Indigenous and Northern Affairs Canada | Affaires autochtones et du Nord Canada

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
2BB-MEL1424	Jamie Quesnel, Jeff Pratt
Licence No. / Expiry	**Representative's Title**
July 21st, 2024	Environment Division
Land / Other Authorizations	**Land / Other Authorizations**
IOL	--
Date of Inspection	**Inspector**
April 12th, 2016	WRO C. Wilson

Activities Inspected

☐ Camp ☐ Drilling ☐ Mining ☒ Construction ☐ Reclamation ☐ Fuel Storage
☐ Roads/Hauling ☐ Other: Water Discharge ☐ Other:

SECTION 1 ☒ Comments **(s._1_)** ☐ Non-Compliance with Act or Licence (s.__) ☐ Action Required (s.__)

Summary

On March 17th, 2016 Agnico Eagle Gold Mines Limited ('AEM') submitted a letter to the Nunavut Water Board ('the Board') reporting elevated levels of chloride and ammonia in a number of water bodies downstream of the Meliadine Gold Project's portal area. The letter detailed AEM's concern with the integrity of two water containment structures, the primary containment pond (P1) and the portal surface sump as well as the imminent freshet. The letter also detailed a series of actions that AEM had initiated to improve the structures and evaluate the cause of the elevated parameters.

On March 31st, an update was received by Indigenous and Northern Affairs Canada ('INAC') from AEM. The update detailed the construction of three additional water containment structures referred to as Pond 1 (DP1-A), 2 (DP2-A), and 3 (DP3-A). On April 6th, during a collaborative teleconference with ECCC, AEM and INAC, AEM suggested that the construction of these structures was being completed under the authority of PART E item seven (7) and twelve (12). On April 12th, INAC's Water Resource Officer, Christine WILSON completed an inspection of the Meliadine Gold Project with the assistance of the AEM's Environmental Superintendent, Jamie QUESNEL and Environmental Coordinator, Jeff PRATT. The following is a record of that inspection.

Observations

1. Construction of DP1-A, DP3-A started on March 24th. AEM anticipates a completion date of all construction on May 1st.
2. The dykes design utilizes a frozen core structure to hold the water. AEM has retained a geotechnical engineer with Tetra Tech to provide field supervision during the construction.
3. The design of the structures are as follows; crushed rock (0-30mm) is used in the 'core' of the berm , the crushed rock is applied as lifts and compacted, each lift of the crushed rock is saturated with water and allowed to freeze, a sample is taken from each lift and analysed for percentage of ice saturation (85% or above). The frozen core is then covered with a thermal capping.
4. The dyke design has been modified as construction has progressed through the analysis of test plots. One of the first lifts of DP3-A was determined to be off specifications. Tetra Tech was able to identify this and rapidly improve the materials mixture to make changes as necessary.
5. Tetra Tech will be present and supervising the entirety of the project.
6. The material used in the construction of the dykes is waste rock. The rock appears to have blasting wire and debris within it. The inspector was concern this rock may also be contaminated with ammonia and chloride as it was blasted from the underground.
7. The water that is used for each lift is brought via truck to the location. The water is metered at monitoring station MEL-1.
8. DP3-A appears to be within thirty one meters of Peanut Lake (A54).
9. A large amount of snow has come in contact with soil during the construction of the dykes. This snow will need to be managed to ensure deposit of sediment into nearby water bodies does not occur.
10. An additional dyke, DP1-B has been added to the design, which is located the north side of A58 Lake.
11. AEM is preparing an emergency plan to mitigate other risks caused by the construction activity.

SECTION 2 ☐ **Comments** (s.__) ☒ **Non-Compliance with Act or Licence (s.2)** ☐ **Action Required** (s.__)

The inspector is concerned this activity does not fall within the scope of approved 2BB-MEL1424 or 8BC-MEL1516 licence, though recognizes the improvements to the P1 containment facility as necessary to protect the downstream receiving environment.

Under the authority of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* section 87 (1) (b), I, Christine Wilson, direct Agnico Eagle Gold Mines Limited to complete the following activities;

I. Take such measure necessary to stop the release of water from containment pond P1 and the portal surface sump into the receiving environment.
II. Within 60 days of completion of DP1-B, DP1-A, DP2-A, DP3-A, and the water collection system, submit to the Board, a construction summary report along with stamped as-build plans and drawings, providing explanation to reflect any deviations from the construction drawings taking into account construction and field decisions and how they affect the performance of each structure.
III. Amend the 2BB-MEL1424 monitoring program to include, at a minimum, a regular compliance point at DP3-A and A54.
IV. Modify the monthly monitoring reports, starting April 2016, to include, at a minimum, an updates of the construction of the containment structures, waste water treatment options; modifications of the freshet action plan, sampling, and analysis of those results.

This Direction is **WITHOUT PREJUDICE** to any further course of action that Inspector may take with respect to any

contravention of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, including an amended or subsequent Inspector's Direction, prosecution or injunction under any Act.

SECTION 3 ☐ **Comments** (s.__) ☐ **Non-Compliance with Act or Licence,** (s.__) ☒ **Action Required** (s.3)

- AEM will prepare a Freshet Action Plan that will address P1 containment facility, and all other water management structures at Meliadine Project. This Plan will be submitted to the Board by April 29th, 2016.
- AEM shall provide sampling results of the materials used in the construction of the DP3-A, to the Board before April 29th, 2016.
- AEM will record water used for the construction of the P1 containment facility. This volume will be reported separately from the explorative/ domestic totals in the monthly monitoring report.
- AEM will arrange a meeting with regulators to discuss; the scope of the current licences (2BB-MEL1424 and 8BC-MEL1516); clarify the use of the P1 containment facility; clarify which undertaking the P1 containment facility supports and which licence will be amended to authorize this activity.

