POND INLET MARINE INFRASTRUCTURE PROJECT

NUNAVUT WATER BOARD

ANNUAL REPORT 2019

WATER LICENCE:

8BW-PIM14821

CONTRACT NUMBER:	15255-00331-07
PROJECT NUMBER:	15255-00331
TA PROJECT NUMBER:	21807
DOCUMENT NUMBER:	TA_NWB_POND INLET MARINE INFRA PROJECT_ANNUAL_REPORT_2019
SUBMITTED BY:	TOWER ARCTIC LTD.
SUBMITTED TO:	NUNAVUT WATER BOARD
DATE SUBMITTED:	MARCH 31, 2020

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1. PURPOSE OF THE REPORT

The Hamlet of Pond Inlet is a northern community of Baffin Island, on the shore of Eclipse Sound. The Government of Nunavut (GN) has initiated the construction of a marine infrastructure project in Pond Inlet, Nunavut. The Marine Infrastructure Project in Pond Inlet is developed to improve the safety and functionality of the marine services. The project included a new Small Craft Harbour (SCH), the development of a new quarry and the construction of a haul road.

The GN has mandated Tower Arctic (TA) as the general contractor for the construction operations. The equipment mobilization by sealift took place in 2018 and 2019 during the open-water season. As requested by the GN, TA started the SCH construction in September 2018 and the construction activities were scheduled until the end of November 2020. According to the contractual requirements, TA was responsible to obtain the Water Licence for the haul road construction. In July 23, 2018, Water Licence No. 8BW-PIM1821 was issued by the NWB and the licence authorized the installation of the necessary culverts to cross the encountered watercourses.

2. " POND INLET MARINE INFRASTRUCTURE HAUL ROAD PROJECT "

2.1 BRIEF DESCRIPTION

A seven (7) kilometres road is necessary to haul over 200,000 tonnes of blasted rock from the Pond Inlet Municipal Quarry "Quarry" to the Small Craft Harbour to be built. Seven (7) culverts were installed in 2018 to cross the encountered watercourses. Theses culverts have diameters ranging from 600 mm to 1,200 mm. The culverts sizes were determined on site by the engineer according to the width of the crossed watercourses. Refer to **Table 2-1** and **Figure 2-1** to see the culverts location and sizes.

At the end of the SCH construction phase, the Haul Road will be blocked by TA using a fill berm with the objective to prevent community vehicles to enter the zone. The road will be handed over to the Municipality of Pond Inlet in useful condition and without any potholes.

FIGURE 2-1 – MAP OF THE HAUL ROAD AND CULVERTS LOCATION

TABLE 2-1 – HAUL ROAD CULVERTS LOCATION AND DIAMETER

Culvert Identification	*Latitude*	*Longitude*	*Culvert Diameter (mm)*
CS01	72°41'25.26"N	77°52'52.44"W	900
CS02	72°41'22.52"N	77°53'8.12"W	900
CS03	72°41'4.32"N	77°55'18.96"W	600
CS04	72°40'55.74"N	77°55'43.05"W	1200
CS05	72°40'49.61"N	77°56'13.95"W	600
CS06	72°40'37.00"N	77°58'40.61"W	600
CS07	72°41'38.15"N	77°58'57.96"W	1200

2.2 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

A Construction Environmental Management Plan (CEMP) was developed for the Pond Inlet Marine Infrastructure Project by TA to outline the implemented measures to avoid, manage or mitigate the impact of the marine based and land-based construction activities. During the project construction, TA implement these measures in the course of the development of the Quarry, the construction of the Haul Road and the construction of the new SCH.

2.3 ENVIRONMENTAL TEAM

The environmental team for 2019 counted two (2) environmental monitors (EM) and two (2) environmental advisors. The environmental team was also supported by delegates who were engineers and local workers.

2.3.1 Environmental Monitor and Delegate

Olivier Bédard-Richard was the EM who monitored the construction activities. During the 2019 season, an on-site EM was present during construction in order to monitor the activities which could potentially affect the fishes and the fish habitat. The EM present on site during the 2019 season was David Lauzon.

Delegates were also present on site to assist the EM on the environmental compliance. Two (2) engineers were the delegates of the EM during the 2019 season.

2.3.2 Environmental Advisor

Environmental advisors were available to assist the EM with contentious issues, together with the assistance of specialists when needed. The role of the advisors was also to adjust the monitoring tools if necessary, to ensure that the environmental monitoring would be efficient and covered the commitments of the projects.

2.4 PROJECT AUTHORIZATION

The GN received an authorization from the Nunavut Impact Review Board to construct the Haul Road. TA obtained an authorization from the NWB to install the culverts to cross the watercourses.

2.4.1 Regulatory Agency Inspection

On September 26, 2019, Fisheries and Oceans Canada (DFO) and the GN environmental inspector inspected the Haul Road's water crossings to confirm that the watercourses were fish habitats or none. It was concluded by the DFO and the GN environmental inspector that the watercourses are none fish habitat. During the watercourse's characterization, the DFO and the GN environmental inspector observed a sediment runoff discharge at water crossings CS03 and CS04. According to the observation, the runoffs were from the Haul Road because the sediments and the erosion control in place were not

according to the interpretation efficient enough. **Section 4.2.1** shows the improvements that TA established after the observation was reported to TA.

3. HAUL ROAD CONSTRUCTION SUMMARY

In the first season, the Haul Road construction operations were from August 2018 to September 2018. The road was used to haul rock materials from September 2018 to October 2018. **Table 3-1** provides the date when the activities started and finished in 2018 and the **Appendix A** presents photographic records before, during and after the culvert's installations in 2018.

