

Appendix G5

Report: East Dike Seepage As-Built



October 7th, 2014

Ms. Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Re: Water License 2AM-MEA0815 Part D, Item 26 - Submission of East Dike Seepage As-Built Report

Dear Ms. Beaulieu,

In accordance with Water License 2AM-MEA0815, Part D, Item 26: *'The Licensee shall submit a Construction Summary Report to the Board, within ninety (90) days following the completion of each structure designed to contain, withhold, divert or retain Waters or Wastes. The Construction Summary Report shall be prepared by a qualified Engineer(s) in accordance with Schedule D, Item 1'*, please find below the construction design and the as-built details for the summer and winter East Dike seepage discharge diffuser in Second Portage Lake enclosed with this letter.

The summer diffuser has been used during the period of May to September and is the same configuration and design proposed by AEM on Figure EDS-01 in the document *East Dike Seepage - NWB Application for a Type A Water License Modification* (AEM, 2013).

Due to operational constraints and harsh winter conditions that caused freezing of the summer diffuser line, an alternate configuration was designed to allow discharge of water consistent with the summer diffusion criteria. The winter and summer as-built configuration have a maximum discharge velocity of 6 m/s to promote mixing of seepage water and is designed to avoid potential lake-bottom erosion. In order to avoid freezing during the approximate period of October to April, heat trace cable was installed along the pipe, as the pipe can freeze very rapidly if the pumping system is shut down.

As presented in Table 1 below, the summer and winter diffusers present a design that meets the criteria recommended in the *Technical Memorandum – Discharge of dike seepage water into the Third Portage Lake and Second Portage Lake* (Golder, 2011) submitted with modification application document on April 23rd, 2013; therefore impacts to the receiving aquatic environment are not expected. With the design flow (1000 m³/day) and the measured flow (700 m³/day) calculated with flowmeters, the flow velocities of the summer and winter diffuser discharge are respectively of 6 m/s and 4.1 m/s. For both configurations, the flow velocities are within the recommended design flow velocity ranging from 3 m/s to 6 m/s. The discharges of the summer and winter diffuser are both oriented East, away from the dike and the island to minimize risk of erosion. The distance of the discharge from the shoreline is 45 m for both configurations mainly to reach an area with a sufficient water depth of 5m. The summer diffuser is anchored with boulders placed around the pipe on the shore to avoid movement due to wind, currents and



waves. The winter diffuser is anchored on the ice, with the pipe directed to discharge below the ice. Finally, most of the water volumes are expected to be discharged during the summer and fall under open water conditions, as the volume generally decreases during the winter period.

Table 1 – Summary of Design and As-Built Criteria

Criteria	Recommended (Golder, 2011)	Summer Diffuser	Winter Diffuser
Design flow	1000 m ³ /day (12 L/s)	12 L/s	12 L/s
Design flow velocity	3 to 9 m/s	6 m/s	6 m/s
Average measured Flow - 700 m ³ /day (8 L/s)	-	8.3 L/s	8.3 L/s
Measured flow velocity	-	4.1 m/s	4.1 m/s
SPL discharge orientation	South East	East	East
Distance from the shoreline (adjusted to field condition)	10 m	45 m	45 m
Minimal water depth	5 m	5 m	5 m
Anchoring outfall to prevent movement	Yes	Yes (with boulder)	Yes (in the ice)

Both summer and winter configuration for the diffuser meet the recommended design criteria to promote mixing of clean east dike seepage water into ambient lake water, is protective of the aquatic life around the edge of the 30 m mixing zone around the discharge outfalls and minimizes the potential risk of erosion.

Should you have any questions regarding this letter, please contact me or Ryan VanEngen.