Licensee or Representative	**Inspector's Name**
	WRO C Wilson
Signature	**Signature**
	Original signed on file
Date	**Date**
	April 25th, 2016

Office Use Only: Follow-up report to be issued by Inspector ☐ Yes ☒ No

cc. Erik Allain, Manager Field Operations, AANDC
Jeff Pratt, Environmental Coordinator, AEML
Jamie Quesnel, Environmental Superintendent. AEML

Attached: Photo Log, April 11th, 2016
Appendix 1- March 17th, 2016 letter
Appendix 2- Conceptual Layout Plan of P1 Water management infrastructure for Freshet 2016

PHOTO LOG			
Date:	**Authorization Number:**	**Camera/Model:**	**Inspector**
April 12th, 2016	2BB-MEL1424	Sony DSC-HX50V Cyber shot	WRO Wilson
Photo No.		**Lat/Long (DD.MM.SS.SS, NAD83)**	
Photo 1		N63° 1′ 43.33”, W 92° 12′ 27.3”	

Description:
Facing South South West DP3-A

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 2	N63° 1′ 37.1″, W 92° 12′ 32.08″

Description

Looking North North East: DP3-A, first lift of the frozen core.

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 3	N63° 1’ 38.33”, W 92° 12’ 29.11”

Description

DP3-A - Orange Wire in material

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 4	N63° 1’ 34.78”, W 92° 12’ 31.77”

Description

Looking South West from DP3-A: Piles of snow mixed with material.

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 5	N63° 1’ 39.00”, W 92° 12’ 47.51”

Description

Facing North: Waste Rock Storage Area.

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 6	N63° 1’ 39.23”, W 92° 12’ 47.57”

Description

Facing North East South East: Primary containment Pond (P1)

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 6	N63° 1’ 40.51”, W 92° 12’ 50.78”

Description

Facing North East:
Fore ground: DP1-A
Back ground: Waste Rock Storage Area

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 7	N63° 1’ 40.36”, W 92° 12’ 52.2”

Description

Facing North East: DP1-A first lift

Locations name:	Lat/Long (DD.MM.SS.SS, NAD83)
Photo 8	N63° 1’ 36.50”, W 92° 12’ 40.99”

Description

Facing East: Portal Surface Sump

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Nunavut Water Board,
P.O. Box 119
Gjoa Haven, NU,
X0B 1J0
Attn: Ida Porter, License Administrator
Email: ida.porter@nwb-oen.ca

Kivalliq Inuit Association
Box 340,
Rankin Inlet, NU
X0C 0G0
Attn: Luis Manzo, Lands Department
Email: dirlands@kivalliqinuit.ca

March 17, 2016

Re: Meliadine – 2BB-MEL1424
Meliadine Portal Area – Water Quality Monitoring in Lake A54
Adverse Trends Noted – Mitigation Measures being implemented

In preparing the 2015 Annual Report for the Nunavut Water Board, our technical teams have been reviewing all of the 2015 water quality data collected under Meliadine Exploration Type B Water License (2BB-MEL1424) and have identified a preoccupying trend associated with rising chloride and ammonia levels in several small ponds downstream of the exploration decline surface containment pond, P1. We are writing to report this observed trend, to present what we know of its history, probable cause and to present the measures proposed by Agnico to reduce the risk of this occurrence.

Background

At the Meliadine site, all waste rock excavated from the underground exploration decline has and continues to be placed on a series of rockfill platforms constructed on both sides and to the north of the decline entrance. These rockfill platforms are used to store waste rock; ore samples brought to surface; and for materials (supplies and equipment) used in the development of the underground mine workings. There are several temporary soft shell buildings sited on the pads either side of the decline used for storage and maintenance to support the underground exploration activities. The layout of this area is shown in the attached photo taken in July of 2014 (Figure 1). All precipitation runoff that

has been in contact with these rockfill pads and the stored waste rock, ore samples, material and equipment drains into containment pond P1, which is located to the north east of the decline entrance and south of the north waste rock storage pad.

The watershed associated with containment pond P1 is shown as area A1 in Figure 2. Sub-watershed A1 has an area of about 134,500 m^2. It is limited to the north by some high ground (around elevation 68.0 m) and to the south-east by a platform and a rockfill road (south road) acting as a confining structure. Natural flow from the P1 containment pond area is toward the south-east toward Lake A54 (often referred as Peanut Lake due its shape). Containment pond P1 is limited to the south by some high ground and the portal platform.

Containment pond P1 is operated under an approved Water Management Plan (WMP) under the Meliadine Type B Water License 2BB-MEL1424. Currently no water has been sent directly from the underground workings to the surface. Most of the underground decline and associated exploration workings are still within the permafrost zone and thus at this point in time there has been no need to construct or install a pumping system to remove excess water from the underground. The water balance for the underground workings is currently in balance; that is there is no excess water. All the water use needs underground are provided through the combination of the water collected in the internal mine sumps plus the water provided by a borehole at level 300. The only water reporting to the surface is the pore water transported with the waste rock (or low-grade ore) brought to surface and then placed in storage on the rockfill pads adjacent to the portal.
Precipitation runoff from the area immediately adjacent to the portal does enter the decline and is collected in a sump constructed for this purpose just below the ground surface known as Sump 1 (located just inside the portal entrance). The water that accumulates in this sump (mostly at freshet) is pumped to another small sump located on surface immediately adjacent (north-east) of the entrance into the ramp (known as the surface sump – see Figure 1). Historically, all water reporting to this surface sump

appears to have been lost to the surrounding environment by either evaporation or natural seepage into the ground.

