Appendix 34

Whale Tail technical memorandum on avoidance of serious harm to fish and fish habitat

AGNICO EAGLE

TECHNICAL MEMORANDUM

Date: March 31, 2019

To: Bev Ross, Mark d'Aguiar, Sally Wong (DFO)

From: Robin Allard, Nancy Duquet-Harvey, Marie-Pier Marcil (Agnico Eagle), Leilan Baxter (Consultant to Agnico Eagle)

Re: 2018 Report on the Implementation and Monitoring of Measures to Mitigate and Avoid Serious Harm to Fish – Whale Tail Pit Project

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1.1 BACKGROUND

In July, 2018, Agnico Eagle Mines Ltd. (Agnico) was issued *Fisheries Act* Authorization (FAA) 16-HCAA-00370 for the Whale Tail Pit project. Approved fish habitat offsetting related to this Authorization is described in the Fish Habitat Offsetting Plan for Whale Tail Pit (March, 2018).

This Technical Memorandum was developed in response to Condition 3 of the FAA, which relates to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish. In particular, it addresses Condition 3.1 of the FAA:

Condition 3.1: ***The Proponent shall monitor the implementation of avoidance and mitigation measures referred to in section 2 of this authorization, and provide a stand-alone report to DFO, by March 31, annually and indicate whether the measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of this authorization.***

Avoidance and mitigation measures as listed in Section 2.3 of the FAA are:

1. Adherence to the *General Fish-out Protocol for Lakes and Impoundments in the Northwest Territories and Nunavut* (Tyson et al., 2011);

2. Adherence to the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (Fisheries and Oceans Canada, 1995) for any and all intake in waterbodies that support fish;

3. Development of a Blasting Mitigation Plan, which shall adhere to the guidance in *Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000 – 2002* (Cott and Hanna, 2005);

4. Adherence to the *Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut* (Fisheries and Oceans Canada, 2010);

5. Ensure that all project infrastructure in watercourses is designed and constructed in such a manner that it does not unduly prevent or limit the movement of water or fish species in fish bearing streams and rivers, unless otherwise authorized by Fisheries and Oceans Canada.

Where appropriate, dated photographs with GPS coordinates and inspection reports are provided to demonstrate effective implementation of these mitigation measures and standards, as described in Condition 3.1.3 of the FAA.

Details of any contingency measures that were required to be followed to prevent further impacts in the event that mitigation did not function properly are provided, according to Condition 3.1.4 of the FAA.

Finally, as described in Condition 3.1.1, this report also summarizes the monitoring results related to fish and fish habitat contained in the documents listed in Section 2.4[1] of the FAA. The referenced documents are:

1. Core Receiving Environment Monitoring Program (CREMP): 2015 Plan Update Whale Tail Pit Addendum (May 2018)

2. Water Quality and Flow Monitoring Plan (Version 3, May 2018)

3. Water Quality Monitoring and Management Plan for Dike Construction and Dewatering (Version 1, January 2017)

4. Conceptual Whale Tail Lake (North Basin) Fish-out Work Plan

1.2 IMPLEMENTATION OF AVOIDANCE AND MITIGATION MEASURES

A commentary on the implementation of each measure to avoid or mitigate serious harm to fish and fish habitat in 2018 is provided.

1.2.1 Adherence to the General Fish-out Protocol for Lakes and Impoundments in the Northwest Territories and Nunavut (Tyson et al., 2011)

As described in the Whale Tail Lake Fish-out Report (provided to DFO by email, March 14, 2019), Agnico and the fish-out consultant (North/South Consultants Ltd.) adhered to guidance in Tyson et al. (2011) for the field methodology employed during the fish-out of Whale Tail Lake (North Basin) and for the reporting of results. A full description of the fish-out protocol is provided in that report, along with photographs and field data forms. No supplemental contingency measures were required to be implemented to mitigate serious harm.

[1] Condition 3.1.1 of FAA 16-HCAA-00370 references Section 2.3. However, review of the requirements of this condition lead to the interpretation that the text intended to refer to Section 2.4.

1.2.2 Adherence to the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (Fisheries and Oceans Canada, 1995) for any and all intake in waterbodies that support fish

Construction of the freshwater intake in Nemo Lake occurred in 2018. The Construction Summary Report (as built) for this project is provided in Appendix A. As described in Appendix A, construction of this freshwater intake adhered to the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (Fisheries and Oceans Canada, 1995) and the design was approved by DFO (letter, Appendix A).

Photographs of the freshwater intake construction are provided in Appendix A.

1.2.3 Development of a Blasting Mitigation Plan

In accordance with this condition, Agnico has developed a Blast Monitoring Program (Version 3, March 2019) (Appendix B) which adheres to the guidance in the document "Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000 – 2002" (Cott and Hanna, 2005) and "Guidelines for the Use of Explosives In or Near Canadian Waters" (Wright and Hopky, 1998) as modified by the DFO for use in the north.

Agnico has also submitted to DFO specific Technical Memorandums regarding blast monitoring and mitigation for construction of the Whale Tail Dike (June 15, 2018; Appendix B). A similar memo was submitted in February 2019 for construction blast monitoring for the Mammoth Dike, and will be included in the 2019 Annual Report.

Every blast is monitored with an Instantel Minimate Blaster to ensure that vibrations generated by blasting are less than 13 mm/sec and the overpressure is under 50 KPa at the nearest fish-bearing waterbody. The results of blast monitoring are systematically analyzed by the Engineering department within the 24 hours following the blasting operation. The blast monitoring results are interpreted and a blast mitigation plan is implemented immediately if the vibrations or the overpressure exceed the guidelines.

1.2.4 Adherence to the *Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut* (Fisheries and Oceans Canada, 2010)

In 2018, winter water withdrawal occurred for the freshwater intake from Nemo Lake only. Withdrawal volumes conformed with the *Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut* (Fisheries and Oceans Canada, 2010) – i.e. total under-ice withdrawal will not exceed 10% of the available water volume.

Volume of Nemo Lake[2]: 8,360,000 m^3

Area of Nemo Lake: 1.255 km^2

Estimated maximum ice thickness: 2 m

Available water volume = total lake volume – (lake area x ice thickness)

= 8,360,000 m^3 – (1,255,000 m^2 x 2 m)

= 5,850,000 m^3

Permissible withdrawal volume = 0.1 x 5,850,000 m^3

= 585,000 m^3

Estimated total under-ice water withdrawal requirements for 2018-2019 winter season: 20,000 m^3

Prior to the 2019-2020 winter season, Agnico will communicate winter water withdrawal requirements with DFO.

1.2.5 Ensure that all project infrastructure in watercourses is designed and constructed in such a manner that it does not unduly prevent or limit the movement of water or fish species in fish bearing streams and rivers, unless otherwise authorized by Fisheries and Oceans Canada.

In 2018, culvert construction for roads 8, 9, 11 and 22 was designed and submitted to NWB (Appendix C). Between July 13 – August 3, 2018, design documents were available for DFO review. No comments from DFO were received, and on September 4, NWB approved the Design Report for Culverts (roads 8, 9, 11 and 22) (Appendix C).

As-built reports for culvert construction, including photographs, will be provided to NWB 90 days after the construction completion, as required according to the Project's Type A Water License (2AM-WTP1826) Part D Item 15.

[2] Volume and area data from the Final Environmental Impact Statement for the Whale Tail Pit and Haul Road Project, Appendix 6-M (2015 Baseline Bathymetry), Table 6-M-1.

1.3 SUMMARY OF MONITORING RESULTS

1.3.1 CREMP – Whale Tail Pit Project

The Whale Tail Project was merged with the Meadowbank and Baker Lake CREMP reporting framework in 2018. Baseline data collection continued for most of the study area lakes in 2018. With the onset of in-water construction activities in Whale Tail Lake, Whale Tail Lake -South Basin (WTS) and Mammoth Lake (MAM) transitioned from control to impact designations in late July and November, respectively. While no major in-water construction activities occurred in Mammoth Lake in 2018, road construction and quarry development adjacent to the lake in the fall had the potential to affect downstream water quality in this lake; subtle changes in water quality were observed in the November sampling event. The focus on the 2018 reporting effort the Whale Tail study area lakes was on describing current conditions in the context of baseline data collected for the Project using plots of the various endpoints over time. A stats approach to comparing potential changes at WTS was considered unnecessary for assessing changes in 2018 and supporting management decisions in 2019. Given the limited amount of data in the “after” period and the absence of site-specific triggers and thresholds, this year’s assessment of spatial and temporal trends focused on visual identification of construction-related changes (i.e., emphasis on WTS and MAM relative to the rest of the areas). Future assessments will follow the same process used for Meadowbank (i.e., use of triggers/thresholds and formal statistical testing of trends).

Water Quality

Water quality reported from the first half of 2018 was broadly representative of baseline conditions observed between 2014 and 2017 at the six Whale Tail study areas.

Construction activities started in late July and resulted in some predictable changes in water quality at WTS during the open water construction season. TSS concentrations measured at 2 mg/L in the August sampling event were below the Meadowbank specific trigger value of 3 mg/L. By September, TSS was trending lower and was <1 mg/L (MDL) in the samples collected in November. Concurrent with the modest increase in TSS in August was an increase in the number of parameters that were > MDL and an increase in the absolute concentration of some parameters. Increases total metals such as aluminum, chromium and iron were correlated with increased TSS in August, but the observed increase was short-lived; by November, the concentrations were back to the range reported during the baseline period. Importantly, there were no measured exceedances of the CCME water quality guidelines for parameters with effects-based thresholds at WTS in 2018, indicating the transient spike in some metals were unlikely to adversely affect aquatic life.

Mammoth Lake (MAM) water quality showed similar seasonal trends in 2018 compared to the baseline period, but in November there was evidence to suggest construction or other site-related activities were resulting in changes in some water quality parameters. The apparent changes were first noticed in the specific conductivity profile from the northeast corner of MAM in November. The upper limit for conductivity at MAM is approximately 75 µS/cm; in November the readings taken at 1 m intervals measured 100 µS/cm near the surface and increase to 150 µS/cm near the bottom. A similar pattern was observed in the December profile taken at the same location in the northeast corner of the lake. The spatial extent of changes in MAM water quality

did not extend throughout the lake based on the specific conductivity results from the second profile collected in November at the other basin in MAM.

Among the parameters measured in the November water samples, hardness, TDS, nutrients (e.g., nitrate and phosphorus), metals (e.g., total and dissolved aluminum, total chromium, and total iron) were measured at higher concentrations compared to earlier in the year and compared to baseline November events in 2016 and 2017. Similar to WTS, there were no measured exceedances of the CCME water quality guidelines for parameters with effects-based thresholds.

The available data from 2018 show the spatial extent of the construction related changes in water quality did not extend downstream from MAM to Lake A76. NEM, A20 and Lake DS1 were similarly kept in the “control” phase for the duration of 2018.

Routine water quality monitoring is recommended for 2019 with analysis of the data using the same BACI statistical assessment used for Meadowbank.

Phytoplankton Community

Phytoplankton taxonomy analyses were carried out synoptic with the water chemistry sampling program in 2018. Phytoplankton communities vary naturally throughout the year in total biomass (and density) and community composition (taxa richness). The primary site-related stressors that have the potential to affect the phytoplankton community included nutrient loading and increased concentrations of metals. Nutrient loading can manifest as an increase in total biomass or a change in community structure, while effects to increasing metals would be expected to result in lower biomass and taxa diversity. Overall there was no evidence to suggest site-related activities caused changes in primary productivity in the near-field areas (MAM and WTS) due to construction activities in 2018. The trends in phytoplankton biomass and richness will be assessed using the BACI framework as the project continues on into the construction phase in 2019.

Sediment Chemistry

Lakes in the Whale Tail study area have naturally-high concentrations of some metals. Arsenic, cadmium, chromium, copper, and zinc exceeded the CCME interim sediment quality guideline in at least one sample collected in 2018. Of these five metals, arsenic is particularly enriched in sediments throughout the study area lakes, with most samples exceeding the CCME probable effect level sediment quality guideline. There was no indication of a temporal increase in sediment metals concentrations at WTS (or any other area) in 2018 relative to the baseline period. Sediment core samples, which target the top 1.5 cm of sediment as opposed to the 3 to 5 cm targeted in grab samples, are preferentially used in the statistical testing of temporal trends in sediment chemistry. The next coring study is scheduled for 2020, coinciding with the normal 3-year sediment coring cycle for the CREMP. Routine sediment grab chemistry sampling is recommended in 2019 to support the benthos community assessment and broadly assess changes in sediment chemistry over time at each area.

Benthos Community

Benthic invertebrate (benthos) community structure (taxa richness) and function (abundance) is typical of northern headwaters lakes in the region (i.e., low abundance and few taxa). Benthos communities in these lakes have, by virtue of their presence, adapted to the naturally-elevated

concentrations of metals in sediment. Although total abundance tends to be low, within-area variability can be substantial. Taxa richness, unlike abundance, is more consistent with interannual variability quite low for the various areas. The normal range of species identified among the various study areas is 10 to 15; in 2018 there were between 13 and 20 taxa identified at WTS. The comparatively high taxa richness, combined with no apparent change in abundance, demonstrates that dike construction did not alter the structure or function of the benthos community in 2018. Routine monitoring of the benthos community is recommended in 2019, consistent with study design outlined in the Addendum to the CREMP: 2015 Design Document (Azimuth, 2018b).

1.3.2 Water Quality and Flow Monitoring Plan - Whale Tail Pit Project

Results of monitoring conducted in 2018 under the Water Quality and Flow Monitoring Plan (Version 3, March 2018), which includes effluent monitoring requirements under MDMER are summarized here by monitoring location or activity, and station ID.

1.3.2.1 Whale Tail North Construction

During the in-water portion of the Whale Tail Dike Construction, Agnico discharged an effluent from the construction dewatering activities. The Whale Tail Site became subject to the MDMER on July 27th, 2018. The final discharge point Whale Tail North Basin (ST-MDMER-4) was in operation between July 27th to August 10th and between August 14th to August 27th. The sample was taken from the Water Treatment Plant and was then released on tundra, which flowed onto a natural boulder field at the edge of the Whale Tail Lake North Basin (receiving environment). Results are provided in the 2018 Annual Report for the Meadowbank and Whale Tail Sites, Section 8.5. No exceedances of MDMER criteria occurred.

The volume of water discharged to the environment was reported on a weekly basis pursuant to the MDMER monitoring program requirements. The total volume discharged in 2018 was 321,537 m^3.

Under the Environmental Effects Monitoring (EEM) program, Agnico was required in 2018 to collect sub-lethal toxicity samples at this discharge point. As per subsection 6(1) "[…] sub-lethal toxicity test under Section 5 shall be conducted two times each calendar year for three years and once each year after the third year […]". No sublethal toxicity has been taken in compliance with Schedule 5 Section 6(1). Agnico had planned to take this sublethal toxicity sample on September 3rd but the discharge stopped on August 27th. It was not possible to conduct the sublethal testing before this date since all of the accredited laboratories able to conduct the analysis were overbooked. Agnico sent a notification to ECCC Inspector on September 6, 2018

The water quality samples were taken from the discharge location (ST-MMER-3), the receiving environment exposure area (WTN or ST-MDMER-4-EEM-WTN) and reference area (TPS or ST-MMER-1-EEM-TPS). Results of the EEM water quality monitoring program are presented in the 2018 Annual Report for the Meadowbank and Whale Tail Sites, Section 8.5. This data was previously reported to Environment Canada via the RISS electronic database reporting system. In 2018, there was only 29 days of discharge. Thus, only one (1) water quality samples was collected at the Whale Tail North Basin exposure and reference areas. On August 6th, Agnico conducted the water quality monitoring as required by Schedule 5 Section 7(1). Radium 226 was

not analysed for the exposed area as the bottle was not provided to the accredited laboratory. When Agnico notice the missing parameters, the discharge was already stopped and it was impossible to take a second sample. Agnico sent a notification to ECCC Inspector on September 6, 2018.

Five non-compliance with the MDMER regulation were observed in 2018:

As required by MDMER Division 2 Section 12(1), Agnico did not collected on July 27th or 28th, 2018 a sample of effluent from the final discharge point.

- As required by MDMER Division 2 Section 12(1), Agnico did not collect a sample for the week of July 29th to August 4th, 2018 from the final discharge point. Agnico didn't record the pH and the concentrations of the deleterious substances prescribed in Section 3 for this week. As the discharge started on July 27th there is no sample taken before this week. Analyses of the MDMER data for the following week were all below the authorized limits of deleterious substances. Notification sent to ECCC Inspector on September 06, 2018.
- As required by MDMER Division 2 Section 14(1), Agnico did not collected for the month of July a toxicity sample.
- No sublethal toxicity has been taken in compliance with Schedule 5 Section 6(1). Agnico had planned to take this sublethal toxicity sample on September 3rd but the discharge stopped on August 27th. It was not possible to conduct the sublethal testing before this date since all of the accredited laboratories able to conduct the analysis were overbooked. Agnico sent a notification to ECCC Inspector on September 6, 2018.
- On August 6th, Agnico conducted the Water quality monitoring as required by Schedule 5 Section 7(1). Radium 226 was not analysed for the exposed area as the bottle was not provided to the accredited laboratory. When Agnico notice the missing parameters, the discharge was already stopped and it was impossible to take a second sample. Agnico sent a notification to ECCC Inspector on September 6, 2018.

1.3.2.2 Waste Rock Storage Facility (WRSF) Pond (ST-WT-3)

In 2018, a small amount of water was observed at the base of the Whale Tail Stage 1 WRSF in September. Two (2) water samples were taken and the data is presented in the 2018 Annual Report for the Meadowbank and Whale Tail Sites, Section 8.5. There are no applicable license limits. No water was transferred from this pond in 2018.

1.3.2.3 Lake A47 (ST-WT-6)

In 2018, water from the Lake A47 (ST-WT-6) was sampled in August during open water as per the requirements in the NWB Water License (sampling station ST-WT-6). There are no applicable license limits. Results are presented in the 2018 Annual Report for the Meadowbank and Whale Tail Sites, Section 8.5.

1.3.2.4 Lake A16 outlet (ST-WT-14)

In 2018, water from the Lake A16 outlet (ST-WT-14) was sampled in August during open water as per the requirements in the NWB Water License (sampling station ST-WT-14). There are no applicable license limits. Results are presented in the 2018 Annual Report for the Meadowbank and Whale Tail Sites, Section 8.5.

1.3.2.5 Lake A15 (ST-WT-15)

In 2018, water from the Lake A15 (ST-WT-15) was sampled in August during open water as per the requirements in the NWB Water License (sampling station ST-WT-15). There are no applicable license limits. Results are presented in the 2018 Annual Report for the Meadowbank and Whale Tail Sites, Section 8.5.

1.3.2.6 Effluent discharged from AP-5 and Trench-water Containment Pond (ST-WT-MEA-4)

As per Water License 2BB-MEA1828 Part D Item 17, a 10 days' notice was sent to CIRNAC's Inspector on September 10 and September 28 to advise the pumping of AP-5 containment pool to the tundra. Discharge locations had flow dissipaters put in place to prohibit the erosion from the discharge. The discharge met discharge criteria in accordance with Part D, Item 14 of the NWB Water License. Pre-discharge sample were taken on September 4th and October 1st. Weekly sample were taken during discharge. No non-compliance events were observed during discharge. Results are provided in the 2018 Annual Report for the Meadowbank and Whale Tail Sites, Section 8.5.

1.3.2.7 Whale Tail Haul Road and Quarries Water Quality Monitoring

Pre-freshet and freshet inspections were conducted at crossings along the Whale Tail Haul Road in 2018. These inspections are conducted to document the presence/absence of flow, erosional concerns and turbidity plumes. No erosional concerns or visual turbidity plumes were observed during the freshet inspections. Weekly inspections are also conducted on a year round basis. No visual turbidity plumes or erosion was observed.

Regular inspections of quarries along the Whale Tail Haul Road were also performed during the year to ensure that runoff, if any, would be free of any visible sheen and would not impact the environment. No issues with runoff water inside the quarries were noted in 2018.

1.3.3 Water Quality Monitoring and Management Plan for Dike Construction and Dewatering – Whale Tail Pit Project

Construction of two dewatering dikes (Whale Tail Dike and Mammoth Dike) is required as a component of the Whale Tail Pit project. The Water Quality Monitoring and Management Plan for Dike Construction and Dewatering (January, 2017) was developed to provide details of water quality monitoring and management actions for dike construction and dewatering activities. TSS

(Total Suspended Sediments) and turbidity (primarily as a surrogate for TSS) are the major drivers of management actions during construction and dewatering.

In 2018, construction of the Whale Tail Dike began. Neither construction of the Mammoth Dike nor dewatering activities occurred in 2018.

The Dike Construction and Dewatering Monitoring Report (March, 2019) describes:

- the implementation of mitigation measures that were planned in conjunction with dike construction to control the release of total suspended solids (TSS) in the environment and thereby avoid and mitigate serious harm to fish and fish habitat;
- results of water quality monitoring that was conducted in accordance with the Plan;
- any supplemental management actions that were implemented based on monitoring results.

In-water construction of the Whale Tail Dike occurred from July 27 – August 27, 2018. Prior to dike construction, three turbidity curtains were installed on the south side of the dike. As a supplementary measure to protect fish remaining in the Whale Tail North Basin during the fishout, two turbidity curtains were also deployed prior to the start of the construction on the north side of the dike. Southern turbidity curtains were removed in September, after in-water construction was complete. A full list of mitigation measures to control release of TSS are described in Section 2.1.1 of this report.

Results of water quality monitoring during dike construction are compared to NWB Type A Water License criteria for TSS/turbidity. Monitoring occurred in four locations; north and south of turbidity curtains, as well as broad survey locations in Whale Tail Lake (South Basin) and Mammoth Lake. Four separate turbidity depth profiles were recorded using a handheld meter at each location, and turbidity values were converted to TSS using a site-specific, DFO-approved regression equation.

All monitoring results for all stations were within NWB Water License criteria, so no supplemental management actions were required to be implemented.

For routine water quality analysis at dike monitoring stations, some exceedances of CCME guidelines occurred. For total metals, one or more samples exceeded CCME guidelines for several parameters at each station, including: iron, lead and selenium (WT-DC location) and aluminum, copper, chromium, iron, lead, selenium, thallium, and zinc (WTN-DC location). While no guidelines were available for any dissolved metal except aluminum, results of the dissolved metals analysis were compared to guidelines for total metals, as in the Bay-Goose Dike construction monitoring report (Azimuth, 2010). Dissolved metals only exceeded those guidelines for three samples: chromium was marginally above the guideline in one sample at WTN-DC, and selenium marginally exceeded the guideline twice in this location. This pattern of results is similar to those observed for the Bay-Goose Dike construction (Azimuth, 2010), and East Dike construction (Azimuth, 2009). Dissolved metals are considered a much better indicator of potential effects to aquatic life in the water column, and therefore as concluded in Azimuth (2010), these water quality results suggest that direct toxic effects to aquatic life are unlikely. Most exceedances occurred on the north side of Whale Tail Dike, in the ultimately impounded area of Whale Tail Lake - North Basin. The 2018 CREMP report provides a complete analysis of water quality

monitoring results for the receiving environment, and although evidence of construction activities is apparent in some results, no adverse affects were identified through that monitoring program.

1.3.4 Conceptual Whale Tail Lake (North Basin) Fish-out Work Plan

The fishout of Whale Tail Lake (North Basin) at the Meadowbank site took place from August 13 to September 28, 2018, and followed the Conceptual Whale Tail Lake (North Basin) Fishout Work Plan (February 2017), which was developed in consultation with the retained fisheries consultant (North/South Consultants Ltd.) and Fisheries and Oceans Canada (DFO). A complete report on fishout methods and results is provided in the Whale Tail Lake Fish-out Report (sent to DFO March 14, 2019, and the program is summarized here.

The fishout consisted of a 2-day methods trial, a catch per unit effort (CPUE) phase, and a final removal phase. During the CPUE phase (August 13 – September 23), fish removal was undertaken during the daytime only, using a standard unit of effort, in order to collect population data and maximize successful transfer of fish to the adjacent Whale Tail Lake (South Basin). Initial abundance was estimated daily during the CPUE phase based on decline in CPUE, using both the Leslie and DeLury methods.

The final removal phase was initiated with DFO approval on September 24, when population estimates (DeLury method) indicated that over 98% of fish had been removed. The fishout was terminated on September 28 when Whale Tail Lake froze.

