Title of document: **WHALE TAIL LAKE SOUTH BASIN TREATED WATER DIFFUSER DESIGN REPORT**

Client: **AGNICO EAGLE MINES – MEADOWBANK DIVISION**

Project: **DETAILED ENGINEERING DESIGN OF WATER MANAGEMENT AND GEOTECHNICAL INFRASTRUCTURES PHASE 2 - WHALE TAIL PROJECT EXPANSION**

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2020-06-15

LIST OF REVISIONS

Revision					Pages Revised	Remarks
#	Prep.	Rev.	App.	Date		
PA	ALN	PC/DC	ALN	June 2, 2020	All	Issued for internal review
PB	ALN	PC/DC	ALN	June 5, 2020	All	Issue for Client comment
00	ALN	PC	ALN	June 15, 2020	All	Issue for Design

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SNC-Lavalin has, in preparing estimates, as the case may be, followed accepted methodology and procedures, and exercised due care consistent with the intended level of accuracy, using its professional judgment and reasonable care, and is thus of the opinion that there is a high probability that actual values shall be consistent with the estimate(s). Unless expressly stated otherwise, assumptions, data and information supplied by, or gathered from other sources (including the Client, other consultants, testing laboratories and equipment suppliers, etc.) upon which SNC-Lavalin's opinion as set out herein are based have not been verified by SNC-Lavalin; SNC-Lavalin makes no representation as to its accuracy and disclaims all liability with respect thereto.

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1.0 Introduction

1.1 Context

Agnico Eagle Mines Limited, Meadowbank Division (AEM) is developing the Whale Tail Project, a satellite deposit located on the Amaruq property (Kivalliq Region of Nunavut, Canada). The Whale Tail Project construction is ongoing and commercial production has started in the third quarter of 2019. To continue mining and milling, AEM is proposing to expand the Whale Tail Project by expanding the Whale Tail pit, developing another open pit called the IVR pit and including underground mining operations. As part of the expansion project, new water management and geotechnical infrastructures shall be required for surface water management.

As part of the water management infrastructure, a diffuser is required when discharging treated water from the Amaruq Arsenic Water Treatment Plant (AsWTP) to Whale Tail Lake South Basin (WTS) during the summer months (i.e. open water season) and when required, during the winter. The following technical note presents the design of the treated water diffuser in WTS.

This design report for the treated water diffuser to WTS is submitted as per the amended Water License 2AM-WTP1830, Part D, Item 1.

1.2 Mandate

SNC-Lavalin was mandated to:

- Evaluate the material required to implement the diffuser ;
- Establish material take-off (MTO) for each diffuser;
- Produce appropriate documentation, including installation specifications and construction drawings to install the diffuser.

1.3 Reference Document

The following reference documents in Table 1-1 were developed for the detail engineering of the treated water diffuser for WTS and can be found in Appendices 1,2 and 3.

Table 1-1: Reference Documents

Document number	Version	Type of document	Description
61-695-270-224	RC	Pipe layout	Amaruq Phase 2 Diffuser Pipe Layout and Profile
61-695-270-225	RC	Pipe layout	Amaruq Phase 2 Plan and Details for Summer Treated Water Discharge Pipeline and Diffuser
61-695-270-226	RC	Pipe layout	Amaruq Phase 2 Plan and Details for Winter Treated Water Discharge Pipeline and Diffuser
6127-S-240-004-MTO-001	PE	Material Take-off List	Material Take-Off Piping, Piping Hardware Amaruq Phase 2 Water Management Infrastructure
6127-S-240-001-MTO-001	R0	Material Take-off List	Material Take-Off Diffuser Ballast Amaruq Phase 2 Water Management Infrastructure
TBC	RB	Installation Specification	Whale Tail Lake South Basin Treated Water Diffuser Installation Specification

2.0 Design Basis

2.1 Purpose

As part of the Whale Tail Project expansion, contact surface water runoff and pit infiltration from the Amaruq site shall be collected and transferred to the new IVR Attenuation Pond. The raw water is then pumped and treated at the Amaruq AsWTP to remove total suspended solids and arsenic. Treated water produced from the Amaruq AsWTP is currently being discharged to Mammoth Lake. A new treated water diffuser shall be used to disperse the treated water in the Whale Tail Lake South Basin (WTS) water column. The purpose of the diffuser is to enhance mixing of the piped effluent in WTS to meet receiving water quality objectives outside of the effluent mixing zone.

2.2 Discharge Capacity

During the summer months, treated water from the Amaruq AsWTP shall be transferred to WTS using up to 2 x 14-in HDPE pipelines and shall be discharged in the lake via two (2) submerged diffusers. Each line and diffuser shall be designed for a flow of 800 m^3/h. The total treatment capacity of the Amaruq AsWTP is 1600 m^3/h.

During the winter months, pit infiltration and dike seepage shall be transferred and stored to the IVR Attenuation Pond. No discharge of the stored water is expected during the winter months. One of the two 14-in HDPE pipeline and diffuser shall be insulated and heat traced to allow for the rapid start-up of the AsWTP at the end of the winter/start of the spring freshet to allow the transfer of treated water to WTS. The discharge flow to WTS during this period shall be up to 800 m^3/h.

Table 2-1 presents an estimate of the average volumes of water that shall be treated during the summer and winter months.

Table 2-1: Estimated Average Volumes of Treated Water Discharge to WTS

Months	Monthly Average Volume (m^3) (Note 1)
June	864,000 approx.
July	183,569 approx.
August	113,269 approx.
September	187.019 approx.
October to May	No discharge planned during the winter months.

Note 1: Volume from Golder Water Balance May 3rd, 2019 (Golder 2019a)

2.3 Treated Water Quality Data

The quality of the treated water that shall be discharged in Whale Tail Lake South Basin shall not exceed the Effluent quality limits set in the amended Water License 2AM-WTP1830, part F, item 5 and meet the Metal and Diamond Mining Effluent Regulations (MDMER) effluent criteria. Furthermore, the diffuser shall enhance mixing of the piped effluent in WTS to meet the Canadian Environment Quality Guidelines (CEQG) for the protection of Aquatic Life receiving water quality objectives outside of the effluent mixing zone. Table 2-2 summarizes the treated effluent water quality limits.

Table 2-2: Treated Effluent Water Quality Limits

Parameters	Units	Maximum Authorized Monthly Mean Concentration at Discharge of AsWTP	Maximum Authorized Concentration in a Grab Sample at Discharge of AsWTP	CEGQ Aquatic Life Limits after Dilution (note 1)
pH		6.0 to 9.5	6.0 to 9.5	--
Total Suspended Solids	mg/L	15	30	--
Total Ammonia (NH_3-N)	mg-N/L	16	32	--
Total Phosphorus	mg-P/L	0.3	0.6	0.01
Aluminum	mg/L	0.5	1.0	0.1
Arsenic	mg/L	0.1	0.2	0.025
Cadmium	mg/L	0.002	0.004	0.00004
Chromium	mg/L	0.02	0.04	0.001
Copper	mg/L	0.1	0.2	0.002
Iron	mg/L	1.0	2.0	0.3
Lead	mg/L	0.05	0.1	0.001
Mercury	mg/L	0.004	0.008	0.000026
Nickel	mg/L	0.25	0.5	0.038
Zinc	mg/L	0.1	0.2	0.03
Total Petroleum Hydrocarbons (TPH)	mg/L	3.0	6.0	--

Note 1: From Table A1 "Required Dilution for different parameters – WTP" of Golder Effluent Plume Modelling in Whale Tail Lake (South Basin), May 28th, 2019 (Golder 2019b)

3.0 Treated Water Diffuser Design

3.1 Diffuser Requirements

The treated water diffusers are designed to enhance mixing of the piped effluent in WTS to meet the Canadian Environment Quality Guidelines (CEQG) for the protection of Aquatic Life receiving water quality objectives outside of the effluent mixing zone.

Of all the parameters listed in Table 2-2, total phosphorus required the highest dilution factor in order to meet the water quality objective of 0.01 mg/L within the near-field mixing zone (typically 100 m). The diffusers are designed to provide a minimum dilution factor of 16.7 for total phosphorus with a water depth of at least 7.3 m under open water conditions and a flow rate of 800 m^3/h. The minimum dilution factor provided by the diffuser is sufficient for all other constituents in the treated water (Golder 2019b).

To achieve the required dilution, in the summer months (open water season), a diffuser equipped with 7 ports spaced at 14 m intervals shall be required. Two diffusers shall be required to be able to discharge a total flow of 1600 m^3/h.

The diffusers shall be approximately installed in Whale Tail Lake (South Basin) at the following coordinates:

- North diffuser (Summer Diffuser #1):
  - Start: Northing: 7 254 653; Easting: 607 533
  - End: Northing: 7 254 632; Easting: 607 451
- South diffuser (Summer / Winter Diffuser #2):
  - Start: Northing: 7 254 536; Easting: 607 533
  - End: Northing: 7 254 488; Easting: 607 464

The two diffusers shall be placed parallel to one another, with a distance separating them of at least 100 m.

3.2 Design Details

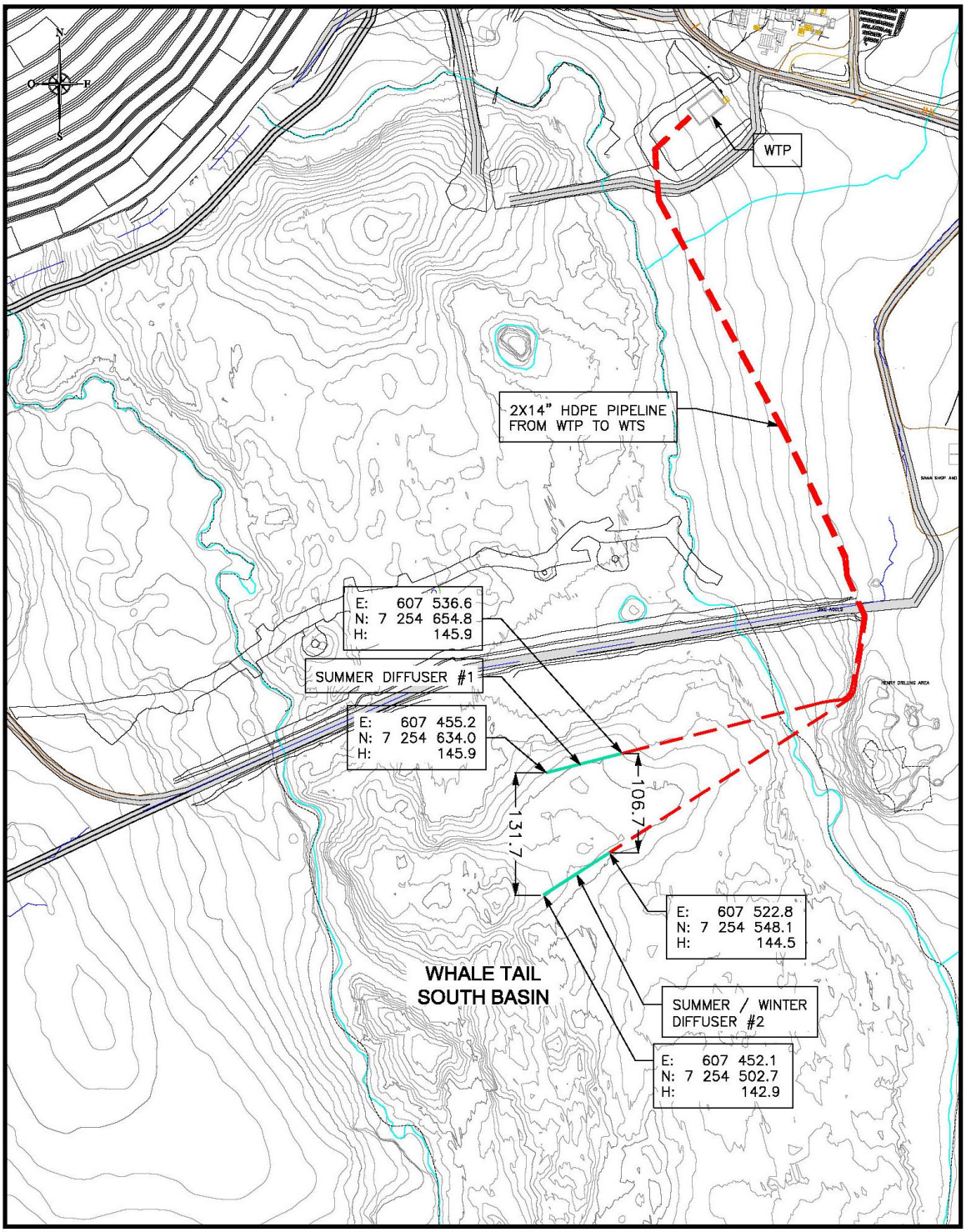
Figure 3-1 shows the treated water discharge locations in Whale Tail Lake South Basin as well as the diffusers.

Each line shall be equipped with a diffuser. Each diffuser consists of:

- 7 discharge ports spaced out at 14 m intervals starting at the end of the line on a 14-in DR17 HDPE pipeline;
- Each port consists of an Ø63.5 mm (2.5-in) diameter schedule 40 stainless steel pipe mounted on a branch saddle with a total length of 720 mm. The internal diameter of the pipe shall be 62.7 mm;
- The diffuser and offshore pipelines are weighted using concrete ballasts, each weighing approximately 90 kg. The ballasts shall be uniformly distributed along the diffuser and offshore pipeline.
- The insulated portion of the summer/winter diffuser is weighted using boulders attached to the pipe as ballasts. All ballasts shall be composed of two boulders weighing approximately 400 kg each, for a total of 800 kg per ballast. Ballasts shall be uniformly distributed along the insulated portion of the offshore pipeline.

Refer to drawings 61-695-270-224, 61-695-270-225 and 61-695-270-226 for details on the diffusers and offshore pipelines.