The amount of water contained in pond P1 varies seasonally, typically growing with the spring freshet, diminishing over the drier summer months and then increasing again with the fall rains. A constructed rockfill road (south road) serves to cut off the natural drainage outflow from containment pond P1. The upstream side of this roadway contains a geotextile liner designed to filter out solids but not to be impermeable, although it should be noted that this confining structure has been able to contain water quite effectively over the past years. Under the approved WMP, water quality in P1 was to be assessed and can only be discharged if water quality met the criteria for discharge. The discharge standard to be met was the standard contained in the Metal Mining Effluent Regulation under the Fisheries Act. Historically, water was discharged (pumped) via a culvert set at an elevated level within the north end of the rock fill roadway cutting off containment pond P1 from its natural drainage pathway towards Lake A54 (see Figure 2).

Containment pond P1 drains naturally to the southeast to Lake A54. Drainage is overland and not by means of any defined watercourse. Water from Lake A54 drains through Ponds A9 and A38 into Lake A8 again overland and not via any defined watercourses. Ponds A54, A9 and A38 are shallow waterbodies that freeze solid every winter and thus do not support any resident fish populations.

Water Quality Monitoring

Under the WMP, water quality monitoring stations have been established by Agnico and regularly sampled in the open water season, specifically P1 (Mel6), Pond A54, Pond A38 Pond A9 and in Lake A8 (Mel 2) (see Figure 3) (Mel6 and Mel2 are mandated under the Water License). Typically four sampling events have occurred each year. The results from this water quality monitoring activity has been previously reported to the NWB and KIA through the Water License monthly and annual reports since 2009 (2009 thru 2011 by Comaplex, 2012 thru today by Agnico).

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Analysis of this water quality monitoring data conducted in preparing the 2015 annual report shows a fairly rapid increase in chloride concentrations in Lake A54 starting in mid-June of 2015. This coincides with a similar trend increase in chloride concentrations in containment Pond P1 suggesting that something changed in the source loading for chloride coming into containment pond P1 that starts somewhere around mid-June of 2015 and that water is exiting containment pond P1 into Lake A54 in a means other than being pumped or overflowing through the installed roadway culvert (most likely seepage through the roadway – see Figure 1). A similar trend in chloride concentrations is seen in Pond A38 downstream of Lake A54. At Lake A8 water quality monitoring indicates that chloride concentrations are above the natural background of around 10 mg/l, trending around 40 mg/l in past years but now trending around 50 mg/l in the summer of 2015 and have spiked previously in summer months (as high as 90 mg/l in one sample in 2014) but have always been below the CCME long term guidance of 120 mg/l for protection of freshwater aquatic life. There is no MMER discharge standard for chloride (see Figures 4, 5, 6 and 7).

Analysis of the water quality monitoring data also shows a change in the trend of ammonia concentrations measured in containment pond P1 again starting in mid-June of 2015 (see Figure 8).

It is our belief that the probable source of this increase in chloride and ammonia concentrations has to be from the underground mine development activities, chloride from the salt used in drilling and/or from increased inflow of higher salinity groundwater from the surrounding rock and from explosive use underground and possibly from surface management issues of the calcium chloride stored on surface and from snow management. We are currently having development activity occurring below the permafrost but are experiencing low ground water inflow in these areas.

Agnico has initiated a series of actions designed to both better understand the reasons behind these trends and to contain and/or treat the water coming from the underground workings to control these trends. These actions include:

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1. Increased frequency and more intensive sampling of the underground sources to allow for a better understanding of where the increased chloride and ammonia is coming from:
2. A review of explosives use practices in the underground to tighten up any wastage;
3. Engineering review to find alternatives to construct a larger and tighter containment facility on surface at containment pond P1 to ensure long term containment of all underground mine water to prevent further release of chloride and ammonia into Lake A8. The immediate focus is on increasing storage capacity in containment pond P1 to accommodate the 2016 spring freshet and to limit to the greatest extent practical any seepage from containment pond P1 into Lake A54;
4. Engineering review to eliminate the surface sump at the top of the exploration decline and to re-route all water pumped from sump 1 located just inside the portal directly into containment pond 1; and
5. A review of current practices to improve the management on surface of calcium chloride storage and the management of potentially contaminated snow.

These activities are currently ongoing. Agnico will provide a further update as we know more and as we develop these mitigation plans in greater detail. In the interim please contact the undersigned for additional information if needed.

Regards;
Agnico Eagle Mines Limited

Jamie Quesnel, Environmental Superintendent
Nunavut Service Group
jamie.quesnel@agnicoeagle.com
c/o Meadowbank Mine Site - (819) 759-3555 x6838

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cc:

INAC Water Resources
Andrew Keim
Water Resources Officer
INAC Nunavut Regional Office
P.O. Box 2200
Iqaluit, Nunavut X0A 0H0
Email: KeimA@inac-ainc.gc.ca

Environment Canada
Anne Wilson
Head, Water Quality
9250 49 Street NW
Edmonton, Alberta T6B 1K5
Email: anne.wilson2@canada.ca

Fisheries and Oceans Canada
Elizabeth Patreau
Senior Fisheries Protection Biologist
P.O. Box 358,
Iqaluit, Nunavut X0A 0H0
Email: Elizabeth.Patreau@dfo-mpo.gc.ca

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Figures

Figure 1: Configuration of the Meliadine Exploration Decline Surface Area - Photo taken in July of 2014

