DEW LINE CLEAN UP PROJECT
CAM-F (SARCPA LAKE)
DEW LINE SITE
2004 GEOTECHNICAL INVESTIGATION

Project No. 1100065.002

MARCH 2005

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Submitted To:

PUBLIC WORKS & GOVERNMENT SERVICES CANADA
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TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General

EBA Engineering Consultants Ltd. (EBA) was retained by Public Works & Government Services Canada (PEGS) on behalf of Indian and Northern Affairs Canada to carry out a geotechnical investigation at the CAM-F (Sarcpa Lake) DEW Line site. The purpose of the geotechnical investigation was to evaluate existing dumps and landfills, and buried debris areas, potential new landfill locations, granular borrow materials, and assess the condition of the existing airstrip and access roads. The investigation included geophysical surveys, visual assessments, and a testpitting program. EBA was also responsible to carry out a topographic survey of key features, current and proposed landfills, and survey testpit locations and other sample locations as identified by the other consultants on site. This information will be used by others to develop design recommendations for the clean up of the CAM-F DEW Line site.

Other work carried out in parallel with the geotechnical evaluation included:

- An environmental sampling program and a hazardous and non-hazardous material waste audit by Earth Tech Inc.
- A human health and ecological risk assessment for the site by Jacques Whitford.
- Design of the comprehensive site remediation plan will be by UMA Engineering.

1.2 Scope of Work

EBA's scope of work for the site visit is outlined as follows:

- The condition of the Sarcpa Lake airstrip was assessed. Repairs and maintenance required to support remedial works have been determined.
- The conditions of the access roads was assessed and repairs required for construction will be identified.

- Gravel borrow sources were characterized for airstrip and road repairs and landfill construction.

- Geophysical surveys were carried out on known landfills to establish the area limits of all existing landfills

- Geophysical surveys were carried out over any suspect areas to identify and establish the area limits of any unknown buried debris.

- Testpits were excavated around the landfills to confirm the geophysical results and landfill boundaries.

- A geotechnical assessment was carried out to determine suitable sites for new landfills.

- A topographic survey was carried out of key features, current landfills, and proposed landfills. Testpit and sample locations were surveyed.

EBA's scope of work did not include landfill design. However, preliminary concepts and recommendations are discussed in this report.

1.3 Site Visit

The geotechnical investigation was carried out between August 10 and August 23, 2004. EBA's representative for the geophysical work was Mr. Neil Parry, while Mr. Jason Berkers conducted the geotechnical investigation.

Geophysical surveys were carried out over areas known and suspected to contain buried debris. The geophysical survey involved mapping the total magnetic field strength and the vertical magnetic field gradients to delineate areas of ferrous debris. The instruments used were a Geometrics G858 cesium magnetometer with two vertically oriented sensors and an integrated real time GPS positioning system as the roving field unit, and a Geometrics G856 proton precession magnetometer as a total magnetic field strength base station. Positioning for all surveys was accomplished using an integrated, real-time, sub-metre accuracy, differentially-corrected GPS system consisting of two components: a low

magnetic signature GPS roving unit and a RTCM MSAT satellite differential correction box. An overview of the operational theory behind these units and a description of the survey technique used at CAM-F are presented in Appendix A.

Shallow testpits were excavated at proposed new landfill locations and in potential granular borrow areas. A total of 54 testpits were excavated by hand or using a small Kubota mini-excavator. Soil samples were collected during the testpitting program for laboratory index testing. The testpit logs are presented in Appendix B. The laboratory index test results are presented in Appendix C.

Select photographs taken during the site visit are presented in the Photographs section.

1.4 Previous Work

EBA conducted a geotechnical reconnaissance of the CAM-F DEW Line site from August 3 to August 6, 1996 (EBA, 1996). The purpose of the investigation was to provide geotechnical design data for the proposed construction and clean up works at the site.

Specifically, the field investigation included:

- evaluation of two existing dump sites;
- assessment of two alternative locations for the development of new landfills; and
- identification and characterization of potential granular borrow sources.

A total of 18 shallow testpits were excavated at proposed construction and potential borrow source areas to obtain information about the surficial soils. A magnetometer and EM-31 geophysical survey was carried out over the Dump A area to assist in determining the extent of the landfill. Selected soil samples were retained for laboratory determination of water content, particle size distributions and a moisture density relationship. The testpit logs and index test results from the 1996 site visit are reproduced in Appendix B and Appendix C, respectively.

