Fisheries and Oceans Canada
Pêches et Océans Canada

Small Craft Harbours
Ontario and Prairie Region
501 University Crescent
Winnipeg, MB R3T 2N6
TEL (204) 983-7443
FAX (204) 983-7166

Ports pour petits bateaux
Région de l'Ontario et des Prairies
501, University Crescent
Winnipeg, MB R3T 2N6
TEL (204) 983-7443
TELECOPIER (204) 983-7166

February 24, 2023 NWB Licence No: 8BC-CLY2225

Nunavut Water Board (NWB)
Attn: Richard Dwyer
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Re: Fisheries and Oceans Canada – Small Craft Harbours' "Clyde River Small Craft Harbour Development" – 2022 NWB Report

Dear Richard Dwyer:

On January 20, 2022 Nunavut Water Board (NWB) completed the review of the Clyde River Small Craft Harbour Development project proposal and issued a NWB type B licence (licence) to Fisheries and Oceans Canada- Small Craft Harbours (DFO-SCH).

As identified in *Part B: General Conditions* section of the licence, an annual report of construction activities and associated monitoring is due March 31, 2023.

In 2022, the contractor began the construction phase of the project by conducting some preliminary work at site. This work included; mobilization of equipment and materials to site, set-up of site office, camp and maintenance garage, initial quarry work, and bridge crossing repairs. The attached annual report will summarize the activities conducted during construction, and confirm the compliance with the monitoring and reporting requirements.

If you have any questions with the content of this letter, please contact Chris McDermid at (431) 335-7530 or by email at Chris.McDermid@dfo-mpo.gc.ca .

Yours sincerely,

Eleanor McEwan, P. Eng.
Senior Project Engineer
Small Craft Harbours Branch
Fisheries and Oceans Canada

cc. Chris McDermid (DFO-SCH)
Kenton Thiessen (Public Services and Procurement Canada)
Loretta Hardwick (CBCL)

Attachments:
Clyde River Harbour NWB report

NWB Annual Report **Year being reported:** 2022

License No: 8BC-CLY2225 **Issued Date:** January 20, 2022
Expiry Date: October 31, 2025

Project Name: Clyde River Harbour Development

Licensee: Fisheries and Oceans Canada

Mailing Address:
Fisheries and Oceans Canada – Small Craft Harbours
501 University Crescent
Winnipeg, Manitoba R3T 2N6

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):
General Contractor: Pilitak Enterprises Ltd
P.O. Box 727, 1519 Federal Road,
Iqaluit, Nu. X0A 0H0

General Background Information on the Project (*optional):
Construction of a small craft harbour

Licence Requirements: the licensee must provide the following information in accodance with
Part B Item 1

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Hamlet water truck delivery

Water Quantity:	
6 cu. M /day	Quantity Allowable Domestic (cu.m)
1.08 cu. M/day	Actual Quantity Used Domestic (cu.m)
36 cu. M /day	Quantity Allowable dust control (cu.m)
0 cu. M/day	Total Quantity Used for dust control (cu.m)

Waste Management and/or Disposal
- ☑ Solid Waste Disposal
- ☑ Sewage
- ☑ Drill Waste
- ☐ Greywater
- ☐ Hazardous
- ☐ Other:

Additional Details:
Sewage collected by the hamlet sewage truck
Solide waste: Transported to the hamlet solide waste facility

Drill waste: A total of 14 boreholes of 8" diam were drilled to a depth of 10 meters in order to install steel piles for the bridge improvement. The drilling was done without fluid and dry cuttings were collected and transported to the quarry for being reused within crush gravel.

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: NA (as reported to the Spill Hot-line)
Date of Spill: NA
Date of Notification to an Inspector: NA
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

No spill to report from our mobilization to Clyde River at the end of August up to our demobilization on November 4th, 2022

Revisions to the Spill Contingency Plan

Other: (see additional details)

Additional Details:

SCP submitted to for review in end of June 2022. The revision 1 was issued at the end of July. The revised version includes some changes made according the comments received from the consultant and from PSPC

Revisions to the Abandonment and Restoration Plan

Other: (see additional details)

Additional Details:

Not applicable, refer to the following section

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

A reclamation plan for the quarry was included in the Quarry Development Plan submitted to the consultant and PSPC in early August 2022. The revision 1 was issued at the end of August. The revised version includes some changes made according the comments received from the consultant and from PSPC

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Not Applicable (N/A)

Additional Details:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Not Applicable (N/A)

Additional Details:

Results of any additional sampling and/or analysis that was requested by an Inspector

No additional sampling requested by an Inspector or the Board

Additional Details: (date of request, analysis of results, data attached, etc)

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board

Additional Details: (Attached or provided below)

Any responses or follow-up actions on inspection/compliance reports

No inspection and/or compliance report issued by INAC

Additional Details: (Dates of Report, Follow-up by the Licensee)

Any additional comments or information for the Board to consider

Refer to the attached report for additional information

Date Submitted:	Nov 14, 2022	
Submitted/Prepared by:	François Bourassa	
Contact Information:	**Tel:**	418-930-0850
	Fax:	
	email:	fbourassa@pilitak.biz

PILITAK ENTERPRISES LTD

ᐱᓕᒃ ᐃᖃᓗᐃᔾᔨᕐᓂᐊᓕᕆᓂ ᓕᒥᑎᓂ

NUNAVUT WATER BOARD (NWB) ANNUAL REPORT

Permit no. 8BC-CLY2225

Clyde River Harbour Development

DFO ET025-222050/A

Submitted to:

Public Services and Procurement Canada

Revision-02: January 2023

Clyde River Harbour Development

NUNAVUT WATER BOARD (NWB) ANNUAL REPORT FOR PROJECT ACTIVITIES

EXECUTIVE SUMMARY

This report addressed to the Nunavut Water Board (NWB) has been prepared to summarize the 2022 project activities that were carried on under the Type 'B' Licence -8BC-CLY2225 issued to the Department of Fisheries and Oceans Canada -Small Craft Harbour (DFO-SCH). The Clyde River Small Craft Harbour Construction's project was awarded to Pilitak Enterprises Ltd in May 2022 by Public Services and Procurement Canada (PSPC) for DFO-SCH.

2022 PROJECT ACTIVITIES

- Camp & garage installation.
- Explosive magazines installation and explosive transfer from marine containers.
- Truck scale installation at the construction site.
- Removal of surface material before drilling.
- Drilling and blasting. About 10,000 m3 were blasted from the east side of the existing quarry.
- Installation and testing of the rip rap plant, the screener plant and conveyors
- Quarry cleanup and blasted material removal
- Corestone production: 2,750 m3
- Filterstone production: 975 m3
- Aggregate production: 1,850 m3
- Road to quarry improvements
- Bridge to quarry improvements
- Winterization of the equipment and facilities

WATER USAGE

Domestic water was use in 2022 for the temporary camp operations. Approximately 84,000 litres of potable water were delivered by the hamlet from the entire duration of our 2022's operations, which lasted a total of 11 weeks. This represents and average water consumption of 1.08 cubic meter/day. No unauthorized discharge occurred during this construction season.

WASTE MANAGEMENT

A considerable volume of used wood coming from the crates and pallets that were emptied after the sealift arrival were offered to the community for salvage. No hazardous waste was generated during this year's working period. The largest volume of waste delivered to the local landfill is coming from the camp construction activities where unsalvageable wood and other construction/packaging material was delivered to the local disposal facilities. The total volume of waste generated by the project activities during 2022 is estimated to 31.3 cubic meters of which 20% was salvaged.

SPILL

No spill occurred during the 2022's construction season.

WATER QAULITY MONITORING

Only preparation works were done during the 2022's construction season. According to the site conditions, silt fences were installed at some specific locations to prevent the migration of fine material into adjacent waterbodies. No culverts were installed for crossing the Clyde River in order to access to the quarry. Instead, the existing bridge was improved. The improvement works were done when the water in the river was frozen. No activity requiring water quality monitoring was undertaken during the 2022's construction season.

MANAGEMENT PLANS

The following management plans were submitted to the contract authorities and are attached to the current report:

- Spill Prevention & Response Plan
- Quarry Development Plan (including the Blasting Management Plan and the Reclamation Plan)
- Erosion and Sediment Control Plan (including the Water Quality Monitoring Plan)

ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦᑕ (NWB) ᐊᕐᖀᒍᑕᒦᖅᓯᐅᑏᑦ ᐅᓂᒃᑳᖏᑦ ᐊᐅᓚᓂᐅᔪᒧᑦ ᐊᐅᓚᓂᐅᔪᓄᑦ

ᓯᕗᓕᖅᑎᓂᒃ ᓇᐃᓕᑎᑦᓯᒪᔪᑦ

ᐅᑯᐊ ᐅᓂᒃᑳᑦ ᑐᕌᖅᑐᑦ ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᓐᓄᑦ (NWB) ᐸᕐᓇᑕᐅᓯᒪᔪᑦ ᓇᐃᓕᑎᖅᑕᐅᑦᓯᑎᒃ 2022-ᒥ ᐊᐅᓚᓂᕐᒧᑦ ᐊᐅᓚᓂᐅᓯᒪᔪᑦ ᑲᔪᓯᑎᑕᐅᓯᒪᔪᑦ ᐊᑖᓂ ᓇᓗᓇᐃᒃᑯᑕᖅ 'B' ᓚᐃᓴᓐᓯᐅᑉ –8BC-CLY2225 ᑐᓂᔭᐅᓯᒪᔪᖅ ᒥᓂᔅᑕᐅᕕᖓᓐᓄᑦ ᐃᖃᓗᓕᕆᔨᒃᑯᑦ ᐃᒪᓕᕆᔨᒃᑯᓪᓗ ᑲᓇᑕᒥ – ᐅᒥᐊᒃᑯᕕᕋᓛᖅ (DFO-SCH). ᑲᖏᖅᑐᒑᐱᒻᒥᒃ ᐅᒥᐊᒃᑯᕕᕋᓛᕐᒥᒃ ᓴᓇᔭᐅᓂᖓ ᑐᓂᔭᐅᓯᒪᔪᖅ ᐱᓕᑕᒃ ᐊᓐᑐᐳᕋᐃᓯᔅ ᓕᒥᑎᒃᑯᓐᓄᑦ ᒪᐃ 2022–ᖑᑎᓪᓗᒍ ᑕᖅᑲᐅᖓ ᐱᔨᑦᓯᖅᑎᓄᑦ ᐊᑭᓖᔨᓄᓪᓗ ᑲᓇᑕᒥ (PSPC) ᐅᑯᓄᖓ DFO-SCH.

2022 ᐊᐅᓚᓂᐅᔪᒧᑦ ᐊᐅᓚᓃᑦ

- ᓄᓇᒋᔭᐅᑲᐃᓐᓇᖅᑑᑉ ᓄᓇᓯᐅᑎᒃᑯᕕᐅᓪᓗ ᐋᖅᑭᑦᑕᐅᓂᖓ.
- ᖄᔩᑦ ᐋᖅᑭᓱᑦᖅᑕᐅᓂᖏᑦ ᐊᒻᒪᓗ ᖄᔩᑦ ᐊᐅᓪᓛᖅᑎᑕᐅᓂᖏᑦ ᐅᒥᐊᕐᔪᐊᕐᒥᒃ ᐃᑦᓯᕙᐊᓗᓐᓂᒃ.
- ᓄᓇᓯᐅᑎᓄᑦ ᐃᓂᑦᓴᓂᒃ ᐋᖅᑮᓂᖅ ᓴᓇᕕᐅᔪᒥ.
- ᐲᔭᐃᓂᖅ ᖄᖓᓃᑦᑐᓂᒃ ᑲᐃᕗᙱᓂᕐᒥᓂ.
- ᑲᐃᕗᕐᓂᖅ ᖃᒐᒋᖅᑎᕆᓂᕐᓗ. 10,000 m3 ᖃᒐᒋᖅᑎᑕᐅᔪᒧᑦ ᑲᓇᖕᓇᕐᐸᓯᖕᖓᓂᒃ ᑐᐊᐸᑦᑕᕐᕕᐅᑉ.
- ᐋᖅᑭᑦᓱᐃᓂᖅ ᐆᑦᑐᕋᕐᓂᕐᓗ rip rap–ᓕᓇᒍᑎᒥᒃ, ᑲᑕᒐᐃᕕᒻᒥᒃ ᐊᒻᒪᓗ ᐃᖏᕐᕋᔪᓂᒃ
- ᑐᐊᐸᑦᑕᕐᕕᒻᒥᒃ ᓴᓗᒻᒪᖅᓴᐃᓂᖅ ᖃᒐᒋᖅᑎᑕᐅᓯᒪᔪᓂᓪᓗ ᓄᐊᑦᓯᓂᖅ
- ᐳᑦᑕᔪᑦ ᓇᑏᑦ ᓴᓇᔭᐅᓂᖏᑦ: 2,750 m3
- ᐊᑦᓴᓗᐊᑦ ᐳᑦᑕᔪᑦ ᓴᓇᔭᐅᓂᖏᑦ: 975 m3
- ᑲᑎᑦᓱᑎᒃ ᓄᐊᑕᐅᔪᑦ: 1,850 m3
- ᐊᑐᓇᐊᑉ ᑐᐊᐸᑦᑕᕐᕕᒻᒨᖓᔪᑦ ᐱᕚᓪᓕᕈᑎᖏᑦ
- ᐃᑳᕈᑎᐅᑉ ᑐᐊᐸᑦᑕᕐᕕᒻᒨᖓᔪᑦ ᐱᕚᓪᓕᕈᑎᖏᑦ
- ᐅᑭᐅᖅᓯᐅᑎᕈᖅᑎᑕᐅᓂᖏᑦ ᓱᓇᒃᑯᑏᑦ ᐃᓪᓗᐃᓪᓗ

ᐃᒥᕐᒥᒃ ᐊᑐᕐᓂᖅ

ᐃᓄᓐᓅᖓᔪᒥᒃ ᐃᒥᕐᒥᒃ ᐊᑐᔪᔪᑦ 2022–ᒥ ᓄᓇᓕᐅᑲᐃᓐᓇᖅᑐᑦ ᐊᐅᓚᓂᖏᓐᓄᑦ. ᒥᑦᓴᓃᑦᑐᑦ 84,000 ᓖᑕᐃᑦ ᐃᒥᕋᑦᓴᐃᑦ ᐸᔪᒍᑕᐅᔪᔪᑦ Hᐋᒻᓚᒪᒃᑯᓐᓄᑦ ᐃᖏᕐᕋᓂᖅᑲᕐᓂᓕᒫᖓᓂ 2022-ᒥᒃ, ᑲᑎᑦᓱᑎᒃ ᐱᓇᓱᐊᕈᓰᑦ 11. ᑕᒪᓐᓇ ᑕᑯᑦᓴᐅᑎᑦᓯᔪᖅ ᐃᒪᖅᑐᕐᓂᕐᒥᒃ ᒥᑦᓴᓂ 1.08 ᑭᑉᐙᓇᑦᑐᑦ ᒦᑕ ᐅᓪᓗᕐᒥ. ᐊᖏᖅᑕᐅᓯᒪᙱᑦᑐᓂᒃ ᐃᒪᖅᑐᖅᑐᖅᑲᔪᙱᑦᑐᖅ ᑕᕝᕙᓂ ᓴᓇᓐᓇᐅᓂᑎᓪᓗᒍ.

