AGNICO EAGLE
MELIADINE

March 2019

Design Report
Meliadine Saline Pond #3 (SP-3)

6528-680-132-REP-002

Prepared by:
WSP Canada Inc.

AGNICO EAGLE
MEADOWBANK

March 2019

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	2019-03-18			Design report

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1 INTRODUCTION

1.1 SITE LOCATION

WSP Canada Inc. (WSP) was retained by Agnico Eagle Mines Limited (Agnico Eagle) to prepare the Design Report of the proposed saline pond nº 3 (SP-3) at the Meliadine mine site 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 saline pond will be built within the existing pond nº 3 (P-3) and will be used to collect treated saline water prior to shipping via tanker trucks to the saline effluent discharge system at Rankin Inlet.

1.2 PURPOSE OF THE DOCUMENT

The purpose of the report is to outline the final design and construction drawings for SP-3.

2 SPECIFICATIONS

2.1 DESIGN CRITERIA

The accretion of water in the pond coming from SETP will be limited to 5,000 cubic meters. However, a maximum of 800 cubic meters of saline treated water is permitted to be discharged per day into the marine environment. This corresponds to a combined 21 trips of tank trucks of 38 cubic meters from de SP-3 pond to the storage tank next to the discharge site, west of Rankin Inlet via Itivia street. Time of one round trip is estimated to be about 3 hours.

To reach a volume of 5,000 cubic meters of saline treated water, it will take for the Saline Effluent Treatment Plant more or less 6 days to produce. Therefore, if maintenance is required on the road to the discharge site or on the truck fleet or anything else that delays the discharge to the marine environment, the treatment plant will be able to continue operating and pump the mine shaft brine for 6 days straight.

2.2 SITE SPECIFIC DATA AND ANALYSIS

The Saline Pond nº 3 (SP-3) is located next to the Saline Water Treatment Plant (SWTP), which is beside the portal nº 1 and the ventilation and emergency egress. There is an existing pit of approximately three hundred (300) meters in length named P-3, flanked with P-3 dike (DP-3).

It will be separated in three parts. One of it being the SP-3 on roughly 50 meters in length in between an untouched part of P-3 that will act as a collection pond, and another part of the P-3 pond that will be

backfilled to be a snow accumulation area. Since the SP-3 is incorporated in the P-3, no excavation work is projected, only berm building and membrane installation which is set to happen during winter.

3 CONSTRUCTION

3.1 GENERAL

All aspects of the civil earthworks' construction, including foundation preparation, backfill procedures and geomembrane placement, will be according to the Technical Specifications for Civil Earthworks (Tetra Tech, 2017) unless otherwise stated below.

Construction is expected to begin and be completed in April 2019.

3.2 FOUNDATION PREPARATION

- Approximately 0.2 m of ice (as of last surveyed elevation September 30th, 2018) currently overlies the original ground surface of the P3 containment area. This ice will be mechanically removed (excavator or bulldozer) prior to backfill placement. Excess snow will be removed from the slopes of the road and D-P3A.
- A topographical survey will be completed verifying previously collected data.

Figure 3.1 illustrates the completed dike DP3-A located on the eastern boundary of the P3 containment area.

Figure 3.1 : Dike DP3-A at the Meliadine Mine (Tetra Tech, 2016)

3.3 UNDERLINER PLACEMENT

- The 600 mm (0.6 m) minus Run of Mine (ROM) will be placed in controlled lifts not exceeding 0.5 m in height. Each lift of material will be compacted with at least four (4) passes of a smooth drum vibratory compactor before placement of the next lift.
- The inside slopes are designed so the degree of inclination is sufficient for the needs of the project
- The outside slopes of 66 % help reduce the footprint of the pond and subsequently the volume of materials required.
- The berms will be sloped with an excavator after compaction.
- Liner bedding material (30 mm minus ROM) will be placed in one lift (0.2 m thickness) with an excavator. Bedding material placed on the floor of the containment area will be compacted with the 10-tonne vibratory compactor with at least four (4) passes. Bedding material placed on the slopes of the containment area will be tamped in place with the excavator bucket.

