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Memo

To:	Claudia Simonato Public Services and Procurement Canada	From:	Lindsay van Noortwyk Stantec Consulting Ltd.
File:	Coral Harbour Remediation	Date:	August 23, 2023

Reference: Coral Harbour Remediation - Acid Rock Drainage and Metals Leaching Sampling Plan.

During their review of the Crown Indigenous Relation and Northern Affairs Canada (CIRNAC) Water Licence Application, the Nunavut Water Board (NWB) recommended that the proponent test all borrow materials and indicate the types of characterization tests that will be conducted to determine Acid Rock Drainage (ARD) and metals leaching (ML) potential before use.

CIRNAC responded on May 23, 2023 indicating that the selected contractor was currently working to develop a Quarry Operations Plan, which would be submitted to the NWB for review and approval prior to the commencement of borrow production activities. The plan would address the development and management of the borrow areas as well as reclamation activities. In addition, the site supervision consultant (Stantec) would develop a plan to characterize the ARD/ML potential in the borrow material and would submit it with the Quarry Operations Plan.

Stantec Consulting Ltd (Stantec) has prepared the following ARD and ML Sampling Plan in response to the NWB's recommendation. The ARD and ML Sampling Plan is consistent with the Mine Environment Neutral Drainage (MEND) Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Prince, 2009).

Generally, ARD and ML testing has been applied to rock quarries, rock cuts, and mine tailings, etc., where there is a disturbance of rock, which, if sulfidic, has potential to cause acidic runoff if the disturbance causes the rock to be exposed to air and water.

In the case of granular borrow materials at the Coral Harbour Remediation Site, in their current in-situ state, they are naturally influencing drainage chemistry already. Borrow material at the Coral Harbour Remediation Site was previously identified as glaciomarine in origin, and surface water samples previously collected in the vicinity of the Coral Harbour Remediation Project have pH of > 8; therefore, ARD/ML is not anticipated to be a concern. Excavating and placing this borrow material without further processing in the form of crushing or grinding does not significantly increase the surfaces exposed to air or water; therefore, it is not expected to increase the potential for ARD or ML.

Excavation of approximately 30,000 cubic metres (m^3) of borrow material to develop granular fill is proposed to complete the Coral Harbour Remediation Project. Ten potential borrow sources have been identified (GMD-A through G, Airport Road Quarry #1, Airport Road Quarry #4,5,7, and Airport Road Un-named Quarry and are shown Figure 1, Appendix A). GMD – F and GMD - G were deemed as not feasible sources of granular materials. At this time, borrow material will be prepared by screening. Crushing and/or grinding of material is not anticipated.

The Contractor will initiate borrow development from within the proposed footprint of the Non-hazardous Waste Facility located within GMD – B, and GMD- B is anticipated to have sufficient borrow material to satisfy the borrow requirements for the Coral Harbour Remediation Project; therefore, it is proposed that only if crushing or grinding is required, then the material within GMD-B will be tested for ARD/ML potential.

Reference: **Coral Harbour Remediation - Acid Rock Drainage and Metals Leaching Sampling Plan**

Samples will be collected at a frequency of 8 per 100,000 m^3. The sampling locations will be distributed to represent the material being excavated from GMD-B. Should additional borrow material requiring crushing or grinding be required from any other previously identified borrow source, it will be sampled per the frequency described in Table 1, below.

Table 1. ARD/ML Sampling Frequency

Tonnage of Unit (metric tonnes)	Minimum Number of Samples
<10,000	3
<100,000	8
<1,000,000	26
<10,000,000	80

If crushing or grinding of the borrow material is required, samples will be collected from a depth of approximately 0.3 metres using a clean trowel. Five scoops of borrow material will be collected at each sample location (approximately 2 kilograms) and placed in clean plastic sample bags. Each sample will be double-bagged and labelled with sample ID, date, and project name and number. General site topography, drainage, and landform description will be logged.

Samples will be submitted to ALS laboratories in Winnipeg, Manitoba for the following analysis:

- **Acid-base accounting (ABA) package including**, Sobek neutralization potential (NP) with siderite correction, acid potential (AP), fizz rating, paste pH, rinse pH on <2 millimetres (mm) fraction, total inorganic carbon by perchloric acid (HClO4) leach and carbon dioxide (CO2) by coulometer, sulphate sulphur by HCl leachable, total sulphur by induction furnace/IR Spectroscopy, and sulphide sulphur calculated by difference of total sulphur and sulphate sulphur.
- **Shake flask extraction (SFE) testing method**, involving continuous mixing of a crushed sample (85% passing 7.5 mm) with deionized (DI) water (1:3) for 24 hours, and leachate analysis by inductively coupled plasma mass spectrometry (ICP-MS) for trace elements. SFE leachate analysis included final pH and anions by ion chromatography.

Prior to the crushing or grinding of borrow material, if required, Stantec personnel will identify up-gradient and down-gradient water bodies based on site-specific surface drainage characteristics. Baseline surface water samples will be collected from the up-gradient and down-gradient water bodies. Upon completion of crushing and/or grinding, surface water samples will be collected from down-gradient water bodies.