ᓴᓂᓐᓂᒃ ᐊᐅᓚᑦᓯᓂᖅ

ᐊᖏᓈᒻᒪᓇᑦᑐᑦ ᕿᔪᐃᑦ ᐊᑐᖅᓯᒪᔪᑦ ᐴᒥᓂᑦ ᐃᑯᕋᐃᓐᑐ ᐅᒥᐊᔪᐊᖅᑲᓚᐅᖅᑎᓪᓗᒍ ᒪᓂᒪᑎᑕᐅᔪᔪᑦ ᓄᓇᓕᓕᓐᓄᑦ ᓇᕝᕚᖅᑖᕆᓴᑦᓴᐅᑦᓯᑎᒃ. ᐅᑐᓇᐊᖅᑐᓂᒃ ᓴᓂᑦᑕᖅᑯᕐᒥᖅᑐᖅ ᑕᕝᕙᓂ ᐊᕐᕿᒍᒥ ᐃᖃᓇᐃᔭᕐᓇᐅᑎᓪᓗᒍ. ᐊᖏᓈᖅᓯᒪᓂᖅᐸᑦ ᓴᓂᑦ ᐊᑦᑕᕐᕕᓕᐊᑭᔅᓯᐅᓯᒪᔪᑦ ᓄᓇᓕᐅᕆᓴᐅᑲᐃᓐᓇᖅᓯᒪᔪᑦ ᓴᓇᕕᒥᓂᐅᔪᓂ ᓇᕝᕚᖅᑕᓇᓴᑦᓴᐅᕐᑦᑐᑦ ᕿᔪᐃᑦ ᐊᓯᖏᓪᓗ ᐳᒥᓂᓚᐃᑦ ᓄᓇᓕᓐᓇ ᐊᑦᑕᕐᕕᓕᐊᑭᔅᓯᐅᔪᔪᑦ. ᑲᑎᑦᓱᑎᒃ ᓴᓂᓕᐊᖑᔪᑦ ᐊᐅᓚᓂᐅᔪᓂᒃ 2022–ᒥ ᓇᓚᐅᑦᓵᖅᑕᐅᓯᒪᔪᑦ 31.3 ᑭᑉᐙᓇᑦᑐᓂᒃ ᒦᑕᓂᒃ ᐊᖏᓂᖅᑲᓇᐊᖏᑦ 20%–ᖏᓪᓗ ᓇᕝᕚᖅᑖᖑᑦᓯᑎᒃ.

ᑯᕕᔪᑦ

ᑯᕕᔪᖅᑲᔪᙱᑦᑐᖅ 2022–ᒥ ᓴᓇᓐᓇᐅᑎᓪᓗᒍ.

ᐃᒪᐅᑉ ᐱᐅᓂᖓᓂᒃ ᖃᐅᔨᓴᕐᓂᖅ

ᐸᕐᓇᑕᐅᑎᓪᓗᒍ ᑭᓯᐊᓂ ᑲᒪᒋᔭᐅᓯᒪᔪᑦ 2022–ᒥ ᓴᓇᓐᓇᐅᑎᓪᓗᒍ. ᑐᙵᕕᐅᑦᓯᑎᒃ ᐃᓂᐅᔫᑉ ᖃᓄᐃᓕᖓᓂᖏᑦ, ᓴᐃᒍᓕᖅᑐᖅᑕᐅᓯᒪᔪᔪᖅ ᐃᓚᖓᒍᑦ ᓄᖅᑲᖓᑎᑕᐅᑦᓯᑎᒃ ᐃᖏᕐᕋᓂᖏᑦ ᓴᓂᑦ ᐊᑦᑐᐊᔪᓄᑦ ᐃᒪᕐᓄᑦ. ᑰᕝᕙᓐᓂᒃ ᐊᖅᑭᑦᑕᐅᔪᖅᑲᖅᑐᖅ ᑲᖏᖅᑐᒑᐱᒻᒥ ᐃᑳᕐᕕᓐᓄᑦ ᑐᐊᐸᓐᓂᐊᕐᕕᓕᐊᕐᓗᓂ. ᑭᓯᐊᓂᓕ ᑕᕝᕙᐅᕐᑦᑐᑦ ᐃᑳᕐᕕᒃ ᐊᖅᑭᒥᐊᖅᑕᐅᔪᔪᑦ.

ᓴᓇᒋᐊᖅᑕᐅᔨᔨᖅ ᑯᐟ ᐃᒪᓐᓚ ᖃᐅᐊᖓᑎᓪᓗᐊᔪ. ᐊᐅᓪᓚᓂᖅᑕᖅᓴᕐᓂᑐᖅ ᖃᐅᔨᓴᓇᐊᓕᒻᒥᐅ ᐃᒪᐅᐸᑦ ᖃᓄᐃᑦᑐᓂᖓᓚᓂᖅ 2022–ᒥ ᓴᓇᓐᓇᐅᑎᓪᓗᐊᔪ.

ᐊᐅᓪᓚᑦᔨᓂᖅ ᓴᖅᓇᐅᑦᑎᑦ

ᐅᑯᐊ ᐊᐅᓪᓚᑦᔨᓂᖅ ᓴᖅᓇᐅᑦᑎᑦ ᑐᓂᔭᐅᔨᔨᑦ ᑲᑦᑐᓴᓪᓚᓂᖅ ᐊᑕᑦᔨᑎᓪᓗ ᒪᓐᓇᐅ ᐅᓂᖅᑐᑦ:

- ᑯᐃᑦᑕᐃᓕᒪᑎᑦᔨᓂᖅ ᐊᐅᓪᓚᕐᓴᒋᐊᕐᑎᓂᓪᓗ ᓴᖅᓇᐅᑦᑎᑦ
- ᑐᐊᓴᑦᑕᕈᒪᓂᖅᑦ ᓴᖅᓇᐅᑦᑎᑦ (ᐱᖁᔨᐅᑎᑦᔨᓂ ᖁᑲᐃᓂᖅᑎᑲ ᐊᐅᓪᓚᑦᔨᓂᖅᑦ ᓴᖅᓇᐅᑎ ᐅᑎᖅᑎᑦᔨᓂᖅᑦᓪᓗ ᓴᖅᓇᐅᑎ)
- ᔨᑐᑦᓂᖅᑎᑲ ᐃᖅᑲᓇᖅᑲᖅᑐᓂᓪᓗ ᐊᐅᓪᓚᑦᔨᓂᖅᑦ ᓴᖅᓇᐅᑎ (ᐱᖁᔨᐅᑎᑦᔨᓂ ᐃᒪᖅᑎᑲ ᖁᐅᔨᓴᓇᐊᓕᒻᒥᐅ ᓴᖅᓇᐅᑎ)

TABLE OF CONTENTS

Appendices

1. DESCRIPTION OF PROGRESS

The construction project was awarded to Pilitak Enterprises Ltd (PEL) in May 2022 by Public Services and Procurement Canada (PSPC) for the Department of Fisheries and Ocean (DFO).

1.1 ACTIVITIES UNDERTAKEN

At the end of August 2022, heavy equipment, camp facilities and material were delivered by sealift to Clyde River. The following activities were completed following the sealift's arrival, on August 29:

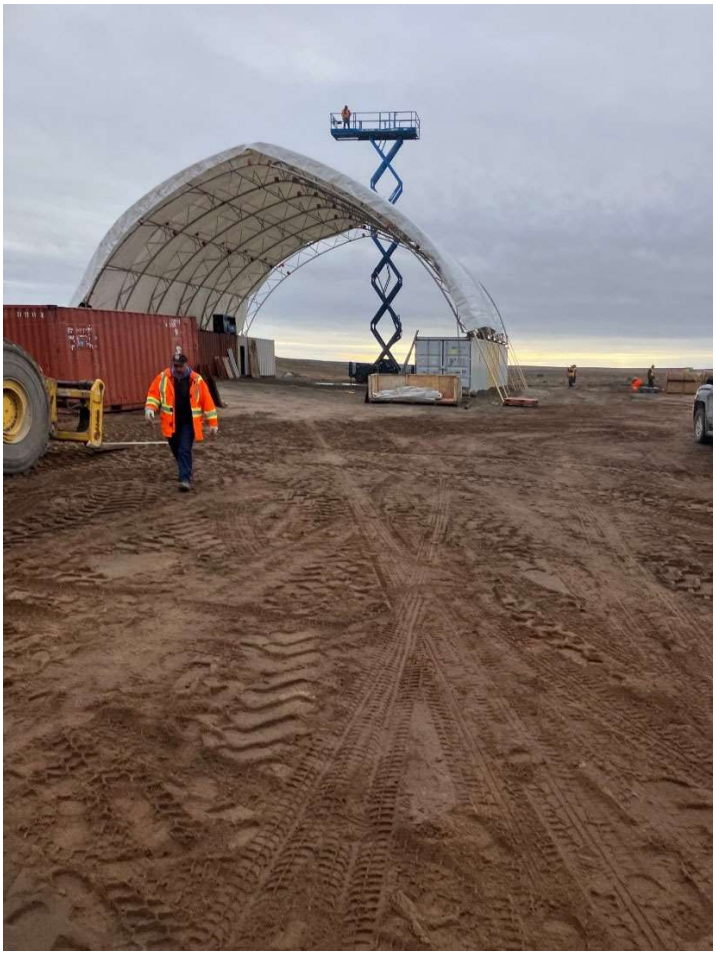
- Camp & garage installation.
- Explosive magazines installation and explosive transfer from marine containers.
- Truck scale installation at the construction site.
- Removal of surface material before drilling.
- Drilling and blasting. About 10,000 m3 were blasted from the east side of the existing quarry.
- Installation and testing of the rip rap plant, the screener plant and conveyors
- Quarry cleanup and blasted material removal
- Corestone production: 2,750 m3
- Filterstone production: 975 m3
- Aggregate production: 1,850 m3
- Road to quarry improvements
- Bridge to quarry improvements
- Winterization of the equipment and facilities

The non-local members of our crew were demobilized from Clyde River on November 4th, 2022.

Camp, maintenance garage and staging area preparation

Camp installed

Weight scale installation



Maintenance garage installation

Maintenance garage installed

Drilling at the quarry

Drilling and blasting at the quarry

Road to quarry improvement

Rock processing plant

Processed products (filterstones and corestones)

Bridge during the improvements

Bridge improvement completed

Equipment winterization

2. WATER USE ACTIVITIES

2.1 DOMESTIC WATER USE

Domestic water was used at our 2 houses in Clyde River and at our temporary camp used during the construction of the main camp facility. The potable water was delivered by the hamlet water truck. The sewage water was collected by the hamlet sewage truck and disposed at their sewage lagoon facility. Our operations started at the end of august with a crew of 2 people and ramped up to an average of 12 people from the mid September up to the beginning of November. Approximately 84,000 litres of potable water were delivered by the hamlet from the entire duration of our 2022's operations, which lasted a total of 11 weeks. This represents and average water consumption of 1.08 cubic meter/day

2.2 WATER FOR DUST CONTROL AND/OR CONSTRUCTION ACTIVITIES

Only preparation works were done this year. No dust control was required. No water was used for the granular material compaction.

2.3 UNAUTHORIZED DISCHARGE

No unauthorized discharge occurred during this construction season.

3. REPORTS AND PROGRAMS

3.1 WASTE MANAGEMENT PLAN

A waste management plan was submitted to PSPC and to the consultant at the end of June 2022. Two revised versions were issued in order to includes the comments from all parties. The final version is presented in Appendix 1.

The following table summarizes the waste management done this year.

Table 3.1: 2022 Waste management

	May	June	July	Aug	Sept	Oct
Streams contributing to credit						
Wood crate or wood pallets or wood to be reused					4	2
Metal strapping and other metals				0	0,2	0,1
Waste oil and waste filters & grease container				0	0	0
Waste batteries				0	0	0
Waste antifreeze				0	0	0
Waste absorbent & dirty rags				0	0	0
Thin can and pops empty cans				0	0	0
Wasted silt fences / geotextile & siltation protections				0	0	0
Streams not contributing to credit						
Waste plastic containers				0	0,1	0,1
Waste carboard boxes				0	0,3	0,1
Food waste and plasticware / Styrofoam cups				0,14	2,1	2,17
Misc. Camp waste				0	10	10
Total diverted waste	6,3	m3				
Total waste	31,31	m3				
Percentage diverted	20%					

A considerable volume of used wood coming from the crates and pallets that were emptied after the sealift arrival were offered to the community for salvage. Very little equipment maintenance was performed this year. No hazardous waste related to this activity was generated during this year's working period. The largest volume of waste delivered to the local landfill is coming from the camp construction activities where unsalvageable wood and other construction/packaging material was delivered to the local disposal facilities.

3.2 SPILL PREVENTION & RESPONSE PLAN

A spill prevention & response plan was submitted to PSPC and to the consultant at the end of June 2022. One revised version was issued in order to includes the comments from all parties. The final version is presented in Appendix 2.

No spill occurred during our operations this year.

3.3 QUARRY DEVELOPMENT PLAN

A quarry development plan was submitted to PSPC and to the consultant in August 2022. A revised version was issued in order to includes the comments from all parties. The final version is presented in Appendix 3.

About 10,000 cubic meters of rock were blasted from the east side of the quarry this fall. As described in the section 1.1, some blasted material was used to produce corestones and filterstones for the project. Smaller size material was used for the road improvements.

Please note that the quarry development does include a section for the reclamation and no separate document will be issue to cover this topic.

3.4 EROSION AND SEDIMENT CONTROL PLAN

An erosion and sediment control plan was submitted to PSPC and to the consultant at the end of July 2022. The document is presented in Appendix 4. It includes a section for the water quality monitoring.

Only preparation works were done this year. According to the site conditions, silt fences were installed at some specific locations to prevent the migration of fine material into adjacent waterbodies.

No culverts were installed for the river crossing. The bridge improvement works were done when the water was frozen. No water quality monitoring was required.

APPENDIX 1
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 1

WASTE MANAGEMENT PLAN

Submittals

PILITAK ENTERPRISES LTD ᐱᓕᑕᒃ ᐃᖃᓇᐃᔭᖅᑎᒋᔪᑦ ᓕᒥᑎᑦ

No. :	18
Rev. :	02
Date :	August 22, 2022

Project : **CLYDE RIVER HARBOUR CONSTRUCTION**
DFO ETO-025-222050
Project No. : 2022-034

Subject : **Revised Waste Management Plan -rev-02**

Submitted to :
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Speciality :	Environment	**Submitted for :**	Révision
Specification section :	01 74 19	**Revision required by :**	**September 1, 2022**
Drawing reference :	NA	**Color choice required :**	
Submited as :	As specified	**Total Page incl. cover :**	**12**

Subcontractor or supplier :

-

Manufacturer :

Description : Revised waste management plan, rev-02

Supplier No :

Comments :

Revised and submitted by :

REVIEWED BY CONTRACTOR PILITAK ENTERPRISES LTD
NAME: François Bourassa
DATE: Aoû 22, 2022

François Bourassa, P.Eng.
Pilitak Enterprises Ltd.
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Review by the consultant or the client :

Shop Drawing Review

This review is intended to assist the contractor in complying with the requirements of the Contract Documents and does not relieve him of his responsibilities under the contract.