For the second season, the Haul Road was maintained and used from September 2019 to November 2019. Refer to **Table 3-2** to consult the starting and finishing dates of the construction activities in 2019 and refer to **Appendix B** which presents the photographic records after the culvert's installations in 2019.

TABLE 3-1 – 2018 CONSTRUCTION ACTIVITIES LIMITED TO HAUL ROAD

Construction Activity	*Date activity started*	*Date activity finished*	*Completion Status*
Contractor mobilization	August 5, 2018	September 15, 2018	± 75 %
Quarry development	August 11, 2018	October 18, 2018	± 15 %
Haul road construction	August 11, 2018	September 23, 2018	± 100 %
Haul road maintenance	September 24, 2018	October 18, 2018	Work in progress
Rock hauling	September 24, 2018	October 18, 2018	± 20 %
Winterizing	October 18, 2018	October 20, 2018	± 25 %

TABLE 3-2 – 2019 CONSTRUCTION ACTIVITIES

Construction Activity	*Date activity started*	*Date activity finished*	*Completion Status*
Contractor mobilization	September 7, 2019	October 4, 2019	± 100 %
Quarry development	September 21, 2019	October 30, 2019	± 50 %
Haul road maintenance	September 21, 2019	October 30, 2019	Work in progress
Rock hauling	September 24, 2019	October 30, 2019	± 50 %
Winterizing	October 30, 2019	November 12, 2019	± 50 %

According to the SCH project schedule, the Haul Road should be closed by the end of the 2020 construction season. At this point the SCH project will be completed and TA will be fully demobilized.

TABLE 3-3 – 2020 PLANNED CONSTRUCTION ACTIVITIES

Construction Activity	*Date activity start*	*Date activity finish*
Quarry development	May 15, 2020	October 15, 2020
Haul Road maintenance	May 15, 2020	October 15, 2020
Rock hauling	May 15, 2020	October 15, 2020
Haul Road closure	October 15, 2020	October 15, 2020
Contractor demobilization	October 15, 2020	October 30, 2020

4. ENVIRONMENTAL MONITORING

This section presents the environmental monitoring conducted by TA for the 2019 season.

4.1 MONITORING PLAN

An updated Monitoring Plan (MP) to describe how TA implemented the monitoring activities was produced before the 2019 season. The water crossing monitoring plan has been updated following the receipt on October 11, 2019, of the NWB Technical Review of the 2018 Annual Report. **Appendix C** provides the NWB Technical Review. On October 28, a conference call occurred between the NWB, TA, the GN and the GN consultants (Advisian and SRM Consulting LTD.) to discuss the monitoring method. During this meeting TA and NWB agreed on the stability condition and the runoff discharge monitoring methods and TA adjusted the monitoring methods accordingly. These updated monitoring methods are included in **Appendix D**.

4.2 WATER CROSSING STABILITY

For the 2018 and 2019 construction seasons, water crossing stability was monitored through visual observation during site inspections conducted by the EM and/or a delegate. These inspections are required to monitor signs of erosion or slope collapses which can potentially result in sediment runoff in a watercourse and cause a water quality deterioration.

In 2018, the water crossings were stabled, and signs of erosion or slope collapse were not apparent. Site engineers from TA conducted the monitoring in 2018 under the supervision of the EM. Refer to **Appendix A** to consult pictures from the inspections. During the 2019 construction season, the water crossing stability condition was inspected by TA's site engineers, local workers and EM. The **Appendix B** provides pictures from the 2019 inspections.

4.3 SEDIMENT AND EROSION CONTROL MEASURES

Following the observed runoff of September 2019, sediment and erosion control measures have been incremented to prevent even more road runoff to enter in the watercourses. At water crossing CS03 and CS04, silt fences and settling ponds were installed to stop and guide the potential runoff through the vegetation and not directly in the watercourse. In addition, TA has trimed some slopes along the Haul Road to lower erosion and slope collapse by placing coarse aggregates on slopes and settling ponds in ditches to control the water flow in certain ditches with steep slopes. **Appendix E** provides examples of sediment and erosion control measures improvement.

4.4 WATER QUALITY

The water quality monitoring was conducted during the 2018 and 2019 construction season. The TA's EM and/or a delegate did site observations to confirm that the water quality of the watercourses was impacted to the minimum by the Haul Road constructions. According to the observations, no sign of water impacted by the Haul Road construction was reported.

For the September 2019 observed runoff, no water sampling was collected to monitor if there was actual none compliance to monitor the exceeding or not of the effluent quality limits established in the water license.

4.5 UNAUTHORIZED DISCHARGE IN WATERCOURSE

No unauthorized discharge was observed since the beginning of the project.

4.6 WATER USE

The water used for the accommodation of the workforce was provided directly by the Municipality of Pond Inlet. No water has been pumped from or in a watercourse during the construction of the Haul Road.

