Town of Gander
Wastewater Treatment Plant
Environmental Assessment Registration Document

173020.00 ● Env. Assessment Registration Document ● April 2017

Prepared for:
Town of Gander

Prepared by:
CBCL LIMITED
Consulting Engineers

Issued for Review	G. Sheppard	04/11/17	M. Rutherford
Issue or Revision	***Reviewed By:***	***Date***	***Issued By:***

CBCL LIMITED
Consulting Engineers

Project No: 173020.00

CBCL LIMITED
Consulting Engineers

April 11, 2017

Dept. of Municipal Affairs and Environment
PO Box 8700
St. John's, NL
A1B 4J6

Attention: Ms. Susan Squires, Ph.D.
Director of Environmental Assessment

RE: Town of Gander – Wastewater Treatment Plant (WWTP)
Environmental Assessment (EA) Registration Document
CBCL Project # 173020.00

Dear Ms. Squires:

Enclosed is our application and associated materials required for your review of the Environmental Assessment Registration Document for the above noted project. If you have any questions or require clarification, please contact me.

Yours very truly,

CBCL Limited

187 Kenmount Road
St. John's, Newfoundland
Canada A1B 3P9

Telephone: 709 364 862
Fax: 709 364 8627
E-mail: info@cbcl.ca
www.cbcl.ca

Solving today's problems with tomorrow in mind

Greg Sheppard
Senior Civil Engineer
Direct: 709-364-8623
E-Mail: gregs@cbcl.ca

Project No: 173020.00

BEST MANAGED COMPANIES

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CHAPTER 2 PROPONENT

2.1 Name of Corporate Body

Town of Gander

2.2 Address

100 Elizabeth Drive
Gander, NL
A1V 1G7

2.3 Proponent

2.3.1 Director of Engineering

Name: James Blackwood
Official Title: Director of Engineering
Address: 100 Elizabeth Drive, Gander, NL, A1V 1G7
Telephone No: 709-651-5915
Email: jblackwood@gandercanada.com

2.3.2 Mayor

Name: Claude Elliott
Official Title: Major, Town of Gander
Address: 100 Elizabeth Drive, Gander, NL, A1V 1G7
Telephone No: 709-651-2930
Email: info@gandercanada.com

2.3.3 Chief Administrative Officer

Name: Dermot Chafe
Official Title: Chief Administrative Officer, Town of Gander
Address: 100 Elizabeth Drive, Gander, NL, A1V 1G7
Telephone No: 709-651-5920
Email: dchafe@gandercanada.com

2.4 Principal Contact for Purpose of Environmental Assessment

2.4.1 CBCL Limited Project Manager

Name: Greg Sheppard
Official Title: Senior Civil Engineer, CBCL Limited
Address: 187 Kenmount Rd, St. John's, NL A1B 3P9
Telephone No: 709-364-8623
Email: gregs@cbcl.ca

2.4.2 CBCL Limited Environmental Lead

Name: Melissa Rutherford
Official Title: Environmental Scientist, CBCL Limited
Address: 1489 Hollis Street PO Box 606, Halifax, NS, B3J 2R7
Telephone No: 902-421-7241 x2574
Email: mrutherford@cbcl.ca

CHAPTER 3 THE UNDERTAKING

3.1 Name of the Undertaking

Town of Gander Wastewater Treatment Plant

3.2 Purpose/Rationale/Need for the Undertaking

The proposed project is a new Wastewater Treatment Plant (WWTP) located in Gander, NL. The purpose of the Project is to replace existing wastewater treatment facilities that do not meet the current Federal *Wastewater Systems Effluent Regulations* (WSER). The new WWTP will be designed to meet future wastewater treatment demands for the Town of Gander (herein referred to as the 'Town').

The Town is currently serviced by two (2) WWTPs. The Beaverwood WWTP, a hydrodynamic separation plant, services the Southeast part of the Town. The Magee Road WWTP, an extended aeration plant, services the Northeast portion of the Town. The Beaverwood WWTP discharges to a stream that is tributary to Gander Lake, while the Magee Road WWTP discharges to Whitman's Pond and, ultimately, to the Gander River. Current effluent sampling results indicate that neither treatment system meets WSER requirements.

