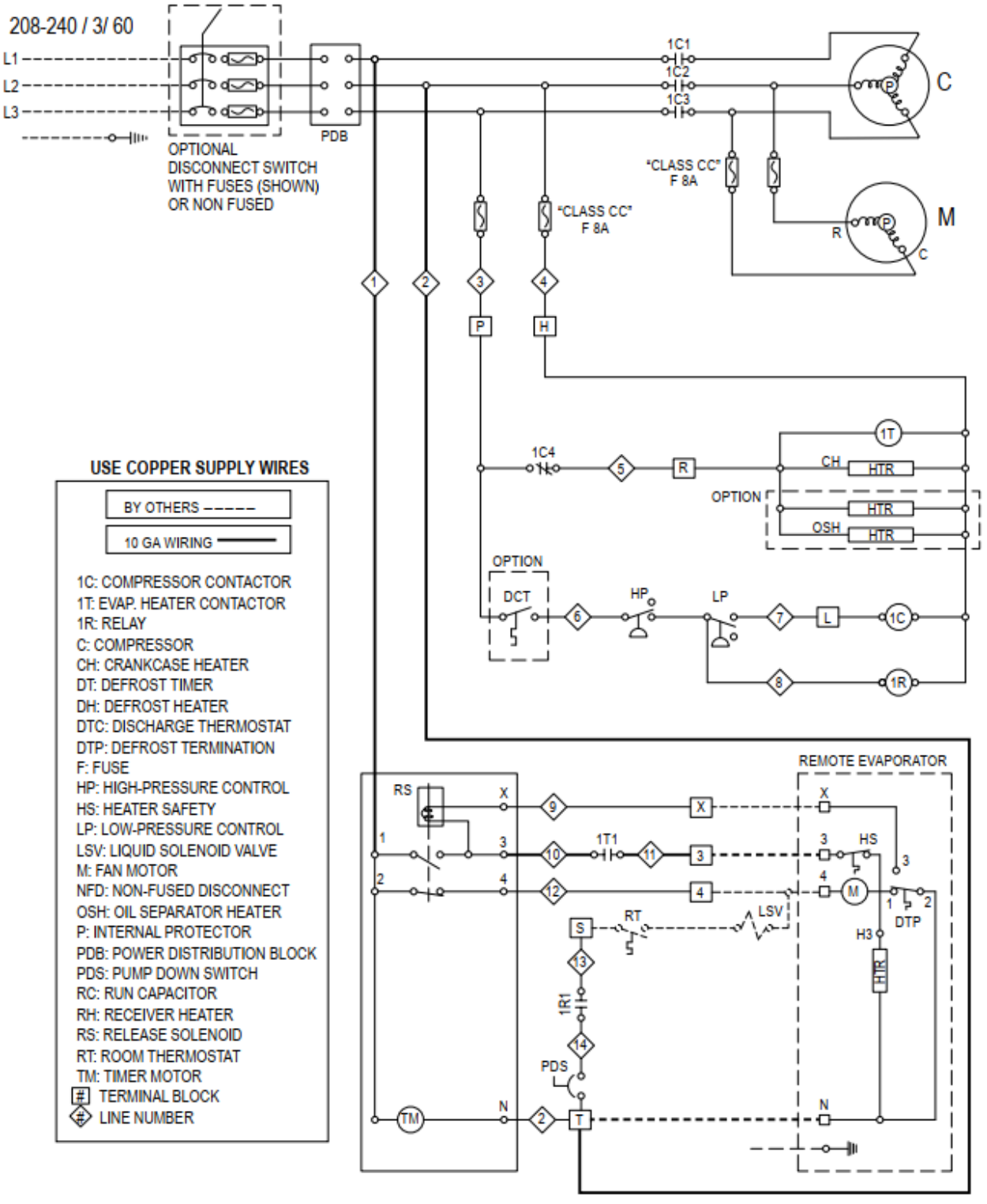
Typical wiring diagram (multiple electric defrost unit)



Typical wiring diagram (electric defrost kit - one evaporator)



Typical wiring diagram (two fans - coresense)



Typical wiring diagram (electric timer)

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OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix F – Dam Emergency Plan

HOPE BAY DAM EMERGENCY PLAN

AGNICO EAGLE

HOPE BAY, NUNAVUT

MARCH 2024

Hope Bay Dam Emergency Plan

Plain Language Overview:

This Dam Emergency Plan (DEP) is a formal document identifying potential emergency conditions that may occur at Agnico Eagle Mines' Hope Bay Project dams and includes specific preplanned actions to minimize potential failure of the dam or minimize failure consequences including loss of life, property damage, and environmental impacts during an unusual or emergency event.

Hope Bay, Nunavut

Publication Date: March 2024

Revisions

Revision #	Date	Section	Changes Summary	Author	Approver
0	April 2022	Whole Document	Broad update	AEM/SRK	AEM
1	March 2023	Whole Document	Broad update to align with AEM governance policy for critical infrastructure management and updated Dam Safety Management System including references to the site wide ERP.	AEM	AEM
2	March 2024	Whole	Broad update to align with updated Hope Bay Site Emergency Response and Crisis Management Plan	AEM	AEM

Contents

Glossary

Term	Definition
Abutment	That part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer looking downstream from the dam.
Acre-foot	A unit of volumetric measure that would cover 1 acre to a depth of 1 foot. One acre-foot is equal to 1,234 cubic meters.
Assembly Point Coordinator	The most senior employee at an assembly point or muster location during an emergency who takes control of the assembly point during an evacuation to take roll-call and account for each person at the assembly point.
Berm	A nearly horizontal step (bench) in the upstream or downstream sloping face of the dam.
Boil	A disruption of the soil surface due to water discharging from below the surface. Eroded soil may be deposited in the form of a ring (miniature volcano) around the disruption.
Breach	An opening through the dam that allows draining of the reservoir. A controlled breach is an intentionally constructed opening. An uncontrolled breach is an unintended failure of the dam.
Briefing Officer (BO)	The Briefing Officer is the liaison between the ICG and the ERT/MRT teams. The BO provides instructional direction to the ERT/MRT teams and is responsible for their safety during an emergency.
Conduit	A closed channel (round pipe or rectangular box) that conveys water through, around, or under the dam.
Consequence classification	A system that categorizes dams (extreme, very high, high, significant, or low) according to the degree of their potential to create adverse incremental consequences such as loss of life, property damage, or environmental impacts of a failure or mis-operation of a dam.
Control section	A usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.
Cross section	A slice through the dam showing elevation vertically and direction of natural water flow horizontally from left to right. Also, a slice through a spillway showing elevation vertically and left and right sides of the spillway looking downstream.
Dam	A barrier constructed for the purpose of enabling the storage or diversion of water diverted from a stream or an aquifer, or both and other works that are incidental to or necessary for the barrier.
Dam Emergency Plan	A formal document identifying potential emergency conditions that may occur at the dam and specifying preplanned actions to minimize potential failure of the dam or minimize failure consequences including loss of life, property damage, and environmental impacts.
Dam failure	An uncontrolled release of all or part of the water impounded by the dam, whether or not caused by a collapse of the dam.
Drain	A water collection system of sand and gravel and typically pipes along the downstream portion of the dam to collect seepage and convey it to a safe outlet. The drains can be located in the toe, foundation or drainage blanket.
Drainage area (watershed)	The geographic area on which rainfall flows into the dam.
Drawdown	The lowering or releasing of the water level in a reservoir over time or the volume lowered or released over a particular period of time.

Term	Definition
Emergency	A condition that develops unexpectedly, endangers the structural integrity of the dam and/or downstream human life and property, and requires immediate action.
Emergency Response Team (ERT)	A group of Hope Bay employee's and contractors who voluntarily prepare for and respond to any emergency incident.
Evacuation map	A map showing the geographic area downstream of a dam that should be evacuated if it is threatened to be flooded by a breach of the dam or other large discharge.
Filter	The layers of sand and gravel in a drain that allow seepage through an embankment to discharge into the drain without eroding the embankment soil.
Freeboard	Vertical distance between a stated water level in the reservoir and the top of dam.
Gate	A general term for any mechanical device to control the flow of water in intakes, outlet works and over controlled spillways.
Groin	The area along the intersection of the face of a dam and the abutment.
Height of dam	The vertical distance between the crest of the dam and the lowest point at the downstream toe, which usually occurs in the bed of the outlet channel.
Hydrograph	A graphical representation of either the flow rate or flow depth at a specific point above or below the dam over time for a specific flood occurrence. It can include inflow, outflow or a breach flow.
Incident Command Group (ICG)	Members of AEM management that assemble during an emergency to direct the response to the incident.
Incident Commander	The highest predetermined official available at the scene of an emergency situation.
Inundation area or map	The geographic area downstream of the dam that would be flooded by a breach of the dam or other large discharge.
Low-Level Outlet	A conduit through a dam to allow for controlled release of the reservoir contents. Also see "Outlet Works"
Mine Rescue	Mine rescue is a term used to refer to underground rescue operations performed by the Emergency Response Team.
Muster Station	A designated gathering area for the purpose of identifying and recording all occupants/evacuees present during an emergency and ensuring their safety until the emergency has ended.
Notification	To immediately inform appropriate individuals, organizations, or agencies about a potentially emergency situation so they can initiate appropriate actions.
IC	Incident Commander
OMS Manual	Operations, Maintenance, and Surveillance Manual
Outlet works	An appurtenant structure that provides for controlled passage of normal water flows through the dam. Combination of intake structure, gates, conduits, tunnels, flow controls and energy dissipation devices to allow the release of water from the dam,
Persons in the immediate vicinity of the dam:	Considered the persons located immediately downstream and adjacent to the dam where available warning time is very limited (where local emergency authorities could not be expected to respond in time).
Physician Assistant (PA)	Medical health care professional that provides overall site medical duties including critical care during emergency situations under the medical directive of a physician.
Piping	The progressive destruction of an embankment or embankment foundation by internal erosion of the soil by seepage flows.

Term	Definition
Probable Maximum Precipitation (PMP) and Prob. Max. Flood (PMF)	The theoretically greatest precipitation (PMP) or resulting flood (PMF) that is meteorologically feasible for a given duration over a specific drainage area or at a particular geographical location.
Reservoir	The body of water impounded or potentially impounded by the dam.
Riprap	A layer of large rock, precast blocks, bags of cement, or other suitable material, generally placed on an embankment or along a watercourse as protection against wave action, erosion, or scour.
Risk	A measure of the likelihood and severity of an adverse consequence.
Seepage	The natural movement of water through the embankment, foundation, or abutments of the dam.
Slide	The movement of a mass of earth down a slope on the embankment or abutment of the dam.
Spillway (emergency)	An additional spillway, which usually has a crest elevation somewhat higher than the main spillway, designed to activate during extreme flood events to avoid overtopping the dam.
Spillway (main)	The appurtenant structure that provides the controlled conveyance of excess water through, over, or around the dam.
Spillway capacity	The maximum discharge the spillway can safely convey with the reservoir at the maximum design elevation.
Spillway crest	The lowest level at which reservoir water can flow over or into the spillway.
Stop Work	An instruction broadcast over the radio system by the Official-In-Charge instructing specific work to stop.
Tailwater	The body of water immediately downstream of the embankment at a specific point in time.
Toe of dam	The junction of the upstream or downstream face of an embankment with the ground surface.
Top of dam (crest of dam)	The elevation of the uppermost surface of an embankment which can safely impound water behind the dam

Acronym List

AEM	Agnico Eagle Mines
CDA	Canadian Dam Association
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CMP	AEM's Crisis Management Plan
DEP	Hope Bay Dam Emergency Plan
DFO	Fisheries and Oceans Canada
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPP	Emergency Preparedness Plan
ERP	Emergency Response and Crisit Management Plan
ERT	Emergency Response Team
GN	Government of Nunavut

HAZCOM	Hazard Communication
HMMP	Hazardous Materials Management Plan
HR	Human Resources
ICC	Incident Command Centre
IATA	International Air Transport Association
KIA	Kitikmeot Inuit Association
MDMER	Metal and Diamond Mining Effluent Regulations
MSDS	Materials Safety Data Sheets
ERT	Emergency Response / Mine Rescue Team
NWB	Nunavut Water Board
JOHSC	Joint Occupational Health & Safety Committee
PPE	Personal Protective Equipment
SAR	Search and Rescue
SCP	Spill Contingency Plan
TDG	Transportation of Dangerous Goods
WRT	Wildlife Response Team
WSCC	Workers Safety Compensation Commission
WHMIS	Workplace Hazardous Materials Information System

1 Overview

The purpose of this Dam Emergency Plan (DEP) is to clearly document the procedures for on-site staff, to be followed in the event of a potential dam emergency at the Agnico Eagle Mines Limited (AEM) Hope Bay Project (the Project). The Dam Emergency Plan is intended to function as part of the Hope Bay Dam Safety Management System (DSMS). This document is linked with the site wide Emergency Response and Crisis Management Plan (AEM 2024). Other key documents comprising the Hope Bay DSMS are the TIA OMS Manual, and the Trigger Action Response Plan, and the Dam Monitoring Standard Operating Procedures. The Hope Bay DSMS is outlined in Section 4.

Dams at the Hope Bay project include: North Dam, South Dam and Madrid North Contact Water Pond (CWP) Berm. This Hope Bay Dam Safety Management System has been prepared with the intent of being consistent with Canadian Dam Association (CDA) and Mining Association of Canada (MAC) guidance. Key components of the DEP include:

- A description of facility components,
- A description of the Hope Bay DSMS,
- Definition of the Emergency response structure and roles,
- Plausible dam-related emergency scenarios.

Notifications regarding an unusual or emergency event at the dam are based on the trigger levels and notification procedure outlined in the OMS Manual and in Section 4 of this document. The alert levels and notification procedure are reviewed annually, or more often if warranted by a change in operational or site conditions.

1.1 Relevant Legislation and Guidance

Jurisdiction	Government of Canada and Kitikmeot Inuit Association (KIA)
Governing Bodies	Authorities involved with permitting and regulating the design, construction, operation, maintenance, surveillance, and closure of the tailings impoundment area include the following groups: • Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) • Kitikmeot Inuit Association (KIA) • Nunavut Impact Review Board (NIRB) • Nunavut Water Board (NWB) • Workers Safety and Compensation Commission Chief Mines Inspector (per the Mine Health and Safety Act) and its associated regulations (Government of Nunavut, 1995)
Guidance of Contents	**Canadian Dam Association (CDA)** • Dam Safety Guidelines (CDA 2007) – Guidance related to development of Emergency Response Plans • Dam Safety Guidelines (CDA 2013) – Guidance related to design and operation of dams

- Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams (CDA 2019) – Guidance related to design, operation and closure of tailings dams
- Note: Although the Madrid North CWP is designed to be operated with a maximum two week residence time, it still meets the definition of a mining dam and thus the CDA guidelines have been consulted for best practice.

Mining Association of Canada (MAC)

- Developing an Operations, Maintenance and Surveillance Manual for Tailings and Water Management Facilities (2019) – Guidance related to the management of Tailings Facilities and Water Management Facilities

Nunavut Water Board (NWB)

- Water License No: 2AM-DOH1335, Amendment No. 2, Doris-Madrid Project, Nunavut (2013). Amended December 7, 2018. Expires March 30, 2035.

1.2 Related Documents

The documents listed in Table 1.1 are expected to be referenced and utilized in conjunction with the DEP.