Regards,

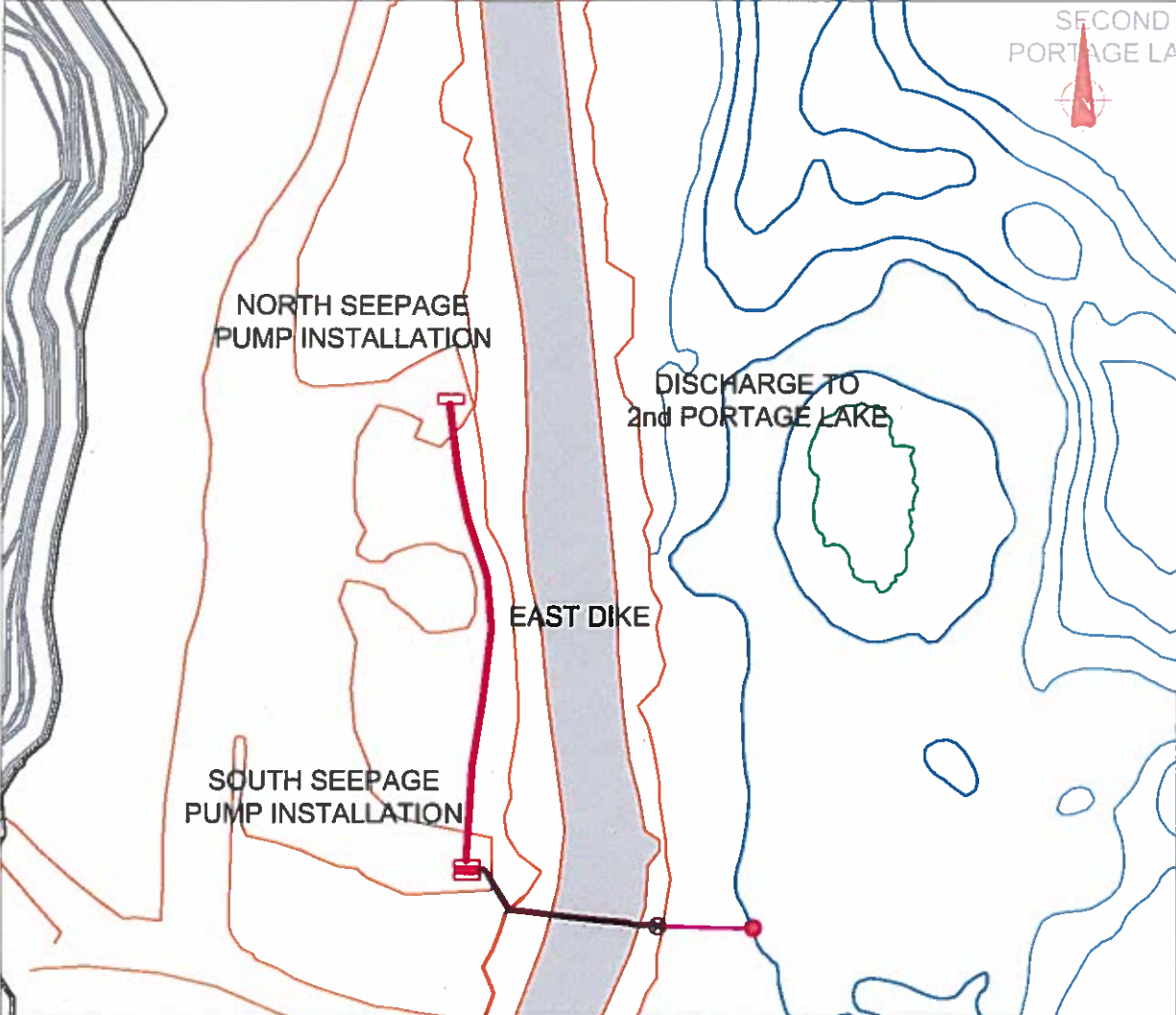
Agnico Eagle Mines Limited – Meadowbank Division

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Senior Compliance Technician

Ryan VanEngen
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Environment Superintendent Interim

cc: *Murray Ball, Aboriginal Affairs and Northern Development Canada*
Luis Manzo, Kivalliq Inuit Association