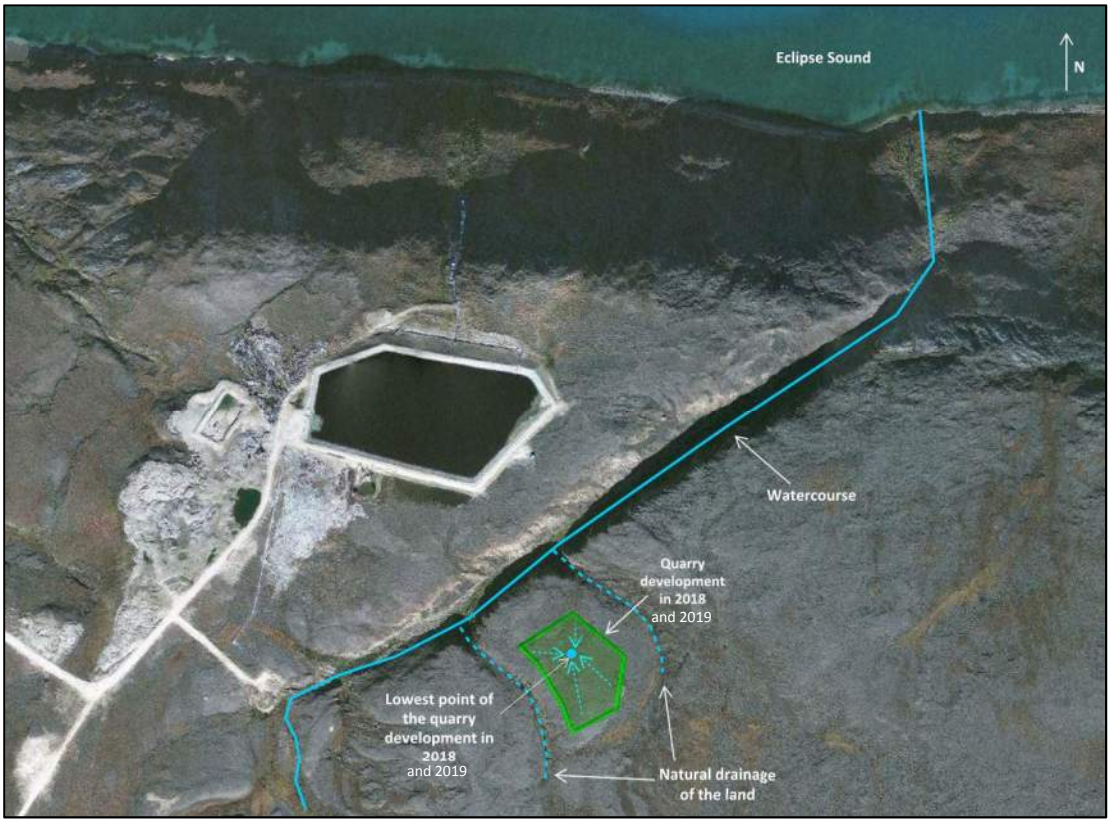
4.7 WASTE MANAGEMENT

The non-hazardous waste was temporarily stored at the TA garage or directly shipped to the municipal landfill. The hazardous waste was stored at the TA garage and will be shipped by sealift at the demobilization to a proper disposal facility

4.8 RUNOFF DISCHARGE FROM QUARRY

Since the beginning of the quarry development, no runoff discharge from the Quarry was observed. The quarry runoff flowed to the lowest point of the quarry as it is concave, therefor no runoff enters the natural drainage ditches shown on **Figure 4-1**. The laboratory acid rock predictions are provided in the 2018 Annual Report.

FIGURE 4-1 – MAP OF THE QUARRY DEVELOPMENT IN 2018 AND 2019



4.9 SPILL PREVENTION AND REPORTING

Training on spill prevention and a response plan were included in the safety presentation and consolidated through the periodic toolbox meetings. Hazardous material were stored in TA's garage area or in the explosive storage zone. Daily inspection of the vehicles and the equipment was done by the equipment operators. If a daily inspection revealed a defect, its repair was done by mechanics prior to the operation. Periodically maintenances were also done by on site mechanics.

No fuel storage is authorized or has been observed near the watercourses. Fueling land-based equipment was executed by the same qualified workers that operated the fuel truck. A spill kit with extra absorbent and a drip tray were available in the fuel truck. A fueling procedure was in place and the workers were trained to do so. Hoses and nozzles used were in good condition and no leakage was observed.

Small spill kits were available in the vehicles and on the equipment. Barrel spill kits were available on the construction sites. In 2019, one (1) spill occurred at the Quarry, that was fully recovered without any leakage in any watercourse.

5. CLOSURE

Expecting this report is to your entire satisfaction and provides the required information about the 2019 construction season.

Report prepared by:

TOWER ARCTIC LTD.