With all effort combined, a total of 3,078 fish weighing 776 kg and consisting of four species (Arctic char, burbot, lake trout and round whitefish) were captured. The live transfer rate was 79% for all phases combined. Abundance and biomass for each species are shown in Table 1. Nearly the total population was represented by lake trout and round whitefish combined (42% and 45%, respectively).

Table 1. Total abundance and biomass by species for the fish-out of Whale Tail Lake (North Basin).

Species	Abundance		Biomass	
	# Fish	%	kg	%
Arctic Char	217	7	79.4	10
Burbot	192	6	34.1	4
Lake Trout	1288	42	410.3	53
Round Whitefish	1381	45	252.8	33
TOTAL	**3078**	**100**	**776.6**	**100**

Length and weight were recorded for nearly all fish captured. Gender, maturity and/or reproductive status were also assessed for a subset that did not survive capture or transfer (434 fish). A smaller subset (up to 96 fish) that did not survive underwent a detailed biological assessment including stomach fullness, gonad weight, and liver weight. Muscle tissue samples and aging structures (otoliths) were collected and stored. Fish were generally determined to be in good health, with average condition factors >1 for all species.

At the completion of the fishout, the population estimates (incorporating the extra effort net sets) were 2878 (Leslie method) and 3084 (DeLury method). Based on the highest estimate (DeLury)

and including all fish removed from the CPUE phase, and final removal phase (2981 fish), approximately 104 fish (>100 mm) were estimated to have been left in the lake.

Overall, all of the Whale Tail Lake fish-out objectives were met:

- the local community was engaged;
- a large proportion of the fish in the area to be dewatered were either rescued and released or fully utilized by traditional resource users; and
- ecological information (biological, limnological, and habitat) was collected to contribute to our understanding of productivity in Arctic lakes in the Northwest Territories and Nunavut.

References

Azimuth (Azimuth Consulting Group Partnership), 2010. Aquatic Effects Monitoring Program – Targeted Study: Dike Construction Monitoring 2009, Meadowbank Gold Project, Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Agnico-Eagle Mines Ltd., Vancouver BC. March 2010.

Azimuth (Azimuth Consulting Group Partnership), 2009. Aquatic Effects Monitoring Program – Targeted Study: Dike Construction Monitoring, Meadowbank Gold Project. Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Agnico-Eagle Mines Ltd., Vancouver BC. March 2009.

APPENDIX A

Nemo Lake - Freshwater Intake Construction Documents

Fisheries and Oceans Canada

Central and Arctic Region
Suite 301, 5204 – 50th Ave
Yellowknife, NT
X1A 1E2

Pêches et Océans Canada

Région du centre et de l'arctique
Suite 301, 5204 – 50th Ave
Yellowknife, NT
X1A 1E2

September 25, 2018

Your file *Votre référence*
2AM-WTP1826

Our file *Notre référence*
16-HCAA-00370

Nunavut Water Board (NWB)
Attention: Karén Kharatyan
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Dear Mr. Kharatyan,

Subject: 2AM-WTP1826 for Agnico Eagle Mines Ltd.'s Design Report Fresh Water Intake – AEM's response to DFO comments dated September 4, 2018.

The Fisheries Protection Program of Fisheries and Oceans Canada (DFO) would like to thank the Nunavut Water Board (NWB) for the opportunity to review Agnico Eagles Mines Limited's (AEM) response to DFO's comments respecting the fresh water intake for the Whale Tail Pit Project. As per correspondence of September 21, 2018, the Board requested that they be informed directly if AEM's response addresses DFO's concerns.

DFO has reviewed AEM's response in accordance with its mandate to maintain the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries.

DFO is satisfied with AEM's response to DFO's concern regarding the appropriate screen mesh size for the freshwater intake. AEM agrees to follow DFO's recommendation found in DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline, which is to use a maximum screen opening (mesh size) of 2.54 mm (0.10 inches) in order to protect freshwater fish with a minimum fork length of 25 mm.

If you have any questions, please contact Sally Wong at (867) 669-4934 or by email at Sally.Wong@dfo-mpo.gc.ca.

Sincerely,

Mark D'Aguiar
Senior Fisheries Protection Biologist
Central & Arctic Region
Fisheries and Oceans Canada

Canada

cc: Bev Ross, DFO
Sally Wong, DFO

SNC·LAVALIN
Building what matters

CONSTRUCTION SUMMARY REPORT

Agnico Eagle Mines Ltd

Report

653281-0004-40ER-0002_0

January 29, 2019

Prepared by:

2019-01-31

Israël Gagnon, P Eng., MBA
Mechanical Engineer

Approved by:

Alain Parent

Signature numérique de Alain Parent
DN : cn=Alain Parent
Date : 2019.02.01 07:08:11 -05'00'

Alain Parent
Project Construction Manager - Amaruq

EXECUTIVE SUMMARY

SNC-Lavalin Stavibel Inc. was retained by Agnico Eagle Mines Limited to prepare a construction summary (as built) report for the fresh water intake for the Whale Tail Project, Nunavut. SNC Lavalin Stavibel Inc. previously prepared the construction drawings and specifications for the fresh water intake.

SNC Lavalin Stavibel Inc. was not involved in the construction of the fresh water intake. The information presented in this report was provided by Agnico Eagle.

The construction of the fresh water intake was completed in October 2018. The construction monitoring and quality assurance was managed by AEM.

This report summarizes the construction as-built information for the fresh water intake.

Table of contents

Figures

Appendices

1. Introduction

This document presents the construction summary report of the fresh water intake pumping station required by the Water License 2AM-WTP1826 Part D Item 15. As required by Water License Schedule D, this report contains the final design and construction drawings, a summary of construction activities including photographic recorded during and after construction. The as-built drawings, detailed explanation of field decision to reflect any deviations from the original construction drawings/plans and how such deviations may affect performance of engineered structures, a discussion of the mitigation measures implemented during construction and its effectiveness are also presented. There was no blast or water use for the dust emission during the construction of the freshwater water intake.

2. Construction summary

2.1 Site location plan

Agnico Eagle is developing the Whale Tail Project in the Kivalliq Region of Nunavut (65°24’25”N, 96°41’50”W). The 99,878-hectare Amaruq property is located on Inuit-owned and Federal Crown Land, approximately 55 km north of the Meadowbank mine. The Meadowbank mine is accessible from Baker Lake, located 70 kilometers to the south.

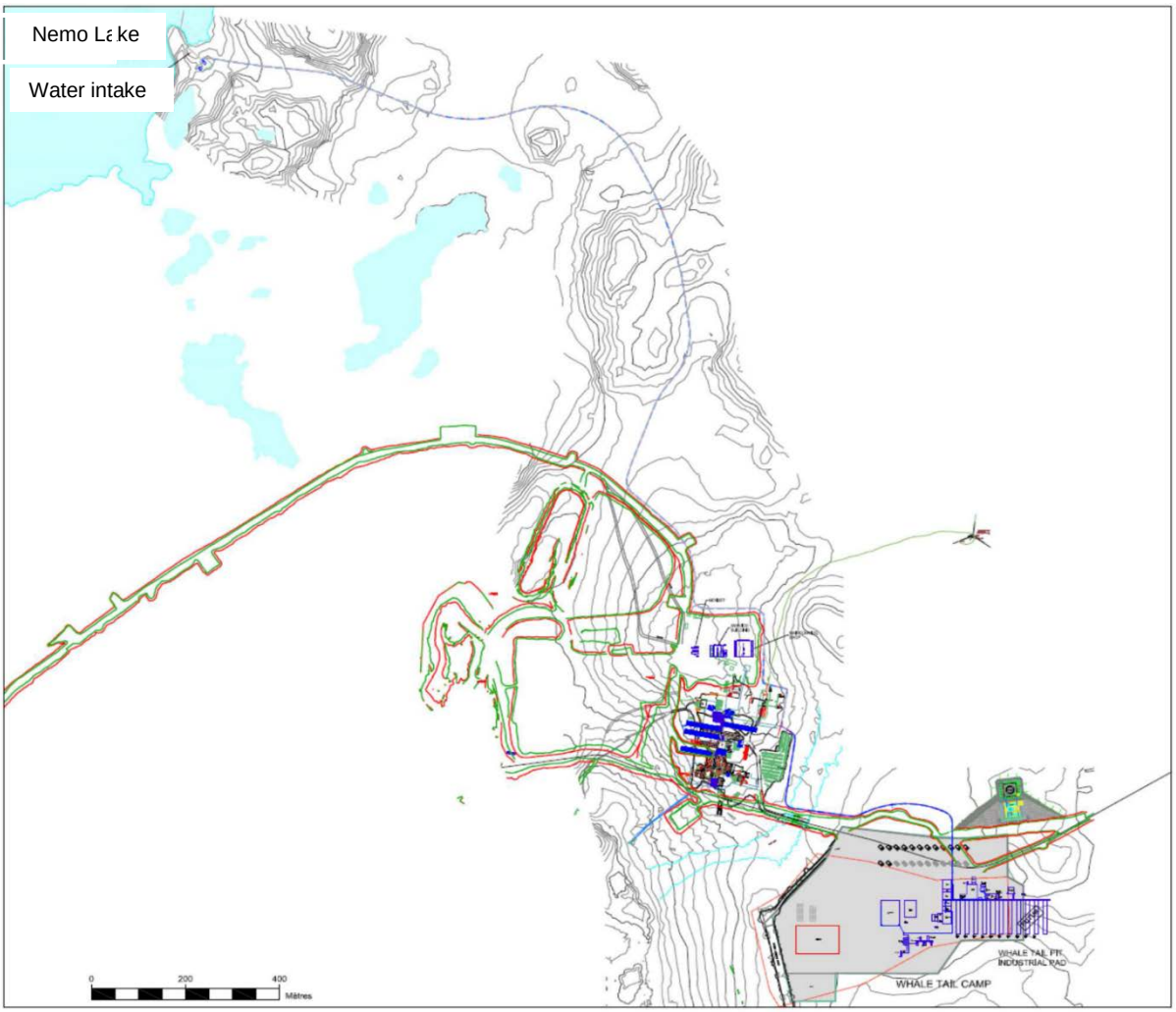


Figure 1 Fresh water intake localization

2.2 Pumping station

All mechanical and electrical pumping station equipment are housed in a heated and insulated enclosure. Electrical equipment (e.g. control panel, junction boxes, VFD/soft starters, etc.) are separated from the mechanical equipment (e.g. pumps, isolation valves, piping, piping accessories, etc.) by a wall and each room have its own access door. The enclosure has been constructed following the site information and design coefficients (temperature, wind load, snow load, etc.) from the Agnico Eagle general guidelines to resist to the Nunavut climatic conditions. The enclosure is installed on a leveled coarse compacted gravel surface. All surfaces are painted in accordance with Agnico Eagle requirements to ensure corrosion resistance over the years of operation.

2.3 Suction Pipeline

The suction line sections were assembled on the shore, with the fish strainer and ballasts. The fish strainer was redesigned to respect DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline. Screen opening was changed from 13 mm to a screen with a mesh size opening of 2,54 mm. It was deployed on the lake ice. Once the suction line was located correctly, the suction was flooded by cutting ice underneath, to sink into its place.

2.4 Ground Pipeline

The above-ground pipeline lie directly on the tundra along the access road to the Pumping Station. The sharp stones were removed before the pipeline installation to reduce the risks of tears and premature wear. Since the pipeline is water tight, no hazards or disturbances are expected after installation. After the complete installation, a hydrostatic test was performed to confirm the water tightness of the pipeline.

2.5 Drawings and photographs

All final design and construction drawings are available in the appendix A, as-built drawings are in appendix B, construction pictures are available in appendix C.

3. Field decisions

3.1 Pumping station

The construction work led to no variations from the original design in the pumping station.

3.2 Suction pipeline

The water suction location has been moved 100 meters north-west to have it in appropriate water depth. To do so, the construction team reviewed the pipe line layout from the pumping station to the lake bed. The new layout can be reviewed in appendix B.

3.3 Ground Pipeline

The pipeline position regarding the access road to the fresh water intake was changed. The line is installed on the west side of the road instead of the east side as it was specified in the original construction drawing. This modification was made because all the vehicles pull out bays along the access road are built on the east side. By placing the pipe line on the west side, access to the line is eased. Again, the final layout can be reviewed in appendix B. Those two decision will not affect the fresh water pump station nor cause any other risk to the environment than the original design.

4. Mitigation Measures

To protect the lake and limit machinery circulation within 31 meters from the shore, Agnico Eagle Mine elected to install the intake pipe line on ice with a telehandler, instead of with a boat and a helicopter. Using that telehandler on the pump station gravel pad, the telescoping boom was used to push the pipeline on it pipe supports and on the ice. Once the fish screen was over the prescribe water depth, ice was cut from underneath the pipe line so that the line could sink, helped with ballast. Picture of this operation can be found in appendix C.

5. Construction Monitoring and Inspection Test Plan

During the commissioning phase, the pipeline from the pumping station to the construction camp has been tested for leaks. The line was filed with water then capped and put under pressure for 5 hours. Results are shown in Table 1: Pipeline leak test pressure record.

Table 1: Pipeline leak test pressure record

Time	Water pressure (kPa)
19:08	390
21:00	700
22:00	700
23 :00	690
23:58	680

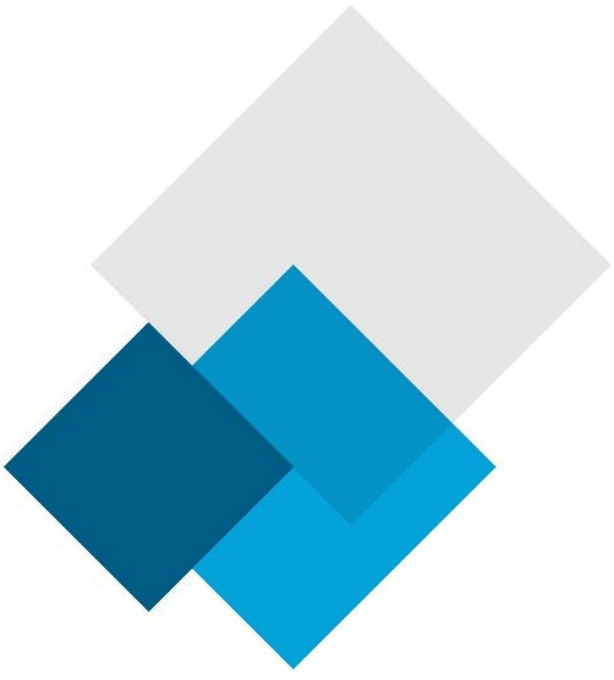
The results shown in table1 are within the acceptance limits for the pipeline. The pressure drop recorded on the 5 hours is less than 3% and confirms that no leaks are present on the line. This variation can be attributed in part to HDPE pipe expansion, in part to ambient temperature change during the test period and in part to the fact that closing the pipe line at the camp end was a butterfly valve, which are known to leak in such use.

6. Closure

The construction summary report of the fresh water intake pumping station presented in this document was done in regard to Water License 2AM-WTP1826 Part D Item 15. Trough review of site location, final plan, and the review of field decision took during construction, mitigation results and the pipeline test, requirements are fulfilled. The following appendices are there to support the summary.

Appendix A

Final design construction drawings of the fresh water intake



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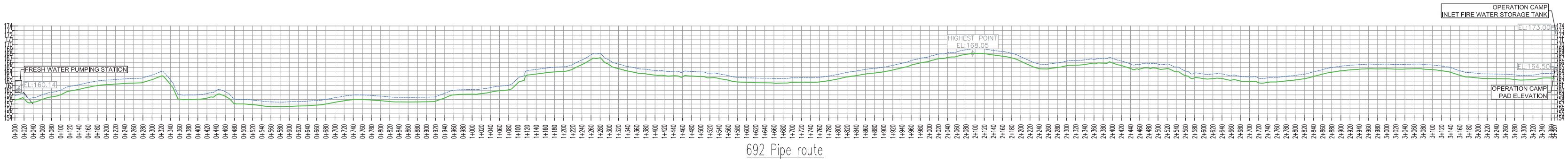
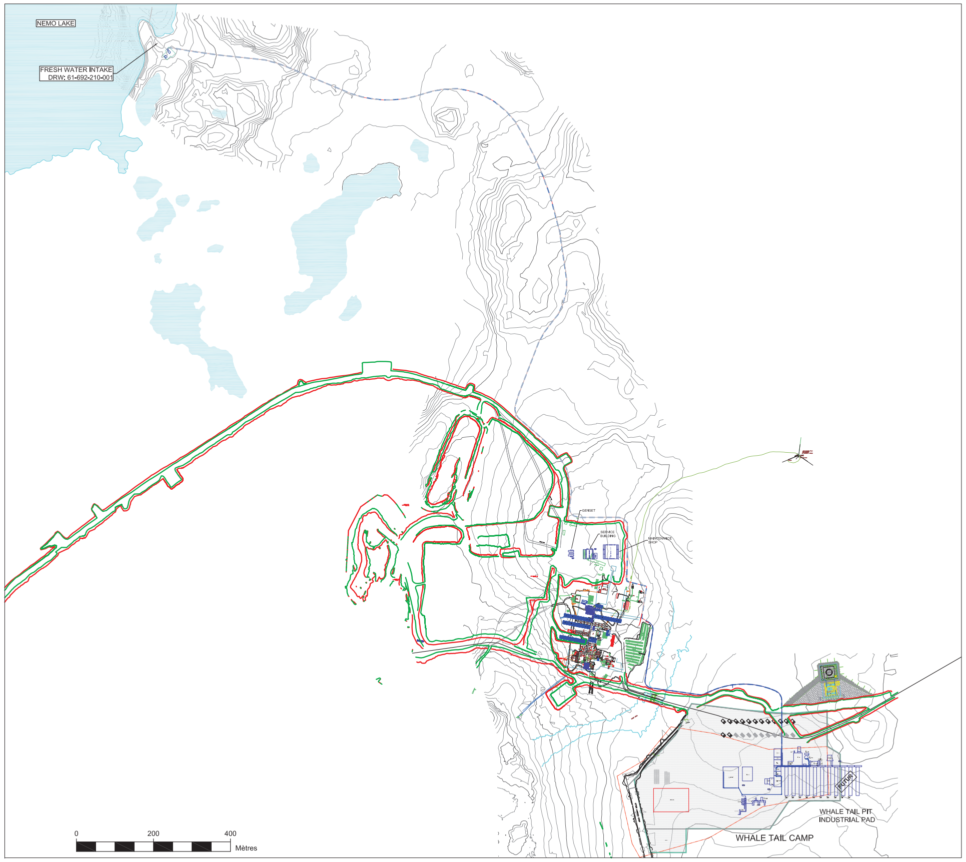


692 Pipe route



PLAN CLÉ
KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-07-16

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
–	–
–	–
–	–
–	–
–	–
–	–

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018/07/16
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

REGISTERED PROFESSIONAL ENGINEER
E.F. GUNTHER
LICENSEE
NT/NU
2018/07/16

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-07-16	ISSUED FOR CONSTRUCTION	L.R.F.	D.L.	

REVISIONS

AMARUQ PROJECT

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION
692 – FRESH WATER
210 – GENERAL
PLAN & PROFILE
FRESH WATER
PIPELINE ROUTING – NEMO to EXPLORATION CAMP

DESSINÉ PAR / DRAWN BY	J.CRETE	DATE 2017-05-11
VERIFIÉ PAR / CHECKED BY	D.LAFLAMME	2017-05-11
APPROUVÉ PAR / APPROVED BY		
ÉCHELLE / SCALE	N/A	DATE 2017-05-11

NO. DESSIN / DRAWING NO. 61-692-210-003

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6115	0	1 / 1

FORMAT ARCHD

AE-CART-ARCH D

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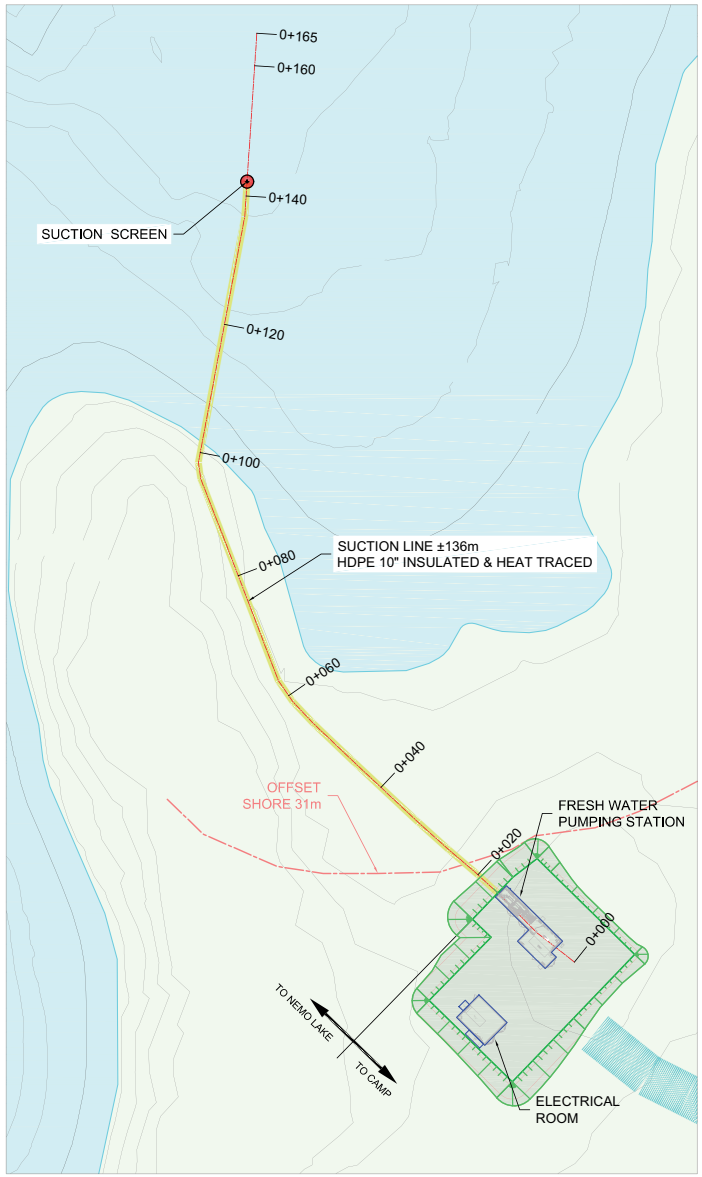
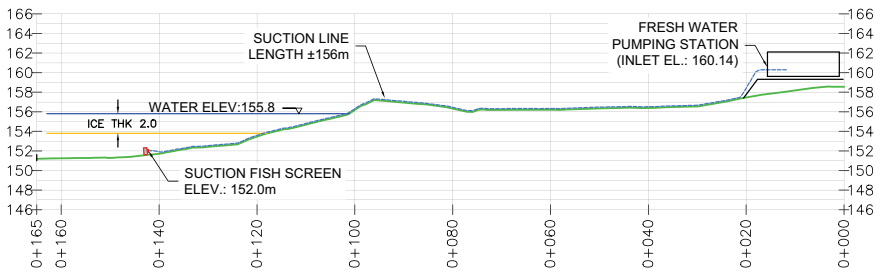
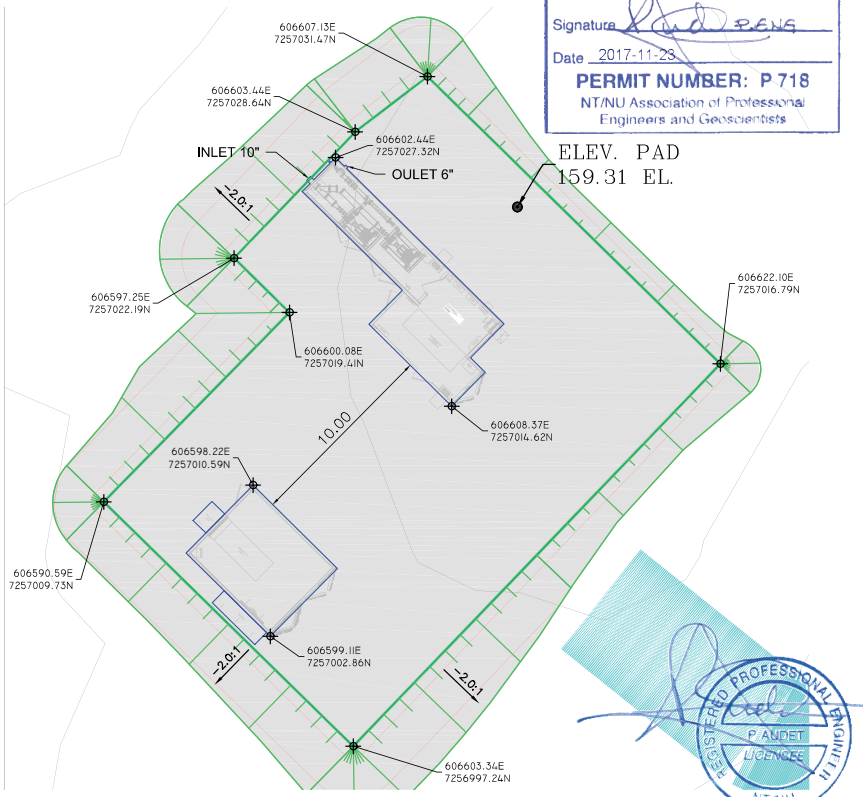
NO. DESSIN
DRAWING NO. 61-692-210-001_R4

FORMAT ANSI B–11x17





Pumping station



PAD & BUILDING ARRANGMENT
1:250

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature _____ P.ENG
Date 2017-11-23
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

REGISTERED PROFESSIONAL ENGINEER
P. AUDET
LICENCEE
N.T./N.U.
2017-11-23

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2017-11-22

NOTES:

AGNICO EAGLE

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TITRE / TITLE	# DWG

DESSINS EN RÉFÉRENCE/REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	PAR BY
4	ISSUED FOR CONSTRUCTION	2017–11–22	J.C.
3	BUILDING INFORMATION	2017–10–10	J.C.
2	ELECTRICAL ROOM LOCALISATION	2017–08–10	J.C.
1	UPDATED PATH & PUMP HOUSE	2017–07–12	J.C.