- [x] no apparent errors
- [ ] apparent errors noted
- [ ] rejected - see remarks
- [ ] revise and resubmit

Dave Parsons
PER
CBCL LIMITED
200235.00 — Aug 24, 2022
PROJECT — DATE

PILITAK ENTERPRISES LTD

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WASTE MANAGEMENT PLAN

Clyde River Harbour Development

DFO ET025-222050/A

Submitted to:

Public Services and Procurement Canada

Revision: August 2022

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

The purpose of this document is to present the waste management plan in detail for the construction project of the new harbour in Clyde River, Nunavut. Clyde River is located within the Qikiqtaaluk Region, in the North Baffin region.

The construction project was awarded to Pilitak Enterprises Ltd (PEL) in May 2022 by Public Services and Procurement Canada (PSPC) for the Department of Fisheries and Ocean (DFO). At the end of August 2022, heavy equipment, camp facilities and material and will be delivered by sealift to Clyde River. The project consists mainly of the construction of two large breakwaters, a fixed wharf structure, two lines of float wharf modules, a retrofit of the existing sealift ramp and the improvements of the uplands. The new marine infrastructure will be constructed during the summers of 2023, 2024 and 2025 while preparation work will be carried out during the fall of 2022.

This waste management plan addresses the opportunities for reduction, reuse or recycling. This plan is in effect from August 2022 and will be updated accordingly, as needed.

Figure 1: Site locations

2. LOCAL DISPOSAL FACILITIES AND RECYCLING

The hamlet of Clyde River operates a small open Solid Waste Facility (SWF) located nearby the sewage lagoon. As part of our waste management plan, we will try to reduce as much as possible our usage of the facility. In the cases where the SWF must be used, it is very important to follow the local regulations. The waste is segregated as part of the operation of the facility and the following different waste area shall be used according to the type of waste to be disposed of:

- Household garbage;
- Bulky/oversized waste and/or metal waste;
- Wood;
- Large appliances;

Any hazardous material shall be containerized and shipped off-site for disposal into a licenced facility, refer to the section 4.

There is no recycling facility in Clyde River. However, when material is left in good conditions at the SWF, reusing is promoted by the hamlet.

There is no sorting facility at SWF, the material must be pre-sorted and placed in the proper areas.

3. ANTICIPATED GENERATED WASTE AND SEGREGATION

Segregation of all waste streams by type or category will avoid potentially undesirable combined effects and will facilitate the reuse, recycling and/or disposal of the various wastes, as per the following actions:

- Reduction Initiatives: reducing the raw material consumption is the first step to reduce waste generation. To practice this principle all processes and material used will be evaluated on the basis of possible reduction in raw material usage;

- Reuse Initiatives: reusing the material in other applications and /or by other parties is routinely examined by using the waste materials exchange;

- Recycling Initiatives: recycling is the next option considered for the successful management of the waste streams;

- Disposal: disposal is the final option when no other solution is applicable or practical.

The following waste streams have been identified for this project. The waste segregation is also described in each section.

As mentioned earlier, there is no sorting facility at the local SWF. The material to be salvaged, ship-off site or disposed locally will be collected as per the following procedures:

- Wood to be salvaged will be collected in large wooden boxes clearly identified. The boxes will be installed at the staging area, nearby the garage, and at the construction site, nearby the offices. When needed, the boxes will be transported and emptied at hamlet wood salvage area located nearby the sewage lagoon. Larger pieces will be directly transported to the salvage area.

- Metal debris will be collected into wooden boxes. One box will be installed at the garage and the other one at the site. Both of them will be identified “Metal Only”. When filled, the box will be closed and prepared for off-site / off-territory shipment.

- Material to be recycled among the kitchen waste will be collected into pre-identified bins. Refer to the next sections for the description of the materials to be recycled. When bins will be filled, the content will be transferred into plastic bags / bulk bags and placed into a marine container for off-site / off-territory shipment to a recycling facility. Recycling boxes will be also installed at the site offices and breakrooms.

- Non recycling waste generated from the kitchen operations will be disposed into garbage bags and placed into close waste bins located beside the camp kitchen. The bins will be emptied everyday and the garbage bags will be transported and placed into the household garbage area into the local SWF.

3.1 WASTE FROM MATERIAL UNPACKAGING

The waste coming for the material unpackaging is generally limited to wood, wood pallets, steel strapping and plastic wrapping. Most of the wooden crates and pallets are kept in order to be re-used for the demobilization. Extra crates and remaining packaging wood will be offered to the community members in order to be reused for different projects as shack construction for fishing and hunting. The metal strapping will be collected and containerized for off-site transportation and recycling. The plastic wrapping will be transported to the local disposal facility.

3.2 WASTE FROM THE CAMP OPERATION

The camp operation will generate the following standard domestic garbage:

- Various plastic/glass containers;
- Various carboard boxes;
- Empty tin/pop cans;
- Empty aerosol cans;
- Plasticware and Styrofoam cups;
- Food waste;
- Cooking grease;
- Other waste from bathrooms and living quarters (i.e.: tissues…)

The various plastic/glass containers, the carboard boxes, the plasticware, the Styrofoam cups, the food waste and the other waste generated from bathrooms and living quarters will be transported and disposed to the local disposal facility. The empty tin/pop cans will be crushed and containerized for off-site recycling. As presented in section 4, any household hazardous waste will be collected packaged and shipped off-site.

3.3 WASTE FROM THE SITE CONSTRUCTION

This type of project does not generate a huge volume of construction waste like a building construction project. However, the following waste will be generated through the project activities:

- Wasted silt fences and other siltation protections;
- Waste from blasting operations (ANFO bags, plastic debris from used caps, etc.);
- Absorbent material from spills;
- Survey stakes;
- Geotextile left over pieces;
- Misc. metal;
- Wood lumber pieces;

At the end of the project, all siltation protection devices will be removed, cleaned and containerized for off-site shipment. The leftover pieces of geotextile and wood will be offered to the community members in order to be reused. The unclaimed geotextile pieces will be placed with the siltation devices and shipped off-site. The explosives packaging (bags, carboards…) will be disposed by combustion. The Blaster will collect all empty explosive packing and burned them at the local disposal facility. The other waste generated from the blasting operations, which consist mainly of plastic wastes, will be collected after usage and disposed at the local waste facility.

4. HAZARDOUS WASTE

All hazardous waste generated during the construction project will be packaged according to the TDG regulation and shipped off-site and off-territory by sealift to licenced disposal facilities. The hazardous waste will be containerized as explained within the next sections and placed in the hazardous waste temporary storage (HWTSA) located beside the maintenance garage. The HWTSA will be located at a minimum of 31 meters away from the any water body and will be clearly identified. The inventory of hazardous material will be kept to date by the environmental monitor. The hazardous material will be shipped off-site by sealift at the end of each working season. The proper waste manifest and transportation documents will be prepared by the environmental monitor.

4.1 HARDOUS WASTE GENERATED FROM THE MAINTENANCE GARAGE

The hazardous waste coming from the maintenance garage is summarized as per the following list:

- Waste oil
- Waste oil filters
- Waste antifreeze
- Empty grease containers
- Waste batteries
- Oil absorbent material and dirty rags

The waste oil and antifreeze will be collected separately into 205 L drums. The drums will be labelled, palletized and stored in the HWTSA. The waste filters (oil and fuel) and the empty grease containers will be collected and containerized into salvage drum (s). The waste batteries will be placed into used battery packed and placed into a marine container installed in the HWTSA. The used granular absorbent material will be collected into salvage drum as well. The used absorbent pads and dirty rags will be collected into plastic bags and placed into the marine container located in the HWTSA.

4.2 HARDOUS WASTE GENERATED FROM CAMP OPERATION

Any household hazardous waste, as disposable batteries, aerosol and fluorescent bulbs, will be collected in pre-identified boxes to be installed at the different locations in the camp and at the site offices. Once filled, the boxes will be collected and transported into the marine container located in the HWTSA.

4.3 CONTAMINATED SOIL

Any contaminated soils generated from our operations will be collected and placed into *Quatrex 27 bags* for off-site shipment and disposal. Any absorbent material used for removing an oil/fuel spill will be bagged, labelled and shipped off-site for disposal to a licenced facility. The bags of contaminated soil will be palletized and transported to the HWTSA.

5. TRAINING AND MONITORING

The environmental monitor, jointly with the site superintendent and the camp manager, will be responsible for implementation of the waste management plan.

5.1 TRAINING

All employees working on the project will have to attend the worker orientation seminar. Through this seminar, the waste management plan will be explained. The waste reduction practices, the waste segregation and the rules for using the local SWF will be discussed.

5.2 MONITORING

Through is daily inspections, the environmental monitor (EM) will make sure that the waste generated from the camp operations, from the maintenance garage and from the site operations are managed according to the current plan. The EM will also be responsible to promote the good practices for the waste reduction and for the reuse of material when possible. The EM will consign waste volume by the type of waste, as indicated in the table presented in the Appendix 1. The EM will maintain records of all Waste backhauled and records of confirmation of proper disposal of backhauled Waste. These records will be available to an Inspector upon request.

WASTE MANAGEMENT PLAN

APPENDIX 1
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 1

Waste Management Form

Waste Management Form
Clyde River Harbour Construction
Pilitak Enterprises Ltd

2022 working season

	May	June	July	Aug	Sept	Oct
Streams contributing to credit						
Wood crate or wood pallets or wood to be reused						
Metal strapping and other metals						
Waste oil and waste filters & grease container						
Waste batteries						
Waste antifreeze						
Waste absorbent & dirty rags						
Thin can and pops empty cans						
Wasted silt fences / geotextile & siltation protections						
Streams not contributing to credit						
Waste plastic containers						
Waste carboard boxes						
Food waste and plasticware / Styrofoam cups						
Misc. Camp waste						
Total landfill / ADC waste		m3				
Total waste		m3				
Percentage diverted		%				

APPENDIX 2
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 2

SPILL PREVENTION AND RESPONSE PLAN

PILITAK ENTERPRISES LTD

Submittals

No. :	14
Rev. :	01
Date :	July 7, 2022

Project : CLYDE RIVER HARBOUR CONSTRUCTION
DFO ETO-025-222050

Project No. : 2022-034

Subject : **Spill Response Plan -revision 1**

Submitted to : CBCL Limited
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Speciality :	Environment	**Submitted for :**	Révision
Specification section :	01 35 43	**Revision required by :**	**July 17, 2022**
Drawing reference :	NA	**Color choice required :**	
Submited as :	As specified	**Total Page incl. cover :**	**79**

Subcontractor or supplier : NA ##
###
##

Manufacturer : NA

Description : Spill Response Plan -revision 1

Supplier No : NA NA

Comments :

Revised and submitted by :

REVIEWED BY CONTRACTOR
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NAME: François Bourassa
DATE: Jul 07, 2022

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Review by the consultant or the client :

Shop Drawing Review

This review is intended to assist the contractor in complying with the requirements of the Contract Documents and does not relieve him of his responsibilities under the contract.

- [ ] reviewed
- [ ] revise and resubmit
- [x] reviewed as noted
- [ ] not required for review

Dallas Dalzell
PER
CBCL LIMITED
200235.00 — PROJECT
07/21/2022 — DATE

Update emergency numbers in section 4.2 once confirmed.

PILITAK ENTERPRISES LTD

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SPILL PREVENTION & RESPONSE PLAN

Clyde River Harbour Development

DFO ET025-222050/A

Submitted to:

Public Services and Procurement Canada

Revision: July 2022

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APPENDICES

1: Safety Data Sheets
2: NT-NU Spill Report Form

1. INTRODUCTION

The purpose of this document is to present the spill response and spill prevention plan in detail for the construction project of the new harbour in Clyde River, Nunavut. Clyde River, which is located within the Qikiqtaaluk Region, in the North Baffin region.

The construction project was awarded to Pilitak Enterprises Ltd (PEL) in May 2022 by Public Services and Procurement Canada (PSPC) for the Department of Fisheries and Ocean (DFO). At the end of August 2022, heavy equipment, camp facilities and material and will be delivered by sealift to Clyde River. The project consists mainly of the construction of two large breakwaters, a fixed wharf structure, two lines of float wharf modules, a retrofit of the existing sealift ramp and the improvements of the uplands. The new marine infrastructure will be constructed during the summers of 2023, 2024 and 2025 while preparation work will be carried out during the fall of 2022.

This spill response and prevention plan for this project includes the description, the safe storage, the handling of the various consumables to be used (diesel, jet fuel, gasoline and lubricants) as well as the procedures to be taken in case of any spill within the different environments. This plan is in effect from June 2022 and will be updated accordingly, as needed.

2. CONSUMMABLES ON SITE

This section describes the consumables to be used on-site. Only a brief explanation of the products is presented here. For a more in-depth, complete description, refer to the safety data sheets found in Appendix 1.

2.1 DIESEL FUEL / JET FUEL

Typical Physical and Chemical Properties:

- Appearance: Clear, yellow, or red
- Flashpoint: 40°C (diesel), -25°C (jet)
- Odour: Petroleum
- Pour point: -50°C to -6°C
- Solubility: Insoluble
- Viscosity: Not viscous
- Vapour: Will sink to ground levels
- Specific gravity: Floats on water (0.8 to 0.9)

Safety Measures/Warnings:

- Vapours are heavier than air and form easily at high temperatures
- Empty containers can contain explosive vapours
- Toxic gases form upon combustion
- Eye contact causes irritation
- Material can accumulate static charges
- Inhalation of vapours can cause irritation of the respiratory tract, headache, vomiting, and unconsciousness

Personal Protection:

- Always wear impervious, chemical-resistant clothing, gloves, footwear, and goggles such as Nitrile, PVC, and Viton which are suitable materials
- Do not use natural rubber or Neoprene
- Wear a full-face organic vapour cartridge respirator where oxygen is adequate; otherwise wear a positive-pressure SCBA

Precautions:

- Monitor for explosive atmosphere

- Avoid contact with strong oxidizers (e.g., nitric acid, sulphuric acid, chlorine, ozone, peroxides) and eliminate ignition sources
- Restrict access and work upwind of spill

2.2 GASOLINE

Typical Physical and Chemical Properties:

- Appearance: colorless
- Flashpoint: -50 °C
- Odour: Petroleum
- Freezing point: -60°C
- Solubility: Insoluble
- Viscosity: Not viscous
- Vapour: Will sink to ground level
- Specific gravity: Floats on water (0.7-0.8)

Safety Measures/Warnings:

- Vapours form instantaneously and are heavier than air
- Empty containers can contain explosive vapours
- Vapours can travel to distant sources of ignition and flash back
- Eye contact causes irritation
- Material can accumulate static charges
- Inhalation of vapours can cause irritation of the respiratory tract, headache, vomiting, and unconsciousness

Personal Protection:

- Always wear impervious, chemical-resistant clothing, gloves, footwear, and goggles Nitrile, PVC, and Viton are suitable materials
- Do not use natural rubber or Neoprene

Precaution:

- Monitor for explosive atmosphere
- Eliminate ignition sources
- Restrict access and work upwind of spill
- Avoid contact with strong oxidizers (e.g., nitric acid, sulphuric acid, chlorine, ozone, peroxides)

2.3 HYDRAULIC OIL

The heavy equipment used for works in the water will function with a bio-hydraulic fluid (Panolin HLP Synth). Other equipment will use regular hydraulic oil (T04 10W). The procedures in case of spill remain the same.