EAST DIKE SEEPAGE PUMP INSTALLATION - PLAN VIEW

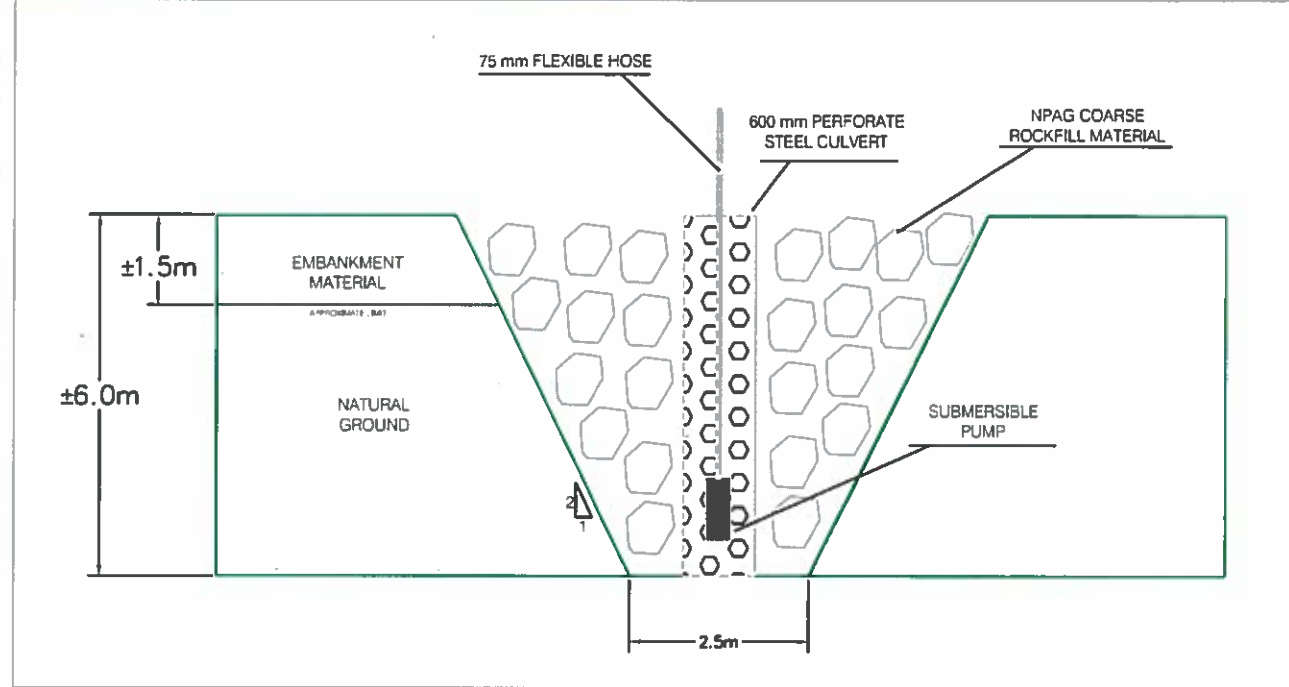


- LEGEND**
- EXISTING ROADS/ INFRASTRUCTURES
 - WATER LAKE SHORE
 - BATHYMETRY
 - PORTAGE PIT FOOTPRINT
 - HEAT TRACED CABLE
 - 4" HDPE PIPE DR17
 - 4" HDPE PIPE DR17 INSULATED
 - PUMPING STATION
 - DIKE
 - QUICK CONNECT VITAUIC
 - DISCHARGE - DIFFUSER

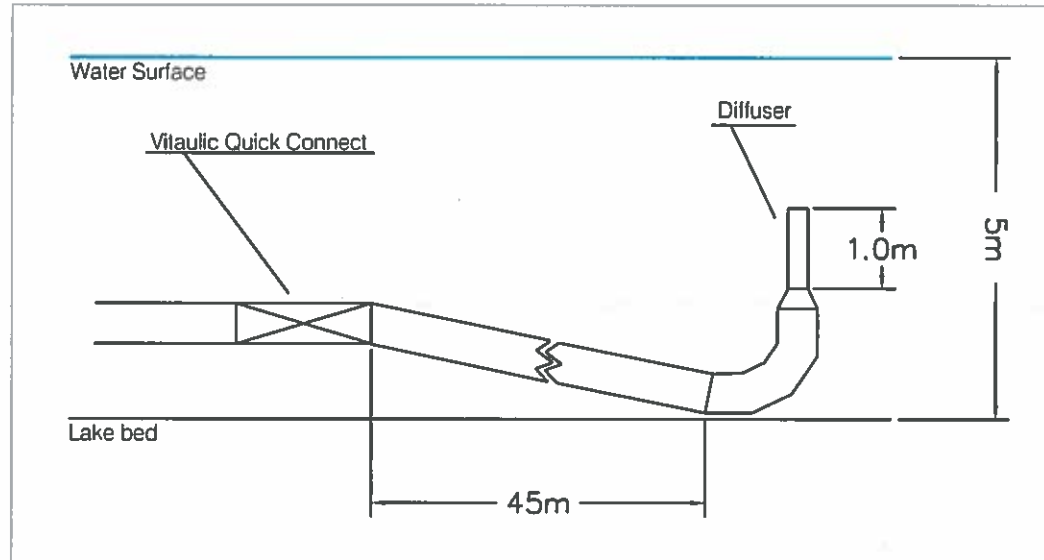
PUMP STATION LOCATION AND FLOW RATE			
	SOUTH SEEPAGE	NORTH SEEPAGE	DISCHARGE
EASTING	639318.4875	639309.4118	639459.4427
NORTHING	7213938.2632	7214183.4241	7213913.3499
DESIGN FLOW RATE	4 L/s	8 L/s	12 L/s
DESIGN FLOW VELOCITY	-	-	6 m/s
MEASURED FLOW	-	-	8.3 L/s
MEASURED VELOCITY	-	-	4.1 m/s

