



GOVERNMENT OF NUNAVUT

Pond Inlet Small Craft Harbour Development

Geotechnical and Environmental Baseline Studies

NON-TECHNICAL ANNUAL REPORT – LICENCE #02 047 16N-M

1 Project Name

Geotechnical and Environmental Baseline Studies – Pond Inlet Small Craft Harbour Development

2 Researcher's Name and Affiliation

Advisian (contact name: Jamiann Questa; email: Jamiann.Questa@advisian.com) on behalf of the Government of Nunavut (contact name: Justin McDonell; email: jmcdonell@gov.nu.ca).

3 Project Location

Pond Inlet, Qikiqtaaluk Region.

4 Timeframe

Summer and fall 2016. Further studies planned through to summer 2017.

5 Description of Studies

The studies will be performed for the Government of Nunavut in the area of a proposed small craft harbour, and quarry in Pond Inlet.

6 Purpose

Geotechnical and environmental baseline studies are required to support the design and permitting of the proposed small craft harbour.

7 Goals and Objectives

These studies provided data to support the engineering design and an assessment of environmental effects as Part 4 screening-level assessment, as per the *Nunavut Land Claims Agreement*, and other permitting, including Disposal at Sea (DAS) and *Fisheries Act* authorization.



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8 Annual Report

An annual summary of the studies completed to date is included below.

8.1 Geotechnical

One field visit to Pond Inlet was undertaken in 2016, which occurred from September 14th to September 16th. It included a site reconnaissance of three potential quarry locations, including rock face mapping, and a site walkover in the vicinity of the small craft harbour location. The aim of the investigation was to identify a suitable quarry location and collect preliminary information including rock mass characteristics and representative rock samples as well as identify potential borehole locations for a 2017 drill program. The aim of the walkover at the proposed small craft harbour was to identify access for the proposed 2017 drilling program as well as look at soil and rock conditions along the shoreline prior to freeze up.

Initial observations of the three proposed quarry locations indicates that only one site likely has the potential for obtaining sufficient rock for construction of the small craft harbour. Aggregate testing to assess the rock for characteristics such as strength, resistance to weathering processes and Potentially Acid Generating (PAG) will take place in 2017.

8.2 Environmental

The environmental program for Pond Inlet consisted of water and sediment quality sampling, fish and fish habitat and terrestrial vegetation and habitat survey and current measurement. A summary of the studies completed to date is included in the following sections. Preliminary observations taken by field biologists are provided, however, analysis and interpretation of the results is still ongoing and will be provided in the Pond Inlet NIRB Part 4 screening document.

8.2.1 Water and Sediment Quality Program

Water samples were collected at six sites in Pond Inlet on September 18th, 2016. Two samples were collected at each site using a Niskin sampler from the surface (1 m below surface) and near-bottom (1 m above seabed). Samples were decanted into appropriate sterilized containers and preserved following laboratory guidance. Samples were transported on ice, with the recommended hold times to a qualified laboratory (Maxxam Analytics) under Chain of Custody (COC) documentation for detailed analysis.

The following parameters were analyzed:

- pH, alkalinity, Total Suspended Solids, hardness, Total Organic Carbon (TOC), dissolved organic carbon (DOC), Bicarbonate, Carbonate, Hydroxide, Alkalinity (as CaCO₃), Sulphur-Dissolved, Sulphur-Total.
- Nutrients (ammonia, Total Kjeldahl nitrogen (TKN), nitrate, nitrite, total phosphorus, orthophosphate, nitrogen).
- Total and dissolved metals (Canadian Council of Ministers of the Environment (CCME) suite, a total of 32 metals).



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At each water quality sampling location a vertical profile of physio-chemical parameters was taken using a Seabird Electronics Inc. SBE19, which included:

- Temperature
- Salinity (conductivity)
- Turbidity
- Dissolved oxygen (DO)

Sediment samples were collected at six sites in Pond Inlet on September 16th, 2016, four of which were collected in the subtidal and two in the intertidal. Subtidal sediment was collected using a standard Ponar grab, which sampled a 23 cm² area. Intertidal sediments were scooped with a stainless steel spoon into a stainless bowl. Both sampling techniques sampled to a depth of approximately 8 cm. Sediment samples were described by substrate type, colour/odour, presence of organic debris (i.e. sticks), and presence of biological material (i.e. invertebrates). Sediment was homogenized in a stainless steel bowl before being placed into glass jars for laboratory analysis.

Samples were collected in laboratory-supplied sample containers and transferred on ice to a qualified laboratory, under COC documentation, for detailed analysis.

Sample analysis included:

- pH
- Phosphorus
- Total organic carbon
- Total metals (CCME suite)
- Nutrients (nitrogen, ammonia, nitrate, nitrite, phosphorous) (a total of 31 metals).
- Polycyclic aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Particle size distribution (Environment Canada Disposal at Sea guidelines)

Sediment samples were typically coarse in texture and dark in colour with minimal debris observed.

8.2.2 Oceanography

Surface current data (i.e. speed and direction data) was collected between September 16th and September 19th, 2016 using surface drogues. project site. The drogues were deployed in multiple locations near the project site during flood and ebb tides. The timing of the flood tide and onerous weather conditions prevented the collection of flood tide data; therefore, the majority of data collected was during the ebb tide. The tidal range during the field work was between 1.5 m to 1.7 m, which is a medium size tide based on the nearest tidal station at Pisktarfik. The position and speed of each drogue was recorded using a data logger fixed to the mast of the drogue. Surface currents speeds near the project area were found to vary approximately between 0.1 knots and 1.3 knots depending on state of the tide and location.



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8.2.3 Migratory and Marine Birds

Information on suitable habitat for migratory and marine birds was collected as part of vegetation surveys in September 2016. Due to the timing of field studies, no targeted migratory and marine bird survey was undertaken in 2016.

8.2.4 Terrestrial Vegetation and Rare Plants

The area surveyed consisted of mostly dwarf shrub and grass dominated vegetation communities, with wetlands situated in drainage areas. Some areas of taller shrubs were observed in small protected moist areas, with willows up to 1 meter in height observed. The north-eastern portion of the vegetation study area was mainly frost shattered bedrock with lichens, with pockets of dwarf shrubs and grasses in protected areas. The southwestern portion of the vegetation study area was dominated by dwarf shrubs and grasses, with scattered exposed rock areas.