Table 1.1. List of Documents Related to the Hope Bay Dam Emergency Plan

Document Title	Year	Relevance
Hope Bay Project Emergency Response and Crisis Management Plan – Version 6	2023	Part of the Hope Bay DSMS. Provides information about required action to handle emergencies at the Hope Bay site in compliance with Territorial Health and Safety Regulations and AEM Corporate Policy
Operations, Maintenance and Surveillance Manual: Hope Bay Project, Phase 2, Doris Tailings Impoundment Area – Revision 7	2023	Part of the Hope Bay DSMS. Describes how AEM will manage and monitor the tailings impoundment area, including the impoundment dams, tailings and water pump and pipeline systems.
Doris TIA Trigger Action Response Plan	2023	Part of the Hope Bay DSMS. Defines specific conditions and thresholds corresponding to each trigger level for the dams and water reclaim pond. Outlines initial actions to be taken at each trigger level, and includes the notification procedure for communication changes in trigger levels.
North Dam Monitoring: Standard Operating Procedure	2023	Provides monitoring requirements for North Dam and includes facility specific guidance on determining alert levels.
South Dam Monitoring: Standard Operating Procedure	2023	Provides monitoring requirements for South Dam and includes facility specific guidance on determining alert levels.

Hope Bay Project Spill Contingency Plan	2022	Outlines spill response procedures and actions to be taken in the event an emergency incident involves a spill of hazardous materials
Hope Bay Project Hazardous Waste Management Plan	2020	Reference for management of hazardous waste that may be generated during an emergency response
Hope Bay Project Non-Hazardous Waste Management Plan	2020	Reference for management of non-hazardous waste that may be generated during an emergency response
Oil Pollution Prevention Plan and Emergency Preparedness Plan	2020	Outlines specific spill response procedures and actions to be taken in the event an emergency incident involves a spill of fuel during the annual sealift fuel transfer
Hope Bay Project Explosives Management Plan	2017	Reference for management of explosives material handling
Doris and Madrid Water Management Plan	2022	Describes the water management procedures including discharge from the TIA and associated water quality criteria

1.3 Plan Management

Emergency response is activated following the activation of the HOP-HSS-PRO-3001 Code 1. The procedure is triggered when an employee contacts the Incident Commander (IC) by pushing the Red Button on any radio, Calls 460-0911, or in person.

The Incident Commander and Site Emergency Management Team is responsible for directing all work performed and managing all resources during an emergency incident (AEM 2024). The team is typically formed by senior management or designates performing the various required functions to ensure the safety of all personnel involved. The team draws on resources from Safety, Operations, Technical Services, Environment and Maintenance personnel as necessary to complete emergency response tasks. Depending on the nature of the emergency, the Corporate Crisis Management Team may also be engaged.

The Site Geotechnical Engineer is responsible for reviewing and revising this Plan annually.

2 Facility Components

North Dam

The North Dam impounds the Reclaim Pond and was designed as a water retaining structure with the following components:

- central frozen core with secondary upstream GCL
- construction from quarry rock including processed fines for core, 150 mm nominal sized transition material, and run of quarry (ROQ) outer shell
- key trench equipped with 12 horizontal thermosyphon evaporators to ensure frozen foundation conditions

Note: The North Dam has been in place since 2012.

South Dam

The South Dam is a frozen foundation dam design to retain tailings solids consisting of:

- construction from quarry rock including ROQ, transition material and overliner material placed along the GCL liner.
- an upstream GCL keyed into the permafrost overburden foundation.

Note: The South Dam has been in place since 2019. Design Details are provided in Section 1.6.

Construction Material

Construction materials are sourced from local rock quarries and include

- ROQ material and
- different grades of processed material attained through crushing and screening.

Tailings Deposition

Tailings are deposited as a beach from the face of the South Dam. At all times a minimum 100m long beach will be maintained. In Phase 2, to accommodate the increased tailings quantities, the South Dam will be raised

- by 8 m in a downstream configuration
- to reach a crest elevation of 46.0 m.

Madrid North CWP

A CWP is required at the Madrid North site to intercept and manage contact water runoff from the Madrid North waste rock pile (WRP). The design of the CWP incorporates a run-of-quarry (ROQ) berm with a geomembrane liner on the upstream face to contain contact water. The CWP liner is anchored and sealed to bedrock at the toe of the berm's upstream slope. The berm was founded on exposed bedrock and areas of frozen overburden soil. Permafrost present within the berm foundation will be maintained due to the thermal protection of the berm fill. The CWP design is presented in SRK (2019).

The CWP is formed by a 200 m long embankment of maximum height 7.5 m. The CWP is located 250 m south of the Madrid mine portal and associated facilities. The pond is designed to be operated with a two-week residence time and pumped regularly to remove accumulating water. The pond has the capacity to retain a volume up to 12,200 m^3.

Based on hypothetical dam breach studies the Madrid CWP is a low-consequence dam. An embankment failure at the Madrid CWP would not lead to an emergency scenario threatening loss of life, or irreversible damage to the environment.

2.1 Directions to Facilities

The dam facilities at Hope Bay are accessible by light vehicle year-round, weather permitting. Operating light vehicles at Hope Bay requires Site Driver Training. Access routes to the facilities are detailed below:

<u>North Dam</u>

From the airstrip, follow the Primary Road south towards Doris Camp. Follow the Primary Road around the perimeter of Doris Camp to the east, then follow the TL Access Road east for approximately 2 km to reach the North Dam.

South Dam

From the airstrip, follow the Primary Road south towards Doris Camp. Follow the Primary Road around the perimeter of Doris Camp to the east, then follow the TL Access Road east for approximately 6 km to reach the South Dam.

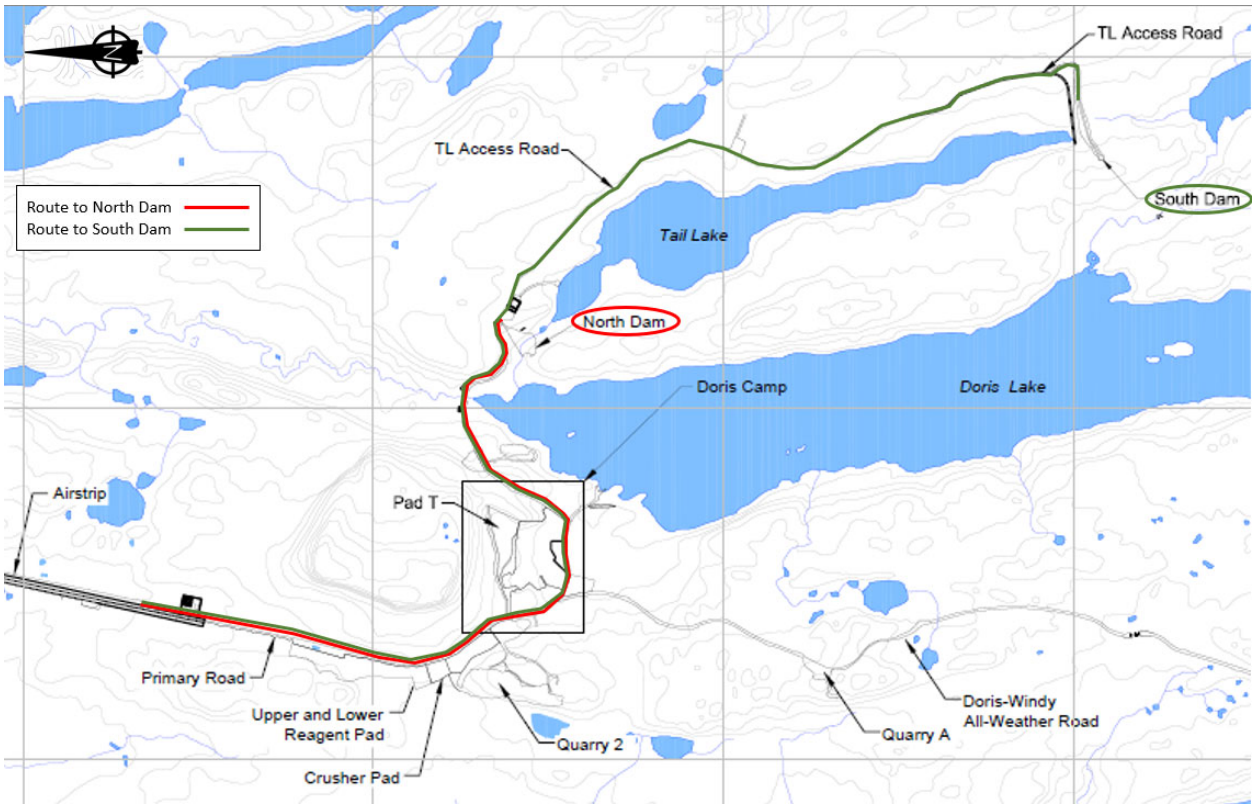


Figure 2-1 – North and South Dam Access Routes

Madrid Contact Water Pond

From the airstrip, follow the Primary Road south towards Doris Camp. Continue past Doris Camp to the south, then follow the Doris-Windy All Weather Road for approximately 12 km to reach the Madrid North CWP.

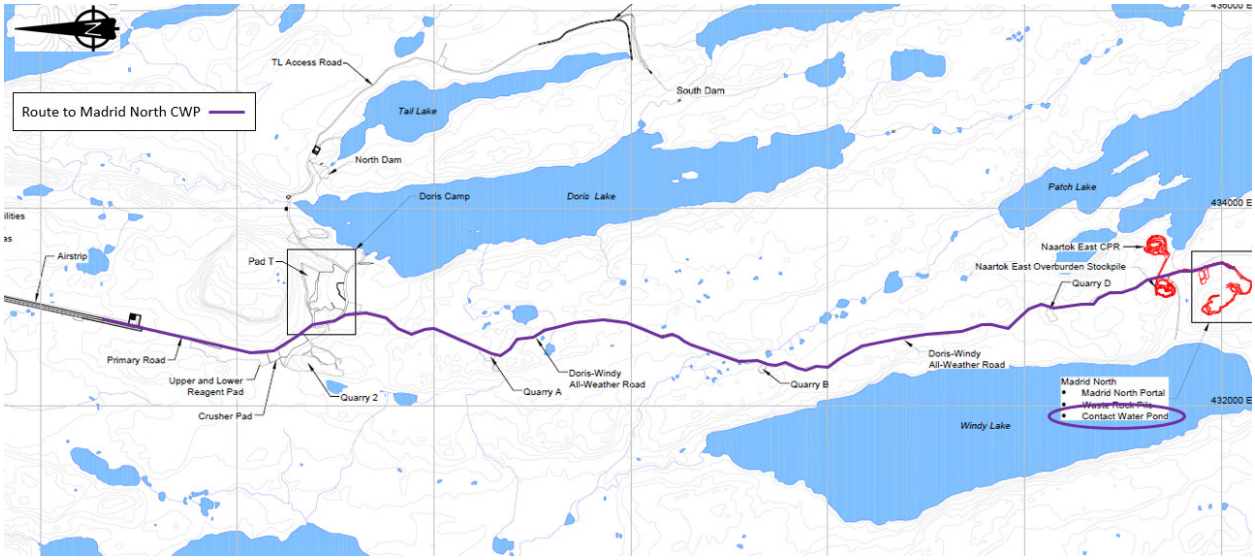


Figure 2-2 – Madrid North CWP Access Route

2.2 Dam Hazard Classification

The dams associated with the TIA area consist of

- **North Dam** - Frozen core rock fill dam with GCL
- **South Dam** – Frozen foundation dam with GCL. Constructed in two phases with downstream raises of GCL and rock fill.

The North and South Dams were assigned a dam hazard classification in accordance with the CDA (2013) dam safety guidelines, as well as the CDA Technical Bulletin on Application of Dam Safety Guidelines to Mining Dams (CDA 2014, CDA 2019).

	North Dam	**South Dam**
Population at Risk	significant	significant
Loss of Life	significant	significant
Environmental and Cultural Values	high	high
Infrastructure and Economics	low	low
Overall Hazard Classification	**high**	**high**

The Madrid CWP is a low-consequence dam. A Dam Safety Review is not required for low-consequence dams. However, the consequences of failure should be reviewed periodically, since the consequences may change with downstream development. If the classification increases, or if it is found that the CWP is not being operated as a dry facility, then a Dam Safety Review may be required.

2.3 Design Criteria and Parameters

The basis of design, design criteria, and design parameters for the TIA dams are outlined below (SRK 2017).

Description	North Dam	South Dam
Secondary Seepage Barrier	GCL	GCL
GCL Deployment Slope	2.5H:1V	3H:1V (4H:1V for the raise)
Crest Centerline Length	220 m	515 m
Maximum Height	11.0 m	14.0 m
Final Crest Elevation	37.5 m	46.0 masl
Initial Crest Elevation	n/a	n/a
Core/GCL Elevation	35.0 m	45.0 m
Full Supply Level	33.5 masl	44.5 masl
Normal Water Level	Typically 32m masl, or lower, against the North Dam. Targets set annually and documented in the TIA Annual Geotechnical Inspection reports.	
Total Freeboard	3.3 m	1.5 m
Hydraulic Freeboard	1.8 m	0.5 m
Thermal Protection above Frozen Core	2.5 m	n/a
Settlement and Allowance	1 m	0.47-0.67 m (Foundation thaw of 1 m) 2.45-3.85 m (Foundation thaw of 7 m)
Deformation Allowance (Total Strain due to Creep)	<2%	n/a
Crest Width	13 m	10 m
Upstream Structure Slope	6H:1V	4H:1V
Downstream Structure Slope	4H:1V	2H:1V
Key Trench Depth	Varies	4.0 m
Key Trench Upstream Slope	0.5H:1V	2H:1V
Key Trench Downstream Slope	0.5H:1V	1H:1V
Dam Hazard Classification	HIGH	HIGH
Design Life: Active use period as water retaining structure Design basis as active water retaining structure Active use period as solids retaining structure Design basis as solids retaining structure Total life until breach	 17 years 22 years 22 years	 17 years 25 years

Description	North Dam	South Dam
Production Life	17 years	
Tailings Solids Content	35% solids (by weight) initially, increasing to 65%	37.5% solids (by weight)
Tailings Specific Gravity	2.85	
Deposited Tailings Dry Density	1.3 t/m^3(1)	
Ice Entrainment Allowance: Percentage of tailings capacity By volume	 20% 2.4 Mm^3	
Tailings Beach Slope: Subaerial tailings Sub-aqueous tailings	 1.0% 1.0%	
Annual Exceedance Probability (AEP) for Risk Based IDF	1/2475 (0.0004)	
AEP for Standards Based IDF	1/3 between 1/1000 and the Probable Maximum Flood (PMF)(1)	
Static Stability Factor of Safety Long-term (Drained Conditions)	1.3 during construction 1.5 during operation and closure 1.2 to 1.3 partial or rapid drawdown	
Stability Factors of Safety (Pseudo-Static)	1.0 during earthquake	
AEP for Earthquake Design Ground Motion	1.2 post earthquake	
Peak Ground Acceleration (PGA)	0.060g(2)	0.036g
Mean Annual Air Temperature Climate Change	+6.8°C up to year 2100	
Thermal Design Freezing Point Depression Tailings Overburden Frozen core	 n/a -8°C -2°C	 0 to -1°C -2°C n/a
Seepage Allowance	78 m^3/day	50 m^3/day

Notes:
(1) Value based on experiential engineered judgement.
(2) A peak ground acceleration for a 1/2475 return period was not available at the time of design of the North Dam, and therefore the PGA of 0.06 g was selected based on published data for Kugluktuk. This is further described in SRK (2007).