REVISIONS

DESSINÉ PAR DRAWN BY	LYSANNE R.FRENETTE	DATE 2017–05–09
VÉRIFIÉ PAR CHECKED BY	DANY LAFLAMME	2017–05–09
APPROUVÉ PAR APPROVED BY	PATRICE AUDET	2017–11–22
No. PROJET PROJECT NO.	6115	
DATE	2017–05–09	

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION
AMARUQ
692 – FRESH WATER PUMPING STATION
210 – GENERAL ARRANGEMENT
PUMP HOUSE & SUCTION PIPE PATH

ÉCHELLE/ SCALE	N/A	FICHIER FILE	61–692–210–001_R4.dwg
No. DESSIN/ DRAWING NO.	61–692–210–001	REVISION 4	FEUILLE/SHT 1 / 1

AE–CART–ANSI B

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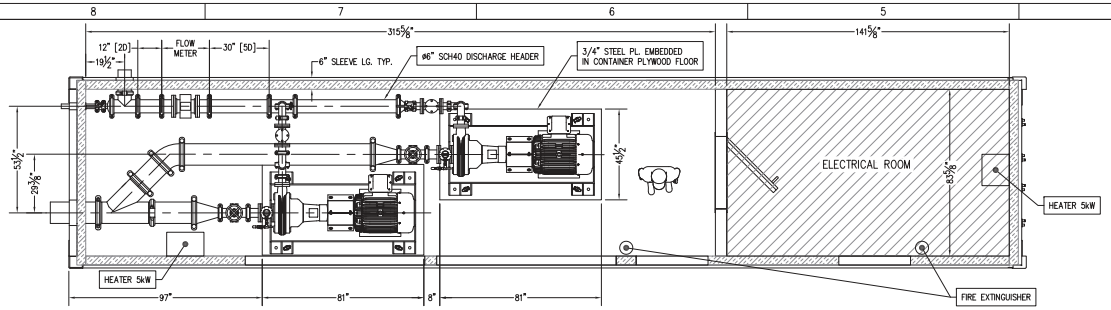
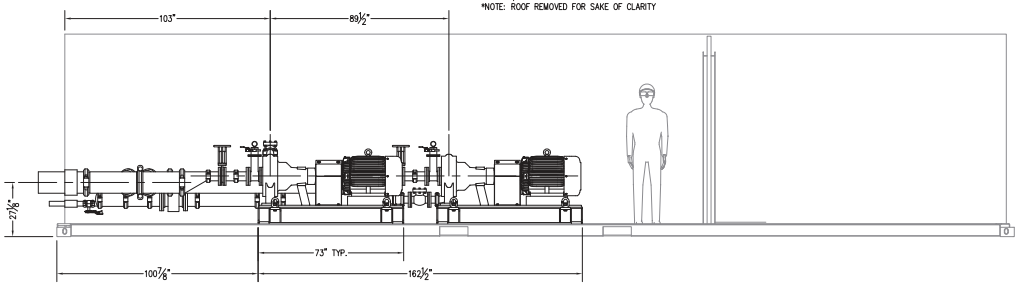


TOP VIEW
SCALE 3/8" = 1'-0"
*NOTE: ROOF REMOVED FOR SAKE OF CLARITY



ELEVATION VIEW
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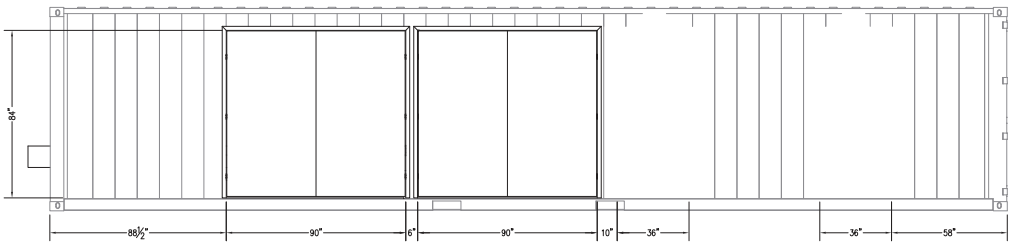
*NOTE: WALLS REMOVED FOR SAKE OF CLARITY



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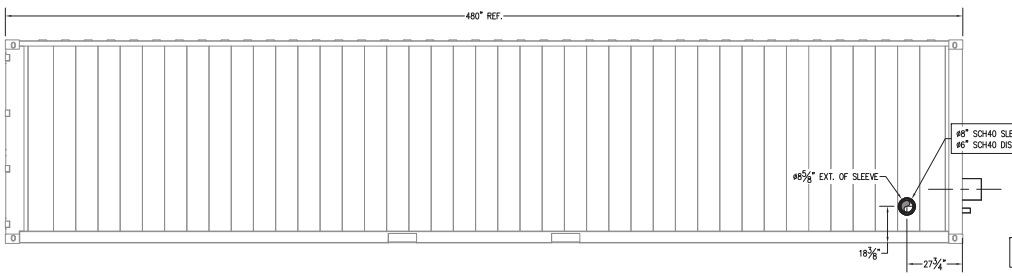

BACK ELEVATION VIEW
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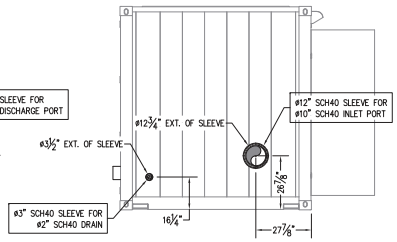

SIDE ELEVATION VIEW
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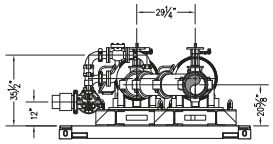

SIDE ELEVATION VIEW
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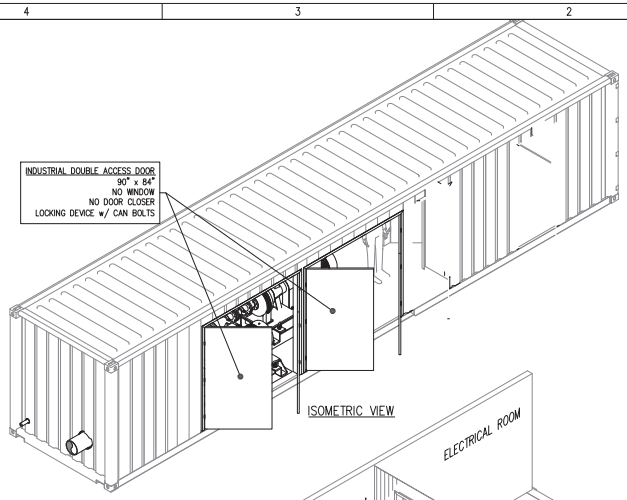
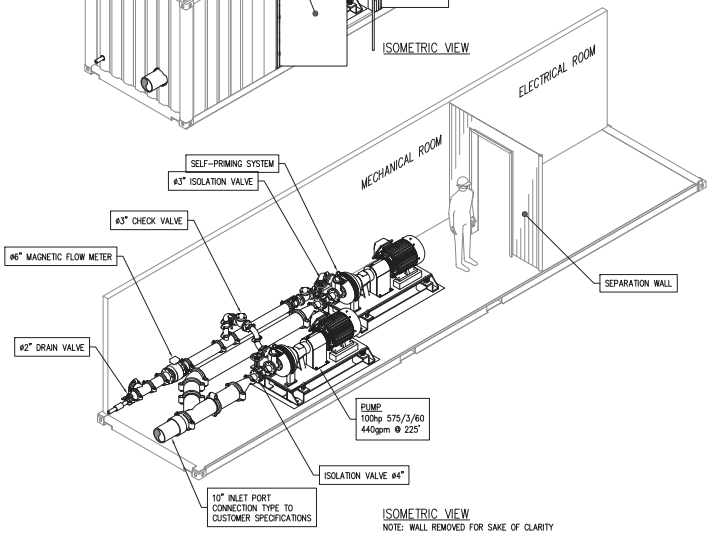
NOTE: WALL REMOVED FOR SAKE OF CLARITY



ISOMETRIC VIEW



ISOMETRIC VIEW
NOTE: WALL REMOVED FOR SAKE OF CLARITY

NOTES & SPECIFICATIONS

FOR COMMENTS
POUR COMMENTAIRES
2017-06-09

WORK IN PROGRESS
EN PROGRES
2017-06-09

DO NOT USE FOR CONSTRUCTION
NE PAS UTILISER POUR CONSTRUCTION

REVISIONS			
R	DESCRIPTION	DATE	APP
A	ISSUED FOR COMMENTS	2017-05-26	M.B.
B	ISSUED FOR PROPOSAL	2017-06-12	D.L.

AGNICO-EAGLE

Techn@sub

SEAL

PROJECT MANAGER
W. BOLDUC, P.Eng.

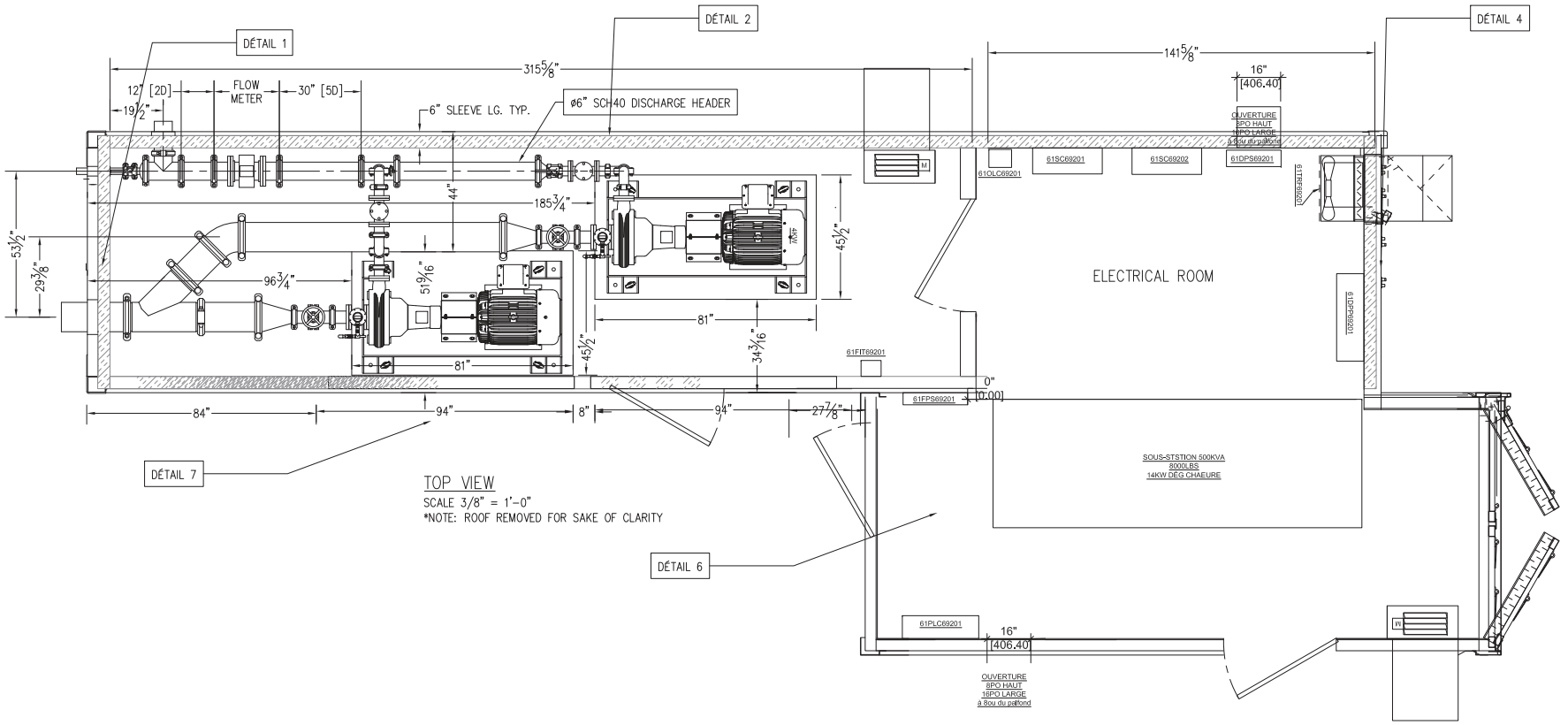
DESIGNER
D. LARIVIERE

QUALITY ASSURANCE
W. BOLDUC, P.Eng.

ENGINEER
W. BOLDUC, P.Eng.

AMARUK
FRESH WATER PUMPING STATION
GENERAL ARRANGEMENT

PROJECT	SEQ.#	SHEET#	REV.
P1704282-1000-1/1-B			



TOP VIEW
SCALE 3/8" = 1'-0"
*NOTE: ROOF REMOVED FOR SAKE OF CLARITY

NOTES & SPECIFICATIONS

FOR COMMENTS
POUR COMMENTAIRES
2017-06-09

WORK IN PROGRESS
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2017-06-09

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REVISIONS			
R	DESCRIPTION	DATE	APP
A	ISSUED FOR COMMENTS	2017-05-26	M.B.
B	ISSUED FOR PROPOSAL	2017-06-12	D.L.

AGNICO-EAGLE

Technosub

SEAL

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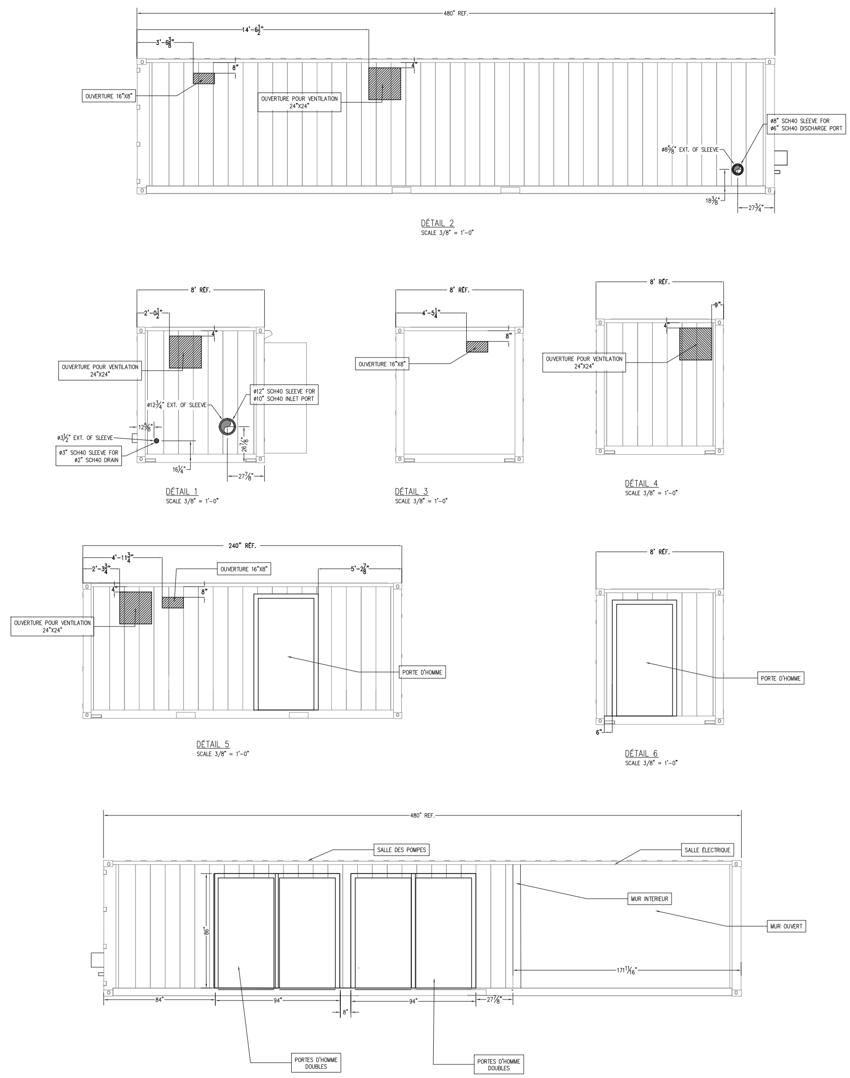
ENGINEER
W. BOLDUC, P.Eng.

AMARUK
FRESH WATER PUMPING STATION
GENERAL ARRANGEMENT

PROJECT	SEQ.#	SHEET#	REV.
P1704282-1000-1/1-B			



NOTES & SPECIFICATIONS

FOR COMMENTS
POUR COMMENTAIRES
2017-06-09

WORK IN PROGRESS
EN PROGRÈS
2017-06-09

DO NOT USE FOR CONSTRUCTION
NE PAS UTILISER POUR CONSTRUCTION

REVISIONS

R	DESCRIPTION	DATE	APP
A	ISSUED FOR COMMENTS	2017-05-09	W.B.
B	ISSUED FOR PROPOSAL	2017-06-12	D.L.

AGNICO-EAGLE

Technosub

SEAL

PROJECT MANAGER
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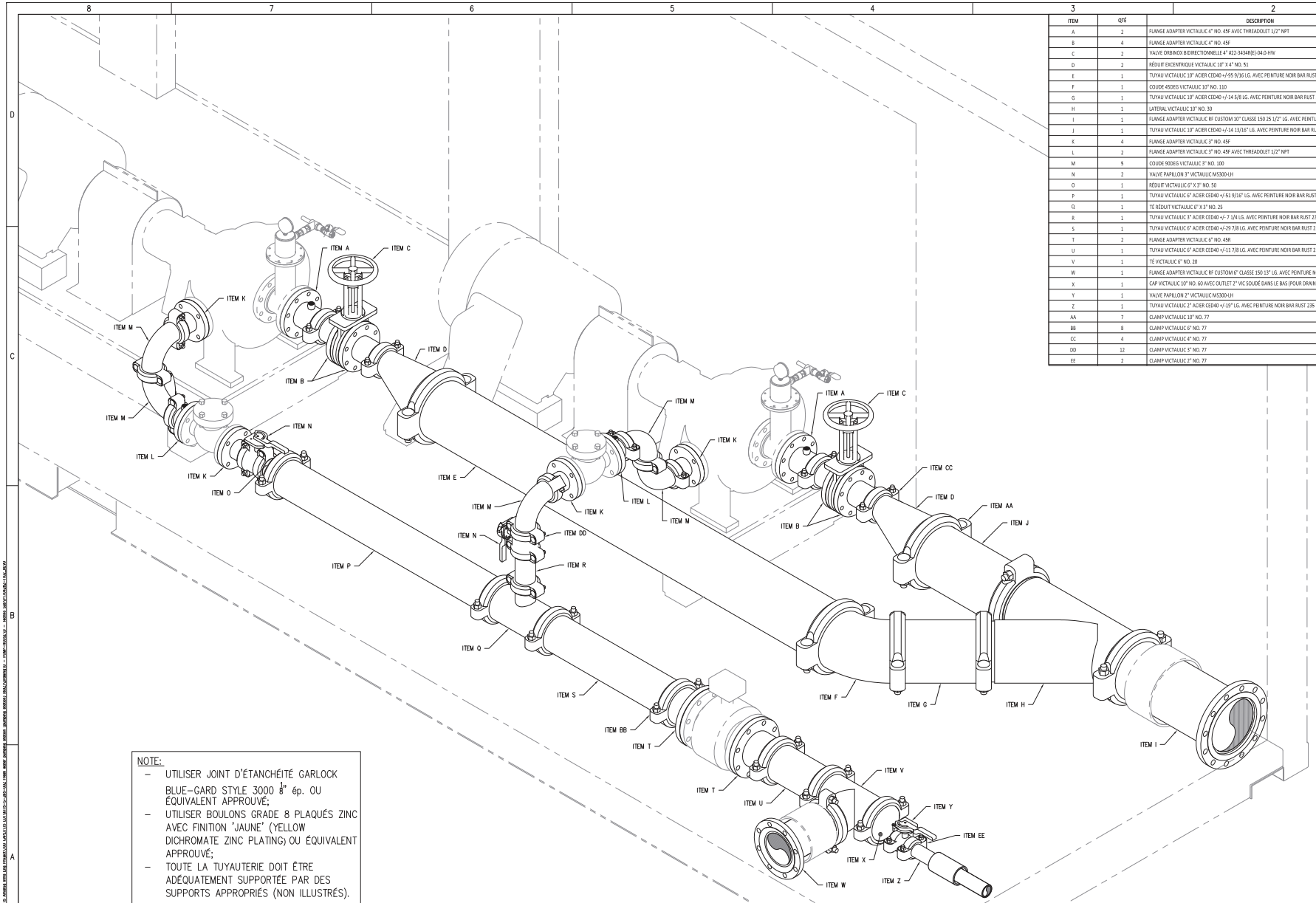
ENGINEER
W. BOLDUC, P.Eng.

