

From: [Anne-Laurence Paquet](#)
To: [Cory Barker](#); [Keith Morrison](#); kgillard@nirb.ca
Cc: [Meliadine Environment Supervisors](#); [Jade Robitaille](#)
Subject: 11MN034: Removal of Itivia Harbour Diffuser and Subsea Waterline
Date: Tuesday, July 9, 2024 10:58:00 AM
Attachments: [image003.png](#)
[image004.png](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)
[Agnico Eagle Letter to NIRB TC130_20240709.pdf](#)

Dear all,

As required by revised Term & Condition 130 from the amended Project Certificate No. 006, Agnico Eagle is writing to provide the NIRB with notification of the planned decommissioning and removal of the current diffuser and associated subsea waterline and to provide the NIRB with necessary information to support this application (attached).

This email and its attachment will also be uploaded shortly to the NIRB Portal.

As usual, we remain available for any questions or comments.

Kind regards,

Anne-Laurence



Anne-Laurence Paquet Compliance Coordinator
anne-laurence.paquet@agnicoeagle.com Direct 819.759.3555
Agnico Eagle Mines Limited - Meliadine Mine, Suite 879 - Rankin Inlet, Nunavut,
Canada X0C 0G0
agnicoeagle.com





July 9th, 2024

Cory Barker
Manager, Project Monitoring
Nunavut Impact Review Board
PO Box 1360
Cambridge Bay, NU X0B 0C0

Object: Agnico Eagle Meliadine Decommissioning and Removal of the Subsea Waterline and Diffuser at Itivia Harbour

Dear Mr. Barker,

Agnico Eagle Mines Limited (Agnico Eagle) currently operates the Meliadine Gold Mine (the Mine) in accordance with Nunavut Impact Review Board (NIRB) Project Certificate No. 006 and Nunavut Water Board (NWB) Type A Water Licence 2AM-MEL1631 (the Water Licence).

In 2019, Project Certificate No. 006 was amended to permit transportation of saline groundwater along the All-Weather Access Road (AWAR) and discharge into Itivia Harbour via a diffuser. Discharge of treated saline effluent to Itivia Harbour via trucking took place during the open water seasons of 2019, 2020 and 2021.

In 2022, Project Certificate No. 006 was amended to reflect significant modifications to the Meliadine Gold Mine Project as proposed in the Saline Effluent Discharge to Marine Environment Proposal, to allow for the construction of a 34 km waterline needed to convey treated saline effluent from the Mine to Itivia Harbour. The approved activities also included the installation of a new diffuser connected to a discharge pipe through a Horizontal Directional Drilling (HDD) corridor.

Following the approval of the waterline for discharge to sea, Agnico Eagle made the decision to utilize onsite saline water storage capacity and to suspend the discharge to Itivia Harbour via trucking, thereby reducing traffic and potential dust emissions on the AWAR until the waterline is commissioned. The available storage capacity in Tiriganiaq Open Pit 2 (TIRI02) in relation to groundwater inflow rates allowed this optimization to be made.

As presented in the 2023 Annual Report, the waterline construction commenced in 2023, focusing on the section from KM15 to KM30. In 2024, the waterline construction will continue from KM15 to KM6. HDD work at Itivia is scheduled in preparation for the installation of the new diffuser. The latter is required to allow for the new flow rate for discharge into Itivia Harbour and will be located approximately 400 m west of the existing subsea discharge waterline and diffuser.

During the open water season of 2025, the construction of the waterline from KM6 to Itivia, along with the waterline diffuser installation are planned to be conducted. At the same time the

new diffuser is installed, it is planned to remove the current diffuser and associated subsea waterline.

As required by revised Term & Condition 130 from the amended Project Certificate No. 006, *New Condition for the Saline Effluent Discharge Proposal and modified for the Waterlines Proposal*, Agnico Eagle is writing to provide the NIRB with notification of the planned decommissioning and removal of the current diffuser and associated subsea waterline and to provide the NIRB with necessary information to support this application.

A summary of planned activities, potential effects and related mitigation measures and Transport Canada regulatory approval are provided below.

1. Planned activities

1.1. Timeline

The current diffuser and associated subsea waterline will be removed during the open water season of 2025, when Itivia Harbour is cleared of ice and weather conditions are favorable. The removal will be aligned with the installation of the new diffuser. Should there be any changes in the proposed timeline, Agnico Eagle will inform the NIRB.

1.2. Description of the works

Due to the nature of the work to be carried out underwater, a specialized contractor will be hired and will be responsible for the execution of the work, to ensure it is completed in a safe manner for the workers and the environment.

Similar to the installation procedure, a combination of a small boat and divers will be used to remove the pipe, ballast anchors, and diffuser. Materials will be lifted for removal using a crane located on the launching pad at shore. A telehandler will be used to carry the material when working on land.

Location of the current diffuser and subsea waterline are shown in Appendix A of the Design report for the Saline Effluent Discharge to Marine Environment, in Appendix 1 of this letter. The proposed launching area is shown in Figure 2 of the Technical Memorandum – Erosion and Sediment Control Plan for the Saline Effluent Discharge Project at Melvin Bay near Rankin Inlet, Nunavut (Golder 2019) in Appendix 2 of this letter.

1.3. Materials management

After removal and as per the Interim Closure and Reclamation Plan, components or materials will be cleaned up and salvageable materials removed, shipped south for disposal or disposed at the landfill.

2. Potential effects and related mitigation measures

As per the 2018 and 2020 FEIS Addendums, potential effects were assessed for activities related to the installation and presence of the discharge pipe / diffuser. The effects were expected to be short-term in duration or restricted to the mixing zone; thus, the effects were negligible with application of following best practices, suitable mitigation measures (i.e., adherence to Erosion and Sediment Control Plan), and adherence to the current Project Certificate conditions and federal regulations. As per Table 13 for the 2020 FEIS Addendum, based on strategies and practices implemented by Agnico Eagle for the installed saline diffuser, there was limited turbidity issues; therefore, Agnico Eagle will employ the same strategies to remove the diffuser.

The Erosion and Sediment Control (ESC) Plan previously developed by Golder for the installation and removal of the existing marine infrastructure (as per technical memorandum dated April 26, 2019) will be followed during the removal activities, where appropriate, to mitigate the potential for erosion and sediment generation from activities on the shoreline and potential sediment disturbance in Itivia Harbour. The previously developed ESC Plan is presented in Appendix 2.

Spill kits will be placed in proximity of the work area for heavy equipment. The Spill Contingency Plan will be followed in the event of a spill.

The removal will not interfere with the local community activities. Prior to conducting the work, public communication will be made to inform community members of the planned activities, timelines and area impacted. Signage and cautionary buoys will be placed as per the terms and conditions of the Approval Letter 8200-2019-600003 from the Transport Canada Navigation Protection Program dated March 15, 2019 and presented in Appendix 3 to prevent interference with navigation.

3. Regulatory Approvals

Agnico Eagle received confirmation from Transport Canada on November 28th, 2023 via email that the Approval (No. 8200-2019-600003) initially issued for the diffuser covers the removal upon completion of the project, as per term and condition 11 of the approval:

11. All portions of the existing work must be completely removed from the natural bed of the waterway immediately upon termination of the work(s)

As mentioned above, buoy and sign placement conditions will be respected as per the Approval letter during the removal. The Approval letter is presented in Appendix 3.

Agnico Eagle will work with Parties to ensure other required regulatory approvals are obtained prior to conducting the work, as applicable.








Should you have any questions or require further information, please do not hesitate to contact us.

With my best regards,

A handwritten signature in blue ink that reads "Anne-Laurence Paquet".



Anne-Laurence Paquet | Compliance Coordinator
anne-laurence.paquet@agnicoeagle.com | Direct 819.759.3555 |
Agnico Eagle Mines Limited - Meliadine Mine, Suite 879 - Rankin Inlet, Nunavut,
Canada X0C 0G0
agnicoeagle.com     

Appendix 1: Design Report – Saline Effluent Discharge to Marine Environment

Design Report Saline Effluent Discharge to Marine Environment

6528-680-132-REP-001

In accordance with NIRB Project No.006 Condition 128

Prepared by:
WSP Canada Inc.

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
0	2019-02-15			Design report

Prepared By:

Phillip Sidorenko, ing.
#5063140
2019-02-15

Phillip Sidorenko, P. Eng.

Verified by:

Ugo Barville, ing.
Ugo Barville, P. Eng.

Approved by:

Manon Turmel
Manon Turmel

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Appendix B: Pumping Station Functional Description

Appendix C: Sclairpipe Technical Specification

Appendix D: Modelling Assessment of Groundwater Discharge into the Melvin Bay Marine Environment, REV B.

1 INTRODUCTION

1.1 SITE LOCATION AND ACCESS

WSP Canada Inc. (WSP) was retained by Agnico Eagle Mines Limited (Agnico Eagle) to prepare the Design Report of the proposed saline effluent discharge to the marine environment near Rankin Inlet, Nunavut. As part of their long-term groundwater management strategy, Agnico Eagle is planning to collect groundwater from the Meliadine underground mine, treat the influent with respect to quality standards and discharge the treated groundwater effluent into Melvin Bay.

The Meliadine Mine is located approximately 25 km North of Rankin Inlet (63°1'23.8" N, 92°13'6.42" W), Nunavut.

The proposed discharge point for the saline groundwater effluent is in Melvin Bay just west of Rankin Inlet. Agnico Eagle will access the area using a bypass road. The area is also accessible by Itivia Street, a gravel road linking the Agnico Eagle Fuel Storage Facility at the Itivia Harbour and Rankin Inlet.

1.2 EXISTING AND FUTURE SITE FACILITIES

Agnico Eagle owns and operates the existing Fuel Storage Facility and plans to use this property to install the saline effluent discharge system. This projected effluent discharge system consists of truck discharge pump, a back-up discharge truck pump, a 100 000-litre storage tank, as well as suction and discharge pipelines. The 100 000-litre storage tank will only be used to contain the treated effluent until the next day, if the 800 m³/d discharge limit is attained upon a truck's arrival. The storage tank will be installed on a containment area, built on a geomembrane with underlying and overlying granular materials and surrounded by berms. The construction drawings are shown in the Appendix A.

A pumping station including two pumps will be installed on the containment area. The truck discharge pump will be used to transfer the effluent from the trucks directly into the sea (or to storage tank). A back-up truck discharge pump will be installed to by-pass the first pump, if necessary. The truck-discharge pump is connected to a 778 m long HDPE pipeline to pump the effluent from the trucks to 20m below sea level in Melvin Bay. A diffuser is connected at the end of the pipe to ensure effective dilution of the saline effluent into the marine environment. The ballast weights will be attached to the pipe to sink and hold it onto the seabed.

For more detailed information, refer to the construction drawings shown in the Appendix A.

1.3 PURPOSE OF THE DOCUMENT

The purpose of the report is to outline the final design and construction drawings for the saline effluent discharge system which includes the storage tank, the pumping station, the discharge pipe as well as the diffuser that will release the treated groundwater effluent into Melvin Bay.

This report has been prepared in accordance with Condition 128 of NIRB Project Certificate No.006:

“The Proponent shall provide the NIRB with a detailed design for the system that includes the location of the pipeline in relation to the saline effluent storage tank at Itivia, the location of submerged collars supporting the pipeline and the design of the diffuser.”

The final design was presented to the local stakeholders including the Kangiqliniq Hunters and Trappers Organization (KHTO), the Hamlet of Rankin Inlet and the Government of Nunavut - Nunavut Airports Division and Community and Government Services Department on January 24th, 2019 for final review.

This design report refers to Golder’s Report which assessed the environmental guidelines characterizing Melvin Bay at the location of the proposed diffuser and conducted the numerical modelling to design the diffuser. Golder’s Report was published in February 2019 and is shown in Appendix D.

1.4 SCOPE OF WORK

WSP was retained by Agnico Eagle to design the pumping station and pipeline while Golder was responsible for the assessment of the groundwater effluent plume with respect to environmental guidelines. This report describes the design of the pumping station, the pipeline and the diffuser.

2 GENERAL SITE CONDITIONS AND OTHER DATA INPUT FOR DESIGN

2.1 MODELLING FOR DIFFUSER DESIGN

The model calculates numerical simulations of the treated groundwater effluent mixing in the proposed marine environment. The modelling of the groundwater effluent plume dispersion allows the user to assess the dilution behaviour.

The ambient environmental conditions (e.g. winds, currents, etc.) and treated groundwater effluent characteristics are necessary to calculate numerical simulations of the mixing.

The proposed diffuser pipeline is to extend from the storage tank to be located south of the Agnico Eagle’s Fuel Storage Facility, to south-south-west in Melvin Bay. The diffuser port will be installed on the seabed at a depth of 20 m, to ensure proper mixing and prevent interference with traditional activities.

Refer to section 2.1.3 of Golder’s Report: Modelling Assessment of Groundwater Discharge into the Melvin Bay Marine Environment, Rev B, for detailed information (Golder, 2019).

2.2 ENVIRONMENTAL DATA

For detailed information on the environmental data used, refer to section 2.1.1 of Golder’s Report.

2.3 CHARACTERISTICS OF THE EFFLUENT

For detailed information on the characteristics of the effluent, refer to Appendix B of Golder's Report.

3 DESIGN OF THE STORAGE AND PUMPING STATIONS

3.1 GENERAL

After treatment, the excess groundwater will be stored on site at the Meliadine Mine, before being hauled by tanker trucks to Itivia Harbour. Trucks will unload their treated groundwater effluent by connecting on a flexible 4" HDPE suction pipe. The truck discharge pump will transfer the treated effluent into the 6" discharge HDPE pipeline and through the diffuser. The truck discharge pump will also be used to transfer effluent into the storage tank until the next day, before it is pumped into sea when necessary.

A by-pass pipeline will be installed parallel to the main discharge pipe in case the discharge truck pump malfunctions or maintenance is required. The back-up truck discharge pump (spare) will be used to pump the effluent into by-pass pipe, through the 6" discharge HDPE pipe and out the diffuser, if necessary.

3.2 PUMP NARRATIVE

The flow rate to be discharged to Melvin Bay will not exceed 800 m³/d with a TDS of 39 600 mg/L (Golder, 2019). The discharge will only occur during open water season. For more detailed information on the modelling scenarios and the input parameters, refer to section 2.1.2 of Golder's Report.

3.3 PUMPING STATION ENCLOSURES

The pumping station will be enclosed inside a heated container to protect the mechanical and electrical equipment from cold temperatures before Winter and at freshet. This precaution will decrease the risks of malfunctions in the system.

3.4 STORAGE TANKS

A 100 000-litre horizontal double wall storage tank will only be used to store the treated groundwater effluent until the next day if the daily discharge limit is attained upon a truck's arrival.

3.5 PIPING

The piping manifold for pumping stations within the container will be made of chlorinated polyvinyl chloride (CPVC) with Victaulic connections to facilitate the dismantlement during maintenance operations.

The 4" suction and 6" discharge pipelines outside of the heated container will be made of HDPE DR-9 pipe.

3.6 CONTROLS

The pumping station was designed to control the high and low water levels in the storage tank. The water level in the storage tank will be regulated with an ultrasonic transmitter located in the storage tank. When the water reaches the high level, the pump will automatically start to discharge the treated effluent to Melvin Bay.

A flow meter will be installed downstream of the pumping station to measure the flow rate before discharging into the marine environment. The pH, conductivity and the temperature levels of the effluent will be measured at the Chlorination Treatment Plant before arrival to Agnico Eagle Fuel Storage Facility. This equipment will allow Agnico Eagle to control the discharge operations and to respect the base parameters. This is in accordance with the commitments during the Final Environmental Impact Statement (FEIS) process.

A valve will be installed downstream of the storage tank to allow the sampling according to the Metal and Diamond Effluent Regulation.

The pumping station is designed to facilitate the user's operations and maintenance. The design allows a local control at the pumping station.

4 DESIGN OF THE HDPE PIPELINES

4.1 GENERAL

The present section of the report describes the main components of the effluent discharge pipeline and provides the reader with further details on its design and functionalities.

The groundwater effluent pipeline was designed to prevent interference with local transportation including snowmobiling, boating and ATV's. Our design proposes an ATV and snowmobile crossing constructed over a section of the onshore pipeline and parallel to the laydown area fence line. Furthermore, drawing 65-100-210-200 illustrates the location of the proposed ATV and snowmobile crossing.

The design will not affect the use of traditional land during construction and operation.

4.2 ABOVE-GROUND PIPELINE

4.2.1 ONSHORE

The onshore pipe will be installed permanently on the undisturbed natural ground. Signage will be installed in both directions of the traffic near the onshore pipe to indicate the obstacle and the crossing to motorized vehicles.

4.2.2 SUBMARINE PIPELINE

Unlike the conceptual design presented during the FEIS process, Agnico Eagle is proposing not to bury the pipeline located in the intertidal zone. This proposed design will result in reducing the impacts on the environment and community (i.e. eliminate need to re-open the Itivia quarry, reduce risk of erosion and sedimentation into Melvin Bay during pipe installation and reduce risk of pipe being moved by ice during winter).

The submarine pipeline is segmented into two sections, a temporary (removable) and a permanent section. The first 150 m long section located south of the crossing must be removed from the Melvin Bay before Winter since the formation of ice could damage the pipe. The temporary section will be re-installed at freshet once the ice has broken up. The temporary pipe is removable by its flanges located at the extremities of the 150 m section.

On the other hand, the permanent section of the submarine pipeline will be at least 6 m below sea level and will stay in place year-round. A diffuser is connected at the end of the pipe.

4.3 MATERIAL

4.3.1 PIPELINES

The effluent discharge pipeline will be made of Sclairpipe HDPE DR-9 PE4710. Also, the pipeline will be welded using a fusion welding machine except at its flanges. The pipe's dimension ratio was selected based on the need for high rigidity. The chemical properties of HDPE pipes make it highly resistant to saline water. Finally, HDPE pipelines are easier to install in a marine environment compared to other materials (e.g. steel).