2.4 Dam Break Analysis

In determining the dam hazard classification, in the context of the TIA Dams, consideration was given to tailings supernatant water and tailings solids reaching the receiving environment. In the context the Madrid North CWP, consideration was given to mine contact water reaching the receiving environment. Based on the hypothetical dam breach studies the Madrid CWP (Appendix A) is a low-consequence dam. An embankment failure at the Madrid CWP would not lead to an emergency scenario threatening loss of life, or irreversible damage to the environment.

The breach scenarios described below are intuitive, although likely extremely conservative. Nonetheless, these scenarios were adopted in assigning the dam hazard classification for the structures. A high-level dam breach analysis was completed for the North and South Dam in 2019 by SRK. Results are available in Appendix B.

North Dam	Breaching of the North Dam would reach • Tail Lake outflow, • Doris Lake, Doris Creek, • and Little Roberts Lake further downstream. **Supernatant Water** Supernatant water could conceivably reach the entire north downstream catchment all the way to Roberts Bay. **Note:** under a conservative case where the largest possible volume of supernatant water (over 12 Mm^3) is discharged rapidly over a period of less than 8hrs, then the Doris Creek Bridge would also be damaged. **Tailings Solids** Based on the current deposition plans (off the South and West dams on the south end of the TIA) there is no conceivable chance of tailings mass solids being released as a result of a breach of the North Dam.
South Dam	Breaching of the South Dam would reach • Ogama Lake, • Ogama Lake outflow, and • Subsequently, Doris Lake. **Supernatant Water** Supernatant water would eventually progress all the way along the drainage network to Roberts Bay. **Tailings Solids** A breach of the South Dam could result in tailings solids releasing • into Ogama Lake and • though a remote chance, into the Ogama Lake outflow and ultimately Doris Lake. Tailings solids would not be expected to be transported any further than Doris Lake, with most tailings between the South Dam and down to and into Ogama Lake.
Madrid North CWP	The modelled scenario is for a worst-case hypothetical condition where the Probable Maximum Precipitation (PMP) event occurs while the CWP is partially full due to a pumping or water management failure. During this hypothetical event, it is assumed that the pond would overtop causing a hydraulic failure of the embankment and releasing the stored water and PMP volume.

Results show the potential for a flow path to the current Madrid portal area. However, the risk to personnel, vehicles, and infrastructure by this flow is very low. Maximum flow depths in the location are less than 0.2 m.

3 Dam Safety Management System

Definition

The Dam Safety Management System (DSMS) is a collection of documents and system that define the safe operation and management of the North Dam and South Dam at the Doris TIA. The Doris TIA OMS Manual is a part of the DSMS, its function with respect to other key documents is outlined in Section 3.1 below.

Objectives

- Act as a prescriptive framework of documents that can be referenced by site staff to support the safe and effective management and operation of the dams
- The documents work together to define the approach to dam safety at Hope Bay

Components

The key documents comprising the DSMS include:

- Hope Bay Doris TIA OMS Manual
- Doris TIA Trigger Action Response Plan
- Dam Monitoring Standard Operating Procedures
- Hope Bay Project Dam Emergency Plan
- Hope Bay Project Emergency Response and Crisis Management Plan

3.1 TIA Dam Safety Management System Key Documents

The function of each document is described in Table 3-1 below. The relationship and references between the documents are outline in Figure 3-1 below.

Table 3-1 - DSMS Key Document Definitions

Document	DSMS Function
Hope Bay Doris TIA OMS Manual (this document)	• Main operational document for the Doris TIA • Defines the Dam Safety Management System framework for Hope Bay • Contains (as Appendices) or references other key DSMS documents such as the DEP (see below)

Doris TIA Trigger Action Response Plan	• Appendix G of the Hope Bay TIA OMS Manual
	• Defines the conditions and thresholds corresponding to each trigger level for the North Dam, South Dam, and the TIA Reclaim Pond Water Elevation
	• Defines initial actions to be taken for operational trigger levels:
	  ○ Green: Normal Operating Conditions
	  ○ Yellow: Early Warning Conditions
	  ○ Orange: Corrective Action Conditions
	  ○ Red: Emergency/Uncontrolled Condition
	• Specific conditions and thresholds are defined for instrumentation data readings, as well as visual observations from inspections.

Dam Monitoring Standard Operating Procedures	• Appendix H of the Hope Bay TIA OMS Manual • Describe in detail the requirements and procedures for dam monitoring under normal operating (Green) conditions
Hope Bay Project Dam Emergency Plan	• Appendix F of the Hope Bay TIA OMS Manual • Activates in the event of an emergency at any of the dams on site. • Further defines the initial response to an emergency condition at the dams (Red Trigger Level). • Includes the personnel, equipment and communication systems available to respond to an emergency situation at the dams. • Is linked the Hope Bay Project ERP
Hope Bay Project Emergency Response Plan	• Appendix E of the Hope Bay TIA OMS Manual • Activates in the event of an emergency on site. • Defines the initial response to an emergency. • Includes the personnel, equipment and communication systems available to respond to an emergency situation.

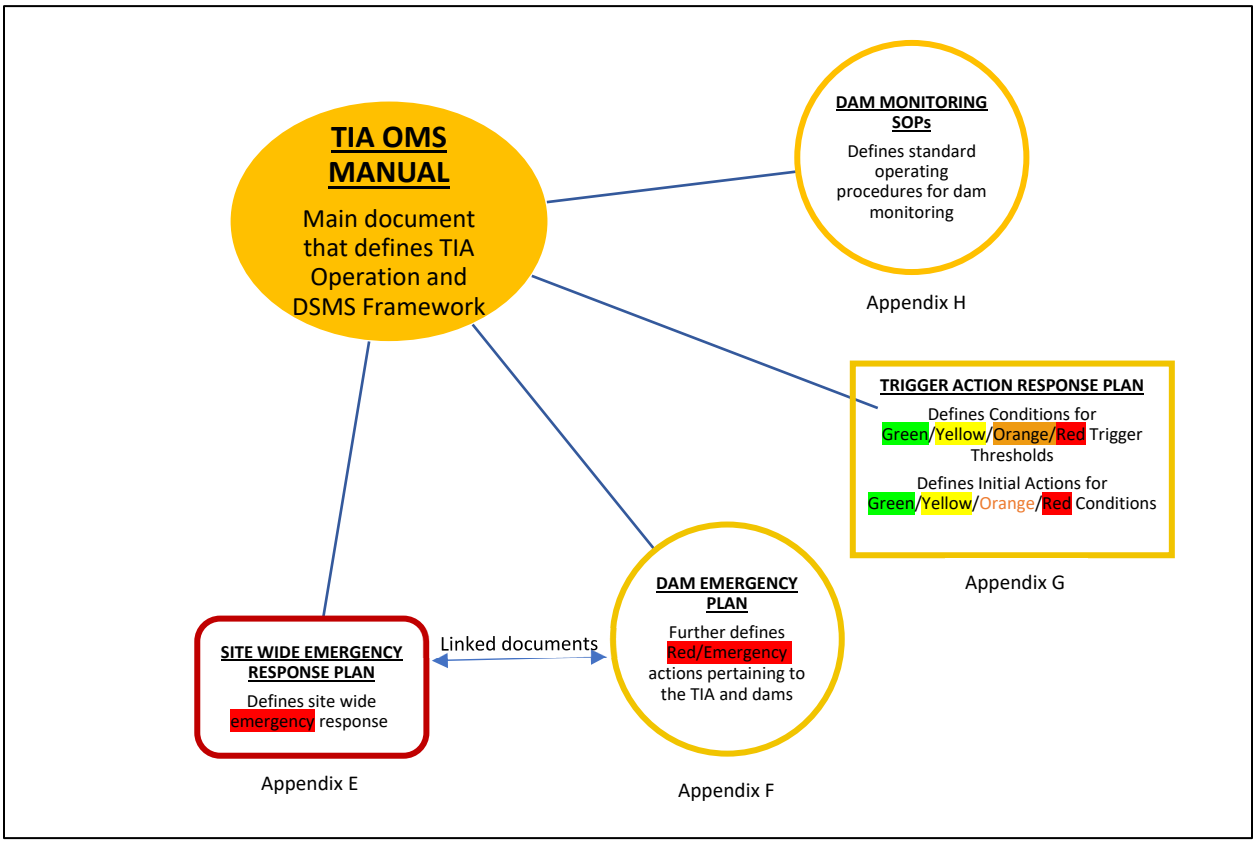


Figure 3-1 - DSMS Document Relationships

3.2 Trigger Action Response Plan Levels

The Trigger Action Response Plan defines the initial actions to be taken in response to specific conditions observed at the TIA and dams. The Trigger Action Response plan includes detailed thresholds for each Green/Yellow/Orange/Red Conditions observed or recorded at the Dams and TIA. Table 3-2 provides encompassing definitions for each of the trigger levels for the Hope Bay Project.

The complete Trigger Action Response Plan be found in Appendix G of the OMS Manual.

Table 3-2 - Definition of Trigger Levels

Trigger Level	Condition	Definition
Green	Normal Operating Condition	Maintain normal operating procedures.
Yellow - Level 1	Early Warning Condition	Areas of concern identified - Requires further investigation to determine **requirements for increased monitoring**
Orange - Level 2	Corrective Action Condition	High Risk Situation - Requires mitigation actions or operational controls to prevent an emergency situation from developing. **Implement Level 2 Actions.**
Red - Level 3	Critical Condition	Emergency Situation - Immediate threat to health and safety or environment that is uncontrollable through operational controls or mitigation actions. **Implement the site wide Emergency Response Plan and/or Dam Emergency Plan**

3.3 DSMS Communication and Decision Making

Figure 3-2 indicates the communication and decision processes when the threshold criteria are met and when pre-defined action need to be implemented. Table 3-3: Communication Procedure to Change TARP Level indicates the communication procedure to follow when changing the TARP level.

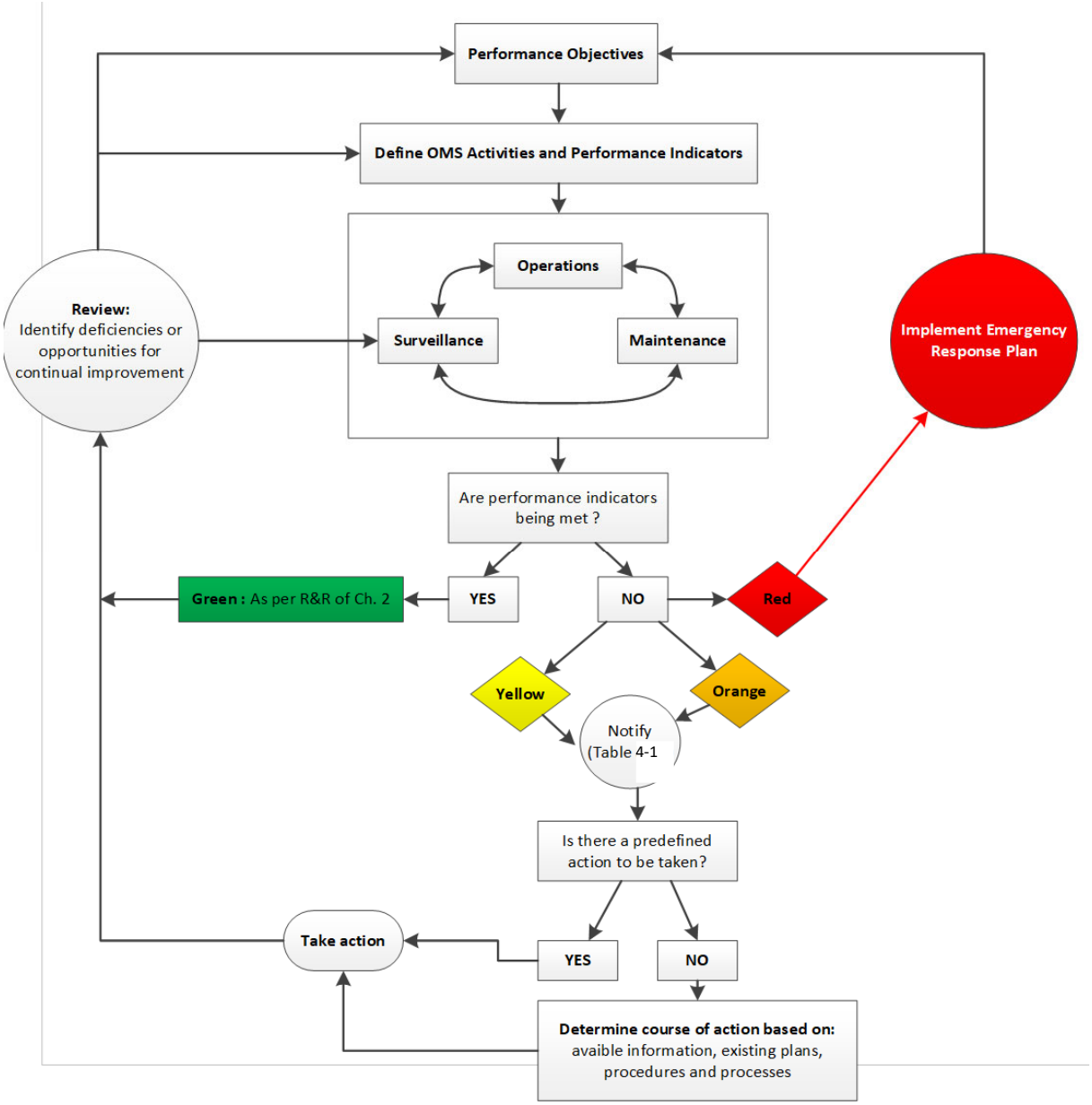


Figure 3-2: Communication and Decision Process for Water Management Infrastructure TARP

Table 3-3: Communication Procedure to Change TARP Level

Category	Notify	Timeline	Method of Communication
Green	On-Site team → Responsible person → • Independent Review Board • Designer • General Manager • EOR • AEO	The trigger are back to green for more than 2 weeks	Phone Call and E-mail to inform on status change. RP and EOR must agree to change status Brief memo sent by e-mail to officialise TARP change

Category	Notify	Timeline	Method of Communication
Yellow	On-Site team → Responsible person → • EOR	Within 24 hours of the TARP level condition being met	Phone Call and E-mail to inform on status change. RP and EOR must agree to change status. If RP can't be joined the on-site team will try to contact these people in this order: Site Geotechnical Engineer, EOR, AEO
	Responsible person → • Independent Review Board • Design Engineer • General Manager • EOR • Process Plant Superintendent	Within 72 hours of the TARP level change	Brief memo sent by e-mail to officialise TARP change Meeting to be set to explain situation if required
	EOR → • AEO	Within 1 week of TARP level change	Left to the EOR discretion
Orange	On-Site team → Responsible person → • EOR	Immediately upon discovering TARP level triggers change	Phone Call, E-mail and meeting to inform on status change. If RP can't be joined the on-site team will try to contact these people in this order : Site Geotechnical Engineer, EOR, AEO
	Responsible person → • Independent Review Board • Design Engineer • General Manager • EOR • AEO • Health & Safety Superintendent • Process Plant Superintendent	Within 24 hours of the TARP level change	Brief memo sent by e-mail to officialise TARP change Meeting to be set to explain situation
RED	On-Site team → Emergencies Response Team Once an emergency is declared refer to the ERP. Emergency response is out of scope of this document	Immediately when the emergency is discovered. If there is currently a risk to Env or Health and Safety	Emergency – Emergency Emergency and road channel Or at Emergencies 911
		Immediately when the emergency is discovered. If there is imminent risk to Env or Health and Safety	Phone call to ERT coordinator (103) & Health and Safety Superintendent

3.4 North Dam and South Dam Operating and Monitoring Criteria

The operating criteria for the North Dam and South are defined by the Trigger Action Response Plan, and the Dam Monitoring Standard Operating Procedures.