AMARUK
FRESH WATER PUMPING STATION
GENERAL ARRANGEMENT

PROJECT	SEQ.#	SHEET#	REV.
P1704282	1000	1/1	B



ITEM	QTÉ	DESCRIPTION
A	2	FLANGE ADAPTER VICTAULIC 4" NO. 45F AVEC THREADOLET 1/2" NPT
B	4	FLANGE ADAPTER VICTAULIC 4" NO. 45F
C	2	VALVE ORBINOX BIDIRECTIONNELLE 4" #22-3434R(E)-04.0-HW
D	2	RÉDUIT EXCENTRIQUE VICTAULIC 10" X 4" NO. 51
E	1	TUYAU VICTAULIC 10" ACIER CED40 +/-95 9/16 LG. AVEC PEINTURE NOIR BAR RUST 235
F	1	COUDE 45DEG VICTAULIC 10" NO. 110
G	1	TUYAU VICTAULIC 10" ACIER CED40 +/-14 5/8 LG. AVEC PEINTURE NOIR BAR RUST 235
H	1	LATERAL VICTAULIC 10" NO. 30
I	1	FLANGE ADAPTER VICTAULIC RF CUSTOM 10" CLASSE 150 25 1/2" LG. AVEC PEINTURE NOIR BAR RUST 235
J	1	TUYAU VICTAULIC 10" ACIER CED40 +/-14 13/16" LG. AVEC PEINTURE NOIR BAR RUST 235
K	4	FLANGE ADAPTER VICTAULIC 3" NO. 45F
L	2	FLANGE ADAPTER VICTAULIC 3" NO. 45F AVEC THREADOLET 1/2" NPT
M	5	COUDE 90DEG VICTAULIC 3" NO. 100
N	2	VALVE PAPILLON 3" VICTAULIC MS300-LH
O	1	RÉDUIT VICTAULIC 6" X 3" NO. 50
P	1	TUYAU VICTAULIC 6" ACIER CED40 +/-51 9/16" LG. AVEC PEINTURE NOIR BAR RUST 235
Q	1	TÉ RÉDUIT VICTAULIC 6" X 3" NO. 25
R	1	TUYAU VICTAULIC 3" ACIER CED40 +/- 7 1/4 LG. AVEC PEINTURE NOIR BAR RUST 235
S	1	TUYAU VICTAULIC 6" ACIER CED40 +/-29 7/8 LG. AVEC PEINTURE NOIR BAR RUST 235
T	2	FLANGE ADAPTER VICTAULIC 6" NO. 45R
U	1	TUYAU VICTAULIC 6" ACIER CED40 +/-11 7/8 LG. AVEC PEINTURE NOIR BAR RUST 235
V	1	TÉ VICTAULIC 6" NO. 20
W	1	FLANGE ADAPTER VICTAULIC RF CUSTOM 6" CLASSE 150 13" LG. AVEC PEINTURE NOIR BAR RUST 235
X	1	CAP VICTAULIC 10" NO. 60 AVEC OUTLET 2" VIC SOUDÉ DANS LE BAS (POUR DRAINAGE)
Y	1	VALVE PAPILLON 2" VICTAULIC MS300-LH
Z	1	TUYAU VICTAULIC 2" ACIER CED40 +/-19" LG. AVEC PEINTURE NOIR BAR RUST 235
AA	7	CLAMP VICTAULIC 10" NO. 77
BB	8	CLAMP VICTAULIC 6" NO. 77
CC	4	CLAMP VICTAULIC 4" NO. 77
DD	12	CLAMP VICTAULIC 3" NO. 77
EE	2	CLAMP VICTAULIC 2" NO. 77

NOTES & SPECIFICATIONS

NOTE:
- UTILISER JOINT D'ÉTANCHÉITÉ GARLOCK BLUE-GARD STYLE 3000 8" ép. OU ÉQUIVALENT APPROUVÉ;
- UTILISER BOULONS GRADE 8 PLAQUÉS ZINC AVEC FINITION 'JAUNE' (YELLOW DICHROMATE ZINC PLATING) OU ÉQUIVALENT APPROUVÉ;
- TOUTE LA TUYAUTERIE DOIT ÊTRE ADÉQUATEMENT SUPPORTÉE PAR DES SUPPORTS APPROPRIÉS (NON ILLUSTRÉS).

FOR COMMENTS
POUR COMMENTAIRES
2017-01-05

DO NOT USE FOR CONSTRUCTION
NE PAS UTILISER POUR CONSTRUCTION

REVISIONS			
R	DESCRIPTION	DATE	APP
A	ÉMIS POUR COMMENTAIRES	17-06-21	M.B.

AGNICO-EAGLE (AMARUQ)

Techn sub

SEAL

PROJECT MANAGER
W. BOLDUC, ing.

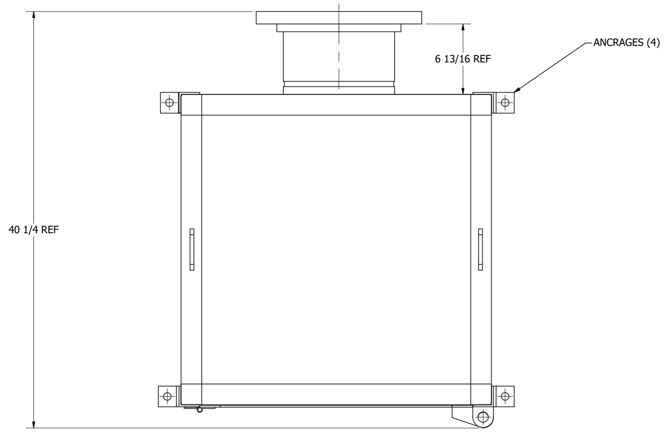
DESIGNER
D. LARIVIÈRE

QUALITY ASSURANCE
P. MARQUIS

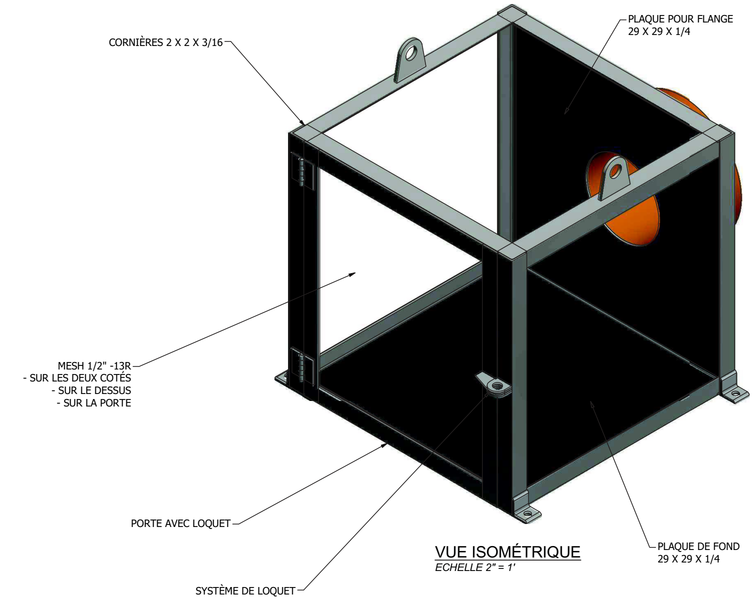
ENGINEER
W.BOLDUC, ing.

FRESH WATER PUMPING STATION
ARRANGEMENT TUYAUTERIE
LISTE DE PIÈCES

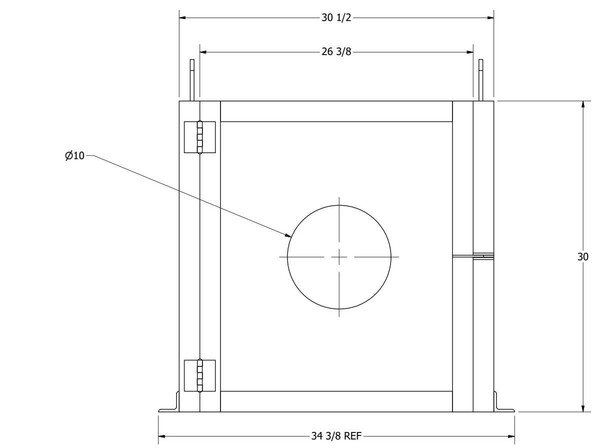
PROJECT	SEQ.#	SHEET#	REV.
P1704282	1001	1/1	A



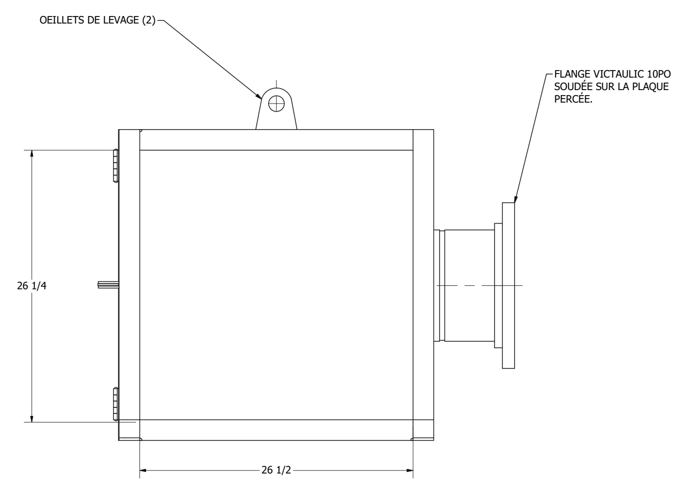
VUE EN PLAN
ECHELLE 2" = 1'



VUE ISOMÉTRIQUE
ECHELLE 2" = 1'



ELEVATION
ECHELLE : 2" = 1'



VUE PROFIL DROIT
ECHELLE 2" = 1'

MASSE TOTALE 330 LBS

NOTES & SPECIFICATIONS

SECTION I.

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

2. ALL REFERENCES TO COMPLEMENTARY DRAWING SEQUENTIAL NUMBERS IMPLY THE SAME PROJECT NUMBER UNLESS OTHERWISE NOTED.

3. ALL MATERIALS TO BE STANDARD STEEL 44W UNLESS OTHERWISE NOTED.

4. UNSPECIFIED FABRICATION TOLERANCES

6' - ± 1/32"
6' to 12' ± 1/16"
12' + ± 1/8"

5. UNSPECIFIED MACHINING TOLERANCES

6" - ± .010"
6" to 18" ± .015"
18" + ± .020"

6. GENERAL TOLERANCES

X.XXX" ± .002"
X.XX" ± .010"

7. MACHINE ALLOWANCE UNLESS OTHERWISE SPECIFIED.

8. BREAK ALL CORNERS UNLESS OTHERWISE SPECIFIED.

FOR COMMENTS
POUR COMMENTAIRES
2017-05-30

DO NOT USE FOR CONSTRUCTION
NE PAS UTILISER POUR CONSTRUCTION

REVISIONS

R	DESCRIPTION	DATE	APP
A	ÉMIS POUR COMMENTAIRES	2017-05-30	W.B.

Techn@sub

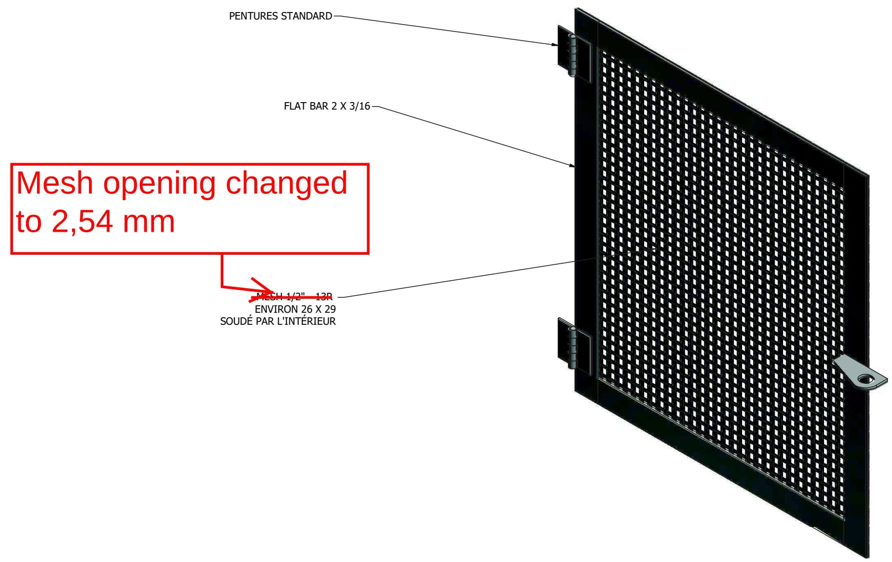
SEAL

PROJECT MANAGER W.BOLDUC, ING.
DESIGNER P. DESCOTEAUX
QUALITY ASSURANCE W. BOLDUC, ING.
ENGINEER W. BOLDUC, ING.
2017-05-30

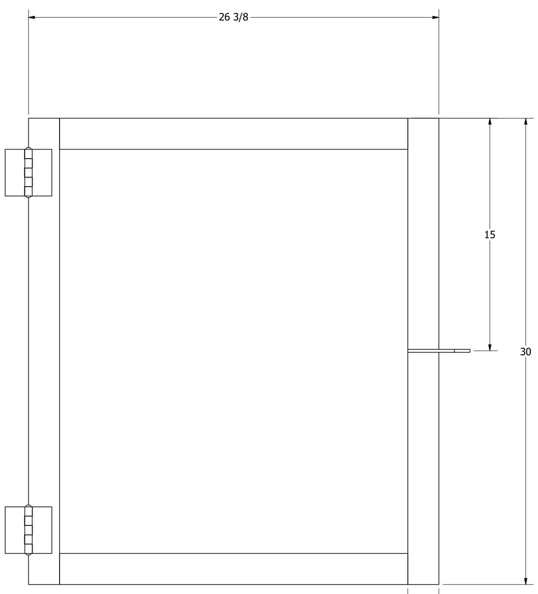
BOITE PROTECTION POISSONS

PROJECT	*SEQ. #*	*SHEET #*	*REV.*
P1704282	0000	1 / 1	A

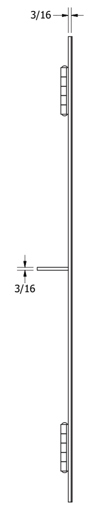
THIS SHOULD MEASURE EXACTLY 1 INCH



VUE ISOMÉTRIQUE
ECHELLE 3" = 1'



ELEVATION
SCALE : 3" = 1'



VUE PROFIL DROIT
ECHELLE 3" = 1'

NOTES & SPECIFICATIONS

SECTION I.

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

2. ALL REFERENCES TO COMPLEMENTARY DRAWING SEQUENTIAL NUMBERS IMPLY THE SAME PROJECT NUMBER UNLESS OTHERWISE NOTED.

3. ALL MATERIALS TO BE STANDARD STEEL 44W UNLESS OTHERWISE NOTED.

4. UNSPECIFIED FABRICATION TOLERANCES

6' -	± 1/32"
6' to 12'	± 1/16"
12' +	± 1/8"

5. UNSPECIFIED MACHINING TOLERANCES

6" -	± .010"
6" to 18"	± .015"
18" +	± .020"

6. GENERAL TOLERANCES

X.XXX" ± .002"
X.XX" ± .010"

7. MACHINE ALLOWANCE UNLESS OTHERWISE SPECIFIED.

8. BREAK ALL CORNERS UNLESS OTHERWISE SPECIFIED.

FOR COMMENTS
POUR COMMENTAIRES
2017-05-30

DO NOT USE FOR CONSTRUCTION
NE PAS UTILISER POUR CONSTRUCTION

REVISIONS

R	DESCRIPTION	DATE	APP
A	ÉMIS POUR COMMENTAIRES	2017-05-30	W.B.

Technosub

SEAL

PROJECT MANAGER W.BOLDUC, ING.
DESIGNER P. DESCOTEAUX
QUALITY ASSURANCE W. BOLDUC, ING.
ENGINEER W. BOLDUC, ING.
2017-05-30

BOITE PROTECTION POISSONS

PROJECT	SEQ. #	SHEET #	REV.
P1704282	0001	1 / 1	A

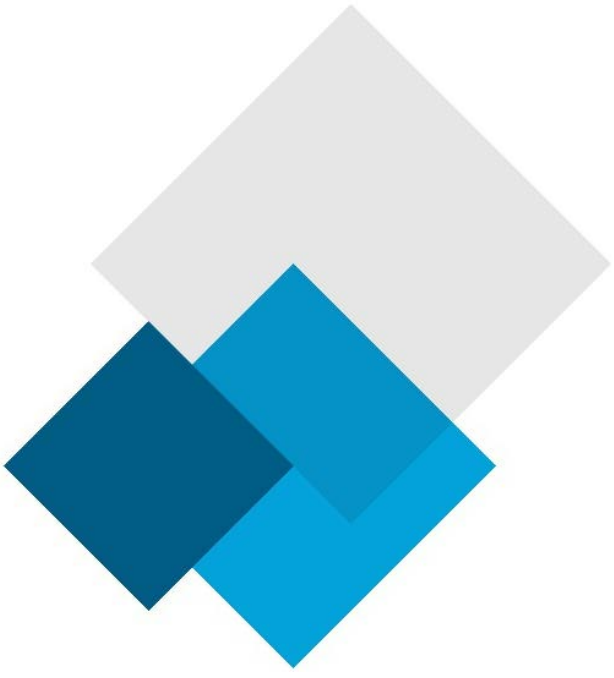
P1704282 - 0001 - 1 / 1 - A

G:\PROJETS\P17-- PROJETS 2017\P1704282 - Agnico-Eagle Amaruk - Fresh water pumping station\DESSINS\EN PROGRÈS\BOITE À POISSONS\MISES EN PLAN\P1704282-0001-A.idw

THIS SHOULD MEASURE EXACTLY 1 INCH

Appendix B

Appendix B As-built drawings of the fresh water intake

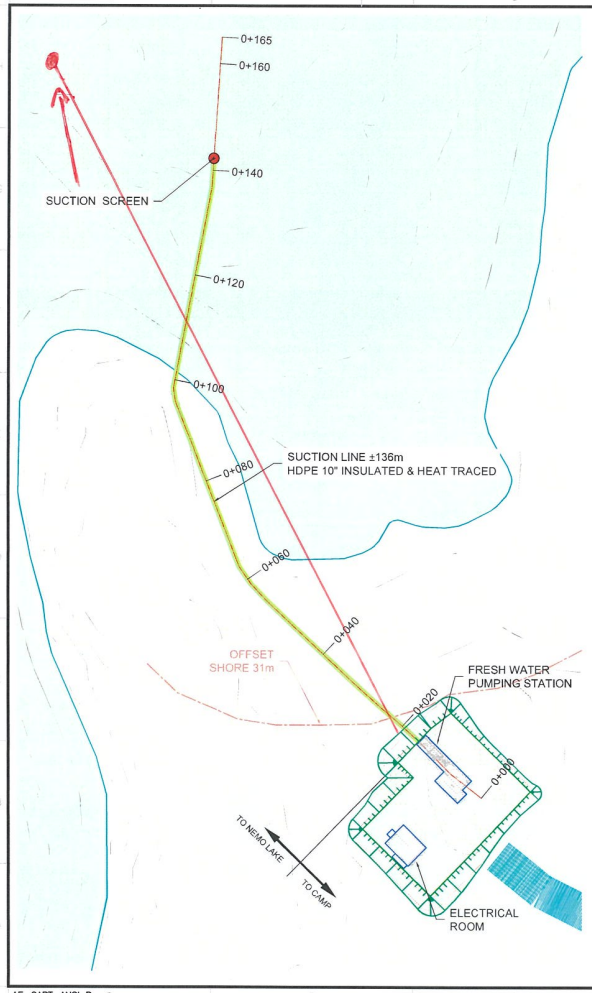


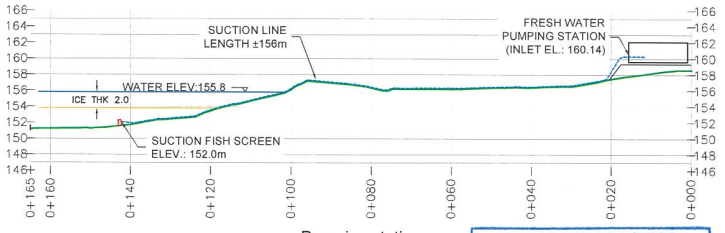
NOTE:

SUCTION LINE ±200m TO BE ABLE TO REACH NEEDED DEPTH

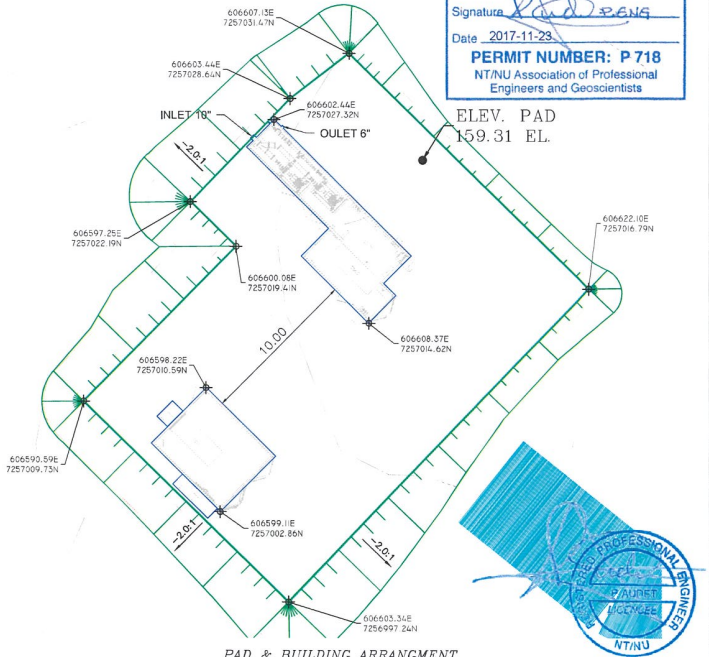
NO. DESSIN / DRAWING NO. 61-692-210-001_R4

FORMAT ANSI B–11x17





Pumping station



PAD & BUILDING ARRANGMENT
1:250

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature P.ENG
Date 2017-11-23
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

NOTES:

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2017-11-22

AGNICO EAGLE

–	–
–	–
–	–
–	–
–	–
TITRE / TITLE	# DWG

DESSINS EN RÉFÉRENCE/REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	PAR BY
4	ISSUED FOR CONSTRUCTION	2017–11–22	J.C.
3	BUILDING INFORMATION	2017–10–10	J.C.
2	ELECTRICAL ROOM LOCALISATION	2017–08–10	J.C.
1	UPDATED PATH & PUMP HOUSE	2017–07–12	J.C.