4.3.2 FLANGES, VALVES AND ACCESSORIES

The pipeline's temporary section has two HDPE flanges at its extremities to enable it to be removed and installed again, when necessary. A back-up ring will be inserted in-between each flange connections and then mechanically fastened to ensure tightness. The ring will be designed to resist low water temperatures as well as salinity.

4.3.3 BALLAST WEIGHTS

The ballast weights will be installed at a 1.52 m interval along the submarine pipeline. The ballast weights must weigh 67.6 pounds to keep the pipeline floating when filled with air, until it is in the projected alignment. Once the pipeline is filled with water, the ballast weights will sink and hold the pipeline onto the seabed. The ballast weight will allow the installation of the pipeline underwater.

4.4 EQUIPMENT

4.4.1 FLOWMETER

As mentioned in section 3.6, a flowmeter will be installed downstream of the pumping station to measure the flow rate before discharge into the marine environment.

5 DESIGN OF DIFFUSER AND MODELLING RESULTS

5.1 DIFFUSER CONFIGURATION

The optimized diffuser has the following configuration:

- Diffuser connection with outfall through a 6" five-way cross;
- Length of the diffuser: 0.9 m;
- Diameter of the diffuser: 150 mm, DR-9 (nominal);
- Diffuser depth: 20 m (based in 2017 bathymetry survey of Melvin Bay);
- Discharge type: single port;
- Horizontal angle of discharge: Perpendicular to bathymetric contours;
- Vertical angle of discharge: 90°;
- Port diameter: 75 mm, DR-9 (nominal);
- Port height from seabed: 1 m.

For more detailed information, refer to construction drawing 65-100-210-200 in Appendix A.

6 CONSTRUCTION

6.1 GENERAL

Construction is expected to begin in May 2019 and end in August 2019.

6.1.1 PIPELINE

The pipeline sections will be welded on shore into three major segments; the onshore segment as well as the temporary and permanent submarine segments.

The ballast weights will be installed onshore only when the submarine segments are welded together. Initially, the ballast weights will be stockpiled adjacent to the work station. Then, a ramp or skid way, including railroad tracks or steel beams, will be placed to facilitate moving the weights along with the pipe.

The pipeline is ready for launching when all the ballast weights are fixed to the pipeline. To keep the pipeline floating until the sinking operation, the pipe ends are blocked to prevent water from entering the pipe. This will be accomplished by installing a flange assembly with a blind flange at each end.

Before the launch, the ramp of the skidway will extend deep enough into the water so that the weights can be supported by the floating pipe. In case of high currents, an anchorage system will be installed to hold the pipe while it is being launched. A boat with a winch and cable system will be used to move the pipeline into the water. It may be necessary to install guide cables and shore anchors to hold the system over the alignment when it is being sunk.

The sinking process consists of filling the pipe with water at one end and evacuating the air out of the other end.

The construction of the pipeline onshore and under water will not interfere with the local community activities. During construction, vertical lighting signs will be installed onshore to alert incoming traffic at Itivia Harbor. The lighting will be oriented with caution, towards the working area and away from the airstrip take off and landing area.

6.1.2 STORAGE TANK

The installation of the storage tank will require the use of a lifting mobile equipment. The storage tank measures 12.2 m long x 3.3 m wide and weighs 15 m.t. It will be set in place with the M & T KoneCrane ReachStacker Model SMV 4531. Its maximum vertical extension is 18.2 m but just to lift the storage tank off a flat bed and set in place, it would be extended about two thirds that height.

6.1.3 CONTAINMENT PAD (NEAR ITIVIA FUEL STORAGE FACILITY)

The Containment pad will be built to minimize land disturbance and environmental risks. Therefore, the pad is to be built 31 m away from the Highest High Water Large Tide (HHWLT).

Once the subgrade is prepared, an HDPE geomembrane is installed with underlying and overlying granular material. Also, berms are to be constructed around and higher than the containment pad. This gives the pad the capacity to contain the volume of effluent inside the storage tank in case of spillage.

The pad will facilitate daily operations such as maneuvering the tanker trucks to unload the groundwater effluent into the storage tank.

The construction of the containment pad will require an excavator, tandem trucks, a spread dozer and a compactor. The tallest heavy equipment on site will be the CAT 330 excavator. It has a maximum vertical reach of 10.7 m but will not be deployed to this height since the work will occur at ground level only.

6.2 MATERIAL SPECIFICATIONS

All the materials used to fabricate the facility are non-potentially acid generating (NPAG) materials. The granular materials that will be used for building the containment pad will be sourced from a nearby borrow pit.

6.3 CONSTRUCTION QUALITY CONTROL AND SURVEY

Agnico Eagle is responsible for conducting quality control and surveying during construction.

6.4 TESTING AND INSPECTION

Agnico Eagle is responsible for testing and inspecting the saline discharge effluent system according to the manufacturer's recommendations before its start-up. After the pipeline installation, divers will verify that the ballasts holding the pipeline are all properly sitting on the bottom contours and that the pipeline is not resting on any rocks, debris or material that could cause damage.

7 OPERATIONS

7.1 REMOVABLE AND PERMANENT PIPE

As stated in section 4.2.2, operation of the saline effluent discharge requires installing and removing a temporary segment of the pipeline at freshet and Winter, respectively. The temporary segment will be removed and stored away before the bay freezes up.

The temporary section of pipe can be disconnected from the system at its flanges and will have to be pulled out using heavy equipment. Agnico Eagle is responsible for storing this pipeline segment on their property during Winter.

7.2 MAINTENANCE PROGRAM

Agnico Eagle will have in place a maintenance program based on manufacturer's recommendations. The system will be inspected according to the manufacturer's recommendations and repaired when needed to keep the system in good working condition.

8 REFERENCES

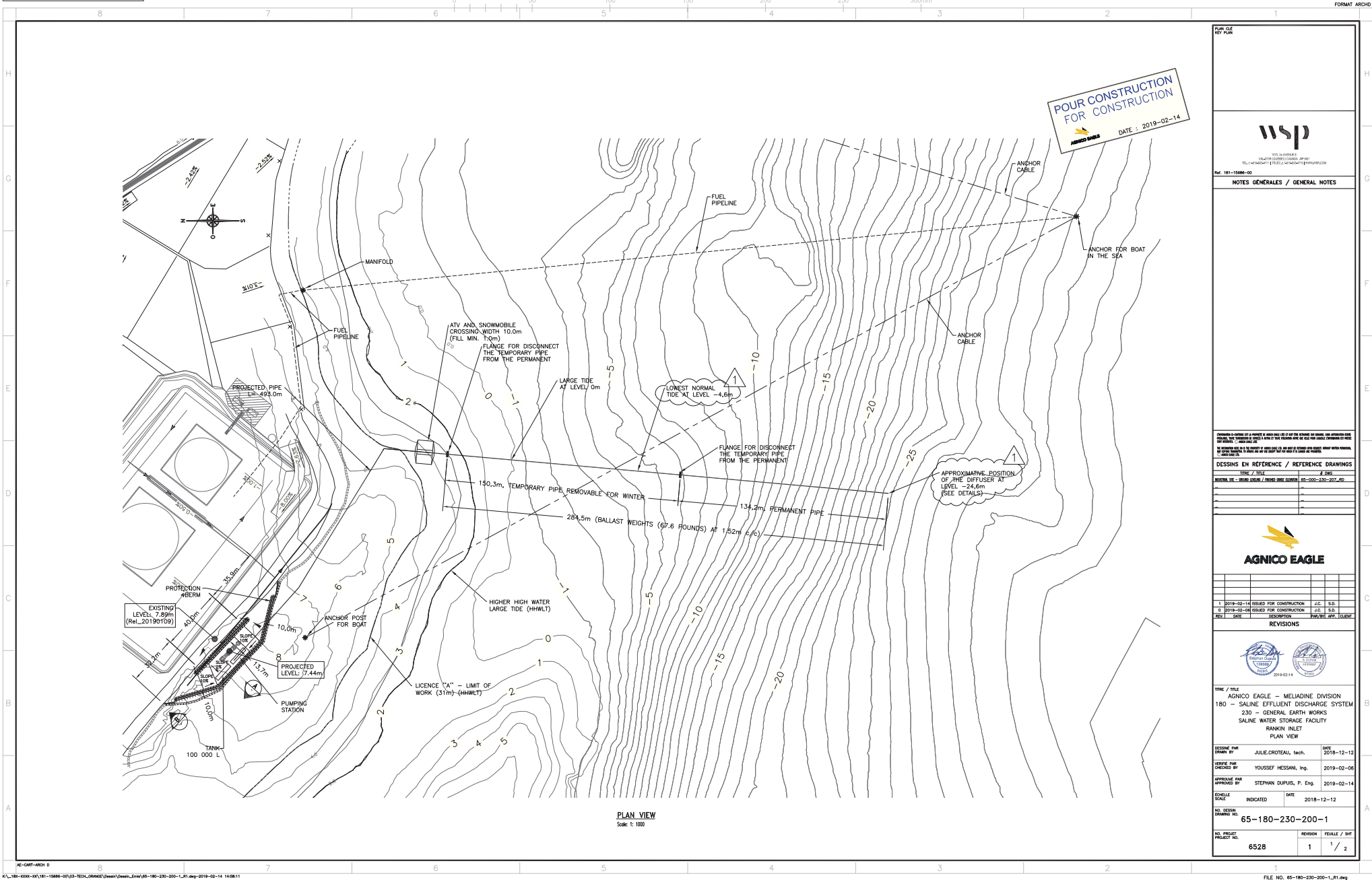
Agnico Eagle. 2018a. Meliadine Gold Project Groundwater Management Plan. Version 1. February 2018.

Golder. 2019. Modelling Assessment of Groundwater Discharge into the Melvin Bay Marine Environment, Rev B. February 2019.

Agnico Eagle (Agnico Eagle Mines Limited). 2014. Final Environmental Impact Statement (FEIS) - Meliadine Gold Project, Nunavut from:
<ftp://ftp.nirb.ca/02REVIEWS/ACTIVE%20REVIEWS/11MN034-AgnicoEagle%20MELIADINE/2-REVIEW/09-FINAL%20EIS/FEIS> Accessed on November 2014.

Agnico Eagle. 2018b. Meliadine Gold Project Water Management Plan. Version 3. 6513-MPS-11. March 2018.

Appendix A: Construction drawings





Scale: 1: 100

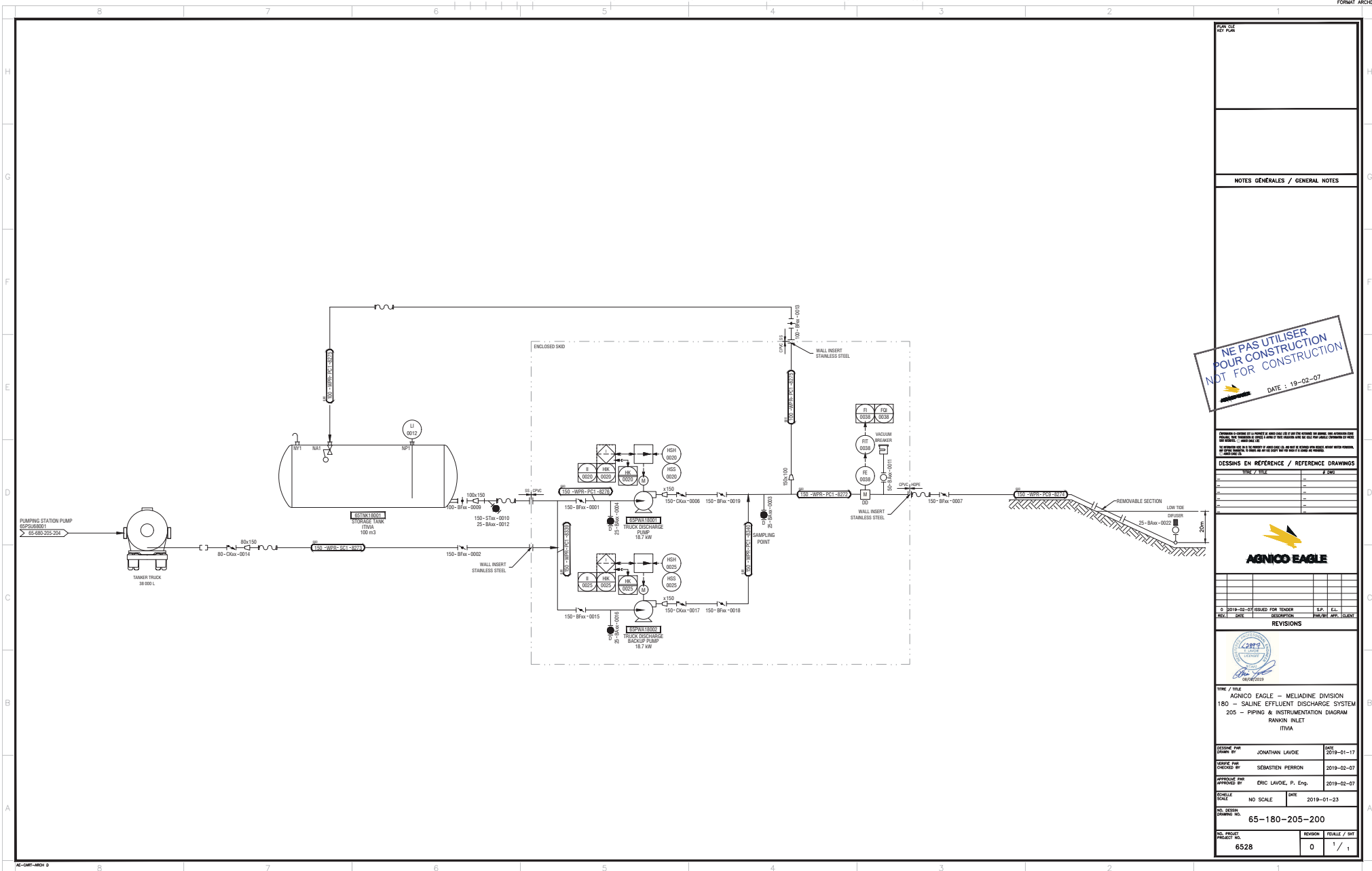


Scale: 1: 20

Scale: NONE



- THE PIPELINE IS LOCATED WITHIN THE PRESCRIBED RIGHT-OF-WAY;
- THE BALLASTS HOLDING THE PIPELINE ARE ALL PROPERLY SITTING ON THE BOTTOM CONTOUR AND THAT THE LINE IS NOT FORCED TO BRIDGE ANY CHANGES IN ELEVATION;
- THE PIPE IS NOT RESTING ON ANY ROCKS, DEBRIS OR MATERIAL THAT COULD CAUSE DAMAGE;
- ANY AUXILIARY LINES, SUCH AS HOSES, ROPES, BUOYANCY BLOCKS OR ANY OTHER EQUIPMENT USED DURING THE INSTALLATION HAS BEEN REMOVED;
- WHERE REQUIRED THE PIPE HAS BEEN BACKFILLED AND THE BACKFILLING WAS DONE PROPERLY;
- ALL OTHER INSTALLATION REQUIREMENTS ESTABLISHED BY THE DESIGNER FOR THE SUBJECT APPLICATION HAVE BEEN COMPLIED WITH.



PUMP CEE
NET PLAN

NOTES GÉNÉRALES / GENERAL NOTES

NE PAS UTILISER
POUR CONSTRUCTION
NOT FOR CONSTRUCTION
DATE: 19-02-07

DESIGNS EN REFERENCE / REFERENCE DRAWINGS

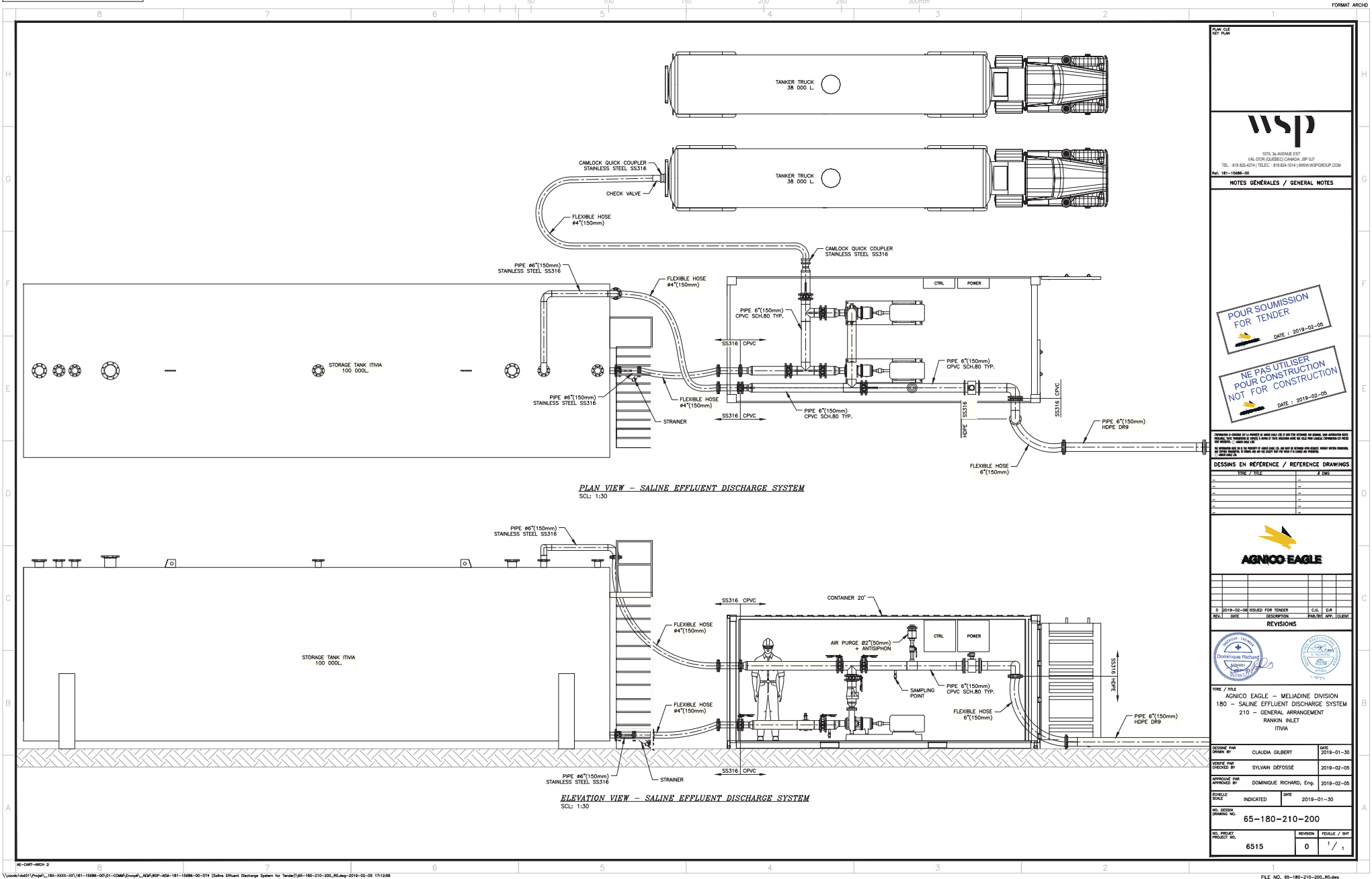
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NO.	DATE	DESCRIPTION	DESIGNED BY	CHECKED BY
1	2019-02-07	ISSUED FOR TENDER	S.P.	E.L.
2				
3				
4				
5				