3.4 LINER SYSTEM

- Once the bedding surface has been prepared, nonwoven geotextile (540 g/m^2) will be unrolled and placed over the entire containment area as an additional protective measure for the geomembrane.

Geotextile panels will be overlapped as per specification and bonded to ensure continuity of the cushion layer.

- 60 mil HDPE will be installed over the geotextile by a qualified installation contractor. All installation, seaming and repair procedures will be conducted according to the project plans and specifications and manufacturer's recommendations.

3.5 QUALITY CONTROL/ASSURANCE

A quality control report, including a description of the geomembrane installation process, details of all Quality Control test results and repair procedures, and a record drawing will be produced by the installation contractor.

Quality assurance will be provided by Agnico Eagle.

3.6 TIMELINE

The testing on the Saline Effluent Treatment Plant is planned for the beginning of July and a pond for discharge and sampling will be required. The construction of the SP-3 pond can be done during winter time since no excavation is required.

4.0 OPERATIONS

Once the SP-3 pond is emptied of saline treated water during the operation of the treatment plant, it will be imperative to monitor the elevation of the water in the adjacent basin P-3. To avoid destabilizing the sealed installations and causing an uplift of the membrane, the maximum water level of P-3 should not exceed 1 meter in depth, because the foundation allows the water to flow underneath due to a lack of cohesive materials to build a waterproof core inside the berm.

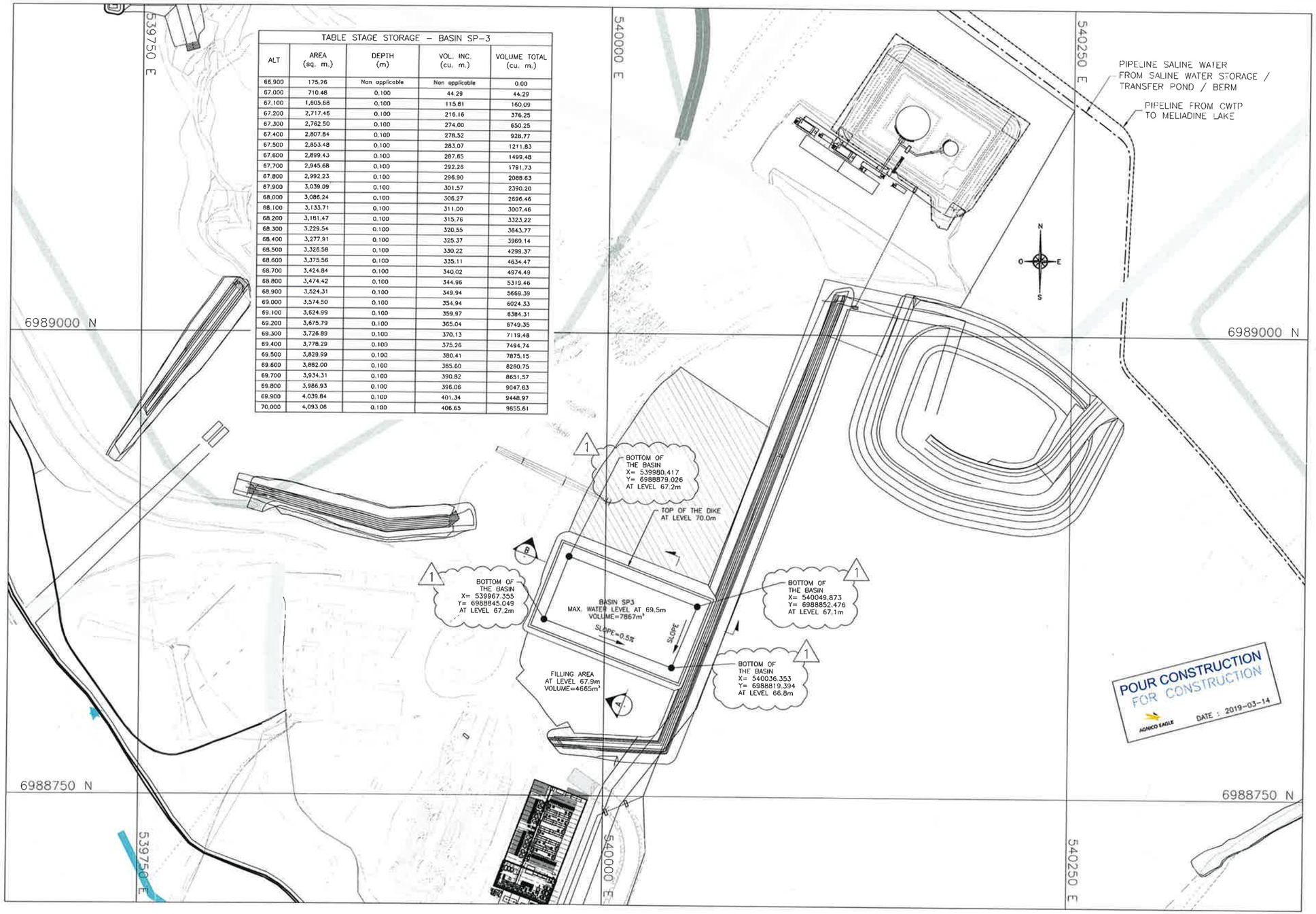
Since the HDPE liner will be the only waterproof element of the system, an annual inspection of its condition will be necessary. Except the risks of punching, the solder joints will also need to be inspected. Permafrost underneath the SP-3 pond could eventually unfreeze and cause sagging. It will be important to monitor the condition of dikes during thaw period at the end of winter before restarting the operation of the treatment plant. No erosion or sedimentation is expected on the outside slopes of the berms because of the type of material used.