REVISIONS

DESSINÉ PAR / DRAWN BY	LYSANNE R.FRENETTE	DATE 2017–05–09
VÉRIFIÉ PAR / CHECKED BY	DANY LAFLAMME	2017–05–09
APPROUVÉ PAR / APPROVED BY	PATRICE AUDET	2017–11–22
No. PROJET / PROJECT NO.	6115	
DATE	2017–05–09	

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION
AMARUQ
692 – FRESH WATER PUMPING STATION
210 – GENERAL ARRANGEMENT
PUMP HOUSE & SUCTION PIPE PATH

ECHELLE / SCALE	N/A	FICHIER / FILE	61–692–210–001_R4.dwg
No. DESSIN / DRAWING NO.	61–692–210–001	REVISION 4	FEUILLE / SHT 1 / 1

PROFESSIONAL ENGINEER
PATRICE AUDET
NT/NU
2017-11-23

AE–CART–ANSI B

N:\Projet\Amaruq\050 Studies\6115 Amaruq Infra Eng Project\010 Info by area\692 Fresh Water Pumping Station\Nemo\61–692–210–001_R4.dwg–2017–11–22 12:51:58

NO. DESSIN DRAWING NO. 61-692-270-201-1_R0

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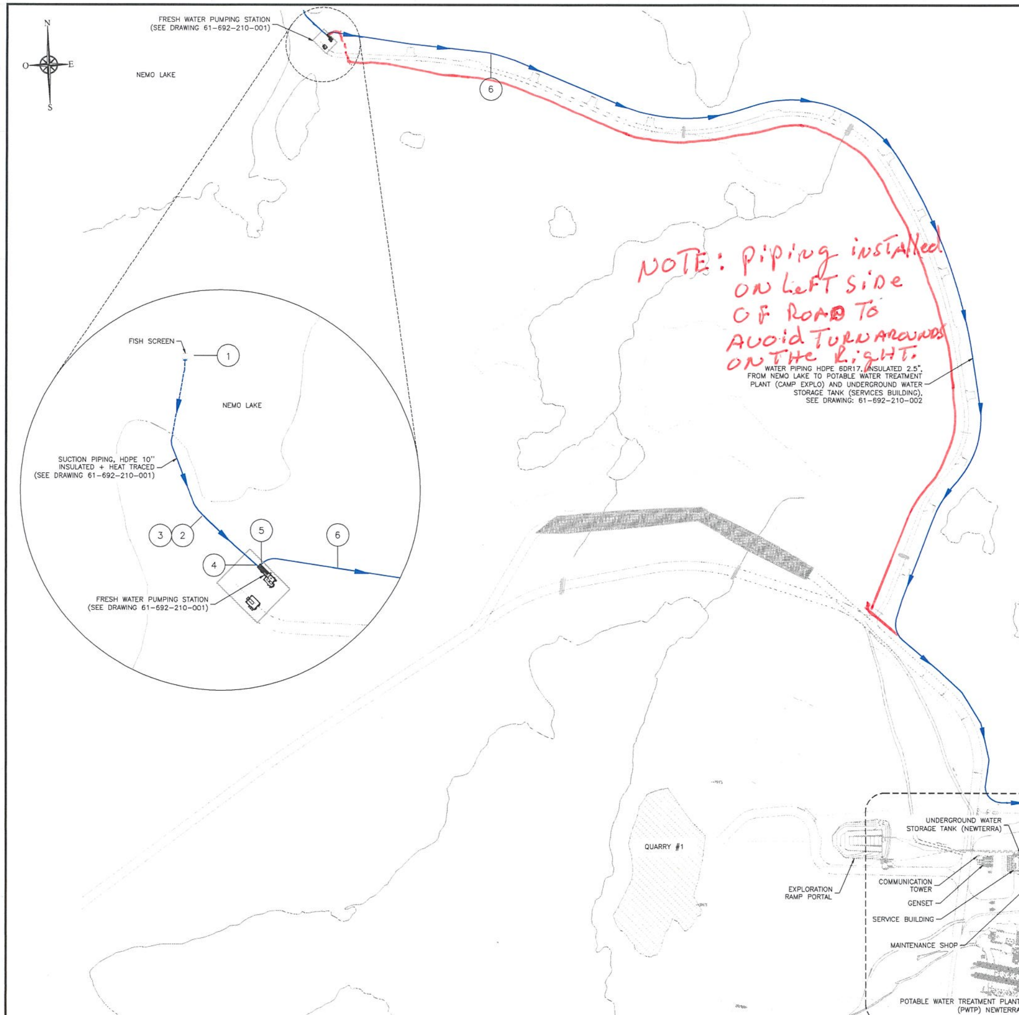


PART	QUANTITY	LENGTH	UNIT	DESCRIPTION	ORDER
1	1	-	EA	FISH SCREEN	-
2	1	± 450	FT	50FT HDPE 10" DR11 PE4710 PIPE	OC - 620437
3	9	-	EA	STUB END 10" HDPE DR11 FLANGED CLASS 150 FLANGE RING	OC - 620437
-	9	-	EA	STUB END 10" HDPE DR11 COMPLETE INSULATION KIT	OC - 620437
4	1	-	EA	EXISTING 10" FLANGE (PUMPING STATION)	-
5	1	-	EA	EXISTING 6" FLANGE (PUMPING STATION)	-
6	1	± 7600	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
7	1	-	EA	T, 6" x 6" x 6" HDPE DR17 FLANGED END	OC - 627466
-	1	-	EA	T. 6" HDPE DR17 COMPLETE INSULATION KIT	OC - 624533
8	1	± 85	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
9	1	± 400	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
10	3	-	EA	ELBOW 45° - 6" HDPE DR17 FLANGED ENDS	OC - 627466
-	3	-	EA	ELBOW 45° - 6" HDPE DR17 COMPLETE INSULATION KIT	OC - 624533
11	1	± 315	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
12	1	± 250	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
13	1	± 65	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
14	1	± 25	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
15	1	± 8	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
16	2	-	EA	ELBOW 90° - 6" HDPE DR17 FLANGED ENDS	OC - 627466
-	2	-	EA	ELBOW 90° - 6" HDPE DR17 COMPLETE INSULATION KIT	OC - 624533
17	1	± 100	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
18	1	± 6	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
19	1	± 7	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
20	1	± 8	FT	PIPING HDPE 6" DR17 INSULATE	OC - 624533
-	0	-	EA	STUB END 6" HDPE DR11(FLANGE 6"CLASS150-DUCTILE IRON)	OC - 627466
-	0	-	EA	STUB END 6" HDPE DR11 COMPLETE INSULATION KIT	OC - 620437
-	11	-	EA	10" RED RUBBER FULL FACED GASKET 1/8"	OC - 620437
-	0	-	EA	6" RED RUBBER FULL FACED GASKET 1/8"	OC - 627466
-	0	-	EA	3/4" UNC GRADE 5 BOLT - 5" LENGTH (6" FLANGE)	OC - 627465
-	0	-	EA	3/4" UNC GRADE 5 NUT	OC - 627465
-	0	-	EA	3/4" WASHER 1/8" THICK	OC - 627465
-	0	-	EA	10 FEET 3/4" UNC ROD	OC - 627465
-	0	-	EA	7/8" UNC GRADE 5 BOLT (10" FLANGE)	OC - 620437
-	0	-	EA	7/8" UNC GRADE 5 NUT	OC - 620437
-	0	-	EA	7/8" WASHER 1/8" THICK	OC - 620437
-	0	-	EA	10 FEET 7/8" UNC ROD	OC - 620437

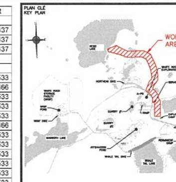
NOTE: ALL LENGTH AND QUANTITY NEED TO BE VALIDATED ON CONSTRUCTION SITE.

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-07-13

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018/07/13
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

2018/07/13

PLAN CLÉ
KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

1. ALL LENGTH AND QUANTITY NEED TO BE VALIDATED ON CONSTRUCTION SITE.
2. THE HDPE 6DR17 (PE 4710 IPS) PIPE FROM NEMO LAKE WILL BE OPERATED NEAR ITS PRESSURE LIMIT. ADEQUATE MEASURES TO ATTENUATE THE WATER HAMMER EFFECT DURING PUMP STARTUP AND SHUTOFF OR DUE TO A SUDDEN VALVE CLOSURE OR PUMP TRIP MUST BE ADDED. MEASURES MUST INCLUDE VARIABLE FREQUENCY DRIVES (VFD) ON THE PUMPS, SLOW CLOSING VALVES (5 SECONDS PER INCH OF PIPE DIAMETER), SURGE TANKS AT THE PUMP END AND PRESSURE RELIEF VALVES AT THE VALVE ENDS.

——— PIPING ON GROUND

------ PIPING IN TRENCH

THE DESIGN AND MATERIALS ON THIS DRAWING ARE ASSUMED BY AGNICO EAGLE.

SNC·LAVALIN

SNC-Lavalin Stavibel inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tél. : 819 764-5181 Fax : 819 797-0158
www.snclavalin.com

Project # : 644819-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
GENERAL ARRANGEMENT / SERVICES PIPING	61-000-270-200
FRESH WATER PIPINGS (MAINTENANCE SHOP)	61-401-270-201
FRESH WATER PIPINGS (SERVICES BUILDING)	61-401-270-202
FRESH WATER PIPINGS (GA & PROFIL)	61-692-210-002
TRUCK FRESH WATER PUMPING STATION	61-692-270-003
-	-

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-07-13	ISSUED FOR CONSTRUCTION	N.B.G.	C.I.G.	K.P.M.

REVISIONS

TITRE / TITLE
AGNICO EAGLE – WHALE TAIL (AMARUQ)
692 – FRESH WATER PUMPING STATION
270 – PIPING
PLAN VIEW
FRESH WATER PIPING (ROUTING)
FROM NEMO LAKE TO EXPLORATION CAMP

DESSINÉ PAR / DRAWN BY	NICOLAS BORDELEAU G., TECH.	DATE 2018-07-13
VÉRIFIÉ PAR / CHECKED BY	KEVEN PLANTE-MARQUIS, ING.	2018-07-13
APPROUVÉ PAR / APPROVED BY	CHRISTIAAN IAN GUNTHER, ING.	2018-07-13
ÉCHELLE / SCALE: N.T.S.	DATE: 2017-12-01	
NO. DESSIN / DRAWING NO.	61-692-270-201	
NO. PROJET / PROJECT NO.: 6115	REVISION: 0	FEUILLE / SHT: 1/2

AE-CART-ARCH D

N:\Projet\Amaruq\050 Studies\6115 Amaruq Infra Eng Project\For approval\61-692-270-201-1_R0.dwg

FILE NO. 61-692-270-201-1_R0.dwg

Appendix C

Appendix C Pictures fresh water intake

Picture 1 Pumping station installation

Picture 2 Pump section of pumping station

Picture 3 Electrical substation after construction

Picture 4 Pumping station after construction

Picture 5 Telehandler pushing pipe with boom

Picture 6 suction line with ballast on lake ice

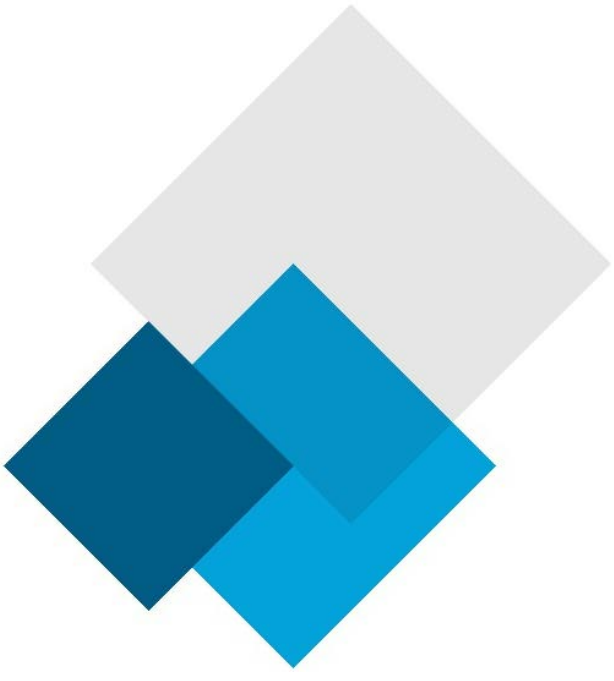
Picture 7 Suction line localization

Picture 8 Suction line sinking

Picture 9 Final suction line installation

Appendix D

Inspection Test Plan



Picture 10 Pipeline pressurization

Picture 11 Pressure readout at 21:00

Picture 12 Pressure readout at 22:00

Picture 13 Pressure readout at 23:00

Picture 14 Pressure readout at 23:58

APPENDIX B

Whale Tail Pit Project – Blast Monitoring Plans

AGNICO EAGLE

TECHNICAL MEMORANDUM

To: Department of Fisheries and Ocean (DFO)

Cc: Amaruq Permitting team

From: Pier-Eric McDonald, Patrice Gagnon

Date: Friday, June 15, 2018

Subject: Blasting Activities – Whale Tail Dike construction

---

1. Introduction

After the reception of Licence A, Agnico Eagle (AEM) plans to build the Whale Tail Dike that will allow for the mining of the Whale Tail pit. One of the construction activities consists of drill & blasting (D&B) the East and West abutments of the Whale Tail dike. Those abutments are located on the shoreline of Whale Tail Lake and this activity is critical for assuring the performance of the dike. Since this activity is close to a water body, AEM aims to comply with the DFO's Guidelines for Use of Explosives in or Near Canadian Fisheries Waters. This memo presents the proposed monitoring and mitigation measures in order to respect the above guidelines that are summarized in section 3.

2. Description of Blasting Activities

Drill and Blast of the Whale Tail Dike abutment is required as per the Design to minimize the risk of deformation of cut-off wall of the structure due to thaw settlement. Following the dike construction, thawing of the abutment is expected due the rise of the Whale Tail lake level which will change the thermal regime of the foundation. Removing the ice-rich till material and unsuitable foundation material under the cut-off wall on the abutments will remove this risk by ensuring that the cut-off of the dike is on a foundation not prone to thaw settlement. Due to the expected thickness of frozen material to remove, blasting is required for this activity. Drill and blast will be undertaken on each abutment and near the lake shore while respecting the distance allowed per the DFO's guideline. The blasting activities are planned to occur in the months of July to August 2018. The extent of the blasting area for both abutments are presented in Appendix A. These extents might change due to field observations and design adjustments.

3. Review of existing DFO guidelines

AEM intends to comply with the nine (9) guidelines of the document "Guidelines for Use of Explosives in or Near Canadian Fisheries Waters" summarize below:

> *1. Proponents considering the use of explosives are encouraged to consult the appropriate DFO Regional/Area authorities (Appendix I) as early as possible in their planning process to identify possible alternatives to the use of explosives, the biological resources and their habitats at risk, and/or effective mitigation measures.*
>
> *2. Where provincial or territorial resource management agencies, or aboriginal resource management boards undertake the administration of fisheries, the proponent is encouraged to consult with the relevant authorities.*

3. The use of confined or, in particular, unconfined explosives in or near Canadian fisheries waters is discouraged, and proponents are encouraged to utilize other potentially less destructive methods wherever possible.

4. No use of ammonium nitrate-fuel oil mixtures occurs in or near water due to the production of toxic by-products (ammonia).

5. After loading a charge in a hole, the hole is to be back-filled (stemmed) with angular gravel to the level of the substrate/water interface or the hole collapsed to confine the force of the explosion to the formation being fractured. The angular gravel is to have a particle size of approximately 1/12th the diameter of the borehole.

6. All "shock-tubes" and detonation wires are to be recovered and removed after each blast.

7. No explosive is to be knowingly detonated within 500 m of any marine mammal (or no visual contact from an observer using 7x35-power binocular).

8. No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e., overpressure) greater than 100 kPa (14.5 psi) in the swimbladder of a fish.

9. No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm•s-1 in a spawning bed during the period of egg incubation.

4. Proposed Monitoring Plan

AEM is committed to monitor blast vibrations with Instantel seismograph monitoring devices to be installed as indicated by the manufacturer at the same location every blast. Note that 2 stations per abutment are suggested depending on which side of the centerline the blast are occurring. Those locations are to be in a representative area on the shoreline and outside the footprint of dike construction . Refer to appendix A for proposed locations of STA-W1, STA-W2, STA-E1 and STA-E2. Such practices are consistent with the current application of the license at Meadowbank.

After each blast, the recorded values shall be analyzed and documented by competent personal and adjustments on the next blasting sequences shall be brought forward should the vibration limits exceed the guidelines presented in section 3.

5. Potential mitigation measures

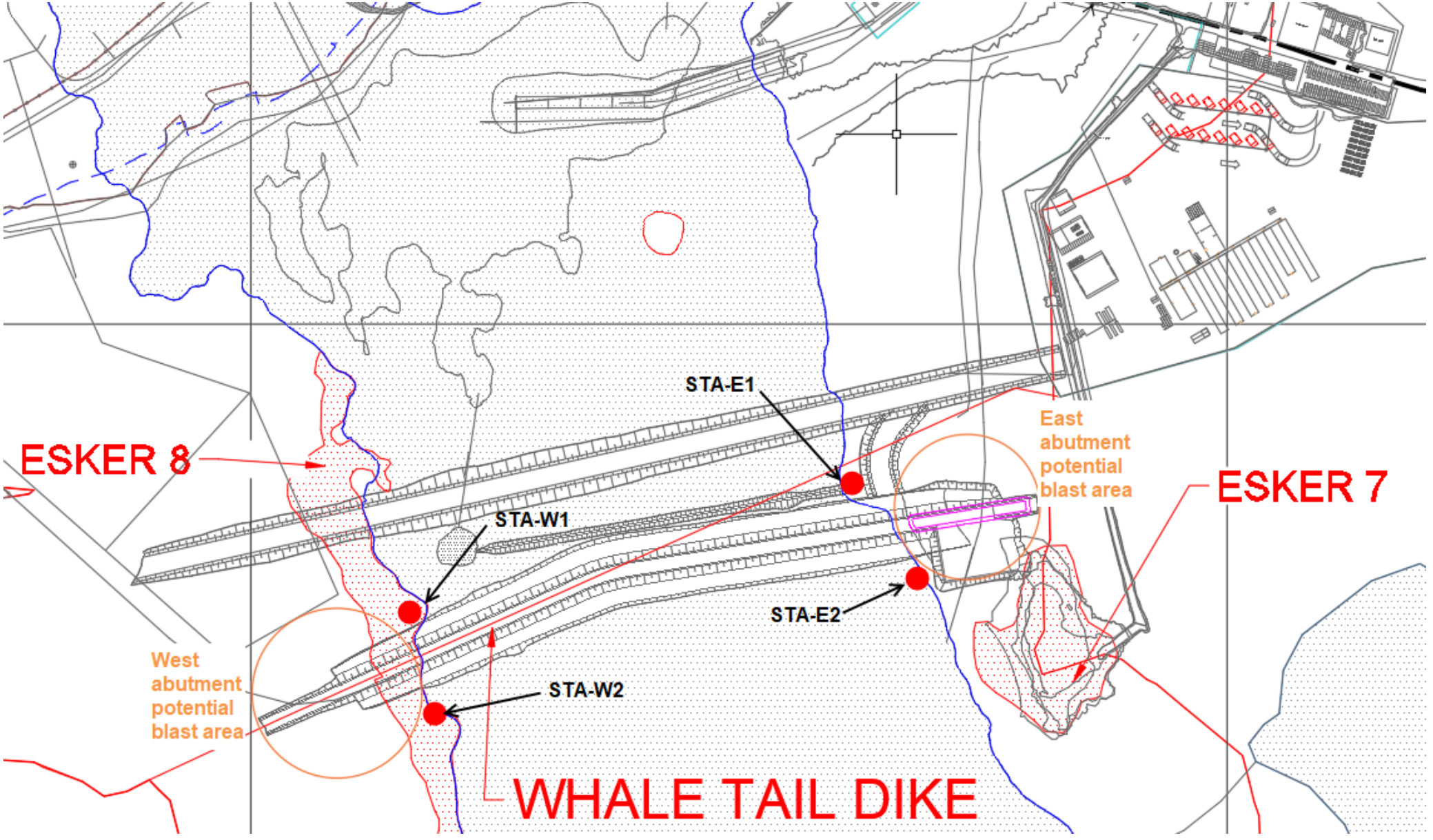
AEM has identified a handful of potential mitigation measures that could be applied in Drill & Blast practices in order to comply with the above mentioned DFO guidelines. Those are developped from a combination of literature and past experiences at Meadowbank that have proven to be successful, namely:

- This document will be reviewed by all parties involved in the D&B activities ;
- Drill on small diameters hole as low as 3" to limit vibrations ;
- The explosive charge in each hole (powder factor) shall be reduced to the minimum judged practical in the design phase of the blast ;

- Number of holes blasting per delay shall be reduced to a minimum as much as practical in the tying plan produced by the D&B engineer to limit vibrations ;
- The blasting area will be broken down to small blast patterns to be blasted in a sequential manner.
- The blaster will perform a visual inspection of the area around the blast after each blast and remove any shock tubes or detonators close to the shoreline. If visual inspection reseals blasting accessories in the water, the blaster will advice the Geotechnical engineer so that the material is removed by boat via appropriate procedures ;
- Every hole will be backfilled with angular gravel as per current AEM practices ;
- The explosive used will be emulsion which is not water soluble.
- In the event where projections are judged problematic, blasting mats or geotextile could be applied over the whole blasting sequence with an appropriate amount of aggregates over it in such a way that the energy is kept in the rock mass as opposed to sending projections and deleterious blasting material in the air.

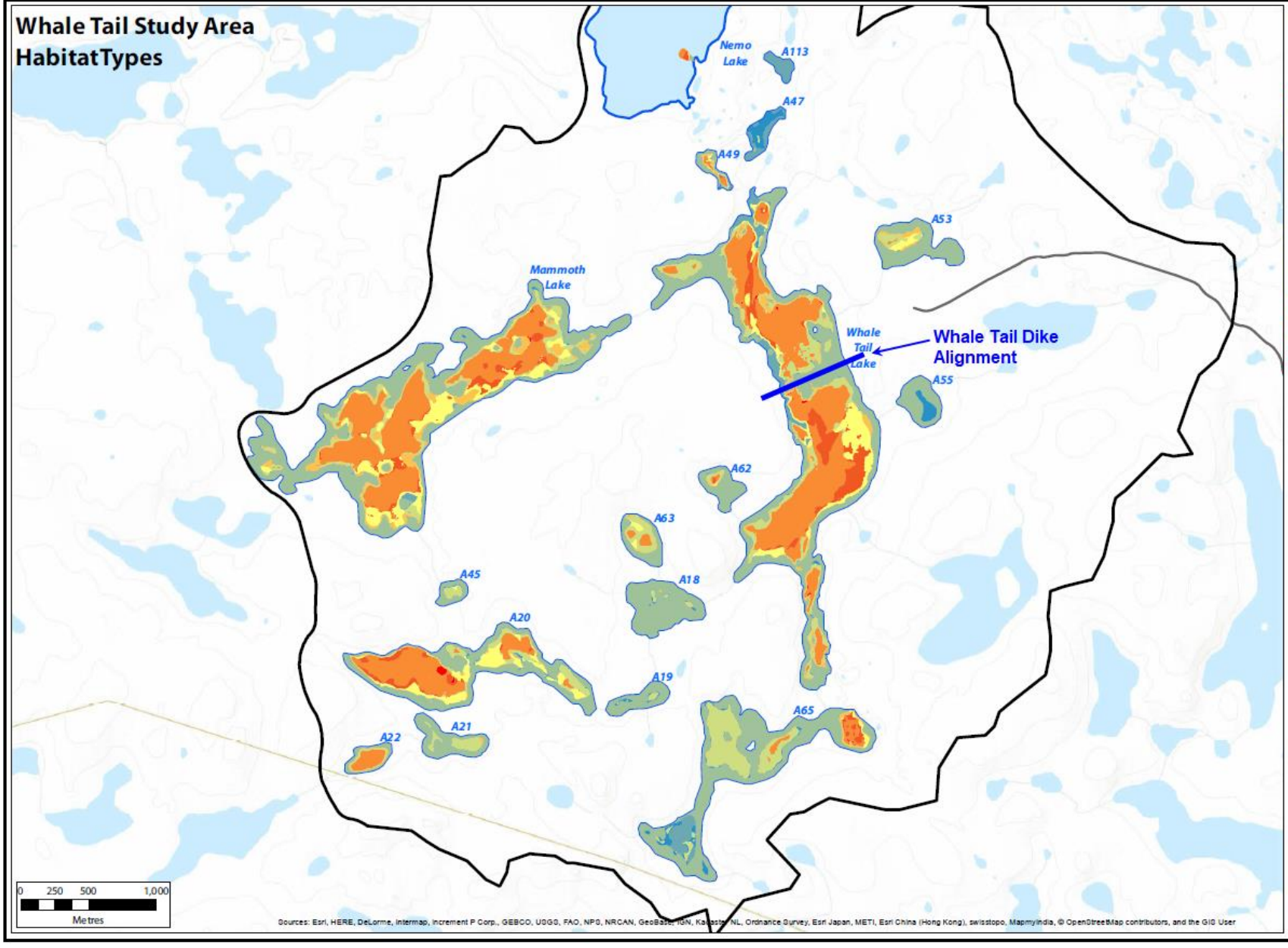
Additionally, AEM's D&B engineers have performed calculations as presented in Appendix II & III of the DFO's guidelines document to find the maximum setback distance from the shoreline to avoid a pressure on fish bladders exceeding 100kpa as per criteria number 8 and to have vibrations limit not exceeding 13 $mm*s^{-1}$ in spawning beds for criteria number 9. Furthermore, appendix B below presents the fish habitats type and it can be seen that the Whale Tail Dike's alignment and proposed blasting areas on the East and West abutments are in a low risk zone and more than 100m away from the critical areas. Nevertheless, AEM is committed to respect the criteria directed by DFO's Guidelines for Use of Explosives in or Near Canadian Fisheries Waters.

APPENDIX A – Proposed Blast Monitoring Stations


ESKER 8
STA-E1
East
abutment
potential
blast area
ESKER 7
STA-W1
STA-E2
West
abutment
potential
blast area
STA-W2
WHALE TAIL DIKE

APPENDIX B – Fish Habitats Types

Whale Tail Study Area
HabitatTypes



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User

Legend

- Proposed Haul Road (AEM, Nov. 2015)
- Whale Tail Study Area
- Study Lake
- Freshwater Jetty

Habitat Type

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Habitat Type	Criteria	
	Depth Zone	Substrate
1	<2 m	Fines
2	<2 m	Mixed
3	<2 m	Coarse
4	2-4 m	Fines
5	2-4 m	Mixed
6	2-4 m	Coarse
7	> 4 m	Fines
8	> 4 m	Mixed
9	> 4 m	Coarse

Whale Tail Habitat Types
Pre-Construction

DOUGAN & ASSOCIATES
ECOLOGICAL CONSULTING & DESIGN

PROJECT: DA14-053-07

CLIENT: Agnico Eagle Mines Ltd., Meadowbank Div.

DATE: APRIL 2016

SCALE: 1:26,000

DRAWN BY: LC

CHECKED BY: C. Portt

FIGURE:

3.7

AGNICO EAGLE

Meadowbank & Whale Tail Project

Blast Monitoring Program

Prepared by:
Agnico-Eagle Mines Limited – Meadowbank Division

Version 3

March 2019

1. EXECUTIVE SUMMARY

The Guidelines for the Use of Explosives In or Near Canadian Waters (Wright and Hopky, 1998) as modified by the DFO for use in the North mention the following requirements that are applicable to the Meadowbank Mine:

- No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e. overpressure) greater than 100 kPa in the swim bladder of a fish.
- No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm/sec in a spawning bed during the period of egg incubation.