AGNICO EAGLE - MELIADINE DIVISION
180 - SALINE EFFLUENT DISCHARGE SYSTEM
205 - PIPING & INSTRUMENTATION DIAGRAM
RANKIN INLET
ITIVA

DESIGNED BY	DATE
JONATHAN LAVOIE	2019-01-17
CHECKED BY	DATE
SEBASTIEN PERRON	2019-02-07
APPROVED BY	DATE
ERIC LAVOIE, P. Eng.	2019-02-07
SCALE	DATE
NO SCALE	2019-01-23
NO. DESIGN DRAWING NO.	NO. DESIGN PROJECT NO.
65-180-205-200	6528
REVISION / SHEET	NO. DESIGN PROJECT NO.
0	1 / 1



wsp
1075, 36 AVENUE EST
VAL-D'OR (QUÉBEC) CANADA J9P 6J7
TEL : 819 855-4274 / TÉLÉC. : 819 854-1514 / WWW.WSPGROUP.COM
Fax: 819-1588-00

NOTES GÉNÉRALES / GENERAL NOTES

**POUR SOUMISSION
FOR TENDER**
DATE : 2019-02-05

**NE PAS UTILISER
POUR CONSTRUCTION
NOT FOR CONSTRUCTION**
DATE : 2019-02-05

AGNICO EAGLE

REVISIONS

NO.	DATE	DESCRIPTION	PREPARE	APPROVED
1	2019-02-05	ISSUED FOR TENDER	C.G.	S.G.

TIME / HOURS
AGNICO EAGLE - MELIADINE DIVISION
180 - SALINE EFFLUENT DISCHARGE SYSTEM
210 - GENERAL ARRANGEMENT
RANKIN INLET
ITIVA

DESIGNER	DATE
CLAUDIA GILBERT	2019-01-30

DESIGNER	DATE
SYLVAIN D'ORSSE	2019-02-05

APPROVED BY	DATE
DOMINIQUE RICHARD, Eng.	2019-02-05

SCALE	DATE
INDICATED	2019-01-30

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Appendix B: Pumping Station Functional Description

Functional Description

Saline Effluent Discharge at Sea

6528-680-132-REP-001 – Appendix 2

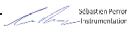
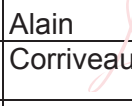

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2019-02-14	R0	Design Report	Sébastien Perron	Alain Corriveau	Éric Lavoie
Date	Rev.	Status	Prepared By	Checked By	Accepted By



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1. Document objective

This document describes the programming of the control logic to be implemented for the control system of the discharging at sea of the treated saline effluent water coming from Meliadine site. The system will be installed close to the existing fuel deposit in Rankin Inlet, near the shore of Melvin Bay. The project is for Agnico Eagle's Meliadine mine.

2. Description

2.1 System description – Saline water truck unloading, storage and discharge at sea

Truck loaded with up to 50 000 liters of treated water ready to discharge at the sea will connect their load to a flexible pipe 150mm in diameter. Once connected, the operator will turn on the pump for about 15 to 30 minutes to transfer the water into a 100 000 liters storage tank or by changing the manual valves, directly to the diffuser in the sea. Overflow of the tank will be prevented by a float valve on the filling port. A mechanical level indicator will be installed on the tank. A flowmeter/totalizer will be installed on the sea discharge line in order to double check the volume of water discharged in sea.

The system will be powered by the existing electrical room at the fuel deposit.

2.2 Control description – Saline water truck unloading pump

Start/Emergency Stop button stations will be installed near the pumps.

Operator will open and close the valves in order to choose:

1. Main Pump or Back up Pump
2. Unload truck to tank, unload truck to sea or unload tank to sea

END OF SECTION

Appendix C: Sclairpipe Technical Specification

uponor

Sclairpipe[®]

VERSATILE HIGH DENSITY
POLYETHYLENE PIPE



Sclairpipe

Sclairpipe® high density polyethylene (HDPE) pipe represents the latest advances in both material and manufacturing techniques. Since 1968, Sclairpipe has been proven in a

wide range of municipal and industrial piping applications. It has been used extensively in the municipal market for gravity sewers, sewage forcemains, and pressure water systems. Uponor

Infra has special expertise in marine installations of Sclairpipe, including river and lake crossings; and river, lake and deep ocean intakes and outfalls.

Lighter. Stronger. Chemical Resistant.

Sclairpipe is a tough, lightweight, solid wall pipe with a smooth internal surface. Available in various diameters from 4" to 48" it can handle internal pressures of up to 380 psi (PE 4710). It is a well suited alternative to copper, PVC, ductile iron and concrete pipe in a variety of applications.

Sclairpipe weighs approximately 1/10 that of a similar sized concrete pipe. Handling requires a minimum of heavy equipment and Sclairpipe can easily be assembled on ice or through wet marshy areas. It will not corrode, tuberculate or support biological growth, making it the material of

choice in harsh environments. Sclairpipe is inert to salt water and to chemicals likely to be present in sanitary sewage effluent.

Sclairpipe has a smooth ID and maintains its flow capability over time - Hazen Williams C Factor remains 150, even after years of use.

Easier to Transport and Install. Leak Proof.

Sclairpipe is much easier to handle and install than heavier, rigid concrete pipe, offering potential cost savings during the construction process. It is

structurally designed to withstand impact, especially in cold weather installations when other pipes are prone to cracks and breaks. Sclairpipe will float

even when full of water. For marine applications long lengths of pipe can be assembled on shore and then floated into position.





Thermal butt fusion provides an economical and fast method of delivering a complete, long, continuous length of pipe. Thermal fusion eliminates potential leak points every 8-20 feet commonly found with gasketed (or bell or spigot) pipe materials. The fused joints provide a continuous leak proof

system that eliminates the risk of joint leakage due to ground shifting. Fused joints are fully restrained and as such may reduce or eliminate the need for expensive thrust blocks. With Sclairpipe infiltration and exfiltration problems are eliminated.

Sclairpipe Advantages

- Leak Proof
- Corrosion Resistant
- Chemical Resistant
- Long Life
- Fatigue Resistant
- Impact Resistant
- Lightweight
- Flexible
- UV Resistant
- Environmentally Friendly

Cost Effective. Permanent.

Sclairpipe offers distinct advantages. It can be cold bent to a radius as small as 25 times the pipe's nominal pipe diameter, and the installed bend radius can be as small as 50 times the nominal pipe diameter. Sclairpipe, installed on a radius, eliminates many of the fittings that would be required for directional changes when using

other pipe materials. In addition, the flexibility of Sclairpipe allows it to adapt to uneven ground, unconsolidated river bottoms and excavated underwater trenches without the need for expensive foundations or minor degree elbows. It is well suited for dynamic soils and areas prone to earthquake.

Sclairpipe is cost effective in both the short and long term. The fact that it is lightweight makes it easier to transport and install. It is leak proof and fatigue resistant means there will be years of maintenance free use. The Plastics Pipe Institute estimates the service life for HDPE pipe to conservatively be 50-100 years.

Proven performance in a wide range of applications

Since its development in 1955, large diameter HDPE pipe has been successfully used in many installations worldwide. In North America, Sclairpipe high density polyethylene pipe was first introduced in 1968. Since then it

has been installed for river, lake and salt water crossings, municipal and industrial fresh and salt water intakes and effluent outfalls. Sclairpipe has also been used extensively for pipeline repair and rehabilitation.

Some popular applications of Sclairpipe include:

- Potable Water Distribution
- Pressure Water Systems
- Sewage Systems
- Water Mains
- Sliplining
- Fire Mains
- Directional Drilling
- Trenchless Technologies
- Slurry Pipe
- Mining
- Marine Pipelines & Crossings
- Deep Water Intakes
- Deep Water Outfalls
- Irrigation Lines
- Biofilters
- Gas Gathering



Potable Water

Sclairpipe is used for both new water main installations and to rehabilitate deteriorated piping systems made from other materials. It can accept repetitive pressure surges that far exceed the static pressure rating of the pipe. Sclairpipe is easy to handle and is available in long lengths that cut down on jointing time. Thermal fusion on site reduces installation time and ensures leakproof joints that eliminate infiltration and exfiltration problems. Sclairpipe is well suited for dynamic soils and areas prone to earthquake.



Sewage Systems

After more than 35 years of use in municipal and industrial sewer applications, Sclairpipe has proven to be a reliable, cost effective, long-term solution for sewer and wastewater systems. It offers resistance to corrosion and chemicals with durability and strength that rigid concrete, PVC or ductile iron pipes can't duplicate. Lightweight Sclairpipe is easy-to-install, extremely flexible and does not corrode or tuberculate over time.



Industry

Long-term reliable piping solutions are always in demand by industry. Sclairpipe offers resistance to corrosion, abrasion and chemicals resulting in a durable, strong and cost-effective installation.



Mining

Sclairpipe solid wall HDPE pipe is commonly used in mining applications for tailings disposal and water management including: river water diversion, reclamation lines, culvert, sewer and sub-drainage systems and slurry pipe. It is lightweight, flexible, durable and abrasion resistant. It is virtually leak proof, and can withstand corrosive chemicals, acids or salts commonly found in mines. Sclairpipe combines strength and durability in above ground applications and is UV resistant.



Irrigation

Sclairpipe is a cost effective solution for irrigation and agricultural drainage applications such as river and canal diversion, agricultural irrigation systems and pipelines, and water conservation. It is lightweight, flexible and leak proof, resistant to corrosion and salt water, and joints can be heat-fused on site for ease of installation. A Sclairpipe irrigation system will withstand the test of time.



Heating & Cooling

Sclairpipe has proven to be a strong, leak proof and chemically inert solution for district cooling applications including dual-purpose projects providing cooling and potable water. It can be assembled on shore in a continuous flexible length, floated on the water's surface and then sunk by a controlled process. The pipe can also be manufactured in specific lengths and connected on site by flanges with the aid of marine divers. Sclairpipe's resistance to both corrosion and zebra mussel fouling makes it an ideal solution.



Choose the size that's right for you

Sclairpipe is available in standard Dimensional Ratio's (DR's), in sizes ranging from 4" to 48" in diameter. Sclairpipe is available in PE 3608 and PE 4710. With the higher allowable stress rating of PE 4710, the pipe wall can be thinner for the same pressure

rating (higher DR).

The Dimensional Ratio relates the minimum wall thickness of the pipe to its outside diameter, and is important to define the pressure rating of a particular pipe. The maximum continuous operating pressure stated is

based on the allowable hydrostatic design stress of each specific material (per ASTM D3350 and PPI's TR-3), and the pipe wall thickness (DR), at a service temperature of 73.4°F.

Uponor, Sclairpipe Product Range, IPS Size, PE3608												
Nominal Pipe Size	PE3608			DR32.5 (50 psi)			DR26 (64 psi)			DR21 (80 psi)		
	Minimum Outside Diameter (inches)	Maximum Outside Diameter (inches)	Average Outside Diameter (inches)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)
4	4.48	4.52	4.50	4.21	0.138	0.83	4.13	0.173	1.03	4.05	0.214	1.26
5	5.54	5.59	5.56	5.20	0.171	1.27	5.11	0.214	1.57	5.00	0.265	1.93
6	6.60	6.65	6.63	6.19	0.204	1.80	6.08	0.255	2.23	5.96	0.315	2.73
7	7.09	7.16	7.13	6.66	0.219	2.08	6.54	0.274	2.58	6.41	0.339	3.16
8	8.59	8.66	8.63	8.06	0.265	3.05	7.92	0.332	3.78	7.75	0.411	4.63
10	10.70	10.80	10.75	10.05	0.331	4.74	9.87	0.413	5.87	9.66	0.512	7.19
12	12.69	12.81	12.75	11.92	0.392	6.66	11.71	0.490	8.26	11.46	0.607	10.12
13	13.31	13.44	13.38	12.50	0.412	7.33	12.28	0.514	9.09	12.02	0.637	11.14
14	13.94	14.06	14.00	13.09	0.431	8.03	12.86	0.538	9.95	12.59	0.667	12.20
16	15.93	16.07	16.00	14.96	0.492	10.49	14.70	0.615	13.00	14.38	0.762	15.94
18	17.92	18.08	18.00	16.83	0.554	13.28	16.53	0.692	16.46	16.18	0.857	20.17
20	19.91	20.09	20.00	18.70	0.615	16.39	18.37	0.769	20.32	17.98	0.952	24.90
22	21.90	22.10	22.00	20.56	0.677	19.83	20.21	0.846	24.58	19.78	1.048	30.13
24	23.89	24.11	24.00	22.43	0.738	23.60	22.04	0.923	29.25	21.58	1.143	35.85
26	25.88	26.12	26.00	24.30	0.800	27.70	23.88	1.000	34.33	23.38	1.238	42.08
28	27.87	28.13	28.00	26.17	0.862	32.13	25.72	1.077	39.82	25.17	1.333	48.80
30	29.87	30.14	30.00	28.04	0.923	36.88	27.55	1.154	45.71	26.97	1.429	56.02
32	31.86	32.14	32.00	29.91	0.985	41.96	29.39	1.231	52.01	28.77	1.524	63.74
36	35.84	36.16	36.00	33.65	1.108	53.11	33.06	1.385	65.82	32.37	1.714	80.67
40	39.82	40.18	40.00	37.39	1.231	65.56	36.74	1.538	81.26	35.96	1.905	99.59
42	41.81	42.19	42.00	39.26	1.292	72.28	38.58	1.615	89.59	37.76	2.000	109.80
48	47.78	48.22	48.00	44.87	1.477	94.41	44.09	1.846	117.02	43.15	2.286	143.42

Pipe dimensions are in accordance with ASTM F714 and AWWA C906

Pressure Ratings are for water at 73.4 deg F.

Some of the pipe sizes and DR's above are available only on request. Check with your representative for availability.

Other dimensions and DR's not listed may be available upon special request.

All dimensions are in inches unless otherwise noted.

Weights are calculated by the methodology established in PPI's TR-7 and are applicable to PE 3608.

The standard stocked length of Sclairpipe pipe is 50 feet, in sizes above 4" in diameter with longer lengths available on request.

Please visit our web site (www.uponor.ca) and use our online design tools to determine the pipe size best suited to your specific application.

DR17 (100 psi)			DR13.5 (128 psi)			DR11 (160 psi)			DR9 (200 psi)			DR7.3 (254 psi)		
Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)
3.94	0.265	1.54	3.79	0.333	1.90	3.63	0.409	2.29	3.44	0.500	2.73	3.19	0.616	3.26
4.87	0.327	2.35	4.69	0.412	2.91	4.49	0.506	3.50	4.25	0.618	4.18	3.95	0.762	4.99
5.80	0.390	3.33	5.58	0.491	4.12	5.35	0.602	4.96	5.06	0.736	5.92	4.70	0.908	7.08
6.24	0.419	3.85	6.01	0.528	4.77	5.75	0.648	5.74	5.45	0.792	6.85	5.06	0.976	8.18
7.55	0.507	5.65	7.27	0.639	6.99	6.96	0.784	8.41	6.59	0.958	10.04	6.12	1.182	11.99
9.41	0.632	8.77	9.06	0.796	10.86	8.68	0.977	13.07	8.22	1.194	15.59	7.63	1.473	18.63
11.16	0.750	12.34	10.75	0.944	15.28	10.29	1.159	18.38	9.75	1.417	21.94	9.05	1.747	26.21
11.71	0.787	13.58	11.27	0.991	16.81	10.80	1.216	20.23	10.22	1.486	24.14	9.49	1.832	28.84
12.25	0.824	14.88	11.80	1.037	18.42	11.30	1.273	22.17	10.70	1.556	26.45	9.93	1.918	31.60
14.00	0.941	19.44	13.49	1.185	24.06	12.92	1.455	28.95	12.23	1.778	34.55	11.35	2.192	41.27
15.76	1.059	24.60	15.17	1.333	30.45	14.53	1.636	36.64	13.76	2.000	43.72	12.77	2.466	52.23
17.51	1.176	30.37	16.86	1.481	37.59	16.15	1.818	45.24	15.29	2.222	53.98	14.19	2.740	64.48
19.26	1.294	36.75	18.55	1.630	45.48	17.76	2.000	54.74	16.82	2.444	65.31	15.61	3.014	78.02
21.01	1.412	43.74	20.23	1.778	54.13	19.37	2.182	65.14	18.35	2.667	77.73	17.03	3.288	92.85
22.76	1.529	51.33	21.92	1.926	63.52	20.99	2.364	76.45	19.88	2.889	91.22	18.45	3.562	108.97
24.51	1.647	59.53	23.60	2.074	73.67	22.60	2.545	88.66	21.40	3.111	105.80	19.87	3.836	126.38
26.26	1.765	68.34	25.29	2.222	84.57	24.22	2.727	101.78	22.93	3.333	121.45			
28.01	1.882	77.75	26.97	2.370	96.22	25.83	2.909	115.80	24.46	3.556	138.19			
31.51	2.118	98.41	30.35	2.667	121.78	29.06	3.273	146.57						
35.01	2.353	121.49	33.72	2.963	150.35	32.29	3.636	180.95						
36.76	2.471	133.94	35.40	3.111	165.76	33.91	3.818	199.49						
42.01	2.824	174.94	40.46	3.556	216.50									

Sclair IPS Cut Sheet_PE3608_r201407

- All dimensions are in inches unless otherwise specified.
- Pressure ratings are based on load durations of 50 years at a service temperature of 73.4F. The HDS (pipe wall allowable stress) for PE 3608 and PE 4710 are 800 psi and 1,000 psi respectively.
- Dimensions and tolerances per ASTM F714. Pipe weights calculated using PPI TR-7 using PE3608 density of 0.953 gm/cc and 0.958 gm/cc for PE4710 materials.
- The ASTM D3350 cell classifications conform to the requirements of the applicable pipe specification (ASTM F714, AWWA C906, etc.).
- Contact Uponor Infra for sizes, DR's and DIPS offering not shown.