Olivier Bédard-Richard, Environmental Monitor

APPENDIX A :
2018 CULVERTS
PHOTOGRAPHIC RECORD

2018-08-17 CS01 DOWNSTREAM AFTER INSTALLATION

2018-08-12 CS02 BEFORE INSTALLATION

2018-08-18 CS02 UPSTREAM DURING INSTALLATION

2018-08-19 CS02 UPSTREAM AFTER INSTALLATION

2018-08-13 CS04 BEFORE INSTALLATION

2018-08-31 CS04 UPSTREAM DURING INSTALLATION

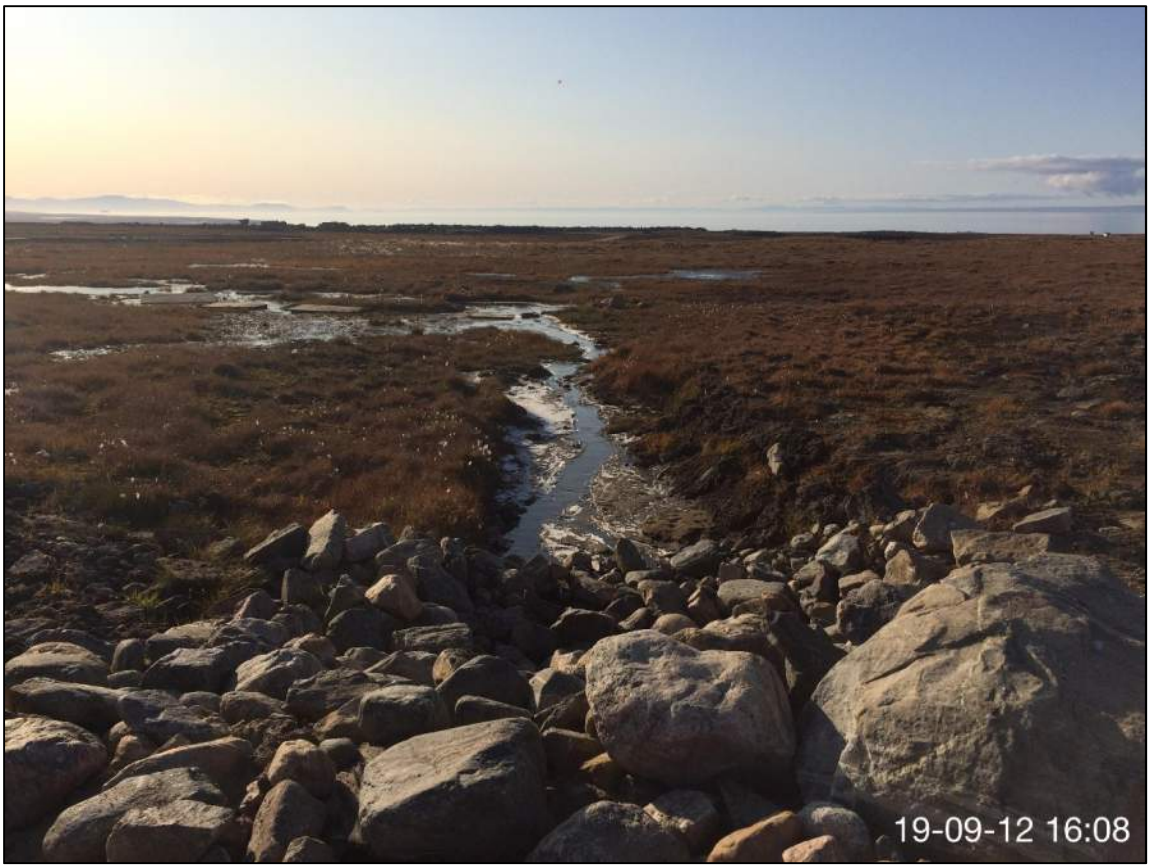
2018-09-02 CS05 UPSTREAM AFTER INSTALLATION

2018-09-30 CS06 DOWNSTREAM AFTER INSTALLATION

2018-08-17 CS07 BEFORE INSTALLATION

APPENDIX B :
2019 CULVERTS
PHOTOGRAPHIC RECORD

CS01 UPSTREAM AFTER INSTALLATION



CS01 DOWNSTREAM AFTER INSTALLATION

2019-10-02 CS02 UPSTREAM AFTER INSTALLATION

2019-07-16 CS03 UPSTREAM AFTER INSTALLATION

2019-09-12 CS03 DOWNSTREAM AFTER INSTALLATION

2019-07-16 CS04 UPSTREAM AFTER INSTALLATION

2019-09-12 CS04 UPSTREAM AFTER INSTALLATION

2019-09-12 CS04 DOWNSTREAM AFTER INSTALLATION

2019-07-16 CS05 DOWNSTREAM AFTER INSTALLATION

2019-09-12 CS05 UPSTREAM AFTER INSTALLATION

2019-07-16 CS06 UPSTREAM AFTER INSTALLATION

2019-09-12 CS07 UPSTREAM AFTER INSTALLATION

2019-09-12 CS07 DOWNSTREAM AFTER INSTALLATION

APPENDIX C :
2018 ANNUAL REPORT
TECHNICAL REVIEW BY NWB

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File No.: **8BW-PIM1821**

October 11, 2019

Simon-Pier Laberge
Tower Arctic LTD.
1502 Federal Road
P.O Box 717
Iqaluit, NU, X0A 0H0
Email: info@towerarctic.ca

RE: NWB Technical Review of 2018 Annual Report for the Pond Inlet Marine Infrastructure Project; Water Licence No. 8BW-PIM1821

Dear Mr. Laberge:

The Nunavut Water Board (NWB or Board) has completed its technical review of the 2018 Annual Report (Annual Report) for Licence 8BW-PIM1821 (Licence), that was submitted by Tower Arctic Ltd. (Tower Arctic or Licensee) on March 27, 2019, and provided to the Qikiqtani email distribution list for information. No comments have been received to date.

The technical review of the Annual Report found that the information generally addresses Licence requirements, and the Board praises the Licensee on their efforts to minimize erosion and sediment from entering into waterways; however important information related to water quality monitoring was absent form the Annual Report, as outlined below.

Construction and Operations

1. PART E, Item 6, of the Licence states:

   All surface runoff or discharges impacted by construction activities associated with the Project, where flow may directly or indirectly enter Water, shall not exceed the following Effluent quality limits:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
Total Suspended Solids (TSS)	50.0	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

This would include both passive surface runoff and active discharges, associated with construction activities. However no water quality monitoring data was provided in the Annual Report, and there was no indication if water quality monitoring was conducted even though the annual Report indicates that runoff from the road occurred with the potential to enter a Water.

Monitoring

2. PART I, Item 2, of the License states:

   The Licensee shall obtain a digital photographic record of the water crossing before, during, and after the completion of construction activities.

   The annual report did not provide photographic records of water crossings.

3. PART I, Item 4, of the Licence states:

   The Licensee shall, during periods of flow, conduct water quality testing immediately upstream and downstream of the water crossings, any significant water seeps in contact with the road and any significant seeps originating from borrow pits or rock quarries prior to construction, weekly during the construction and upon completion.

   The annual report did not contain any water quality data, nor was there any indication that water quality monitoring was conducted.