Appendix A: Construction drawings

NO. DESSIN / DRAWING NO. 65-695-230-254_R1

FORMAT ARCHD

TABLE STAGE STORAGE – BASIN SP-3				
ALT	AREA (sq. m.)	DEPTH (m)	VOL. INC. (cu. m.)	VOLUME TOTAL (cu. m.)
66.900	175.26	Non applicable	Non applicable	0.00
67.000	710.48	0.100	44.29	44.29
67.100	1,605.68	0.100	115.81	160.09
67.200	2,717.46	0.100	216.16	376.25
67.300	2,762.50	0.100	274.00	650.25
67.400	2,807.84	0.100	278.52	928.77
67.500	2,853.48	0.100	283.07	1211.83
67.600	2,899.43	0.100	287.65	1499.48
67.700	2,945.68	0.100	292.26	1791.73
67.800	2,992.23	0.100	296.90	2088.63
67.900	3,039.09	0.100	301.57	2390.20
68.000	3,086.24	0.100	306.27	2696.46
68.100	3,133.71	0.100	311.00	3007.46
68.200	3,181.47	0.100	315.76	3323.22
68.300	3,229.54	0.100	320.55	3643.77
68.400	3,277.91	0.100	325.37	3969.14
68.500	3,326.58	0.100	330.22	4298.37
68.600	3,375.56	0.100	335.11	4634.47
68.700	3,424.84	0.100	340.02	4974.49
68.800	3,474.42	0.100	344.95	5319.46
68.900	3,524.31	0.100	349.94	5668.39
69.000	3,574.50	0.100	354.94	6024.33
69.100	3,624.99	0.100	359.97	6384.31
69.200	3,675.79	0.100	365.04	6749.35
69.300	3,726.89	0.100	370.13	7119.48
69.400	3,778.29	0.100	375.26	7494.74
69.500	3,829.99	0.100	380.41	7875.15
69.600	3,882.00	0.100	385.60	8260.75
69.700	3,934.31	0.100	390.82	8651.57
69.800	3,986.93	0.100	396.06	9047.63
69.900	4,039.84	0.100	401.34	9448.97
70.000	4,093.06	0.100	406.65	9855.61