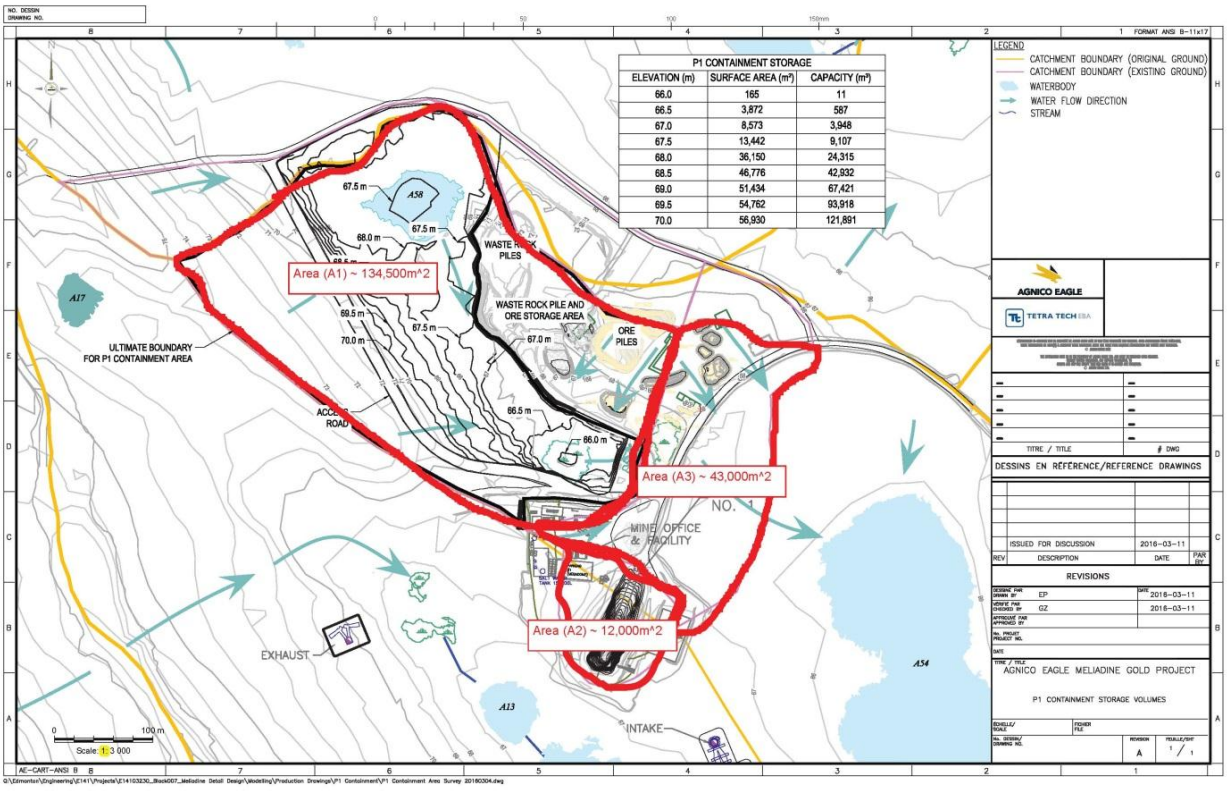

Figure 2: Meliadine Decline Surface Containment Pond P1 - Watershed Areas

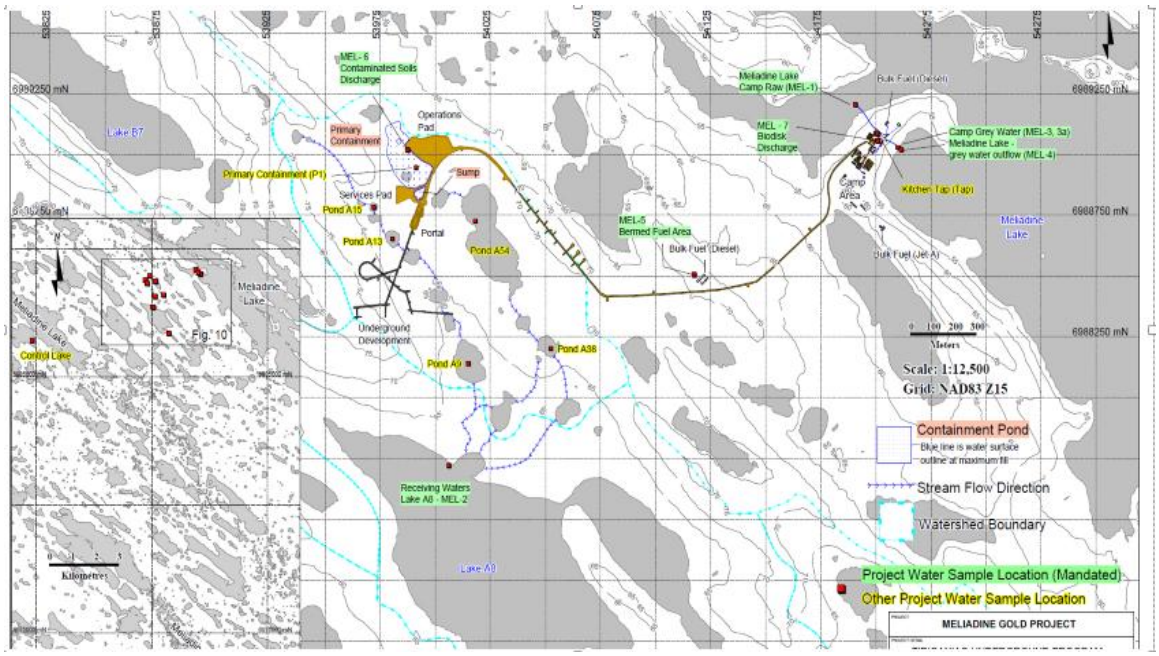

Figure 3: Meliadine Decline Water Management - Water Quality Monitoring Stations

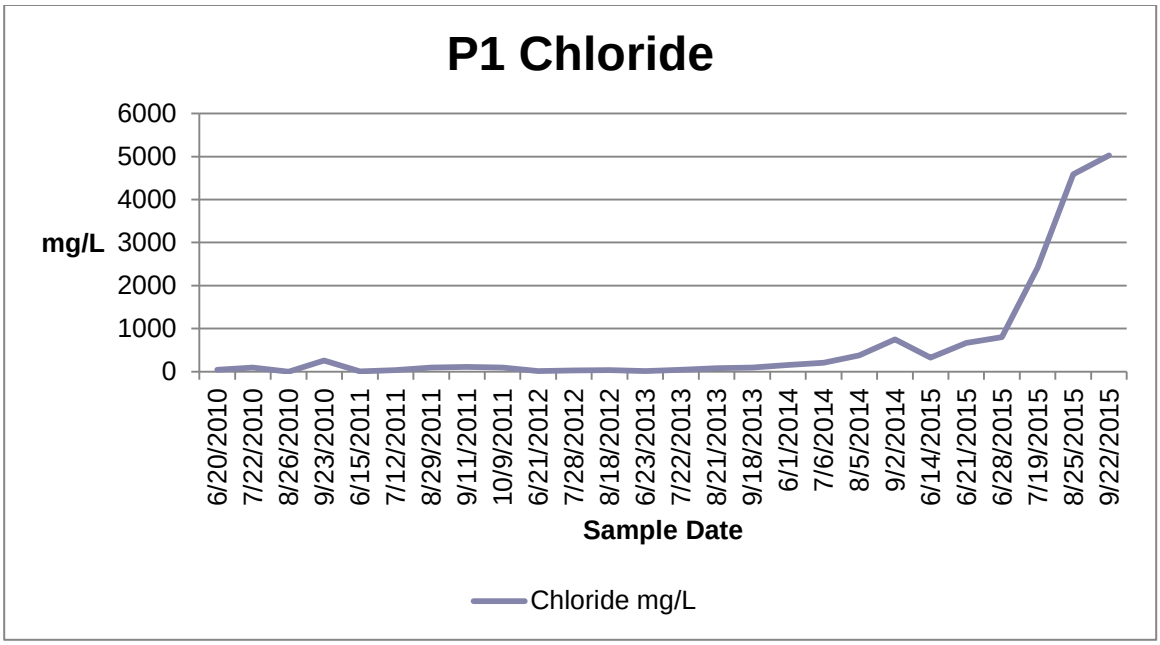

Figure 4: Measured Chloride Concentrations in UG Decline Containment Pond P1