The Beaverwood WWTP sewershed contains areas serviced with combined sewers. This plant was designed to accommodate large volumes of flow, but is still reported to overflow during extreme rainfall events. The overflow is located upstream of the headworks; therefore, wastewater that discharges via the overflow is not treated. The Magee Road WWTP is located in an area of Town experiencing significant growth. This facility is currently operating at approximately 95% capacity and cannot accommodate future growth. Land in this area is becoming increasing valuable for development. Further, the Town has received odour complaints from nearby residents.

The design population has been projected to be 17,500 in 2040. This reflects the fact that the Town is growing rapidly, and that continued rapid growth is expected, although at a somewhat lower rate (8% per 5 years) than the last few years (11% per 5 years). Future growth is assumed to expand the current built-up area at a similar density to the current Magee Road WWTP catchment. The 2015 population is approximately 12,000, as projected from 2011 census data, and 5,500 more people are projected to join the Town in the next 25 years (Statistics Canada 2017).

The new WWTP will include preliminary, primary, and secondary levels of treatment as well as effluent disinfection to mitigate the effect of the effluent discharge on the receiving water. The facility design will consider residuals handling procedures in order to safely and effectively handle wastewater treatment residuals such as screenings, grit, and sludge. Further details of the project are described in section 4.2.1.

The project delivery method for the new WWTP is the Design-Build method. By this method, a short-listed group of contractor-engineer teams will respond to a Request for Proposals which outlines the performance requirements for the WWTP. The successful proponent becomes the Design-Build contractor.

CHAPTER 4 DESCRIPTION OF THE UNDERTAKING

4.1 Geographic Location

The proposed location of the wastewater treatment system is approximately 3 km East of Cooper Boulevard in Gander, NL (Figure 4.1 and Figure 4.2 in Appendix A). Located South of Whitman's Pond, treated effluent would be discharged to Whitman's Pond, which flows to Jonathan's Pond, which is outside of the Gander Lake watershed. There are no marked water bodies identified on the proposed site. The project site will be accessed via newly constructed roads constructed from Cooper Boulevard.

The proposed project would be located on Crown Lands and land controlled by the Gander International Airport Authority (GIAA); the property area, including the site, access road and sewer easements, is approximately 44 hectares. The proposed lot property boundaries for the WWTP are:

- Northwest boundary – N 5428347.04, E 408669.50
- Northeast boundary – N 5428510.67, E 409039.34
- Southwest boundary – N 54 27809.24, E 408907.44
- Southeast boundary – N 5427972.87, E 409277.28.

The Town is in discussions with the Crown and the GIAA for the procurement/lease of these properties. The site is situated in a rural area removed from future development. This proposed WWTP location is currently forested, and as such some areas of the site will be cleared and grubbed during site preparation. This location was selected as the preferred option of several sites under consideration, as adequate separation distances from the Town are easily achieved at this location. Accordingly, the risk of exposure to odours is minimized.

4.2 Physical Features of the Undertaking

4.2.1 Description of the Project

The Town intends to design and construct the WWTP to treat wastewater at variable rates. A 60-year life span for structural components and a 15-25 year life span for mechanical, electrical and instrumentation components are anticipated. Project components will include the WWTP proper, new access roadways, new trunk sewers and an outfall. Major features are described below.

4.2.1.1 WASTEWATER TREATMENT FACILITY

The new WWTP will include a number of major features, which are described, in general terms, below. The exact number of these features, materials of construction, and configuration will be determined by the Design-Build contractor.

- Process building(s): These will contain preliminary treatment equipment, offices, control room, electrical room, and process equipment that must be sheltered, such as blowers and UV disinfection units. It is anticipated that 1-3 process buildings will be required.
- Large basins for solids removal: These basins are unaerated to promote effective settling of solids from the wastewater. These may be constructed of earthen berms lined with an impervious liner, or of concrete or fibreglass-reinforced plastic.
- Large basins for biological organics removal: These basins are typically aerated actively or passively to foster the growth of microorganisms to metabolize and remove the organic matter in the wastewater. These may be constructed of earthen berms lined with an impervious liner, or of concrete or fibreglass-reinforced plastic.