PLAN VIEW
Scale: 1: 1000

PLAN CLÉ / KEY PLAN

wsp
1135, 24 AVENUE E
VAL-D'OR (QUÉBEC) CANADA J9P 1W1
TÉL. : 1 819 825-4711 | TÉLÉC. : 1 819 825-4715 | WWW.WSP.COM

Réf. 181-15686-00

NOTES GÉNÉRALES / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TYPE / TITLE	NO.
MASTER ST - GROUND LEVELING / FINISHED GRADE ELEVATION	65-000-230-207_R0

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
1	2019-03-14	ISSUED FOR CONSTRUCTION	J.C.	S.D.	
0	2019-03-01	ISSUED FOR CONSTRUCTION	J.C.	S.D.	

REVISIONS

TITRE / TITLE
AGNICO EAGLE – MELIADINE DIVISION
695 – WATER MANAGEMENT
230 – GENERAL EARTH WORKS
SP3 LAYOUT

PLAN VIEW

DESSINÉ PAR / DRAWN BY	JULIE CROTEAU, tech.	DATE: 2019-02-15
VÉRIFIÉ PAR / CHECKED BY	STEPHAN DUPUIS, P. Eng.	2019-03-14
APPROUVÉ PAR / APPROVED BY	STEPHAN DUPUIS, P. Eng.	2019-03-14
ÉCHELLE / SCALE	INDICATED	DATE: 2019-02-15
NO. DESSIN / DRAWING NO.	65-695-230-254	
NO. PROJET / PROJECT NO.	6528	REVISION: 1 / FEUILLE / SHT: 1 / 1

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FILE NO. 65-695-230-254_R1.dwg

NO. DESSIN DRAWING NO. 65-695-230-255_R1

FORMAT ARCHD

TABLE STAGE STORAGE – BASIN SP-3				
ALT	AREA (sq. m.)	DEPTH (m)	VOL. INC. (cu. m.)	VOLUME TOTAL (cu. m.)
66.900	175.26	Non applicable	Non applicable	0.00
67.000	710.48	0.100	44.29	44.29
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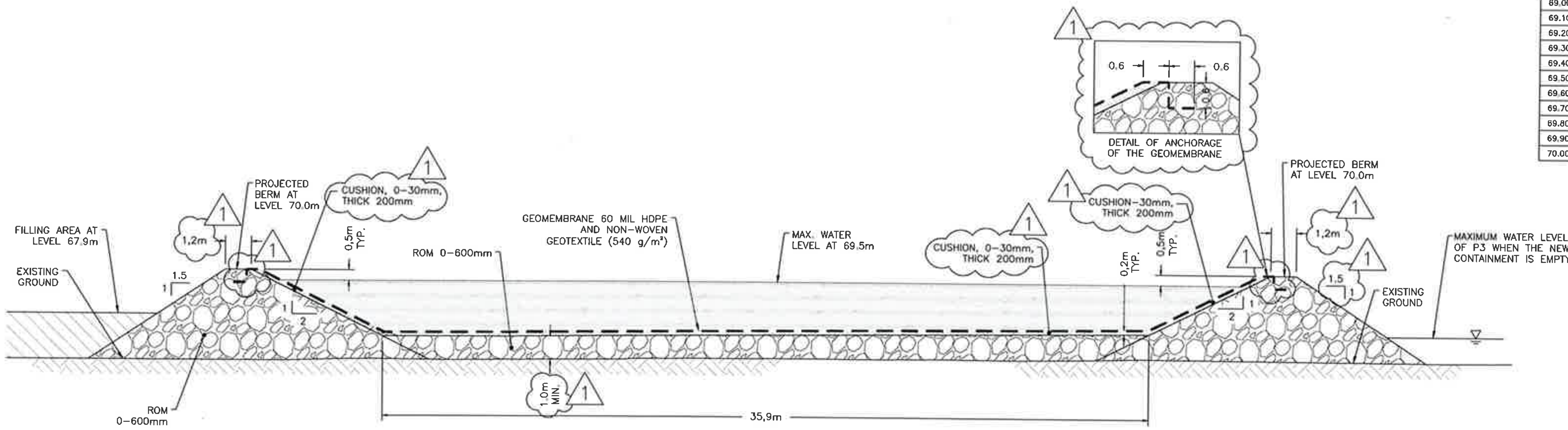