Typical Physical and Chemical Properties:

- Appearance: Straw yellow liquid
- Flashpoint: 215°C
- Odour: Petroleum
- Pour point: -25°C
- Solubility: Generally Insoluble
- Viscosity: Medium
- Vapour: Few vapours emitted
- Specific gravity: Floats on water (0.9)

Safety Measures/Warnings:

- Vapours are heavier than air but are unlikely to form
- Toxic gases can form in fire and at high temperatures
- CO, CO2 and dense smoke are produced upon combustion
- Oil mist or vapour from hot oil can cause irritation of the eyes, nose, throat and lungs

Personal Protection:

- Always wear impervious, chemical-resistant clothing, gloves, footwear, and goggles Nitrile, PVC, and Viton are suitable materials
- Do not use natural rubber or Neoprene

Precaution:

- Avoid excessive heat, which can cause formation of vapours
- Avoid contact with strong oxidizers (e.g., nitric acid, sulphuric acid, chlorine, ozone, peroxides)
- Eliminate ignition sources
- Restrict access and work upwind of spill

2.4 LUBE OIL

Typical Physical and Chemical Properties:

- Appearance: amber liquid
- Flashpoint: 190°C - 220°C
- Odour: Petroleum
- Pour point: -35°C - -40°C
- Solubility: Generally Insoluble
- Viscosity: Medium
- Vapour: Few vapours emitted
- Specific gravity: Floats on water (0.9)

Safety Measures/Warnings:

- Vapours are heavier than air but are unlikely to form
- Toxic gases can form in fire and at high temperatures
- CO, CO2 and dense smoke are produced upon combustion
- Oil mist or vapour from hot oil can cause irritation of the eyes, nose, throat and lungs

Personal Protection:

- Always wear impervious, chemical-resistant clothing, gloves, footwear, and goggles Nitrile, PVC, and Viton are suitable materials
- Do not use natural rubber or Neoprene

Precaution:

- Avoid excessive heat, which can cause formation of vapours
- Avoid contact with strong oxidizers (e.g., nitric acid, sulphuric acid, chlorine, ozone, peroxides)
- Eliminate ignition sources
- Restrict access and work upwind of spill

3. STORAGE AND REFILLING

All fuel / Jet fuel and gasoline for the entire project will be supplied by Petroleum Product Division (PPD) from the tank farm facility located at the west end of the hamlet, in front of where the harbour will be constructed. The gasoline and the fuel distribution are managed by the local PPD's agent *Aqunik Enterprises.*

3.1 STORAGE

a. Diesel (motive or P-50) /jet fuel

According to what will be available from PPD, diesel or downgraded jet fuel or a blend of both products will be used for heavy equipment and for heating our camp facility.

One aboveground horizontal dyke tanks CAN/ULC S653 of a capacity of 4,633 litres will be installed at the quarry for refilling heavy equipment as a backup.

One aboveground horizontal dyke tanks CAN/ULC S653 of a capacity of 2,359 litres will be installed at the camp to feed the backup generator and the heating system.

All tanks comply with CEPA storage tank systems for petroleum products regulations and applicable territorial regulation for temporary fuel tanks. They are also registered with Environment Canada Federal Identification Registry for Storage Tank Systems.

b. Gasoline

All gasoline for the entire project will be supplied by PPD, from the exiting hamlet's gas station. Minor quantities of gasoline for small equipment and the boat's motor will be stored into 5 gallon jerricans.

c. Lubricants and antifreeze

All the lubricants and the antifreeze for the equipment will be sent in 205L drums. Lubricant and antifreeze drums are stored into a marine container located beside the maintenance garage.

3.2 REFILLING VEHICLES AND EQUIPMENT

a. Diesel /jet fuel

The heavy equipment and vehicles using diesel fuel (or downgraded jet fuel) will be refueled by our fuel truck having a capacity of 11,000 L. The fuel truck will be refilled directly at the tank farm as per PPD's procedures.

A 995 L capacity fuel tank will be installed at the back of a pickup truck for refilling heavy equipment when the fuel truck is not available, or the equipment's location would be too difficult to access by the fuel truck.

b. Gasoline

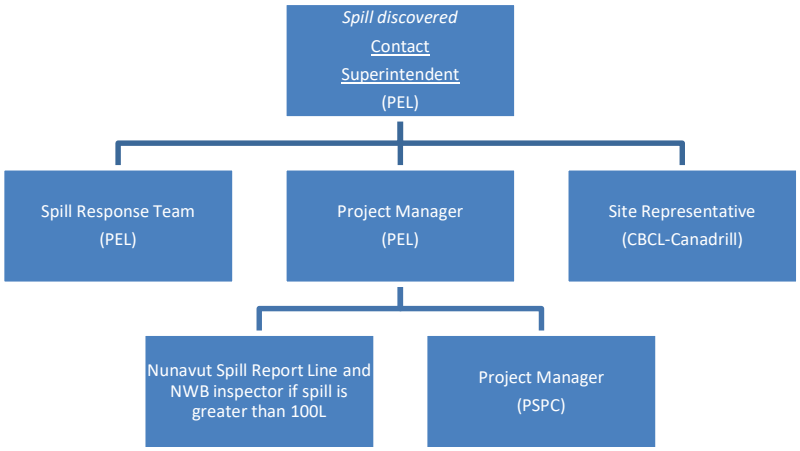
All gasoline vehicles will be refilled directly at the hamlet gas station located at the tank farm facility. The refilling is done by the gas station employees according to PPD's regulations.

4. PROCEDURES IN CASE OF SPILL

Spills have the potential to cause severe environmental damage. Workers must ensure that any spills are treated with great care, and dealt with promptly, to minimize the possibility of any of them becoming a major issue.

4.1 LINE OF COMMUNCATION

No matter the size of the spill, it must be reported as soon as possible to the site superintendent and the environment monitor who will be in charge of the spill response team. The following line of communication must be applied:



Spills of other products shall also be reported. Refer to the table "Schedule 1 – Reportable Quantities for NT–NU Spills" included in the Appendix 2 for reportable products. Diesel/oil spill on land greater than 100L must me reported to the Nunavut Spill Report Line and to the NWB inspector. Any spill near or into a water body, regardless of the quantity of releases of harmful substances, must be reported immediately to the same authorities.

4.2 EMERGENCY PHONE NUMBERS

Pilitak Enterprises Ltd	Business hours	After hours
Site superintendent	To be confirmed	

Jean-Marc Ballard, EM	To be confirmed	
François Bourassa, Project Manager	(418) 930-0850	(418) 930-0850
Site Office, Clyde River	To be confirmed	
PSPC		
Kenton Thiessen, project manager	(204) 229-6375	
Michael Steinborn	(431) 229-6375	
CBCL-Canadrill		
David Parsons, project manager	(506) 651-1812	
Jason Smith	(867) 222-0184	
Corey Heffernan	(902)293-4554	
Hamlet of Clyde River		
Philip Sanguya, Forman	(867) 924-6342	
Aqunik Enterprises (PPD local agent)		
Jonathan Palluk	(867) 924-6506	
Environment		
Nunavut Spill Report Line	(867) 920-8130.	
GN environmental protection	(867) 975-7726	
NWB Inspector	(867) 975-4284	
Environment Canada	(867) 975-4644	

4.3 SPILL RESPONSE MATERIAL

Complete emergency spill kits will be installed at every working site listed below:

- Quarry
- River crossing
- Crusher site
- Camp site
- Construction site

Each kit is made of the following items and is stored in pre-identified 45 gallon drums:

- 3 Tyveck coveralls
- 10 pairs of disposable gloves
- 1 pair of protective goggles
- 2 x 100 absorbent pad packs
- 1 x 20kg granular absorbent bag

- 4 x 10’”x 2’’ diam. floating absorbent booms
- 10 yellow storage bags
- One spade
- One broad nose shovel
- One broom
- Rags

All environmental supplies for the entire project, including a large inventory of hydrocarbon absorbents and emergency spill material, are stored in the marine container # 203387-0 located beside the site office, as indicated below.

Figure 5.3: Location of the spill response marine container

The emergency boat, which is a 26’ x 10’ pontoon equipped with a 70 HP motor, will be parked at the existing small craft harbour. A spill kit in a 205 drum will be installed on the boat for the duration of the construction season. Additional spill contingency material is located nearby the office, as described above. The spill kit installed on the boat will include the following material:

- 2 nylon rope 100’
- 1 telescoping boat hook
- 10 pairs of disposable gloves
- 1 pair of protective goggles
- 2 x 100 absorbent pad packs
- 6 absorbent socks
- 1 bag of peat moss
- 10 x 10’x 2’’ diam. floating absorbent booms

- 10 yellow storage bags
- 6 grapnel anchors

4.4 GENERAL PROCEDURES

This general procedure is to be followed in the event of a spill. Steps are listed in the order of importance; however, depending on the circumstances, conditions, and potential injuries, this order may need to be altered to meet specific needs.

1. Identify the product spilled and call for help:

Petroleum products to be used on site are arctic diesel, jet fuel, gasoline and lubricants. As soon as possible, advise the site superintendent and call for help when needed.

2. Assessment of dangers and hazards:

An immediate determination must be made about the direction of the spill's progress, whether downhill, on the ice, towards the water, or already in the water. As well, careful attention will be paid to the full nature of the incident; is this solely a surface contaminant, or are fumes an additional factor; are there any injuries current or possible.

3. Stop the flow at source:

Has the flow been stopped or is it still leaking? Is there an emergency Shut-off valve? Have holes in the container been patched? Is the container empty? PRECAUTION: ONLY ATTEMPT TO STOP THE FLOW IF IT IS SAFE TO DO SO.

4. Take actions to contain the spill:

Prompt containment can reduce environmental exposure and risk. Containment measures may be land or water based. Land based measures include application of sorbents, construction of berms and diversion/collection trenches. Water based measures could include dams, dykes, and floating booms.

4.5 SPECIFIC PROCEDURES FOR DIFFERENT ENVIRONMENTS

4.5.1 Spill on land

- Do not flush into ditches or drainage systems.
- Block entry into waterways and contain with earth, snow or other barriers.
- Remove small spills with sorbent pads.
- On tundra, collect as much contamination as possible ensuring to the maximum, yet reasonably practicable extent, to minimize destruction of the root zone of the tundra grasses.

4.5.2 Spill in water

- Contain spill as close to release point as possible.
- Use spill containment boom to concentrate slicks for recovery.
- On small spills, use sorbent pads to pick up contained oil.
- On larger spills, use skimmer on contained slicks.

The following strategies can be used to contain spills on slow moving or calm water: Contain spills on open water immediately to restrict the size and extent of the spill. Fuel and petroleum products that float on water may be contained through the use of booms, absorbent materials, skimming, or the erection of culverts. Deploy containment booms to minimize spill area; the effectiveness of booms may be limited by wind, waves, and other factors. Use absorbent booms to slowly encircle and absorb spilled material. These absorbents are hydrophobic (they absorb hydrocarbons and repel water). Once booms are secured, use skimmers to draw in hydrocarbons and minimal amounts of water. Skimmed material can be pumped through hoses to empty fuel tanks and/or drums. Recognize that culverts permit water flow and can allow fuel to be captured and collected along the surface with absorbent materials. Use absorbent pads and similar materials to capture small spills and/or oily residue on water. Determining the best possible strategy for containment will depend on a number of factors, such as: speed of slick travel, location of possible containment sites, availability of personnel and equipment, location of sensitive areas and safety of operations. Booming with either absorbent or non-absorbent booms is another effective means of containing spills on slow-moving waters and in lakes.

4.5.3 Spill in rivers and streams

- Prevent entry into water, if possible, by building berms or trenches.
- Intercept moving slicks in quiet areas using (sorbent) booms.
- Do not use sorbent booms/pads in fast currents and turbulent water.

Effective containment using conventional booming techniques is very difficult in streams or rivers where currents exceed 0.7 knots (0.4 m/s). At these speeds, oil becomes entrained in the water flowing under the boom, resulting in significant losses. Some improvement can be achieved in waters flowing at 1-2 knots (0.5 m/s to 1 m/s), particularly if the boom is deployed at an angle of less than 90° to the direction of flow. Absorbent booms or socks can also be used to provide a barrier to floating oil. These types of booms should be checked regularly, to ensure that they do not become saturated with either water or oil, as they tend to float very low in the water or even sink and release oil downstream.

4.5.4 Spill on ice and snow

- Block entry into waterways and contain with snow or another barrier.
- Remove minor spills with sorbent pads and/or snow.
- Use ice augers and pump to recover diesel under ice.
- Slots in ice can be cut over slow moving water to contain oil.
- Recover all remaining spilled product with absorbent pads.

4.6 COLLECTION AND DISOSAL OF CONTAMINATED SOIL AND MATERIAL

Once the source of the spill has been stopped and the spill response material have been installed and the spill secured, the cleanup operation needs to be initiated. Any contaminated soil will be removed and placed into *Quatrex 27* bulk bags. Empty *Quatrex* bulkbags are available in the environmental supply container located nearby the site office. For small spills, 2 *Quatrex* bags will be installed beside the maintenance garage, one for soil contaminated by oil and the other one for the soil contaminated with diesel/jet fuel or gasoline. Small spills or stained soil will be collected manually with a shovel, placed into a pale and transferred into one of the two storage bags located beside the maintenance garage. If a bag is getting filled, it will be closed, palletized, and labelled according to TDG for off-site / off-territory disposal into a licenced facility. For larger spills, the excavator will be used to remove the contaminated soil. For small to medium size spills, *Quatrex* bags will be loaded with contaminated soil directly beside the excavation. For larger spills, the contaminated soil will be loaded into a dump truck and transported to a temporary processing area where the it will be placed in stockpiles of less than 20 cubic meters. Each stockpile will be protected with polyethylene tarps. The location of a temporary storage area will be discussed with the hamlet. A soil sample will be collected from each of the 20 cubic meter stockpile and sent to the analytical laboratory to be tested. According to the analytical results, the soil could be disposed at the local solid waste facility as daily cover or loaded in to *Quatrex* bags for off-site / off-territory disposal into a licenced facility.

The dirty spill response material, including used PE, used absorbents and rags, will be collected and placed into an assigned bulk bags for off-site / off-territory disposal into a licenced facility. A bulk bag for dirty spill response material will be installed and identified properly beside the maintenance garage.

Any product collected from a spill will pumped into empty drum (s). A cubic meter tote tank could be used as a Oil/water separator if needed. Collected product, according to their type, could be reused for heating the maintenance garage (diesel and jet fuel only) or ship off-site off-territory disposal into a licenced facility.

4.7 REPORTING

Spills of other products shall also be reported. Refer to the table "Schedule 1 – Reportable Quantities for NT–NU Spills" included in the Appendix 2 for reportable products.