In the Annual report, Tower Arctic indicated that runoff from the road was occurring, and that settling ponds were constructed to help mitigate this. Thus, Licence conditions warranted the monitoring of water quality in the project area. The Board notes that discharge criteria imposed under PART E, Item 6, are limited and can be conducted on site with field meters for pH and Turbidity; and turbidity can be correlated to TSS if a project TSS/Turbidity curve is generated.

The Board Recommends that for all future works that Tower Arctic conduct water quality monitoring in accordance with Licence conditions, compare it to discharge criteria, and provide this information in all future annual reports.

The Board also recommends the Tower Arctic provide photographs of all water crossings in all future annual reports, in accordance with Licence conditions.

Finally, the Board recommends that the Licensee provide a brief summary of any/all work done to address any concerns identified by regulatory agencies or the public during the reporting year.

Thank you for taking the time to consider these comments for future reporting. Please provide, this information in all future Annual Reports, and if for some reason data or information is not

available, include a discussion indicating:

- What information is missing;
- Why it was not provided; and
- Steps being made to provide it in the future.

Should you have any questions, please feel free to contact me, Derek Donald, at (867) 360-6338 (extension 32), at your earliest convenience.

Sincerely,

Derek Donald
Nunavut Water Board,
Technical Advisor

Cc: Distribution List – Qikiqtani

Olivier Bédard-Richard

De: Derek Donald <derek.donald@nwb-oen.ca>
Envoyé: 28 octobre 2019 19:16
À: Olivier Bédard-Richard; cmougeot@srmconsult.com; David Lauzon; Currie, Paul; Simon Goulet; Crompton,Robert (Vancouver); Justin McDonnell; Burdett-Coutts, Victoria (Vancouver); Simon Brochu; Licensing Department
Objet: NWB 2018 Annual Report followup for Water Licence No. 8BW-PIM1821

Hi Simon

Thanks for organizing the conference call this morning. To follow up, I will outline the points discussed for the written record.

1. Turbidity/TSS Monitoring: Monitoinrg the tubidity of runoff from construction activities and converting to TSS values, according to the TSS:Turbidity relationship outlined on page 7 of the CCME Guidlies for Total Particulate Matter, will satisfy Licence condition Part E, Item 6.

Reference: Canadian Council of Ministers of the Environment. 2002. Canadian water quality guidelines for the protection of aquatic life: Total particulate matter. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

Monitoring of runoff discharges to a natural water course is required when this runoff is "impacted by construction activities", including hauling of quarry materials on the road and/or repairs to the road. Monitoring would not be required when construction is not occuring on site, but of course the site must be left in stable condition.

For Part I, Item 4, "...water quality testing immediately upstream and downstream of the water crossings..." refers to TSS/Turbidity, Oil and Grease, and pH; only "prior to construction, weekly during the construction and upon completion" of the water crossings, and/or if there are any other in-water works.

2. Photographic record: for the photographic record please include three photos of each water crossing, one before, one during, and one after the culvert was installed. If only post installation photos are available, that is fine. Simply to show that it was generally installed correctly and is functioning as planned.

This should cover it.

Regards,
Derek

Derek Donald- ᑎᐅᓇᒃ ᑖᓅᑦᑦ

Technical Advisor - Conseiller technique ᐱᓗᐊᖅᓇᖅᑐᓕᕆᓂᖅᒧᑦ ᐃᑲᔪᖅᑎ-
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NUNAVUT WATER BOARD - OFFICE DES EAUX DU NUNAVUT
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APPENDIX D :
REVIEWED WATER CROSSING MONITORING PLAN

POND INLET MARINE INFRASTRUCTURE PROJECT

WATER CROSSING MONITORING PLAN

CONTRACT NUMBER:	15255-00331-07
PROJECT NUMBER:	15255-00331
TA NUMBER:	21807
DOCUMENT NUMBER:	TA_POND INLET_ WCMP_20200318
SUBMITTED BY:	TOWER ARCTIC LTD.
SUBMITTED TO:	NUNAVUT WATER BOARD
DATE SUBMITTED:	MARCH 31, 2020
REVISION:	0

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1 WATER CROSSING MONITORING PLAN

The water crossing monitoring plan include the stability condition (refer to section 2) and the runoff discharge (refer to section 3) monitoring method. Both monitoring must be conducted during the haul road use by Tower Arctic (TA) including hauling of aggregates and road repairs.

Seven (7) culverts have been placed on the road to cross the creeks. Refer to figure 1 to locate the road and the culverts. Table 1 provides culverts GPS coordinates and diameter.

FIGURE 1 – MAP OF THE POND INLET HAUL ROAD CULVERT LOCATION

TABLE 1 – CULVERT GPS COORDINATES AND DIAMETER

Culvert identification	X	Y	Diameter (mm)
CS01	72°41'25.26"N	77°52'52.44"W	900
CS02	72°41'22.52"N	77°53'8.12"W	900
CS03	72°41'4.32"N	77°55'18.96"W	600
CS04	72°40'55.74"N	77°55'43.05"W	1200
CS05	72°40'49.61"N	77°56'13.95"W	600
CS06	72°40'37.00"N	77°58'40.61"W	600
CS07	72°41'38.15"N	77°58'57.96"W	1200

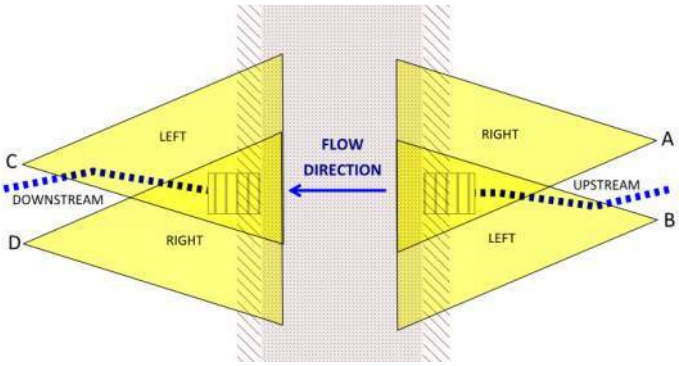
2 WATER CROSSING STABILITY MONITORING

The water crossings stability monitoring shall be conducted twice a year, once at the beginning of a new construction season and once at the beginning of the freeze-up season. Also, the monitoring must be conduct prior to and during freshet and after major precipitation. The monitoring will be conducted by a TA's employee after reviewing the monitoring procedure with TA's Environmental Monitor (EM).