As a result of testing and monitoring in the NWT that indicates the limit of 100 kPa was not protective to fish, DFO has recommended to Agnico to use 50 kPa as the threshold for instantaneous pressure change.

Every blast is monitored with an Instantel Minimate Blaster to ensure that vibrations generated by blasting are less than 13 mm/sec and the overpressure is under 50 KPa. The blasts are monitored from three locations at the Meadowbank site; one station is located near the northern end of Portage Pit, the second near the south end of Portage Pit and the other one at the north of Vault Pit. For Whale Tail, the blasts are monitored from two locations; one on Whale Tail Lake before the fish out is completed and another one on Mammoth Lake for the open pit operations. Independent blast monitoring plans will be established for blasts that are outside of the Whale Tail Pit area; for example: the Whale Tail Dike and the Mammoth Dike Construction MEMO that was submitted to the DFO. The results of blast monitoring are systematically analyzed by the Engineering department within the 24 hours following the blasting operation. The blast monitoring results are interpreted and a blast mitigation plan is implemented immediately if the vibrations or the overpressure exceed the guidelines. A retro analysis is conducted to determine what caused the higher than expected results.

The following factors are considered in controlling vibration intensity:

- The confinement of the charges
- The coupling of the explosives charges to the rock affects how much energy is transferred to the rock

- The spatial (geometric) distribution of the explosives affects the character and intensity of the ground vibrations
- The charge weight per delay (8ms intervals)
- The blast direction

The following factors are considered in controlling overpressure:

- Depth of burial
- Insufficient burden on the first row of holes, this can cause air blast and generate fly rocks
- Charges placed in open seams, clay filled seams, and highly fractured zones where gases could be vented
- The charge weight per delay (8ms intervals), especially for pre-shear blasting

The blast monitoring reports are systematically archived and relevant information entered into a database. The blast monitoring data will be submitted for regulatory review annually in the Meadowbank Annual Report.

IMPLEMENTATION SCHEDULE

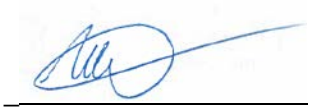
This Plan is implemented immediately (March 2019)

DISTRIBUTION LIST

Agnico Eagle – Environment Superintendents
Agnico Eagle – Environmental Coordinators
Agnico Eagle – Engineering Superintendents
Agnico Eagle – Engineering Coordinators

Version	Date (YMD)	Section	Page	Revision
1	May 2010	All Section		Comprehensive plan for Meadowbank Project
2	March 2017	All Section		Update of the original plan
3	March 2019	All Section		Implementation of Whale Tail project monitoring

Produced by Engineering Department

Approved by: 

Miles Legault
Assistant Engineering Superintendent

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1. Introduction

Agnico-Eagle Mines Limited – Meadowbank Division has developed this Blasting Monitoring Program for the control of blasting vibrations at the Portage, Goose and Vault Pit in accordance with Condition 85 of Project Certificate No.004 issued by the Nunavut Impact Review Board (NIRB). This monitoring program was also updated to include blasting activities at Whale Tail Project in accordance with Condition 22 of NIRB Project Certificate No.008.

Agnico had developed a detailed blasting program to minimize the effects of blasting on fish and fish habitat, water quality, and wildlife and terrestrial VECs. The Blasting Program has been developed in consultation with the Department Of Fisheries and Oceans (DFO) and the Government of Nunavut (GN), and shall:

a) Comply with the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998) as modified by the DFO for use in the north;
b) adhere to the guidance provided in the Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000-2002 (Cott and Hanna, 2005);
c) Include a monitoring and mitigation plan to be developed in consultation with the DFO, and obtain DFO approval of the blasting program prior to the commencement of blasting;
d) Restrict blasting when migrating caribou, or sensitive local carnivores or birds may be negatively affected; and
e) Minimize the use of ammonium nitrate to reduce the effects of blasting on receiving water quality

The Blasting Monitoring Program will continue to be implemented during the operation phases of the Meadowbank and Whale Tail Projects.

2. Blasting standard and criteria

The effects of blasting are typically assessed in terms of Peak Particle Velocity (PPV). The US Bureau of Mines has established that the peak particle velocity is related to the scaled distance by the following relationship:

$$PPV = k * (R/W^{0.5})^{-b}$$

Where:

PPV = Peak Particle Velocity, mm/s

R = Distance from blast to point of concern, m

W = Charge weight per delay, kg

k = confinement factor – specific to site

b = site factor

This formula can be used to estimate PPV and determine if the PPV will surpass the given limits before the blast occurs.

The Guidelines for the Use of Explosives In or Near Canadian Waters (Wright and Hopky, 1998) as modified by the DFO for use in the North mention the following requirements that are applicable to the Meadowbank Project:

> "8. No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e. overpressure) greater than 100 kPa (14.5 psi) in the swim bladder of a fish.
>
> 9. No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm/sec in a spawning bed during the period of egg incubation."

As a result of testing and monitoring in the NWT that indicates the limit of 100kpa was not protective to fish, DFO has recommended to Agnico to use 50 kPA as the threshold for instantaneous pressure change.

To keep PPV under the 13 mm/sec guideline Wright and Hopky (1998) suggests the setback distances shown in table 1.

Table 1 : Set back distance (m) from center of detonation of a confined explosive to spawning habitat to achieve 13mm/sec guideline criteria for all types of substrate (Wright and Hopkins, 1998)

	Weight of Explosive Charges (kg)						
	0.5	1	5	10	25	50	100
Setback distance (m)	10.7	15.1	33.7	47.8	75.5	106.7	150.9

Concerning the instantaneous pressure change (i.e. overpressure), Wright and Hopky (1998) suggest the following setback distances to keep it under the 100 kPa guideline.

Table 2 : Set back distance (m) from center of detonation of a confined explosive to fish habitat to achieve 100 KPa guideline criteria for various substrate.

	Weight of Explosive Charges (kg)							
Substrate Type	0.5	1	2	5	10	25	50	100
Rock	3.6	5.0	7.1	11.0	15.9	25.0	35.6	50.3
Sfrozen Soil	3.3	4.7	6.5	10.4	14.7	23.2	32.9	46.5
Ice	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Saturated Soil	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Rock	2.0	2.9	4.1	6.5	9.2	14.5	20.5	29.0

The Meadowbank Engineering team is also referring to the vibration and overpressure historical data to assess certain blast pattern closer to lakes. Nine (9) years of historical data are archived in the Meadowbank database and they are often used as case study for delicate blasting operations.

3. Blast monitoring plan

3.1. Blast monitoring equipment

Every blast is monitored to ensure that vibrations generated by blasting are less than 13 mm/sec and the overpressure is under 50 KPa. The instrument used for blast monitoring is an Instantel Minimate Blaster which is fully compliant with the international Society of Explosives and Engineers performance specification for blasting seismographs (Instantel, 2005).

The Minimate Blaster has three main parts: a monitor, a standard transducer (geophone) and a microphone (figure 1). The monitor contains the battery and electronic components of the instrument. It also checks the two sensors to be sure that they work properly. The transducer measures ground vibration with a mechanism called a geophone.

Figure 1: Instantel Minimate Blaster Unit

The transducer has three geophones that measure the ground vibrations in terms of particle velocity. They measure transverse, vertical and longitudinal ground vibrations (figure 2). Transverse ground vibrations agitate particles in a side to side motion. Vertical ground vibrations agitate particles in an up and down motion. Longitudinal ground vibrations agitate particles in a back and forth motion progressing outward from the event site (Instantel, 2016).

The microphone measures the PSP (Peak Sound Pressure) also referred as to the PAO (Peak Air Overpressure). The instrument checks the entire event waveform and displays the largest sound pressure in Pa unit.

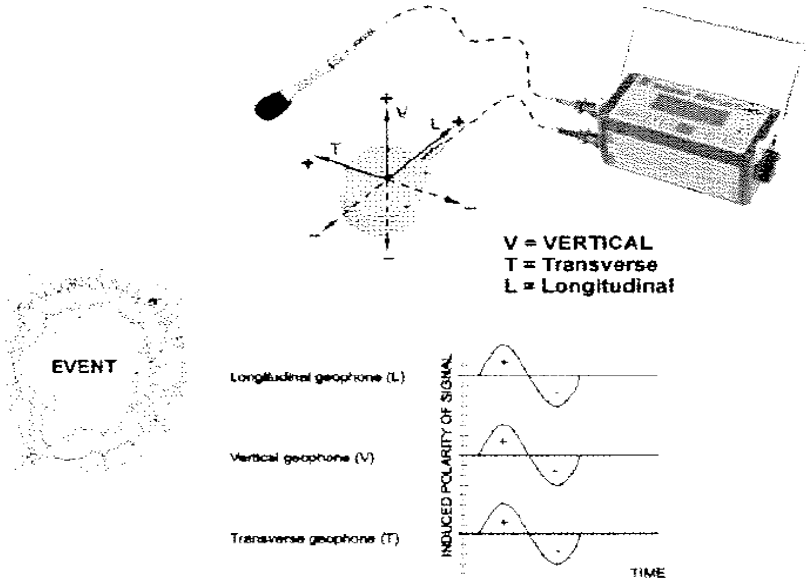

Figure 2: Sensor Orientation (Instantel, 2016)

The Minimate Blaster (Instantel) calculates the PPV for each geophone and calculates the vector sum of the three axes.

The final result is the PVS (Peak Vector Sum) and it is the resultant particle velocity magnitude of the event:

$$PVS = \sqrt{(T^2 + V^2 + L^2)}$$

Where:

T = particle velocity along the transverse plane

V = particle velocity along the vertical plane

L = particle velocity along the longitudinal plane

3.2. Equipment installation

The transducer is installed on a hard surface, which in this case is rock. A 3/8 inch bolt is anchored in the rock (figure 3) and the transducer is tightened with a nut (figure 4). The arrow on the top of the standard transducer must be pointed in the direction of the event to ensure the geophone sensors, located inside the standard transducer, remains in their natural axis (Instantel, 2016). The trigger level of the instrument is set to 1 mm/s and the transducer will start recording an event automatically when the ground vibrations are greater than or equal to 1 mm/s. The recording time is 4 seconds, which is sufficient considering that the blast timing is rarely more than 2 seconds at Meadowbank. The instrument is protected with a box and the microphone is oriented in the direction of the blast.

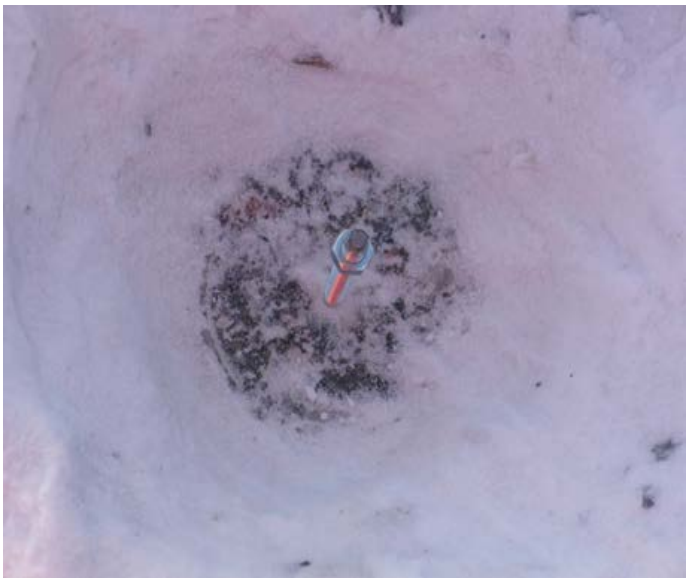

Figure 3: 3/8 inch bolt anchored in the rock

Figure 4: Transducer tightened with a nut

Figure 5: Final Set-up with the Microphone in the direction of the blast

Figure 6: General view of the Portage South monitoring station

3.3. Blast monitoring stations at Meadowbank

The blasts are monitored from three different locations. The locations were chosen to have the optimal distance between the blasts and the water (fish habitat). One station is located near the northern end of Portage pit and the other near the south end of Portage pit (figure 7). The third station is located at the complete northern of the Vault Pit (Figure 8).

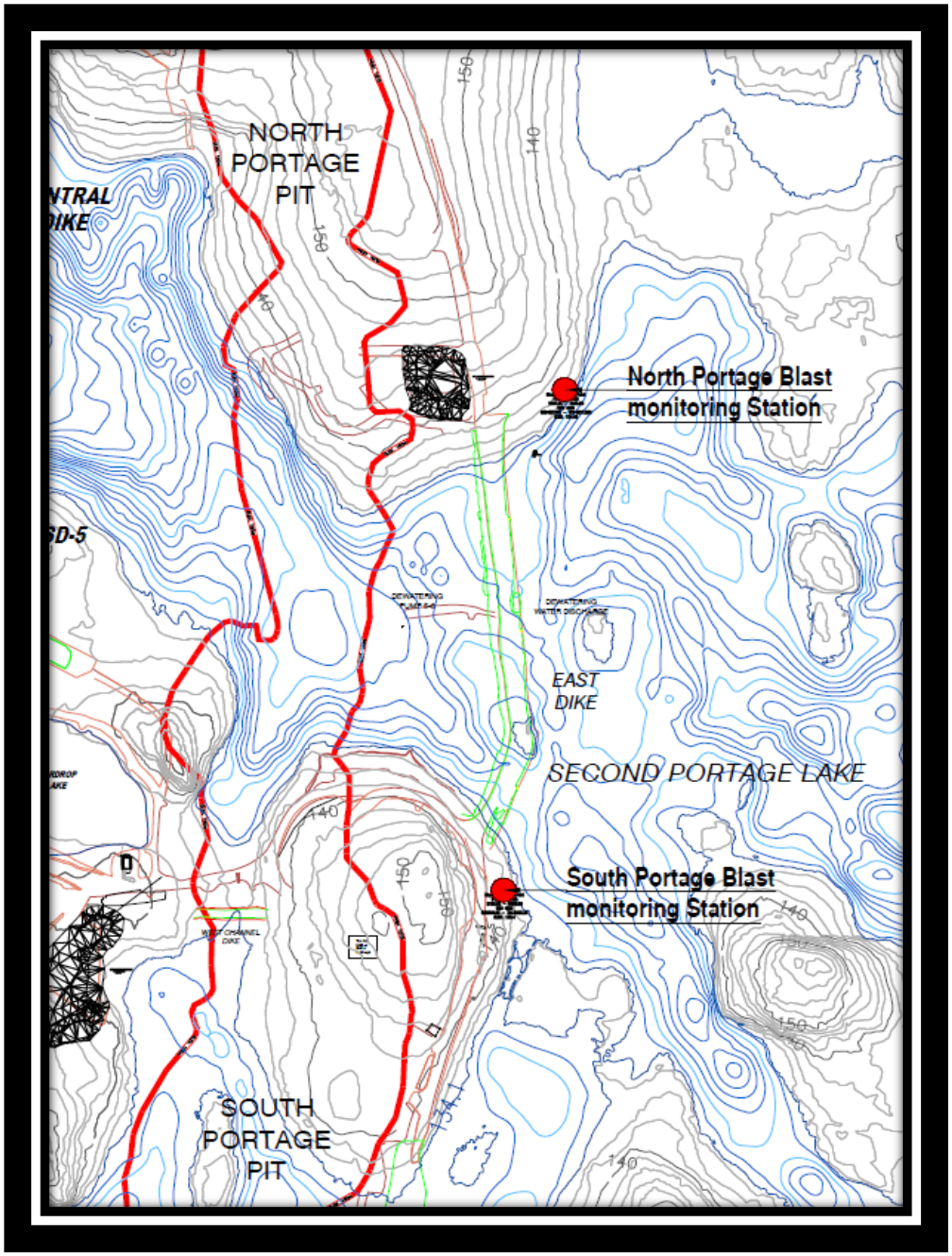

Figure 7: Localizations of the two blast monitoring stations at Portage Pit

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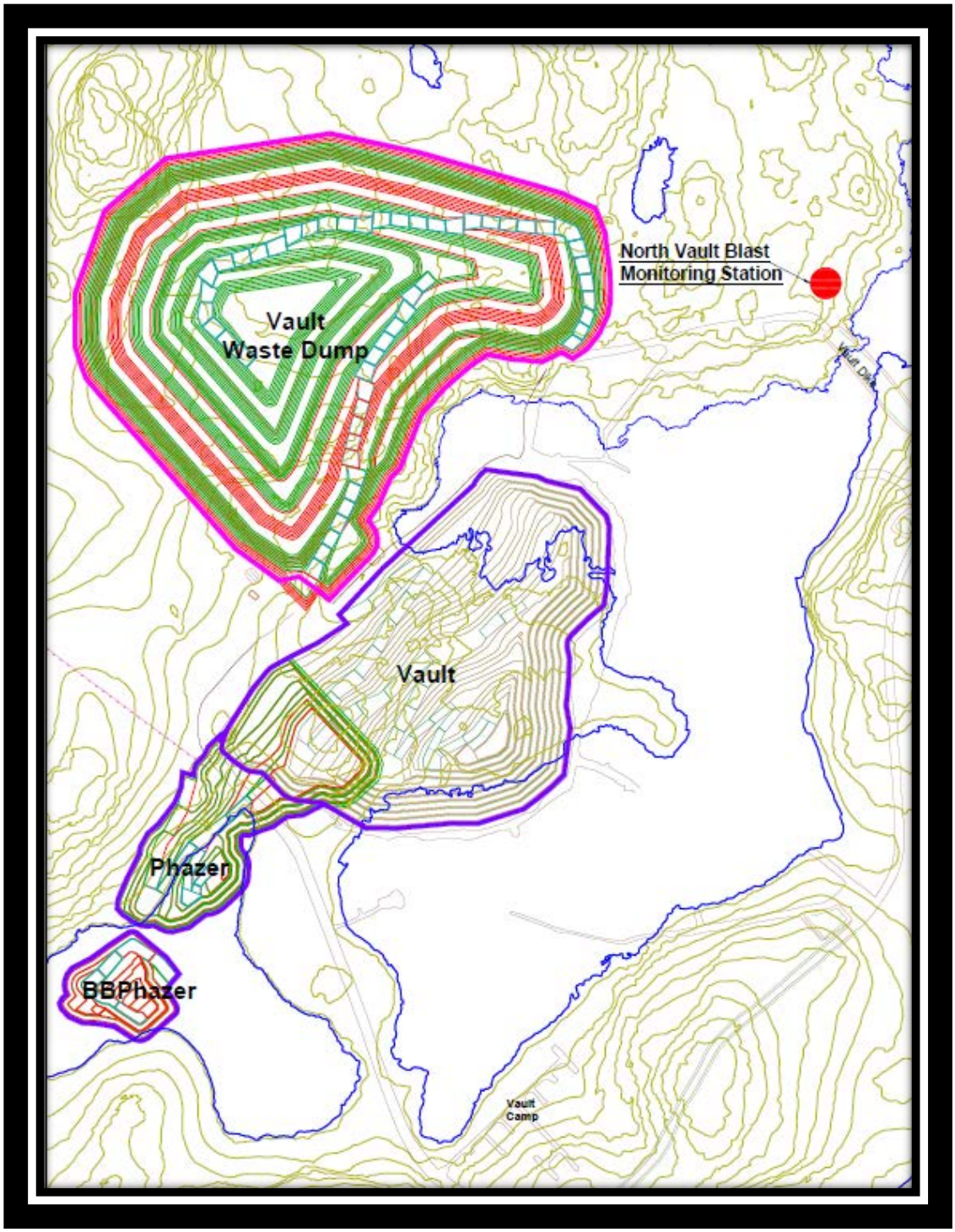


Figure 8: Localization of the blast monitoring station at Vault pit

3.4 Whale Tail monitoring stations

The blasts were monitored from Whale Tail Station 1 when mining in Quarry 1 and Ap-5. For Quarry 2 and Phase 1 of Whale Tail Pit; monitoring is done from Mammoth Station 1 only since the fish out of Whale Tail Lake has been completed. Depending on the location of the blast inside Whale Tail Pit, Whale Tail Station 2 will be used as well. Additionally, monitoring will be done on both Mammoth Dike and Whale Tail Dike which will provide redundancy and mitigation if ever the Instatel monitoring devices were to not record.

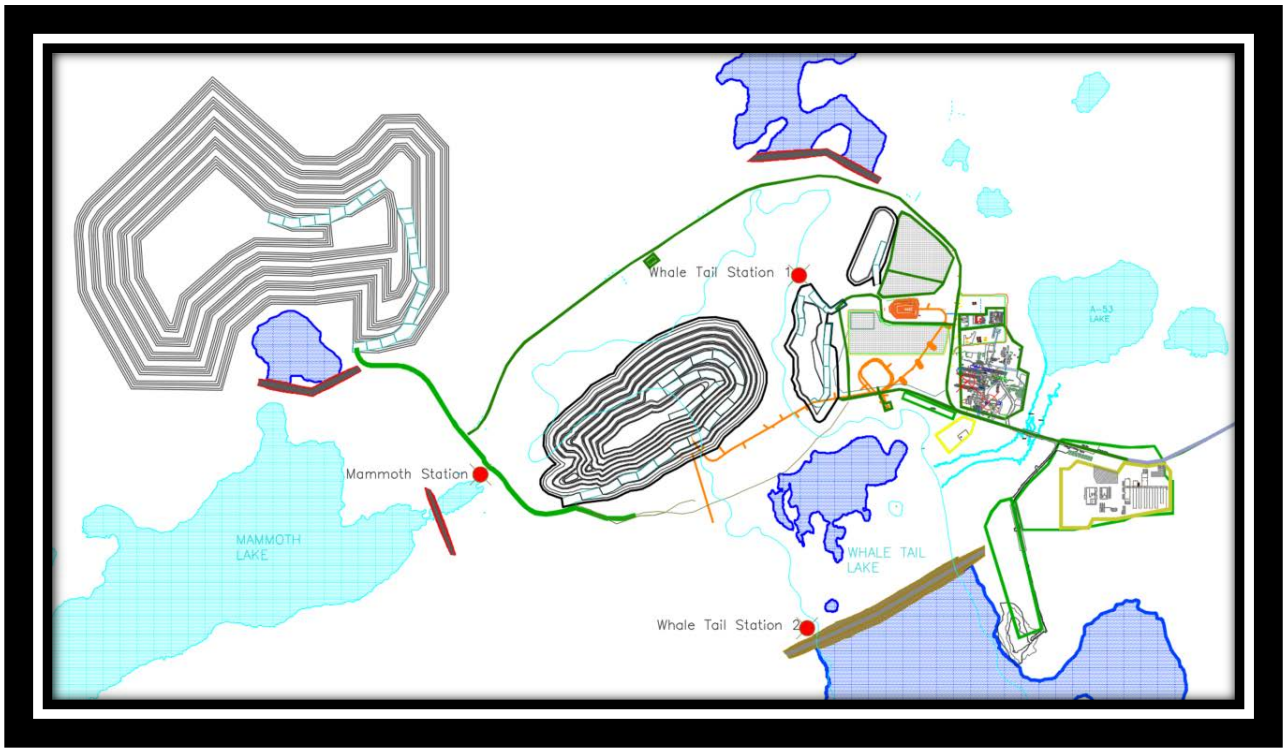


Figure 9: Localization of the blast monitoring stations at Amaruq

As demonstrated on Figure 10, the possible fish spawning areas are located West of Mammoth Dike while Mammoth Station is located East of the Dike. Therefore, it is safe to say, according to the formula for calculating PPV in Section 2, that if we record PPVs under the 13mm/s threshold, that the PPVs will be lower at the fish spawning areas.