For every spill, pictures must be taken during and after the cleanup process. The GPS coordinates of the spill location must be recorded. All collected information and pictures will be used for the spill report. Spills of 100 litres and less will be recorded on the Site Spill Log, reported in the weekly report and within the annual license reporting. Any spill grater than 100 litres must be reported to the Nunavut 24-hour spill report line (see the attached from in Appendix 2). The person reporting the spill must provide as much of the following information as possible. Please note that the operators at the Hotline are NOT spill management experts. They can only relay information to the appropriate authorities/protection agencies. Reportable information includes but is not limited to the following:

- Date and time of spill;
- Direction spill is moving (or if it has stopped);
- Name and phone number of persons close to the location of the spill;
- Type of contaminant spilled and quantity spilled;
- Cause of spill;
- Whether the spill is continuing or has stopped;
- Description of the existing containment;
- Actions taken to recover, clean-up and dispose of spilled contaminant;
- Name, address and phone number of person reporting the spill;
- Name of person in charge of management or control at time of spill;

The spill report must be filled and sent to the NT-Nu spill Report email address spills@gov.nt.ca with a copy to the following individuals:

- PSPC, Kenton Thiessen: kenton.thiessen@pwgsctpsgc.gc.ca
- CBCL-Canadrill. David Parsons: davidp@cbcl.ca

5. SPILL PREVENTION

The prevention is the first and the most effective measure to avoid potential spills and it should be a priority for everyone.

5.1 SAFE STORAGE

All liquid that could be potentially spill should be stored in a way to have a double containment, as per applicable regulations. Diesel storage tank installed on site are dyke tanks CAN/ULC S653. Oil and antifreeze drums are stored into a marine container. When drums are temporary stored outside, they should be installed on wooden pallet. Liquid storage should be done at least 20 meters away from any water body. The proper product must be stored into the proper container with the applicable identification. Gas and diesel jerricans shall be stored in lockable and vented area.

5.2 SAFE HANDLING

Simple measures could help to prevent spills, especially when handling diesel and gasoline. When using the dyke tank to refuel a vehicle, the following procedure shall apply:

- Park the vehicle adequately and turn off the engine;
- Turn on the power switch to activate the fuel pump;
- Remove the nozzle from the tray and place it into the filling device of the vehicle;
- Push the handle's lever and monitor often the fuel level in the tank;
- Stay beside the handle during the entire refueling operation;
- When refueling is completed, place the nozzle slowly back in the tray to avoid fuel dropping;
- Turn-off the power

Only the authorized and trained drivers can operate the fuel truck. Any refueling activities shall be done at least 20 meters away from any water body. At the end of the working shift, the fuel truck shall be parked beside the maintenance garage.

5.3 MAINTENANCE OF EQUIPMENT

A good preventive maintenance of vehicles and equipment will help to prevent potential spills. Any signs of malfunctioning equipment, including a small liquid leak, shall be immediately reported to the head mechanic. When a small leak cannot be repaired immediately, the vehicle must be parked over a spill tray.

5.4 SAFE OPERATION OF VEHICLE AND EQUIPMENT

The safe operation of the vehicles and the equipment will prevent potential incident and/or accident that can lead to a spill. The traffic control plan, including the speed limits, must be followed by everyone. Considering that we will be doing work in or nearby water, the equipment operators shall be more careful and more attentive when handling rocks or material that could damage hydraulic hoses. In the case where a oil leak is observed on any components of the equipment, work must cease immediately and the source of the leak shall be found and repaired.

6. TRAINING

6.1 SPILL RESPONSE

All employees working on the project will have to attend the worker orientation seminar. Through this seminar, the spill response plan will be reviewed and explained to everyone. The employees will be trained in the safe operation of all machinery and tools, as well as in the handling of materials to help prevent and respond to spills safely, in a timely and effective manner. The content of a spill kit will be showed to the workers and a demonstration will be done for explaining how to use the equipment. Training will also include initial spill response in the event of a spill. The spill response team will be also determined and the member list will be posted.

APPENDIX 1
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 1

SAFETY DATA SHEETS
Updated SDS binder will be posted at the site office

APPENDIX 2
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 2

NT-NU Spill Report Form

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR	REPORT NUMBER -
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME	☐ UPDATE # TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM THE NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR		
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION		
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION		
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS			

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION **Station operator**	EMPLOYER	LOCATION CALLED **Yellowknife, NT**	REPORT LINE NUMBER **(867) 920-8130**

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Appendix A
Schedule 1 – Reportable Quantities for NT–NU Spills

Substance	Reportable Quantity	TDG Class
Explosives	Any amount	1.0
Compressed gas (toxic/corrosive)		2.3/2.4
Infectious substances		6.2
Sewage and wastewater (unless otherwise authorized)		6.2
Radioactive materials		7.0
Unknown substance		None
Compressed gas (Flammable)	Any amount of gas from containers with a capacity greater than 100 L	2.1
Compressed gas (Non-corrosive, non-flammable)		2.2
Flammable liquid	≥ 100 L	3.1/3.2/3.3
Flammable solid	≥ 25 kg	4.1
Substances liable to spontaneous combustion		4.2
Water reactant substances		4.3
Oxidizing substances	≥ 50 L or 50 kg	5.1
Organic peroxides	≥ 1 L or 1 kg	5.2
Environmentally hazardous substances intended for disposal		9.0
Toxic substances	≥ 5 L or 5 kg	6.1
Corrosive substances		8.0
Miscellaneous products, substances or organisms		9.0
PCB mixtures of 5 or more parts per million	≥ 0.5 L or 0.5 kg	9.0
Other contaminants, e.g. crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, wastewater, etc.	≥ 100 L or 100 kg	None
Sour natural gas (i.e., contains H_2S)	Uncontrolled release or sustained flow of 10 minutes or more	None
Sweet natural gas		
Flammable liquid	≥ 20 L	3.1/3.2/3.3
Vehicle fluids	When released on a frozen water body that is being used as a working surface	None
Reported releases or potential releases of any size that: 1. Are near or in an open water body; 2. Are near or in a designated sensitive environment or habitat; 3. Pose an imminent threat to human health or safety; or 4. Pose an imminent threat to a listed species at risk or its critical habitat	Any amount	None

Note: L = litre; kg = kilogram; PCB = Polychlorinated Biphenyls; ppm = parts per million

APPENDIX 3
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 3

QUARRY DEVELOPMENT PLAN

PILITAK ENTERPRISES LTD
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Submittals

No. : 31
Rev. : 01
Date : August 29, 2022

Project :	**CLYDE RIVER HARBOUR CONSTRUCTION** **DFO ETO-025-222050**	**Project No. :**	2022-034
Subject :	**Quarry Development Plan, rev-01**		
Submitted to :	CBCL Limited 1505 Barrington St Halifax, NS, B3J 3K5	David Parsons davidp@cbcl.ca 506-633-6650 ext 3233	
Copy to :	Kenton Thiesson PSPC	kenton.thiessen@pwgsc-tpsgc.gc.ca 204-229-6375	

Speciality :	General	**Submitted for :**	Révision
Specification section :	01 35 4331 23 16.26	**Revision required by :**	**September 8, 2022**
Drawing reference :		**Color choice required :**	
Submited as :	As specified	**Total Page incl. cover :**	**56**

Subcontractor or supplier :

-

Manufacturer :

Description : Quarry Development Plan, rev-01

Supplier No :

Comments :

Revised and submitted by :

REVIEWED BY CONTRACTOR
PILITAK ENTERPRISES LTD
NAME: François Bourassa
DATE: Aoû 29, 2022

François Bourassa, P.Eng.
Pilitak Enterprises Ltd.
1519 Federal Road
Iqaluit
418-781-6114 ext 213
fbourassa@pilitak.biz

Review by the consultant or the client :

Shop Drawing Review

This review is intended to assist the contractor in complying with the requirements of the Contract Documents and does not relieve him of his responsibilities under the contract.

- [X] no apparent errors
- [ ] apparent errors noted
- [ ] rejected - see remarks
- [ ] revise and resubmit

PER Dallas Dalzell
CBCL LIMITED

200235.00 — PROJECT
09/05/2022 — DATE

PILITAK ENTERPRISES LTD

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QUARRY DEVELOPMENT PLAN

Clyde River Harbour Development

DFO ET025-222050/A

Submitted to:

Public Services and Procurement Canada

Revision: August 2022

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

The purpose of this document is to present the Quarry Development Plan in order to describe the design and operation of the quarry from initial development through to final reclamation.

The construction project was awarded to Pilitak Enterprises Ltd (PEL) in May 2022 by Public Services and Procurement Canada (PSPC) for the Department of Fisheries and Ocean (DFO). At the end of August 2022, heavy equipment, camp facilities and material will be delivered by sealift to Clyde River. The project consists mainly of the construction of two large breakwaters, a fixed wharf structure, two lines of float wharf modules, a retrofit of the existing sealift ramp and improvements to the uplands. The new marine infrastructure will be constructed during the summers of 2023, 2024 and 2025 while preparation work will be carried out during the fall of 2022.

This plan is in effect from August 2022 and will be updated accordingly, as needed.

1.1 OBJECTIVE AND DEFINITIONS

The main objectives of this plan are described below:

- Present the development steps of the quarry;
- Detail the drilling and blasting procedures;
- Explain the explosive management;
- Present the reclamation plan at the end of our operations.

The existing quarry is located about 2 kilometers southwest of the air terminal. The quarry is accessible through two roads, both connected to the airport road. The current foot print of the quarry represents approximately 3,800 square meters. The quarry floor is currently at the elevation ±20 m with faces ranging from 4 meters high on the north side and up to 12 meters high on the south side.

The total volume of rock needed for this project could be roughly estimated to 150,000 cubic meters including losses for rejected material. The total volume will be higher in the case where the rock would be highly fractured. Assuming an average depth of 8 meters, a surface of 18,750 square meters would be needed to produce the rocks and the granular material for the project. The current permitting for the quarry allows a potential expansion of about 40,000 square meters, which seems sufficient to cover the needs for this project.

1.2 EXISTING SURFACE AND BEDROCK CONDITIONS

According to the results of the geotechnical investigation realized by Canadrill for this project, the overburden thickness within the quarry expansion would range from 100mm to 460mm. The overburden consists mainly in a thin layer of rootmat and silty sand. This was observed in 7 boreholes that were drilled within the quarry expansion limits. The bedrock consists of granitic gneiss that could be moderately fractured, as observed in the current quarry faces.

1.3 TOPOGRAHY AND HYDROGEOLOGY

In regard to the topography of the area included within the quarry expansion, the west half is mainly flat at an elevation of 33 meters while the eastern half is sloping toward North east to reach an elevation of 18 meters at the limit of the expansion area. It is expected that any surface water would follow the natural slope of this area, ending into a drainage path that leads to the Clyde River.

The current elevation of the quarry floor is about 20 meters. It allows the water to drain out to the north end. It is expected that the floor will be kept to the same elevation during the development phases of the quarry. However, a minimum slope will be kept toward the north end in order to maintain a positive drainage in this direction.

2. QUARRY DEVELOPMENT

2.1 CLEARING AND GRUBBING

Prior the development of a quarry section, the organic vegetation mat and upper soil horizon material will be grubbed and stockpiled for further site rehabilitation. The quarry development will be initiated prior to the arrival of migratory birds (breeding season mid-May to mid-August) such that the quarry and surrounding area becomes unattractive for nesting. Buffers or exclusion zones shall be implemented, in the event a sensitive species or feature (e.g., nest) is identified, to ensure wildlife are not disturbed.
During grubbing, care will be taken to ensure that grubbed material will not be pushed into areas which are to be left undisturbed.

2.2 SNOW REMOVAL AND LOCAL WATER MANAGEMENT

Positive drainage will be incorporated in the quarry design as development progresses. As mentioned earlier, the pit floor will also have a positive grade applied for drainage to flow and to minimize ponding effects. Grades will not exceed 2% to avoid adverse flow and erosion problems. The drainage will exit the pit floor to natural ground elevations at the north end of the quarry.

At the end of each season, rocks will be removed from the pit floor in order to facilitate the snow removal at the beginning of the next construction season. The accumulated snow during the winter will be cleared out from the pit floor and stockpiled outside of the work area. Erosion and sediment control measures will be implemented where needed, according to the site conditions and to the Erosion and Sediment Control Plan (ESCP).

2.3 DEVELOPMENT PHASES AND PROCESSING

2.3.1 Development phases

The quarry site development will be a drill and blast (rock) site and the pit will be developed uniformly up the face of the deposit, using the quarry section already opened. It is anticipated that the deposit is consistent through the quarry perimeters. Extraction will be consistent with the drilling pattern and bench design working up the face of the ridge.

The quarry development will be done in 3 phases, as presented in figure 2.3.1. It is currently planned to develop the phase 1 during the fall 2022 in order to test and adjust our processing methodology. During

the phase 1, the rock processing plant will be installed outside of the quarry limits. For the subsequent development phases, the rock processing plant will be installed directly into the quarry. The processing equipment will be removed while blasting.

The top perimeter of the quarry will be protected with boulders.

Figure 2.3.1

2.3.2 survey

An original ground topographic survey will be completed prior to quarry activities and repeated upon completion of quarrying to obtain a final measurement of the materials excavated from the quarry source.

2.3.3 Processing

The rocks meeting the requirements to be used for armour stones will be removed directly from the blasted section with an excavator, measured, transported and placed into two separate stockpiles on the west side of the quarry, the first one being for the 500-1500 Kg and the second one for the 2000-3000 Kg. The Oversize material will be left in the quarry and reprocessed with an excavator equipped with a hydraulic hammer in order to meet the armour stones specifications. In certain cases, the oversized material will be dealt with by the drilling and blasting crew by “popping” the material with a small charge to break it down into usable material.

Material too small to be used for armour stones will be processed with the rip rap plant which will be adjusted to produce either core stone, filter stones or rip rap. Each product will be transported and placed into separate stockpiles outside of the quarry limits. The rejected material will be transported to the rock crusher plant installed on the west side of the airport where the other types of material will be processed.