Uponor, Sclairpipe Product Range, IPS Size, PE4710

Nominal Pipe Size	PE4710			DR32.5 (64 psi)			DR26 (80 psi)			DR21 (100 psi)		
	Minimum Outside Diameter (inches)	Maximum Outside Diameter (inches)	Average Outside Diameter (inches)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)
4	4.48	4.52	4.50	4.21	0.138	0.840	4.13	0.173	1.030	4.05	0.214	1.27
5	5.54	5.59	5.56	5.20	0.171	1.280	5.11	0.214	1.580	5.00	0.265	1.94
6	6.60	6.65	6.63	6.19	0.204	1.81	6.08	0.255	2.24	5.96	0.315	2.75
7	7.09	7.16	7.13	6.66	0.219	2.09	6.54	0.274	2.59	6.41	0.339	3.18
8	8.59	8.66	8.63	8.06	0.265	3.07	7.92	0.332	3.80	7.75	0.411	4.66
10	10.70	10.80	10.75	10.05	0.331	4.77	9.87	0.413	5.91	9.66	0.512	7.24
12	12.69	12.81	12.75	11.92	0.392	6.70	11.71	0.490	8.31	11.46	0.607	10.18
13	13.31	13.44	13.38	12.50	0.412	7.38	12.28	0.514	9.14	12.02	0.637	11.21
14	13.94	14.06	14.00	13.09	0.431	8.08	12.86	0.538	10.02	12.59	0.667	12.28
16	15.93	16.07	16.00	14.96	0.492	10.56	14.70	0.615	13.08	14.38	0.762	16.04
18	17.92	18.08	18.00	16.83	0.554	13.36	16.53	0.692	16.56	16.18	0.857	20.29
20	19.91	20.09	20.00	18.70	0.615	16.49	18.37	0.769	20.44	17.98	0.952	25.06
22	21.90	22.10	22.00	20.56	0.677	19.96	20.21	0.846	24.74	19.78	1.048	30.32
24	23.89	24.11	24.00	22.43	0.738	23.75	22.04	0.923	29.44	21.58	1.143	36.08
26	25.88	26.12	26.00	24.30	0.800	27.87	23.88	1.000	34.55	23.38	1.238	42.34
28	27.87	28.13	28.00	26.17	0.862	32.33	25.72	1.077	40.07	25.17	1.333	49.11
30	29.87	30.14	30.00	28.04	0.923	37.11	27.55	1.154	46.00	26.97	1.429	56.37
32	31.86	32.14	32.00	29.91	0.985	42.22	29.39	1.231	52.34	28.77	1.524	64.14
36	35.84	36.16	36.00	33.65	1.108	53.44	33.06	1.385	66.24	32.37	1.714	81.18
40	39.82	40.18	40.00	37.39	1.231	65.98	36.74	1.538	81.77	35.96	1.905	100.22
42	41.81	42.19	42.00	39.26	1.292	72.74	38.58	1.615	90.16	37.76	2.000	110.49
48	47.78	48.22	48.00	44.87	1.477	95.01	44.09	1.846	117.76	43.15	2.286	144.32

Pipe dimensions are in accordance with ASTM F714 and AWWA C906

Pressure Ratings are for water at 73.4 deg F.

Some of the pipe sizes and DR's above are available only on request. Check with your representative for availability.

Other dimensions and DR's not listed may be available upon special request.

All dimensions are in inches unless otherwise noted.

Weights are calculated by the methodology established in PPI's TR-7 and are applicable to PE4710

Product innovation and quality assurance

For 50 years Uponor Infra has been a leader in the design, development, manufacture and support of polyethylene piping systems. Uponor Infra's experienced engineers can offer design and engineering assistance, assuring you of a dependable piping system designed to meet your needs. Visit our website (www.uponor.ca) and see how our innovative online calculator can assist you. Extensive R&D in the early 1960's led us to produce 16" diameter polyethylene pipe at a time when many considered large diameter polyethylene pipes a

technical impossibility. Today Uponor Infra produces solid wall Sclairpipe in sizes up to 48".

All Uponor Infra products are manufactured from special, high strength resins with complete quality control maintained from raw material to finished pipe product. Uponor Infra was the first North American manufacturer of polyethylene pipe and fittings to have its Quality Management System registered to the ISO 9001:2008 level.

Our strict manufacturing specifications are verified daily,

using precise dimensional controls and accelerated long term hydrostatic testing. A continuous quality control process assures you of long-term pipe performance. We certify that the pipe resin used to extrude Sclairpipe has a minimum cell classification of PE 345464C or PE445474C respectively, when classified in accordance with ASTM D3350. Sclairpipe's material classification is based on PPI's (Plastic Pipe Institute) method of determining and validating the Long-Term Hydrostatic Stress (LTHS) of polyethylene pipe.

DR17 (125 psi)			DR13.5 (160 psi)			DR11 (200 psi)			DR9 (250 psi)			DR7.3 (317 psi)		
Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)	Average Inside Diameter (inches)	Minimum Wall Thickness (inches)	Average Weight (lbs/ft)
3.94	0.265	1.55	3.79	0.333	1.91	3.63	0.409	2.30	3.44	0.500	2.75	3.19	0.616	3.28
4.87	0.327	2.36	4.69	0.412	2.93	4.49	0.506	3.52	4.25	0.618	4.20	3.95	0.762	5.02
5.80	0.390	3.35	5.58	0.491	4.15	5.35	0.602	4.99	5.06	0.736	5.96	4.70	0.908	7.12
6.24	0.419	3.88	6.01	0.528	4.80	5.75	0.648	5.78	5.45	0.792	6.89	5.06	0.976	8.23
7.55	0.507	5.68	7.27	0.639	7.03	6.96	0.784	8.47	6.59	0.958	10.10	6.12	1.182	12.07
9.41	0.632	8.83	9.06	0.796	10.93	8.68	0.977	13.15	8.22	1.194	15.69	7.63	1.473	18.75
11.16	0.750	12.42	10.75	0.944	15.37	10.29	1.159	18.50	9.75	1.417	22.08	9.05	1.747	26.37
11.71	0.787	13.67	11.27	0.991	16.92	10.80	1.216	20.36	10.22	1.486	24.29	9.49	1.832	29.02
12.25	0.824	14.98	11.80	1.037	18.53	11.30	1.273	22.31	10.70	1.556	26.62	9.93	1.918	31.79
14.00	0.941	19.56	13.49	1.185	24.21	12.92	1.455	29.13	12.23	1.778	34.76	11.35	2.192	41.53
15.76	1.059	24.76	15.17	1.333	30.64	14.53	1.636	36.87	13.76	2.000	44.00	12.77	2.466	52.56
17.51	1.176	30.56	16.86	1.481	37.82	16.15	1.818	45.52	15.29	2.222	54.32	14.19	2.740	64.89
19.26	1.294	36.98	18.55	1.630	45.77	17.76	2.000	55.08	16.82	2.444	65.72	15.61	3.014	78.51
21.01	1.412	44.01	20.23	1.778	54.47	19.37	2.182	65.55	18.35	2.667	78.22	17.03	3.288	93.44
22.76	1.529	51.65	21.92	1.926	63.92	20.99	2.364	76.93	19.88	2.889	91.80			
24.51	1.647	59.90	23.60	2.074	74.13	22.60	2.545	89.22	21.40	3.111	106.46			
26.26	1.765	68.77	25.29	2.222	85.10	24.22	2.727	102.42	22.93	3.333	122.22			
28.01	1.882	78.24	26.97	2.370	96.83	25.83	2.909	116.53						
31.51	2.118	99.02	30.35	2.667	122.55	29.06	3.273	147.49						
35.01	2.353	122.25	33.72	2.963	151.29									
36.76	2.471	134.78	35.40	3.111	166.80									
42.01	2.824	176.04												

Uponor_Sclair_IPS_PE4710_r201407

Innovative joining methods and equipment

Sclairpipe piping systems can be assembled by heat fusion (butt, electrofusion, socket and saddle fusion), flanged connections, compression couplings and various mechanical couplings. The superior performance of Sclairpipe results from the combination of pipe and fittings designed to work together as a complete system. A full range of pressure rated fittings is available to suit any application.

The most popular method of joining Sclairpipe is thermal butt fusion. This fast and economical technique permits the quick assembly of long continuous lengths and the joining of fittings to the pipe. The fused joints are as reliable and strong as the pipe itself, fully restrained, providing continuous leak proof systems.

Ordering & shipping information

Uponor Infra welcomes your inquiries for non-standard sizes, lengths and pressure ratings of Sclairpipe pipe.

We can meet most special packaging requirements and provide custom pipe fittings. Please contact your local Uponor Infra representative or visit our web site.

The charts below outline standard shipment sizes for straight length and coiled pipe.

Standard Shipments - Straight Lengths

IPS PIPE				
PIPE SIZE	AVG OD	BUNDLE QTY	TRUCK LOAD QTY	CONTAINER QTY
4"	4.50	38	380	480
5"	5.563	23	276	320
6"	6.625	20	200	208
7"	7.125	17	136	180
8"	8.625	14	112	120
10"	10.750	11	66	80
12"	12.750	4	56	52
13"	13.375	42		48
14"	14.000	42		42
16"	16.000	30		30
18"	18.000	25		25
20"	20.000	20		20
22"	22.000	16		16
24"	24.000	16		14
26"	26.000	9		9
28"	28.000	9		9
30"	30.000	9		9
800mm	31.594	9		9
32"	32.000	9*		8
36"	36.000	4		6
1000mm	39.469	4		4
42"	42.000	4		4
1200mm	47.382	4		3
48"	48.000	4*		3

Notes:

* Bunks required

** Drop deck trailer - maximum 42' length
Pipe lengths range from 40 to 50 feet in size



Scclairpipe general specifications & material standards

Pipe and Fittings

REFERENCE SPECIFICATIONS

ASTM F714: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR). Based on outside diameter.
CSA B137.1: Polyethylene Pipe, Tubing and Fittings for Cold Water Pressure Services.
ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
AWWA C901: Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. Through 3 in. for Water Service.
ASTM D3035: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR). Based on Controlled Outside Diameter
ISO 9001:2008: Model for Quality Assurance in Production and Installation.
AWWA C906: Standard for Polyethylene (PE) Pressure Pipe and Fittings 4 in. Through 63 in., for Water Distribution.NSF 14, 61

MATERIAL

The pipe shall be made from polyethylene resin compound with a minimum cell classification of PE 345464C for PE 3608 materials and PE445474C for PE 4710 materials in accordance with ASTM D3350. This material shall have a Long Term Hydrostatic Strength of 1600 psi when tested and analyzed by ASTM D2837, and shall be a Plastic Pipe Institute (PPI) TR4 listed compound. The raw material shall contain a minimum of 2%, well dispersed, carbon black. Additives, which can be conclusively proven not to be detrimental to the pipe may also be used, provided that the pipe produced meets the requirements of this standard. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification and from the same raw material supplier. Compliance with the requirements of this paragraph shall be certified in writing by the pipe supplier, upon request. Manufacturer's Quality System shall be certified by an appropriate independent body to meet the requirements of the ISO 9001:2008 Quality Management Program.

PIPE DESIGN

The pipe shall be designed in accordance with the relationships of the ISO-modified formula (see ASTM F714).

$$P = \frac{2S}{(D^o/t) - 1}$$

where, **S** = Hydrostatic Design Stress (psi)
P = Design Pressure Rating (psi)
D° = ODavg for IPS Pipe
ODmin for ISO Pipe
t = Minimum Wall Thickness
D°/t = Dimension Ratio

The design pressure rating P shall be derived using the formula above, expressed in pounds per square inch.
The Hydrostatic Design Stress for PE 3608 materials is 800 psi and for the PE4710 materials is 1000 psi.
The pipe dimensions shall be as specified in manufacturer's literature.

MARKING

The following shall be continuously printed on the pipe or spaced at intervals not exceeding 5 feet:
Name and/or trademark of the pipe manufacturer.
Nominal pipe size.
Dimension ratio.
The letters PE followed by the polyethylene grade per ASTM D3350, followed by the Hydrostatic Design stress in 100's of psi e.g. PE 3608.
Manufacturing Standard Reference e.g. ASTM F 714
A production code from which the date and place of manufacture can be determined.

JOINING METHODS

Whenever possible, polyethylene pipe should be joined by the method of thermal butt fusion as outlined in ASTM F2620, Standard Practice for Heat Fusion Joining of PE Pipe and Fittings. Butt fusion joining of pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer. The temperature of the heater plate should be between 400°F and 450°F. Follow the recommendations of ASTM F2620 regarding interfacial pressures for pipe wall thickness less than or equal to 1.5". Follow the manufacturer's recommendations regarding interfacial pressures for pipe walls thicker than 1.5".

Polyethylene pipe may be connected to fittings or other piping systems by means of a flanged assembly consisting of a polyethylene flange adapter or stub end, and a metal backup ring that has a bolting pattern meeting the dimensional requirements of Class 150, ANSI B16.1/B16.5 in sizes up through 24", and meeting Class 150 Series A, ANSI B16.47 or AWWA C207 Class B for larger sizes. Follow the manufacturer's recommendations regarding bolting techniques and the use of gaskets. Pipe or fittings may be joined by butt fusion only by technicians who have been trained and qualified in the use of the equipment.

GENERAL REQUIREMENTS

The pipe manufacturer shall provide, upon request, an outline of quality control procedures performed on polyethylene system components.

Uponor Infra Ltd.
6507 Mississauga Rd.
Mississauga ON L5N 1A6
Canada
Tel: 1-866-594- 7473
Fax: (905)-858-0208
Web: www.uponor.ca
E-mail: nainfra-sales@uponor.com

uponor

**Appendix D: Modelling Assessment of Groundwater Discharge into Melvin Bay
Marine Environment, Rev B (Golder, 2019)**

TECHNICAL MEMORANDUM

DATE February 1, 2019 **Project No.** Doc718_1773384 _Rev0

TO Manon Turmel
Agnico Eagle Mines Ltd.

CC Ryan Vanengen, Carolina Leseigneur Torres

FROM Shouhong Wu and Bruce Dean, Golder Associates Ltd. **EMAIL** bruce_dean@golder.com

MODELLING ASSESSMENT OF GROUNDWATER DISCHARGE INTO THE MELVIN BAY MARINE ENVIRONMENT, REV B

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Agnico Eagle Mines Limited (Agnico Eagle) to undertake a modelling assessment of groundwater discharge into the marine environment near Rankin Inlet. This modelling assessment consisted of nearshore oceanographic modelling of the discharge. The study did not include geotechnical, structural or hydraulic engineering assessments of the outfall. This technical memorandum was updated to account for an additional modelling scenario and updated baseline data collected by Golder from Melvin Bay in September 2018 as well as to account for increased discharge velocity resulting from a change to the diffuser port size. This memorandum should be read in conjunction with "Important Information and Limitations of this Report".

1.1 Scope of Work

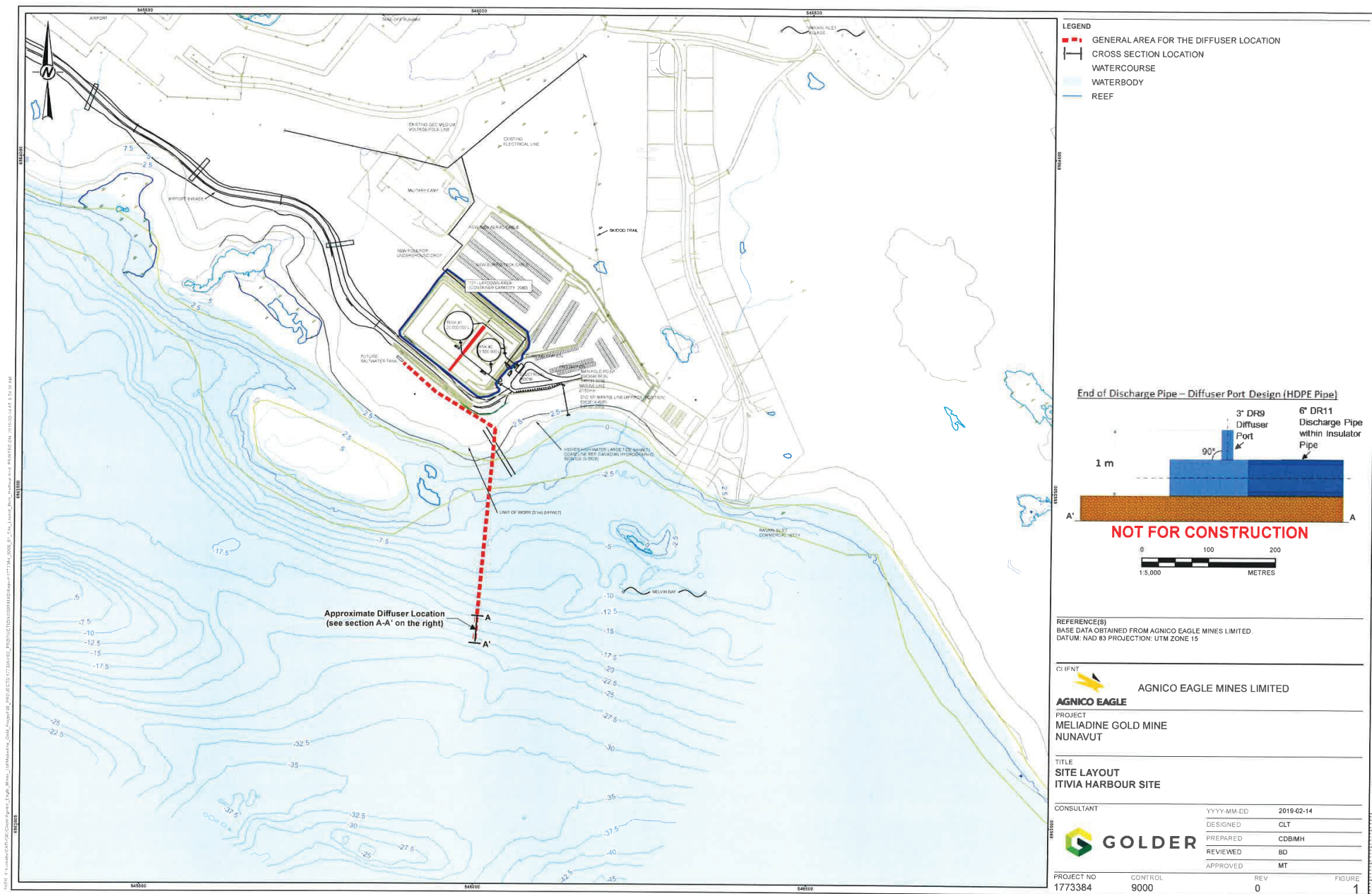
The objective of this work is to assess the near field mixing of the treated groundwater effluent disposal with respect to relevant environmental guidelines. The scope of the work includes:

- Near field modelling of dispersion of treated groundwater effluent plume using CORMIX (Doneker and Jirka 2007).
- Assess the plume dilution behavior.