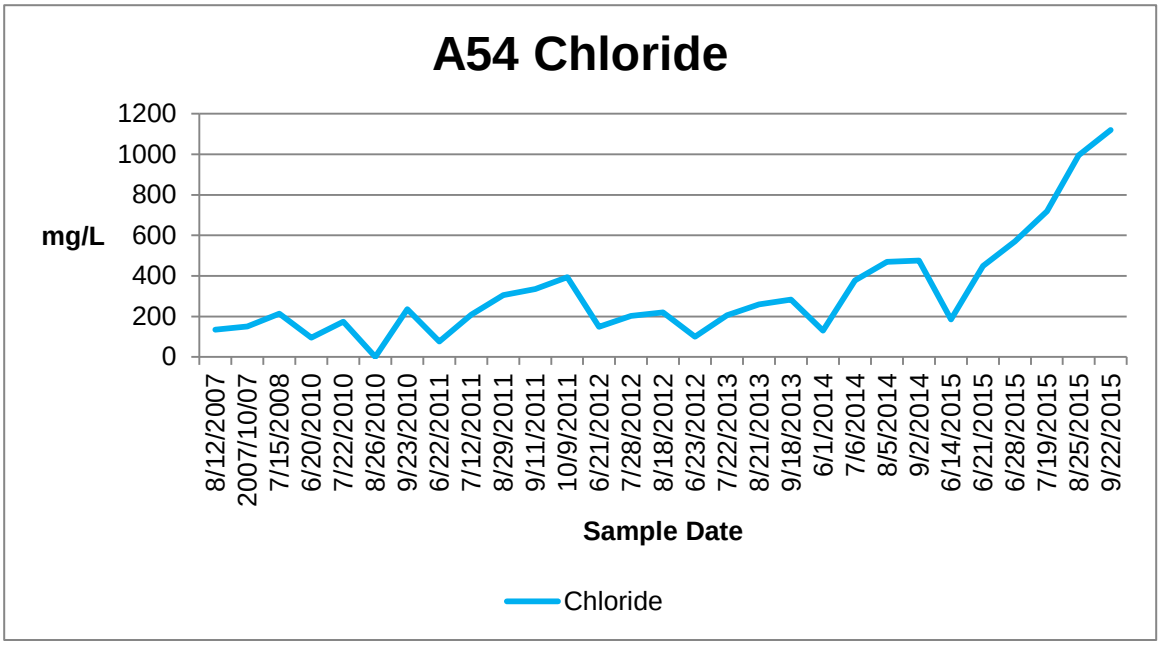

Figure 5: Measured Chloride Concentrations in Lake A54 - Peanut Lake

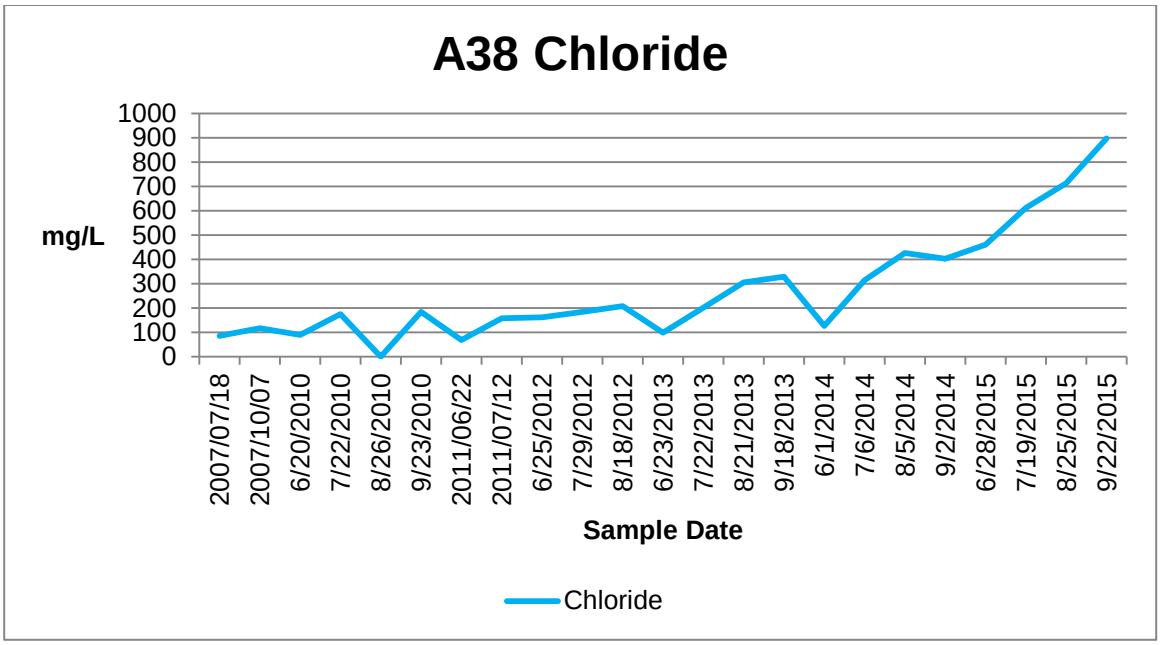

Figure 6: Measure Chloride Concentrations in Pond A38

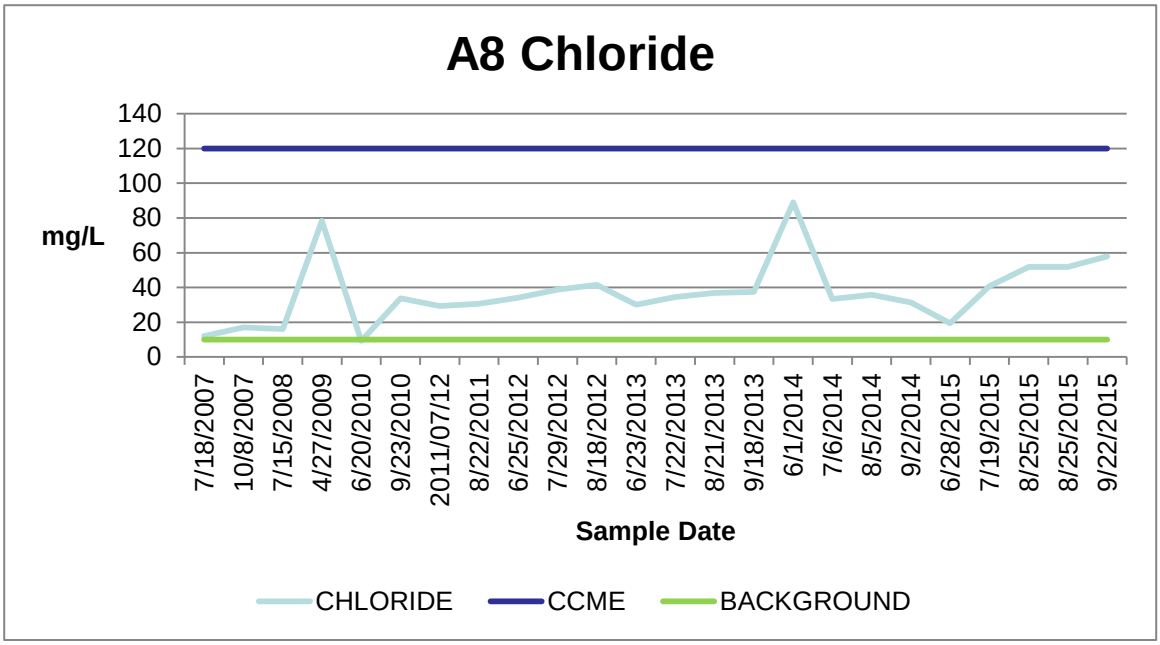

Figure 7: Measured Chloride Concentrations in Lake A8

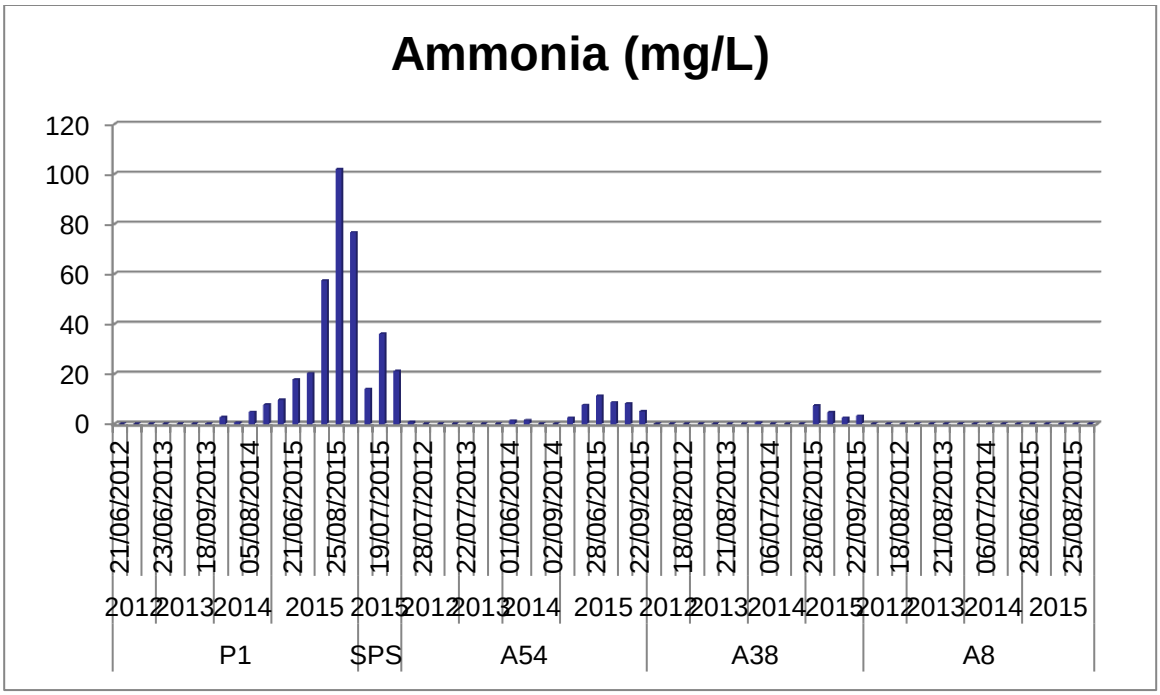