2.3.4 Equipment

Rock processing Plant

- Rip Rap Plant Lippman VGF6224
- Screener Plant and conveyor JCI-FT6203
- Excavator Komatsu PC-650-11
- Excavator PC-450 LC8
- Loader Komatsu W500-8
- Dump truck HM-300 (2)

Rock crushing plant

- Rock crusher Pioneer FT2650
- Rock crusher JCI FT 300
- Excavator Komatsu PC-400 LC7
- Loader Komatsu W500-6
- Dump truck HM-300

3. DRILLING AND BLASTING

The drilling pattern was preliminary established to 3.7 x 4.3 meters in order to obtain material in a size that can be used as armour stone for the construction of the breakwaters. The drill pattern will be adjusted according to the result of the first blast and when changes in the geological conditions are observed. Boreholes diameter will be 4 ½'' and the drilling depth will be reaching the current pit floor elevation. The in-hole powder factor will be initially set at 0.8 and adjusted according to the results of the first blast. The following table shows typical explosive quantity to be used according to the borehole diameter

Loading density

Hole Diameter mm	Hole Diameter in	Kg of explosive per meter of column for given density (g/cm³)*														Hole Diameter mm	Hole Diameter in
		0.60	0.80	0.82	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.30	1.35	1.40		
25	1	0.29	0.39	0.40	0.42	0.44	0.47	0.49	0.52	0.54	0.56	0.59	0.64	0.66	0.69	25	1
32	1 1/4	0.48	0.64	0.66	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.97	1.05	1.09	1.13	32	1 1/4
38	1 1/2	0.68	0.91	0.93	0.96	1.02	1.08	1.13	1.19	1.25	1.30	1.36	1.47	1.53	1.59	38	1 1/2
45	1 3/4	0.95	1.27	1.30	1.35	1.43	1.51	1.59	1.67	1.75	1.83	1.91	2.07	2.15	2.23	45	1 3/4
51	2	1.23	1.63	1.68	1.74	1.84	1.94	2.04	2.14	2.25	2.35	2.45	2.66	2.76	2.86	51	2
57	2 1/4	1.53	2.04	2.09	2.17	2.30	2.42	2.55	2.68	2.81	2.93	3.06	3.32	3.44	3.57	57	2 1/4
64	2 1/2	1.93	2.57	2.64	2.73	2.90	3.06	3.22	3.38	3.54	3.70	3.86	4.18	4.34	4.50	64	2 1/2
70	2 3/4	2.31	3.08	3.16	3.27	3.46	3.66	3.85	4.04	4.23	4.43	4.62	5.00	5.20	5.39	70	2 3/4
76	3	2.72	3.63	3.72	3.86	4.08	4.31	4.54	4.76	4.99	5.22	5.44	5.90	6.12	6.35	76	3
83	3 1/4	3.25	4.33	4.44	4.60	4.87	5.14	5.41	5.68	5.95	6.22	6.49	7.03	7.30	7.57	83	3 1/4
89	3 1/2	3.73	4.98	5.10	5.29	5.60	5.91	6.22	6.53	6.84	7.15	7.47	8.09	8.40	8.71	89	3 1/2
95	3 3/4	4.25	5.67	5.81	6.02	6.38	6.73	7.09	7.44	7.80	8.15	8.51	9.21	9.57	9.92	95	3 3/4
102	4	4.90	6.54	6.70	6.95	7.35	7.76	8.17	8.58	8.99	9.40	9.81	10.62	11.03	11.44	102	4
108	4 1/4	5.50	7.33	7.51	7.79	8.24	8.70	9.16	9.62	10.08	10.54	10.99	11.91	12.37	12.83	108	4 1/4
114	4 1/2	5.82	8.17	8.37	8.68	9.19	9.70	10.21	10.72	11.23	11.74	12.25	13.27	13.78	14.29	114	4 1/2
121	4 3/4	6.90	9.20	9.43	9.77	10.35	10.92	11.50	12.07	12.65	13.22	13.80	14.95	15.52	16.10	121	4 3/4
127	5	7.60	10.13	10.39	10.77	11.40	12.03	12.67	13.30	13.93	14.57	15.20	16.47	17.10	17.73	127	5
133	5 1/4	8.34	11.11	11.39	11.81	12.50	13.20	13.89	14.59	15.28	15.98	16.67	18.06	18.76	19.45	133	5 1/4
140	5 1/2	9.24	12.32	12.62	13.08	13.85	14.62	15.39	16.16	16.93	17.70	18.47	20.01	20.78	21.55	140	5 1/2
146	5 3/4	10.04	13.39	13.73	14.23	15.07	15.90	16.74	17.58	18.42	19.25	20.09	21.76	22.60	23.44	146	5 3/4
152	6	10.89	14.52	14.88	15.42	16.33	17.24	18.15	19.05	19.96	20.87	21.78	23.59	24.50	25.40	152	6
159	6 1/4	11.91	15.88	16.28	16.88	17.87	18.86	19.86	20.85	21.84	22.83	23.83	25.81	26.81	27.80	159	6 1/4
165	6 1/2	12.83	17.11	17.53	18.18	19.24	20.31	21.38	22.45	23.52	24.59	25.66	27.80	28.87	29.94	165	6 1/2
172	6 3/4	13.94	18.59	19.05	19.75	20.91	22.07	23.24	24.40	25.56	26.72	27.88	30.21	31.37	32.53	172	6 3/4
178	7	14.93	19.91	20.41	21.15	22.40	23.64	24.88	26.13	27.37	28.62	29.86	32.35	33.59	34.84	178	7
187	7 1/4	16.48	21.97	22.52	23.34	24.72	26.09	27.46	28.84	30.21	31.58	32.96	35.70	37.08	38.45	187	7 3/8
200	7 1/2	18.85	25.13	25.76	26.70	28.27	29.85	31.42	32.99	34.56	36.13	37.70	40.84	42.41	43.98	200	7 7/8
203	8	19.42	25.89	26.54	27.51	29.13	30.75	32.37	33.98	35.60	37.22	38.84	42.08	43.69	45.31	203	8
216	8 1/2	21.99	29.31	30.05	31.15	32.98	34.81	36.64	38.48	40.31	42.14	43.97	47.64	49.47	51.30	216	8 1/2
229	9	24.71	32.95	33.77	35.01	37.07	39.13	41.19	43.25	45.31	47.37	49.42	53.54	55.60	57.66	229	9
251	9 1/2	29.69	39.58	40.57	42.06	44.53	47.01	49.48	51.95	54.43	56.90	59.38	64.33	66.80	69.27	251	9 1/2
254	10	30.40	40.54	41.55	43.07	45.60	48.14	50.67	53.20	55.74	58.27	60.80	65.87	68.41	70.94	254	10
270	10 1/2	34.35	45.80	46.95	48.67	51.53	54.39	57.26	60.12	62.98	65.84	68.71	74.43	77.29	80.16	270	10 5/8
279	11	36.68	48.91	50.13	51.97	55.02	58.08	61.14	64.19	67.25	70.31	73.36	79.48	82.53	85.59	279	11
311	12 1/4	45.58	60.77	62.29	64.57	68.37	72.17	75.96	79.76	83.56	87.36	91.16	98.75	102.55	106.35	311	12 1/4
381	15	68.41	91.21	93.49	96.91	102.61	108.31	114.01	119.71	125.41	131.11	136.81	148.21	153.91	159.61	381	15
445	17 1/2	93.32	124.42	127.53	132.20	139.98	147.75	155.53	163.30	171.08	178.86	186.63	202.19	209.96	217.74	445	17 1/2

*For non-gassed products only. The density of gassed products varies according to depth in an explosive column and the open cup density. Please consult the "Gassing density for Titan blends" table for further information.

Calculation Kg/m = 3.14159 x D² x P / 4,000 **Where** D is the hole diameter in mm P is the explosive density in g/cm³

To determine the loading factor for explosive densities not listed, select the loading factor for the size hole in the 1.00g/cm³ column then multiply it by the required density in g/cm³.

3.1 PERMITTING AND QUALIFICATIONS

An explosive license for the acquisition and storage of explosives was obtain through Natural Resources Canada for the Clyde River Harbour Project.
Considering that the quarry is located in the alignment of the runway, an aeronautical assessment form was sent to transport Canada and a land use proposal to NAV Canada in order to advise them that blasting operations will be carried out at the quarry. These notifications shall be done at the beginning of each blasting season. A NOTAM (Notice to Airmen) agreement for blasting will be issued by NAV Canada when required.

All explosive handling and blasting operations will be carried out by our licenced explosive specialists. Refer to the appendix 1 for their qualifications.

3.2 EQUIPMENT AND EXPLOSIVES

The following equipment will be assigned to the drilling and blasting operations.

Equipment

- Drill Sandvik DX800
- Air compressor 950 CFM Atlas-Copco
- 2 explosive magazine, capacity 2,500Kg
- 2 explosive magazine, capacity 7,500Kg
- 6 explosive magazine, capacity 10,000Kg
- Pick up truck with explosive magazine, capacity 900 Kg

The following explosives and accessories will be used. The safety data sheets are presented in Appendix 2.

Explosives

- ANFO bags WR
- ANFO bags HD
- Packaged emulsion 1.5 Normite V 2.5'' x 35''
- Cast boosters AES 12 OZ
- Non-electric detonators 15M 25/500
- Electric detonators Daveydet serie 4000

3.3 EXPLOSIVE MANAGEMENT

High quality explosives have been selected for blasting operations. The explosives are packaged into marine containers specially built and identified for ground and marine transportation. Once arrived in Clyde River, the explosive containers will be transported nearby the quarry and their content transferred into certified explosive magazines. The explosive containers will be guarded 24 hours until their content has been transferred into magazines. When boreholes are ready to be loaded, the explosives will be transported from the storage caches to the quarry with a pickup truck equipped with an explosive magazine at the back. The following procedures apply for the transportation and the handling of the explosives:

- Transportation and handling of explosives to be done only by authorized and qualified personnel;
- No smoking or any source of light or fire shall be allowed near explosives;
- Explosives and detonators are to be transported into separate magazines;
- A daily Inventory of the explosives shall be done;
- Ensure the stock of explosives is rotated so that the oldest stock is used first;
- Explosive magazines are to be weekly inspected;
- Empty packages shall be removed immediately and destroyed;
- Proper signage to be installed on magazines and vehicles

During the project shut down for the winter period, a weekly inspection of the explosive magazines will be done by a local worker. The Hamlet will be informed of the explosive storage plan and conditions of the permit.

3.4 SAFETY PERIMETER

The quarry is located into an area where the access is limited by the Clyde River. There are only two access roads that lead to the quarry from the airport road. One access road is crossing the river by the bridge and the other one by the ford crossing. The airport is located 1.5 km from the quarry to the north and the nearest building is located at 1.4 km to the northwest. The nearest point of the airport road from the quarry is located at 1.2 km to the north. Before any blast, both access roads to the quarry will be temporary blocked at the junction of the airport road. Currently, the safety perimeter for workers and construction vehicles was established to an area of 300 meters away from the blast location. This perimeter could be adjusted according to the observed geological conditions.

3.5 BLASTING PROCEDURES

Blasting will be restricted to hours as agreed upon with the Hamlet. The blasting schedule will be submitted to the Hamlet for review and approval prior to commencing blasting.

When a Blast has been completely drilled, the following procedures will be applied by Pilitak before loading boreholes and blasting:

- The blaster in the morning will let the following people know the scheduled time of blast in accordance with the airport flight dispatcher.

AIRPORT (CARS)	(867) 924-6344
RCMP	(867) 980-0123
HAMLET RADIO	(867) 924-6264

- Two trucks will be assigned to block the access roads (2) to the quarry site, at junction of the airport road. Proper signage will be installed.
- The guards will be communicating to the blaster by radio to let him know that the entire blasting perimeter has been cleared and that it is safe to blast when he is ready.
- When all is cleared the blaster will sound the siren to let everybody know he is ready to blast. 30 seconds will pass then he will press on the button.
- No one is to leave their position until the blaster goes down to the blast site to make sure that all the explosives set off as properly.
- The blaster will then set off the siren again to let everybody know it is safe to go back to work.
- The trucks will then clear the way and the guards will remove the signs.

3.6 MISFIRE

Before drilling is commenced, the Blaster shall walk the complete pattern to check for any misfire/cut-off holes. The Blaster will look for any signs of explosives or lack of ground movement that might indicate a misfire or cut-off hole. Where an explosive charge has been misfired or cut-off, no work may be performed in the area other than that required making the area safe. Once the hole has been cleaned out, the hole may be re-charged, re-stemmed and blasted.

3.7 MONITORING

There is only one building located within 1.5 kilometers of the quarry. The Learning Center is located to 1.4 km to the northwest. A seismograph will be installed inside the building in order to monitor the vibrations during the entire progress of blasting operations.

3.8 EXPLOSIVE SPILL

When handling, transporting or storing explosives, care will be taken to avoid any spillage. Any spilled product will be promptly reported, cleaned up, and properly disposed. A spill report detailing the incident will be submitted. An incident report will be provided that details the basic cause of the spill and any corrective actions taken to minimize the type of incident from reoccurring.

3.9 INCIDENTS INVOLVING EXPLOSIVES

Any incident involving the transportation, the storage of explosives and restricted of explosives and restricted components shall be reported to the Chief Explosives Inspector as soon as circumstances permit. For an accident serious injury or major property damage, call (855) 912-0012 as soon as possible. All other accidents/incidents should be reported to (450) 773-3431. The completed Explosive Incident Report Form F07-01 and should be emailed to ERDmms@rncan.gc.ca or by fax to (450) 773-6226.

3.10 TRAINING

Training is seen as a key element in the safe usage and proper environmental management of explosives and blasting. All employees working on or around blasting operations will undergo rigorous employee orientation and training procedures for managing, transporting and loading explosives into blast holes. Experienced competent employees are an essential part of blasting best management practices

4. RECLAMATION

The operation of the quarry is anticipated to continue until 2025. The process of the quarry reclamation will be ongoing and not relegated to the end of operations. As a result, progressive reclamation will be employed as areas of the pit quarry become depleted and no longer used. The active quarry site will be kept clean, tidy, trimmed and free of any garbage and debris during the operational. All unused materials will be returned to the quarry, flattened and contoured at the time of final reclamation. Displaced and stored topsoil and overburden will also be returned and placed into selected areas where revegetation will be promoted.

4.1 WATER DIVERSION

As described previously, the quarry development includes a positive drainage management plan for the pit floor. On completion of the operations and final clean-up of the quarry, positive drainage will be maintained or improved to enhance the drainage requirements. Disruption of drainage courses will not be encountered in the development of the quarry. According to the Erosion and Sediment Control Plan (ESCP), adequate mitigation facilities will be installed to reduce the erosion at the discharge point, where the water is coming out from the quarry pit.

4.2 PERMAFROST PROTECTION

Soil permafrost conditions in the quarry are not anticipated. At the end of the quarry operation, the general appearance of the quarry will be of exposed rock, not prone to movement or erosion.

4.3 WILDLIFE HABITAT ENHANCEMENT

Working in conjunction with the environmental monitor, wildlife habitat enhancement will be considered in the reclamation plan. This includes specifics related to the enhancement of revegetation using locally stored materials and if required, reseeding and fertilization using the appropriate and approved mixtures.

4.4 FACE STABILIZATION AND EDGE PROTECTION

Each time a face section of the quarry is completed, loose rocks will be removed with the excavator in order to make sure to avoid future potential rock fall-off. Boulders and rocks will be placed along the top edge of the quarry faces in order to indicate the limit of the quarry perimeter.

APPENDIX 1
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 1

EXPLOSIVE SPECIALIST QUALIFICATIONS

Certificate Number: 2020-0262

Expires at midnight on: July 10, 2025

MINE HEALTH AND SAFETY ACT

BLASTING CERTIFICATE

This certifies

Jean Blouin

meets the requirements of the *Mine Health and Safety Act* and Regulations, and has authority to prepare and conduct blasting in any Nunavut mine, within

Surface

Dated at Yellowknife,
this 10 day of July, 2020

Chief Inspector of Mines

WSCC Workers' Safety & Compensation Commission | ᐃᖃᓗᐊᔪᖅᑎᓂᒃ ᐊᑕᐊᓇᖅᑐᓂ ᐊᒻᒪᓗ ᓇᓕᓕᒫᓂᖅ ᖃᐅᔨᓴᖅᑎᑦ

Promoting workplace safety and care for injured workers.