Figure 3-1 : Location of Treated Water Discharge Locations in Whale Tail Lake South Basin



4.0 Operation Description

During the open water seasons (summer), raw water stored in the IVR Attenuation Pond shall be pumped to the Water Treatment Plant (AsWTP) for treatment. Two HL250 diesel pumps shall be used to transfer the water to the AsWTP. The treated water shall then be pumped from the AsWTP to Whale Tail Lake South Basin (WTS) via two (2) 14-in HDPE pipelines. The treated water shall then be discharged into WTS using the two submerged diffusers. The total treatment flow rate shall be limited up to 1600 m^3/h, 800 m^3/h per diffuser.

At the end of the summer, all of the pipelines shall be drained. At the end of winter/start of the spring freshet, treatment of the water stored in IVR Attenuation Pond shall begin. The insulated and heat traced pipeline shall be used to transfer water from the pond to the AsWTP and then from the AsWTP to WTS. The treatment flow rate shall be limited up to 800 m^3/h. Once the ice sheet cover is melted, the second diffuser shall be put into service.

During operation, an operator shall inspect each pump station at least once a day. The operator shall also monitor on a daily basis the operation and treatment performance of the AsWTP. The operator shall manually collect water sample of the treated water after the AsWTP per the requirements of the amended Water Licence No. 2AM-WTP1830, schedule I, table 2 and Part F, item 5.

The flow rate and cumulative volume pumped to WTS shall be measured continuously using the magnetic flowmeters located at the AsWTP.

5.0 Installation Description

5.1 Date of Construction

The diffusers and offshore pipelines are planned to be installed in Whale Tail Lake South Basin on the following dates:

- Installation of diffuser and offshore pipelines: Summer 2020 (August to September);
- Operation of diffusers: Spring 2021 or 2022.

5.2 Diffuser and Pipeline Installation

The following section describes the general installation procedure for the diffuser and offshore pipeline in Whale Tail Lake South Basin. The installation shall take place over the summer months. The general installation procedure for the diffusers is as follows:

1. Assemble one (1) of the two diffusers/pipelines:
    a. Assemble one diffuser and offshore pipeline segment on the shoreline using pipe-butt welding for the whole length.
    b. Install flanges at both ends of the pipeline.
    c. Install a blind flange on the diffuser end and keep the other end open on the shoreline.
    d. Install the discharge ports by mounting 2.5-in saddles on the 14-in DR17 HDPE and drilling a 2.5-in hole. Each saddle shall be mechanically secured. Screw in the 2.5-in diffuser riser and

cap them so that they are airtight. Refer to drawing 61-695-270-225 to 61-695-270-226 for details.

e. Using a boat, gradually pull the assembled diffuser/pipeline off the shoreline while installing concrete ballasts. Keep a +/-50 m section of unballasted pipeline on the shoreline. Refer to drawing 61-695-270-225 to 61-695-270-226 for details. The assembly and positioning of the diffuser/pipeline assembly shall carried out in a such a way to limit any erosion along the shoreline.

f. Continue the diffuser/pipeline/concrete ballast assembly, while continually pulling the ballasted pipeline into the lake.

g. On the insulated and heat-traced pipeline, install heat trace channel and insulation kit around the HDPE pipe on the shoreline. Attach the boulder ballasts to this section of insulated pipeline. Pull the line into the lake gradually as insulation and ballasts are added to the assembly.

2. Using a boat, position the floating diffuser/pipeline into position in Whale Tail Lake South Basin.

3. The end of the pipeline that in onshore should be anchored to the shore to prevent it from slipping into the water. One possible approach that could be considered is to use a group of massive boulders that shall be attached to a backup ring placed near the end of the pipeline. The backup ring shall be free to slide along the pipe. Steel wires that link the pipeline to the boulders shall not be taut during installation. The exact method to anchor the line on the shore shall be detailed based on site conditions.

4. Once the diffuser/pipeline is floating in position, remove caps on diffuser risers.

5. Slowly fill pipeline/diffuser from shoreline end until pipe is approximately 70% full. Filling should be done with a pump at a rate no higher than 5 l/sec using lake water.

6. Once diffuser/pipeline is in place and partly full, crack open lake-side blind-flange and allow the diffuser/pipeline to sink. Keep tension in the rope used for towing from the boat to ensure it remains in position.

7. A diver must be on hand to close the lake-side blind-flange on the end of the diffuser.

All of the piping being installed at the site shall be High-Density Polyethylene (HDPE). The HDPE pipe segments shall be assembled by butt fusion joints performed by a technician quality in this field according to Plastique Pipe Institute (PPI) TN-42 guidelines.

Hydrostatic leak test on a number of assembled HDPE pipe spool shall be required before it is pulled into the lake and must comply with ASTM F 2164, ASTM F 1412 and the AWWA M55 Good Practice Manual, Chapter 9, and the PPI Polyethylene Pipeline Manual, Chapter 2 (2nd Edition). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or labour at no additional cost to the Buyer.

For more details, please refer to the Installation Specifications that can be found in Appendix 3.

5.3 Access Roads Material of Construction

An access road running along the treated water discharge pipelines and leading to the shoreline of the Whale Tail Lake South Basin shall be built.

Only rockfill and granular fill that is Non-Potential Acid Generating (NPAG) and non-metal leaching (NML) shall be used for the construction of the access road. The NPAG/NML rock shall be sourced from waste rock material from Whale Tail Pit that has been tested in laboratory. Waste material is considered NPAG/NML when:

- It contains less than 0.1 wt.% total sulphur, regardless of its Neutralizing Potential (NP) value; and/or
- It contains more than 0.1 wt.% total sulphur, and the calculated carbonate Net Potential Ratio (NPR) value is greater than 2; and
- The average total arsenic < 75 ppm.

The same quality assurance/quality control (QA/QC) program currently in use at Meadowbank shall be used in the sample analysis of the waste materials from Whale Tail pit, which includes the use of certified reference materials and duplicate analyses by an accredited external laboratory, as described in Meadowbank Operational ARD-ML Samplint and Testing Plan – Whale Tail Pit Expansion Project, April 2019, version 5.

5.4 TSS Mitigation

To minimize TSS reporting to the Whale Tail Lake South Basin (WTS) during the assembly and installation of the diffuser/pipeline, the location where the assembly work shall be carried out shall be selected to have an easy access to the water, such as from an existing ramp located along the shoreline of WTS. During construction, field observations shall be taken of the water body where the diffusers/pipelines are being installed. If there is a TSS excursion, silt curtains shall be deployed around the disturbed area.

5.5 QA/QC Requirements

The quality assurance and quality control (QA/QC) program that shall be put in place during the construction of the access road and diffuser/pipeline assembly and installation to ensure the following:

- NPAG rockfill material are properly assessed and identified for use in the construction of the access roads.
- Ensure proper compaction of the rockfill and granular fill material.
- Track the quantity of NPAG rockfill and granular fill used in the construction.
- Provide as-built drawings for the access road, including final elevations of the structures.
- Identify and place the proper diameter and HDPE DR rated pipeline at its proper location on the site.
- Verify qualifications of the field technician that is assembling the piping.
- Perform hydrostatic testing of the HDPE pipe spool.
- Weigh rocks before using as ballast weights and to make sure similar weights are used at each ballast.
- Approve wire rope length used to tie rock ballasts to pipeline.
- Verify functionality of heat tracers after installation and ballasting.
- Provide as-built drawings for the diffuser and offshore pipelines and their location once submerged.

The installation Contractor shall have to provide, at a minimum, the following documentations to confirm that the installation, commissioning and testing were properly completed:

- Test Plans (To be approved by AEM)
- Test Sheets (To be approved for each test perform)
- As-Built Drawings

These documents shall be submitted at the end of the project (Hand Over) by the Contractor.

Further details of the QA/QC for this work can be found in the Installation Specifications.

6.0 References

Golder (2019a), Water Balance for Amaruq Site Phase 2, 3 May 2019.

Golder (2019b), Technical Memorandum Effluent Plume Modelling in Whale Tail Lake (South Basin), 1789310-240-TM-Rev0, 28 May 2019.

Appendix 1: Drawings

61-695-270-224:	Phase 2 – Diffuser Pipe Layout and Profile
61-695-270-225:	Phase 2 – Plan and Details for Summer Treated Water Discharge Pipeline and Diffuser
61-695-270-226:	Phase 2 – Plan and Details for Summer/Winter Treated Water Discharge Pipeline and Diffuser

NO. DESSIN
DRAWING NO. 61-695-270-224

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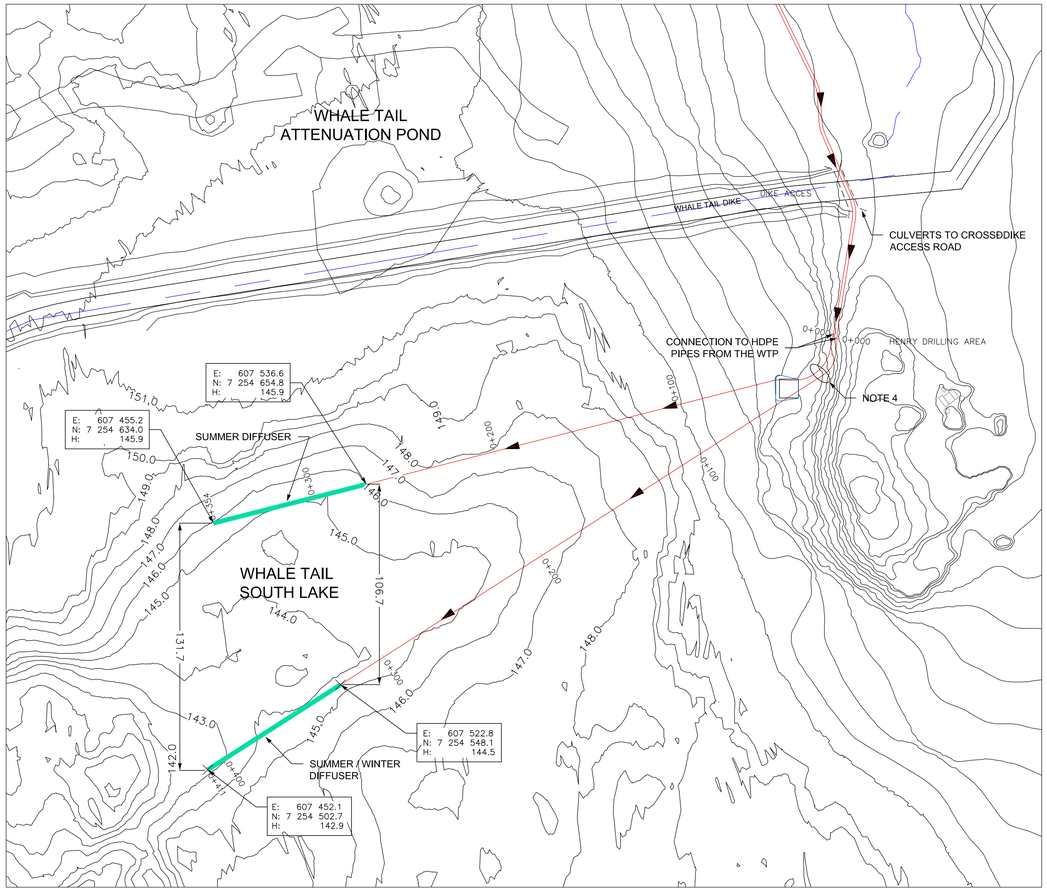

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DETAILED PLAN VIEW
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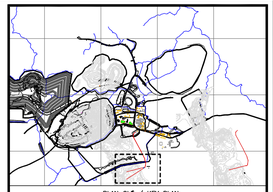

PLAN CLÉ / KEY PLAN

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	9000	46 | DD	0001	EPC

NOTES GÉNÉRALES / GENERAL NOTES

NOTE:

1. FOR DETAILS ON THE OFFSHORE BALLAST OF THE PIPELINE, REFER TO DRAWING 61-695-270-225 AND 61-695-270-226.
2. EXISTING PAD SHOWN ON THIS DRAWING IS PRELIMINARY. ELEVATION AND DIMENSIONS OF THE PAD ARE TO BE CONFIRMED ON SITE.
3. ON-SHORE PIPES SHALL BE ANCHORED TO PREVENT ANY SLIPPING OF THE OFF-SHORE PIPES.
4. EXISTING ACCESS ROAD IN THE AREA SHALL BE USED TO ACCESS THE PIPELINES. EXISTING ACCESS ROAD TO THE EXISTING PAD MAY REQUIRE REPROFILING TO FACILITATE PIPELINE MAINTENANCE.