SECTION "A"
Scale: 1: 125

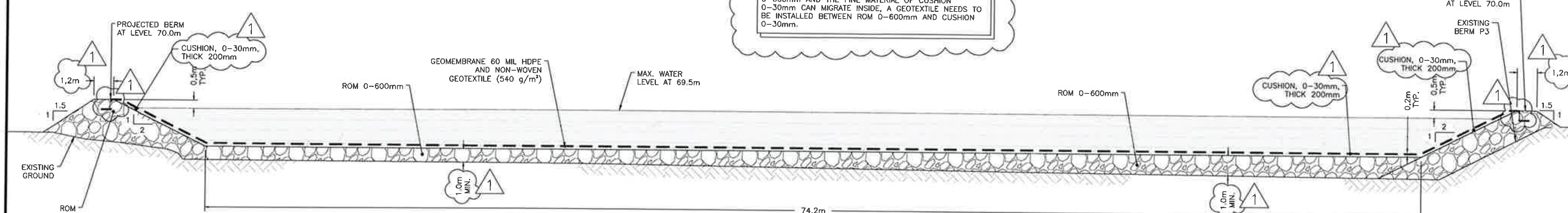
POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2019-03-14

NOTE:

THE GEOMEMBRANE CUSHION AND ANCHOR MUST BE APPROVED BY THE MANUFACTURER.

THE WELDS OF THE GEOMEMBRANE MUST BE MADE BY A CERTIFIED WELDER APPROVED BY THE MANUFACTURER.

IF THERE ARE HOLES IN THE SURFACE OF THE ROM 0-600mm AND THE FINE MATERIAL OF CUSHION 0-30mm CAN MIGRATE INSIDE, A GEOTEXTILE NEEDS TO BE INSTALLED BETWEEN ROM 0-600mm AND CUSHION 0-30mm.



SECTION "B"

PLAN CLÉ
KEY PLAN

wsp
1075, 3e AVENUE E
VAL-D'OR (QUÉBEC) CANADA J9P 5M1
Ref. 181-15688-00

NOTES GÉNÉRALES / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
INDUSTRIAL SITE - GROUND LEVELING / FINISHED GRADE ELEVATION	65-000-230-207_R0

AGNICO EAGLE

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1	2019-03-14	ISSUED FOR CONSTRUCTION	J.C.	S.D.	
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REVISIONS

2019-03-15

TITRE / TITLE
AGNICO EAGLE – MELIADINE DIVISION
695 – WATER MANAGEMENT
230 – GENERAL EARTH WORKS
SP3 LAYOUT

SECTIONS & DETAILS

DESSINÉ PAR DRAWN BY	JULIE CROTEAU, tech.	DATE 2019-02-15
VÉRIFIÉ PAR CHECKED BY	STEPHAN DUPUIS, P. Eng.	2019-03-14
APPROUVÉ PAR APPROVED BY	STEPHAN DUPUIS, P. Eng.	2019-03-14
ÉCHELLE SCALE	INDICATED	DATE 2019-02-15

NO. DESSIN DRAWING NO. 65-695-230-255

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6528	1	1 / 1

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FILE NO. 65-695-230-255_R1.dwg