EBA's scope of work was focused on geotechnical issues related to the clean up. Environmental sampling and testing was carried out by Queens University Analytical

Group, and the clean up criteria and protocol were specified by Queens University Analytical Group, and Royal Military College Environment Science Group, (RRMC, 1993). UMA Engineering Ltd. carried out a topographic survey and surveyed the location of testpits, dump perimeters and debris areas.

Recommendations made in this current report supercede previous recommendations.

2.0 SITE CONDITIONS

2.1 Site Description

The Sarcpa Lake site is located approximately 85 km west of Hall Beach, Nunavut on the Melville Peninsula at longitude of 83° 19' W and a latitude of 68° 33' N. The site is land locked limiting site access to helicopters and small aircraft. The site construction was completed in 1957 as an Intermediate site (I-site) for the DEW Line system. It was used for a short period of time until it was abandoned in 1963. It was converted to a scientific research station in 1977 under the Science Institute of the Northwest Territories and Canada, Department of Indian and Northern Affairs (DIAND).

The site facilities consist of an airstrip, a warehouse, garage, an Inuit hut, petroleum, oil and lubricants (POL) tanks, a small Quonset and a main building train. The site contains thousands of barrels, a radar tower that has been knocked down and other site debris. An "old camp" area exists 3 km southeast of the station. The old camp area consists primarily of scattered barrels and abandoned construction equipment. The general layout of the site facilities is shown in Figure 1.

2.2 Geology

The main station is situated on a hill 260 m above sea level. The site emerged from glacial cover only 8000 years ago. The site lies at an elevation that never experienced marine transgression.

The terrain is dominated by till deposits with Archean granitic bedrock outcrops prevalent throughout the area. There are numerous ponds, lakes and streams in the area,

notably Kingaroo River and Sarcpa Lake. Undisturbed tundra is covered with sedges, and grasses.

Sarcpa Lake is well within the zone of continuous permafrost. No ground temperatures measurements were made at the site; however ground temperatures have been measured at Hall Beach, 85 km east of Sarcpa Lake (EBA, 1996). The mean annual ground temperatures at Hall Beach varied from - 9°C to -10°C.

3.0 EXISTING LANDFILLS

Two existing landfills/dump areas were investigated during the 2004 site investigation program. They are referenced as Dump A and Dump B and are shown on Figure 2.

Geophysical surveys consisting of both total magnetic field strength and vertical magnetic gradient readings were carried out over each landfill and surrounding area. The geophysical surveys are presented on Figures 2B, 2C and 2D. The surveys were conducted as discussed in Section 1.3 and Appendix A. The two dump areas are described in the following sections.

The geophysical surveys identified smaller debris areas in the immediate vicinity of the dump areas and debris areas removed from the dump areas. The debris areas nearby to the dumps are described in the following section and debris areas removed from the dumps are described in Section 4.0. It should be noted that not all surface debris areas are described in this report. EBA's investigation focused predominantly on areas of potential buried debris. A complete inventory of debris on site was completed by others.

3.1 Dump A

Dump A is located 200 m northeast of the module train as shown in Figure 2A and Photos 1 through 4. The dump was originally constructed by dumping debris over the edge of a small bedrock outcrop. The dump contained barrels, equipment, domestic waste, electronic parts etc. Some of the debris was covered with silty sand with a trace of clay and gravel. Subsequently, loose debris was piled on the landfill area. Most of the loose debris was removed from the area by the clean up team under the direction of Queens University during the summer of 1996. The clean up of the loose debris was in

conjunction with the excavation and removal of soil contaminated with PCB concentrations higher than CEPA standards. In general, the majority of loose debris, all soil that exceeded CEPA standards, and some Tier II soil (DEW Line Clean up Protocol) was removed from the dump area. The CEPA soil was packed in polyethylene barrels, and the Tier II soil was packaged in plastic bags (wrangler packs).

The soil throughout the area typically consists of 2 to 5 cm of peat overlying wet sand and silt with a trace of clay and gravel. Occasional cobbles and boulders are present throughout the area. Bedrock outcrops are also prevalent.

Drainage flows between the toe of the dump and a large bedrock outcrop located east of the dump and then flows towards small ponds 100 m north of the dump. The pond drains into Sarcpa Lake located 3 km east of the landfill.

A geophysical survey consisting of both total magnetic field strength and vertical magnetic gradient readings was carried out over the entire Dump A area in 2004. The results of the survey are presented on Figures 2B, 2C, and 2D. A total of six debris lobes were identified and named Lobes A to F as shown.