LEGEND

RUN-OF-MINE ROCKFILL 0-1000 MM

CULVERT TO CROSS THE WHALE TAIL DIKE ROAD

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
RC	2020-06-15	ISSUED FOR PERMITTING	MA/DC/KQ	AN/HB	
RB	2020-03-19	ISSUED FOR CLIENT COMMENTS	MA/DC/KQ	AN/HB	
RA	2020-03-16	ISSUED FOR INTERNAL COMMENTS	MA/DC/KQ	AN/HB	

REVISIONS

TITRE / TITLE

AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT
270 – PIPING

AMARUQ PHASE 2
DIFFUSER PIPE LAYOUT AND PROFILE

DESSINÉ PAR / DRAWN BY	MARIUS MOVILA	DATE 2020-03-16
VÉRIFIÉ PAR / CHECKED BY	DARIUSH RASTGOU / DAN CHEN	2020-03-16
APPROUVÉ PAR / APPROVED BY	ANH-LONG NGUYEN	2020-03-16
ÉCHELLE / SCALE	AS SHOWN	DATE 2020-03-16

NO. DESSIN / DRAWING NO. 61-695-270-224

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6127	RC	1 / 2

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NO. DESSIN
DRAWING NO. 61-695-270-224

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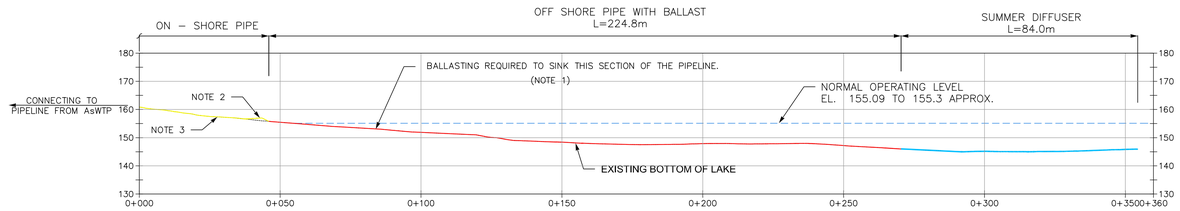

LINE 695-350-WFR-PC17-0137 & 0138 FROM DISCHARGE COMMON HEADER TO WHALE TAIL SOUTH LAKE (SUMMER DIFFUSER)
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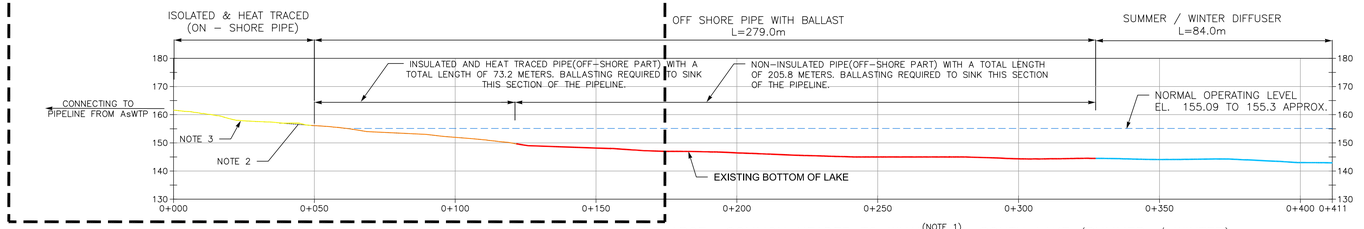
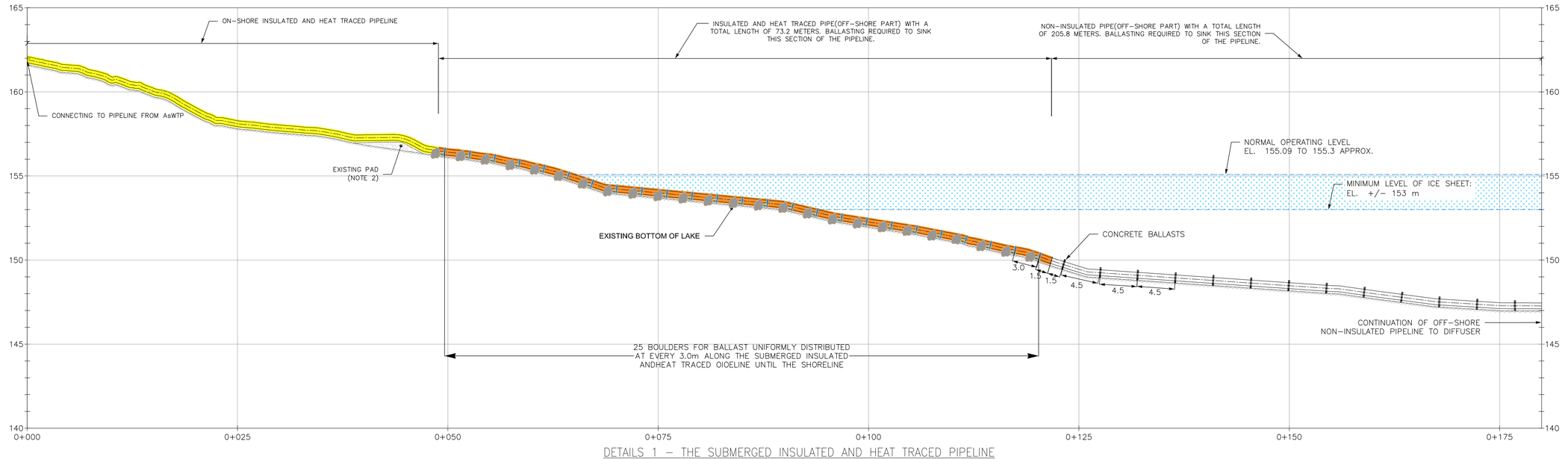
REFER TO DETAIL 1



LINE 695-350-WFR-PC17-0135-HT & 0136-HT FROM DISCHARGE COMMON HEADER TO WHALE TAIL (NOTE 1) SOUTH LAKE (SUMMER / WINTER)
SCALE 1:1000



DETAILS 1 – THE SUBMERGED INSULATED AND HEAT TRACED PIPELINE
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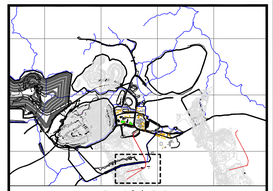

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LEGEND

RUN-OF-MINE
ROCKFILL 0-1000 MM

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

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RC	2020-06-15	ISSUED FOR PERMITTING	MA/DC/NQ	ALN/HB	
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RA	2020-03-16	ISSUED FOR INTERNAL COMMENTS	MA/DC/NQ	ALN/HB	

REVISIONS

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AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT
270 – PIPING

AMARUQ PHASE 2
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61-695-270-224

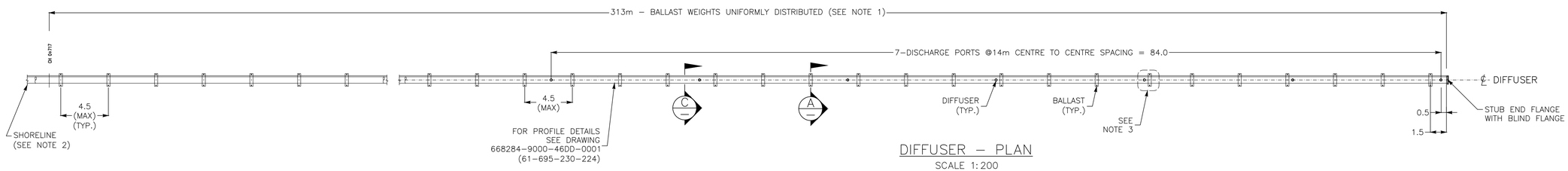
NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6127	RC	2 / 2

AE-CART-ARCH D

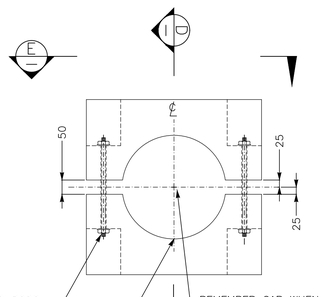
FILE NO.

NO. DESSIN
DRAWING NO. 61-695-230-225

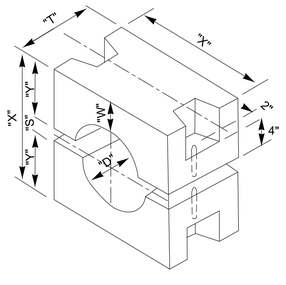
FORMAT ARCHD



DIFFUSER – PLAN
SCALE 1:200



SECTION A – CONCRETE BALLAST
SCALE 1:10
(FOR REINFORCING, SEE SECTION D)



Dimensions	in	mm
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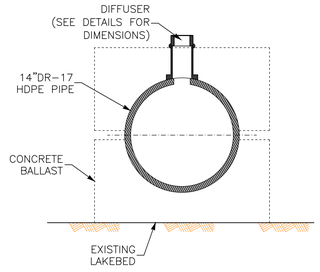
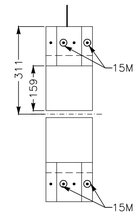
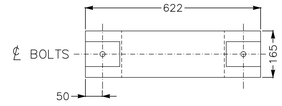
X	24 1/2	622
T	6 1/2	165
Y	11 1/4	286
W	5	127
S	2	51



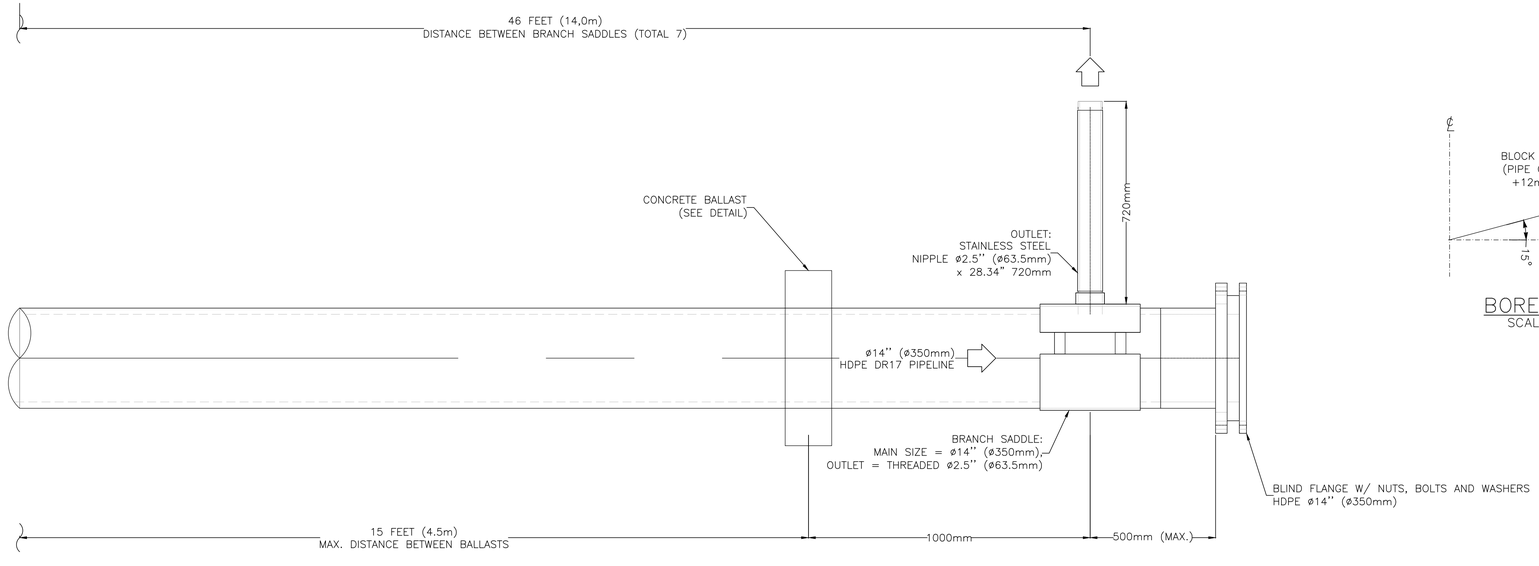
SECTION C
SCALE 1:10



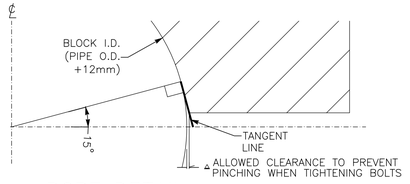
SECTION D
SCALE 1:10



SECTION E
SCALE 1:10



TYPICAL DETAIL – DIFFUSER OUTLETS AND BALLASTING
SCALE : 1:10



BORE DETAIL
SCALE : NTS

PLAN CLÉ / KEY PLAN

SNC·LAVALIN
Mining & Metallurgy
5500, des Galeries Blvd., bur. 200, Quebec (Quebec), Canada G2K 2E2
Telephone: (418) 621-5500, Fax: (418) 621-8887

PROJECT No	SUBDIVISION	SUBJECT		SERIAL	REV.
668284	9000	46	DD	0002	EPC

NOTES GÉNÉRALES / GENERAL NOTES

NOTES:
1) BALLAST UNIFORMLY DISTRIBUTED ON WHOLE LENGTH OF UNDERWATER PIPE STARTING FROM PROJECTED SHORELINE TO END OF DIFFUSER. IF A BALLAST WEIGHT ENTERS IN CONFLICT WITH DIFFUSER PORT, SEE NOTE 3.
2) 1ST BALLAST MUST BE INSTALLED 4,5m MAX FROM INDICATED SHORELINE.
3) BALLASTS ARE TO BE EVENLY DISTRIBUTED. IF A BALLAST POSITION ENTERS IN CONFLICT WITH A DIFFUSER PORT POSITION, THE BALLAST MUST BE DISPLACED. THE DISPLACEMENT MUST MINIMALLY 1,0m FROM DIFFUSER PORT, ALL THE WHILE RESPECTING 4,5m MAX SPACING BETWEEN TWO BALLASTS.

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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—	—
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
RC	2020-06-15	ISSUED FOR PERMITTING	KL/PC/BC	A.LN.	
RB	2020-04-24	ISSUED FOR CLIENT COMMENTS	KL/PC/BC	A.LN	
RA	2020-03-25	ISSUED FOR INTERNAL COMMENTS	KL/PC/BC	A.LN.	