For the purpose of this scope of this work, it is assumed that the discharges will consists of only pumped water at quantities and qualities per the estimated underground inflow volumes (Golder 2016) and estimated groundwater inputs to surface storage for management (Agnico Eagle 2017). Section 2.1 describes the modelling conditions.

1.2 Physical Setting

In September 2018, a field program was conducted by Golder in Melvin Bay. Field parameters measured included temperature, conductivity, pH, dissolved oxygen, salinity, and oxidation-reduction potential. The measurement depth ranged from 0.3 m to 26.7 m at three different locations in Melvin Bay (i.e., the exposure area and two new reference areas). The field measurement results are summarized in Appendix A. Nearshore bathymetry (Agnico Eagle 2017 data) and the approximate discharge location is shown in Figure 1, to the south of the Tank Farm at the Itivia Fuel Storage Facility. Based on the bathymetry of Melvin Bay at Itivia Harbour, the diffuser would be placed on the seabed at a depth of approximately 20 m, to ensure an unconstrained mixing zone and to avoid interference with use of Itivia Harbour by ships and boats at high and low tide.



2.0 NEAR FIELD MODELLING

The Cornell Mixing Zone Expert System (CORMIX; Doneker and Jirka 2007) was applied to calculate numerical simulations of the near-field mixing and dilution behavior of treated groundwater effluent entering the nearshore coastal receiving environment in Melvin Bay. CORMIX is one of the most extensively applied models for predicting near-field discharge plume mixing and dilution of both conservative and non-conservative substances in surface water bodies. CORMIX calculates plume boundary interactions to estimate plume fate in terms of dilution and geometry relative to mixing zone regulations (Doneker and Jirka 2007). Nearshore ambient and treated groundwater effluent characteristics required to implement the mixing model are presented in the sections that follow.

2.1 Conditions for Modelling

2.1.1 Ambient Conditions

Assumptions made to characterize the ambient conditions of the receiving marine waters are as follows:

- Weak current: Ambient current velocity of 0.01 m/s and zero wind velocity were considered for this scenario which represented a slack tide condition during ice covered season.
- Mean current: Current speed of 0.2 m/s with no wind was used for this scenario.
- Open water condition: The water temperature and TDS (salinity) were considered to be 0°C (to account for the start and end of the open water season) and 33,300 mg/L, respectively.
- Water depth at discharge location is 20 m.

2.1.2 Discharge Conditions

Following discharge conditions based on estimated underground inflows were used for the near field mixing analysis:

- Flow rate of 800 m³/d discharged over a 12 hour period (for an equivalent flow rate of 1,600 m³/day), with TDS of 39,600 mg/L.
- Treated groundwater effluent temperature: 0°C.
- Outfall length: 230 m from the shoreline as shown.
- A single nozzle for discharge which has inside diameter of 68.07 mm (standard 3.0 inch port, DR9 (PE 4710), 252 psi) was used.
- Nozzle elevation from seabed: 1 m.
- Direction of discharge is perpendicular to the bathymetry contour and 90° vertical angle (upward port).

2.1.3 Modelling Scenarios

Table 1 lists the combination of effluent flow rate and ambient current speed in two simulation scenarios. Table 2 lists the CORMIX model input parameters. The target dilution at the edge of the near-field mixing zone is 11 as per analysis presented in Appendix B.

Table 1: Modelling Scenarios

Parameter	Scenario	
	1	2
Treated Groundwater Effluent Rate (m ³ /d) ¹	1,600	1,600
Ambient Current Speed (m/s)	0.01	0.20
Discharge Velocity (m/s)	5.1	5.1

Note: 1. Daily flow rate is 800 m³/day but this volume will be discharged over 12 hours for an equivalent flow rate of 1,600 m³/day.

Table 2: CORMIX Model Input Parameters

Parameter	Value	Source
Depth at Discharge	20 m	Based on 2017 bathymetry survey completed by Agnico Eagle
Coastal Current (Velocity)	Low = 0.01 m/s Mean = 0.2 m/s	Based on CCG (2008) and assumed
Roughness Value	0.020	Assumed (equivalent to minimum roughness value of similar seabed). This value does not affect vertical jet results.
Wind Speed	0 m/s	Assumed
Water Condition	Saline, non-stratified	Based on Agnico Eagle (2014) and confirmed through Sep. 2018 sampling
Ambient water temperature	Open water season (start and end condition): 0°C	Conservative estimate to capture the start and end of the open water season for discharge
Effluent Flow Rate	1,600 m ³ /d ¹	Per underground inflow and storage estimates (Agnico Eagle 2014; Golder 2016)
Effluent Temperature	0°C	Based on Diamond Drill Hole groundwater data (Agnico Eagle 2017)
Effluent Concentration	100%	Assumed
Discharge Type	Single Port	Assumed
Distance from Nearest Bank	230 m	Assumed
Horizontal Angle of Discharge	Perpendicular to bathymetric contour	Assumed
Vertical Angle of Discharge	90°	Assumed
Port Height above Seabed	1.0 m	Assumed
Port Diameter	0.0681 m	Assumed (3.0" port, DR 9, 252 psi)

Note: 1. Daily flow rate is 800 m³/day but this volume will be discharged over 12 hours for an equivalent flow rate of 1,600 m³/day.

3.0 RESULTS

Figures 2 and 3 present the near-field treated groundwater effluent plume dilution for a discharge of 800 m³/day (an effective effluent rate of 1,600 m³/d) in weak and mean ambient current conditions respectively, via the diffuser. For weak ambient current conditions, the maximum plume (centreline) height is 11.1 m from the seabed. For mean current conditions, the maximum plume (centreline) height is 5.6 m above the seabed. After reaching the maximum height, the negatively buoyant plumes settle towards the bottom as gravity starts to dominate over the initial jet momentum, and this is illustrated by the plume centrelines of Figures 2 and 3. For both scenarios, the plume centreline dilution factor reaches 11 within 1 m horizontal distance and 6 m vertical distance above the port. At

100 m distance from the diffuser, the dilution factors are 70 and 470 for scenarios 1 and 2 respectively, which are much higher than the required dilution of 11.

Figure 4 shows the changes in chloride concentration along the centrelines of the plumes, illustrating that at less than 5 m distance from the diffuser, the chloride concentration meets the required criteria. Figure 5 shows the changes in TDS concentration along the centrelines of the plumes, illustrating that at less than 1 m distance from the diffuser, the TDS concentration meets the required criteria.

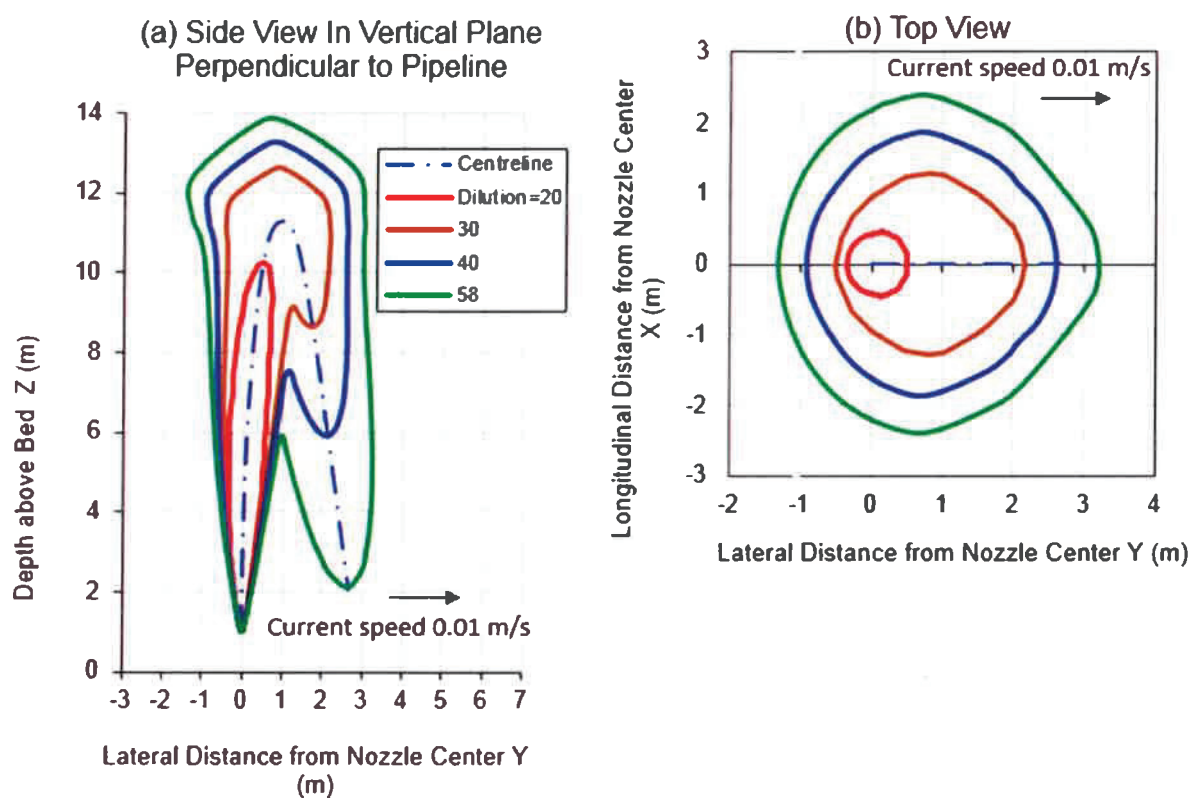


Figure 2: Dilution contours for a flow rate of 800 m³/day (effective effluent flow rate of 1,600 m³/d) in weak ambient current

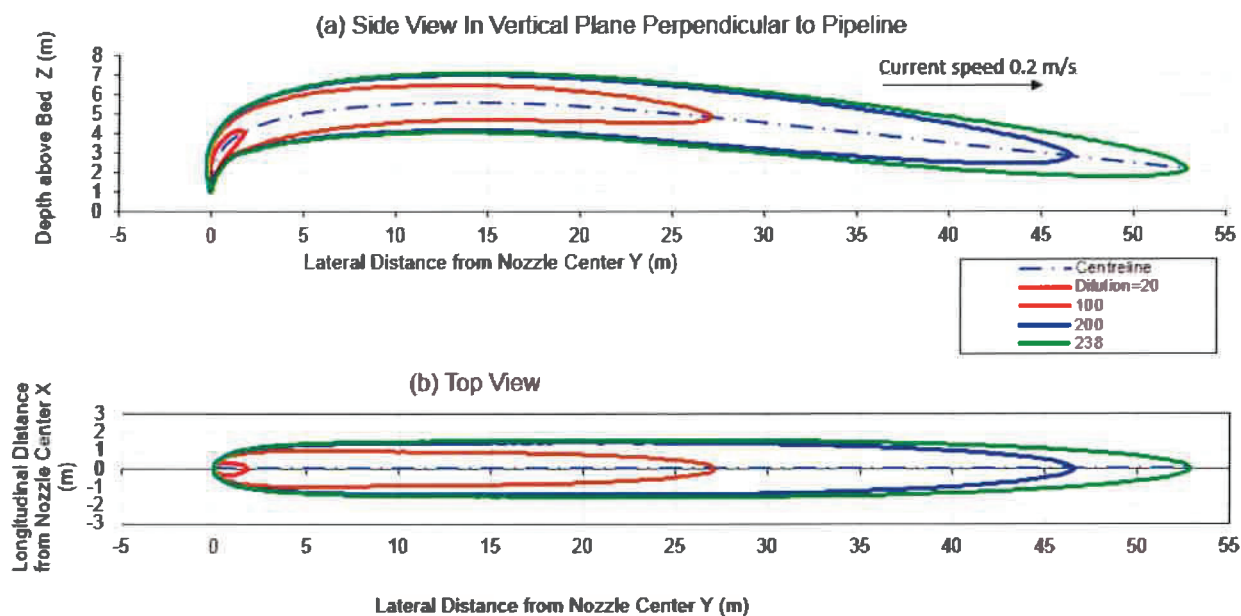


Figure 3: Dilution contours for a flow rate of 800 m³/day (effective effluent flow rate of 1,600 m³/d) in mean ambient current