Lobe A encompasses the main dump area where the surface debris and CEPA/Tier II soil was removed. Surface debris and partially buried material is still present throughout the area. A small amount of buried material is present between the bedrock outcrops as indicated on Figure 2B. Given the topography of the area and the presence of the bedrock outcrops, it is believed the buried material will be within 1.0 m of the ground surface. Only a minimal amount of cover material is present over the buried/partially buried debris. The majority of this debris is located at the toe of a bedrock outcrop. Given that the majority of the debris is partially buried up against the toe of the bedrock outcrop and that only a relatively small amount of debris is present, the partially buried and buried debris could be excavated and consolidated with other similar material during cleanup. If the material in this area is not to be excavated, then a perimeter for an area that should be regraded and covered can be provided. Results from the environmental investigation should be reviewed to determine whether the area should be excavated or covered with fill.

Lobe B consists of miscellaneous metal surface debris, while Lobe C and D are locations of stockpiled barrels. Lobe E is surface debris, which was removed from the Lobe A area in 1996. Lobe F is made up of miscellaneous surface debris.

Other anomalies in this area and which are presented on Figure 2B indicate areas of surface debris.

Additional barrel stockpiles and construction equipment are located north of Dump A at the toe of the bedrock outcrop as shown in Photo 5 through 7. The location of this material is indicated on Figure 2B. Accessing this debris area will be difficult because it is located at the toe of a steep bedrock outcrop.

3.2 Dump B

Dump B is located 170 m north of the module train as shown in Figure 2B. The dump primarily contains building material from the demolished warehouse, barrels and construction equipment. The dump is constructed over a bedrock ledge 4 to 5 m high as shown in Photos 8 and 9. The debris contains steel beams, aluminium siding, gas cylinders, electrical parts, batteries, furniture, cable reels, etc. Some of the materials appear to be covered with asbestos. A small amount of debris at the northeast end of the dump is partially buried.

The soil at the top and bottom of the dump consists of silty sand till. Bedrock outcrops are present throughout the dump. Drainage from the area flows from the toe of the landfill down to ponds located 50 m north of the landfill. The ponds flow into Sarcpa Lake, located 3 km east of the dump.

A geophysical survey consisting of both total magnetic field strength and vertical magnetic gradient readings was carried out on a portion of the Dump B area in 2004. The results of the survey are presented on Figures 2B, 2C, and 2D. A total of two debris lobes were identified and named Lobes A and B. Lobe A consists of miscellaneous metal surface debris as discussed above and is shown in Photo 8. Lobe B consists of barrels and construction equipment as shown in Photo 9. The debris is loosely placed in the area. It is recommended that the debris be removed and consolidated in an engineered landfill.

4.0 EXISTING DEBRIS AREAS

Several debris areas not included within the landfill/dump areas were also investigated in 2004. These debris areas are as follows:

- Burn Debris Area;
- Tower Debris Area;
- Sewer Outfall Debris Area;
- Station Northwest Debris Area;
- Garage Debris Area;
- Road Debris Area;
- Old Camp Debris Area; and
- Old Camp Trail Debris Area.

All debris areas, excluding the Old Camp Trail Debris Area, were geophysically surveyed with the magnetometer.

4.1 Burn Debris Area

The Burn Debris Area is located approximately 150 m northeast of the module train as shown in Figure 2A and Photo 10. The area was geophysically surveyed in 2004 and the results are presented in Figures 2B, 2C, and 2D. The debris area is a single lobe of surface debris that consists of two burning barrels and scattered burned domestic waste. The ground surface is comprised mostly of bedrock outcrops and is relatively flat. It is assumed that this material will be removed during cleanup; therefore, the area does not require regrading.

4.2 Tower Debris Area

The Tower Debris Area is located approximately 90 m northeast of the module train as shown in Figure 2A and Photo 11. The area was geophysically surveyed in 2004 and the results are presented in Figures 2B, 2C, and 2D. The debris area is a single lobe of partially buried debris that consists of crushed barrels. The lobe is situated along an existing access road. It is estimated that the partially buried material is buried less than 1.0 m below the ground surface, based on the topography of the area. The ground surface

is relatively flat with surface runoff ponded south and east of the area between two access roads and a bedrock outcrop. The buried debris could remain in place and be covered with a layer of soil or it could be excavated, provided there are no environmental issues with the area. Given the limited amount of debris and the fact that it is only partially buried, it is recommended that the material be excavated.