REVISIONS

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT
270 – PIPING

AMARUQ PHASE 2
PLAN AND DETAILS FOR SUMMER TREATED WATER DISCHARGE PIPELINE AND DIFFUSER

DESSINÉ PAR / DRAWN BY	MARK SYKES	DATE 2020-06-15
VÉRIFIÉ PAR / CHECKED BY	PIERRE CARIGNAN / DAN CHEN	2020-06-15
APPROUVÉ PAR / APPROVED BY	ANH-LONG NGUYEN	2020-06-15
ÉCHELLE / SCALE	AS SHOWN	DATE 2020-06-15

NO. DESSIN / DRAWING NO. 61-695-270-225

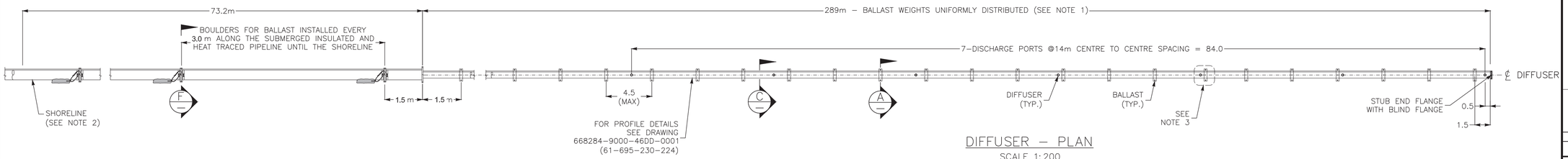
NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6127	RC	1 / 1

AE-CART-ARCH D

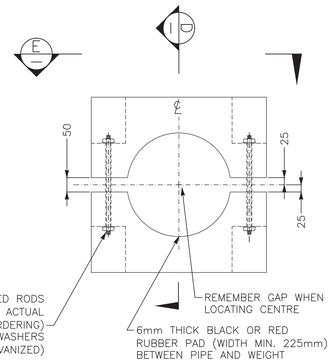
FILE NO.

NO. DESSIN
DRAWING NO. 61-695-230-226

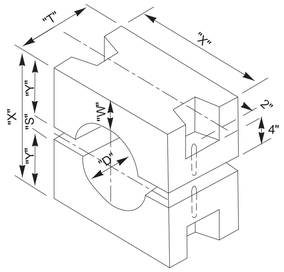
FORMAT ARCHD



DIFFUSER – PLAN
SCALE 1:200



SECTION E – CONCRETE BALLAST
SCALE 1:10
(FOR REINFORCING, SEE SECTION D)



Dimensions	in	mm
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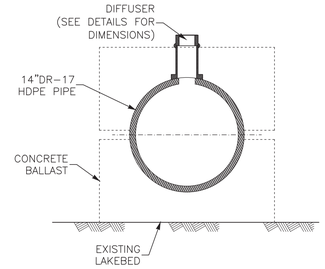
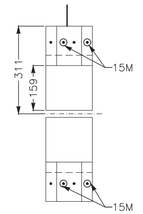
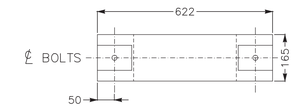
X	24 1/2	622
T	6 1/2	165
Y	11 1/4	286
W	5	127
S	2	51



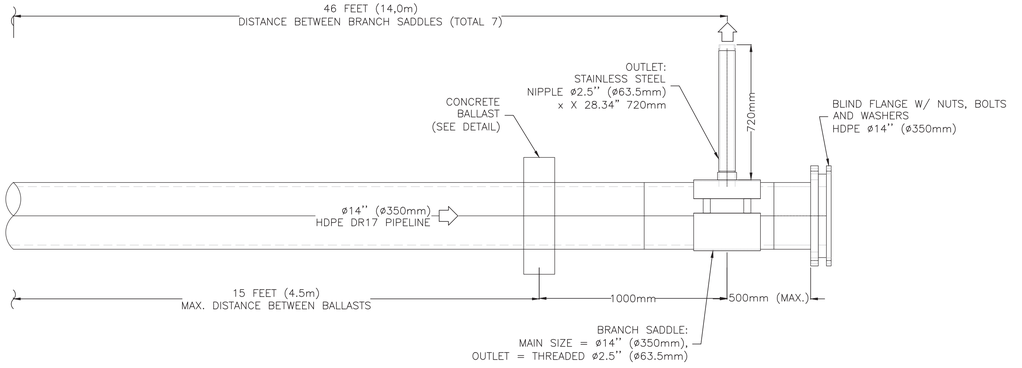
SECTION C
SCALE 1:10



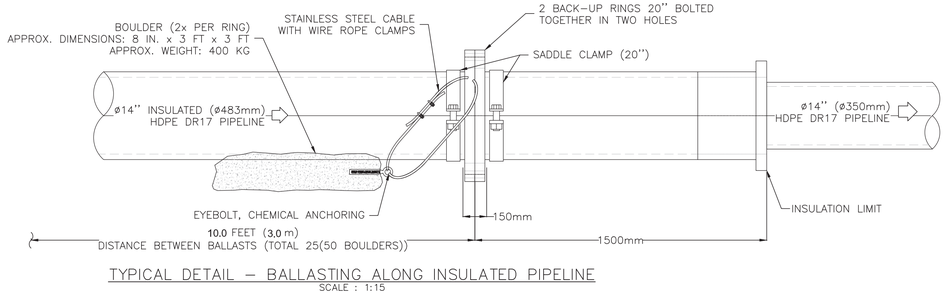
SECTION D
SCALE 1:10



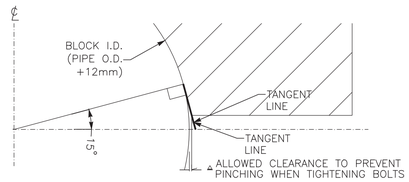
SECTION E
SCALE 1:10



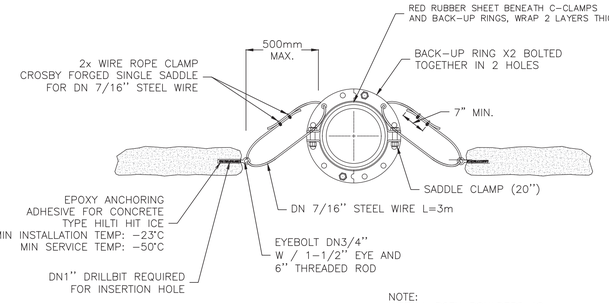
TYPICAL DETAIL – DIFFUSER OUTLETS AND BALLASTING
SCALE : 1:15



TYPICAL DETAIL – BALLASTING ALONG INSULATED PIPELINE
SCALE : 1:15



BORE DETAIL
SCALE : NTS



NOTE:
INSTALL BOTH BOULDERS AS CLOSE AS POSSIBLE AND AT AN EQUAL DISTANCE FROM PIPE.

SECTION F – BALLAST
SCALE 1:20

PLAN CLÉ / KEY PLAN

SNC·LAVALIN
Mining & Metallurgy
5500, des Galeries Blvd., bur. 200, Quebec (Quebec), Canada G2K 2E2
Telephone: (418) 621-5500, Fax: (418) 621-8887

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	9000	46 DD	0003	EPC

NOTES GÉNÉRALES / GENERAL NOTES

NOTES:
1) BALLAST UNIFORMLY DISTRIBUTED ON WHOLE LENGTH OF UNDERWATER PIPE STARTING FROM PROJECTED SHORELINE TO END OF DIFFUSER. IF A BALLAST WEIGHT ENTERS IN CONFLICT WITH DIFFUSER PORT, SEE NOTE 3.
2) 1ST BALLAST MUST BE INSTALLED 3.0m MAX FROM INDICATED SHORELINE.
3) BALLASTS ARE TO BE EVENLY DISTRIBUTED. IF A BALLAST POSITION ENTERS IN CONFLICT WITH A DIFFUSER PORT POSITION, THE BALLAST MUST BE DISPLACED. THE DISPLACEMENT MUST MINIMALLY 1.0m FROM DIFFUSER PORT, ALL THE WHILE RESPECTING 4.5m MAX SPACING BETWEEN TWO BALLASTS.

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R0	2020-06-15	ISSUED FOR PERMITTING	KL/PL/BG	ALN	
RB	2020-04-24	ISSUED FOR CLIENT COMMENTS	KL/PL/BG	ALN	
RA	2020-03-25	ISSUED FOR INTERNAL COMMENTS	KL/PL/BG	ALN	

REVISIONS

OIQ PROFESSIONAL ENGINEER 2020-06-15 ANH-LONG NGUYEN

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT
270 – PIPING
AMARUQ PHASE 2
PLAN AND DETAILS FOR WINTER TREATED WATER DISCHARGE PIPELINE AND DIFFUSER

DESSINÉ PAR / DRAWN BY	MARK SYKES	DATE 2020-06-15
VÉRIFIÉ PAR / CHECKED BY	PIERRE CARIGNAN / DAN CHEN	2020-06-15
APPROUVÉ PAR / APPROVED BY	ANH-LONG NGUYEN	2020-06-15
ÉCHELLE / SCALE	AS SHOWN	DATE 2020-06-15

NO. DESSIN / DRAWING NO.
61-695-270-226

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6127	RC	1 / 1

AE-CART-ARCH D

FILE NO.

Appendix 2: Material Take-Off List

6127-S-240-004-MTO-001	Material Take-off List Material Take-Off Piping, Piping Hardware Amaruq Phase 2 Water Management Infrastructure (excerpt for diffuser)
6127-S-240-001-MTO-001	Material Take-off List Material Take-Off Diffuser Ballast Amaruq Phase 2 Water Management Infrastructure

SNC·LAVALIN	MATERIAL TAKE-OFF LIST PIPING, PIPING HARDWARE, VALVES AMARUQ PHASE 2 WATER MANAGEMENT INFRASTRUCTURE SNC Document No.: 668284-6000-46ET-0001 AEM Document No.: 6127-S-270-004-MTO-001	AGNICO EAGLE	Date 6-May-20 Revision PE

Prepared By:

Process	Dan Chen, ing.	_____
Civil Engineer	Pierre Carignan, ing.	_____

Reviewed By:

Project Manager:	Anh-Long Nguyen, ing.	_____

Revision Index:

REV.	DATE	DESCRIPTION
PA	14-Feb-20	Issued for internal coordination
PB	18-Feb-20	Issued for coordination with Client
PC	5-Mar-20	Issued for coordination with Client
PD	2-Apr-20	Issued for coordination with Client
PE	6-May-20	Issued for coordination with Client

SNC·LAVALIN	MATERIAL TAKE-OFF LIST PIPING, PIPING HARDWARE, VALVES AMARUQ PHASE 2 WATER MANAGEMENT INFRASTRUCTURE SNC Document No.: 668284-6000-46ET-0001 AEM Document No.: 6127-S-270-004-MTO-001	AGNICO EAGLE	Date 6-May-20 Revision PE

Values in black indicated items that are ordered for 2020
Values in red are proposed quantities to order in 2021