Operational Document	Location (within TIA OMS manual)
North Dam Monitoring SOP	Appendix H
North Dam Trigger Action Response Plan	Appendix G, Table 1
South Dam Monitoring SOP	Appendix H
South Dam Trigger Action Response Plan	Appendix G, Table 2

Table 3-4 below summarizes the instrumentation and visual monitoring completed at the North and South Dam. The Dam monitoring SOPs (Appendix H of OMS Manual), provide details of dam monitoring procedures.

Table 3-4 - Dam Monitoring Summary

Monitoring Component	Monitoring Frequency	North Dam	South Dam
Visual Walkover Inspections	Weekly	Yes	Yes
Deformation Survey Monitoring	Monthly (May to November)	Yes	Yes
Inclinometer Deformation Monitoring	Monthly	Yes	No
Ground Temperature Cable Thermal Monitoring	Continuous/Monthly	Analog Thermistors Continuous Logging, Monthly Download and Data Review	Digital GTCs Continuous logging and satellite transmission, monthly Data Review
TIA Reclaim Pond Water Elevation	Continuous/Daily	Yes	No

3.5 TIA Operating Criteria and Freeboard Requirements

3.5.1 TIA Water Reclaim Pond Operating Criteria and Thresholds

The operating criteria for the TIA water reclaim pond elevation is presented in Table 3-5 below. The water reclaim elevation criteria are also included in the Trigger Action Response Plan (Appendix G, Table 3).

The Hope Bay Water Management Plan provides an overview of the site wide water management strategy.

Table 3-5 - TIA Water Reclaim Pond Operating Criteria and Thresholds

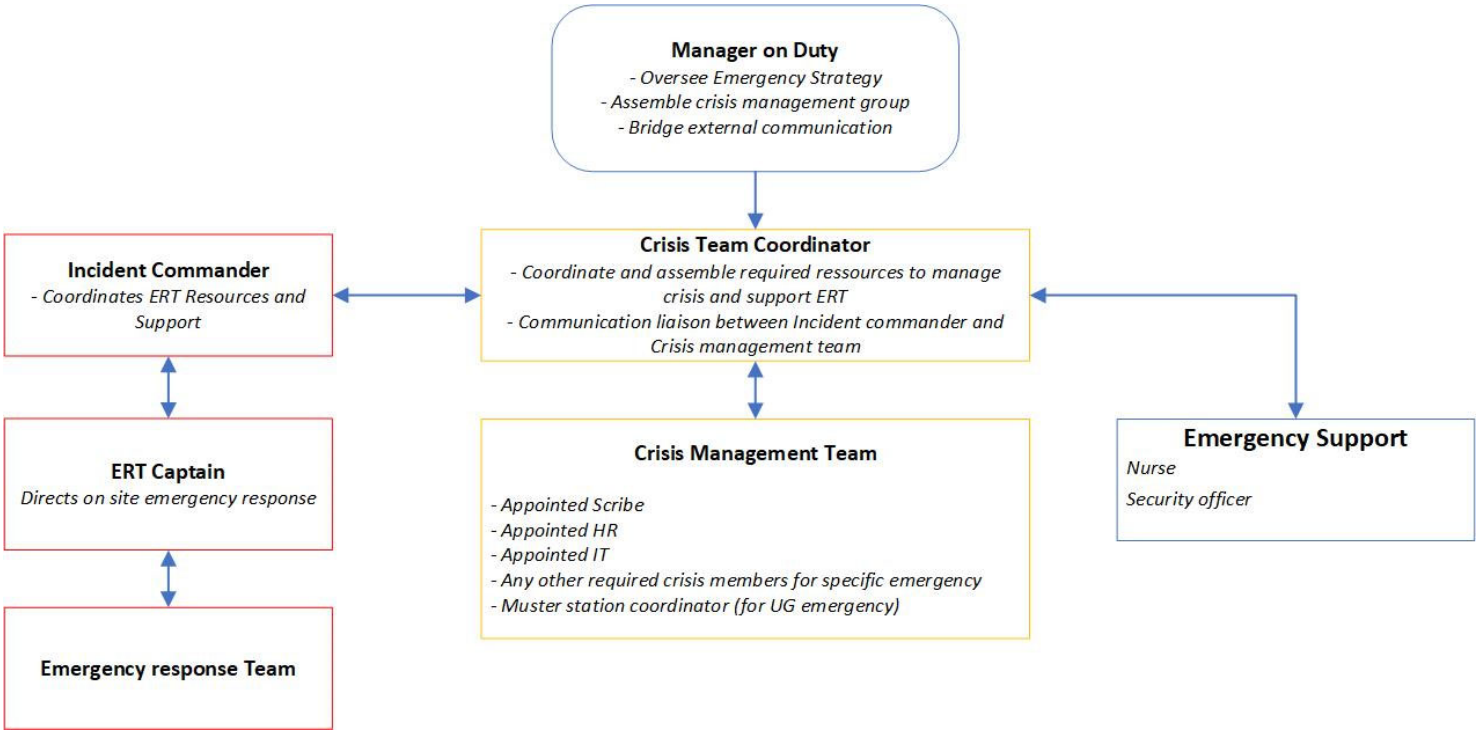
Structure	Freeboard to crest (m)		Maximum tailings elevation (m)	Operational Water level (m)			Corrective Action Level (m)	Critical Condition Level (m)
	Tailings	Water		Minimum (MinOWL)	Normal (NOWL)	Maximum (MOWL)		
North Dam	N/A	2.0	N/A	30.0	<34.0	34.0 – 34.5	34.5 – 35.0	>35.0
South Dam	1.5	N/A	33.5	N/A	N/A	N/A	N/A	N/A
TARP Level	N/A				Green	Yellow	Orange	Red

Structure	Freeboard to crest (m)		Maximum tailings elevation (m)	Operational Water level (m)			Corrective Action Level (m)	Critical Condition Level (m)
	Tailings	Water		Minimum (MinOWL)	Normal (NOWL)	Maximum (MOWL)		
Response	N/A			Standard Operations, Stop TIA dewatering activities	Standard operations	Inform stakeholders (**Table 3-3**) Refer to TARP (Appendix G of OMS manual)	Immediately take action to stop increase and lower water level. Inform stakeholders (**Table 3-3**)	Trigger ERP and DEP

4 Emergency Response Structure and Roles

Response to dam related emergencies will use the same emergency response structure and crisis management as described in the Hope Bay Project Emergency Response and Crisis Management Plan. Hope Bay crisis management is summarized in the subsections below. Additionally, roles and responsibilities outlined in Section 2 of the TIA OMS Manual also apply to dam related emergencies.

This section details the roles and responsibilities of all parties involved in emergency response planning and implementation at the Hope Bay site.



*In many emergencies, the Incident Commander will often be the same person as the onsite Crisis Team Coordinator and the emergency management team being under the direction of the Manager on Duty. If an Emergency is elevated to a Crisis, it may be required to appoint an on site Crisis Team Coordinator. Generally, this will either be H&S or the department head where the emergency is occurring (or their designate).

4.1 General Manager

The General Manager is responsible for implementing and maintaining the ERP. In addition, the General Manager's responsibilities in an emergency are to:

- Act as a spokesperson on behalf of AEM with the public, media, and government agencies, as required.
- Ensure that Health, Safety and Environment have the means (financial and otherwise) to ensure that all required resources are made available or provided from off-site if required.
- Prepare and submit any formal reports (within the required time frame) to regulators and AEM management detailing the occurrence of an emergency; this includes submitting an incident reporting form.
- Work with the H&S, Human Resources and Environment teams to evaluate what training is required by all staff, ensure that all staff are given appropriate training, and ensure that all staff are retrained as needed.
- Ensure that emergency response training practices and emergency response equipment inspections are carried out.
- Ensure that emergency response exercises are conducted annually,
- Ensure that the results of the regular inspections are used to improve emergency response practices and improve relevant plans accordingly.
- Complete an annual review of the ERP and that updated versions are available.
- Ensure that updates to new emergency communications information (new phone numbers, changes in reporting structure, etc.) are distributed as soon as the new information becomes available.
- Keep a formal record of distribution and amendments to the ERP.

4.2 Manager on Duty

In any level of an Emergency / Crisis, the role of the Manager on Duty is to Contact & Consult the General Manager and to "be the voice" of the General Manager.

Collaborate with the Incident Commander and act as a contact point with other departments to request assistance that may be needed for the ERT.

4.3 On-Site Management Team (Emergency/Crisis Management Team)

No single department can handle an emergency alone. Everyone must work together to manage the emergency and coordinate the effective use of all available resources. Therefore, at the time of any emergency requiring the assistance of the management team, the members will report to the Incident Command room(s) that will be the Emergency Control room. In General, the Incident Commander will request that the Manager on Duty activates the onsite Management Group.

Incident Command Center includes:

1. Admin Board Room.
2. GeoHub Conference Room (Alternate)

The Emergency management team structure lends support, fosters efficiency, and provides additional knowledge during an emergency response situation.

The Manager on Duty maintains the overall coordination and direction of the Emergency and ensures the continued safety of all employees and the public. The Incident Commander and the on-site Department

Head of the area affected by the emergency will assist with the development of the overall emergency response. The determination that the ongoing emergency has progressed into a crisis, requiring the activation of the AEM's CMP will be made collaboratively between the Manager on Duty and the Incident Commander, with the final decision being up to the Manager on Duty.

The remainder of the Emergency management group will be given specific tasks to perform that will assist with the management and coordination of the emergency response plan.

Additional Checklists can be found in Section 8 of AEM's CMP

4.4 Joint Occupational Health & Safety Committee

The Joint Occupational Health and Safety Committee (JOSHC) are responsible for:

- Review the emergency response plan on an annual basis.
- Assist with any investigation resulting from the emergency.
- Encourage and promote incident Prevention.

4.5 Other Personnel

Depending on the nature of the emergency (medical, electrical, mechanical, fire, etc.) other site personnel may be called upon to play key roles. The Incident Commander must be made aware of any use of work completed by personnel not on the ERT.

4.6 Supervisors

All Supervisors are responsible for:

- Ensuring personnel under their supervision are accounted for in muster point.
- Informing the incident commander of the emergency and provide details regarding the type, the location, and the nature of the emergency, including possible hazardous materials involved and health and safety concerns.
- Supervisors may also be requested to guide the ERT to or at the site of the emergency.

4.7 All Employees

All employees are responsible for:

- Ensuring site and personnel safety.
- Remain calm and report to the nearest Muster Station when a fire alarm is sounded.
- Employee's must be quiet and await the "head count" when at a Muster Point or UG refuge.
- Reporting any emergency by using a two-way radio as per HOP-HSS-PRO-3001 Code 1
- Know the location of first aid stations and supplies, emergency and safety equipment (e.g., fire water pumps, fire extinguishers, gas monitors, Safety Data Sheets (SDS), emergency exits, and muster stations.)
- Wear appropriate personal protective equipment (PPE) for the task at hand.
- Report all incidents & emergencies to their supervisor without delay
- Be aware of AEM's Social Media Policy and the issues with posting comments / photographs of an ongoing situation.

4.8 Emergency Response Contact Information

An accurate list of available responders is always available via Hope Bay PowerBI dashboard.

NSO-HOB-2023-001_ERT_Training_Model – Power BI

In addition to this, a hard copy is updated after every crew change and placed on the ERT board as well as at the ERT Hall. On site ERT members are also required to Tag In on the board at the ERT Hall.

Table 4.8.1: Hope Bay Internal Emergency Response Contact Information

NAME	POSITION	EXTENTION	MOBILE
Eric Steinmetzer	General Manager	460-0104	819-763-0187
Philemon Desrochers-Gagnon	General Superintendent	460-0106	819-355-0815
Conrad Dix	Exploration Manager, Nunavut		905-975-6150
Morgan Hjorth	Health and Safety Coordinator	460-0123 & 460-0911	639-470-2909
Jason Sanderson	Health and Safety Coordinator		306-361-1866
Dr. Marc Lee	AEM Medical Director		819-856-5092
Guy Dufour	Environment General Supervisor	460-0102	418-933-5799
Brennan Jay	Geotechnical Engineer	Microsoft Teams	
Dan Izzard	Logistics superintendent	460-0154	780-245-4293
Emma Geist	HR Superintendent	460-0159	819-860-2898
Cody Kerr	Maintenance General Supervisor	460-0131	778-220-8688
Stephan Quessy	IT Coordinator		819-598-0445
Ashley Leblanc	Exploration General Supervisor	460-0135	902-292-8659
Richard Mann	Exploration Advisor	460-0135	819-279-1749
Adam Johnson	Exploration H&S Coordinator		819-860-7912
Mike Malocsay	Exploration H&S Superintendent		720-320-4189
Norman Ladouceur	Corporate Manager, H&S / Mine Rescue		819-860-6258
Denis Vaillancourt	Exploration Manager, Special Projects	410-3605	819-354-9023
Jason Allaire	VP Health, Safety, Social Affairs and People, Crisis Management Coordinator	460-8004	819-355-2608
Benoit Massicotte	Corporate Health & Safety Advisor, Crisis Management Coordinator (alt)	410-5850	819-762-2870
Dominique Girard	EVP, Chief Operating Officer, Co-Chair AEM Crisis Team (Nunavut)	401-3747	416-568-8513
Martin Plante	VP Nunavut, Co-Chair AEM Crisis Team (Alt)		819-856-1873

**All personnel are also available via Microsoft Teams and company emails: firstname.lastname@agnicoeagle.com*

Table 4.8.2 Radio List of key Personnel onsite

Group	DEPARTMENT	Number	Name
MGMT		4600909	Manager on duty
MGMT	WH	4600652	John Pruden/Kevin Rutter
MGMT	E&I	4600609	Cody Kerr
MGMT	CAMP	4600634	Eric Desbien/Mike Hollick
MGMT	ENV	4600675	Guy Dufour
COORD	IT	4600997	Stephan Quessy
MGMT	EXPLO	4600682	Ashley Leblanc / Richard Mann
MGMT	H&S	4600910	Philemon Desrocher Gagnon
SUPERVISOR	E&I	4600610	Nelson Bell/George Miller
ERT	IC	4600911	Jason Sanderson/Morgan Hjorth
ERT	MEDIC	4600912	Vicky Hamelin/Sean Howe
ERT	SECURITY	4600914	John Fitzgerald
ERT	EXPLO LOG	4600915	Pierre-Olivier Lamontagne/Sheldon Cameron
ERT	UG	4600916	Rod Keats/Charlie Riley
ERT	UG	4600917	Daryl Drinkwater/Winston Gunn
ERT	E&I	4600918	Jason Silverwood
ERT	E&I	4600919	Jon Hill/Edwin Munyoro
ERT	E&I	4600920	Ron O'Neil/Morgan Ross
ERT	MECH	4600922	Eric Wheat/Todd Scheutt
ERT	GEO	4600923	Yan Paquet
ERT	GEO	4600924	Matthew Melchiorre/Jessica Macdonald
ERT	GEO	4600925	Marc Nash/Todd Murray
ERT	UG / E&I	4600926	Claude Swiderski
ERT	GEO	4600927	Braden Dowzansky/Sean Qitsualik
ERT	GEO	4600928	Christian Beros / Anette Pardy
ERT	GEO	4600929	Jackie Kameemalik
ERT	GEO	4600930	Keith Milne / Karley Fugel
ERT	GEO	4600931	Muzorodzi Zhou
ERT	GEO	4600934	Sam Wigmore
ERT	UG	4600936	Fred Doody/Peter Johnson
MEDIC	BASE	4600938	Clinic
ERT	BASE	4600939	ERT Hall
ERT	BASE	4600940	Admin Board Room