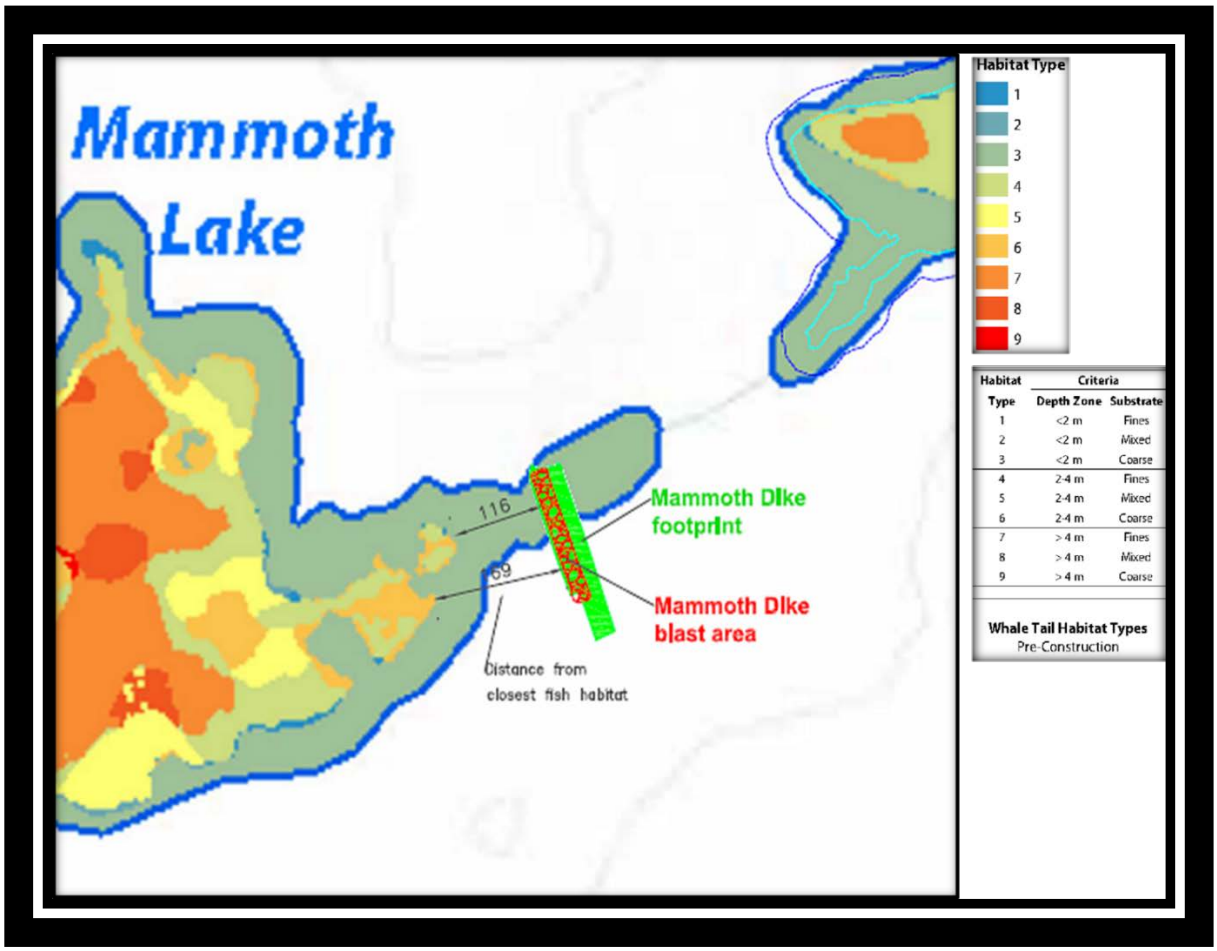
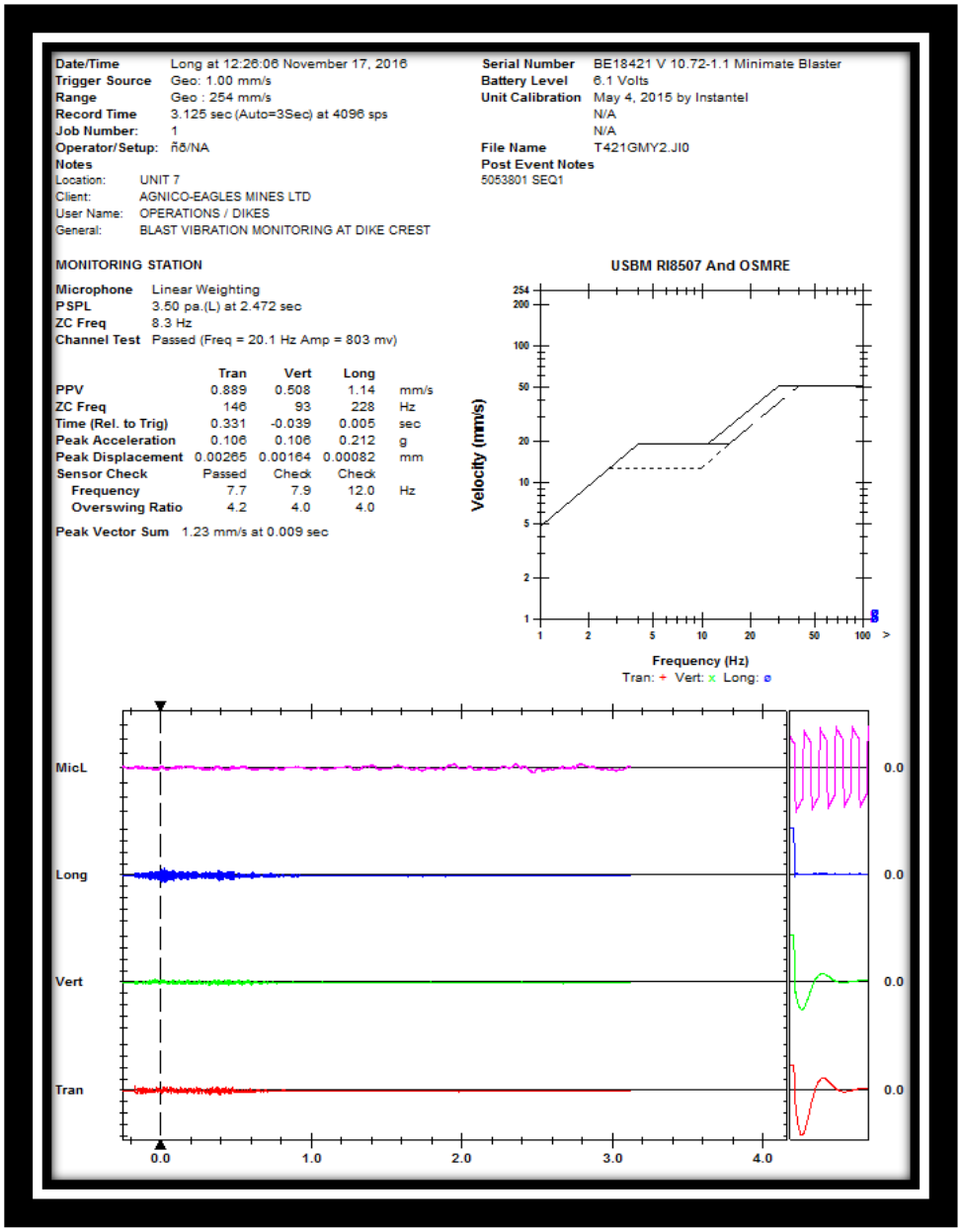


Figure 10: Fish Habitat Types for Mammoth Lake

3.5 Blast monitoring report

After each blast, the results are stored in a database and the report saved in the library for future reference. The blast monitoring results are interpreted and a blast mitigation plan is implemented immediately if the vibrations or the overpressure exceed the permitted limit (see section 4). The data will be submitted to DFO, GN, NIRB, Environment and Climate Change Canada, and the Nunavut Water Board annually in the Meadowbank Annual Report.



4. Blast mitigation plan

This mitigation plan is specific to blasts in the open pits (Portage Pit, Vault Pit, BB Phaser Pit, Phaser Pit and Whale Tail Pit. A Memo has been sent to the Fisheries and Oceans with its own specific mitigation plan relative to blasts for Whale Tail Dike and Mammoth Dike excavation.

If the vibrations or the overpressure approach or exceed the permitted limit, it is possible to conduct a retro analysis and find the factors that may have caused higher than desired results. It is important to consider the main factors influencing blast vibration intensity (table 3) or overpressure (table 4) in order to prevent such results (ISEE, 1998).

Table 3: Main Factors Influencing Blast Vibration Intensity (ISEE, 1998)

Main Factors Influencing Blast Vibration Intensity
Maximum charge weight detonating at one time
True distance (distance the waves must travel)
Geological conditions
Confinement
Physical properties of the rock
Coupling
Spatial distribution
Detonator timing scatter
Time of energy release
Type of Explosive

Table 4: Main Factors Influencing Overpressure (ISEE, 1998)

Main Factors Influencing Overpressure
Maximum charge weight per delay
Depth of burial of charges
Exposed surface detonation material
Atmospheric conditions
Wind
Temperature gradients
Topography

Volume of displaced rock
Delay interval and orientation
Type of Explosive

Geological conditions and rock properties are site specific and cannot be changed but there are several controllable factors that may reduce blast vibration intensity. Agnico takes the following factors into consideration at Meadowbank to reduce vibration intensity:

I. The confinement of the charges affects the vibration intensity. If a charge is deeply buried with no free face nearby, the rock is not displaced and more of the energy goes into seismic waves (ISEE, 1998). The engineering department carefully plans pre-shear blasting that may have excessive burden in the first row of holes.

II. The coupling of the explosives charges to the rock affects how much energy is transferred to the rock and hence the intensity of the vibrations. If smaller-diameter charges are placed in large-diameter holes, the charges are decoupled and less energy is transferred (ISEE, 1998). Using bulk products increases the coupling. In specific cases, like pre-splitting blast, it is a better idea to use packaged products that have a small diameter.

III. The spatial (geometric) distribution of the explosives affects the character and intensity of the ground vibrations. A reduction in vibration is often found when there are many small charges per delay, widely distributed. There is a practical limit to the number of small charges that can reinforce each other, and the more there are, the less effective their reinforcement. A charge per delay composed of 100 charges of 1lb each will not generate the same intensity of vibration as a single charge of 100 lbs. (ISEE, 1998).

IV. The main factor that is used to prevent high intensity vibration is the charge weight per delay. The 8-ms criterion is applied to prevent short delay times from overlapping or causing constructive reinforcement (addition) of two or more pulses (ISEE, 1998), which could cause higher vibrations. In every blast connection plan designed by the engineering department, this fact is taken into consideration. Timing is designed to minimize the number of holes that overlap in an 8 ms delay.

V. The blasting direction of a blast pattern is another key element to minimize vibration once blasting besides areas close to lakes.

Mitigation techniques used to reduce overpressures are as follows:

I. Depth of burial affects the overpressure. Improperly stemmed or insufficient collar will allow blast holes energy to be vented upwards. The quality of the stemming is also important: angular, coarse stemming material (3/4'') is necessary to be efficient.

II. Avoid having insufficient burden on the first row of holes. This can cause air blast and generate fly rocks. Leaving muck piles from the previous blast in front of the free face (choke blasting) can reduce the amount of air blast generated and minimize the chance fly rocks.

III. Avoid placing charges in open seams, clay filled seams, and highly fractured zones where gases could be vented.

IV. Controlling the charge weight per delay especially for the pre-shear drilling. A limited number of kg per delay is in effect at Portage pit to avoid overpressure.

5. Conclusion

Blast monitoring process will continue to ensure that blast vibrations do not cause harm to aquatic life at Meadowbank and Whale Tail. The results are used to find a more accurate confinement factor of the site. The data collected helps to correlate different factors that could influenced vibration intensity and will be taken into consideration in the future to guarantee a constant improvement in controlling blast vibrations.

We have overall successfully managed to keep our vibrations below the limit authorized. Agnico is committed to monitoring all blasts in order to fully comply with the regulation.

6. References

INSTANTEL INC. 2005, MINIMATE BLASTER OPERATOR MANUAL

INTERNATIONAL SOCIETY OF EXPLOSIVE ENGINEERS (ISEE) (1998). BLASTERS' HANDBOOK (17TH ED.). CLEVELAND: INTERNATIONAL SOCIETY OF EXPLOSIVE ENGINEERS..

WRIGHT, D.G., AND G.E. HOPKY. (1998) GUIDELINES FOR THE USE OF EXPLOSIVES IN OR NEAR CANADIAN

FISHERIES WATERS. CAN. TECH. REP. FISH. AQUAT. SCI. 2107: IV + 34P.

GAGNON, P. AND MACDONALD, P-E, MEADOWBANK AND AMARUQ GEOTECHNICAL ENGINEERS,

Memo: Blasting Activities – Mammoth Dike construction, Agnico Eagle

APPENDIX C

Whale Tail Pit Project – 2018 Culvert Design Documents

SNC·LAVALIN	**WHALE TAIL INFRASTRUCTURE ENGINEERING PROJECT (AMARUQ)** Nunavut	AGNICO EAGLE

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature _____ P.ENG
Date 2018-06-27
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

WHALE TAIL PROJECT, NUNAVUT

DESIGN REPORT AND DRAWINGS

Design report for culverts (roads #8, 9, 11 & 22)

Prepared by:
DIGITALLY SIGNED DOCUMENT
REGISTERED PROFESSIONAL ENGINEER G. MARCOTTE LICENSEE NT/NU
2018-06-27

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2018-06-27

Patrice Audet, Eng.
OIQ Member No. 133049
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Rev.	Date	Revision Description	By	Ver.	Appr.
0	2018-06-27	For Construction	GM	GM	PA

Client Document No. 6115-C-230-001-REP-001	SNC Document No. 644819-0024-41ER-0002
Client Project No. 6115	SNC Project No. 644819

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APPENDICES

1. GENERAL

SNC-Lavalin Stavibel has been mandated by Agnico Eagle to design the Infrastructure for the Whale Tail Project. The Amaruq property is a 408 square kilometer (km^2) site located on Inuit-Owned Land approximately 150 kilometers (km) north of the hamlet of Baker Lake and approximately 50 km northwest of Meadowbank Mine in the Kivalliq Region of Nunavut. The deposit will be mined as an open pit (i.e., Whale Tail Pit), and ore will be hauled by truck to the approved infrastructure at Meadowbank Mine for milling. The Project facilities will consist of a personnel camp, power plant, maintenance shop, tank farm, water and sewage collection and treatment system, haul roads and access roads. As a result of development, Agnico Eagle is also expanding the width of the existing exploration access road to a haul road to accommodate increased traffic rates and haul trucks (approved under pre-dev. licence 2BC-WTP1819).

Infrastructures are designed to accommodate the personnel, equipment and fuel requirements. Given its location, projects infrastructures were designed to accommodate cold temperatures and permafrost conditions.

1.1. DEVELOPMENT OF ROAD INFRASTRUCTURES FOR THE MINING OPERATIONS

Road infrastructures are essential to allow mining operations and the logistics associated with the camp activities.

In Appendix B, there is an overall plan showing the location of roads 8, 9, 11 and 22 with their functionality.

The territory is relatively smooth, containing valleys and low points where the installation of culverts is required to ensure the natural flow of runoff.

1.2. SCOPE OF WORK

SNC-Lavalin Stavibel Inc. has been hired by Agnico Eagle to provide professional engineering services related to the design of access roads 8, 9, 11 and 22 and for drainage, respecting Water Management and Environment requirements.

Accordingly, the scope of the mandate includes:

- Geometric design of roads, their horizontal geometry and vertical profile.
- Structural design of the roads.
- Calculation of surface runoff rates and sizing of the culverts.
- Environmental impact attenuation measures during construction.
- Stabilization of structures.

2. DESIGN CRITERIA – DESIGN OF CULVERTS

2.1. CULVERT DESIGN BASIS AND WATER MANAGEMENT STRATEGY

The overall objective of the water management strategy of this project is to develop a practical and feasible site-wide water management plan to minimize the potential negative impacts of mining development on the surrounding environment including habitats for fish and wildlife, and to facilitate mine operation and long-term closure and reclamation of the mine site. To attain this objective, culverts are used to control and divert runoff underneath the road and new facilities.

All culverts (#8, 9, 11 & 22) are required and installed at the lower point of their watershed to allow runoff flow by gravity under the haul road. Locations of proposed culverts are shown in Appendix B.

2.2. HYDRAULIC ANALYSES AND PEAK FLOW CALCULATION

Hydrologic and hydraulic analyses were carried out to determine culvert sizes to accommodate a 25-year peak design flow.

The Rational Method was used to determine peak flows. The Intensity-Duration-Frequency (IDF) curve developed by Environment Canada for Baker Lake Station was used. 25-year recurrence period rainfall intensity for a duration equivalent to the time of concentration of the catchment area was considered to determine the design peak flow for each culvert.

Estimated peak flows, culverts capacity and characteristics of each culvert are given in Table 2.1 Characteristics of the culverts.

2.3. CULVERTS

The proposed culverts will be in service for up to 15 years. All proposed culverts are Aluminized Corrugated Steel Pipe (ACSP) TYPE 2, with a profile of 68 x 13mm (helical) and a minimum size of 600mm. The thickness of each culvert is shown in the table below.

Ø	Gage (mm)
600	2.8
700	2.8
800	2.8
900	3.5
1000	3.5
1200	3.5
1400	4.2
1500	4.2
1600	4.2
1800	4.2
2000	4.2

A. Culvert installation

A minimum of fill cover will be placed over and all around the culverts according to the Standard Proctor Maximum Dry Density (ASTM D698) and these specifications:

- Minimum recovery height over culverts : 0.9 m
- Minimum spacing between culvert walls: 1.2 m
- Seating or recovery materials: MG 20 or (0-50mm)
- Seating thickness:
    - Recommended: 300 mm;
    - Minimum : 150 mm.

All details and layout for the culverts installation are shown on drawing 61-417-230-226 presented in Appendix C.

The timeline, for the installation of the culverts, is planned in August and according to this order: roads 11, 8, 9 & 22.

B. Preliminary selection of required diameter

According to the tables in the Guide to the application of the Regulation respecting the sustainable development of forests in the domain of the state.

C. Calculation of hydraulic profile :

The software (Model HY8 – Storm management hydrologic model) was used to determine the profile of the various configurations of culverts on the site.

2.4. EROSION CONTROL

Erosion control is provided by the installation of rip rap at the culvert entrance and exit. The rip rap consists of fragmented rocks (50-300mm) from an NAG (Non Acid Generator) and Non Metal Leaching source of rock. To insure the quality of materials, a sampling protocol is followed on construction site (180601-16MN056_ARD-ML Sampling Plan). For the installation, see drawing 61-417-230-226, in Appendix C.

During construction, in the summer, it is planned to use anti-sediment barriers (geotextile curtain) to limit erosion and the transport of fine particles into the watercourses.

Table 2.1: Characteristics of the culverts

LOCALISATION		Ø	Length (m)	Slope (%)	Material		Estimated Peak Flow (m^3/s)	Culvert Flow capacity (m^3/s)
ROAD	# CULVERT	(mm)			Type	Thickness (mm)		
ROAD # 8 & 9 - Whale Tail	**8-1**	900	23	2.6	ACSP	3.5	0.546	1.700
ROAD # 8 & 9 - Whale Tail	**8-2**	600	22.5	2.0	ACSP	2.8	0.103	0.620
ROAD #11 - NEMO	**11-1**	600	18	1.1	ACSP	2.8	0.113	0.620
ROAD #11 - NEMO	**11-2**	1200	19	1.1	ACSP	3.5	1.795	3.110
ROAD #11 - NEMO	**11-2**	900	17	1.2	ACSP	3.5	1.795	1.700
ROAD #11 - NEMO	**11-2**	900	17	1.2	ACSP	3.5	1.795	1.700
ROAD #11 - NEMO	**11-3**	600	17	5.3	ACSP	2.8	0.04	0.620
ROAD #11 - NEMO	**11-4**	1200	20.5	0.8	ACSP	3.5	2.743	3.110
ROAD #11 - NEMO	**11-4**	1200	20.5	1.0	ACSP	3.5	2.743	3.110
ROAD #11 - NEMO	**11-4**	900	18	1.1	ACSP	3.5	2.743	1.700
ROAD #11 - NEMO	**11-4**	900	18	0.8	ACSP	3.5	2.743	1.700
ROAD #11 - NEMO	**11-5**	900	18	0.6	ACSP	3.5	1.700	1.700
ROAD #11 - NEMO	**11-5**	900	18	0.6	ACSP	3.5	1.700	1.700
ROAD #11 - NEMO	**11-5**	900	18	0.6	ACSP	3.5	1.700	1.700
Road #22 - Explosive Road	**22-1**	900	12	2.0	ACSP	3.5	1.169	1.700
Road #22 - Explosive Road	**22-2**	900	14	2.7	ACSP	3.5	1.351	1.700
Road #22 - Explosive Road	**22-3**	700	13	1.5	ACSP	2.8	0.536	0.790
Road #22 - Explosive Road	**22-4**	700	15	2.0	ACSP	2.8	0.568	0.790
Road #22 - Explosive Road	**22-5**	1000	16	1.0	ACSP	3.5	1.807	2.550

(1) ACSP: Aluminized Corrugated Steel Pipe

(2) All culverts are helical profile 68 x 13mm.

3. VARIOUS CALCULATIONS

A. Return period

- T c = 25 years.

  T c: Concentration time.

B. Calculation of peak flow

- Rational method
- Q = CIA / 360

  Q: peak flow (m^3/s)

  C: Coefficient of runoff

  A: area of watershed (ha).

  I: intensity of rainfall

C. Coefficient of runoff

- C = 1.0 (frozen or saturated soil condition)

D. Calculation of the concentration time

- Tc = 3.26 (1.1 – C) L0,5 /S0,33 C < 0.4
- Tc = 0,057 $L_c/(S_c0{,}2 \times A_b^{0,1})$ C $\geq$ 0.4

E. Calculation of the rainfall intensity

$$\mathbf{I_{(T,\,tc)} = A / (t_c + B)^C}$$

I: rainfall intensity (mm/h)

A, B, C: parameter of the IDF curve (recurrence T)

$\mathbf{t_c}$: concentration time

T : rainfall recurrence

F. Parameter of the IDF curve

SNC QUEBEC - BAKER LAKE IDF CURVE WITH SWMHYMO			
RETURN PERIOD	PARAMETERS		
	A=	B=	C=
2	51	1.5	0.512
5	75	1.5	0.516
10	76	1.5	0.49
25	100	1.5	0.509
50	116	1.5	0.507
100	118	1.5	0.494

4. LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Agnico Eagle Mines Ltd., and their agents, SNC-Lavalin Stavibel does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Agnico Eagle Mines Ltd. or for any Project other than the proposed development at the subject site, Any such unauthorized use of this report is at the sole risk of the user, Use of this report is subject to the terms and conditions stated in SNC-Lavalin Stavibel's Services Agreement.

5. FIGURES AND DRAWINGS

The following plans and drawings were prepared for the design of the structures (shown in Appendix D).