Figure 8: Measured Ammonia Concentrations in Containment Pond P1, Surface Sump, Lake A54, Pond A38 and Lake A8

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0 50 100 150mm

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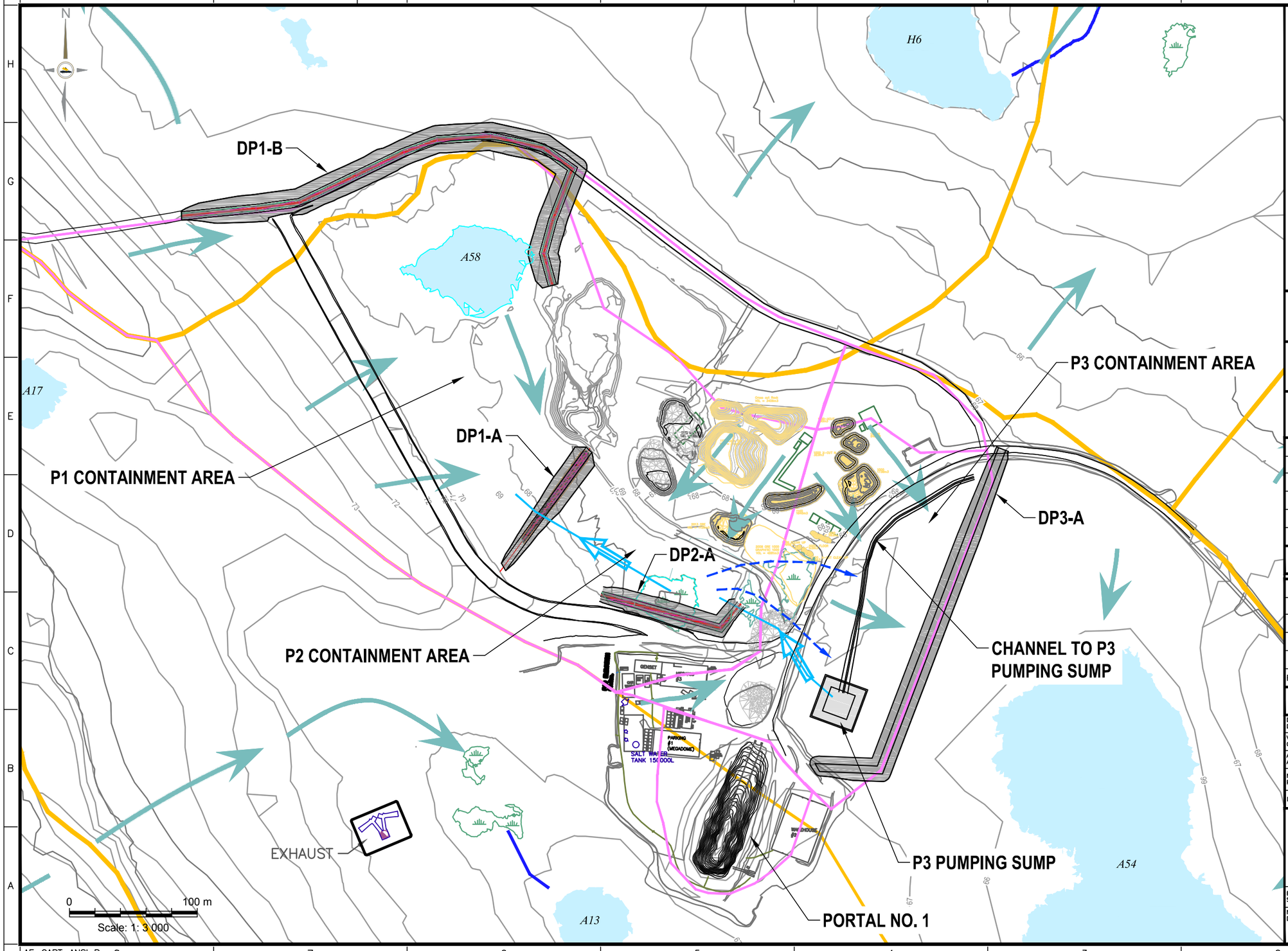

LEGEND

- CATCHMENT BOUNDARY (ORIGINAL GROUND)
- CATCHMENT BOUNDARY (EXISTING GROUND)
- WATERBODY
- SURFACE WATER FLOW DIRECTION
- STREAM
- PUMP AND PIPELINE FOR WATER MANAGEMENT
- POTENTIAL SEEPAGE ROUTES THAT MAY REQUIRE DOWNSTREAM WATER MANAGEMENT

NOTE: ADDITIONAL SEEPAGE COLLECTION SUMPS, PUMPS AND PIPELINES WILL BE INSTALLED AS NECESSARY TO COLLECT AND MANAGE SEEPAGE CIRCUMVENTING THE TEMPORARY FROZEN CORE DIKE STRUCTURES DURING FRESHET 2016.