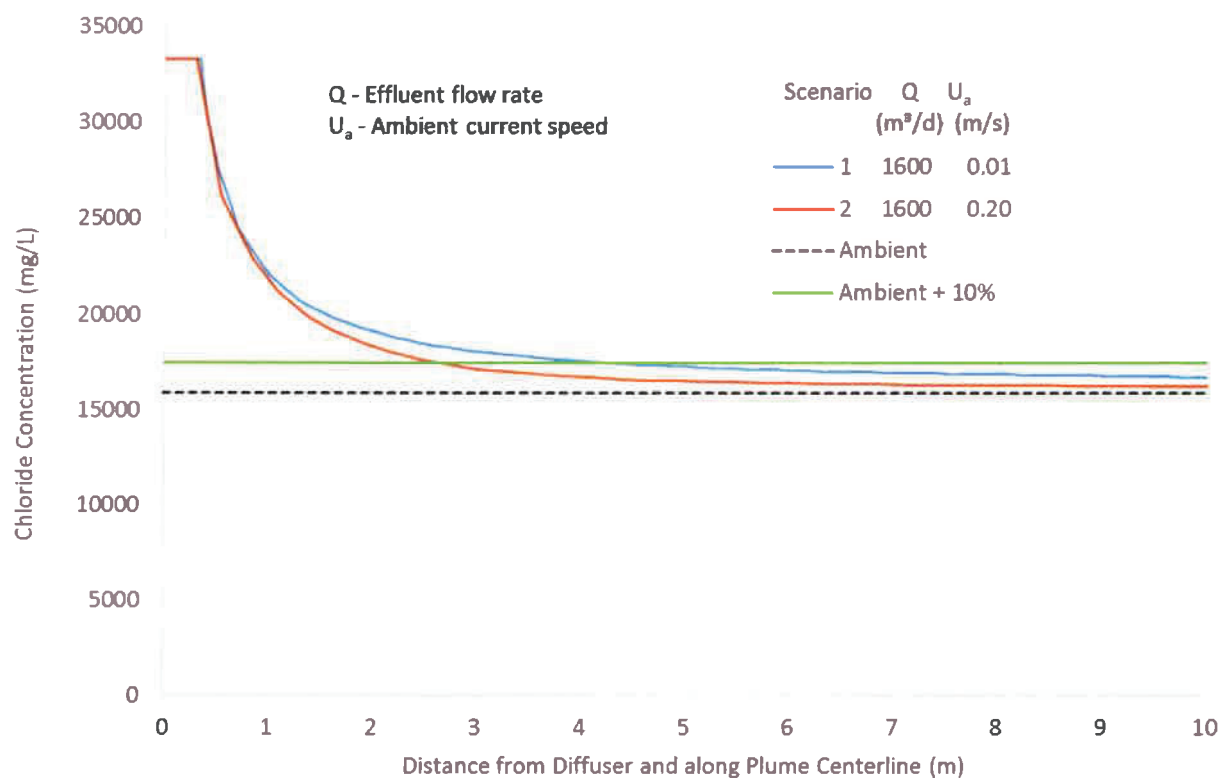


Figure 4: Chloride concentration along the plume centreline for both scenarios

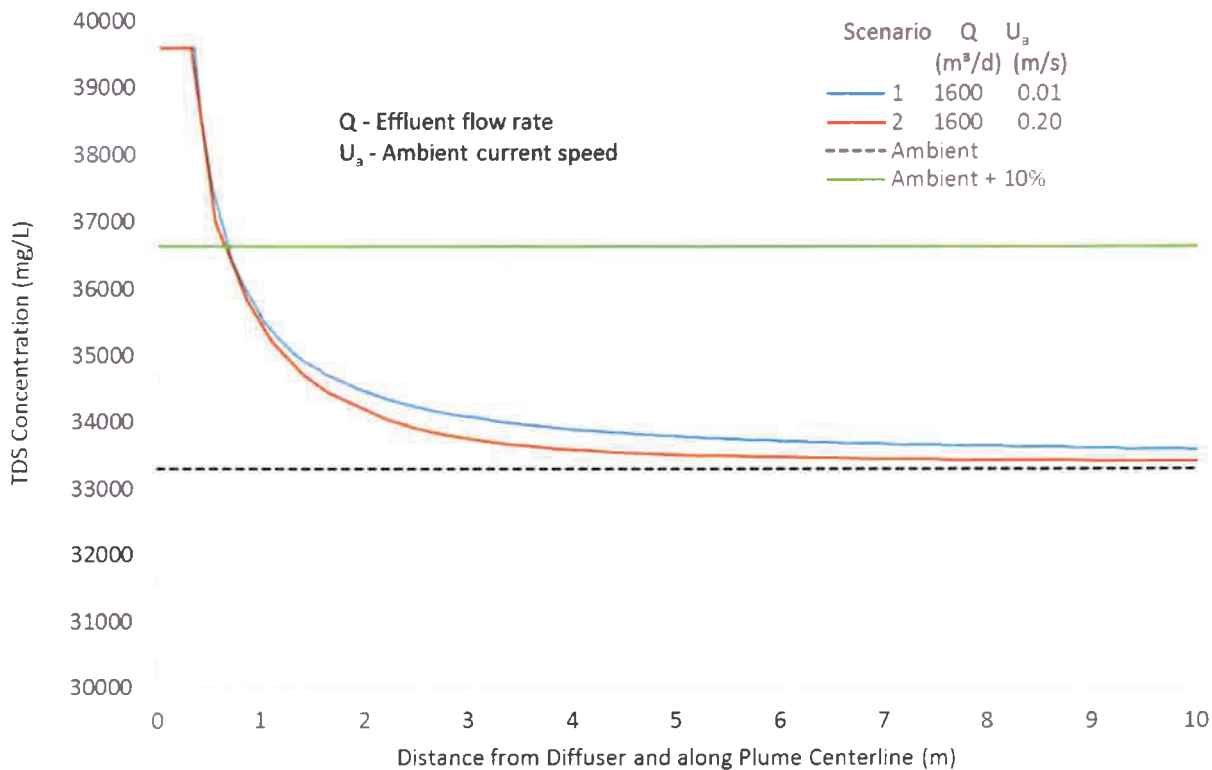


Figure 5: TDS concentration along the plume centreline for both scenarios

3.1 Temperature Sensitivity Analysis

For the simulated scenarios (800 m³/day discharged over 12 hours for an effective flow rate of 1,600 m³/day under weak and mean ambient current conditions), a sensitivity analysis simulation was conducted to review the effect of effluent and ambient temperature changes. The simulation conditions were otherwise identical to those for scenarios 1 and 2 except that the effluent temperature was increased to 20°C, and the ambient water temperature was increased to 8.5°C. The 20°C effluent temperature is understood to be the highest (though not expected) possible effluent temperature, as communicated by Agnico Eagle in November 2018. The 8.5°C was the water temperature measured in August 2011 at depth of 13 m below water surface (Stantec 2012).

The effluent temperature change results in effluent density change from 1031.85 kg/m³ to 1028.30 kg/m³, and the ambient water temperature change results in ambient water density change from 1026.76 kg/m³ to 1025.89 kg/m³. The temperature changes result in a slight change of the density difference between effluent and ambient water from 5.09 kg/m³ to 2.41 kg/m³. The plumes remain negatively buoyant with this temperature change, but not as strongly negative as under the original temperature assumptions for the ambient and effluent temperatures (both 0°C).

Table 3 summarizes the simulation results for sensitivity analysis on temperature change for the two scenarios. This table illustrates the following:

- The plumes rise to higher elevations than the plumes with the originally assumed temperature of 0°C due to reduced negative buoyancy.
- Similar to the original discharge plumes, the required dilution is met at less than 1 m distance from the diffuser.
- At an effective flow rate of 1,600 m³/day, the dilution factors at 100 m from the diffuser are increased due to accelerated plume mixing.

Table 3: Summary of simulation results for effluent temperatures of 20°C and ambient temperature of 8.5°C

Parameter	Scenario	
	1	2
Effluent flow rate (m ³ /d) ¹	1,600	1,600
Ambient current velocity (m/s)	0.01	0.2
Horizontal distance (m) from diffuser where required dilution of 11 is met	<1	<1
Maximum plume (centerline) height (m)	16.2	6.3
Dilution factor at 100 m from diffuser	163	563
Simulation results for originally assumed temperatures of 0°C		
Maximum plume (centerline) height (m)	11.1	5.6
Dilution factor at 100 m from diffuser	70	470

Note: 1. Daily flow rate is 800 m³/day but this volume will be discharged over 12 hours for an equivalent flow rate of 1,600 m³/day.

4.0 CONCLUSIONS

Mixing analysis was conducted for a diffuser designed for Melvin Bay, Rankin Inlet NWT. The simulation results show the following:

- 1) Dilution of the treated groundwater effluent plume is achieved within 5 m of the diffuser under the assumed conditions for the ambient and discharge conditions tested under assumed and increased temperatures.
- 2) After initial mixing, the plume migrates along the seabed under gravity and achieves further dilution and mixing with ambient water; concentrations within the 100 m regulatory mixing zone will thus meet discharge criteria per regulatory requirements and/or background concentrations for non-regulated parameters per the modelled conditions.
- 3) The results are valid for placement of the diffuser in Melvin Bay in water depths of at least 20 m.
- 4) Sensitivity analysis was performed for increased effluent and ambient temperatures. The required dilution of 11 is met within 1 m of the diffuser and dilution factors at 100 m from the diffuser were increased from the base case.

CLOSURE

Should you require any further information, please contact the undersigned.

Golder Associates Ltd.

Prepared by:

Reviewed By:



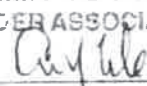
Shouhong Wu, Ph.D.
Senior Water Resources Specialist

SW/BD/vm/tt



K. Bruce Dean, M.Sc., P.Eng.
Principal, Senior Coastal Engineer

[https://golderassociates.sharepoint.com/sites/17491gde/variables/diffuser/memo/modelling assessment draft/doc718_1773384_modelling assessment of groundwater discharge_final.docx](https://golderassociates.sharepoint.com/sites/17491gde/variables/diffuser/memo/modelling%20assessment%20draft/doc718_1773384_modelling%20assessment%20of%20groundwater%20discharge_final.docx)

PERMIT TO PRACTICE GOLDER ASSOCIATES LTD.	
Signature	
Date	8 Feb 2019
PERMIT NUMBER: F 043	
NT/NU Association of Professional Engineers and Geoscientists	

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IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

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Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

APPENDIX A

Field Measurements

Table A1: Results for September 2018 Measurements

Parameter	Minimum	Maximum	Average
pH (pH)	7.96	7.98	7.97
Salinity (psu)	29.7	30.5	30.0
TSS (mg/L)	<2	3.8	2.4
TDS (mg/L)	33,300	36,000	34,727
Hardness (as (CaCO ₃) (mg/L)	4,890	5,180	5,000
Conductivity (uS/cm)	45,400	46,500	45,782
Temperature (°C)	5.80	6.13	5.92
Chloride (mg/L)	15,900	17,400	16,655

Source: Golder (2018)

APPENDIX B

Environmental Guidelines

The intention of the treated groundwater effluent discharge objectives is to set the allowable effluent concentrations at the end-of-pipe and edge of a regulatory mixing zone. These allowable concentrations can then be used to design the diffuser to achieve the required dilution within the mixing zone. There is no specific definition for size of a mixing zone for discharges to Canadian coastal and estuarine waters. However, a radius of 100 m from the point of discharge is widely used for environmental compliance assessments. For example, the Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories (NWT 1992) provide guidance that the limits of initial mixing zone are 100 m from all points of discharge. For the current study, a 100 m regulatory mixing zone was applied.

Final effluent quality included in the model and assessment was based on measured groundwater quality from the borehole samples (see Section 3.4.2, Table 3 of the FEIS Addendum) and constrained by various regulations and guidelines to achieve non-acutely lethal effluent that will meet chronic guidelines or background concentrations at the edge of the regulatory mixing zone. The regulations and guidelines considered included:

- The proposed Metal and Diamond Mining Effluent Regulations (MDMER; GC 2017).
- Acute water quality guidelines for protection of marine aquatic life (CCME 2003; BC MOE 2017a, b).
- Fisheries and Oceans Canada Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013).

Table B1: Meliadine Mine – Assumed Treated Groundwater Effluent Discharge Criteria

Parameter	Units	Discharge Criteria	
		Standard Based ⁽¹⁾	95 UCLM ⁽²⁾
pH (pH units)	pH units	-	7.634
Alkalinity (as CaCO ₃)	mg/L	-	71.35
Total Hardness (as CaCO ₃)	mg/L	-	14101
Turbidity	NTU	-	90.54
Total Dissolved Solids (TDS)	mg/L	-	58,165
Total Suspended Solids (TSS)	mg/L	15	159.4
Aluminium	mg/L	-	1.832
Ammonia (as N)	mg/L	5.91	35.47
Antimony	mg/L	-	0.0047
Arsenic	mg/L	0.0125	0.0193
Barium	mg/L	-	0.299
Beryllium	mg/L	-	0.00165
Bicarbonate (as CaCO ₃)	mg/L	-	69.09
Boron	mg/L	-	2.389
Total Organic Carbon (TOC)	mg/L	-	6.448
Dissolved Organic Carbon (DOC)	mg/L	-	5.69
Cadmium	mg/L	-	5.83E-04
Calcium	mg/L	-	2164
Chloride (dissolved)	mg/L	-	33274
Chromium	mg/L	-	<0.1 ⁽³⁾
Copper	mg/L	0.003	0.113

Table B1: Meliadine Mine – Assumed Treated Groundwater Effluent Discharge Criteria

Parameter	Units	Discharge Criteria	
		Standard Based ⁽¹⁾	95 UCLM ⁽²⁾
Cyanide (free)	mg/L	0.001	0.0494
Iron	mg/L	-	13.37
Lead	mg/L	0.14	0.00369
Lithium	mg/L	-	3.33
Magnesium	mg/L	-	2129
Manganese	mg/L	-	1.076
Mercury	mg/L	-	4.01E-05
Molybdenum	mg/L	-	0.0181
Nickel	mg/L	0.5	0.0208
Nitrate (as N)	mg/L	1500	35.65
Nitrite (as N)	mg/L	-	2.156
Total Kjeldahl Nitrogen (TKN)	mg/L	-	55.4
Phosphorus	mg/L	-	0.069
Potassium	mg/L	-	514.2
Radium-226 (Ra 226)	Bq/L	0.37	2.498
Selenium	mg/L	-	0.0457
Silica (reactive)	mg/L	-	19.77
Silver	mg/L	0.003	8.10E-04
Sodium	mg/L	-	14784
Strontium	mg/L	-	65.21
Sulfate	mg/L	-	3160
Thallium	mg/L	-	3.57E-04
Tin	mg/L	-	<0.5 ⁽³⁾
Titanium	mg/L	-	0.187
Uranium	mg/L	-	0.00168
Vanadium	mg/L	-	<0.5 ⁽³⁾
Zinc	mg/L	0.055	0.133

Notes:

"<" Concentration is below the reported detection limit (RDL).

- (1) End of pipe discharge criteria is based on the minimum of the following (refer to Tables 8 and 9 of the FEIS Addendum):
Amended Metal and Diamond Mining Effluent Regulations (MDMER; GC 2017) Schedule 4 Authorized Limits of Deleterious Substances - Maximum Authorized Monthly Mean Concentration.
Canadian Council of Ministers of the Environment (CCME 2003) Short-term Water Quality Guidelines (WQG) for the Protection of Aquatic Life - Marine.
British Columbia Ministry of Environment (BC MOE 2017a) Approved Water Quality Guidelines for Marine Aquatic Life (Short-Term).
BC MOE Working Water Quality Guidelines for Marine Aquatic Life (BC MOE 2017b).
- (2) 95% Upper Confidence Level of the Mean (UCLM) of the August 2016 to September 2017 diamond drillhole groundwater data provided by Agnico Eagle. 95% UCLM calculated using the US EPA ProUCL Version 5.1 software. Agnico Eagle will monitor groundwater quality and criteria will be updated as necessary based on observed changes.
- (3) A 95% UCLM could not be calculated due to low detection rates within the dataset. The maximum concentration has been used for conservative purposes.

In addition to the above and since chloride ions mainly constitute the salt content in the marine water and ultimately the treated groundwater effluent plume, chloride guidelines are used to assess the near-field mixing zone. No local or federal guideline was available for chloride discharges in the marine environment, and therefore, the guideline published by the BC MOE (2017a) was used for the analysis. The guideline states:

"Human activities should not cause the chloride of marine and estuarine waters to fluctuate by more than 10% of the natural chloride expected at that time and depth".

This indicates that the chloride concentration at the mixing zone boundary should not exceed the ambient chloride concentration of 15,900 mg/L by 1,590 mg/L (10%). The behavior of the discharge in the marine environment is influenced by density. For the purposes of this assessment, it is assumed that treatment of the groundwater will be such as to achieve a TDS concentration of the treated groundwater effluent that is +/- 10% (in line with the BC MOE 2017a guideline) of the maximum TDS concentration of 36,000 mg/L measured in September 2018 at Melvin Bay. Therefore, the assumed effluent TDS concentration will be up to approximately 39,600 mg/L. It is conservatively assumed that the chloride concentration of 33,300 mg/L remains unchanged in the treated groundwater effluent.

To reach a chloride concentration difference of no more than 10% at the edge of regulatory mixing zone, the required plume dilution factor via the diffuser is 11, per the equation below:

$$S = \frac{C_{eff} - C_a}{C_{edg} - C_a} = \frac{C_{eff} - C_a}{110\%C_a - C_a} = \frac{33,300 - 15,900}{110\% \cdot 15,900 - 15,900} = 11$$

where S is required dilution factor, C_{eff} is effluent chloride concentration (33,300 mg/L), C_a is ambient chloride concentration (15,900 mg/L), and C_{edg} is chloride concentration at the edge of regulatory mixing zone. Per the BC MOE (2017a) guideline, the upper bound of C_{edg} is 10% greater than ambient chloride concentration.

There are also no federal or provincial specific criteria for mixing zone discharges regarding thermal changes to the marine environment. However, per the BC MOE (2017a) guideline:

"Temperature at the mixing zone boundary should not change by more or less than 1°C from natural ambient background temperatures, and the hourly rate of change should not exceed 0.5°C."

This is taken into consideration for the model, which conservatively assumes treated groundwater effluent discharge and ambient ocean temperatures of 0°C, to account for start and end of temperatures for the open water season.

Appendix 2: Erosion and Sediment Control Plan (Golder 2019)

TECHNICAL MEMORANDUM

DATE April 26, 2019

Project No. 1773384

TO Manon Turmel
Agnico Eagle Mines Ltd.

CC Cam Stevens; Julien Lacrampe

FROM Youeil Tarkalam

EMAIL Youeil_Tarkalam@golder.com

EROSION AND SEDIMENT CONTROL PLAN FOR THE SALINE EFFLUENT DISCHARGE PROJECT AT MELVIN BAY NEAR RANKIN INLET, NUNAVUT

1.0 BACKGROUND

Agnico Eagle Mines Limited (Agnico Eagle) has requested an Erosion and Sediment Control Plan (the Plan) from Nuqsana Golder Engineering and Environmental Inc. (Nuqsana Golder) for the Saline Effluent Discharge Project (the Project) in Rankin Inlet, Nunavut. The Plan will be submitted to Fisheries and Oceans Canada (DFO).

The Project consists of the installation and decommissioning of a saline diffuser to release treated groundwater effluent from Agnico Eagle's Meliadine Mine into Melvin Bay near Rankin Inlet, Nunavut. The Project's activities, potential environmental and socio-economic impacts, and mitigation measures are provided in the Project's environmental and socio-economic assessment submitted to the Nunavut Impact Review Board (NIRB) in June 2018 (Agnico Eagle 2018).

The Plan identifies mitigation measures for each Project activity (related to installation and removal of the diffuser) with potential for erosion and sedimentation in consideration of regulatory requirements, existing conditions, planned activities, accepted practices and Agnico Eagle's successful experience with similar projects. The Plan is organized as follows:

- Regulatory requirements (Section 2.0);
- Existing conditions (Section 3.0);
- Project activities (Section 4.0); and
- Erosion and sediment control plan (Section 5.0).

2.0 REGULATORY REQUIREMENTS

Under the *Fisheries Act*, activities undertaken near water must avoid causing serious harm to fish or impacting aquatic species at risk. Project activities with potential to cause residual effects to fish habitat include the installation and decommissioning of a saline diffuser to discharge treated groundwater effluent into the marine environment, and therefore, are subject to a review by DFO for approval under the federal *Fisheries Act* (Government of Canada 1985). This Plan is expected to be submitted to DFO by Agnico Eagle to support a Request for Review (RFR) application, where potential impacts on fish and fish habitat will be described in detail. It is expected that a *Fisheries Act* authorization is not required for the Project.

Construction activities associated with installation and decommissioning of the saline diffuser have the potential to introduce sediment into Melvin Bay which can be harmful to aquatic organisms. Possible direct and indirect effects of introduced sediment include: habitat degradation, changes in substrate composition, reduced habitat quantity and quality for macroinvertebrates and fish, smothering of benthic communities and fish eggs, and abrasion of respiratory surfaces for macroinvertebrates and fish (Canadian Council of Ministers of the Environment [CCME] 2002).

The CCME water quality guidelines are intended to provide protection of freshwater and marine life from anthropogenic stressors such as chemical inputs or changes to physical components (CCME 2002). Guideline values are meant to protect all forms of aquatic life and all aspects of aquatic life cycles. The guidelines for total particulate matter in marine environments include values for turbidity (Nephelometric Turbidity Units [NTU]) and total suspended solids [TSS; mg/L]. The guidelines are meant to provide general guidance in evaluating surface water quality for the protection of marine aquatic life.