4.3 Sewer Outfall Debris Area

The Sewer Outfall Debris Area is located approximately 60 m northwest of the module train as shown in Figure 2A and Photo 12. The area was geophysically surveyed in 2004 and the results are presented in Figure 2B, 2C, and 2D. The debris area is a single lobe of surface debris that consists of crushed barrels and wooden debris, which is located northeast of a lined bermed pad area for barrel storage.

4.4 Station Northwest Debris Area

The Station Northwest Debris Area is located approximately 200 m northeast of the module train as shown in Figure 2A and Photo 13 and appears to be a location of an old laydown area. The area was geophysically surveyed in 2004 and the results are presented in Figures 2B, 2C, and 2D. The debris area comprises two lobes, Lobe A and Lobe B. Lobe A is located at the entrance of the laydown area and consists of an area of buried debris. The ground surface of the area is level with the surrounding laydown area. There are no visible signs of surface debris. Earth Tech completed a testpitting and sampling program for the buried debris area and confirmed that the area contains buried debris. It is recommended that the area be regraded with fill 0.7 m thick, provided environmental assessments by others indicate no environmental concerns in the area. A perimeter for the area that should be regraded is shown on Figure 2A.

Lobe B is located west of Lobe A and consists of stockpiled barrels. The debris is situated partially on the laydown pad and partially on the tundra.

4.5 Garage Debris Area

The Garage Debris Area is located approximately 40 m southwest of the garage as shown in Figure 2A and Photos 14 and 15. The area was geophysically surveyed in 2004 and the results are presented in Figures 2B, 2C, and 2D. The debris area comprises two lobes, Lobe A and Lobe B. Lobe B consists of surface debris made up of barrels and construction equipment while Lobe A contains buried debris. The surface debris in Lobe B should be collected during cleanup.

Lobe A is located on the slope down gradient to a relatively flat area adjacent to the garage. This flat laydown area was constructed by placing fill over the edge of bedrock outcrops that are present in various areas throughout this flat area. Lobe A is present in this fill. It is recommended that this area be regraded with fill 0.7 m thick, provided environmental assessments by others indicate no environmental concerns in the area. A perimeter for the area that should be regraded is shown in Figure 2A.

4.6 Road Debris Area

The Road Debris Area is located approximately 325 m south of the garage as shown in Figure 5. The area was geophysically surveyed in 2004. The debris area is a single lobe of partially buried debris that consists of crushed barrels, miscellaneous metal and timber debris. Only a small amount of material is present. It is assumed that the debris will be removed during the clean up.

4.7 Old Camp Debris Area

The original construction camp for the CAM-F DEW Line site was located adjacent to Sarcpa Lake approximately 3 km southeast of the station. Over the years, many of the disturbed areas have revegetated, making it difficult to identify lobes of buried debris, if any. Therefore, the entire area was geophysically surveyed with the magnetometer. The results of the survey are presented on Figures 3B, 3C, and 3D. The area is shown in Photos 16 through 19.

Thirteen main lobes of debris were identified in the Old Camp Debris Area, Lobe A to Lobe N. Along with the thirteen lobes, the geophysical survey identified many small anomalies in the area that signify additional surface debris. Of the thirteen lobes, only

two, Lobe H and Lobe M, have partially buried material. The remainder of the lobes all are comprised of surface debris. The majority of the lobes are comprised of stockpiled barrels, while some have construction equipment and miscellaneous metal objects and timber present. Lobe H is located alongside the access road in the vicinity of an old borrow area and has partially buried barrels present. Windrows and troughs are present throughout the area from past borrow activities. Lobe M is comprised of partially buried barrels that were used to construct a loading ramp.

It is assumed that all thirteen lobes along with all other surface debris will be removed during cleanup. It is recommended that the area of Lobe H be regraded after the debris is removed. This will smooth the windrows and troughs to match the natural topography.

4.8 Old Camp Trail Debris Area

The Old Camp Trail Debris Area is located approximately 200 m east of Proposed Borrow Area 5, as shown in Figure 6. The debris area is a large area of surface debris that consists of stockpiled barrels. The majority of these barrels are filled with household debris and miscellaneous metal and wooden debris. It is assumed that this debris will be removed during clean up.

