Memorandum

Project Name: Hamlet of Pangnirtung – Drainage Survey	Project #: FRE-00253815-A0 /File No: 60.2
To: Nancy Anilniliak	From: Daryl Burke
Date: June 18th, 2019	
Subject: Pangnirtung Drainage Plan Topographic Survey	
Prepared By: Brady Gaudette	
Distribution: Bhabesh Roy (GN), Daryl Burke (EXP)	

History

The Hamlet of Pangnirtung is in the process of submitting a Surface Water Drainage Plan to the Nunavut Water Board to fulfill the requirements of their water license. As part of the drainage plan, the Hamlet is required to complete a topographic survey of the area surrounding the landfill and wastewater treatment plant sites. The Hamlet retained EXP Services Inc. to complete the on site survey work. The goal of this work is to provide an updated contour map of the area highlighting natural drainage features and include details of existing drainage culverts contained within the survey area.

Location

The survey was completed of the area from the waste water treatment plant to where the mountain meets the roadway (approximately two kilometers) in the Hamlet of Pangnirtung, Nunavut. The land was surveyed from the base of the mountain down to the high water mark in the Pangnirtung Fjord. The approximate survey area as included in the EXP proposal is represented in Figure 1.

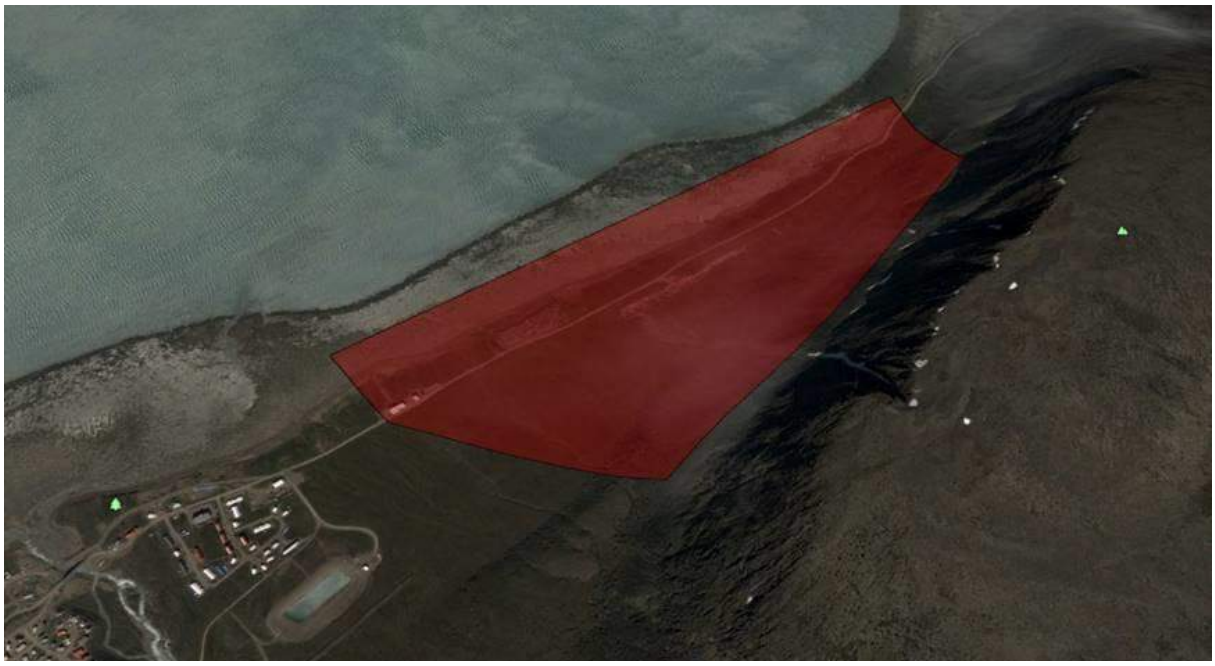

Figure 1 - Proposed Limits of Survey

Establishing Control

Two High Precision Network (HPN) monuments were found in preparation for the survey. The coordinate system chosen for these monuments was “UTM Zone 20”. The selected Geoid was “CGG2013a” along with the reference frame “NAD83(CSRS)”. Finally, the Epoch was set at “2010.0”. Monument W8048740 was located halfway up the road to the water treatment plant established on a large boulder and marked with a very noticeable white-painted cross. This monument was used to correct the GPS base receiver each day due to its proximity to the survey area. M08T9400 was discovered near the lodge and the old Hudson Bay Company buildings. This HPN monument was checked against W8048740 with a horizontal and vertical displacement of approx. 2.5 and 1.5 inches respectfully. It was determined that this accuracy was acceptable to commence work.