* Measured flow estimated with flowmeter
* Discharge includes both South and North seepage

PUMP INSTALLATION - TYPICAL CROSS SECTION



DISCHARGE - TYPICAL CROSS SECTION



- Technical specifications**
- Diffuser composed of a 90 degree elbow pipe with a 1.0 m long 4" pipe. The water is discharged vertically.
 - At the diffuser location, the lake is 5m deep and the ice cover will reach a maximum of 2 m thick during the winter.
 - The water going trough this diffuser has the same flow velocity at the end of the pipe than with the winter design.
 - This diffuser will be in function during summer period going approximately May to September.

DRAWING NO.	REFERENCES

REV	DATE	DES	REVISION DESCRIPTION



PROJECT

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT

TITLE

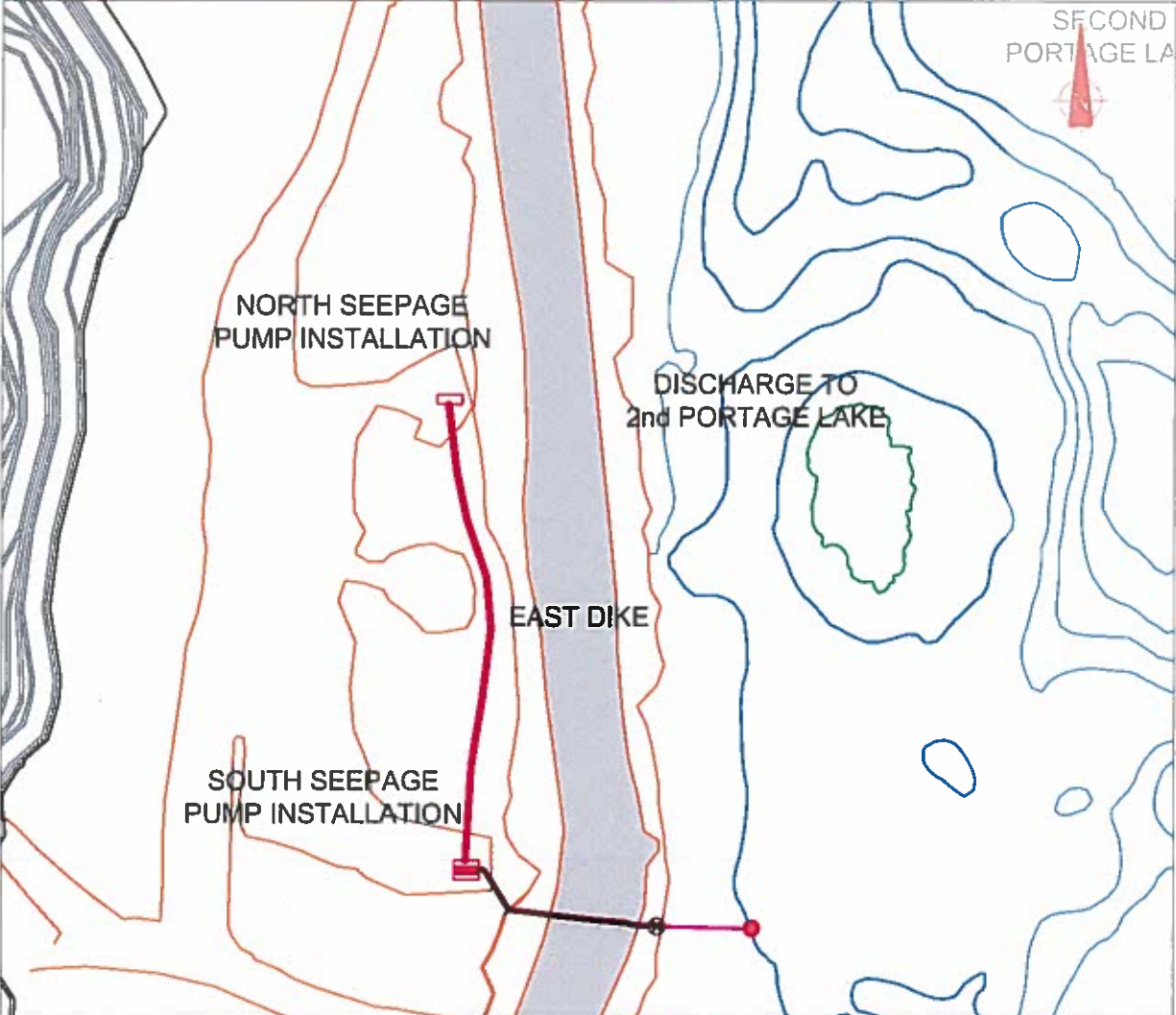
**EAST DIKE SEEPAGE
DIRECT DISCHARGE TO
2nd PORTAGE LAKE**