Rev.	Item	P&ID Line Tag #	Diameter (in)	Diameter (mm)	Description 1	Description 2	Function	Delivery Year	Year in Service	Unit	Estimated Quantity	Contigency (%)	With contingency	Qty (+contingency) Ordered for Barge 2020	Qty (+contingency) From Existing AMQ Inventory	Qty (+contingency) To be Ordered for Barge 2021	Notes
	1.9.4	695-350-WFR-PC17-0125	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PUMP SUCTION LINE FOR IVR ATT POND LINE 2	2020		m	**150**	20%	**180**	**180**		0	
	1.9.5	695-350-WFR-PC17-0144	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	LINE SECTION FOR SPARE PUMP TO WTP DURING FRESHET	2020		m	**30**	20%	**36**	**36**		0	
	1.9.6	695-350-WFR-PC17-0145	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PUMP SUCTION LINE FOR SPARE PUMP DURING FRESHET	2020		m	**76**	20%	**91**	**91**		0	
PE	1.9.7	695-350-WFR-PC17-0146	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	EXTENSION TO SUCTION LINE TO MANAGE FLOOD EVENT	2020		m	**76**	20%	**91**	**91**		0	
														0		-	
	1.10				**LINE J1 & J2: WTP TO DISCHARGE HEADER (EXSITING LINES FROM PHASE 1)**									**0**		-	
PE	1.10.1	695-350-WFR-PC17-0108-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	PHASE 2, TREATED WATER DISCHARGE TO HEADER #3 - LINE 1	2020		m	**0**	0%	**-**	**-**		-	Re-use existing line installed in Phase 1, but add insulation and heat tracing on approx. 6 m of line
	1.10.2	Existing line	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PHASE 2, TREATED WATER DISCHARGE TO HEADER #3 - LINE 2	2020		m	**0**	0%	**-**	**-**		-	Re-use existing line installed in Phase 1
														0		-	
	1.11				**LINE J1 & J2: DISCHARGE HEADER TO SOUTH WHALE TAIL LAKE**									**0**		-	
PE	1.11.1	695-350-WFR-PC17-0135-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	PHASE 2, TREATED WATER DISCHARGE. UP TO WHALE TAIL DIKE - LINE 1	2020		m	**525**	20%	**630**	**630**		0	
PE	1.11.2	695-350-WFR-PC17-0135-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	PHASE 2, TREATED WATER DISCHARGE. ON-SHORE PORTION TO DIFFUSER #1	2020		m	0	20%	-	**-**			Moved to line item 1.18.2
PE	1.11.2	695-350-WFR-PC17-0136-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	PHASE 2, TREATED WATER DISCHARGE. OFF-SHORE PORTION TO DIFFUSER #1 (EXCLUDE DIFFUSER)	2020		m	0	20%	-	**-**			Moved to line item 1.18.3 and 1.18.4
	1.11.3	695-350-WFR-PC17-0137	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PHASE 2, TREATED WATER DISCHARGE. UP TO WHALE TAIL DIKE - LINE 2	2020		m	**525**	20%	**630**	**630**		0	
	1.11.4	695-350-WFR-PC17-0137	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PHASE 2, TREATED WATER DISCHARGE. ON-SHORE PORTION TO DIFFUSER #2	2020		m	0	20%	-	**-**			Moved to line item 1.19.2
	1.11.2	695-350-WFR-PC17-0138	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PHASE 2, TREATED WATER DISCHARGE. OFF-SHORE PORTION TO DIFFUSER #2 (EXCLUDE DIFFUSER)	2020		m	0	20%	-	**-**			Moved to line item 1.19.3
														0		-	
	1.12				**LINE K1 & K2: EXISTING HEADER TO DISCHARGE HEADER - BY-PASS OF WTP FROM IVR ATTENUATION POND TO SWTL C**									**0**		-	
	1.12.1	695-350-WFR-PC17-0130	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	WTP BY-PASS	2020		m	**25**	20%	**30**	**30**		0	
PE	1.12.2	695-350-WFR-PC17-0129-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	WTP BY-PASS	2020		m	**30**	20%	**36**	**36**		0	
														0		-	
	1.13				**LINE L: EXISTING HEADER TO WT ATTENUATION POND - IVR ATT. POND TO WT ATT. POND**									**0**		-	
PE	1.13.1	695-200-WFR-PC17-0131	8	200	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	WTP BY-PASS TO WT ATT. POND	2020		m	**255**	20%	**306**	**306**		0	
														0		-	
	1.14				**LINE M: FROM WT ATTENUATION POND TO IVR ATTENUATION POND**									**0**		-	
PE	1.14.1	695-350-WFR-PC17-0107-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	WT ATT. POND TO IVR ATT. POND	2020		m	**725**	20%	**870**	**870**		0	
														0		-	
	1.15				**LINE N: WHALE TAIL SOUTH BASIN TO MAMMOTH LAKE**									**0**		-	
	1.15.1	695-350-WFR-PC17-0140	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	WTS TO MAMMOTH LAKE WATER TRANSFER	2020		m	**1985**	20%	**2382**	**2382**		0	
	1.15.2	695-350-WFR-PC17-0139	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PUMP SUCTION LINE FOR WTS TRANSFER PUMP	2020		m	**136**	20%	**163**	**163**		0	
														0		-	
	1.16				**LINE O: MAMMOTH DIKE SUMP TO NORTH WEST SUMP**									**0**		-	
	1.16.1	695-150-WFR-PC17-0102	6	150	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	RUNOFF CONTROL	2020		m	**540**	20%	**648**	**648**		0	
	1.16.2	695-200-WFR-PC17-0101	8	200	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PUMP SUCTION LINE FOR MAMOTH DIKE SUMP PUMP	2020		m	**100**	20%	**120**	**120**		0	
														0		-	
	1.17				**OTHER LINES**									**0**		-	
	1.17.1	695-500-WFR-PC17-0127	20	500	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	EXTENSION TO EXISTING HEADER AT INLET OF WTP	2020		m	**shop fab**	0%		**0**		0	Shop fabricated header
	1.17.2	695-500-WFR-PC17-0134	20	500	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	TREATED WATER HEADER	2020		m	**shop fab**	0%		**0**		0	Shop fabricated header
														0		-	
	1.18				**YEAR-ROUND DIFFUSER - LINE #1**									**0**		-	
	1.18.1		14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	WTS DIFFUSER STUCTURE	2020		m	**84**	0%	**84**	**84**		0	No intermediate flanges. Blind flange on end
PE	1.18.2	695-350-WFR-PC17-0135-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	PHASE 2, TREATED WATER DISCHARGE. ON-SHORE PORTION TO DIFFUSER #1	2020		m	**200**	20%	**240**	**240**		0	Flange every 76m (250ft) and insulation kits up to 50m from contour line 157m (estimated high-water limit).
PE	1.18.3	695-350-WFR-PC17-0135-HT	14	350	IPS DR17 HDPE 4710	INSULATED WITH 2-IN INSULATION, 3 HEAT TRACED CHANNEL, 50' LENGHT	ON-SHORE / OFF-SHORE TRANSITION WATER-PROOF HT TRACING	2020		m	**16**	0%	**16**	**16**		0	Butt-end fusions on both ends

SNC·LAVALIN	MATERIAL TAKE-OFF LIST PIPING, PIPING HARDWARE, VALVES AMARUQ PHASE 2 WATER MANAGEMENT INFRASTRUCTURE SNC Document No.: 668284-6000-46ET-0001 AEM Document No.: 6127-S-270-004-MTO-001	AGNICO EAGLE	Date 6-May-20 Revision PE

Values in black indicated items that are ordered for 2020
Values in red are proposed quantities to order in 2021

Rev.	Item	P&ID Line Tag #	Diameter (in)	Diameter (mm)	Description 1	Description 2	Function	Delivery Year	Year in Service	Unit	Estimated Quantity	Contigency (%)	With contingency	Qty (+contingency) Ordered for Barge 2020	From Existing AMQ Inventory	To be Ordered for Barge 2021	Notes
	1.18.4	695-350-WFR-PC17-0136	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PHASE 2, TREATED WATER DISCHARGE. OFF-SHORE PORTION TO DIFFUSER #1 (EXCLUDE DIFFUSER)	2020		m	230	20%	276	276		0	No flanges. Junction with diffuser via butt-end fusion.
														0		-	
	1.19				SUMMER DIFFUSER - LINE #2									0		-	
	1.19.1		14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	WTS DIFFUSER STUCTURE	2020		m	84	20%	101	101		0	
	1.19.2	695-350-WFR-PC17-0137	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PHASE 2, TREATED WATER DISCHARGE. ON-SHORE PORTION TO DIFFUSER #2	2020		m	112	20%	134	134		0	
	1.19.3	695-350-WFR-PC17-0138	14	350	IPS DR17 HDPE 4710	UNINSULATED, 50FT LENGHT	PHASE 2, TREATED WATER DISCHARGE. OFF-SHORE PORTION TO DIFFUSER #2 (EXCLUDE DIFFUSER)	2020		m	236	20%	283	283		0	
													-	-		-	
	2.0				PIPING HARDWARE												
														0		-	
	2.1	695-100-WFR-PC17-0133			LINE A: GSP-1 POND TO GSP-2 POND								-	-		-	
	2.1.1	695-100-WFR-PC17-0133			Pressure pipe									0		-	
PE	2.1.1.1	695-100-WFR-PC17-0133	4	100	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	14	20%	17	17		0	
PE	2.1.1.2	695-100-WFR-PC17-0133	4	100	IPS HDPE DR17	Flange Insulation Kit (every 250 ft)				u	0	20%	-	-		-	
PE	2.1.1.3	695-100-WFR-PC17-0133	4	100	IPS HDPE DR17	Flange Adapter				u	8	20%	10	10		0	
PE	2.1.1.4	695-100-WFR-PC17-0133	4	100	IPS HDPE DR17	Backing Ring				u	8	20%	10	10		0	
PE	2.1.1.5	695-100-WFR-PC17-0133	4	100	IPS DR17	Red Rubber Gasket				u	5	20%	6	6		0	
PE	2.1.1.6	695-100-WFR-PC17-0133	5/8	16	5/8" X 5-7/8" Bolt GR5 Full Thread	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	40	15%	46	46		0	
PE	2.1.1.7	695-100-WFR-PC17-0133	5/8	16	5/8" Hex Nut Gr5	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	40	15%	46	46		0	
PE	2.1.1.8	695-100-WFR-PC17-0133	5/8	16	5/8" Steel Washer	For Flange Bolt-Up - 4 in pipe	16 units per joint			u	80	15%	92	92		0	
	2.1.1.9	Discharge of pump	4	100	IPS DR17	Red Rubber Gasket				u	2	20%	2	2		0	
	2.1.1.10	Discharge of pump	5/8	16	5/8" X 5-7/8" Bolt GR5 Full Thread	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	16	15%	18	18		0	
	2.1.1.11	Discharge of pump	5/8	16	5/8" Hex Nut Gr5	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	16	15%	18	18		0	
	2.1.1.12	Discharge of pump	5/8	16	5/8" Steel Washer	For Flange Bolt-Up - 4 in pipe	16 units per joint			u	32	15%	37	37		0	
PE	2.1.1.13	Discharge of pump	6	150	IPS HDPE DR17	Molded Tee (6"-6"-6")	For 2nd pump			u	0	0%	-	-		-	Deleted
PE	2.1.1.14	Discharge of pump	4 x 6	100 x 150	IPS HDPE DR17	Flanged concentric reducer				u	0	0%	-	-		-	Deleted
	2.1.1.15	Discharge of pump	4	100	IPS HDPE DR17	Blind flange				u	1	0%	1	1		0	
														0		-	
	2.1.2	695-200-WFR-PC17-0132			Pump suction line									0		-	
	2.1.2.1	695-200-WFR-PC17-0132	8	200	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	8	20%	10	10		0	
	2.1.2.2	695-200-WFR-PC17-0132	8	200	IPS HDPE DR17	Flange Insulation Kit (every 250 ft)				u	0	20%	-	-		-	
	2.1.2.3	695-200-WFR-PC17-0132	8	200	IPS HDPE DR17	Flange Adapter				u	8	20%	10	10		0	
	2.1.2.4	695-200-WFR-PC17-0132	8	200	IPS HDPE DR17	Backing Ring				u	8	20%	10	10		0	
	2.1.2.5	695-200-WFR-PC17-0132	8	200	IPS DR17	Red Rubber Gasket				u	6	20%	7	7		0	
	2.1.2.6	695-200-WFR-PC17-0132	3/4	19	3/4" X 6-1/4" Bolt GR5 Full Thread	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	48	15%	55	55		0	
	2.1.2.7	695-200-WFR-PC17-0132	3/4	19	3/4" Hex Nut Gr5	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	48	15%	55	55		0	
	2.1.2.8	695-200-WFR-PC17-0132	3/4	19	3/4" Steel Washer	For Flange Bolt-Up - 8 in pipe	16 units per joint			u	96	15%	110	110		0	
	2.1.2.9	695-200-WFR-PC17-0132	4	100	IPS DR17	Red Rubber Gasket				u	1	20%	1	1		0	
	2.1.2.10	695-200-WFR-PC17-0132	5/8	16	5/8" X 5-7/8" Bolt GR5 Full Thread	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	8	15%	9	9		0	
	2.1.2.11	695-200-WFR-PC17-0132	5/8	16	5/8" Hex Nut Gr5	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	8	15%	9	9		0	
	2.1.2.12	695-200-WFR-PC17-0132	5/8	16	5/8" Steel Washer	For Flange Bolt-Up - 4 in pipe	16 units per joint			u	16	15%	18	18		0	
PE	2.1.2.13	695-200-WFR-PC17-0132	4 x 8	100 x 200	IPS HDPE DR17	Flanged concentric reducer	Suction side of PP-14			u	1	0%	1	1		0	
														0		-	
													-	-		-	
	2.2	695-200-WFR-PC17-0115-HT			LINE B: IVR PIT TO IVR ATTENUATION POND								-	-		-	
	2.2.1	695-200-WFR-PC17-0115-HT	8	200	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	134	20%	161	161		0	
	2.2.2	695-200-WFR-PC17-0115-HT	8	200	IPS HDPE DR17	Flange Insulation Kit (every 250 ft)				u	31	20%	37	37		0	
	2.2.3	695-200-WFR-PC17-0115-HT	8	200	IPS HDPE DR17	Flange Adapter				u	59	20%	71	71		0	
	2.2.4	695-200-WFR-PC17-0115-HT	8	200	IPS HDPE DR17	Backing Ring				u	59	20%	71	71		0	
	2.2.5	695-200-WFR-PC17-0115-HT	8	200	IPS DR17	Red Rubber Gasket				u	30	20%	36	36		0	
	2.2.6	695-200-WFR-PC17-0115-HT	3/4	19	3/4" X 6-1/4" Bolt GR5 Full Thread	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	240	15%	276	276		0	
	2.2.7	695-200-WFR-PC17-0115-HT	3/4	19	3/4" Hex Nut Gr5	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	240	15%	276	276		0	
	2.2.8	695-200-WFR-PC17-0115-HT	3/4	19	3/4" Steel Washer	For Flange Bolt-Up - 8 in pipe	16 units per joint			u	480	15%	552	552		0	
PE	2.2.9	695-200-WFR-PC17-0115-HT	8	200	IPS HDPE DR17	Molded Tee (8"-8"-8")	Pig cleaning insertion			u	1	0%	1	1		0	
PE	2.2.10	695-200-WFR-PC17-0115-HT	8	200	IPS HDPE DR17	Blind Flange				u	1	100%	2	1		1	
													-	-		-	
	2.3	695-200-WFR-PC17-0110			LINE C: FORMER LAKE A49 AND A47 TO IVR ATTENUATION POND								-	-		-	
	2.3.1	695-200-WFR-PC17-0110			Dewatering lake A49									0		-	
PE	2.3.1.1	695-200-WFR-PC17-0110	8	200	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	77	20%	92	92		0	
PE	2.3.1.2	695-200-WFR-PC17-0110	8	200	IPS HDPE DR17	Flange Insulation Kit (every 250 ft)				u	0	20%	-	-		-	
PE	2.3.1.3	695-200-WFR-PC17-0110	8	200	IPS HDPE DR17	Flange Adapter				u	32	20%	38	38		0	
PE	2.3.1.4	695-200-WFR-PC17-0110	8	200	IPS HDPE DR17	Backing Ring				u	32	20%	38	38		0	
PE	2.3.1.5	695-200-WFR-PC17-0110	8	200	IPS DR17	Red Rubber Gasket				u	20	20%	24	24		0	
PE	2.3.1.6	695-200-WFR-PC17-0110	3/4	19	3/4" X 6-1/4" Bolt GR5 Full Thread	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	160	15%	184	184		0	
PE	2.3.1.7	695-200-WFR-PC17-0110	3/4	19	3/4" Hex Nut Gr5	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	160	15%	184	184		0	
PE	2.3.1.8	695-200-WFR-PC17-0110	3/4	19	3/4" Steel Washer	For Flange Bolt-Up - 8 in pipe	16 units per joint			u	320	15%	368	368		0	
	2.3.1.9	695-200-WFR-PC17-0110	4	100	IPS DR17	Red Rubber Gasket				u	3	20%	4	4		0	
	2.3.1.10	695-200-WFR-PC17-0110	5/8	16	5/8" X 5-7/8" Bolt GR5 Full Thread	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	16	15%	18	18		0	