At the request of the Hamlet, EXP established a temporary control point represented as “CP1”. This control point is close to the gate of the disposal area, scribed onto a large boulder, and will be used for a future project involving the disposal area. The following is a photo of CP1 along with its Northing, Easting, and Elevation.

Control Point ID	Northing	Easting	Elevation (m)
CP1	7339972.237 N	379789.201 E	20.189

Survey

A grid was created with 25-meter spacing between points in the bulk of this survey. However, if certain areas had significant change in gradient, these areas were surveyed as necessary to map important features. Areas of linear gradient, where the land did not change dramatically, were surveyed as necessary with the focus of capturing low and high points. The Southern-most survey points were taken at the base of the mountain when it became too difficult to climb. The Northern-most points were shot either at the high water mark or as close as EXP could get without risk of falling from significant height onto the ice-covered shoreline. Special attention was given to surveying the scrap yard and the stream that runs down the mountain South of it. Also, both edges of the gravel road were surveyed along with the centerline of the ditch. The attached Figure A-1 presents the resulting contour map of the surveyed area showing natural drainage swales that were discovered as well as the locations and details of the surveyed culverts.

Culvert Reconnaissance

Seven culverts were located along the gravel roadway. These culverts were photographed, surveyed, and the condition of each pipe was noted. Also, two culverts were found running from within the disposal area toward the water. These culverts were assessed and surveyed on the outlet end but examining the inlet end was not possible. The following are photographs of the culvert inlets and outlets, respectively for each culvert surveyed.

Culvert ID: 1

Culvert ID: 2 (Could not safely photograph outlet end)

Culvert ID: 3

Culvert ID: 4

Culvert ID: 5

Culvert ID: 6

Culvert ID: 7

Culvert ID: 8 (Both photos are of outlet end)

Culvert ID: 9 (Photo is of outlet end)

Table 1 consists of culvert information such as pipe type/diameter and includes a condition assessment.

Table 1: Culvert Information and Assessment

Culvert ID	Diameter (mm)	Type	Condition Assessment
1	600	Corrugated Steel	Good condition.
2	450	Corrugated Steel	Good condition.
3	900	Corrugated Steel	Sagged midway under road. Both ends damaged.
4	900	Corrugated Steel	Sagged midway under road. Contains debris and silt build up. Outlet end 50% plugged with silt.
5	900	Corrugated Steel	Minor sag midway under road. Debris build up on inlet end. Silt and stone buildup of approximately 15% of culvert. Damaged at outlet end.
6	1200	Corrugated Steel	Minor sag at inlet end (approx. 3 meters). Garbage all throughout culvert. Half pipe extension at outlet end, full of garbage from dump (see photo). Culvert has less than recommended cover depth.
7	600	Corrugated Steel	Silt build up 50% at inlet. Plugged at outlet.
8	600	Corrugated Steel	Runs from within the dump. Contains various debris. Could not examine inlet side. Major sag midway under dump fence.
9	600	Corrugated Steel	Runs from within the dump. Plugged with garbage and silt. Could not examine inlet side.

Table 2 is composed of the horizontal location and elevation of each culvert's inlet invert and outlet invert.

Table 2: Culvert Location

Culvert ID	Invert	Northing	Easting	Elevation (m)
1	Inlet Invert	7340787.473 N	380885.451 E	3.592
	Outlet Invert	7340792.339 N	380874.198 E	3.108
2	Inlet Invert	7340389.046 N	380400.306 E	21.833
	Outlet Invert	7340397.001 N	380395.935 E	21.621
3	Inlet Invert	7340292.709 N	380240.637 E	19.219
	Outlet Invert	7340302.800 N	380233.995 E	18.446
4	Inlet Invert	7340173.205 N	380072.766 E	19.001
	Outlet Invert	7340183.947 N	380066.768 E	18.405
5	Inlet Invert	7340118.616 N	379979.243 E	18.758
	Outlet Invert	7340126.904 N	379975.357 E	18.425
6	Inlet Invert	7339937.497 N	379651.760 E	15.487
	Outlet Invert	7339946.979 N	379643.904 E	14.424
7	Inlet Invert	7339751.362 N	379366.897 E	20.037
	Outlet Invert	7339722.352 N	379308.091 E	18.392
8	Inlet Invert	N/A	N/A	N/A
	Outlet Invert	7340114.377 N	379772.022 E	5.452
9	Inlet Invert	N/A	N/A	N/A
	Outlet Invert	7340025.675 N	379626.279 E	5.462

Attachments

Figure A-1 – Existing Drainage Features Plan

Submitted by:

Brady Gaudette
Designer – Municipal Infrastructure

EXP Services Inc.