PROJECT No. 12-1221-0010-3100

DESIGN	MG	SFB2014	SCALE	REV.	A
CADD	MG	SFB2014			
CHECK					
REVIEW	EV	24SEP2014			

Summer Diffuser

EAST DIKE SEEPAGE PUMP INSTALLATION - PLAN VIEW



LEGEND

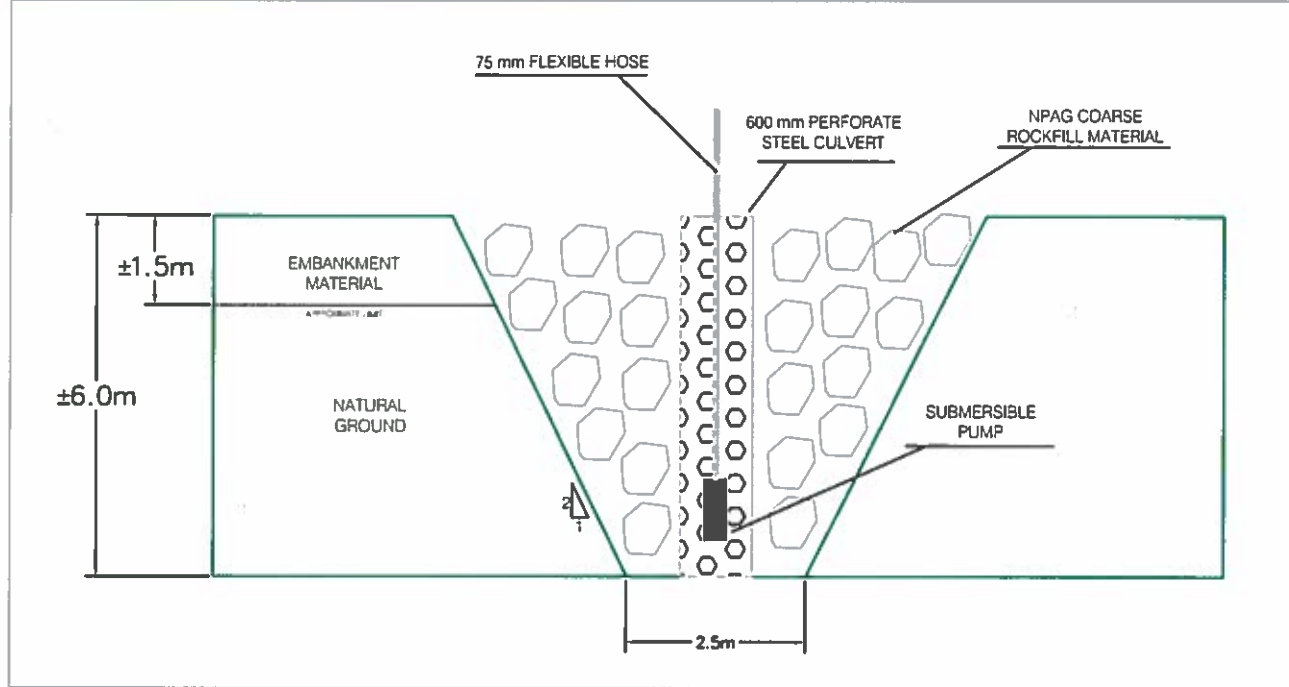
- EXISTING ROAD/ INFRASTRUCTURES
- WATER LAKE SHORE
- BATHYMETRY
- PORTAGE PIT FOOTPRINT
- HEAT TRACED CABLE
- 4" HDPE PIPE DR17
- 4" HDPE PIPE DR17 INSULATED
- PUMPING STATION
- DIKE
- QUICK CONNECT VITALLIC
- DISCHARGE - DIFFUSER