SNC·LAVALIN

MATERIAL TAKE-OFF LIST
PIPING, PIPING HARDWARE, VALVES
AMARUQ PHASE 2 WATER MANAGEMENT INFRASTRUCTURE
SNC Document No.: 668284-6000-46ET-0001
AEM Document No.: 6127-S-270-004-MTO-001

AGNICO EAGLE

Date
6-May-20
Revision
PE

Values in black indicated items that are ordered for 2020
Values in red are proposed quantities to order in 2021

Rev.	Item	P&ID Line Tag #	Diameter (in)	Diameter (mm)	Description 1	Description 2	Function	Delivery Year	Year in Service	Unit	Estimated Quantity	Contigency (%)	With contingency	Qty (+contingency) Ordered for Barge 2020	From Existing AMQ Inventory	To be Ordered for Barge 2021	Notes
	2.16.2.4	695-200-WFR-PC17-0101	8	200	IPS HDPE DR17	Backing Ring				u	14	20%	17	17		0	
	2.16.2.5	695-200-WFR-PC17-0101	8	200	IPS DR17	Red Rubber Gasket				u	9	20%	11	11		0	
	2.16.2.6	695-200-WFR-PC17-0101	3/4	19	3/4" X 6-1/4" Bolt GR5 Full Thread	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	72	15%	83	83		0	
	2.16.2.7	695-200-WFR-PC17-0101	3/4	19	3/4" Hex Nut Gr5	For Flange Bolt-Up - 8 in pipe	8 units per joint			u	72	15%	83	83		0	
	2.16.2.8	695-200-WFR-PC17-0101	3/4	19	3/4" Steel Washer	For Flange Bolt-Up - 8 in pipe	16 units per joint			u	144	15%	166	166		0	
	2.16.2.9	695-200-WFR-PC17-0101	4	100	IPS DR17	Red Rubber Gasket				u	1	20%	1	1		0	
	2.16.2.10	695-200-WFR-PC17-0101	5/8	16	5/8" X 5-7/8" Bolt GR5 Full Thread	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	8	15%	9	9		0	
	2.16.2.11	695-200-WFR-PC17-0101	5/8	16	5/8" Hex Nut Gr5	For Flange Bolt-Up - 4 in pipe	8 units per joint			u	8	15%	9	9		0	
	2.16.2.12	695-200-WFR-PC17-0101	5/8	16	5/8" Steel Washer	For Flange Bolt-Up - 4 in pipe	16 units per joint			u	16	15%	18	18		0	
PE	2.16.2.13	695-200-WFR-PC17-0101	4 x 8	100 x 200	IPS HDPE DR17	Flanged concentric reducer	Suction side pump PP-21			u	1	0%	1	1		0	
														0		-	
														0		-	
	2.18	**695-350-WFR-PC17-0136**			**YEAR-ROUND DIFFUSER - LINE #1**								-	-		-	
	2.18.1	695-350-WFR-PC17-0136			**WTS DIFFUSER STRUCTURE**									0		-	
	2.18.1.1	695-350-WFR-PC17-0136	14	350	IPS HDPE DR17	Flange Adapter				u	1	25%	1	1		0	
	2.18.1.2	695-350-WFR-PC17-0136	14	350	IPS HDPE DR17	Backing Ring				u	1	25%	1	1		0	
	2.18.1.3	695-350-WFR-PC17-0136	14	350	IPS DR17	Red Rubber Gasket				u	1	25%	1	1		0	
	2.18.1.4	695-350-WFR-PC17-0136	1	25	1" X 10-1/2" Bolt GR5 Full Thread	For Flange Bolt-Up -14 in pipe	12 units per joint			u	12	15%	14	14		0	
	2.18.1.5	695-350-WFR-PC17-0136	1	25	1" Hex Nut Gr5	For Flange Bolt-Up -14 in pipe	12 units per joint			u	12	15%	14	14		0	
	2.18.1.6	695-350-WFR-PC17-0136	1	25	1" Steel Washer	For Flange Bolt-Up -14 in pipe	24 units per joint			u	24	15%	28	28		0	
	2.18.1.7	695-350-WFR-PC17-0136	14	350	IPS HDPE DR17	Blind Flange				u	1	0%	1	1		0	
PE	2.18.1.8	695-350-WFR-PC17-0136	14	350	IPS SS Saddle	14-in Saddle for diffusers w/ 2.5-in opening	Saddle mechanically installed on the pipe			u	7	15%	8	8		0	
PE	2.18.1.9	695-350-WFR-PC17-0136	2.5	63.5	DN 63.5 SS threaded pipe	Diffuser ends, total length = 720mm	Pipe screwed into saddle			u	7	15%	8	8		0	
PE	2.18.1.10	695-350-WFR-PC17-0136	3 x 2.5		3" x 2.5" Reducer, threaded	End of nozzle				u	0	15%	-	-		-	Deleted
														0		-	
	2.18.2	**695-350-WFR-PC17-0135-HT**			**PHASE 2, TREATED WATER DISCHARGE ON-SHORE PORTION TO DIFFUSER - #1**									0		-	
	2.18.2.1	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	20	20%	24	24		0	
	2.18.2.2	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE DR17	Flange Insulation Kit (every 250 ft)				u	5	20%	6	6		0	
	2.18.2.3	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE DR17	Flange Adapter				u	11	20%	13	13		0	
	2.18.2.4	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE DR17	Backing Ring				u	11	20%	13	13		0	
	2.18.2.5	695-350-WFR-PC17-0135-HT	14	350	IPS DR17	Red Rubber Gasket				u	7	20%	8	8		0	
	2.18.2.6	695-350-WFR-PC17-0135-HT	1	25	1" X 14" Bolt GR5 Full Thread	For Flange Bolt-Up -14 in pipe	12 units per joint			u	84	15%	97	97		0	
	2.18.2.7	695-350-WFR-PC17-0135-HT	1	25	1" Hex Nut Gr5	For Flange Bolt-Up -14 in pipe	12 units per joint			u	84	15%	97	97		0	
	2.18.2.8	695-350-WFR-PC17-0135-HT	1	25	1" Steel Washer	For Flange Bolt-Up -14 in pipe	24 units per joint			u	168	15%	193	193		0	
	2.18.2.9	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE EDR17	FABRICATED Tee (14"-14"-14")	For pig launch			u	1	0%	1	1		0	
PE	2.18.2.10	695-350-WFR-PC17-0135-HT	14	350	IPS	GATE valve	For maintenance and pig launch			u	0	0%	-	-		-	Deleted
	2.18.2.11	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE DR17	Blind flange				u	1	0%	1	1		0	
														0		-	
	2.18.3	**695-350-WFR-PC17-0135-HT**			**ON-SHORE/OFF-SHORE TRANSITION, WATER-PROOF HT TRACING**									0		-	
	2.18.3.1	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	2	20%	2	2		0	
	2.18.3.2	695-350-WFR-PC17-0135-HT	14	350	IPS HDPE DR17	Flange Insulation Kit (every 250 ft)				u	1	20%	1	1		0	
														0		-	
	2.18.4	**695-350-WFR-PC17-0136**			**PHASE 2, TREATED WATER DISCHARGE OFF-SHORE PORTION TO DIFFUSER (EXCLUDES DIFFUSER) - #1**									0		-	
	2.18.4.1	695-350-WFR-PC17-0136	14	350	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	26	20%	31	31		0	Underwater line is fused together, including the diffuser.
														0		-	
	2.19	**695-350-WFR-PC17-0138**			**SUMMER DIFFUSER - LINE #2**								-	-		-	
	2.19.1	695-350-WFR-PC17-0138			**WTS DIFFUSER STRUCTURE**									0		-	
	2.19.1.1	695-350-WFR-PC17-0138	14	350	IPS HDPE DR17	Flange Adapter				u	1	25%	1	1		0	
	2.19.1.2	695-350-WFR-PC17-0138	14	350	IPS HDPE DR17	Backing Ring				u	1	25%	1	1		0	
	2.19.1.3	695-350-WFR-PC17-0138	14	350	IPS DR17	Red Rubber Gasket				u	1	25%	1	1		0	
	2.19.1.4	695-350-WFR-PC17-0138	1	25	1" X 10-1/2" Bolt GR5 Full Thread	For Flange Bolt-Up -14 in pipe	12 units per joint			u	12	15%	14	14		0	
	2.19.1.5	695-350-WFR-PC17-0138	1	25	1" Hex Nut Gr5	For Flange Bolt-Up -14 in pipe	12 units per joint			u	12	15%	14	14		0	
	2.19.1.6	695-350-WFR-PC17-0138	1	25	1" Steel Washer	For Flange Bolt-Up -14 in pipe	24 units per joint			u	24	15%	28	28		0	
	2.19.1.7	695-350-WFR-PC17-0138	14	350	IPS HDPE DR17	Blind Flange				u	1	0%	1	1		0	
PE	2.19.1.8	695-350-WFR-PC17-0138	14	350	IPS SS Saddle	14-in Saddle for diffusers w/ 2.5-in opening	Saddle mechanically installed on the pipe			u	7	15%	8	8		0	
PE	2.19.1.9	695-350-WFR-PC17-0138	2.5	63.5	DN 63.5 SS threaded pipe	Diffuser ends, total length = 720mm	Pipe screwed into saddle			u	7	15%	8	8		0	
PE	2.19.1.10	695-350-WFR-PC17-0138	3 x 2.5		3" x 2.5" Reducer, threaded	End of nozzle				u	0	15%	-	-		-	Deleted
														0		-	
	2.19.2	**695-350-WFR-PC17-0137**			**PHASE 2, TREATED WATER DISCHARGE ON-SHORE PORTION TO DIFFUSER - LINE 2**									0		-	
	2.19.2.1	695-350-WFR-PC17-0137	14	350	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	12	20%	14	14		0	
	2.19.2.2	695-350-WFR-PC17-0137	14	350	IPS HDPE DR17	Flange Insulation Kit (every 250 ft)				u	0	20%	-	-		-	
	2.19.2.3	695-350-WFR-PC17-0137	14	350	IPS HDPE DR17	Flange Adapter				u	7	20%	8	8		0	
	2.19.2.4	695-350-WFR-PC17-0137	14	350	IPS HDPE DR17	Backing Ring				u	7	20%	8	8		0	
	2.19.2.5	695-350-WFR-PC17-0137	14	350	IPS DR17	Red Rubber Gasket				u	5	20%	6	6		0	
	2.19.2.6	695-350-WFR-PC17-0137	1	25	1" X 14" Bolt GR5 Full Thread	For Flange Bolt-Up -14 in pipe	12 units per joint			u	60	15%	69	69		0	
	2.19.2.7	695-350-WFR-PC17-0137	1	25	1" Hex Nut Gr5	For Flange Bolt-Up -14 in pipe	12 units per joint			u	60	15%	69	69		0	
	2.19.2.8	695-350-WFR-PC17-0137	1	25	1" Steel Washer	For Flange Bolt-Up -14 in pipe	24 units per joint			u	120	15%	138	138		0	
	2.19.2.9	695-350-WFR-PC17-0137	14	350	IPS HDPE EDR17	FABRICATED Tee (14"-14"-14")	For pig launch			u	1	0%	1	1		0	
PE	2.19.2.10	695-350-WFR-PC17-0137	14	350	IPS	GATE valve	For maintenance and pig launch			u	0	0%	-	-		-	Deleted
	2.19.2.11	695-350-WFR-PC17-0137	14	350	IPS HDPE DR17	Blind flange				u	1	0%	1	1		0	
														0		-	
	2.19.3	**695-350-WFR-PC17-0138**			**PHASE 2, TREATED WATER DISCHARGE OFF-SHORE PORTION TO DIFFUSER (EXCLUDES DIFFUSER) - LINE 2**									0		-	
	2.19.3.1	695-350-WFR-PC17-0138	14	350	IPS HDPE DR17	Number of pipe butt-fusion required (every 50 ft)				u	26	20%	31	31		0	Underwater line is fused together, including the diffuser.

SNC·LAVALIN	MATERIAL TAKE-OFF LIST DIFFUSER BALLAST AMARUQ PHASE 2 WATER MANAGEMENT INFRASTRUCTURE SNC Document No.: 668284-9000-46ET-0001 AEM Document No.: 6127-S-240-001-MTO-001	AGNICO EAGLE	Date 15-May-20 Revision R0

Prepared By:

Civil Engineer — Pierre Carignan, ing.

2020-05-14

Reviewed By:

Project Manager: Anh-Long Nguyen, ing.