**Blue indicates in PA-MGMT and Orange in PA-ERT, Orange and blue indicates in both groups*
**An up to date contact list is stored on the public drive W:\Public\IT\Sepura Radios

Table 4.8.3: External Emergency Phone Numbers

Organization / Authority	Phone Number	Other

Medical		
WSCC Reporting 24 Hour Hotline	800-661-0792	
Med Response (Medevac)	1-844-633-9999	
Keewatin Air Ambulance (Medevac)	1-800-913-4352 or 1-204-784-6568	
Nunavut Emergency Management	800-693-1666	
Cambridge Bay Health Centre	867-983-4500	
Stanton Hospital 24-hour hotline	867-669-4100	
Canadian Association Poison Control	1-844-764-7669	
Yellowknife Coroner's Office	867-920-8713	
RCMP Cambridge Bay	867-983-1111 (24/7) or 867-983-0123 (admin)	
Environment		
A detailed list of contacts for environmental regulators is kept up to date in the Spill Contingency Plan		
On site Contracting Companies		
Major Drilling	306-380-8756	Tyler Lief - Field Superintendent
	204-250-6036	Ian Wilson - Regional Manager
Geotech Drilling	250-640-5447	Noah Naylor - Project Manager
Kitikmeot Camp Services - (Andrew Desilets - Regional Operations Director)	780-690-1590	adesilets@dexterra.com
	866-305-6565	Dexterra 24hr emergency line
Acasta Helicopters	(o) 867-873-3306 or (c) 867-445-1592	Dennis Rusch
Logistics		
Air Tindi	867-669-8201	
Summit Air	867-873-4464	
Buffalo Airways	867-765-8092 or 867-446-2479	
Adlair (Cambridge Bay)	867-983-2569 or 867-983-2247	
Search and rescue – Arctic Armed Forces	800-267-7270	
Rescue Coordination Centre Trenton	613-965-3870	
NAVCAN (Flight Information Center North Bay)	866-541-4109	

4.9 Emergency Management Centre

Emergency management operations will be directed out of the Emergency Management Centre located at the Admin Conference Room (Alternate – GeoHub Conference Room). However, the location will depend on the nature and circumstances of the emergency.

- Key decisions will be made, and operations will be managed.
- Technical information to direct emergency activities will be provided.
- A communications centre will be established for emergency operations and to communicate with other organizations.
- Resource procurement will be provided, and resource use will be directed.
- Information on the emergency will be logged for accuracy and disseminated to all necessary internal and external parties.

The following information is available at the Emergency & Crisis Management Centre:

- Locations of hazardous material storage areas.
- Emergency Response Guidebook (orange book)
- Locations of emergency and safety equipment.
- Locations of first aid stations and muster areas.
- Safety Data Sheets (SDS).
- Hard Copies of the Hope Bay ERP, Spill Response, OPPP/OPEP, and Dam Emergency Plan (DEP), as well as hard copies of any other relevant Emergency Plan.
- Notification lists, staff lists, contact lists, with regular and emergency telephone/radio numbers, etc.

All response and mitigation efforts developed at the Emergency Management Group will be implemented through the IC.

In the event of an emergency, security personnel may be required to establish and maintain a security perimeter to prevent or minimize injury to personnel, to preserve evidence for investigation, or to prevent unauthorized access to the scene.

4.10 Training

The Health and Safety Department is responsible for documenting, tracking, and updating all training activities. Training records shall be kept up to date in the Training Management System (TMS). AEM will ensure a sufficient number of trained and active ERT members are on site at all times. A minimum of 10 rescuers must always be readily available. All members of the ERT will be trained and familiar with emergency response for all potential emergencies that might occur at Hope Bay, including but not limited to.

- Medical Emergencies, including major burns, severe cuts / bleeds, heart attacks, and fatalities.
- Fires – Surface and Underground
- Spills – On Land and on/near Water Bodies
- Search and Rescue – UG, Surface Buildings, and Remote Locations
- Hazmat
- High Angle Rescue
- Ice and Cold-water rescue, including overturned equipment.
- Aircraft (Plane) incidents on or near the airstrip
- Helicopter crash
- Major Power Outage

Regular ERT practises are recorded under “Mine Rescue – Practise (HB 4.2)”. All senior site staff shall receive the training “Emergency and Crisis Management Training (HB 4.10)”.

Training will be conducted on a regular basis as outlined in HOP-HSH-PLN-3002 Emergency Response Training Plan (currently in draft). Regular trainings will use various combinations of the above potential emergencies (i.e. vehicle incident with an injured driver creating a fire and causing a spill directed towards a water body)

4.11 Governance and Individual Responsibilities

Agnico Eagle is committed to the protection of the public, the environment and its personnel. The company has developed a governance policy for its critical infrastructure to ensure their management in an appropriate and responsible manner (AEM 2020). The primary elements of the policy are:

- The development of specific roles with specific responsibilities;
- Regular and consistent reporting;
- Accountability at all levels, from operations to corporate;
- The use of Best Available Technology (BAT) and Best Applicable Practices (BAP); and
- The use of a risk-based approach to manage the risks associated with critical infrastructure

The persons responsible for operations, maintenance, surveillance, emergency preparedness, and emergency response along with the governance policy are listed below and in Appendix A, which also provides the site management structure.

Accountable Executive Officer (AEO)	As emphasized by MAC (2019), the accountability for decisions related to tailings management rests with the Owner's Board of Directors or Governance Level. The Board of Directors or Governance Level is expected to designate an Accountable Executive Officer (AEO) for tailings management. More specifically, the following responsibilities are assigned to the AEO: • Needs to be aware of key outcomes of water management risk assessment and of how these risks are being managed • Has accountability and responsibility for putting in place appropriate management structure • Assign responsibility and appropriate budgetary authority for tailings management • Define the personnel duties, responsibility and reporting relationships, supported by job description and organisational charts to implement the tailings management system through all stages in the facility life cycles Provide assurance to AEM and its Community of Interest that tailings are managed responsibly
Mine General Manager	• Identify the scope of work and budget requirement for all aspects of tailings management • Approve budget for operations, maintenance, and surveillance related activity • Establish an organisational structure with Roles and Responsibilities that meets the Governance Standard on Critical Infrastructure

	• Identify and retain a Responsible Person (RP) • Liaise with independent reviewer (IRB) as required
General Superintendents	Ensure the OMS responsibilities delegated to the departments they oversee are carried out as described in this section of the OMS Manual
Engineer of Record (EoR)	The function of EoR is to support AEM in ensuring that mine waste and water management infrastructure are designed and operated properly. The owner, in assuring that these facilities are safe, has the responsibility to identify and retain an EoR, who provides technical direction on behalf of the owner. Having an EoR for mine waste and water infrastructure is recognized as one of the best practices for responsible management of mine waste and water management facilities. In accordance with the AEM Governance Policy for Critical Infrastructure, the EoR is an employee of AEM. The EoR's responsibilities include: • Support and give technical advice to the RP and the AEO on geotechnical and operational challenges • Participate if possible, in Dam Safety Inspections and associated reports for tailings facilities that include retention structures/dams • Verify if the Tailings Impoundment Area (TIA), waste rock storage facility (WRSF), and Water Retaining Infrastructures are designed and are operating in accordance with the best standards in the industry and the AEM corporate standards • Verify if the waste and water management plans are developed and followed to ensure safety of the operation and the business; • Review and provide agreement on the procedural documents related to waste and water management (including OMS, ERP and TARP); • Be available for the Independent Review Board (IRB); • Participate in IRB meetings and assist the RP in their preparation if required; • Participate in the facility's risk assessments; • Be available to participate in dam safety reviews; • Identify other internal or external professionals (such as hydrogeologists, geologists, hydrologists, etc.) to provide their support when required; • Propose a schedule of site visits and required meetings during the course of the year.
Design Engineer (DE)	Engineer Responsible for the design and annual inspection of the facilites. At Hope Bay, the DE plays an important role in the management of critical infrastructure. • Advise on contemplated changes to the structure operation • Advise on structure performance and mitigation work as required • Present during independent review board meeting to provide input and context on the structure performance

Responsible Person

The Responsible Person(s) identifies the scope of work and budget requirements (subject to final approval) for all aspects of tailings management, including the Engineer of Record (EoR), and will delegate specific tasks and responsibilities for aspects of tailings management to qualified personnel." The RP is directly responsible for the management of critical infrastructure on a specific site with the objective of compliance with the Governance. The management of critical infrastructure includes design, construction, operation and closure. The RP may delegate specific tasks and responsibilities for aspects of tailings management to qualified personnel (MAC 2017).

- Ensure the implementation and sustainability of the Governance model at the site level;
- Management of critical infrastructure, as well as appurtenant structures that may affect the critical infrastructure;
- The management of personnel, budget and external resources for the critical infrastructure (external resources include the Design Engineer (DE), Independent Review Board (IRB) and any other necessary consultants/contactors);
- Close collaboration with the EoR and communication with the Design Engineer and Independent Review Board);
- Preparation for, and coordination of, IRB meetings and site visits;
- Preparation for, and coordination of, annual geotechnical inspections;
- Responding to, and implementation of, the recommendations of the IRB;
- Annual review and update of the OMS Manual in collaboration with the EoR;
- Continued application of the requirements of the OMS;
- In collaboration with the EoR, preparation of an annual report on the status of the critical infrastructure;
- Management of all documents and data related to design, construction, operation, closure, surveillance and monitoring in a secure, accessible and permanent manner;
- Revise and update the OMS Manual to reflect as-built conditions and any other changes. Review and update the OMS manual into Intelex. Maintain up to date distribution list of the OMS Manual

Site Geotechnical Engineer (EIT)

The Site Geotechnical Engineer (or EIT) is designated by the RP and is responsible for specific tasks and responsibilities for aspects of tailings management that are delegated by the RP. The Site Geotechnical Engineer works closely with the RP and EOR. At Hope Bay the responsibilities of the Site Geotechnical include:

- Support the implementation and sustainability of the Governance model at the site level;
- Management of critical infrastructure, as well as appurtenant structures that may affect the critical infrastructure;

	• Support the management of personnel, budget and external resources for the critical infrastructure (external resources include the Design Engineer (DE), Independent Review Board (IRB) and any other necessary consultants/contactors); • Close collaboration with the EoR and communication with the Design Engineer and Independent Review Board; • Preparation for, and coordination of, IRB meetings and site visits; • Preparation for, and coordination of, annual geotechnical inspections; • Responding to, and implementation of, the recommendations of the IRB; • Annual review and update of the OMS Manual in collaboration with the EoR and RP; • Continued application of the requirements of the OMS; • In collaboration with the EoR, preparation of an annual report on the status of the critical infrastructure; • Management of all documents and data related to design, construction, operation, closure, surveillance and monitoring in a secure, accessible and permanent manner; • Review, revise and update the OMS Manual to reflect as-built conditions and any other changes. Review and update the OMS manual into Intelex. Maintain up to date distribution list of the OMS Manual • Ensure that maintenance work (predictive, preventive and corrective) is identified and carried out on the earthwork and instrumentation system in collaboration with the Site Services Department • Ensure the surveillance of the structures as required in the OMS Manual (visual inspection and instrument monitoring) is carried out • Ensure the maintenance work (predictive, preventive and corrective) on the earthwork and instrumentation system is identified and performed • Ensure that the surveillance data is reviewed and analyzed to evaluate dike performance with respect to design parameters • Ensure surveillance of the structures is carried out as required in the OMS Manual (visual inspection and instrument monitoring)
Independent Review Board (IRB)	Independent Review Boards are a mechanism to obtain independent, expert commentary, advice, guidance and where appropriate, recommendations to assist owners/operators in identifying, understanding, and managing risks associated with TSF, WRSF, WSF, HLF and water-retaining infrastructures. The Independent Reviewer(s) does not have decision-making authority. Accountability and responsibility for decisions rests with AEM. • Review mine waste management strategy (including tailings and waste rock storage facilities);

	• Review water management infrastructure designs and performance (including water retaining infrastructures); • Review on-going construction works and monitoring data; • Comment on implementation progress of proposed mine waste management improvement measures; • Provide opinions and guidance to the operation on the physical integrity, safety, behavior, and performance of the confinement systems for mine waste and water retaining infrastructures; and • Comment on management systems, emergency preparedness and overall management approach of the different mine waste management facilities and water retaining infrastructures.
Process Operations Superintendent (Not applicable during Care and Maintenance)	The Process Plant Department is the owner of the process plant. They work in close collaboration with the other stakeholder to ensure the success of tailings management. The Process Plant Superintendent is in charge of the Process Plant and ensure that: • The Process Plant team as sufficient resource (qualified workforce, material, budget, training) to fulfill the OMS obligation defined in this manual • A structure is in place that define the R&R, qualification, training requirement and a staffing strategy to fulfill the obligation of the OMS Manual • The process plant operates and maintains the infrastructure required to produce and transport (i.e pump) the tailings to tailings impoundment area • The process plant tracks the parameters and characteristics of the tailings produced to ensure that targets are reached • The process plant operates the reclaim water system and tracks the water consumption to ensure that targets are reached • The process plant stops the transport of tailings if required in case of upset or emergency condition
Environment Superintendent or designate	The Environment Department ensures compliance with Environment Regulation and the Water License and is the owner of the water & tailings management infrastructures outside of the process plant. They ensure reporting and liaison with the NIRB, NWB, NGO's and other government agencies. The Environment Superintendent is in charge of the Environment Department and ensure that: • The Environment team has sufficient resources (qualified workforce, material, budget, training) to fulfill the OMS obligations defined in this manual • A structure is in place that defines the R&R, qualification, training requirement and a staffing strategy to fulfill the obligation of the OMS Manual

- Environment review monitoring data for compliance with Water License and regulations and to determine dike performance with respect to design parameters
- Support the Site Geotechnical Engineer

Site Services Superintendent or designate

The Site Services Department has the workforce and equipment to manage road, electricity and dewatering at the Hope Bay Site. They fulfill the planning done in collaboration with the Environment team to ensure the fulfilment of the OMS requirement. The Maintenance Superintendent is in charge of the Site Services Department and ensure that:

- The Site Services team has sufficient resources (qualified workforce, material, budget, training) to fulfill the OMS obligation defined in this manual
- A structure is in place that defines the R&R, qualification, training requirement and a staffing strategy to fulfill the obligation of the OMS Manual
- Site Services maintain access to the structure and tailings management systems. This include making road repairs, controlling dust and managing snow and water.
- Site Services install, operate, maintain and monitor all the components of pumps and piping system associated with water management. They also perform operation, maintenance and surveillance work on the piping system. This work is planned in collaboration with the Environment Department.
- Update and maintain a list of operational pumping equipment
- Install, operate, maintain and monitor all the components of pumps and piping system associated with water management. They also perform operation, maintenance and surveillance work on the piping system.