5.0 PROPOSED NEW LANDFILL LOCATIONS

It is understood that a landfill will be required for disposal of demolition, surface, and excavated debris. It is uncertain whether a facility for contaminated soil or a landfarm for treatment of hydrocarbon contaminated soil will be required; however, EBA assessed locations for each of these types of landfills during the site investigation. Conceptual landfill design details are discussed below; however, the design details and alternatives should be further assessed once the clean up protocols have been defined.

The location of these facilities is based on a variety of factors, including:

- size of the area available;
- acceptable soil and foundation conditions;
- limited surface runoff through the area;
- relatively level topography;

- does not impede natural drainage in the area;
- appropriate distance from natural water bodies or water courses; and
- no adverse ground conditions that could affect the ability of the permafrost to function as a containment system.

The volume of contaminated soil and debris that have to be landfilled will dictate the size of the facilities and to a certain degree influence the areas chosen for construction of these new facilities.

Two potential debris landfill locations, three potential soil disposal facility locations, and one potential landfarm location were evaluated in 2004.

5.1 Debris Landfill

5.1.1 Design Considerations

The following describes design considerations for Debris Waste Landfills.

Waste characterization – It is understood that the waste material placed in a new debris landfill will consist only of debris and demolition waste. This includes treated and untreated wood, metal wastes from demolition and equipment disposal, empty crushed barrels, and concrete. Asbestos, when packaged according to regulations, is also considered non-hazardous. A large percentage of the waste from the site is barrels. It is understood that the barrels will have the residue removed. It is recommended that the barrels be crushed to reduce their volume in the landfill.

Surface water run-on and run-off control - The final landfill surface must be graded such that water ponding does not occur. Ponding and infiltration could increase the seasonal thaw depth or contribute to leachate generation. Percolation can only occur during the very short summer season when the active layer is thawed. The landfill surface must not be so steep that it promotes erosion of the cover materials, which could expose debris. The fill material for landfill cap should be the sand and silt till available on site. This is a well-graded material that is relatively erosion resistant, and will have moderate water infiltration.

Leachate Control - The landfill material is non-hazardous dry waste; thus leachate needs to be controlled rather than eliminated completely. The following design factors will control the amount of leachate within the landfills:

- Only "Dry Waste" will be placed in the landfills;
- The short arctic summer limits the amount of time that water infiltration can occur;
- The compacted cap material will promote surface run-off; and
- Landfills are located where natural overland runoff is minimal.

Frost Jacking - Frost jacking of debris occurs when; (1) fills contain debris subjected to seasonal freezing and thawing; (2) the mineral soils used for fill are frost susceptible (fine grained; and (3) there is access to free water. In order to prevent frost jacking, the landfill backfill material should be frost stable, and both groundwater and surface water must be controlled. Backfill material specifications that address these considerations are presented in Section 6.0.

Biological Odour and Methane Gas Control - Odour and gas generation are typical of most domestic landfills in the south and are the result of decomposition due to biological activity, fungi and bacteria. These are not considered to be significant factors in the design of demolition debris landfills at CAM-F for two reasons; firstly (1) the proportion of domestic waste to be landfilled will be insignificant in relation to the total volume of debris; and (2) the temperature of the waste and surrounding permafrost will limit decomposition and therefore the rate at which gas is generated.

Settlement of Landfill Surface - To reduce settlement and ground subsidence, the debris should be placed in 0.5 m thick lifts with a prescribed earth fill graded over each lift of debris to fill the voids. The earth fill should be a minimum of 0.15 m thick and worked into the underlying debris. Quality assurance testing should be carried out to determine the optimum debris lift thickness and to confirm that there are no large voids in the landfill.

5.1.2 Debris Landfill Design Parameters

The cover and berms may be constructed with appropriate granular borrow materials available at CAM-F. The intermediate fill should be a frost stable material. Recommended material specifications for the berm and cover and intermediate fill materials are presented in Section 6.0.

The landfills are generally constructed on grade to reduce constructability issues, and permafrost disturbance. The landfills should be constructed by first building containment berms around the perimeter of the landfill area. It is recommended that the containment berms have a maximum outside slope of 3H:1V and an inside slope of 1.5H:1V. The top of the berm should have a minimum width of 2.0 m. The sand and silt till is good material for the landfill berms.

To reduce settlement and ground subsidence, the debris should be placed in 0.5 m thick lifts with a prescribed non frost susceptible intermediate fill (see Section 6.0) graded over each lift of debris to fill the voids. The intermediate fill should be a minimum of 0.15 m thick and worked into the underlying debris. The maximum debris thickness (sum of all debris lifts) in the landfill should not exceed 3.0 m.