Revision Index:

REV.	DATE	DESCRIPTION
PA	17-Mar-20	Issued for internal coordination
PB	19-Mar-20	Issued for coordination with Client
R0	15-May-20	Issued for construction

SNC·LAVALIN

MATERIAL TAKE-OFF LIST
DIFFUSER BALLAST
AMARUQ PHASE 2 WATER MANAGEMENT INFRASTRUCTURE
SNC Document No.: 668284-9000-46ET-0001
AEM Document No.: 6127-S-240-001-MTO-001

AGNICO EAGLE

Date	Revision
15-May-20	R0

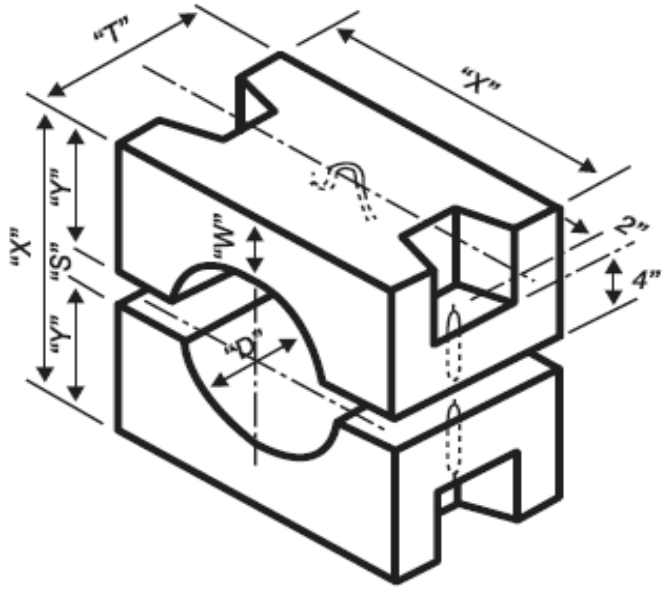
Values in black indicated items that are ordered
Values in red are proposed quantities to order

Rev.	Item	P&ID Line Tag #	Diameter (in)	Diameter (mm)	Description 1	Description 2	Function	Delivery Year	Year in Service	Unit	Estimated Quantity	Contigency (%)	With contingency	Qty (+contingency) Ordered for Barge 2020	Qty (+contingency) From Existing AMQ Inventory	Qty (+contingency) To be Ordered for Barge 2021	Notes
	1.0				DIFFUSER BALLASTING												
	1.1				YEAR-ROUND DIFFUSER - LINE #1	LENGTH OF PIPELINE TO SUBMERGE = APPROX. 314 M, DIAMETER 14-IN										-	
	1.1.1				DIFFUSER BALLASTING												
	1.1.2				Pre-mixed concrete ballast	15ft spacing	Dimensions as per design	2021		u	70	5%	74	74		0	See Sketch for details
	1.1.3		1	25	Bolt GR5 Full Thread, L = 13 in	To join ballast halves	2 per ballast	2021		u	140	20%	168	168		0	
	1.1.4		1	25	Hex Nut Gr5	To join ballast halves	4 per ballast	2021		u	280	20%	336	336		0	
	1.1.5		1	25	Steel Washer	To join ballast halves	4 per ballast	2021		u	280	20%	336	336		0	
	1.1.6				Red rubber sheet	1/8" thick, Sheet width = ballast width +2"	Wind 2 to 3 layers on pipe per ballast	2021		m	235	20%	282	282		0	
																-	
	1.2				SUMMER DIFFUSER - LINE #2	LENGTH OF PIPELINE TO SUBMERGE = APPROX. 320 M, DIAMETER 14-IN										-	
	1.2.1				DIFFUSER BALLASTING												
	1.2.2				Pre-mixed concrete ballast	15ft spacing	Dimensions as per design	2021		u	72	5%	76	76		0	See Sketch for details
	1.2.3		1	25	Bolt GR5 Full Thread, L = 13 in	To join ballast halves	2 per ballast	2021		u	144	20%	173	173		0	
	1.2.4		1	25	Hex Nut Gr5	To join ballast halves	4 per ballast	2021		u	288	20%	346	346		0	
	1.2.5		1	25	Steel Washer	To join ballast halves	4 per ballast	2021		u	288	20%	346	346		0	
	1.2.6				Red rubber sheet	1/8" thick, Sheet width = ballast width +2"	Wind 2 to 3 layers on pipe per ballast	2021		m	241	20%	290	290		0	
	1.3				NOTES												
	1.3.1				Ballast suppliers:	Contact information											
	1.3.2				Béton Provincial	M.Cote@betonprovincial.com											
	1.3.3				Pélomix inc.	mathieupoulin@pelomix.com											

END OF TABLE

SNC·LAVALIN	MATERIAL TAKE-OFF LIST DIFFUSER BALLAST AMARUQ PHASE 2 WATER MANAGEMENT	AGNICO EAGLE	Date
	SNC Document No.: 668284-9000-46ET-0001 AEM Document No.: 6127-S-240-001-MTO-001		15-May-20 Revision R0

BALLAST SKETCH



Weight of concrete per ballast (kg)	102

Dimensions	in	mm
D	14 1/2	368
X	24 1/2	622
T	6 1/2	165
Y	11 1/4	286
W	5	127
S	2	51

Appendix 3: Installation Specification

SNC·LAVALIN	**AMARUQ WATER MANAGEMENT** Nunavut	AGNICO EAGLE

Lot #:

Installation Specifications

Whale Tail Lake South Basin Treated Water Diffuser Installation Specifications

Prepared by:	*Verified by:*	*Approved by:*
Pierre Carignan, P. Eng. *OIQ Member No. 5046323* *NAPEG Member No. L3983*	*Anh-Long Nguyen, P. Eng.* *OIQ Member No. 122858* *NAPEG Member No. L2716*	*Anh-Long Nguyen, P. Eng.* *OIQ Member No. 122858* *NAPEG Member No. L2716*
Dan Chen, P. Eng. *OIQ Member No. 5008464*		

RB	2020-06-15	Issued for Client comments	PC / DC	ALN	ALN
RA	2020-06-11	Issued for comments	PC / DC	ALN	ALN
Rev.	**Date**	**Revision Description**	**By**	**Ver.**	**Appr.**

Client Document No.***6127-E-132-003-SPT-00X***	SNC Document No.***668284-9000-40EF-0001***
Client Project No. ***6127***	SNC Project No. ***668284***

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1. GENERAL

Agnico Eagle Mines Limited, Meadowbank Division (AEM) is developing the Whale Tail Project, a satellite deposit located on the Amaruq property (Kivalliq Region of Nunavut, Canada). The Whale Tail Project construction is ongoing and commercial production has started in the third quarter of 2019. To continue mining and milling, AEM is proposing to expand the Whale Tail Project by expanding the Whale Tail pit, developing another open pit called the IVR pit and including underground mining operations. As part of the expansion project, new water management and geotechnical infrastructures shall be required for surface water management.

As part of the water management infrastructure, diffusers are required when discharging treated water from the Amaruq Water Treatment Plant (AsWTP) to Whale Tail Lake South Basin (WTS) during the summer months (i.e. open water season).

2. SCOPE OF DOCUMENT

The following document provides general installation specifications and guidelines for the following infrastructure:

- Two (2) diffusers will be installed in Whale Tail Lake South Basin (WTS) to discharge treated water from the AsWTP during the summer months.

3. REFERENCE DOCUMENTS

Table 3-1 presents the reference documents to consult for the installation of the treated water diffusers.

Table 3-1: Reference Documents

Document Number	Revision	Title
61-695-270-224	RC	Diffuser pipe layout and profile
61-695-270-225	RC	Plan and details for summer treated water discharge pipeline and diffuser
61-695-270-226	RC	Plan and details for summer/winter treated water discharge pipeline and diffuser
61-695-270-230	RB	HDPE piping typical installation details

4. DIFFUSER AND SUBMERGED PIPELINE INSTALLATION

The following section describes the general installation procedure for the diffuser and pipeline in Whale Tail Lake South Basin (WTS). During the summer period, treated water from the Amaruq

AsWTP will be pumped towards Whale Tail Lake South Basin via 2 x 14-in HDPE pipelines. The treated water will be discharged in the lake via 2 x submerged diffusers. One of the two diffusers/pipeline shall be heat-traced and insulated to allow for the rapid start-up at the end of winter/start of the spring freshet.

Each line will be equipped with a diffuser. Both diffusers will consist of:

- 7 discharge ports spaced out at 14m intervals starting at the end of the 14-in DR17 HDPE line;
- Each port will consist in an Ø63.5mm diameter pipe mounted on a saddle with a total length of 720 mm;
- Both diffusers and part of the submerged portion of the pipelines will be weighted using ballasts for sinking. Specifically:
    - Diffuser #1: the non-insulated diffuser and submerged portion of the pipeline will be weighted using concrete ballasts;
    - Diffuser #2: part of the non-insulated diffuser and submerged portion of the pipeline below elevation 150 m will be weighted using concrete ballasts; the submerged part of the pipeline above El. 150 m that is insulated and heat-traced will be weighted using boulders.

The general installation procedure for the diffusers is as follows:

1. Assemble one (1) of the two diffusers/pipelines:
    a. Assemble one diffuser and offshore pipeline segment on the shoreline using pipe-butt welding for the whole length.
    b. Install flanges at both ends of the pipeline.
    c. Install a blind flange on the diffuser end and keep the other end open on the shoreline.
2. Install the discharge ports by mounting 2.5-in saddles on the 14-in DR17 HDPE and drilling a 2.5-in hole. Remove any burrs. Each saddle shall be mechanically secured. Screw in

the 2.5-in diffuser risers and cap them so that they are airtight. Refer to drawing 61-695-270-225 to 61-695-270-226 for details. Mark the location of the diffuser on the pipeline.

3. Using a boat, gradually pull the assembled diffuser/pipeline off the shoreline while installing concrete ballasts. Keep at least a 50 m approx. section of unballasted pipeline on the shoreline. Refer to drawing 61-695-270-225 to 61-695-270-226 for details.

4. For the diffuser/pipeline that is non-insulated and heat traced:

    a. For the assembly of each concrete ballast, install the thick rubber pad around the pipeline. Then place the bottom and top section of the concrete ballast around the rubber pad. Tighten both section together using the threaded rods, nuts and washer. Note the location of the ballast on the pipeline.

5. For the diffuser/pipeline that is partially insulated and heat-traced:

    a. Assemble the insulation and heat tracing in the segment of the pipeline running from elevation 150.0 m to 156.0 m approximately that shall be submerged in the lake, per the Manufacturer's Installation Instruction:

        i. Install six (6) heat-tracing ¾-in channels on the top half of the piping (between the 9, 12 and 3 o-clock) and 1 control sensor ¾-in channel at the 6 o-clock position.

        ii. Assembled the 2.5-in insulation kit around the pipeline. Each insulation segment is shipped in 40-ft length.

    b. Concrete ballast for 14-inch pipe will be installed up to the insulated and heat traced part (El. +/- 150 m). For the assembly of each concrete ballast, install the thick rubber pad around the pipeline. Then place the bottom and top sections of the concrete ballast around the rubber pad. Tighten both section together using the threaded rods, nuts and washer. Note the location of the ballast on the pipeline.

    c. The insulated and heat-traced segment of the pipeline will be ballasted using large boulders. For the assembly of each boulder ballast, install the thick rubber pad around the pipeline to protect the insulation around the 14-inch pipeline. Slip in

two (2) 20-in back-up rings flange around the insulated and heat traced pipeline. Install two (2) saddle clamps on both side of the flange to limit lateral movement. Attach two (2) boulders that have been previously weighted, one on each side to the flange by drilling an eyebolt into the boulder and attaching it to the flange using a steel wire. The weight of each boulder should be approximately 400 kg and should be similar to each other at +/- 5%. Limit steel wire length to a minimum. Note the location of the boulder ballast on the pipeline.

6. Continue the diffuser/pipeline/concrete ballast assembly, while continually pulling the ballasted pipeline into the lake.

7. Using a boat, position the floating diffuser/pipeline into position in Whale Tail Lake South Basin by means of a portable GPS apparatus. Ensure the distance at least 100 meters between the two diffusers.

8. The end of the pipeline that is onshore should be anchored to the shore to prevent it from slipping into the water. One possible approach that could be considered is to use a group of massive boulders that shall be attached to a backup ring placed near the end of the pipeline. The backup ring shall be free to slide along the pipe. Steel wires that link the pipeline to the boulders shall not be taut during installation. The exact method to anchor the line on the shore shall be detailed based on site conditions.

9. Once the diffuser/pipeline is floating in position, remove caps on diffuser risers.

10. Slowly fill pipeline/diffuser from shoreline end until pipe is approximately 70% full. Filling should be done with a pump at a rate no higher than 5 l/sec.

11. Once diffuser/pipeline is in place and partly full, crack open lake-side blind-flange and allow the diffuser/pipeline to sink. Keep tension in the rope used for towing from the boat to ensure it remains in position.

12. A diver must be on hand to close the lake-side blind-flange on the end of the diffuser.

13. Once submerged, from the shoreline, proceed with the installation of the heat-trace cables and control sensor per Manufacturer’s Installation Procedure.

14. For diffuser #2, complete the heat-tracing and insulation of portion of the on-shore pipeline.

All of the piping being installed at the site shall be High-Density Polyethylene (HDPE). The HDPE pipe segments shall be assembled by butt fusion joints performed by a technician quality in this field according to Plastique Pipe Institute (PPI) TN-42 guidelines.

Hydrostatic leak test on a number of assembled HDPE pipe spool shall be required before it is pulled into the lake and must comply with ASTM F 2164, ASTM F 1412 and the AWWA M55 Good Practice Manual, Chapter 9, and the PPI Polyethylene Pipeline Manual, Chapter 2 (2nd Edition). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or labour at no additional cost to the Buyer.

5. PIPING GENERAL INSTALLATION SPECIFICATIONS

5.1 HDPE Pipeline Installation

Take into consideration the expansion of the HDPE. Typically, the HDPE pipeline is installed in summer. In winter, the shrinkage of the HDPE piping is important. The expansion or shrinkage of the HDPE pipeline must not cause it to snake onto the road or risk of slipping into inside slope. Add extra length if necessary.

5.2 Standards and Reference Manuals

The most recent versions of the following standards are applicable for the project.

5.2.1 ANSI / AWWA

AWWA M55 PE Pipe – Design and Installation

5.2.2 Plastics Pipe Institute (PPI)

1. PPI Handbook of Polyethylene Pipe - 2009 (2nd Edition)
2. PPI TN-42 Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects (March 2013)

5.2.3 ASTM

ASTM F905	Routine Practices for the Qualification of Saddle Joint Assembly in Polyethylene Conduit
ASTM F 1055	Specification Standard for Electro-fusion Polyethylene Fittings for Polyethylene Pipe and Piping of Controlled Outside Diameter

ASTM F 2164	Routine Practices for Field Leak Testing of Polyethylene (PE) Pressure Pipe Networks Using Hydrostatic Pressure
ASTM F 2620	Routine Joining Practices by Melting Polyethylene Conduit and Fittings
ASTM D 3261	Specification Standard for Butt Fusion Joining of Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Piping

5.3 Quality Assurance

In his bid, the Contractor shall provide all relative costs associated with supervision services and testing for HDPE pipe fusion.