Turbidity values and TSS concentrations shall be monitored and compared with CCME guidelines to determine whether additional mitigation measures are required (CCME 2002) (Table 1). As per the CCME guidelines, any increase in turbidity of 8 NTUs or increases in TSS of 25 mg/L above background concentrations is considered an exceedance of the CCME short-term guidelines (CCME 2002). In the event that concentrations exceed the guideline for high flow or turbid water (Table 1), it is recommended that the environmental monitor notifies the construction supervisor, and that construction activities in the water stop for approximately 30 minutes, or until the concentrations have decreased to below the guideline.

In the event of a significant exceedance event where turbidity and TSS increase to a level where a visible sediment plume is present, at any time, the environmental monitor will notify the construction supervisor and Agnico Eagle, and construction activities in the water will be stopped until additional mitigation can be effectively applied. For any such event, it is recommended that Agnico Eagle notifies Environment and Climate Change Canada (ECCC) and/or Fisheries and Oceans Canada (DFO) Fisheries Protection Program (FPP) for the region, without delay.

Table 1: Federal Water Quality Guidelines for Turbidity and TSS

Parameter	Flow Conditions	Guideline Value
■ Turbidity	■ Clear flow	■ Maximum increase of 8 NTU from background values for a short-term exposure (e.g., 24 hour period). Maximum average increase of 2 NTU from background values for a longer-term exposure (e.g., 30 day period).
	■ High flow or turbid waters	■ Maximum increase of 8 NTU from background levels at any one time when background levels are between 8 and 80 NTU. Should not increase more than 10% of background levels when background is greater than 80 NTU.
■ Total Suspended Solids	■ Clear flow	■ Maximum increase of 25 mg/L from background concentrations for any short-term exposure (e.g., 24 hour period). Maximum average increase of 5 mg/L from background concentrations for longer term exposures (e.g., inputs lasting between 24 hours and 30 days).
	■ High flow or turbid waters	■ Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. Should not increase more than 10% of background levels when background is greater than 250 mg/L.

NTU = Nephelometric Turbidity Units; TSS = Total suspended solids; mg/L = milligrams per litre; >=greater than; - = not applicable
Source: CCME 2002.

3.0 EXISTING CONDITIONS

Existing conditions relevant to the Plan were based on information and LiDAR data available from Agnico Eagle (2014, 2018), and are summarized as follows:

- **Drainage patterns:** the immediate surroundings of the Project generally drain south to Melvin Bay, as shown in Figure 1. Existing developments, including Itivia Street and the platform for water storage tanks, drain to Melvin Bay either directly through surface runoff, or indirectly through surface runoff, and conveyance by ditch and culvert.
- **Shoreline material:** The shoreline at Melvin bay is rocky, with cobbles and pebbles along the shore. Approximately 80% of the substrate along the shoreline is composed of boulder, cobble and gravel while the remaining 20% is composed of fines.
- **Melvin Bay tidal regimes:** At Rankin Inlet, the tidal range varies between 2.0 m and 4.6 m, and currents usually flow southwest at about 1.85 km/h.



LEGEND

- SURFACE RUNOFF PATH
- HIGHER HIGH WATER LARGE TIDE
- LICENSE "A" - LIMIT OF WORK (31 m)

0 80 160
APPROX. METRES

REFERENCE(S)
IMAGE OBTAINED FROM GOOGLE EARTH © 2019 GOOGLE INC. USED WITH PERMISSION.
GOOGLE AND GOOGLE LOGO ARE REGISTERED TRADEMARKS OF GOOGLE INC.
IMAGERY DATE: 2017-08-24. GOOGLE EARTH IMAGE IS NOT TO SCALE.
DATUM: NAD 83 PROJECTION: UTM ZONE 15

CLIENT **AGNICO EAGLE MINES LIMITED**

AGNICO EAGLE

PROJECT
**MELIADINE GOLD MINE
NUNAVUT**

TITLE
EXISTING CONDITIONS

CONSULTANT	YYYY-MM-DD	2019-04-24
	DESIGNED	YT
	PREPARED	CDB
	REVIEWED	CS
	APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
1773384	11000/11003	0	1

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4.0 PROJECT ACTIVITIES

The Project is expected to start in June 2019, and to be decommissioned in October 2032. Project activities (related to installation and removal of the diffuser) with a potential to generate erosion and sedimentation are identified in Table 2, along with their corresponding schedule and description of the generation pathway. The proposed infrastructure components are illustrated on Figure 2, when applicable. Additional information can be found in the Project's environmental and socio-economic assessment (Agnico Eagle 2018).

Table 2: Description, Schedule and Erosion and Sedimentation Generation Pathway of Project Activities

Project Activity	Description	General Schedule	Erosion and Sedimentation Generation Pathway
■ Mobilization	■ Mobilization of Project machinery and materials to the Project's laydown area	■ Completed annually for the installation of the temporary pipe	■ Potential erosion and sedimentation generation from roads
■ Construction of the Project laydown area	■ Construction of a gravel pad	■ Completed once during the Project's initiation	■ Potential erosion and sedimentation generation from construction activities originating from the laydown area
■ Pipe assembly	■ The welding of pipe sections, connection of flanges, and installation of ballast weights at the Project laydown area using a telehandler.	■ Completed annually	
■ Installation of temporary and permanent diffuser pipes	■ The temporary section will extend from the higher high water large tide ^(a) to the shallow (< 6 m) part of Melvin bay ■ The permanent section will extend from the temporary section and is located entirely in Melvin Bay ■ Steel beams and a combination of tug/divers will be used to launch the pipe. Material will be lifted for installation using a crane located on the launching pad at shore.	■ Completed within ten days ■ Temporary section installed annually during open water season (June or July) ■ Permanent section installed at the Project's initiation	■ Potential erosion and sedimentation generation from construction activities on the shoreline, and potential sediment disturbance in Melvin Bay
■ Installation of ballast anchors	■ Installation of anchors every 2 m along the temporary and permanent pipe sections within the expected high tide level. Divers will be used to complete the in-water installation.	■ Installed annually for the temporary pipe section ■ Installed permanently for the permanent pipe section	
■ Removal of temporary pipe and corresponding ballast anchors	■ Removal activities. As for installation, divers, a tug, a crane and a telehandler will be used to complete this task.	■ Completed annually before the end of open water season	
■ Decommissioning of pipeline system	■ Removal activities	■ Completed at the end of Project life (i.e., 2032)	

(a) The higher high water large tide is defined as the average of the highest high waters, one from each of 19 years of predictions (DFO, 2019).



LEGEND

- SILT FENCING
- SURFACE RUNOFF PATH
- HIGHER HIGH WATER LARGE TIDE
- LICENSE "A" - LIMIT OF WORK (31 m)

0 80 160
APPROX. METRES

REFERENCE(S)
IMAGE OBTAINED FROM GOOGLE EARTH © 2019 GOOGLE INC. USED WITH PERMISSION.
GOOGLE AND GOOGLE LOGO ARE REGISTERED TRADEMARKS OF GOOGLE INC.
IMAGERY DATE: 2017-08-24. GOOGLE EARTH IMAGE IS NOT TO SCALE.
DATUM: NAD 83 PROJECTION: UTM ZONE 15

CLIENT

AGNICO EAGLE MINES LIMITED

PROJECT

**MELIADINE GOLD MINE
NUNAVUT**

TITLE

PROPOSED MITIGATION MEASURES

CONSULTANT	YYYY-MM-DD	2019-04-24
GOLDER	DESIGNED	YT
	PREPARED	CDB
	REVIEWED	CS
	APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
1773384	11000/11003	0	2

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5.0 EROSION AND SEDIMENT CONTROL PLAN

The Plan involves a combination of i) strategies incorporated into the Project's design aimed at minimizing the potential for erosion to effectively reduce the potential for sedimentation and deposition in the receiving environment; ii) activity-specific mitigation measures to capture sediment where it is expected to mobilize; and iii) monitoring to assess the effectiveness of the Plan and rely on adaptive management when required.

5.1 General Erosion and Sediment Control Strategies

General erosion and sediment control mitigation strategies were incorporated in the Project's design, and include:

- **Project staging:** develop the Site in stages to minimize the active disturbance footprint.
- **Buffer from Melvin Bay:** maintain a buffer between disturbances and Melvin Bay where practical to minimize the potential for effects to the receiving environment. The Project work will be conducted outside of a 31 m buffer from the higher high water large tide to the extent practical (Figure 2); however, the launching area will extend within this buffer for ease in installation of the diffuser system.
- **Project schedule:** install water components of the Project during high tide to minimize the potential for land disturbance. Install land components of the Project during low tide to maximize the buffer between land activities and the water level of the receiving environment. Install land components outside of major runoff events (e.g., freshet; major rainfall events) to the extent practical.

5.2 Activity-Specific Erosion and Sediment Control Measures

Erosion and sediment control measures are provided in Table 3 for each Project activity described in Table 2, and illustrated in Figure 2 when applicable. These erosion and sediment control measures will be implemented before and during each corresponding activity, as applicable.

Table 3: Erosion and Sediment Control Measures by Project Activity

Project Activity	Erosion and Sediment Control Measure
■ Mobilization	<ul style="list-style-type: none"> ■ Limit speed near the Project to minimize sedimentation and dust generation ■ Install silt fencing along the downstream side of the access road
■ Construction of the Project laydown area	<ul style="list-style-type: none"> ■ Minimize direct contact with fine material prone to erosion ■ Install silt fencing around the downstream perimeter of the Project laydown area
■ Pipe assembly	<ul style="list-style-type: none"> ■ Assemble pipe at the Project laydown area where silt fencing has been installed
■ Installation of temporary and permanent diffuser pipes	<ul style="list-style-type: none"> ■ Install silt fencing along the perimeter of the work area on land ■ Avoid dragging pipe on the shoreline or on the bed of Melvin Bay where practical <ul style="list-style-type: none"> ■ use machinery to carry pipe when working on land ■ float pipe when practical ■ Add protective material (e.g., bedding, geotextile) over bed material prone to erosion where dragging of the pipe is required ■ Install silt curtain if deemed required based on monitoring (Section 5.3)
■ Installation of ballast anchors	
■ Removal of temporary pipe and corresponding ballast anchors	
■ Decommissioning of pipeline system	<ul style="list-style-type: none"> ■ Avoid dragging pipe on the shoreline or on the bed of Melvin Bay <ul style="list-style-type: none"> ■ use machinery to carry pipe when working on land ■ float pipe when practical ■ Install silt curtain if deemed required based on monitoring (Section 5.3)

5.3 Monitoring and Adaptive Management

5.3.1 Overview

Water quality monitoring for turbidity and TSS will be undertaken by an environmental monitor on-site to assess the effectiveness of the Plan and manage activities adaptively throughout the duration of the project. The federal water quality guidelines (CCME 2002) will provide general guidance in evaluating surface water quality for the protection of marine aquatic life, and the process outlined in Section 2.0 shall be followed in the event of any measurable changes in suspended sediment concentrations.

5.3.2 Monitoring Plan

Sampling sites shall be established prior to the beginning of construction within Melvin Bay, and turbidity monitoring shall be ongoing throughout the duration of construction. Turbidity shall be sampled and measured in the field using a handheld turbidity meter (LaMotte Model 2020we portable turbidity meter or equivalent).

A minimum of one manual reference sampling site will be established in an area unaffected by construction activities to act as a control site, and several manual sampling sites will be established near the construction activities to monitor water quality. Sampling sites within the construction impact zone are typically within 400 m away to encompass the potential zone of influence. A single sample site or up to three sites along a sampling transect will be established at various distances to ensure representative samples are being obtained. The distances and number of sites per location will be determined on site by the environmental monitor to ensure the potential zone of influence is being sampled effectively.

Prior to construction, representative sediment samples will be collected (via wading from shore) from in-water and exposed portions of substrate in the bay. Water samples will also be collected at this time. The sediment and water samples will be combined to produce approximately 20 surrogate suspended sediment samples, creating a range of turbidity values that might be encountered during construction. The samples will be measured for turbidity and then submitted to the predetermined accredited laboratory to determine the TSS concentration of each sample. This will provide data to establish a turbidity-TSS relationship so that turbidity can be used as a surrogate measurement for TSS (unlike turbidity, TSS is not an immediate or directly measurable quantity under field conditions). To describe the relationship between TSS and turbidity, paired measurements from individual water samples will be used to develop a linear regression model. Throughout the duration of the program, corresponding TSS concentrations will be derived from turbidity measurements using the linear regression equation.

During construction, turbidity monitoring will occur on a continuous basis throughout the environmental monitor's shift, with the environmental monitor manually collecting multiple water quality samples throughout each shift. Prior to the monitoring, the communication protocol (outlined in Section 2.0) will be finalized between the environmental monitor, the construction supervisor, and Agnico Eagle. The reporting process outlined in Section 2.0 shall be followed in the event of any exceedances or major plume events. If the unplanned release cannot be rectified, the environmental monitor will continue to sample and document turbidity levels to accurately quantify and describe the increase in turbidity.

Monitoring will continue throughout the duration of construction activities within Melvin Bay and after construction activities are complete, until turbidity returns to background levels.

6.0 CONCLUSION AND CLOSURE

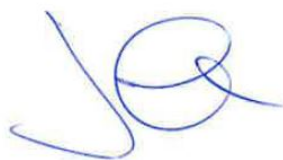
This Plan identifies mitigation measures for each Project activity with potential for erosion and sedimentation in consideration of regulatory requirements, existing conditions, planned activities and accepted practices. It considers a combination of i) strategies incorporated in the Project's design aimed at minimizing the potential for erosion to effectively reduce the potential for deposition in the receiving environment; ii) activity-specific mitigation measures to capture sediment where it is expected to mobilize; and iii) monitoring to assess the effectiveness of the Plan and rely on adaptive management when required.

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

GOLDER ASSOCIATES LTD.



Youeil Tarkalam
Civil Engineer-in-Training



Julien Lacrampe, P. Eng. (NWT / NU)
Senior Water Resources Engineer



Megan McLean, M.Env.Sc
Aquatic Biologist



Cam Stevens, Ph.D., P.Bio.
Associate, Senior Aquatic Biologist

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Appendix 3: Transport Canada
Approval No. 8200-2019-600003



Transport
Canada

Transports
Canada

Navigation Protection Program
1100 9700 Jasper Avenue
Edmonton, Alberta T5J 4E6

Your file

Our file
8200-2019-600003

March 15, 2019

REGISTERED MAIL

Agnico Eagle Mines Ltd.
11600-Rue Louis-Bisson
Mirabel, QC J7N 1G9

Attention: Manon Turmel

RE: Notice to the Minister under the *Navigation Protection Act* for Approval of the Submerged Works- Outfall, located in Melvin Bay, 62°47'55.58"N x 92° 5'52.58"W, Rankin Inlet, Itivia Harbour, in the Territory of Nunavut

The Minister of Transport has determined under section 5 of the *Navigation Protection Act* (NPA) that your work is likely to substantially interfere with navigation.

Enclosed please find the Approval for the above-noted work issued by the Minister of Transport in accordance with subsection 6(1)- Placement, of the NPA.

This permission relates only to the effect of your work on navigation under the NPA and does not grant any rights related to the ownership of the bed of the waterway.

Please note that the NPA, amongst other obligations, requires the owner to immediately notify the Minister if your work causes or is likely to cause serious or imminent danger to navigation and take reasonable measures to remediate the danger to navigation (section 12 of the NPA).

Should you have any questions, please do not hesitate to contact our office in Edmonton by phone at (780) 495-8215, by fax at (780) 495-8607 or by e-mail at TC.NPPNR-PPNRPN.TC@tc.gc.ca

Respectfully,

Dallas Babuik
Officer, Navigation Protection Program
Programs Group
Transport Canada
Prairie and Northern Region

Attachment(s)

Stamped Map and Plans

Canada



NAVIGATION PROTECTION ACT
Subsection 6(1)

8200-2019-600003

Approval

OWNER: Agnico Eagle Mines Ltd.
11600-Rue Louis-Bisson
Mirabel, QC J7N 1G9

WORK: **Submerged Works- Outfall**

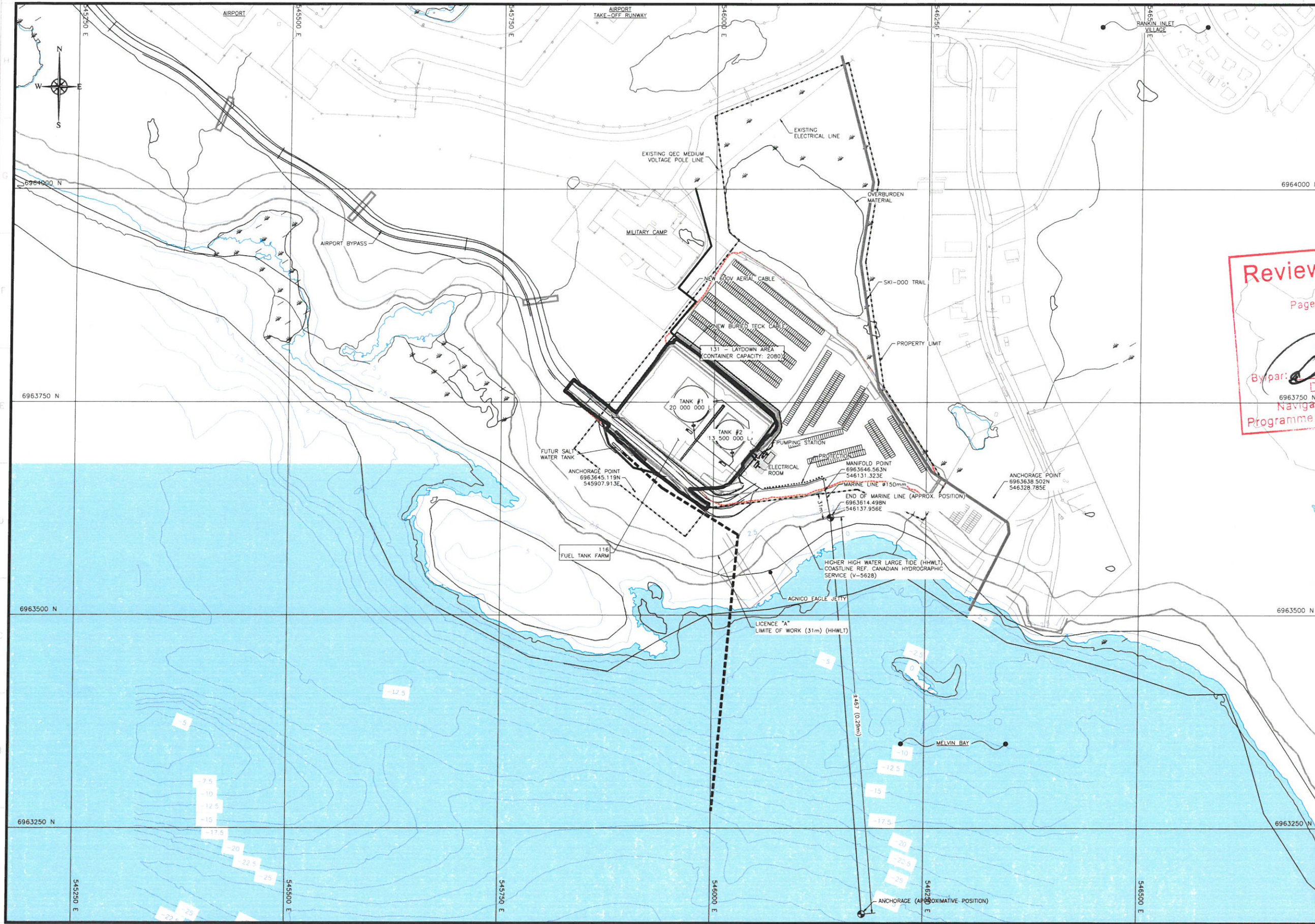
SITE LOCATION: Located at Approximately 62°47'55.58"N x 92° 5'52.58"W,
Melvin Bay, Itivia Harbour, Rankin Inlet, in the Territory of Nunavut