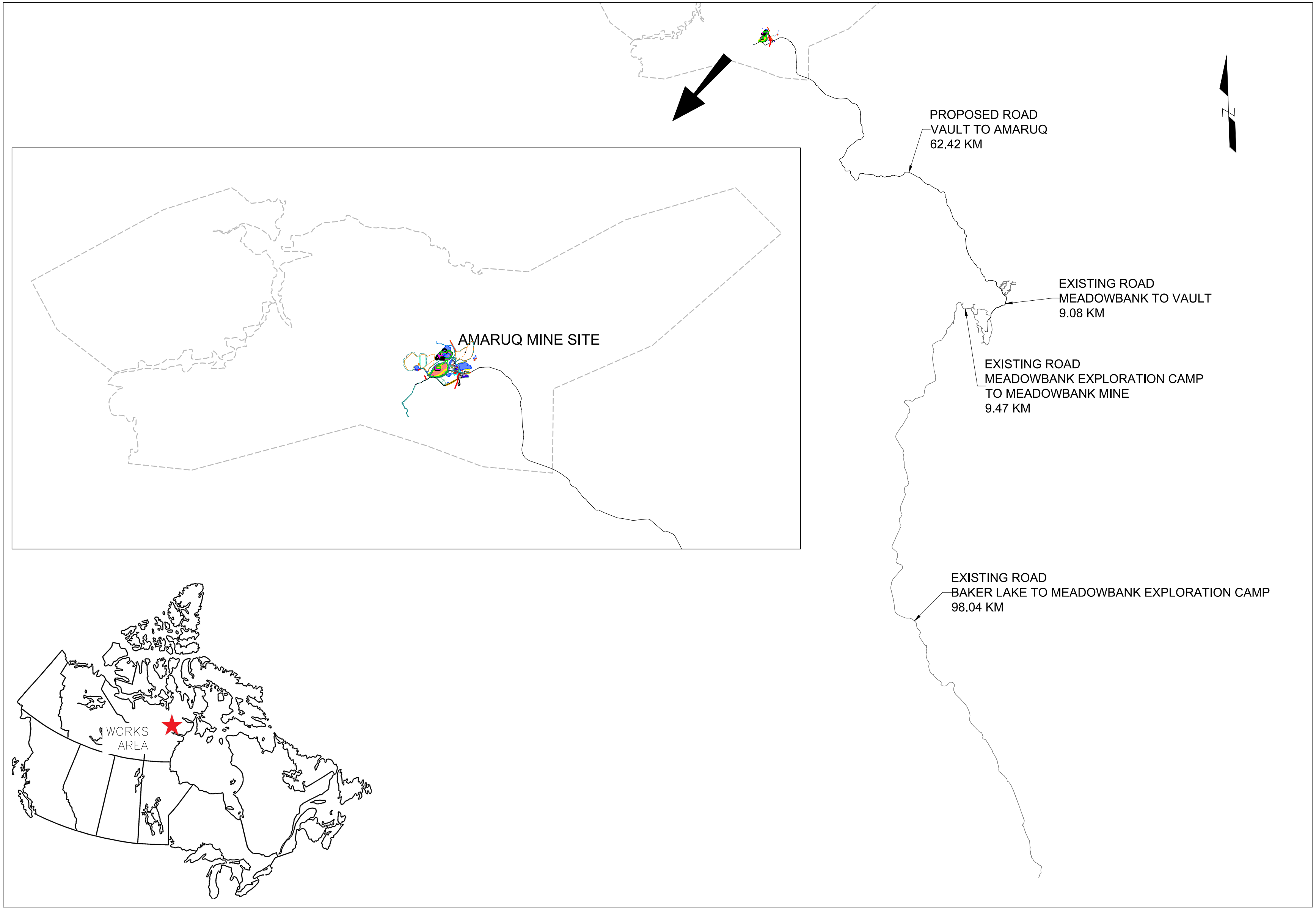
- **61-417-230-212_R0** : PLAN & PROFILE / SERVICE ROAD TO NEMO LAKE / 0+000 @ 0+700
- **61-417-230-213_R0** : PLAN & PROFILE / SERVICE ROAD TO NEMO LAKE / 0+700 @ 1+400
- **61-417-230-214_R0** : PLAN & PROFILE / SERVICE ROAD TO NEMO LAKE / 1+400 @ 1+800
- **61-417-230-215_R1** : PLAN & PROFILE / ROAD TO WHALE TAIL DIKE / 0+000 @ 0+700
- **61-417-230-216_R0** : PLAN & PROFILE / ROAD TO WHALE TAIL DIKE / 0+700 @ 1+100
- **61-417-230-226_R2** : CROSS SECTION AND DETAILS
- **61-417-230-251_R0** : PLAN & PROFILE / ROAD #22 – EXPLOSIVE ROAD / 0+000 @ 0+600
- **61-417-230-252_R0** : PLAN & PROFILE / ROAD #22 – EXPLOSIVE ROAD / 0+600 @ 1+200
- **61-417-230-253_R0** : PLAN & PROFILE / ROAD #22 – EXPLOSIVE ROAD / 1+200 @ 1+800
- **61-417-230-254_R0** : PLAN & PROFILE / ROAD #22 AND #24 – SOUTH WHALE TAIL DIVERSION CHANNEL / 1+800 @ 2+400

APPENDIX A

General project location plan

NO. DESSIN / DRAWING NO. 61-000-210-200_R0

FORMAT ARCHD



PLAN CLÉ / KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2018-06-22

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-06-22	ISSUED FOR CONSTRUCTION	NBG	GM	DL

REVISIONS

DIGITALLY SIGNED DOCUMENT

REGISTERED PROFESSIONAL ENGINEER
G. MARCOTTE
LICENSEE
NT/NU
2018-06-27

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION
WHALE TAIL PROJECT (AMARUQ)
000 – GENERAL
210 – GENERAL ARRANGEMENT
LOCALIZATION MAP
WORKS AREA

DESSINÉ PAR / DRAWN BY	NICOLAS BORDELEAU G.	DATE	2018-06-22
VERIFIÉ PAR / CHECKED BY	GILLE MARCOTTES		2018-06-22
APPROUVÉ PAR / APPROVED BY	GILLE MARCOTTES		2018-06-22
ÉCHELLE / SCALE	N.T.S.	DATE	2018-06-20

NO. DESSIN / DRAWING NO. 61-000-210-200

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6115	0	1 / 1

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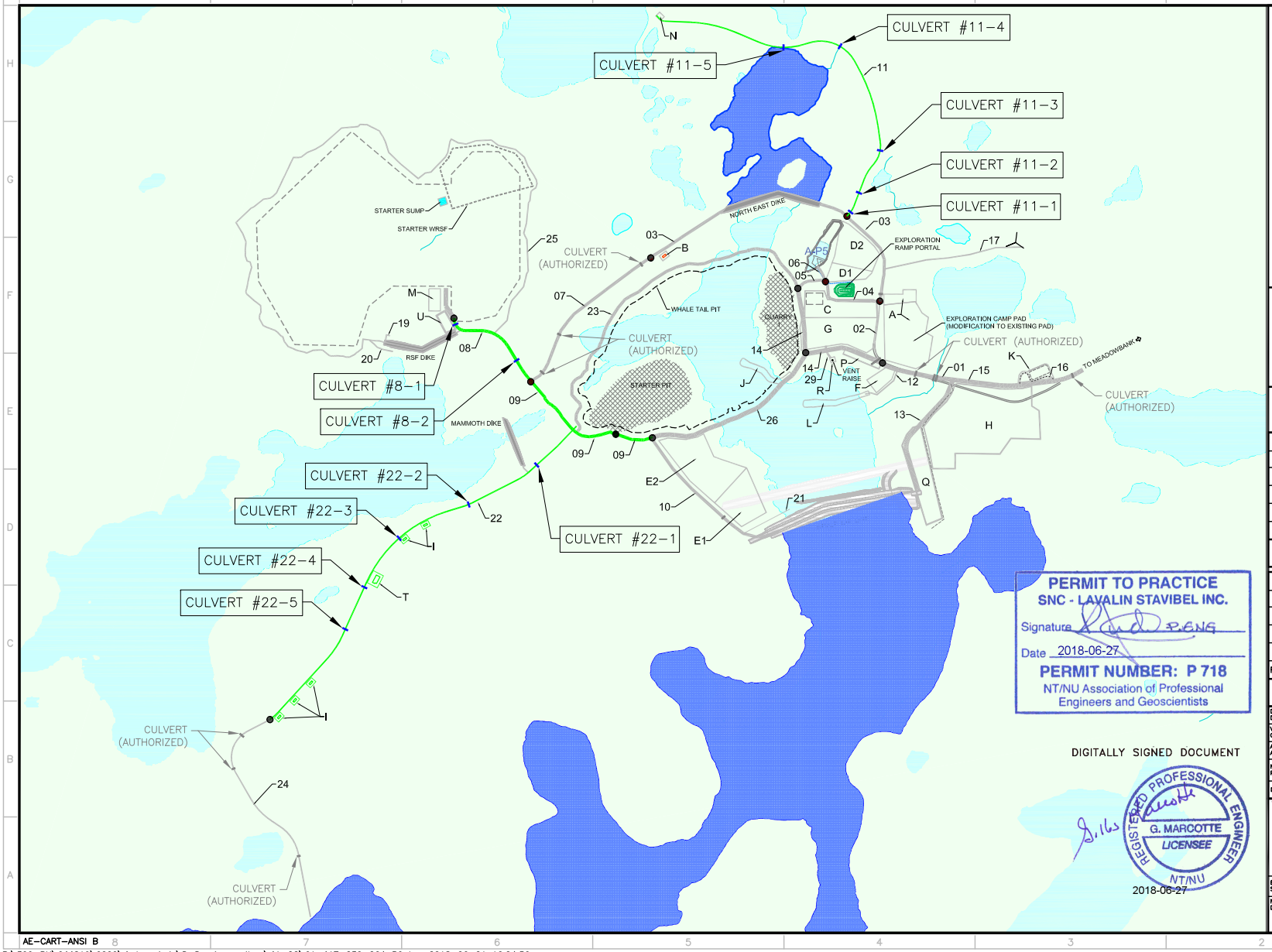
APPENDIX B

Plan general view – Layout of proposed culverts on roads #8, 9, 11 & 22

NO. DESSIN
DRAWING NO. 61-417-230-264

FORMAT ANSI B-11x17



NOTES:

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-06-22

AGNICO EAGLE

SNC·LAVALIN

PROJECT NO.: 644819

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TITRE / TITLE	# DWG

DESSINS EN RÉFÉRENCE/REFERENCE DRAWINGS

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature P.ENG
Date 2018-06-27
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

DIGITALLY SIGNED DOCUMENT

REGISTERED PROFESSIONAL ENGINEER
G. MARCOTTE
LICENSEE
NT/NU
2018-06-27

REV	DESCRIPTION	DATE	PAR BY
0	ISSUED FOR CONSTRUCTION	2018-06-22	NBG

REVISIONS

DESSINÉ PAR DRAWN BY	NICOLAS BORDELEAU G.	DATE 2018-06-22
VÉRIFIÉ PAR CHECKED BY	GILLES MARCOTTE	2018-06-18
APPROUVÉ PAR APPROVED BY	GILLES MARCOTTE	2018-06-22
No. PROJET PROJECT NO.	6115	
DATE	2018-06-18	

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION
AMARUQ – INFRASTRUCTURE ENGINEERING PROJECT
230 – GENERAL EARTH WORKS
LAYOUT OF PROPOSED CULVERTS
ROADS #8, 9, 11 & 22 – LOCATIONS

ÉCHELLE/ SCALE	NTS	FICHIER FILE	61-417-230-264_R0.DWG
No. DESSIN/ DRAWING NO.	61-417-230-264	REVISION 0	FEUILLE/SHT 1 / 1

AE-CART-ANSI B

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APPENDIX C

Culverts installation (61-417-230-226)

NO. DESSIN / DRAWING NO. 644819-61-417-230-CIVIL_R0MOD2017-09-12

FORMAT ARCHD

SNC·LAVALIN

AMARUQ INFRASTRUCTURE ENGINEERING PROJECT

List of materials (culverts)

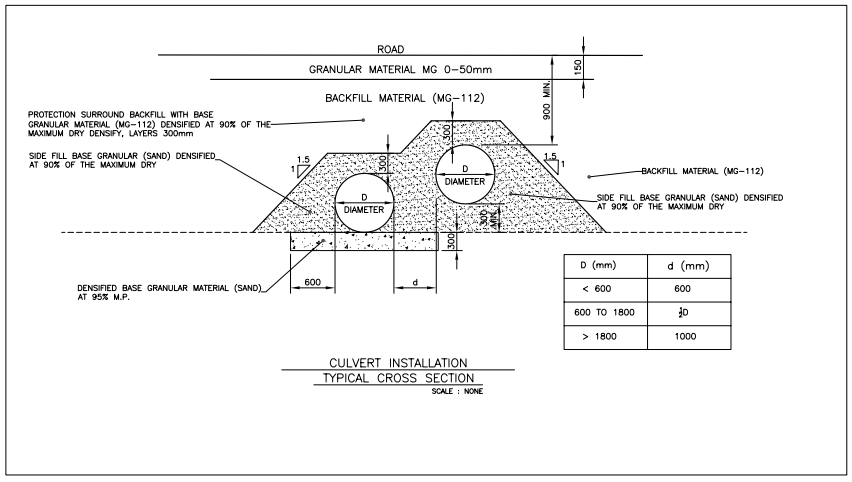
AGNICO EAGLE

Date: 2017-07-10

LOCALISATION ROAD	STATION (m)	Fonction	ID #	Ø (mm)	Total Length (m)	Material Type	Material Gage (mm)	COMMENTS
ACCESS	0+239	Culvert	1	700	18	ACSP	2,8	
ACCESS	0+618	Culvert	1	1200	18	ACSP	3,5	SNC-Québec, East Channel
ACCESS	0+618	Culvert	2	1200	18	ACSP	3,5	SNC-Québec, East Channel
ACCESS	0+705	Culvert	1	900	18	ACSP	3,5	
ACCESS	0+892	Culvert	1	600	28	ACSP	2,8	
NEMO	0+026	Culvert	1	600	18	ACSP	2,8	
NEMO	0+123	Culvert	1	1200	19	ACSP	3,5	
NEMO	0+123	Culvert	2	900	17	ACSP	3,5	
NEMO	0+123	Culvert	3	900	17	ACSP	3,5	
NEMO	0+344	Culvert	1	600	17	ACSP	2,8	
NEMO	0+876	Culvert	1	1200	20.5	ACSP	3,5	
NEMO	0+876	Culvert	2	1200	20.5	ACSP	3,5	
NEMO	0+876	Culvert	3	900	18	ACSP	3,5	
NEMO	0+876	Culvert	4	900	18	ACSP	3,5	
NEMO	1+146	Culvert	1	900	18	ACSP	3,5	SNC-Québec
NEMO	1+146	Culvert	2	900	18	ACSP	3,5	SNC-Québec
NEMO	1+146	Culvert	3	900	18	ACSP	3,5	SNC-Québec
WRSF	0+240	Culvert	1	600	21	ACSP	2,8	Culvert for service pipelines
WRSF	0+240	Culvert	2	600	21	ACSP	2,8	Culvert for service pipelines
WRSF	10+227	Culvert	1	1200	26,5	ACSP	3,5	
WRSF	10+227	Culvert	2	900	25	ACSP	3,5	
WRSF	10+227	Culvert	3	900	24,5	ACSP	3,5	
WRSF	10+505	Culvert	1	1400	30	ACSP	4,2	
WRSF	10+505	Culvert	2	1200	28	ACSP	3,5	
WRSF	10+505	Culvert	3	1200	26	ACSP	3,5	
WRSF	1+816	Culvert	1	600	23.5	ACSP	2,8	
WRSF	2+315	Culvert	1	900	24	ACSP	3,5	SNC-Québec, North Channel
WRSF	2+512	Culvert	1	600	26	ACSP	2,8	
WHALE TAIL	0+030	Culvert	1	900	23	ACSP	3,5	
WHALE TAIL	0+385	Culvert	1	600	22.5	ACSP	2,8	
WHALE TAIL	0+565	Culvert	1	900	26.5	ACSP	3,5	SNC-Québec, North Channel
WHALE TAIL	0+565	Culvert	2	900	26.5	ACSP	3,5	SNC-Québec, North Channel
RAMP	20+300	Culvert	1	600	28	ACSP	2,8	Culvert for access to the pad

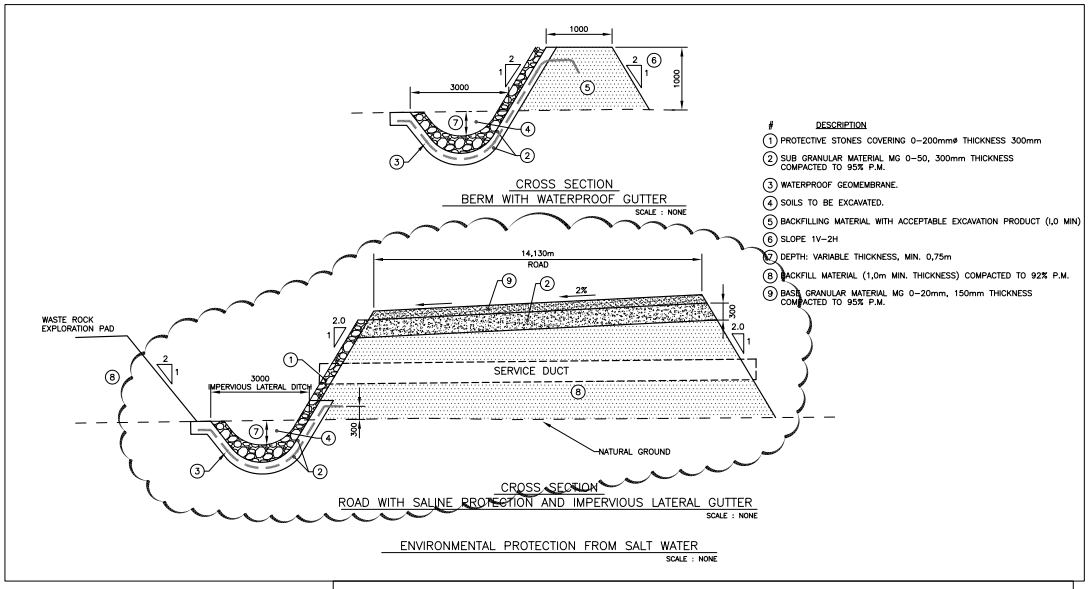
(1) ACSP: Aluminized Corrugated Steel Pipe
(2) These lengths are associated with road widths built in 2017
(3) All hardware must be provided, if required

LIST OF MATERIALS

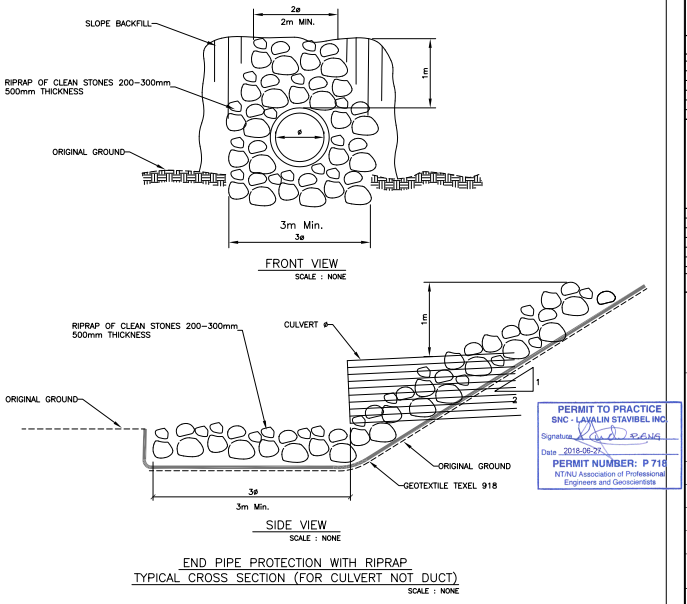


D (mm)	d (mm)
< 600	600
600 TO 1800	½D
> 1800	1000

CULVERT INSTALLATION
TYPICAL CROSS SECTION
SCALE : NONE

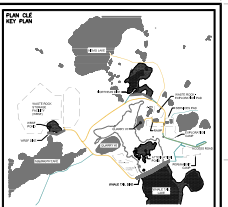


#	DESCRIPTION
1	PROTECTIVE STONES COVERING 0-200mmø THICKNESS 300mm
2	SUB GRANULAR MATERIAL MG 0-50, 300mm THICKNESS COMPACTED TO 95% P.M.
3	WATERPROOF GEOMEMBRANE.
4	SOILS TO BE EXCAVATED.
5	BACKFILLING MATERIAL WITH ACCEPTABLE EXCAVATION PRODUCT (I,0 MIN)
6	SLOPE 1V-2H
7	DEPTH: VARIABLE THICKNESS, MIN. 0,75m
8	BACKFILL MATERIAL (1,0m MIN. THICKNESS) COMPACTED TO 92% P.M.
9	BASE GRANULAR MATERIAL MG 0-20mm, 150mm THICKNESS COMPACTED TO 95% P.M.



PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-06-27
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

PLAN CLÉ / KEY PLAN



CONSTRUCTION ROADS 2017:
CONSTRUCTION ROADS 2018:

NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2017-09-15
AGNICO EAGLE

SNC·LAVALIN

SNC-Lavalin Stavibel Inc.
130, rue Garnier Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tel.: 819 764-5181 Fax: 819 797-2109
www.snclavalin.com

Project # : 644819-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
2	2017-09-15	ISSUED FOR CONSTRUCTION	Y.B.	G.M.	E.T.
1	2017-09-08	ISSUED FOR CONSTRUCTION	Y.B.	G.M.	E.T.
0	2017-08-06	ISSUED FOR CONSTRUCTION	D.D.	G.M.	E.T.
C	2017-07-07	ISSUED FOR COMMENTS	Y.B.	G.M.	E.T.
B	2017-06-16	ISSUED FOR COMMENTS	Y.B.	G.M.	E.T.

REVISIONS

DIGITALLY SIGNED DOCUMENT
G. MARCOTTE LICENSEE
NT/NU
2018-06-27

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
417 – ROADS, YARDS, FENCES AND OTHER
230 – GENERAL EARTH WORKS
CROSS SECTION AND DETAILS

DESSINÉ PAR / DRAWN BY	YVES BOISVERT, TECH.	DATE 2017-06-15
VÉRIFIÉ PAR / CHECKED BY	GILLES MARCOTTE, ING.	2017-06-15
APPROUVÉ PAR / APPROVED BY	GILLES MARCOTTE, ING.	2017-06-15
ÉCHELLE / SCALE	.	DATE 2017-06-15

NO. DESSIN / DRAWING NO. 61-417-230-226

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6115 / 644819	2	1 / 1

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P:\300-RN\644819\0000\4-Ingenierie\D-Dessins maitres\41-GC\644819-61-417-230-CIVIL_R0mod2017-09-12.dwg-2013-02-19 14:03:29

FILE NO. 644819-61-417-230-CIVIL_R0mod2017-09-12.dwg

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File: 2AM-WTP1826/TR/D1, 2

September 4, 2018

Manon Turmel
Environmental Compliance Counselor
Agnico Eagle Mines Limited
Nunavut Office – 11600 rue Louis-Bisson
Mirabel, QC J7N 1G9
E-mail: Manon.Turmel@agnicoeagle.com

Jamie Quesnel
Environmental Superintendent - Nunavut
Agnico Eagle Mines Limited
145, King Street East Suite 400,
Toronto, ON M5C 2Y7
E-mail: Jamie.Quesnel@agnicoeagle.com

Subject: Design Report for Culverts (roads 8, 9, 11 and 22); Type "A" Water Licence 2AM-WTP1826, Whale Tail Pit Project; Agnico Eagle Mines Limited

Dear Ms. Manon and Mr. Quesnel:

The Nunavut Water Board ("NWB") received from Agnico Eagle Mines Limited (Agnico Eagle or Licensee) on July 13, 2018, the document entitled: "Whale Tail Pit Project Design Report for Culverts (roads 8, 9, 11 and 22) (Report) as a requirement of Part D, Item 1 of Water Licence 2AM-WTP1826 (Licence) that was approved by the Minister of Crown-Indigenous Relations Canada on July 11, 2018. The Report was prepared by SNC-Lavalin Stavibel Inc. and dated June 27, 2018.

As indicated by Agnico Eagle the overall objective of the water management strategy of Whale Tail Pit Project is to develop a practical and feasible site-wide water management plan to minimize the potential negative impacts of mining development on the surrounding environment including habitats for fish and wildlife, and to facilitate mine operation and long-term closure and reclamation of the mine site. To attain this objective, culverts are used to control and divert runoff underneath the road and new facilities. All culverts (#8, 9, 11 & 22) are required at the lower point of their watershed to allow runoff flow by gravity under the haul road. *The proposed culverts will be in service for up to 15 years. All proposed culverts are Aluminized Corrugated Steel Pipe (ACSP) TYPE 2, with a profile of 68 x 13mm (helical) and a minimum size of 600mm.*

On July 13, 2018, the Report was distributed for interested parties' review with a deadline for submissions set at August 3, 2018. On August 3, 2018, comments were submitted by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC). On August 15, 2018, Agnico Eagle provided responses to comments. On September 4, 2018, CIRNAC informed the NWB that they are satisfied with Agnico Eagle responses.

The Board is satisfied that the Report addresses the requirements of Part D, Item 2 of Licence 2AM-WTP1826, and has accepted the Design Report for Culverts (roads 8, 9, 11 and 22), as required by Part D, Item 1 of Licence. The Licensee is advised that the Board's "acceptance" of

this document is a verification that the proposed activity is consistent with the existing terms and conditions of the Licence and more specifically with the Part D, Item 2, and may proceed in accordance with the Report and drawings provided. It should be noted that the Board's "acceptance" is NOT intended or offered as any representation regarding the suitability of the plans nor third party verification of the design, construction, planning or engineering discussed in the document.

Should you have any questions, please feel free to contact the undersigned at (867) 360-6338 or karen.kharatyan@nwb-oen.ca at your earliest convenience.

Regards,

Karén Kharatyan
Director of Technical Services

cc: Distribution List - Meadowbank