Certificate Number: 2020-0307

Expires at midnight on: July 10, 2025

EXPLOSIVES USE ACT

EXPLOSIVES HANDLING PERMIT

This permit authorizes

Jean Blouin

to handle and use explosives in Nunavut
(Subject to the limitations below)

Surface

Dated at Yellowknife
this 10 day of July, 2020

Permit Holder

Cary Ingram

Digitally signed by Cary Ingram
DN: dc=ca, dc=nt, dc=wcb, dc=corp, ou=Accounts, ou=User Accounts, ou=Employees, cn=Cary Ingram
Date: 2020.09.10 12:54:26 -06'00'

Inspector or Deputy Inspector

WSCC Workers' Safety & Compensation Commission | ᐃᖃᓗᐃᔪᖅᑎᓂᒃ ᐊᑕᐅᓯᒪᓂᖅ ᐊᒻᒪ ᓇᓕᓕᒫᓂᖅ ᖃᐅᔨᓴᖅᑎᓂᒃ

Promoting workplace safety and care for injured workers.

Certificate Number: 2020-0261

Expires at midnight on: July 10, 2025

MINE HEALTH AND SAFETY ACT

BLASTING CERTIFICATE

This certifies

Jean-Francois Auger

meets the requirements of the *Mine Health and Safety Act* and Regulations, and has authority to prepare and conduct blasting in any Nunavut mine, within

Surface

Dated at Yellowknife,
this 10 day of July, 2020

Chief Inspector of Mines

WSCC Workers' Safety & Compensation Commission | ᐃᖃᓗᐊᔪᖅᑎᓂᒃ ᐊᑕᐊᓇᖅᑐᓂᒃ ᐊᒻᒪᓗ ᓇᓕᓕᒫᓂᒃ ᖃᐅᔨᓴᖅᑎᑦ

Promoting workplace safety and care for injured workers.

Certificate Number: 2020-0308

Expires at midnight on: July 10, 2025

EXPLOSIVES USE ACT

EXPLOSIVES HANDLING PERMIT

This permit authorizes

Jean-Francois Auger

to handle and use explosives in Nunavut
(Subject to the limitations below)

Surface

Dated at Yellowknife
this 10 day of July, 2020

Permit Holder

Cary Ingram

Digitally signed by Cary Ingram
DN: dc=ca, dc=nt, dc=wcb, dc=corp, ou=Accounts, ou=User Accounts, ou=Employees, cn=Cary Ingram
Date: 2020.09.10 12:55:03 -06'00'

Inspector or Deputy Inspector

WSCC Workers' Safety & Compensation Commission | ᐃᖃᓗᐃᔨᖅᑎᓂᓪᓗᒍ ᐊᑕᐊᓘᑐᐃᓐᓇᓕᒫᓂᖅ ᐊᒻᒪ ᓇᓕᓕᐅᑉᐳᓗᒃᑐᓂᖅ ᖃᐅᔨᓴᖅᑎᑦ

Promoting workplace safety and care for injured workers.

APPENDIX 2
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 2

EXPLOSIVE PRODUCTS SAFETY DATA SHEETS

APPENDIX 4
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 4

EROSION AND SEDIMENT CONTROL PLAN

PILITAK ENTERPRISES LTD ᐱᓕᑕᒃ ᐃᖅᑲᐃᓯᕕᒡᔪᐊᑦ ᓕᒥᑎᑦ

Submittals

No. :	28
Rev. :	00
Date :	July 30, 2022

Project :	**CLYDE RIVER HARBOUR CONSTRUCTION** **DFO ETO-025-222050**	**Project No. :**	2022-034
Subject :	**Erosion and Sediment Control Plan**		
Submitted to :	CBCL Limited 1505 Barrington St Halifax, NS, B3J 3K5	David Parsons davidp@cbcl.ca 506-633-6650 ext 3233	
Copy to :	Kenton Thiesson PSPC	kenton.thiessen@pwgsc-tpsgc.gc.ca 204-229-6375	

Speciality :	Environment	**Submitted for :**	Révision
Specification section :		**Revision required by :**	**August 9, 2022**
Drawing reference :		**Color choice required :**	
Submited as :	As specified	**Total Page incl. cover :**	**20**

Subcontractor or supplier :

-

Manufacturer :

Description : Erosion and Sediment Control Plan

Supplier No :

Comments :

Revised and submitted by :

REVIEWED BY CONTRACTOR
PILITAK ENTERPRISES LTD
NAME: François Bourassa
DATE: Jul 30, 2022

François Bourassa, P.Eng.
Pilitak Enterprises Ltd.
1519 Federal Road
Iqaluit
418-781-6114 ext 213
fbourassa@pilitak.biz

Review by the consultant or the client :

Shop Drawing Review

This review is intended to assist the contractor in complying with the requirements of the Contract Documents and does not relieve him of his responsibilities under the contract.

- [ ] no apparent errors
- [X] apparent errors noted
- [ ] rejected - see remarks
- [ ] revise and resubmit

Dallas Dalzell
PER
CBCL LIMITED
200235.00 PROJECT
08/02/2022 DATE

5.2.3.3 - The contractor shall obtain Hamlet approval for acceptable dust suppressants. Dust suppressants shall be selected in accordance with GN Sustainable Development, Environmental Protection Services, and Environmental Guideline for Dust Suppressants (GN,2002)

PILITAK ENTERPRISES LTD

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EROSION & SEDIMENT CONTROL PLAN

Clyde River Harbour Development

DFO ET025-222050/A

Submitted to:

Public Services and Procurement Canada

Revision: July 2022

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

The purpose of this document is to present the Erosion and Sediment Control Plan (ESCP) employed to control site runoff and to prevent and mitigate erosion and sedimentation during the construction of the new harbour in Clyde River, Nunavut. Clyde River. In-water construction activities have the potential to temporarily affect marine water quality and increase turbidity and total suspended sediment (TSS) in the harbour. Dredging and the placement of materials can also result in the resuspension of sediment.

The construction project was awarded to Pilitak Enterprises Ltd (PEL) in May 2022 by Public Services and Procurement Canada (PSPC) for the Department of Fisheries and Ocean (DFO). At the end of August 2022, heavy equipment, camp facilities and material will be delivered by sealift to Clyde River. The project consists mainly of the construction of two large breakwaters, a fixed wharf structure, two lines of float wharf modules, a retrofit of the existing sealift ramp and improvements to the uplands. The new marine infrastructure will be constructed during the summers of 2023, 2024 and 2025 while preparation work will be carried out during the fall of 2022.

This ESCP includes the identification of the activities that are susceptible to generate erosion and/or sedimentation, the mitigation measures, the description of the protection equipment to be used and the monitoring and reporting. This ESCP is part of the Environmental Management and Mitigation Measures that are being implemented to protect the environment during construction. These measures will help maintain compliance with the Federal Fisheries Act, especially Sections 34 to 36 of the Act, which prohibits any activities, other than fishing, that results in the death of fish, including the deposition of deleterious substances into waterbodies frequented by fish. This plan is in effect from August 2022 and will be updated accordingly, as needed.

1.1 OBJECTIVE AND DEFINITIONS

Erosion and sedimentation are natural processes of loosening and transporting soil through the action of wind, water, and the subsequent movement and deposition of sediment particles. Construction activities can result in increased erosion and sedimentation. The dredging activities will generate important volume runoff water which will require appropriate mitigation measures. The importance of erosion and sedimentation control is primarily to reduce the potential impact that erosion has on watercourses. Soil consists of many components, the majority of which are organic material, sand, silt and clay. It is the silt and clay that are the most damaging to watercourses as they are comprised of small particles that can be carried for long distances while suspended in water. Small silt and clay particles can cloud the water making it difficult for fish to find food, and also block sunlight reaching aquatic plants. When small silt and clay particles settle on the bottom, they can smother fish and amphibian eggs. There is an added risk that eroded soil may carry hard metals, traces of petroleum product or other pollutants from land into a watercourse. The effects of sedimentation in watercourses can be profound enough to be considered deleterious (harmful or damaging) to fish.

Erosion

Occurs when energy (water in this case) is applied to a soil surface causing the detachment, suspension and transfer of soil particles from a stable mass. The objective is to reduce the water flow that could loosen the soil particles.

Sedimentation

The process whereby the energy of water carrying soil particles is reduced down to the point that those suspended particles are allowed to settle out and be deposited, creating a build-up of sediment at that location. The objective is to create a sedimentation low point in order to reduce the energy and have all the size particles deposited before it enters any water bodies, rivers and streams.

Deleterious

The federal Fisheries Act defines it as “Any substance that, if added to water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use of by man of fish that frequent that water” (Canadian Fisheries Act).

Wind can be a mechanism of erosion, particularly for dry, finely textured soils with low organic content that is exposed by construction activities. Wind erosion can influence local air quality on the project site and be a source of sediment for water bodies. Areas of potential wind erosion are mainly roads and stockpiles.

1.2 EXISTING SURFACE AND VEGETATION CONDITIONS

Most of Clyde River's town and airport are built atop thick, terraced, raised marine and glaciomarine sandy sediments that contain saline permafrost. According to the geotechnical investigation done for this project, the native soils at the harbour water lot and at the harbour uplands primarily consist of silty sand to sand with silt and gravel. It is acknowledged that the sediments present on site are susceptible to be easily transported and will need special attention in order to minimise the erosion and sediment processes during the different construction phases.

2. EROSION RISKS IDENTIFICATION AND MITIGATION MEASURES

This section describes the risks and presents the mitigation measures. The following construction activities have been identified as operations that could potentially generate erosion and siltation.

- Quarrying (drilling, blasting, excavation)
- Rock crushing
- Haul road and river crossing upgrades
- Breakwater construction
- Dredging and disposal of dredged material

It is important to understand that sedimentation controls themselves are only employed as a second line of defense. Sedimentation controls are designed to provide a place for water to slow down and allow the particles to be deposited that the primary erosion controls were unable to prevent. Sediment fencing does not “filter” the water but rather are meant to slow down the water and allow fine soil particles or other potentially deleterious materials to settle behind it. Other measures related to sediment control will be implemented when necessary and when possible, as the installation of floating silt curtain in the ocean, culverts, ditches, berm construction, embankment work and grading of the working surface.

2.1 QUARRY ACTIVITIES

For construction of the breakwaters, a large amount of rock will have to be blasted and processed from the existing quarry. As presented in the figure 2.1, the existing quarry is located 600 meters southwest of the Clyde River. The topography of the quarry area slops toward the Clyde River. The elevation of the bottom of the quarry is about at 20 meters while the river bottom in this area is at around 2 meters.

The quarry needs to be kept free of standing water. The drainage of the quarry will be done through a ditch that eventually leads to the Clyde River. Even though the quarry operations will not generate a lot of fine material, the drainage of this area could transport fine material to the river. In order to prevent silt to reach out the river, a catch basin will be built at the exit of the quarry. The exact locations of the catch basins will be determined on site. Silt fences could be added according to site conditions.

Some dust could be produced during dry days mainly from heavy equipment movements. This will be addressed into a further section. The rock sorting process will not generate a lot of dust since we will mainly be working with mainly blasted rocks. The blasts do create some dust but only for a brief moment. The drilling operation does generate dust but it is mitigated by a dust collector.

Figure 2.1 Quarry Location

2.2 CRUSHING ACTIVITIES

The rock crushing activities will be carried out on a flat area located nearby the west side of the airport. This area was used for the same purpose during the runway upgrade, a few years ago. The material extracted from the quarry will be transported to this area, processed and stockpiled. Silt fences will be installed around the stockpiles, if needed. This entire area is flat and not well drained. Additional drainage ditches could be added where needed. The existing ground could be soft in some areas and in order to control the potential erosion from the heavy equipment circulation, coarse material will be used to improve the surface stability where needed. Considering that this area is mainly flat, existing drainage paths will generate only low velocity currents and the erosion potential should be considered low. The main receptor is a draining ditch located on the north side of the road that leads to the airport. Silt fences and catch basins will be added according to site conditions in order to avoid fine sediments from getting through this receptor which is connected to a brook that leads to the bay of Clyde River.

According to the weather conditions, dust could be generated during the rock crushing operation. Water spray could be used to keep the dust down during the dry and windy days.

2.3 RIVER CROSSING

The river crossing to reach out the existing quarry will be done either on a temporary culvert crossing to be installed or on the existing bridge that will require improvements in order to handle the weight of loaded trucks and heavy equipment. At the time of writing this document, the option for the bridge improvement is preferred but pending for permitting. The required permits are in place for the temporary culverts crossing and if this method is used, the erosion protection and sediment control measures will be added within this section.

The bridge improvement would include the drilling and the installation of 14 steel piles of 203 mm diameter. The work is planned for mid September but could be done later in the season, pending of the permit issuance. According to the period when the work would be performed, the drilling activities would be carried out either from the bridge or form the bottom of the river. Both options would generate low impacts on the river compared to the yearly installation and removal of the culvert crossing.

This part of the plan will be updated when the river crossing method will have been determined.

2.4 ROAD AND ACCESS ROAD

The existing roads will be used for the transportation of the rocks and granular material required for the construction of the breakwaters and other features of the new harbour. The total drive distance between the quarry and the construction site is about 5 kilometers. Existing culverts are crossing the road at different places. Some of the culverts will have to be replaced. During the process of replacing a culvert, adequate sediment control measures will be installed. Both culvert entry and exit will be protected with clear stones and geotextile. The access road to the quarry will need to be upgraded. Drainage ditches may have to be improved and road structure to be reinforced in order to avoid rutting, gouging and/or erosion of the ground surface. The existing hamlet roads will be frequently graded and compacted in order in order to maintain them in good conditions. Additional crushed gravel will be added in some sections of the road where needed.

Regarding the dust control, water and calcium chloride will be added in order to keep the dust down. Water will be poured out by our water truck which is equipped with a rear spreader bar. Calcium chloride will be added with a 2 tons spreader installed at the back of a pickup truck. The normal rate of application recommended by the manufacturer is one tonne per kilometer, for a 10 meters wide road. Several applications could be done during one summer, depending upon the weather conditions and the volume of the traffic. Based on daily observations, the environmental monitor will be responsible to determine when the dust suppression application is required.

2.5 BREAKWATER CONSTRUCTION

The breakwaters construction will involve the placement of large quantities of rocks and granular material at different depths in the water. Even tough the type of material to be used for the construction of the breakwaters contains almost no fine, the placement of the materials could generate suspended solids coming from the seabed. The core material will be dumped and pushed while the rocks will be placed using an excavator. Even placed with care, this operation will create seafloor disturbance and increased water turbidity conditions. This operation will be followed by the environmental monitor. The water quality will be monitored as per described in section 4. The method used for material placement could be adjusted to mitigate the impacts. According to sea conditions and the absence of floating ice, a floating silt curtain could be installed around the work area. The floating silt curtain will be available at the site and installed if needed.

2.6 DREDGING AND DISPOSAL OF DREDGED MATERIAL

The dredging operations involve the construction and removal of temporary roads in order to access the areas to be dredged, the excavation of the seabed, the transportation and the management of the dredged spoils. According to our current schedule, dredging operations will be carried only once both breakwaters will have been completed. This will allow the reduction of potential impacts generated during this type of activity. This will also render possible the installation of a floating silt curtain that will enclose the work area in order to reduce the impact of suspended solids in water. The temporary access roads will be built with clear stones and gravel to reduce the impact on water quality. During the dredging operations, the water quality will be monitored as per described in section 4.