Reference: **Coral Harbour Remediation - Acid Rock Drainage and Metals Leaching Sampling Plan**

If required, surface water samples will be submitted to ALS laboratories in Winnipeg, Manitoba for the following analysis:

- General parameters (pH, conductivity, hardness), alkalinity, nitrate, nitrite, cations/anions
- Low detection total and dissolved mercury
- Dissolved and total metals concentrations

Stantec Consulting Ltd.

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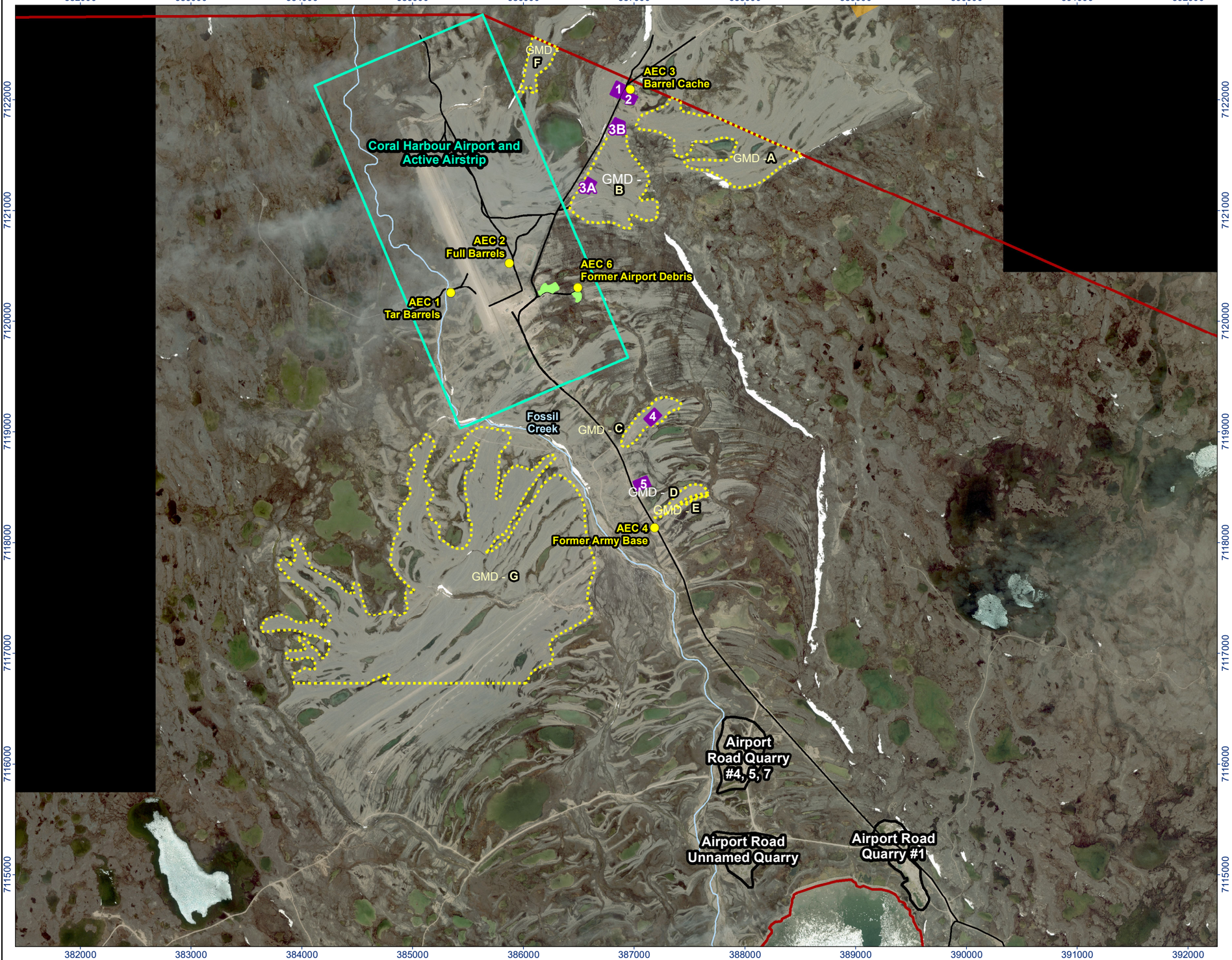
Attachment: Figure 1 – Borrow Source Locations



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Legend

- Area of Environmental Concern (AEC)
- Existing Borrow sources
- Granular Material Deposit
- Surface Debris Area
- Potential Non-Hazardous Waste Facility Locations
- Transport Canada Land Parcel
- Parcel
- Municipal Boundary
- Gravel Roads
- Fossil Creek

N

0 500 1,000 Metres

(At original document size of 11x17)
1:35,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources: Government of Nunavut

Project Location
Coral Harbour,
Nunavut

Prepared by AC on 2022-03-30
Technical Review by CB on 2022-03-30

Client/Project
121417087

Public Service and Procurement Canada
Updated Remedial Action Plan

Figure No.
1

Title
Borrow Source Locations

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