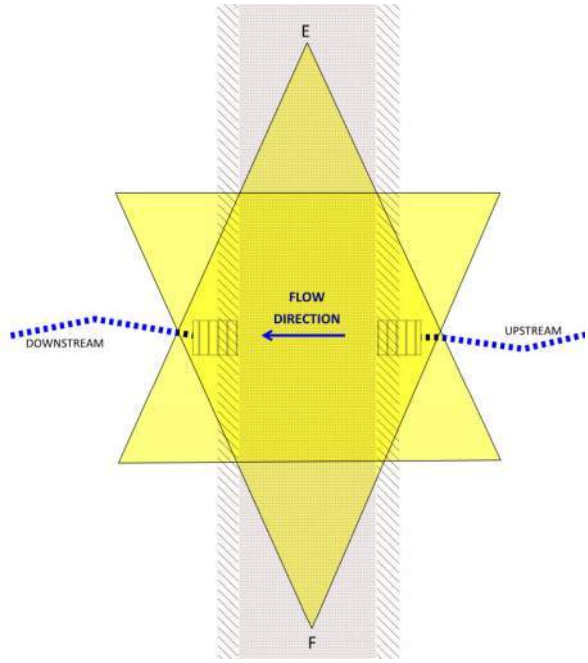
2.1 Visual Monitoring

For each culvert on Table 1, the monitoring steps as follow:

1) Stand from 5 m to 10 m from the culvert and photograph:
   A. Upstream side, culvert right side
   B. Upstream side, culvert left side
   C. Downstream side, culvert left side
   D. Downstream side, culvert right side



2) Stand in the middle of the road at about 20 m from the culvert and photograph the road where the culvert is located. Photograph twice, one of each side of the culvert (E and F).



3) If erosion or slope collapse is present, it's required to photograph with detail the condition of the culvert and/or the road where the erosion or slope collapse is present.
4) Transmit the pictures to the EM after renaming them using the following structure:

   CULVERT NAME_FLOW SIDE_CULVERT SIDE_DATE (e.g.: CS01_DOWNSTREAM_RIGHT_190716)

The EM will review the pictures and prepare a report summarizing the water crossing stability condition. The report template is provided in Appendix A.

2.2 Stability Improvement Measures

If erosion and/or slope collapse are observed which has or could result in water course runoff discharge, the EM will recommend to the superintendent temporary and/or permanent stability improvement measures.

The measures should be as follow:

Temporary measure

- Silt fence installation

Permanent measure

- Redirecting flow into vegetation
- Rip rap placement
- Localize re-grading of the road

Following the improvement measures, the water crossing site will be photographed again to allow the EM to evaluate the efficiency of the measures. A summary of the evaluation will be added to the visual monitoring report.

3 WATER QUALITY MONITORING

The water quality monitoring must be conducted according to Table 2. The monitoring shall be conducted by a TA's employee after reviewing the monitoring procedure with TA's EM. The monitoring is to be conducted during the haul road use by TA including hauling of aggregates and road repairs.

TABLE 2 – MONITORING FREQUENCY ACCORDING TO THE PERIOD

Period	Monitoring frequency
Melting and summer condition	Once a week and after precipitation
Winter condition (Frozen watercourse)	Not required

3.1 Visual Monitoring

For each culvert in Table 1, the monitoring step are the following:

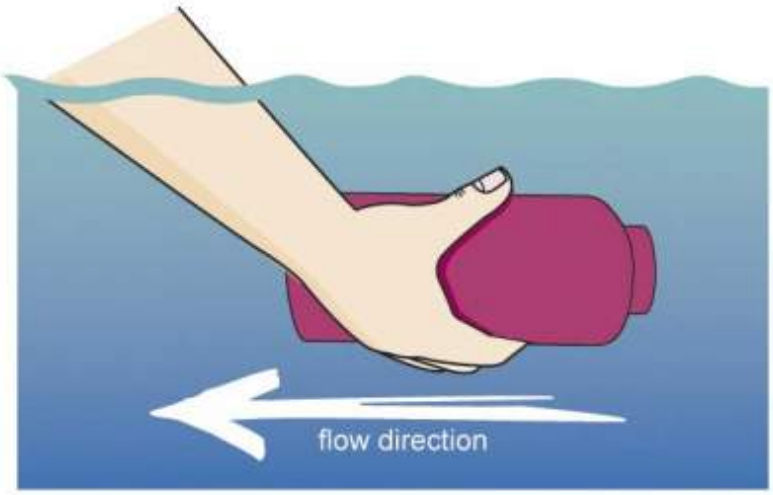
1) Reach the culvert site and observe the water course upstream and downstream. Observe if there's a presence of turbidity in the clear water. If yes, investigate the origin of the turbidity. Refer to Image 1 to see an example of runoff discharge.
2) If the turbidity comes from a runoff discharge from the road proceed immediately to the water sample collection (refer to section 3.2).
3) Collect information on the duration and the origin of the runoff discharge. Photograph the origin and any factor which can influence the runoff discharge.