The Site Services Department has the workforce and equipment to maintain mobile equipment and pumps. They fulfill maintenance of some of the mechanical equipment component of the dewatering dike as requested by the Site Services department. The Site Services Superintendent is in charge of the Site Services Department and ensure that:

- Ensure preventive, predictive and corrective maintenance is carried out regularly on pumping equipment related to water management as requested by Site Services
- Keep records of maintenance performance on pumping equipment

Health and Safety Superintendent or designate

The Health and Safety Department is responsible to update and manage the site wide emergency response plan. The Health and Safety Superintendent is in charge of the Health and Safety Department and ensure that:

- The emergency response plan is updated and is aligned with the OMS manual

- The trigger to raise an emergency defined in the OMS manual and the communication pathway to do so is understood and aligned with the ERP

4.12 Contact Information

Environment and Critical Infra VP / Accountable Executive Officer	Michel Julien |michel.julien@agnicoeagle.com 416-947-1212 x3738 514-244-5876
Engineer of Record (EoR) / Technical Specialist, Environmental Management	Thomas Lepine | thomas.lepine@agnicoeagle.com 418-473-8077
Design Engineer	John Kurylo | jkurylo@srk.com 604-235-8541 Peter Luedke | pluedke@srk.com
Site Geotechnical Engineer	Brennan Jay (EIT)| brennan.jay@agnicoeagle.com 867-988-6882 x 4600122
Independent Review Board	Bill Horne | bill.horne61@gmail.com Henri Sangam | henri.sangam@geomino.com
Mine General Manager	Eric Steinmetzer | eric.steinmetzer@agnicoeagle.com 867-988-6882 x 4600104 819-763-0187
Lab & metallurgy Superintendent (currently inactive)	TBD 867-988-6882 x 4600101
General Superintendent	Philemon Desrochers-Gagnon | philemon.desrochers@agnicoeagle.com 867-988-6882 x4600106
Environment General Supervisor (Responsible Person)	Guy Dufour | guy.dufour@agnicoeagle.com 867-988-6882 x4600102 418-933-5799

Maintenance General Supervisor (Dewatering Superintendent)	Cody Kerr | cody.kerr@agnicoeagle.com 867-988-6882 x4600131
Health and Safety Coordinator	Morgan Hjorth | morgan.hjorth@agnicoeagle.com 867-988-6882 x4600123

5 Emergency Response Equipment

The H&S Department will ensure that site drawings with emergency equipment are posted conspicuously across the site. These should include clearly mark all Muster Points and the location of First Aid Equipment, AED's, Eye Wash, and Fire Extinguishers.

The H&S Department will ensure that all the Emergency Response equipment around site is in good condition. This includes, but not limited to;

- Readiness of emergency equipment in the ERT hall (e.g. SCBA, BG4's, AED's, First Aid Kits, Fire Extinguishers, etc.)
- Availability of internal medical support
- Primary Response Vehicles including the Fire Truck, Ambulance, and UG Toyota
- Location of alternate Response Vehicles and how to contact the Acting Department Head. This includes but is not limited to; Loaders, Excavators, Fat Truck, Tucker, and Helicopters.

The Incident Commander will know where the above information is posted and where emergency equipment is stored.

6 Communication Systems

The primary basis for off-site communication will be the phone system; back-up communication will be available via satellite. For on-site communication, hand-held radios will be mandatory for all employees working or travelling in remote areas from the main camp. Back-up power sources and replacement batteries for communication equipment will be available to provide continuous, uninterrupted operation either at fixed facilities or at emergency sites.

Other key site personnel will be accessible at all times by either portable radios, radios in vehicles, office radios, and / or have their rooms listed on the call-out board. The Incident Commander will monitor the Red Button Talk Group at all times. Clinic staff will always carry a hand-held radio. They will also monitor the Red Button Talk Group as a backup to the IC.

7 Mutual Aid Agreements

Any emergency at any mine can quickly overwhelm the capacity of the site ERT. It is therefore important that we maintain our Mutual Aid agreement with other mines in the area. If an emergency overwhelms the Hope Bay ERT, the IC in conjunction with the Manager on Duty will activate the Mutual Aid agreement and request assistance from as many of our partners as necessary. Even a simple emergency can quickly be escalated. With the remote nature of Hope Bay, the initial call should be made as early as possible. The Manager on Duty will coordinate with the Logistics department to bring the personnel and materials to site.

As part of the agreement, Hope Bay must also be prepared to send personnel and / or materials to other sites. After receiving the initial mutual aid request, approval from the Manager on Duty and / or the General Manager should be received. The initial plan should be to fulfill the mutual aid request without impact to operations at Hope Bay (i.e. maintain at least the minimum number of rescuers and equipment to keep the operation active).

7.1.1 Table 8.1: Mutual Aid Partners and contact information

Company	Site	ERT Coordinator	Phone	24/7 Monitored Number	Email
Agnico Eagle	Meadowbank / AMQ	Philippe Beaudoin	819-759-3555 ext. 460-5128	ext. 460-6911	philippe.beaudoin@agnicoeagle.com
		Fanny Laporte	819-759-3555 ext. 460-5148		fanny.laporte@agnicoeagle.com
	Meliadine	Dave Loder	891-759-3555 ext. 460-3113	ext. 460-3911	david.loder@agnicoeagle.com
		Darren Wilcox			darren.wilcox@agnicoeagle.com
	Hope Bay	Morgan Hjorth	819-759-3555 ext. 460-0123	ext. 460-0911	morgan.hjorth@agnicoeagle.com
		Jason Sanderson			jason.sanderson@agnicoeagle.com
Burgundy Diamonds	Ekati	Geoff Kinder	867-880-4400 ext. 2371	Security Control ext. 2201	geoff.kinder@burgundydiamonds.com
		Alex Morris			Alexander.Morris@burgundydiamonds.com
De Beers	Gahcho Kue	Jakub Matecki	867-679-5866	Protective Services 867-679-5864	Jakub.Matecki@debeersgroup.com
		Jon Gale			Jonathan.gale@debeersgroup.com
Baffinland Iron Mine	Baffinland	Steve Janknegt	647-253-0596 ext. 4048	Mary River Security ext. 6047 Milne Inlet Security ext. 4129	Steve.Janknegt@baffinland.com
		Chris MacDonald			Chris.Macdonald@baffinland.com
		Kyle Hewey			Kyle.Hewey@baffinland.com
		Dean Metzler			Dean.Metzler@baffinland.com
B2GOLD	Back River	Pascale Claveau	418-698-8388		PClaveau@b2gold.com
		Allan Baxter			Allan.Baxter@b2gold.com
Parsons Inc.	Giant Mine	Doug Hayes	867-688-1036	Security 867-686-1259	Doug.Hayes@parsons.com
Rio Tinto	Diavik	Richard Kretschmar	867-669-6500 ext. 5462		Richard.Kretzschmar@riotinto.com
		Nathan Pitre			Nathan.Pitre@riotinto.com

**Updated October 2023*

8 Dam Emergency Scenarios

8.1 Dam Break or Uncontrolled Environmental Discharge – *Extreme Case*

An emergency or "Red" condition is defined as a situation where there is a credible threat to the health and safety or an uncontrollable discharge of tailings/contact water resulting in irreversible environmental impacts.

8.1.1 Breach of the North Dam

In the event of a breach of the North Dam. Access to the North Dam via Doris Bridge should be immediately restricted via **activation of the site wide ERP.**

Based on conservative dam breach scenarios, Doris bridge may be impacted by a dam breach event (Appendix B).

8.2 Potential Actions in the Event of a Dam Breach

If time permits, the following emergency remedial actions should be **considered**. Immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam. Several of the listed adverse or unusual conditions may be apparent at the dam at the same time, requiring implementation of several modes of remedial actions. Close monitoring of the dam must be maintained to confirm the success of any remedial action taken at the dam. Time permitting, any remedial action should be developed through consultation with the site Geotechnical Engineer and AEM's Engineer of Record.

Embankment Overtopping

1. If the water level in the reservoir is no longer rising, place sandbags along the low areas of the top of the dam to control wave action, reduce the likelihood of flow concentration during minor overtopping, and to safely direct more water through the spillway.

2. Cover the weak areas of the top of the dam and downstream slope with riprap, sandbags, plastic sheets, or other materials to provide erosion-resistant protection.

Seepage and Sinkholes

1. If the entrance to the seepage origination point is observed in the reservoir (possible whirlpool) and is accessible, attempt to reduce the flow by plugging the entrance with readily available materials such as cocomatting, bentonite, soil or rockfill, or plastic sheeting.

2. Cover the seepage exit area(s) with several feet of sand/gravel to hold fine-grained embankment or foundation materials in place. Alternatively, construct sandbag or other types

of ring dikes around seepage exit areas to retain a pool of water, providing backpressure and reducing the erosive nature of the seepage.

3. Prevent vehicles and equipment from driving between the seepage exit points and the embankment to avoid potential loss from the collapse of an underground void.

Embankment Movement

1. Open outlet(s) and lower the reservoir to a safe level at a rate commensurate with the urgency and severity of the condition of the slide or slump. If piping is damaged or blocked, pumping or siphoning may be required.

2. Repair settlement of the crest by placing sandbags or earth and rockfill materials in the damaged area to restore freeboard.

3. Stabilize slides by placing a soil or rockfill buttress against the toe of the slide.

Earthquake

1. Immediately conduct a general overall visual inspection of the dam.

2. Perform a field survey to determine if there has been any settlement and movement of the dam embankment, spillway, and low-level outlet works.

3. Drain the reservoir, if required.

9 DEP Document Maintenance

9.1 Training

Personnel outlined in Section 4.11 and 4.12 should be trained in problem detection, problem evaluation and appropriate remedial (emergency and non-emergency) measures. This training is essential for proper evaluation of developing situations at all levels of responsibility (initial evaluation is usually based on on-site observations). Training should be made available annually during periods where the TIA is in operation.

Testing is an integral part of emergency preparedness, to ensure that both the documents and the training of involved parties are adequate. Tests can range from a limited pen and paper exercise to a full-scale simulation of an emergency and can include multiple failure scenarios. Revisions

The DEP should be reviewed on an annual basis and revised if any of the relevant contacts and/or roles and responsibilities have changed. A full update the DEP is expected to be conducted at minimum every 10 years for significant and high failure consequence classification dams. The responsible person or designate is responsible for updating the DEP.

The DEP document held by AEM is the master document. When revisions occur, the AEM will provide the updates to all the DEP document holders as required. The document holders are responsible for

revising any outdated copy of the respective document(s) whenever revisions are received. Outdated documents shall be immediately destroyed to avoid any confusion with the revisions.

9.2 Testing

The Canadian Dam Association recommends DEP training for all dam personnel and testing the DEP through internal exercises and periodic review and/or exercise of the DEP. Periodic exercise may consist of a simple review by AEM and key personnel (i.e. emergency, principal, alternate contacts the dam owner's technical experts) or a more thorough exercise that could include external organizations such as the local emergency authorities and others with responsibilities listed in the DEP.

A tabletop exercise usually involves a facilitator presenting a scenario of an unusual or emergency event at the dam. The scenario should be developed prior to the exercise. Once the scenario has been presented, the participants will discuss the responses and actions that they would take to address and resolve the scenario. The facilitator controls the discussion, ensuring realistic responses and developing the scenario throughout the exercise.

During periods of operation, testing is recommended to be conducted annually.

HOPE BAY DAM EMERGENCY PLAN

HOPE BAY, NUNAVUT

Appendix A: CWP Hypothetical Dam Breach Study

SRK Consulting (Canada) Inc.
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Vancouver, BC V6E 3X2

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Memo

To:	File	**Client:**	TMAC Resources Inc
From:	David Moran	**Project No:**	1CT022.043
Reviewed:	Ryan Williams, John Kurylo, Mauricio Herrera	**Date:**	October 29, 2019
Subject:	Madrid North Contact Water Pond – Hypothetical Dam Breach		

1 Introduction

As part of the development at Madrid, a contact water pond (CWP) is required at the Madrid North site to intercept and manage contact water runoff from the Madrid North waste rock pile (WRP). The design of the CWP incorporates a run-of-quarry (ROQ) berm with a geomembrane liner on the upstream face to contain contact water. The CWP liner is anchored and sealed to bedrock at the toe of the berm's upstream slope. The berm was founded on exposed bedrock and areas of frozen overburden soil. Permafrost present within the berm foundation will be maintained due to the thermal protection of the berm fill. The CWP design is presented in SRK (2019).

The CWP is formed by a 200 m long embankment of maximum height 7.5 m. The CWP is located 250 m south of the proposed Madrid mine portal and associated facilities which prompted the need to evaluate a potential dam breach of the CWP. The pond is designed to be operated with a two-week residence time and pumped regularly to remove accumulating water. The pond has the capacity to retain a volume up to 12,200 m^3.

2 Dam Breach Model

The modelled scenario is for a worst-case hypothetical condition where the Probable Maximum Precipitation (PMP) event occurs while the CWP is partially full due to a pumping or water management failure. The 24-hr spring PMP was estimated to be 115 mm (SRK 2017). During this hypothetical event, it is assumed that the pond would overtop causing a hydraulic failure of the embankment and releasing the stored water and PMP volume.

To evaluate this dam breach scenario a HEC-RAS 2D model was developed to simulate downstream flow routing. Model input parameters are outlined in Table 2-1, and Figure 2-1 shows the inflow hydrograph used in the hydraulic model which was produced based on the release volume, time to peak and a typical unit hydrograph shape.

Table 2-1: Hydraulic Model Input Parameters

Parameter	Data	Reference
Topography	1 m DEM including SRK designed infrastructure	Generated for study
Manning's *n*	0.05 (Scattered brush, heavy weeds)	Chow, 1959
Breach Height	7.5 m (full embankment)	Measured
Breach Width	22.9 m[1]	VT & G, 1990
Time to Peak	0.05 hrs[1]	Froehlich, 1995a
Release Volume	15,900 m^3	SRK, 2017

Note 1: A suite of five parametric equations were used with the worst-case selected

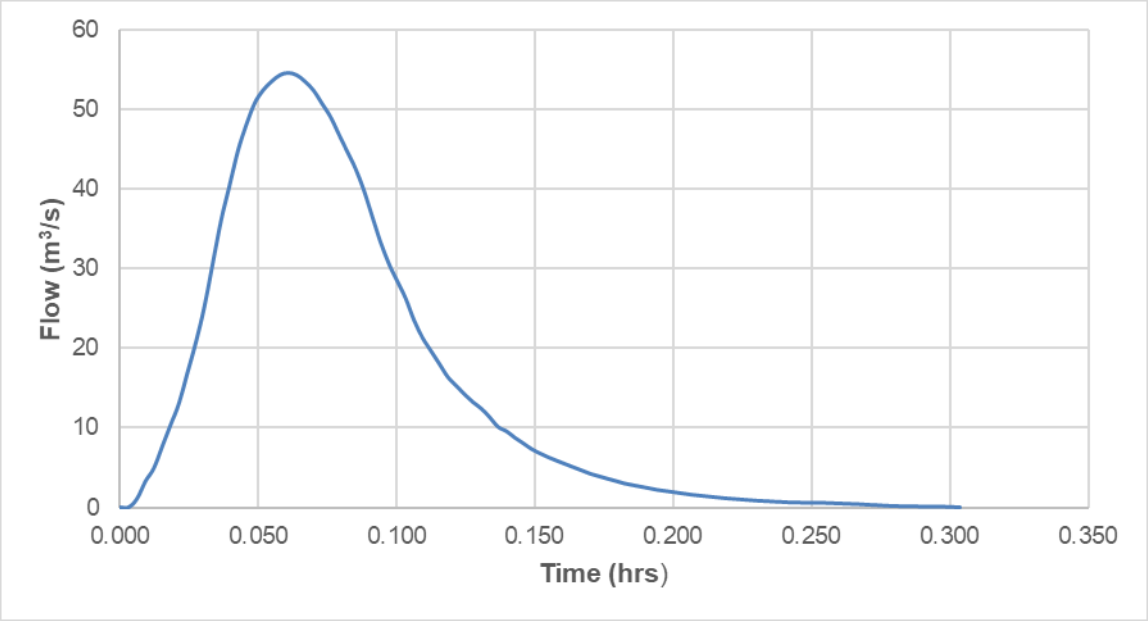

Figure 2-1: Dam Breach Hydrograph

3 Results

The results of the hydraulic model are presented in Maps 1, 2 and 3 (Appendix A). These figures show the peak arrival time, hazard classification and maximum water depth. The hazard classification map uses a combination of maximum depth and maximum velocity results to generate the risk classification in accordance with FEMA guidelines (FEMA, 2004).