The dredged material will be loaded into dump trucks and transported to the dredge spoil disposal area, located on the west side of the tankfarm, as indicated on the figure 2.6.1. This area will be prepared in order to control the water runout from the dredged spoils as well as to avoid erosion and siltation. The entire area will be reshaped and ditches will be dug in order to control the water runoff. Silt fences and catch basins will be installed at the proper locations. The dredged spoil will be placed in order to facilitate their drainage. Rocks will be placed in a separate pile and drained material will be either processed for reuse, as per specifications, or spread out and compacted.

figure 2.6.1: Dredge spoil disposal area

3. EROSION PROTECTION DEVICES AND METHODS

The erosion and protection devices will be stored nearby the site office. Their installation will be done under the supervision of the environmental monitor.

3.1 SILT FENCES

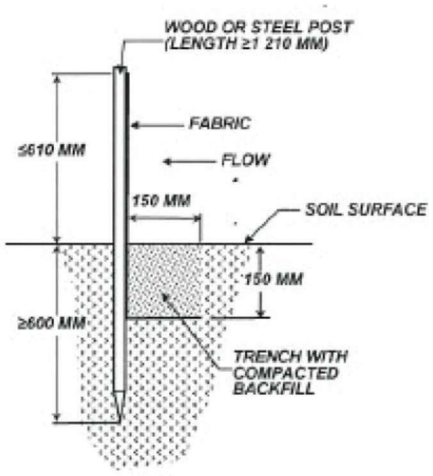
Silt fences are made with permeable geotextile fabric installed vertically and supported by posts with the bottom of the fabric buried in a trench. They are designed to prevent transport of sediment off site. It acts as an above ground settling pond to provide an area of catchment where water can remain still and allow sediment to settle out. Sediment fencing requires frequent monitoring and maintenance to remain effective.

Application

- Flat Ground
- Anywhere low flow runoff and retention of sediment are a concern
- Sloping Ground
- Stockpiles
- Ditches

Implementation

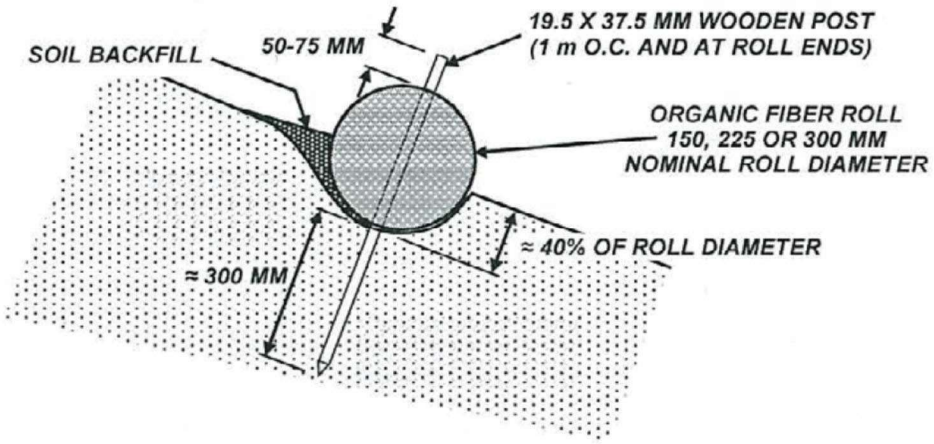
It is important to note that the correct installation of this sediment control measure is crucial to its effectiveness and the level of maintenance it will require. It should be Installed downslope from construction activities, and used with other control measures (such as straw wattles/roles, or sediment catch basin). Silt fences should follow the contour of the slope with sides going upslope making the shape of a “U” to trap water. The amount of joints in the fabric should be minimized. Regular inspections of the fence should occur, especially after rain events.



3.2 ORGANIC FIBRES ROLLS

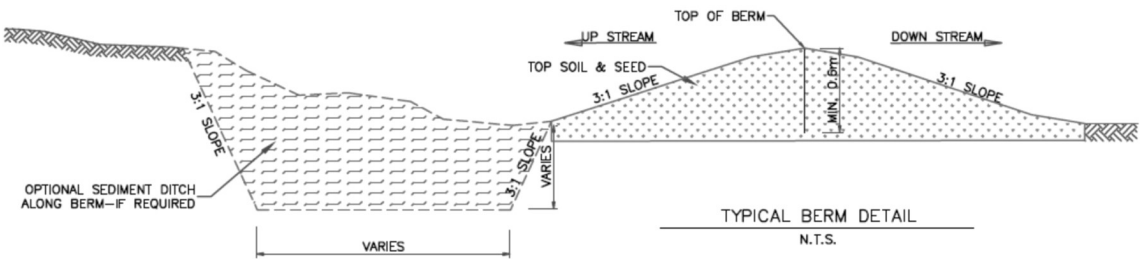
Organic fibres (straw) are encased in a photodegradable plastic net casing that form a roll used primarily for erosion control but also for sediment control as a secondary use. Installed perpendicularly across a slope it reduces erosion by shortening the slope length and by providing grade breaks. They are also effective at slowing flow velocity of overland flow and retaining sediment that accumulates behind the roll instead of migrating down slope.

Organic fibre rolls will be used where slopes are steeper, where the surface has been disturbed and at a risk of erosion. The rolls cannot be installed across ditches, swales or natural water flow paths.



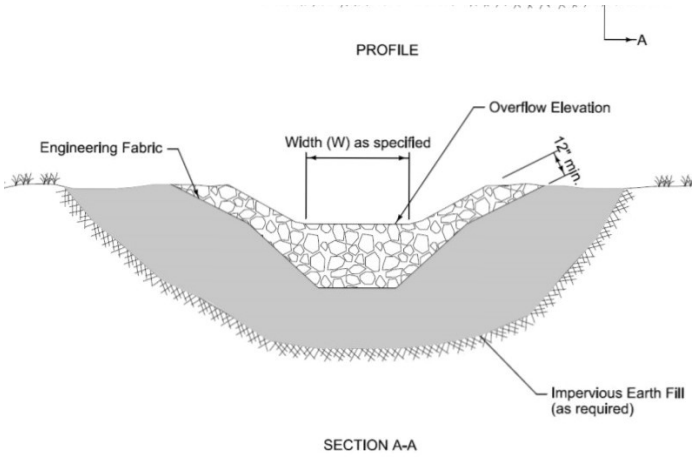
3.3 DITCHING AND BERMS

Ditching and berms will be mainly used at the dredged spoil disposal area in order to manage the water runoff from the saturated soils. Berms will be constructed with available material and compacted. Ditches will be dug and collected to catchment basins where fine sediment will settle downwards.



3.4 CATCHEMENT BASSINS

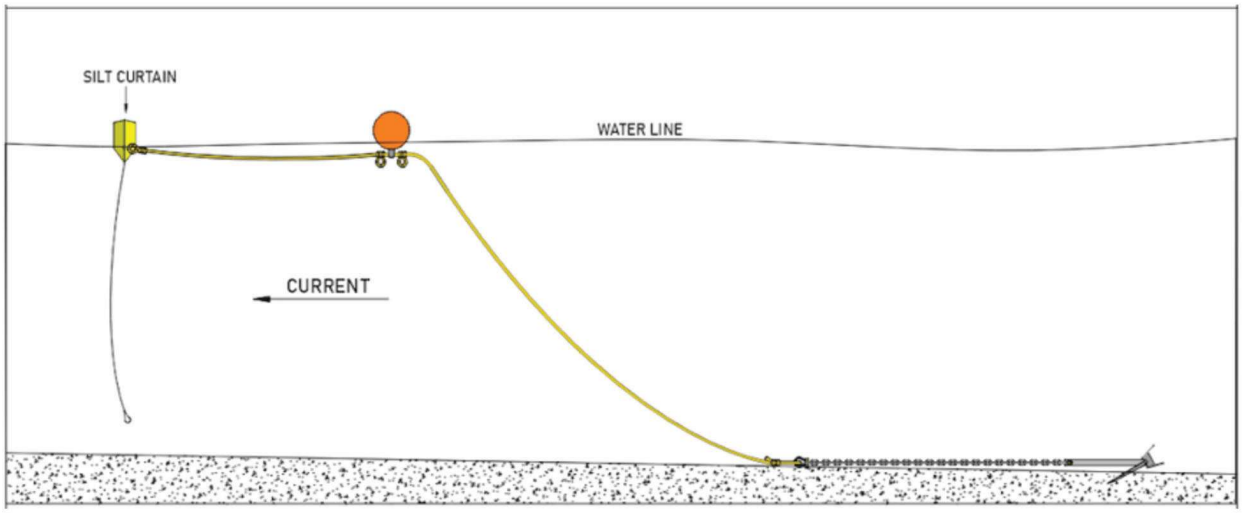
Catchment basins will be installed to collect the sediments from the drainage ditches before they reach out to the existing water courses. The basin sizes will be adjusted to the area drained by the ditches. Each basin will be excavated, lined with geotextile and protected with clear stones.



3.5 FLOATING SILT CURTAINS

The floating silt curtains are designed to help prevent particulate materials from leaving the immediate area of construction in the water. Type 2 silt curtains for moderate current conditions will be available for works to be carried out at the harbour site. Type 3 silt curtains for high current conditions will be available for the river crossing site.

Typical installation of a type 2 floating silt curtain



Typical installation of type 3 floating silt curtain

4. MONITORING AND REPORTING

Monitoring, inspection and adaptive management are necessary to ensure the effectiveness of this plan. It provides confirmation of proper implementation and effectiveness of erosion and sediment control measures. The effects of wet weather during construction activities can have a significant impact on ground conditions and can change otherwise stable soils into soils that are affected by erosion and sedimentation. Freeze thaw cycles at the beginning and at the end of construction seasons can also expose stable soils to an unstable condition overnight and throughout the day.

4.1 EROSION AND SEDIMENT CONTROL MONITORING AND MAINTENANCE

Monitoring will take place until the concern of erosion and sedimentation no longer exists. It is the duty of the environmental monitor to ensure that the erosion and sediment control measures are properly installed, well maintained and functioning as intended. However, it is the responsibility of everyone to report any ineffective erosion and sedimentation control measures or those in need of repair. The inspection of the erosion and sediment control measures will be part of the environmental monitor daily routine. These inspections and repairs will be reported.

Sediment control measures may require accumulated sediment to be removed in order to function properly or to not overload the structure. The removed sediment will be transported to the dredge spoil disposal area.

4.2 WATER QUALITY MONITORING

Marine and land construction activities will be monitored for their potential impact on water quality and marine habitat. The specific purpose of ESCP is to first identify any activities that could increases the potential of sediment erosion by implementing mitigation measures in order to reduce or eliminate soil particulate transport into the existing water bodies (river, steam or ocean). Second, in the case of any event of potentially impacted water reaching the water bodies, direct measurement of the water quality will be carried-out for the total suspended solids (TSS) and the turbidity. If needed, on-site correctives measure will be immediately implemented in order to reduce the load of sediment in the runoff water. In any case of measured quality remaining above the guideline criteria of the CCME guidelines, the EM has the authority to shut down any related construction activities and have corrective measures implemented until guideline criteria are meet. For that specific case, immediate communication will be forwarded to the CBCL and DFO representative for further discussion and correction of the issue. The following section of the plan is detailing the monitoring and reporting actions related to erosion related issues of on-site activities.

All monitoring activities of the ESCP will be documented in a daily report that will include the following elements (see appendix X for a preliminary version of the report sheet).

- Contact information of the sites supervisors and the environmental monitor.
- Identification and location of the work activities causing erosion that could affect water quality.
- Sediment control measures or correction actions to minimize or eliminate the source of sediment transport will be documented in the daily report. These measures could include but are not limited to silt fencing, culvert installation, water channel and berm construction, embankment work and grading of the working surface, etc. On-site modification to the plan and actions could be adapted accordingly as needed and in order to efficiently resolve any impact of water quality issue (s) related to erosion.
- When visual monitoring identifies sediment run-off in the natural water bodies, the direct monitoring of the turbidity and the total suspended solids (TSS) of the water quality will be conducted and documented. The measured parameters (TDS and turbidity) are directly related to the presence of small solid particulates that are suspended in the water and that could affect its quality. These particulates will originate from the washout and leachate of inorganic manipulated soil material, and should not affect the chemical balance of the water, so the pH will not be monitored. The measurement will be conducted on site with a Hatch portable meter HATSSMETER that measure turbidity and the total suspended solids. The respective range of the probe for TSS and turbidity are between 0.001 to 400 g/L and 0.001 to 9999 FNU. The monitoring program will measure the background values before work begins and at different periods of activities based on visual monitoring and potential effect of the work on the water quality. The location of measurement with the probe will be made at around 1 to 2 meters from the point of entry of potentially impacted water into the water bodies. The monitoring distance can be adjusted based on context, results and visual observations. The measured total suspended solids (TSS) and turbidity are compared to the Canadian Council of Ministers of the Environment (CCME) guidelines for the protection of aquatic life which can be found; (https://ccme.ca/en/res/total-particulate-matter-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf). A resume of these guideline is provided below:
- *For TSS:*
    - For clear flow, maximum increase of 25 $mg \cdot L^{-1}$ from background levels for any short-term exposure (e.g., 24-h period). Maximum average increase of 5 $mg \cdot L^{-1}$ from background levels for longer term exposures (e.g., inputs lasting between 24 h and 30 d) .
    - For high flow, maximum increase of 25 $mg \cdot L^{-1}$ from background levels at any time when background levels are between 25 and 250 $mg \cdot L^{-1}$. It should not increase more than 10% of background levels when background is >250 $mg \cdot L^{-1}$.

- *For turbidity:*
  - For clear flow, maximum increase of 8 NTUs from background levels for a short-term exposure (e.g., 24-h period). Maximum average increase of 2 NTUs from background levels for a longer term exposure (e.g., 30-d period).
  - For high flow or turbid waters, maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. It should not increase more than 10% of background levels when background is >80 NTUs.

- Photographs of ''before and after'' work/events will be documented and provided as needed, and also included in the reports.

- At the end of each season, a synthesis of the daily reports (see appendix 1) will be compiled with a focus on presenting the important events that have occurred during the working period. This compilation will be included in the yearly report.

APPENDIX 1
CLYDE RIVER HARBOUR CONSTRUCTION

APPENDIX 1

ESCP DAILY MONITORING SHEET

Pilitak

Daily reporting sheet
Environmental monitoring of erosion and water quality

Date :

Contact information
Sites supervisors :
Environmental monitor :

Identification and location of the work activities causing erosion and that could affect water quality.

Visual inspection of erosion events and detailed description

Direct monitoring of the turbidity and the total suspended solids (TSS) of the water quality

Location 1:

	Background (date/hour)	1st reading (hour)	2nd reading (hour)	3rd reading (hour)
TSS (NTU)				
Turbidity (mg/L):				

Location 2:

	Background (date/hour)	1st reading (hour)	2nd reading (hour)	3rd reading (hour)
TSS (NTU)				
Turbidity (mg/L):				

Location 3:

	Background (date/hour)	1st reading (hour)	2nd reading (hour)	3rd reading (hour)
TSS (NTU)				
Turbidity (mg/L):				