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TETRA TECH EBA

TITRE / TITLE	# DWG

DESSINS EN RÉFÉRENCE/REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	PAR BY
	FOR DISCUSSION ONLY	2016–03–28	

REVISIONS

DESSINÉ PAR / DRAWN BY	EP	DATE 2016–03–21
VÉRIFIÉ PAR / CHECKED BY	NG	2016–03–21
APPROUVÉ PAR / APPROVED BY		
No. PROJET / PROJECT NO.		
DATE		

TITRE / TITLE

AGNICO EAGLE MELIADINE GOLD PROJECT

CONCEPTUAL LAYOUT PLAN OF P1 WATER MANAGEMENT INFRASTRUCTURE FOR FRESHET 2016

ÉCHELLE/ SCALE	FICHIER FILE		
No. DESSIN/ DRAWING NO.		REVISION 00	FEUILLE/SHT 1 / 2

AE–CART–ANSI B

Q:\Edmonton\Engineering\E141\Projects\E14103230_Block007_Meliadine Detail Design\Modelling\Production Drawings\P1 Containment\P1 Containment Area Survey 20160315 Frozen Core Option Model–For Regulator.dwg

NO. DESSIN
DRAWING NO.

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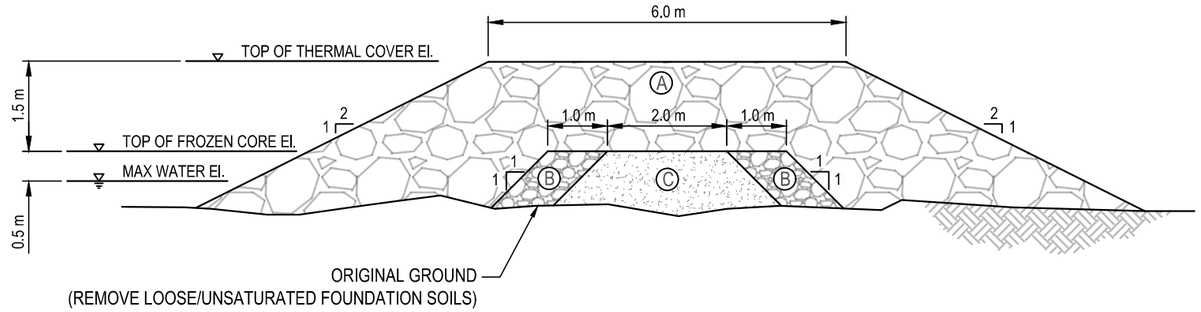
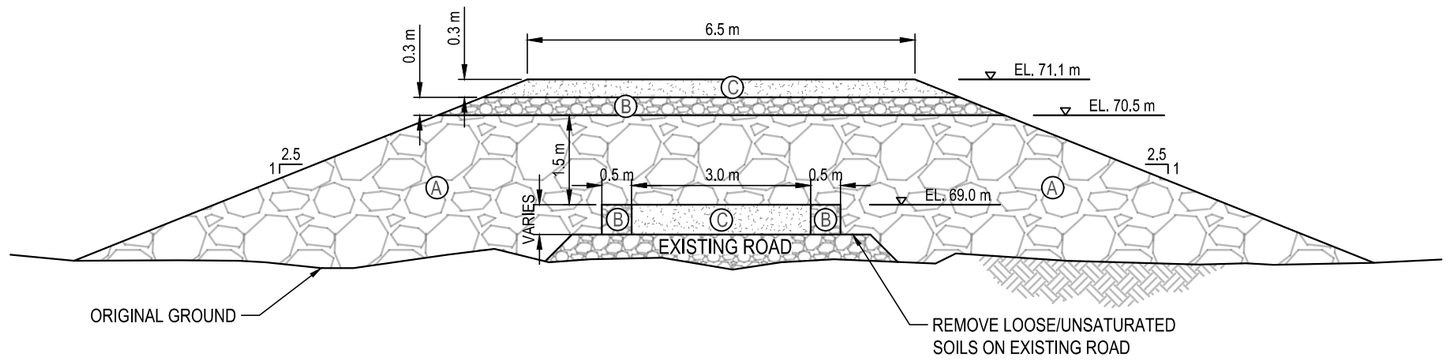


TEMPORARY FROZEN CORE DIKE TYPICAL CROSS SECTION
(DP1-A, DP2-A, DP3-A)



TEMPORARY FROZEN CORE DIKE TYPICAL CROSS SECTION WITH ROAD
(DP1-B)

TEMPORARY FROZEN CORE DIKES			
FROZEN CORE DIKE	MAX WATER EL. (m)	TOP OF FROZEN CORE El. (m)	TOP OF THERMAL COVER El. (m)
DP1-A	68.5	69.0	70.5
DP1-B	68.5	69.0	70.5
DP2-A	67.5	68.0	69.5
DP3-A	67.0	67.5	69.0

LEGEND

- (A) RUN-OF-MINE (0-600mm)
- (B) TRANSITION ROCKFILL (0-200mm)
- (C) FROZEN CORE (0-30mm)

NOTE: ADDITIONAL SEEPAGE COLLECTION SUMPS, PUMPS AND PIPELINES WILL BE INSTALLED AS NECESSARY TO COLLECT AND MANAGE SEEPAGE CIRCUMVENTING THE TEMPORARY FROZEN CORE DIKE STRUCTURES DURING FRESHET 2016.

AGNICO EAGLE

TETRA TECH EBA

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No. PROJET / PROJECT NO.		
DATE		

TITRE / TITLE
AGNICO EAGLE MELIADINE GOLD PROJECT

TYPICAL SECTIONS OF P1 WATER MANAGEMENT INFRASTRUCTURE FOR FRESHET 2016

ÉCHELLE/ SCALE	FICHIER FILE		
No. DESSIN/ DRAWING NO.		REVISION 00	FEUILLE/SHT 2 / 2

AE–CART–ANSI B

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