5.4 Supply of HDPE Pipes and Accessories

The supply of HDPE piping, accessories, insulation, heat-tracing and diffuser accessories to be used in this project are provided by AEM.

5.5 Piping Assembly Method

5.5.1 Butt Fusion Joints

The pipe shall be assembled using the butt fusion joining procedure described in ASTM F 2620 or PPI TR-33. All fusion assemblies must be done as recommended by the pipe or fittings manufacturer. Fusion assemblies must be performed by a technician qualified in this field according to PPI TN-42.

Fusions must be performed by experienced technicians. For Contractors, the qualification of the field technician must be demonstrated by proof of training.

5.5.2 Electro Saddle Fusion

If required, electro saddle fusions must be performed in accordance with ASTM F 2620 or TR-4, or as recommended by the fitting manufacturer and according to PPI TR-41. Saddle fusion assemblies must be performed by experienced technicians. For Contractors, the qualification of the field technician must be demonstrated by proof of training within the past year specifically tied to the equipment to be used for this project. Saddle fusion is used to assemble branch saddles, tapping tees and other HDPE constructions on the main pipe wall. (see ASTM F905).

5.5.3 Mechanical Joints

If required, the mechanical connection of HDPE to ancillary equipment such as valves, pumps and fittings shall use adapters for mechanical connections and other equipment in accordance

with the PPI Polyethylene Piping Manual, Chapter 9 and the AWWA M55 Manual of Good Practice, chapter 6.

Mechanical coupling shall be executed by experienced technicians. For Contractors, the qualification of the field technician must be demonstrated by proof of training in mechanical couplings within the past year. This training must be done on the equipment and the components of the pipe that are used for this project.

5.6 Preparation

For pressure systems, HDPE pipe and fittings shall be installed in accordance with ASTM D2321 or ASTM D2774 and the AWWA M55 PE Pipe – Design and Installation, Chapter 7.

5.6.1 Regulatory Requirements

The Contractor must comply with provincial/territorial requirements for workspace safety standards and worker protection for excavation work.

The Contractor must possess the SKILLS AND ADEQUATE EQUIPMENT to ensure quality results and must be recognized by the manufacturer of HDPE piping.

5.7 Pipe Installation

5.7.1.1 Cushion

The pipes shall be installed directly on the natural ground. The pipes will be installed along the road on the ground except where fill is required in low points. If the pipe is placed on a cushion, the low points along the cushion must be raised to ensure a uniform support. The fill material used for the cushions and filling shall be muck.

5.8 Contractor Testing

The hydrostatic leak test on the HDPE piping is required and must comply with ASTM F 2164, ASTM F 1412 and the AWWA M55 Good Practice Manual, Chapter 9, and the PPI Polyethylene Pipeline Manual, Chapter 2 (2nd Edition). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or labour at no additional cost to the Buyer.

For safety reasons, the pneumatic (compressed air) leakage test of the HDPE pipe under pressure is prohibited.

5.9 Cleaning

Following the tests, the line must be cleaned in accordance with AWWA M55 Manual, Chapter 10.

6. QUALITY CONTROL AND QUALITY ASSURANCE PROGRAM

6.1 Definitions

- Quality: Quality is defined as fitness to intended function and/or purpose.
- Quality Assurance (QA): A planned and systematic pattern of all means and actions designed to provide adequate confidence that products or services meet contractual and jurisdictional requirements and will perform satisfactorily in service.
- Quality Control (QC): Actions which provide a means to measure and regulate the characteristics of an item of service to established requirements.
- Quality Plan: A written description of intended actions to control and ensure quality. The Quality Plan defines applicable quality policy and procedures for the project.
- Quality Program: The co-ordinated execution of applicable QA and QC plans and activities for a project.
- Quality System: The documents that describe and govern the systematic application of the quality program.
- Contractor: Contractor that shall be performing the work
- Owner: Agnico Eagle Mines
- Engineer: Agnico Eagle Mine Construction Team

6.2 Contractor's Responsibility for Quality of the Work

Be solely responsible for quality control and quality of the work, including the work of all sub-Contractors, sub-consultants, suppliers, manufacturers and fabricators. Submit full documentary evidence of quality control of the work.

6.3 Contractor's Quality Organization

Provide an organization to ensure quality work. Provide QC personnel necessary to execute the Quality Program.

Ensure that QC personnel have a thorough working knowledge of the products/processes to be addressed on this contract and have the requisite.

All QC activities on this contract are subject to QA auditing, as deemed necessary by the Engineer. Co-operate with the Engineer undertaking these audits, including providing access to all work areas (suppliers, off-site manufacturing and fabrication, on-site construction) and provide all requested quality related documentation (e.g., supplier's/manufacturer's specifications, standards and operations and/or maintenance manuals, etc.).

6.4 Contractor's Quality Control System

Submit the following parts of the Contractor's system at time of tender:

- Contractor's Quality Policy and Statement of Corporate Commitment to Quality; QA/AC Organizational Structure;
- Contractor's Quality Manual including its established and documented QA/QC processes and procedures covering the subjects indicated in the contract Supplementary Conditions;
- QA/QC manuals and documented processes and procedures of sub-consultants, sub-Contractors, suppliers, manufacturers and fabricators.

Following award of the contract, submit the contract QC Plan as described in Paragraph 6.5 below, to the Engineer for review.

6.5 Contractor's Quality Control Plan

Plan, prepare, and submit a fully documented QC Plan for the contract. Address and detail the control provisions for the following elements. Reference and append existing company procedures to be used for this contract:

1. Management Responsibility: Describe the Quality Organization and individual responsibilities and/or activities;
2. Documented Quality System: Reference applicable quality manuals, procedures, and this Quality Plan;

3. Product Identification and Traceability: Describe the system for materials and production description, tagging, and continued identification throughout the work processes;

4. Process Control: Identify specific work-flow processes and required in progress control procedures/techniques (e.g., welding, etc.);

5. Inspection and Testing (I&T): Identify I&T organization and provide inspection checklists;

6. Inspection Measuring and Testing Equipment: List I&T equipment requiring calibration. Indicate specific recalibration schedules (such as butt-fusion machines);

7. Inspection and Test Status: Describe segregation, classification, tagging, and stage-by-stage handling of non-conforming work; tag signing and authorization required to proceed to next stage;

8. Non-Conformance: Describe identification and documentation of non- conformances;

9. Corrective/Preventative Actions: Outline how corrective actions will be classified, documented, authorized, verified, and how measures will be taken to prevent reoccurrences;

10. Quality Records: Describe procedure for collecting quality records and for keeping Engineer informed. List all records to be handed over to Owner at contract completion;

11. Quality Assurance Audits: Outline audit schedule and documentation proposed;

12. Training: Outline any staff training planned/required on this contract. Indicate training already received by quality control staff;

13. Environment and Workplace: Identify measures to maintain the workplace and environment in contract and jurisdictional conformance. Reference applicable agency and Owner regulations and requirements.

6.6 Owner Regulations and Requirements

Require sub-consultants, sub-Contractors, suppliers, manufacturers, and fabricators providing work on the contract on behalf of the Contractor, to implement all applicable elements of this Plan, including where necessary the submission of individual QC Plans to the Contractor. It is the Contractor’s responsibility to integrate such Plans into its contract-wide QC Plan.

Submit as part of the QC Plan, all QC Forms intended to be used on the contract. Include clear delineation of responsibilities for form initiation, performance of actions, recording of compliance intent, verification of completed activities, achievement of quality conformance, approvals and sign-offs.

Include in the QC plan for regular submission of reports to the Engineer on quality control results, including deficiencies and the associated proposed and/or completed correctives actions. Provide a list of proposed reports and the submissions schedule. Include for non-recurring and special reports. Schedule regular weekly quality control review meetings with Engineer.

Submit the completed draft QC Plan for the contract to the Engineer for review. Incorporate the review comments and submit the final version of the QC Plan.

Appendix B and C presents the proposed QA/QC program for the assembly of the treated water diffusers and the QA/QC plan for HDPE pipe fusion respectively. Proposed QA/QC approval forms are presented in Appendix D.

Supplement and update the QC Plan in the course of the contract, as necessary, and where required by the Engineer.

The Engineer's review of the QC Plan (or any testing or inspection the Engineer may perform) for the contract does not relive the Contractor, or his agents, of responsibility for compliance of the finished work with the contract documents.

6.7 Inspections and Testing by the Contractor

Provide all routine daily and special inspection necessary to ensure the quality of the work. Be responsible for all inspection and testing required by the contract documents, statutes, regulations, by-laws, standards or codes or any other jurisdictional requirements. Where witnessing of inspection and testing by the Engineer is called-for in the specifications, give timely notice of readiness for witnessing, and date and time for attendance by the Engineer. The QC representative of the Owner will notify the Contractor prior to the start of such tests but the QC Representative of the Owner shall not be required to wait for the arrival of the Contractor.

Full time visual inspection during welding will be carried out by the QC Representative of the Contractor to ensure that the welding meets the design requirements. The QC Representative shall produce daily reports on the pipeline and diffuser installation including a sketch with test

results, length of pipes welded during the shift and other relevant information. Each daily report should be communicated to the Owner's Engineer at the beginning of each following shift.

Implement the QC Program to organize, document and demonstrate that the work is performed in accordance with the contract documents. Incorporate in the QC program, all necessary inspection and testing of work on the contract that is carried out by the Contractor's sub-consultants, sub-Contractors, suppliers, manufacturers and fabricators.

6.8 Inspection and Testing by the Engineer

The Owner reserves the right to conduct inspection and testing without notice to the Contractor. The Contractor shall provide assistance when required for collecting and handling the samples. Sampling or testing required by the QC Representative shall be executed by the Contractor without delay. All samples and tests shall be taken or performed in accordance with the appropriate standard, approved by the QC Representative, and shall meet the requirements of the present document.

The Engineer will appoint his own staff and/or an independent inspection and testing company to carry-out such inspection and testing of the contract work he deems necessary. Costs for such inspection and testing will be paid by the Owner. However, inspection and testing that is undertaken due to suspected and subsequently demonstrated, non-conformance of the work to the contract documents shall be at the Contractor's expense.

Should the Contractor's Quality Program prove ineffective or is not being applied in accordance with the finalised QC Plan, the Engineer will place the Contractor on written notice to provide satisfactory service within five (5) working days. If the Engineer determines that the Contractor has failed to give the required satisfaction, the Owner reserves the right to conduct such inspections and testing as he deems necessary to ensure conformance to contract quality requirements. This inspection and testing shall be at the Contractor's expense.

Co-operate fully with the Engineer in his inspection and testing activities. Where such activities are necessitated by suspected non-conformance of the work, inspections and testing by the Engineer will be promptly made. Uncover for examination any such work and make good at no cost to the Owner. The Engineer may inspect and test products during the manufacture, fabrication, shop testing, installation, construction and commissioning phases of the contract. The

Engineer will ascertain the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the site, as designated by the Engineer.

Where inspection and testing by the Engineer is done, either during manufacture, fabrication or construction at the site, ensure that proper facilities and assistance are provided. The Engineer will formally notify the Contractor of found non-conformances. Take corrective action at no cost to the Owner.

6.9 Defective Work

Work which does not conform with the requirements of the contract shall be considered as defective. The work shall be removed and replaced with acceptable products at no cost to the Owner. Do not use defective products which have been corrected unless the Engineer has approved them. Handle the disposition of any work in non-conformance to the contract documents as directed by the Engineer. Control the work by segregation, quarantining, marking, tagging, and staging. All corrective and/or preventative actions shall be acceptable to and verified by the Engineer and released only upon written acceptance by the Engineer.

6.10 Quality of Materials

Use products and materials from the Owner or new products and materials supplied by the Contractor, warranted to be of the quality specified, throughout the permanent work. Incorporate these in such manner as to produce a completed construction in accordance with the contract documents.

Used materials may be employed for temporary work. Such materials shall be structurally sound and acceptable to the Engineer.

Provide documentation to the Engineer of the quality of products and materials to be incorporated into the work.

6.11 Substitutions

The contract documents are not intended to preclude the use of any product which is not specified. In the specifications the manufacturer’s name, catalogue number, etc., may be given to identify products to be used. The specific products mentioned, indicate the type, function, minimum standard of design, efficiency, durability and quality required, but shall not be construed

to exclude products which, in the opinion of the Engineer, are acceptable substitutions. Use of substitutions will only be permitted when the Engineer advises the Contractor in writing that such a substitution has been approved. Substitutions to methods or processes described in the contract documents, may be proposed for the consideration of the Engineer. Ensure that such substitutions are in accordance with the following requirements:

- Substitutions shall be proposed no later than 10 days prior to the scheduled date for the applicable submittal requirement;
- Proposed substitutions have been investigated and complete data is submitted in accordance with the specifications;
- Data relating to changes in the contract Schedule and the impact on other work has been submitted;
- Equal or better guarantee is given for the substitution as for the original product specified;
- There will be no extra cost to the Owner resulting from the use of a substitution.

Appendix A: *Drawings*

Appendix B: *QA/QC Program*

Appendix C: HDPE Pipe Fusion QA/QC Plan

Appendix D: *Approval Forms*

APPENDIX A : DRAWINGS

APPENDIX B : QA/QC PROGRAM

APPENDIX C : HDPE PIPE FUSION QA/QC PLAN

APPENDIX D : APPROVAL FORMS