3.2 Water Sample Collection[1]

The method chosen to sample water in the watercourse is near the surface "Grab sampling" using a 500 ml bottle. The sampler shall collect one (1) sample 10 m upstream of the turbidity generated by the runoff discharge (use for background levels) and one (1) sample 10 m downstream of the runoff discharge (use as compliance samples). The steps to collect water samples are as follow:

1) Before sample collection, rinse all sampling equipment (if necessary) in the body of water to be sampled. Dispose of all rinse water downstream of the site, or in such a way that it does not contaminate or disturb the site to be sampled.
2) Start sampling in areas of lowest turbidity, followed by areas of highest turbidity. This reduces the potential for cross contamination of samples. As the watercourse to be sampled are not deep (< 30 cm), the sampler must make sure the bottle does not disturb the watercourse bed to prevent sediment entering in the bottle. All samples must be taken while the opening is facing upstream.
3) Plunge the bottle, neck downward, below the surface and immediately turn the bottle until the neck points slightly upwards with the mouth directed into the current. Hold the bottle facing upstream at arm's length while it fills. Fill all bottles with the sample water to approximately 0.5 cm from the top and cap each bottle immediately after filling. Identify the bottle according to the type of site sampled (background or compliance) and the location (e.g. culvert name) of the sampling.

[1] Adapted from *Northern Waters: A Guide to Designing and Conducting Water Quality Monitoring in Northern Canada.*



Note: Be sure not to touch the cap liner, or the inside of the bottles. Touching may result in contamination of the sample. Remove all jewelry and watches. Roll up sleeves to avoid sample contamination, or wear gauntlet gloves. Don't smoke while taking or handling the samples. During sampling by hand don't use insect repellent, as this may cause sample contamination.

4) Photograph the location of the sampling sites and rename the pictures according to Section 2.1 step 4. The pictures must be transmitted to the EM with the turbidity and pH measurement report.
5) Immediately after collecting both water samplings and site pictures, turbidity (refer to section 3.3) and pH (refer to section 3.4) measurement shall be conducted.

3.3 Turbidity Measurement[2]

For each water compliance and background samples, turbidity is measured in nephelometric turbidity units (NTU) using a turbidimeter and the procedure is as follow:

1) Verify the turbidimeter calibration using the calibration standard of 15 NTU and if necessary, adjust the calibration using the calibration standard.
2) Fill a cuvette with shaken field water sample to the line marked on the cuvette.
3) Dry the cuvette with a clean, lint-free, laboratory-grade paper towel.
4) Place the cuvette, with the orientation mark facing forward, in the chamber.

   Note: Handle cuvette with care and do not touch the area of the cuvette below the line. Keep the cuvettes absolutely clean.

5) Measure the turbidity of the sample. Rinse the cuvette with deionized water before storage.
6) Note the measurement results and details in the field report (Appendix B provides the report frame).

For additional information on the turbidimeter use, refer to the manufacturer's user manual.

[2] Adapted from *CCME: Protocols manual for water quality sampling in Canada.*

3.4 pH Measurement[3]

For each water compliance sample, pH is measured using a pH meter and the procedure is as follows:

1) Adjust the temperature reading (if needed) to the temperature of the field sample.
2) Shake the sample and rinse the electrode with sample.
3) Place the electrode in the sample.
4) Select pH measurement mode.
5) Swirl the sample and measure the pH. Allow sufficient time for the meter to stabilize.

   Note: Be sure to rinse the electrode with deionized water before storage. Store the electrode in a potassium Chloride (KCl) storage solution according to the manufacturer's instructions. pH electrode sensors should be kept wet with sample water or tap water, and not in a standard solution, at all times during storage.

6) Note the measurement results and details in the field report (Appendix B provides the report frame).

For additional information on the pH meter use, refer to the manufacturer's user manual.

3.5 Water Quality Limit

Each water compliance samples must be compliant with the criteria provided in Table 3.

TABLE 3 – WATER QUALITY CRITERIA LIMIT

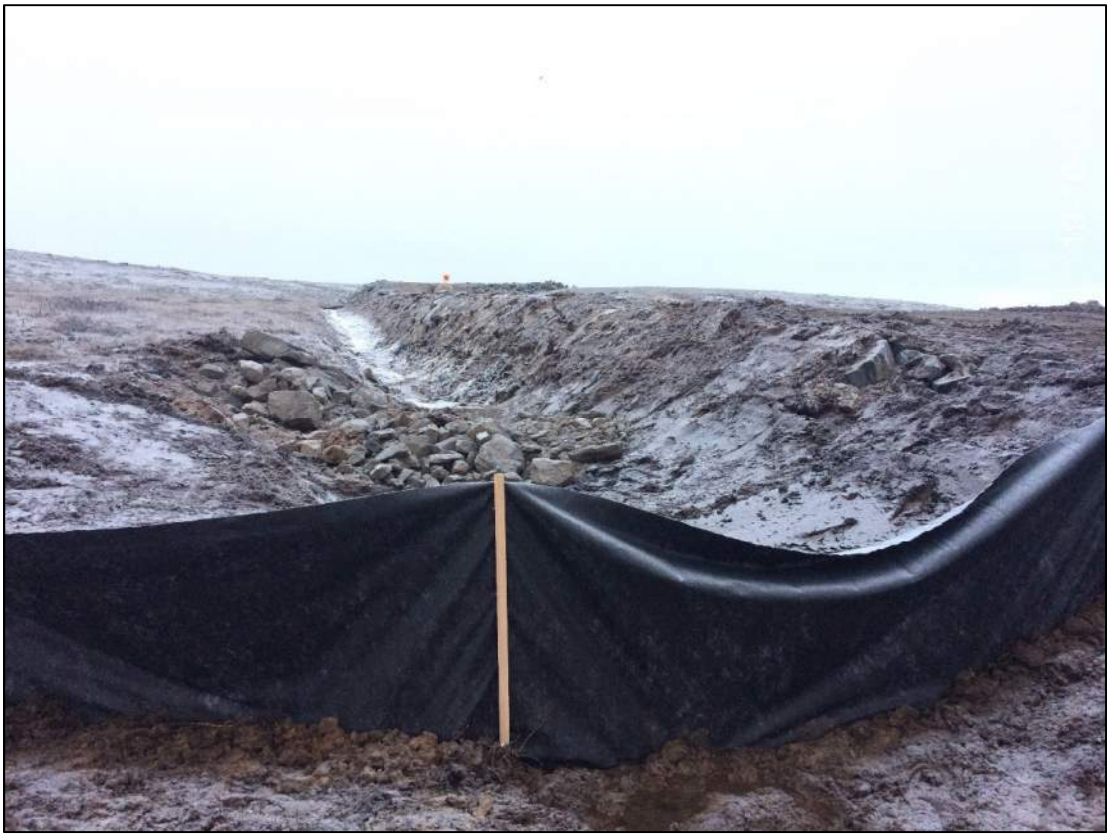
Parameter	Criteria
Turbidity	Maximum increase of 33 NTU from background levels[4]
Oil and Grease	No visible sheen[5]
pH	Between 6.0 and 9.5[6]