PUMP STATION LOCATION AND FLOW RATE

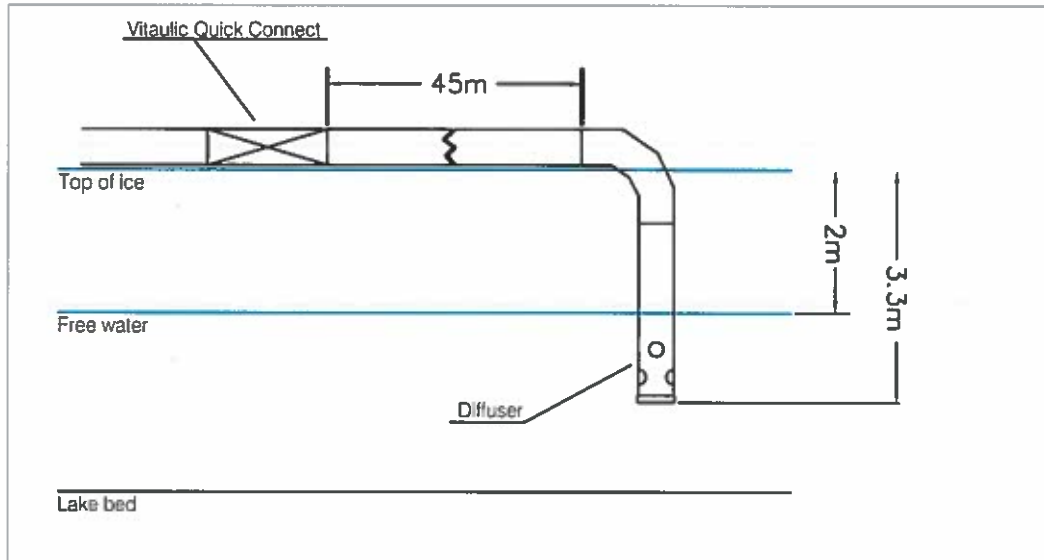
	SOUTH SEEPAGE	NORTH SEEPAGE	DISCHARGE
EASTING	639318.4875	639309.4118	639459.4427
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DESIGN FLOW RATE	4 L/s	8 L/s	12 L/s
DESIGN FLOW VELOCITY	-	-	6 m/s
MEASURED FLOW	-	-	8.3 L/s
MEASURED VELOCITY	-	-	4.1 m/s

* Flow estimated by field measurement.

PUMP INSTALLATION - TYPICAL CROSS SECTION



DISCHARGE - TYPICAL CROSS SECTION



- Technical specifications**
- Diffuser composed of a 90 degree elbow pipe with a 2.5 m long 4" pipe ended with a 4" cap. 8 holes of 1/2 inch have been drilled into the pipe to discharge water to the appropriate flow rate.
 - At the diffuser location the lake is 5m deep and the ice cover will reach a maximum of 2 m thick during the winter.
 - The water going trough this diffuser has the same flow velocity at the end of the pipe than with the summer.
 - This diffuser will be in function during winter period going approximately from October to April.

DRAWING NO.	REFERENCES	REV	DATE	DES

REVISION DESCRIPTION	CADD	CHK	RW

REGISTERED PROFESSIONAL ENGINEER
J. BELANGER
LICENSEE
1903/2014

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT

TITLE
**EAST DIKE SEEPAGE
DIRECT DISCHARGE TO
2nd PORTAGE LAKE**

PROJECT No. 12-1221-0010-3100
DESIGN MG SEP2014
CADD MG SEP2014
CHECK EV
REVIEW EV 24SEP2014

SCALE
AS-BUILT DRAWING

REV. A
**Winter
Diffuser**