The landfill should be capped with a layer of fill compacted to 95% of the maximum density determined in the laboratory using standard effort (ASTM D698). The surface of the landfill should be graded to a slope between 2% and 4%. The landfill should be contoured to blend in with the surrounding terrain.

Most of the available fills for landfill covers are relatively pervious, however, using the available materials, landfill freezeback can be achieved using a thermally designed thickness of landfill cover. A freezeback design would significantly reduce the risk of moisture migration into and out of the landfill. EBA can carry out the analysis for a freezeback cover design upon request.

Environmental assessment of the debris materials is being carried out by others. Provided the environmental risk of leachate products escaping the landfill is deemed acceptable, a cover thickness less than that required for complete freezeback can be used.

5.1.3 Proposed Debris Landfill Locations

Two alternative sites were identified as potential debris landfill sites in the EBA 1996 report, these being the Dump A Proposed Landfill and the Tower Landfill. The first site is located adjacent to Dump A; the second site is located in a low lying area north of the module train. The Dump A site has been rejected due to construction issues pertaining to the decommissioning of the dump. An additional site located east of the Quonset hut between two bedrock outcrops was investigated during the 2004 investigation. The following sections describes the original proposed Tower Landfill which has been renamed as Potential Debris Landfill Location 1 and the area east of the Quonset hut, referenced as Potential Debris Landfill Location 2.

Potential Landfarm Location 1 is also a possible location for a demolition debris landfill. This location is described in Section 5.3.1.

Potential Debris Landfill Location 1

A new landfill could be constructed in the low lying area between the module train and the POL area, as shown in Figure 2A. The majority of the area is undisturbed between the road to the POL area and the module fill pad. An old tower is located in the centre of the site; a small sand berm runs parallel to the POL road. The landfill could be constructed up against the POL road, and could blend into the natural topography of the area. The area is shown in Photos 20 and 21.

The area adjacent to the module train fill pad is wet and low lying. Testpit 10 was excavated in the area and encountered 0.1 m of peat overlying 0.05 m of gravel, overlying very wet silt and sand. Testpit TP-04-42 was excavated during the 2004 investigation. The testpit encountered wet, silty, sand till with some gravel. Two samples from the testpit had moisture contents of 9.7%. Ponded water was present in the area during the 2004 investigation. Bedrock outcrops are present at the north-northeast portion of the area directly west of the POL tanks. Testpits logs and laboratory results are present in Appendix B and C, respectively.

The area drains north towards small ponds located 170 m north of the area. The ponds eventually drain to Sarcpa Lake located 3 km to the east.

Potential Debris Landfill Location 1 is an acceptable location for construction of a new landfill; however, constructability issues resulting from wet ground makes this site less desirable than Potential Debris Landfill Location 2.

Potential Debris Landfill Location 2

Potential Debris Landfill Location 2 is situated in a low-lying area between two bedrock outcrops east of the Quonset hut as shown on Figure 2A and Photo 22. The area has minor relief, from the northwest end to the southeast end. The area is undisturbed and has good access from an existing road that leads to Dump A. The landfill berms could be constructed up against the bedrock outcrops on either side and be blended into the natural topography of the area.

Three testpits (TP-04-39 to TP-04-41) were excavated in the proposed landfill area in 2004. Sand and silt till were encountered in all the testpits to an undetermined depth. All three testpits terminated on frozen ground at a depth between 1.1 and 1.2 m. The soils are generally damp to wet with seepage observed in testpit TP-04-41 at the top of the frozen ground. A sample from this testpit at a depth of 0.3 – 0.4 m had a moisture content of 15.6%. No ponded water or excessively soft areas were encountered in the area during the 2004 investigation. Testpit logs are present in Appendix B and laboratory results are presented in Appendix C.

The area drains towards the southeast towards small ponds located 750 m southeast of the area. The ponds eventually drain to Sarcpa Lake located 1.2 km to the southeast. Drainage also travels southwest towards the freshwater lake 250 m away.

Potential Debris Landfill Location 2 is an acceptable location for a new landfill and a reduction of fill quantities can be realized by taking advantage of the natural topography of the area. The soft soil conditions found at Potential Debris Landfill Location 1 were not apparent at Location 2 during the site investigation; therefore, Location 2 is the preferred site.