Regarding the notice and application to the Minister of Transport, submitted pursuant to the *Navigation Protection Act*, for an approval of a work, the Minister hereby approves the placement of the above-described work and the attached plans pursuant to subsection 6(1) in accordance with the following terms and conditions:

1. Signs stating Submerged Works- No Anchoring written in English and the language of the nearest community, must display black lettering on a yellow or orange background and
2. Cautionary buoy(s) (yellow) must be equipped with a radar reflector
3. Cautionary buoy(s) (yellow) must be lit with a yellow flashing light from dusk to dawn and during periods of restricted visibility
4. Cautionary buoy(s) (yellow) must be marked with yellow retro-reflective material
5. Cautionary buoy(s) (yellow) must be placed at each end of the work
6. Cautionary buoy(s) (yellow) must be placed directly over the submerged work(s)
7. Cautionary buoy(s) (yellow) must be placed during all periods of open water
8. Cautionary buoy(s) (yellow) must have a minimum circumference of 30 centimetres
9. Cautionary buoy(s) (yellow) must have a minimum height above the water of 100 centimetres
10. Signs must be placed and maintained above the high water watermark facing the lay of the work, and must be visible at a minimum distance of 200metres
11. All portions of the existing work must be completely removed from the natural bed of the waterway immediately upon of termination of the work(s)
12. The Minister or his representatives must be allowed unimpeded access to any site related to the project for inspection and/or monitoring purposes.
13. The proponent must notify the Canadian Coast Guard at 418-648-2239 at least 24 hours in advance of commencement and upon completion of the project.

SIGNED in two copies on MAR 15 2019 in Edmonton, Alberta

Dallas Babuik
Navigation Protection Program Officer
Programs Group
Transport Canada
Prairie and Northern Region
For the Minister of Transport



PLAN CLE
KEY PLAN

WSP
1075, 34 AVENUE EST
VAL-D'OR (QUEBEC) CANADA J9P 0J7
TEL. 819 825-4274 | TELE. 819 824-1514 | WWW.WSPGROUP.COM
Fax: 1-514-0844-40

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

- ARCHEOLOGICAL SITE MITIGATED
- ARCHEOLOGICAL SITE STAKED
- ARCHEOLOGICAL SITE NOT MITIGATED
- WORKING POINT

Reviewed / Examine
Page 1 of 3
MAR 15 2019
By par: *[Signature]*
DALLAS BABU
6963750 N
Navigation Pour Construction /
Programme de protection de la navigation
DATE: 2019-01-22

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	PAR/REV	APP.	CLIENT
4	2018-01-22	GENERAL UPDATE	J.C.	S.D.	
3	2018-10-24	GENERAL UPDATE	L.G.	O.P.	
2	2018-09-18	ISSUED FOR CONSTRUCTION	L.G.	O.P.	
1	2017-12-20	ISSUED FOR CONSTRUCTION	L.G.	O.P.	
0	2017-08-14	ISSUED FOR CONSTRUCTION	L.G.	O.P.	

REVISIONS

TECHNOLOGICAL DOCUMENT
THE ORIGINAL OF THIS TECHNOLOGICAL DOCUMENT WAS ISSUED AND AUTHENTICATED:
ON _____

AGNICO EAGLE

AGNICO EAGLE - MELJADINE DIVISION
000 - GENERAL
210 - GENERAL ARRANGEMENT
RANKIN INLET
PLAN VIEW

DESIGNED PAR
DRAWN BY ISABELLE GILBERT
DATE 2015-06-10

NOTRE PAR
CHECKED BY OLIVIER PERREAULT, P. Eng.
DATE 2015-06-23

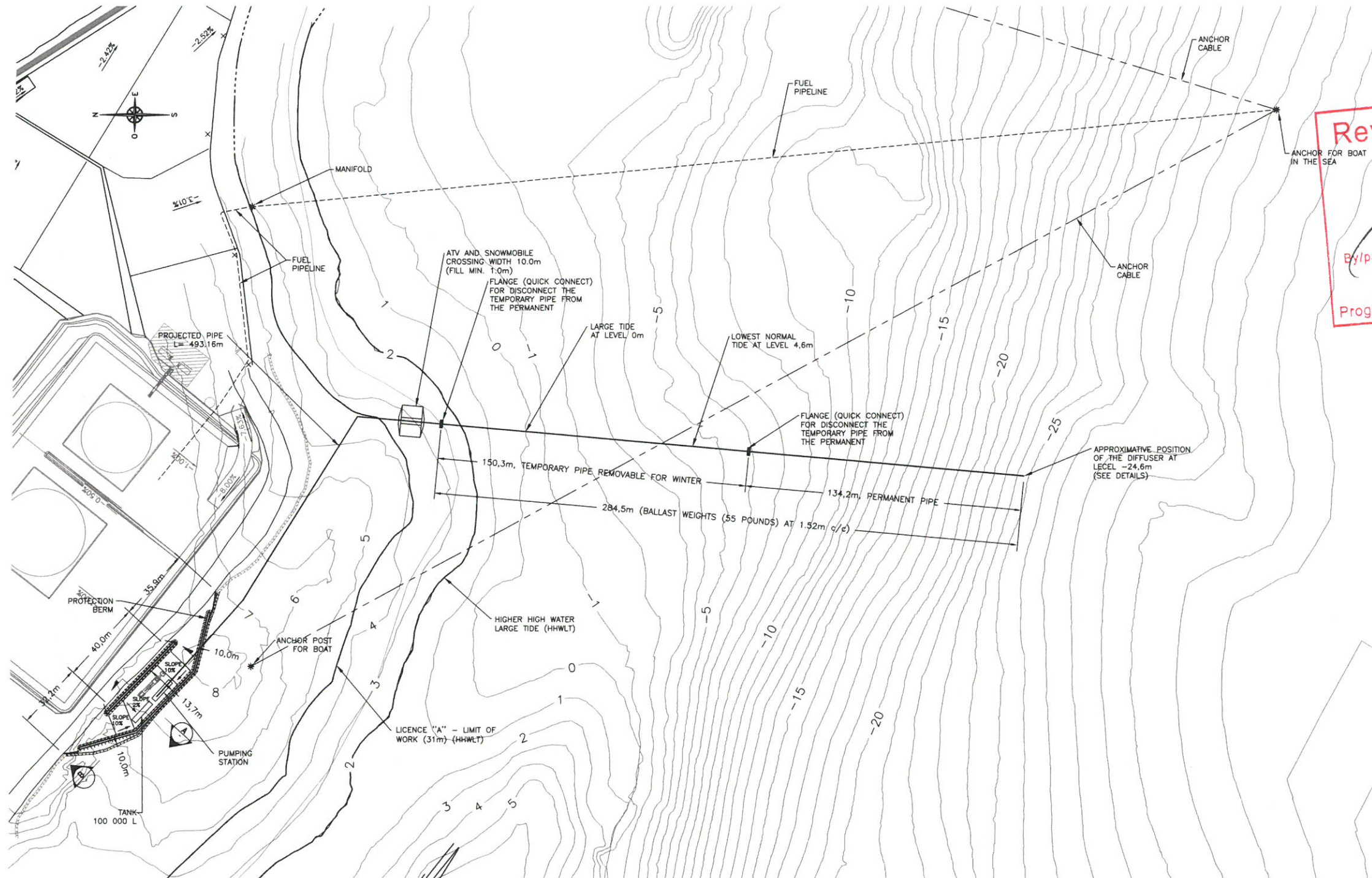
APPROUVE PAR
APPROVED BY OLIVIER PERREAULT, P. Eng.
DATE 2017-09-19

SCHEMATA
SCALE 1:2000
DATE 2015-06-10

NO. DESIGN
DRAWING NO. 65-000-210-200

NO. PROJET
PROJECT NO. 6515

REVISION
FEUILLE / SHEET 4 / 7



PLAN VIEW
Scale: 1: 1000

Reviewed / Examined
Page 2 of 3
MAR 15 2019
By/pour **DALLAS BABUIK**
Navigation Protection Program /
Programme de protection de la navigation

**NE PAS UTILISER
POUR CONSTRUCTION
NOT FOR CONSTRUCTION**
DATE : 2019-01-18

Information is contained in this document for the purpose of providing a general overview of the project and is not intended to be used for construction purposes. The information is not to be used for any other purpose without the written consent of the project manager.

DESIGNS EN RÉFÉRENCE / REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	PREPARED BY	APP. CLIENT
0	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
1	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
2	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
3	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
4	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PREPARED BY	APP. CLIENT
0	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
1	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
2	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
3	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.
4	2018-01-14	ISSUED FOR COMMENTS	J.C.	S.D.

REVISIONS

TECHNOLOGICAL DOCUMENT
THE ORIGINAL OF THIS TECHNOLOGICAL DOCUMENT WAS ISSUED AND AUTHENTICATED BY: STEPHAN DUPUIS, P. Eng., ON 2018-06-14.

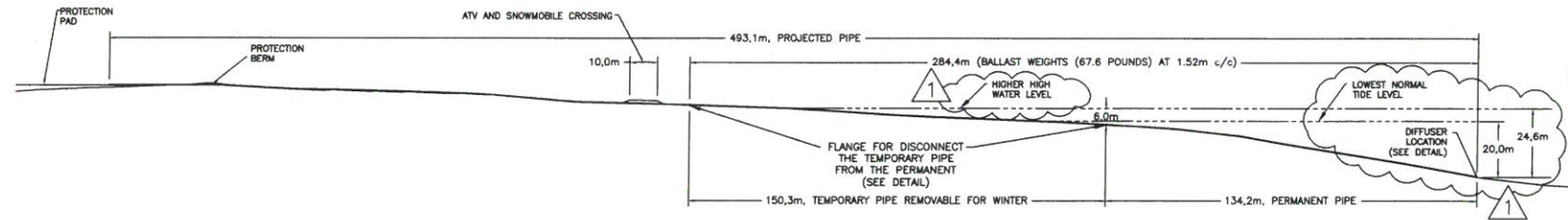
TITLE / TITRE
AGNICO EAGLE - MELIADINE DIVISION
000 - GENERAL
210 - GENERAL ARRANGEMENT
SALINE WATER STORAGE FACILITY
RANKIN INLET
PLAN VIEW

DESIGNED BY	JULIE CROTEAU, tech.	DATE	2018-12-12
CHECKED BY	YOUSSEF HESSANI, Ing.	DATE	2018-12-12
APPROVED BY	STEPHAN DUPUIS, P. Eng.	DATE	2018-12-12

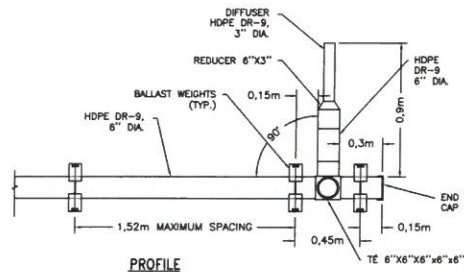
SCALE INDICATED DATE 2018-12-12

NO. DESIGN 65-100-210-200

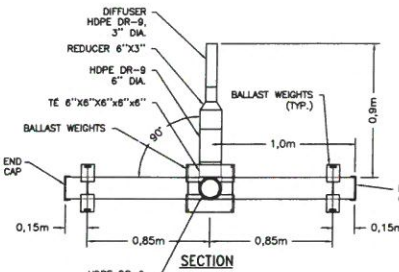
NO. PROJECT	6526	REVISION	D	FEUILLE / SHEET	1 / 2
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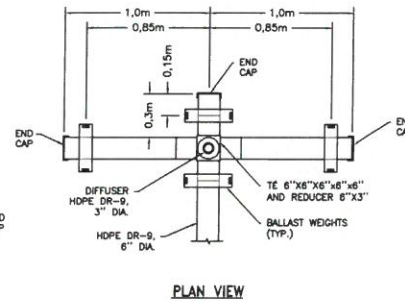
LONGITUDINAL PROFILE - PIPE
Scale: 1:1000



PROFILE

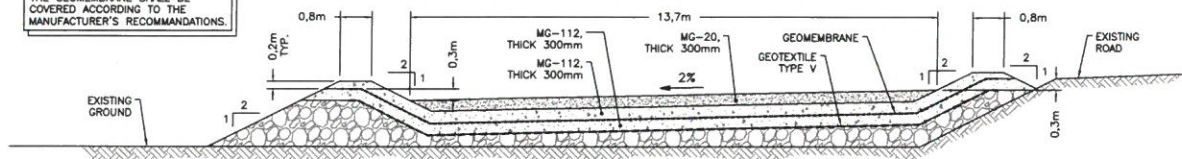


SECTION

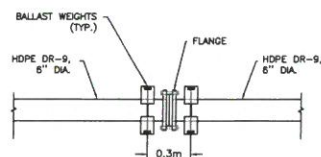


PLAN VIEW

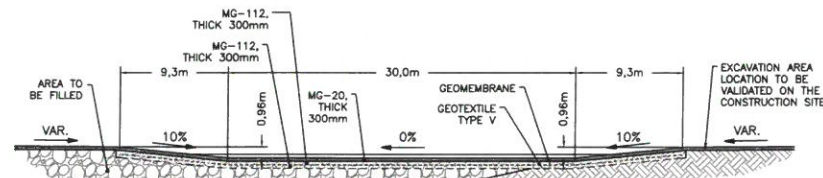
NOTE:
THE GEOMEMBRANE SHALL BE COVERED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.



SECTION "A" - PAD
Scale: NONE



DETAIL - FLANGE
Scale: 1:20



SECTION "B" - PAD
Scale: 1:20

NOTES:

- 1) FOR THE INSTALLATION, THE CONTRACTOR NEED TO REFER TO THE HANDBOOK OF PE PIPE CHAPTER 10, MARINE INSTALLATION. EACH SECTION OF PIPE MUST BE JOINT BY FUSION, EXCEPT FOR THE TEMPORARY PIPE REMOVABLE FOR WINTER THEY ARE CONNECTING TO THE PERMANENT PIPES WITH FLANGE FUSED AT EACH END BACK-UP RING.
- 2) POST-INSTALLATION SURVEY
UPON COMPLETION OF THE INSTALLATION OF A SUBMERGED PIPELINE, IT IS ADVISABLE TO HAVE THE COMPLETE LINE SURVEYED BY A COMPETENT DIVER TO ENSURE THAT:
- THE PIPELINE IS LOCATED WITHIN THE PRESCRIBED RIGHT-OF-WAY;
- THE BALLASTS HOLDING THE PIPELINE ARE ALL PROPERLY SITTING ON THE BOTTOM CONTOUR AND THAT THE LINE IS NOT FORCED TO BRIDGE ANY CHANGES IN ELEVATION;
- THE PIPE IS NOT RESTING ON ANY ROCKS, DEBRIS OR MATERIAL THAT COULD CAUSE DAMAGE;
- ANY AUXILIARY LINES, SUCH AS HOSES, ROPES, BUOYANCY BLOCKS OR ANY OTHER EQUIPMENT USED DURING THE INSTALLATION HAS BEEN REMOVED;
- WHERE REQUIRED, THE PIPE HAS BEEN BACKFILLED AND THE BACKFILLING WAS DONE PROPERLY;
- ALL OTHER INSTALLATION REQUIREMENTS ESTABLISHED BY THE DESIGNER FOR THE SUBJECT APPLICATION HAVE BEEN COMPLIED WITH.

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE: 2019-02-14

wsp

NOTES GÉNÉRALES / GENERAL NOTES

Reviewed / Examiné
Page 3 of 3
MAR 15 2019
By: DALLAS BABUIK
Navigation Protection Program /
Programme de protection de la navigation

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

AGNICO EAGLE

REVISIONS

2019-02-14

AGNICO EAGLE - MELIADINE DIVISION
180 - SALINE EFFLUENT DISCHARGE SYSTEM
230 - GENERAL EARTH WORKS
SALINE WATER STORAGE FACILITY
RANKIN INLET
DETAILS

DESIGNER: JULIE CROTEAU, Inc. DATE: 2018-12-12
CHECKED BY: YOUSSEF HESSANI, Inc. DATE: 2019-02-06
APPROVED BY: STEPHAN DUPUIS, P. Eng. DATE: 2019-02-14
SCALE: INDICATED DATE: 2018-12-12
PROJECT NO.: 65-180-230-200-2
REVISION: 1 OF 2