The results show the potential for a flow path to the mine portal area. However, the risk to personnel, vehicles, and infrastructure by this flow is very low. Maximum flow depths in the location are less than 0.2 m. If this risk is deemed unacceptable a diversion berm would be an appropriate mitigation option. Further consideration would be required to determine the height, location and design of the diversion berm needed.

4 Summary

SRK has completed a hypothetical dam breach of the CWP in line with industry best practice standards. The analysis was completed for the conservative scenario assuming the pond is partially full, followed by the occurrence of a PMP event. The results of the analysis conclude:

- It is possible that a small amount of flow released from the CWP during a hypothetical breach would flow towards and reach the Madrid mine portal.
- The risk that flow poses to personnel, vehicles, and infrastructure in the portal area is very low, based on the hazard classification results.
- If TMAC prefer to eliminate the risk entirely of flow reaching the portal area, a small diversion berm would be required upstream of the proposed portal location.

5 References

Chow, Ven Te. 1959. Open Channel Hydraulics.

Federal Emergency Management Agency (FEMA), Federal Guidelines for Dam Safety, Hazard Potential Classification System for Dams, April 2004.

Froehlich, David C., 1995, “Embankment Dam Breach Parameters Revisited,” Water Resources Engineering, Proceedings of the 1995 ASCE Conference on Water Resources Engineering, San Antonio, Texas, August 14-18, 1995, p. 887-891.

SRK Consulting (Canada) Inc. 2017. Climate and Hydrological Parameters Summary Report, Hope Bay Project. November 2017.

SRK Consulting (Canada) Inc., 2019. Detailed Design of the Contact Water Pond Berm at Madrid North, Hope Bay Project. Report Prepared for TMAC Resources Inc., 1CT022.043. March 2019.

Von Thun, J. Lawrence, and David R. Gillette, 1990, Guidance on Breach Parameters, unpublished internal document, U.S. Bureau of Reclamation, Denver, Colorado, March 13, 1990, 17 p.

Appendix A – Model Results Maps

433200

433450

7550250

7550000

N

Portal Pads

Proposed Portal Location

Assumed Breach Location

Madrid North Waste Rock Pile Footprint

Contact Water Pond Berm

Madrid South All-Weather Road

LEGEND

Peak Arrival Time

(hours)

- < 0.1
- 0.1- 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 <

0 50 100

Meters

Notes:
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Aerial Imagery Provided by TMAC (Dated 2007)

srk consulting

Project No: 1CT022.043

Filename: 1CT022.043.100_DamBreach_Fig01_rev03

TMAC RESOURCES

HOPE BAY PROJECT

Madrid CWP Hypothetical Dam Breach

Flood Wave Peak Arrival Time

Date:	Approved:	Figure:
Oct. 2019	RW	1

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433200

433450

7550250

7550000

Portal Pads

Proposed Portal Location

Assumed Breach Location

Madrid North Waste Rock Pile Footprint

Contact Water Pond Berm

Madrid South All-Weather Road

LEGEND

Hazard Classification

- Low
- Medium
- High
- Very High
- Extreme

0 50 100

Meters

Notes:
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Aerial Imagery Provided by TMAC (Dated 2007)

srk consulting

Project No: 1CT022.043

Filename: 1CT022.043.100_DamBreach_Fig02_rev03

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HOPE BAY PROJECT

Madrid CWP Hypothetical Dam Breach

Flood Wave Hazard Classification

Date:	Approved:	Figure:
Oct. 2019	RW	2

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433200

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7550250

7550000

Portal Pads

Proposed Portal Location

Assumed Breach Location

Madrid North Waste Rock Pile Footprint

Contact Water Pond Berm

Madrid South All-Weather Road

LEGEND

Maximum Depth

(m)

- 0.0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4

0 50 100

Meters

Notes:
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Aerial Imagery Provided by TMAC (Dated 2007)

srk consulting

Project No: 1CT022.043

Filename: 1CT022.043.100_DamBreach_Fig03_rev01

TMAC RESOURCES

HOPE BAY PROJECT

Madrid CWP Hypothetical Dam Breach

Flood Wave Maximum Depth

Date:	Approved:	Figure:
Oct. 2019	RW	3

Z:\01_SITES\Hope Bay\1CT022.043_Madrid Eng Design Support\GIS\maps\1CT022.043.100_DamBreach_Fig03_rev01.mxd

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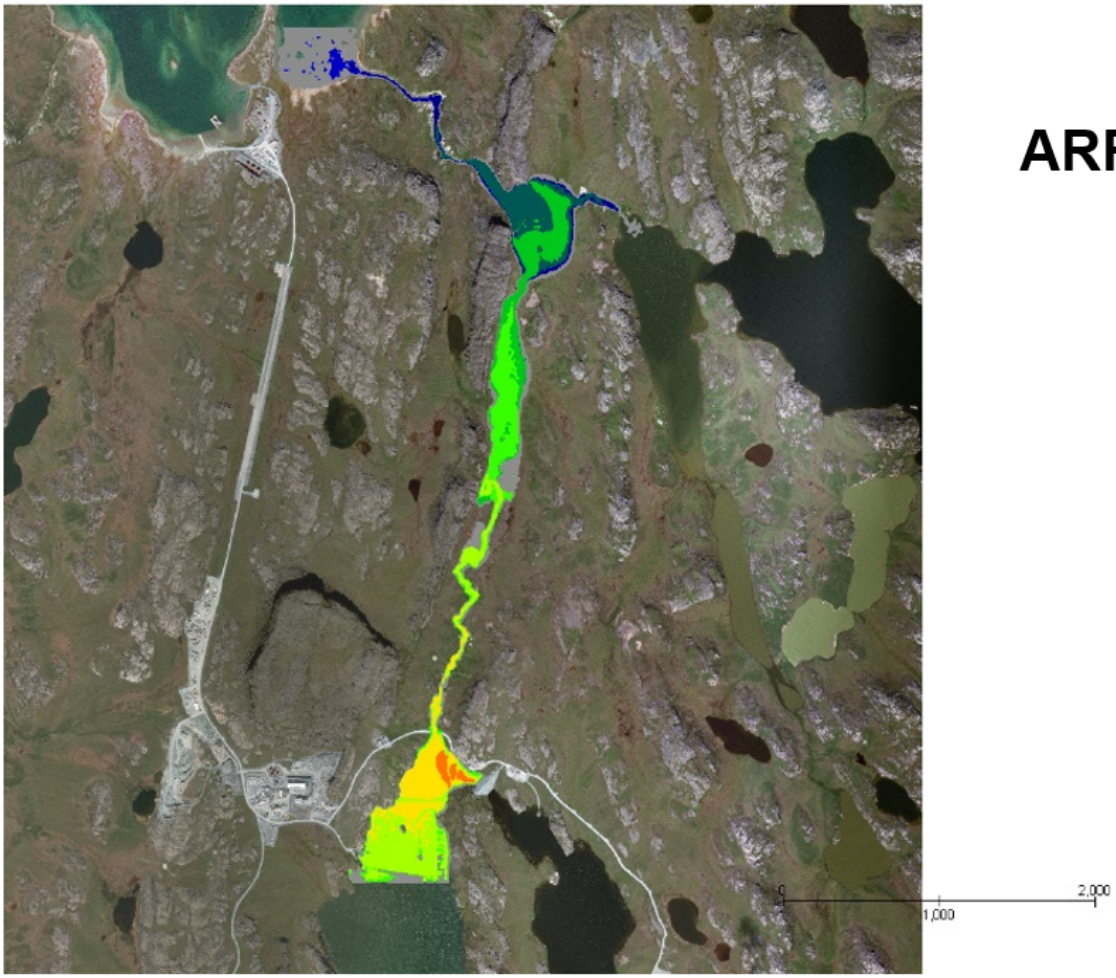
HOPE BAY DAM EMERGENCY PLAN

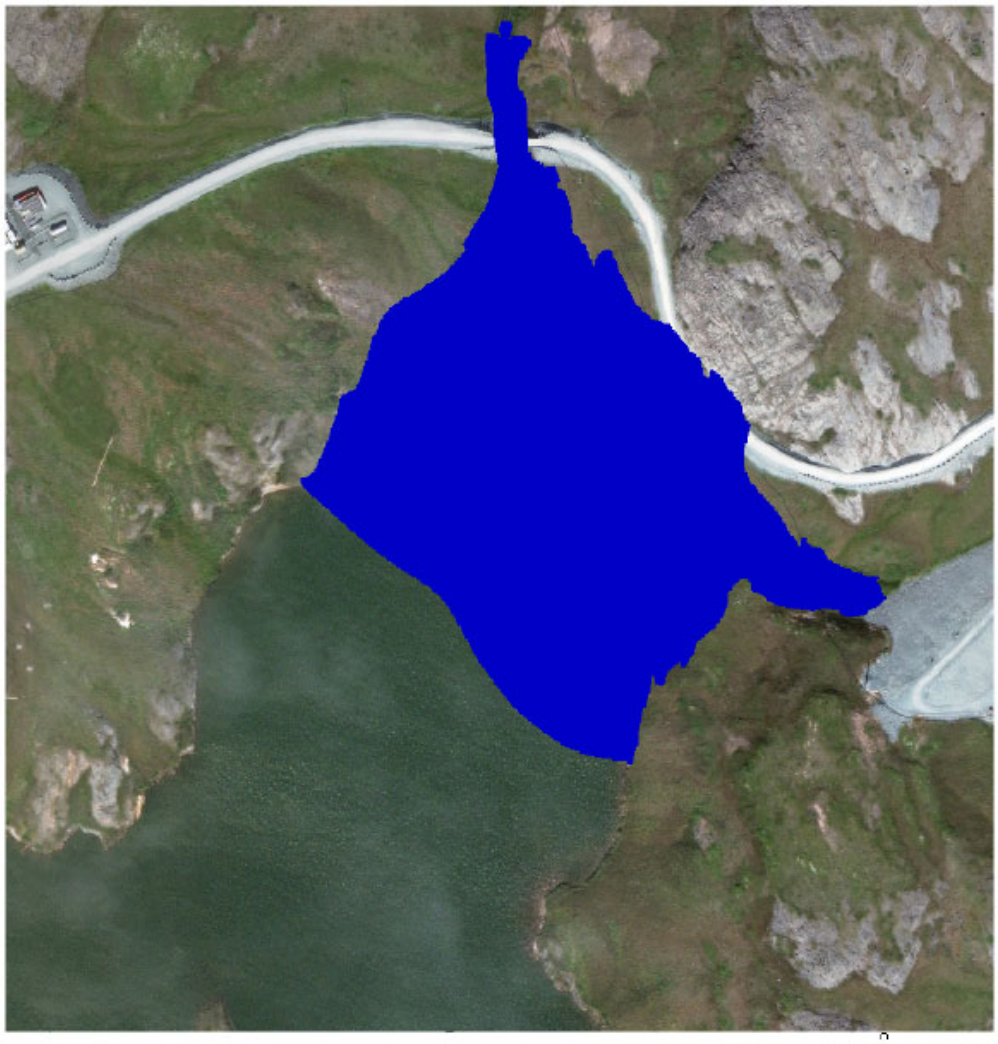
HOPE BAY, NUNAVUT

Appendix B: North Dam Inundation Maps

Grid Element Time to One Foot
(From simulation time 0.0 or initial breach discharge)



Grid Element Flow Depth (3600 sec.) [1:0:0]



~ 60 mins

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OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix G – Trigger Action Response Plan (TARP)

Hope Bay TIA - Draft TARPs Rev_6
25-Mar-24

Table of Contents

Trigger Level	Condition	Definition
Green	Normal Operating Condition	Maintain normal operating procedures.
Yellow - Level 1	Early Warning Condition	Areas of concern identified - Requires further investigation to determine **requirements for increased monitoring**
Orange - Level 2	Corrective Action Condition	High Risk Situation - Requires mitigation actions or operational controls to prevent an emergency situation from developing. **Implement Level 2 Actions.**
Red - Level 3	Critical Condition	Emergency Situation - Immediate threat to health and safety or environment that is uncontrollable through operational controls or mitigation actions. **Implement the site wide Emergency Response Plan and/or Dam Emergency Plan**

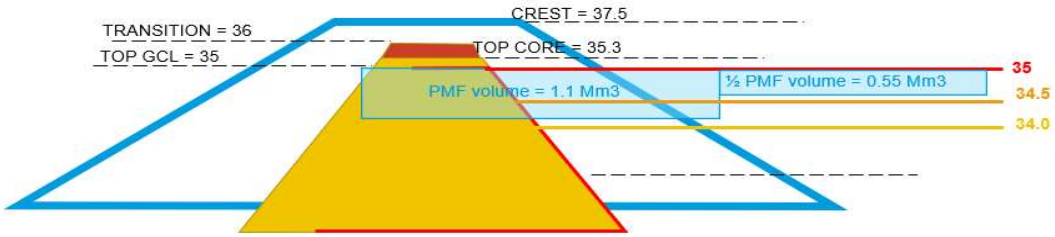
Procedure for changing trigger levels:
Refer to the TARP Notification Procedure tab for the decision making process and notification procedure that lists key personnel to be contacted when there is a change in trigger level.