If sample is not compliant with the water quality criteria, immediately runoff control measures must be put in place to stop the runoff discharge. The measures should be the same as indicated in Section 2.2 Stability Improvement Measures.

Until the control measures are in place, the water quality shall be monitoring twice a day (Sections 3.1 to 3.5). After the measure's placement, the efficiency must be photographed and sampled to confirm compliance. The pictures and data shall be transmitted to the EM with all turbidity and pH measurement report.

[3] Adapted from *CCME: Protocols manual for water quality sampling in Canada.*
[4] According to the NWB Licence No. 8PW-PIM1821 and *Canadian Water Quality Guidelines for the Protection of Aquatic Life: Total Particulate Matter*
[5] According to the NWB Licence No. 8PW-PIM1821
[6] According to the NWB Licence No. 8PW-PIM1821

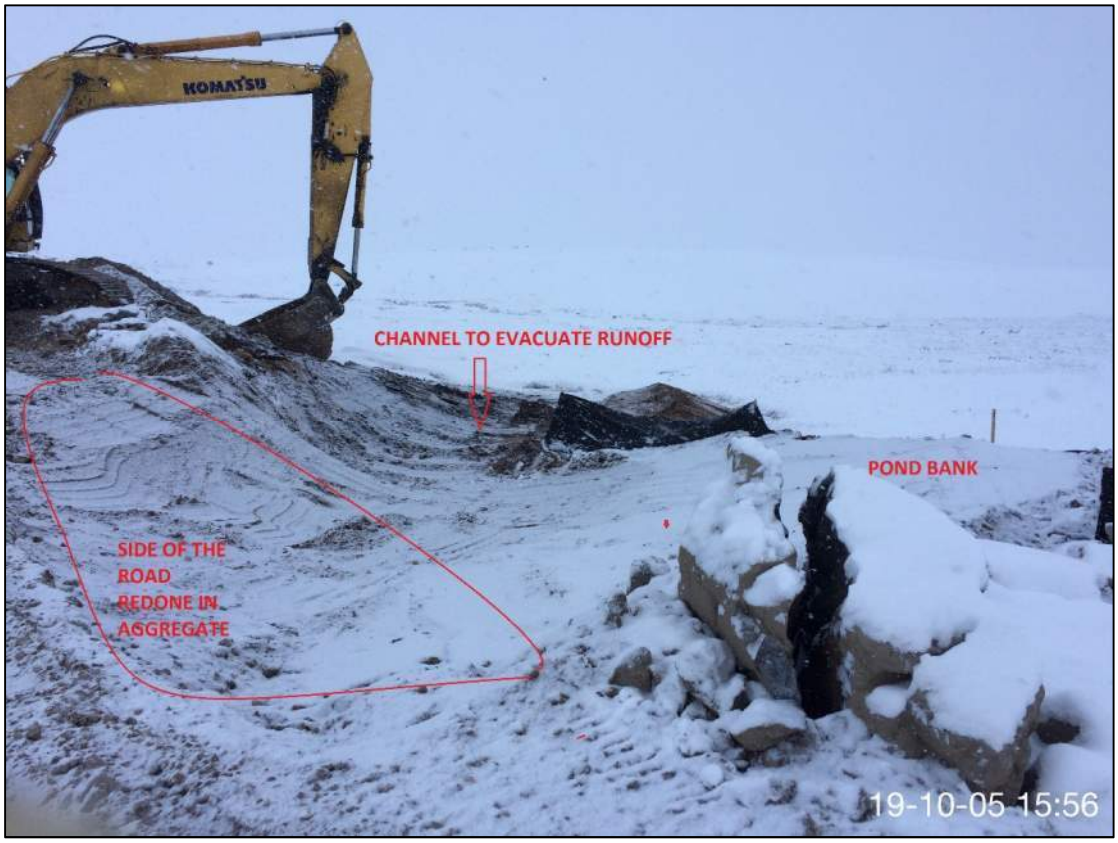
APPENDIX E :
SEDIMENT AND EROSION CONTROL PHOTOGRAPHIC RECORD



2019-10-03 CS03 UPSTREAM SILT FENCE AND SETTLING POND

2019-10-03 CS04 DOWNSTREAM SILT FENCE

2019-10-05 CS04 SLOPE STABILISATION



2018-10-05 CS04 SETTLING POND