Dam Safety Criteria/Parameter	Observation/Monitoring Method	Operational Trigger Level Criteria			
		Green **Normal Operating Condition**	**Yellow** **Areas of Concern**	**Orange** **High Risk Situation**	**Red** **Emergency Situation**
Deformation or Displacement	Inclinometer	Within typical maximum of past 24 months	Displacement of 0.1 m per month over two survey periods (0.2 m) or greater than 0.5m total, with a credible trend.	Displacement of 0.15 m per month over four survey periods (0.6m) or greater than 0.5 m total, or if strain is greater than 10% in any area, with a credible and continuous or accelerating trend. 3 or more surrounding instruments must support this.	Displacements of over 0.8 m. Must be supported by visual observations of displacement/deformation.
	Suvey Monitoring Points (SSP, CSP, DSP)	Total displacement within typical maximum range of past 24 months	Vertical, horizontal or total displacement of 0.1 m per month over two survey periods (0.2 m) or greater than 0.5 m total, with a credible trend that is supported 3 or more surrounding instruments.	Vertical, horizontal or total displacement of 0.15 m per month over four survey periods (4 months) or greater than 0.5 m total with a credible and continuous or accelerating trend. 3 or more surrounding instruments must support this.	Displacements of over 0.8 m. Must be supported by visual observations of displacement/deformation. Measurements from SSPs must be supported by measurements from other suvey points or inclinometers.
Cracking	Visual Inspection	None	New and expanding observed cracking, >= 5 cm wide, >= 10 m long, and deeper than 5 cm.	Expanding cracking 5 - 15 cm wide, 50 m long, deeper than 15cm but not in a clear orientation that would suggest a failure mechanism (semicircular, perpendicular or parallel to crest) but potential to propagate. Multiple aligned smaller cracks could be considered one larger crack.	**Evidence of clear imminent failure**, large cracking > 50 m long, > 30 cm deep, extending across or through the crest of the dam.
Depressions, settlement, erosion		None	Newly observed displacement, typically associated with cracking, (10-20 cm deep or 10-20 m2 in area)	New or progressing displacement observed (greater than 20 cm deep or greater than 20 m2 in area)	**Evidence of clear immentint failure**, progression of previously observed displacement (greater than 50 cm deep or greater than 20 m2 in area, expanded since previous inspection or supported by similar trends in nearby instrumentation)
Bulging/Sloughing/Discplacment at toe		None	Bulging at toe, parallel to dam centreline	Large bulge (> 50 m long) with excess water at toe, parallel to dam centreline, continuous over a significant portion of the dam, accompanied by tension cracking in the slope. Must be confirmed by instrumentation readings suggesting foundation thaw or active layer progression.	Similar observations as the orange trigger but must be accompanied by visual observations of cracking and settlement, with progressively worsening conditions with **evidence of clear imminent failure.**
Seepage (water quality downstream of toe)	Visual Inspection/Seepage Sampling/Lab Results	No seepage indicated by water quality results.	Seepage or ponding at the toe during otherwise site conditions. Must be confirmed by water quality results.	Turbid seepage or an increase in seepage at the toe during otherwise dry site condtions. Must be confirmed by water quality results.	Uncontrollable seepage toe, notably higher flow rate than in past seasons (typically a small stream of water during freshet) with high TSS (visibly sediment laden) and a tailings signature confirmed by water quality results.
Critical Zone - Core Temperature	GTC	Temperatures colder than -3°C	Temperature exceeding -3°C , for multiple beads showing a credible warming trend. Check list of excluded beads.	Temperature exceeding -0°C, for multiple beads with a rapid warming trend. (suggesting flowing water in contact with the sensors)	Temperatures exceeding orange criteria for a prolonged period within the critical zones, with a warming trend identified in multiple sensors, accompanied by data from other instruments and observations that show **evidence of clear immenint failure.**
Critical Zone - Foundation Temperature		Temperatures colder than -8°C	Temperature exceeding design criteria of -8°C , for multiple beads with a credible trend. Check list of excluded beads.	Temperature exceeding -2°C, for multiple beads with a rapid warming trend. (suggesting flowing water in contact with the sensors)	
Non-Critical Zone - Foundation Temperature		Below typical maximum of past 24 months	Warming trend that persists for more than 3 months, that exceeds typical seasonal trends of the past 2 years and exceeds temperatures predicted by thermal modelling. Check list of excluded beads.	Temperature exceeding -0°C, for multiple beads with a rapid warming trend that persists for more than 3 months, with potential to impact critical zone temperatures.	N/A
Excluded Beads (excluded from the rest of the trigger levels and are monitored independantly.)			Warming trend that persists for more than 3 months, that exceeds typical seasonal trends of the past 2 years and exceeds temperatures predicted by thermal modelling.	Temperature exceeding -0°C, for multiple beads with a rapid warming trend that persists for more than 3 months, with potential to impact critical zone temperatures.	
Initial Actions:		• Continue operation, maintenance, surveillance and monitoring as per standard operating procedure	• Notify required personnel per the Notification Procedure • Document location, photograph, survey, and inscrease inspection or monitoring frequency as appropriate • Conduct engineering review to assess further risk and determine next steps	• Notify required personnel per the Notification Procedure • Continue procedures established for Yellow conditions • Conduct engineering review to assess further risk and determine remedial/mitigative actions to be taken • Reassess thresholds and conditions for Red (Emergency) Level, taking into account current observations and conditions	• Implement the Hope Bay Project Emergency Response and Crisis Management Plan • Consult Hope Bay Dam Emergency Plan • Notify personnel working downstream of the dam • Restrict Access to Doris Bridge andTail Lake Road • Restrict Access to the Dam Crest

Dam Safety Criteria/Parameter	Observation/Monitoring Method	Operational Trigger Level Criteria			
		Green **Normal Operating Condition**	**Yellow** **Areas of Concern**	**Orange** **High Risk Situation**	**Red** **Emergency Situation**
Deformation or Displacement	Suvey Monitoring Points (SSP, CSP, DSP)	Total displacement within typical maximum range of past 24 months	Displacement of 0.1 m per month over two survey periods (0.2 m) or greater than 0.5 m total, with a credible trend. Measurements from SSPs must be supported by measurements from CSPs or DSPs.	Displacement of 0.15 m per month over four survey periods (0.6m) or greater than 1.0 m total, or if strain is greater than 10% in any area, with a credible and continuous or accelerating trend. 3 or more surrounding instruments must support this. Measurements from SSPs must be supported by measurements from CSPs or DSPs.	Displacements of greater than 1.5 m. Must be supported by visual observations of displacement/deformation. Measurements from SSPs must be supported by measurements from CSPs or DSPs.
Cracking	Visual Inspection	New or exisitng small cracks < 5 cm wide, < 10 m long, and shallower than 5 cm.	Newly observed or expanding cracking, > 5 cm wide, > 10 m long, and deeper than 5 cm.	New or expanding cracking > 15 - 30 cm across, > 50 m long, deeper than 15cm but not in a clear orientation that would suggest a failure mechanism (semicircular, perpendicular or parallel to crest) but potential to propagate. Multiple aligned smaller cracks could be considered one larger crack.	**Evidence of clear imminent failure**, large cracking > 100 m long, > 0.5 m deep, extending across or through the crest of the dam.
Depressions, settlement, erosion		Seasonal movement confined to the downstream slope and toe areas that can be clearly associated with the permafrost active layer.	Newly observed displacement, typically associated with cracking, (20-40 cm deep or 20-40 m2 in area)	New or progressing displacement observed (greater than 40 cm deep or greater than 40 m2 in area)	**Evidence of clear imminent failure**, progression of previously observed displacement with evidence of migartion of tailings. Displacements greater than 100 cm deep or greater than 40 m2 in area, expanded since previous inspection or supported by similar trends in nearby instrumentation.
Bulging/Sloughing/Discplacment at toe		Seasonal movement that can be clearly associated with the permafrost active layer.	Bulging at toe, parallel to dam centreline	Large bulge (> 50 m long) with excess water at toe, parallel to dam centreline, continuous over a significant portion of the dam, accompanied by tension cracking in the slope. Must be confirmed by instrumentation readings suggesting foundation thaw or active layer progression.	Similar observations as the orange trigger but must be accompanied by visual observations of cracking and settlement, with progressively worsening conditions with **evidence of clear imminent failure.**
Ponded water at downstream toe of dam	Visual Inspection/Seepage sampling	Small ponds < 10 m in length and < 20 m in depth near the downstream toe of dam	Ponded water against toe of dam > 10 m in length and > 0.2 m in depth.	Continuous ponded water against toe of dam approx 100m long with depth > 0.5 m, with flow of water downstream with an identifiable tailings signature	Uncontrolled accumulation of water against toe of dam or any water with tailings signature downstream of the dam with **evidence of clear imminent failure.**
Critical Zone - Foundation Temperature	GTC	Temperatures colder than -3°C	Temperature exceeding -3°C , for multiple beads showing a credible warming trend. Check list of excluded beads.	Temperature exceeding -0°C, for multiple beads with a rapid warming trend. (suggesting flowing water in contact with the sensors)	Temperatures exceeding orange criteria for a prolonged period within the critical zones, with a warming trend identified in multiple sensors, accompanied by data from other instruments and observations that show evidence of **clear imminent failure.**
Non-Critical Zone - Foundation Temperature Upstream and Downstream		Below typical maximum of past 24 months	Warming trend that persists for more than 3 months, that exceeds typical seasonal trends of the past 2 years and exceeds temperatures predicted by thermal modelling. Check list of excluded beads.	Temperature exceeding -0°C, for multiple beads with a rapid warming trend that persists for more than 3 months, with potential to impact critical zone temperatures.	N/A
Non-Critical Zone - Key Trench Temperature		Below typical maximum of past 24 months	Warming trend that persists for more than 3 months, that exceeds typical seasonal trends of the past 2 years and exceeds temperatures predicted by thermal modelling. Check list of excluded beads.	Temperature exceeding -0°C, for multiple beads with a rapid warming trend that persists for more than 3 months, with potential to impact critical zone temperatures.	
Excluded Beads (excluded from the rest of the trigger levels and are monitored independantly.)					
Upstream Tailings Temperature		Cooling trend showing tailings freezeback in accordance with design/performance criteria	Need to set after instrument installs	Need to set after instrument installs	N/A
Tailings beach length	Visual Inspection	Beach length 100 - 80 m	Beach length < 80 m	Water against dam	N/A
Initial Actions:		• Continue operation, maintenance, surveillance and monitoring as per standard operating procedure	• Notify required personnel per the Notification Procedure • Document location, photograph, survey, and inscrease inspection or monitoring frequency as appropriate • Conduct engineering review to assess further risk and determine next steps	• Notify required personnel per the Notification Procedure • Continue procedures established for Yellow conditions • Conduct engineering review to assess further risk and determine remedial/mitigative actions to be taken • Reassess thresholds and conditions for Red (Emergency) Level, taking into account current observations and conditions	• Implement the Hope Bay Project Emergency Response Plan • Consult Hope Bay Dam Emergency Plan • Notify personnel working downstream of the dam • Restrict Access to the Dam Crest

Structure	Freeboard to crest (m)		Maximum tailings elevation (m)	Operational Water Level (m)			Corrective Action Level (m)	Critical Condition Level (m)
	Tailings	Water		Minimum (MinOWL)	Normal (NOWL)	Maximum (MOWL)		
North Dam		2.0	N/A	30	<34.0	34.0 – 34.5	34.5 – 35.0	>35.0
South Dam	1.5	N/A	33.5	N/A	N/A	N/A	N/A	N/A
TARP Level	-				Green	Yellow	Orange	Red
Response	-				Standard operations	Inform stakeholders (Table 4-3 of TIA OMS)	Immediately take action to stop increase and lower water level. Inform stakeholders (Table 4 3)	Trigger ERP and DEP (Section 8)

FREEBOARD DIAGRAMS OPTION 1A



USING PMF TO DEFINE YELLOW LEVEL, USING ½ OF THE PMF TO SET ORANGE LEVEL

Level Definition	Water Elevation	Remaining Volume below 35 masl
Yellow TARP Level	**34.0**	1.3 Mm3
PMF Storage	34.2	1.1 Mm3
Orange TARP Level	**34.5**	0.67 Mm3
½ PMF Storage	34.6	0.55 Mm3
Red TARP Level (Top of GCL)	**35.0**	**0 m3**

20JUN23 – checked these values with updated SSC from SRK

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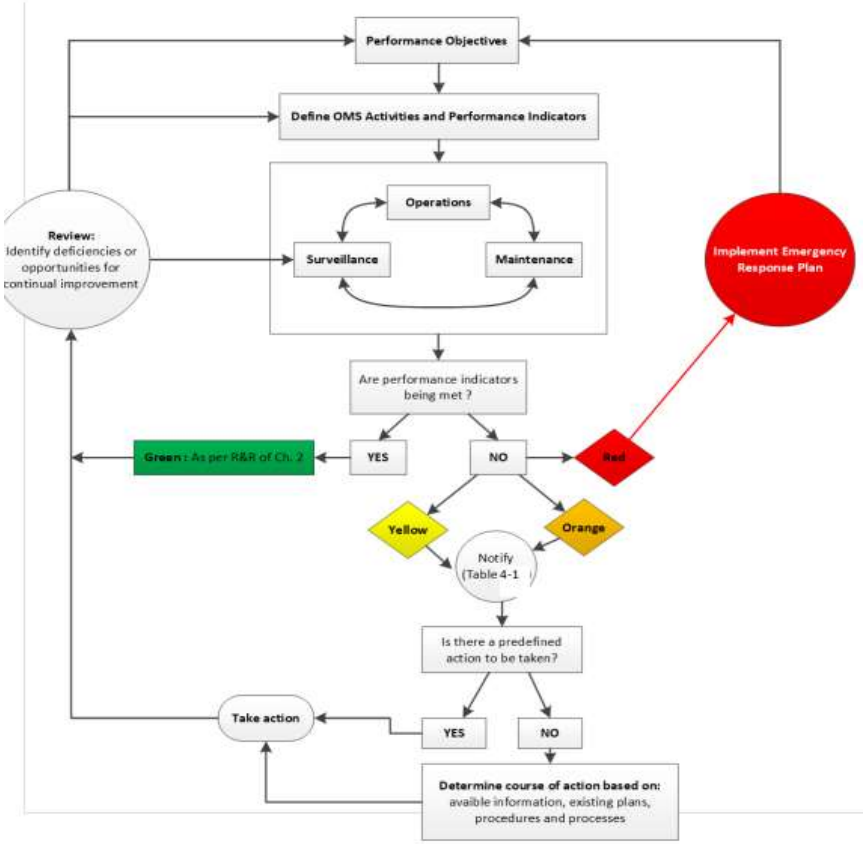
TARP Notes:

- Red Level still doesn't signify immediate overtopping (at 35 masl, still have 2.5 m freeboard for wind and waves). But the conservatism is may be warranted, since there is no EOC.
- Yellow TARP level is set based on storing the PMF below 35 masl.
- Orange TARP is set based on storing ½ of the PMF below 35 masl.
- Yellow and Orange TARP Levels rounded down for conservatism and simplicity. See table.

This information was presented at the 2023 IRB meeting for review. Updated Water Elevation TARPs were finalized in 2023.

From TIA OMS



igure 4-1: Communication and Decision Process for Water Management Infrastructure TARP

Table 4-1 : Communication Procedure to Change TARP Level

Category	Notify	Timeline	Method of Communication
Green	On-Site team → Responsible person → • Independent Review Board • Designer • General Manager • EOR • AEO	The trigger are back to green for more than 2 weeks	Phone Call and E-mail to inform on status change. RP and EOR must agree to change status Brief memo sent by e-mail to officialise TARP change
Yellow	On-Site team → Responsible person → • EOR	Within 24 hours of the TARP level condition being met	Phone Call and E-mail to inform on status change. RP and EOR must agree to change status. If RP can't be joined the on-site team will try to contact these people in this order : Water & Tailings GS, EOR, AEO
	Responsible person → • Independent Review Board • Designer • General Manager • EOR • Process Plant Superintendent	Within 72 hours of the TARP level change	Brief memo sent by e-mail to officialise TARP change Meeting to be set to explain situation if required
	EOR → • AEO	Within 1 week of TARP level change	Left to the EOR discretion
Orange	On-Site team → Responsible person → • EOR	Immediately upon discovering TARP level triggers change	Phone Call, E-mail and meeting to inform on status change. If RP can't be joined the on-site team will try to contact these people in this order : Water & Tailings GS, EOR, AEO
	Responsible person → • Independent Review Board • Designer • General Manager • EOR • AEO • Health & Safety Superintendent • Process Plant Superintendent	Within 24 hours of the TARP level change	Brief memo sent by e-mail to officialise TARP change Meeting to be set to explain situation
RED	On-Site team → Emergencies Response Team Once an emergency is declared refer to the ERP. Emergency response is out of scope of this document	Immediately when the emergency is discovered. If there is currently a risk to Env or Health and Safety	Emergency – Emergency Emergency and road channel Or at Emergencies 911
		Immediately when the emergency is discovered. If there is imminent risk to Env or Health and Safety	Phone call to ERT coordinator (103) & Health and Safety Superintendent

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OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL: HOPE BAY DORIS TAILINGS IMPOUNDMENT AREA

HOPE BAY, NUNAVUT

Appendix H – Standard Operating Procedures