The design of the WWTP processes and equipment, including the major features, will comply with the more stringent requirements from the following list of design guidelines, which cover all aspects of the design of wastewater treatment facilities:

- Atlantic Canada Wastewater Guidelines Manual for Collection, Treatment, and Disposal (Environment Canada, 2006).
- Guidelines for the Design, Construction and Operation of Water and Sewerage Systems (NL Department of Environment and Conservation, Water Resources Management Division, 2005).
- Recommended Standards for Wastewater Facilities, "Ten State Standards" (Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 2014).

The WWTP will include the following levels of treatment, as a minimum, as shown in Figure 4.3:

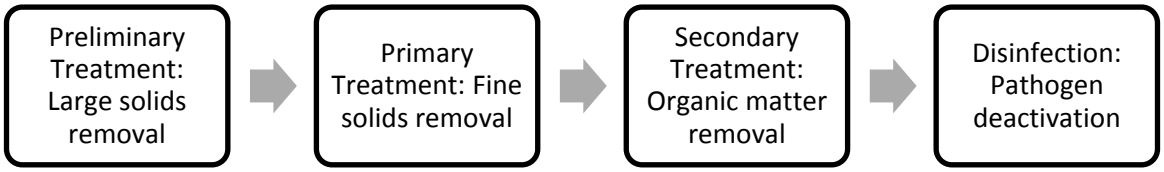

Figure 4.3: Proposed WWTP treatment unit operations

The exact equipment and configuration will be determined by the Design-Build contractor, but a typical process train is described below:

- Preliminary Treatment uses automated screens and/or grit removal equipment to remove large, non-biodegradable solids. This produces a "screenings" waste stream and possibly a "grit" waste stream, both of which must be removed from site and disposed of in an approved waste-disposal facility such as a landfill. The total annual volume of screenings projected to be produced under 2040 design flow conditions is 73 m^3.
- Primary Treatment uses large, quiescent tanks to provide conditions for settling out of fine solids. This produces a "sludge" waste stream which is typically dewatered, and may be partly biodegraded on site to stabilize it before eventual removal from site and disposal in an approved waste-disposal facility such as a landfill.

- Secondary Treatment uses large, usually aerated tanks to provide conditions for microbes to metabolize and remove organic matter. This produces a "sludge" waste stream which is typically dewatered, and may be partly biodegraded on site to stabilize it before eventual removal from site and disposal in an approved waste-disposal facility such as a landfill. The total annual volume of sludge (primary and secondary combined) projected to be produced under 2040 design flow conditions is 3,000 m^3/year, assuming 15% solids.
- Disinfection uses banks of ultraviolet (UV) lights to deactivate pathogens so that they cannot reproduce. This produces no waste streams. Chlorination and dechlorination will not be used for disinfection because of the risk of unacceptable chlorine release into the receiving water.

The WWTP will produce effluent of a quality that meets or exceeds the values presented below in Table 4.1, in accordance with WSER and Provincial requirements.

Table 4.1: Treated Effluent Quality Objectives

Parameter	Units	Measurement Method	Monitoring Location	Value
Carbonaceous Biochemical Oxygen Demand - $CBOD_5$	mg/L	Composite	Final Effluent	25
Total Suspended Solids -TSS	mg/L	Composite	Final Effluent	25
Un-ionized ammonia	mg/L	Composite	Final Effluent	1.25
Total Residual Chlorine (TRC)	mg/L	Grab	Final Effluent	0.00
Total Coliforms	MPN/mL	Grab	Final Effluent	5,000
E.Coli	MPN/mL	Grab	Final Effluent	1,000
pH		Composite	Final Effluent	6.5–9.0

The site will be equipped with security perimeter fencing system around the perimeter of WWTP and a gated entry at the access road to the WWTP. The fencing and gate shall deter and delay unauthorized entry or access by animals or humans, control the exit and entry through designated openings. A security system will be developed to monitor boundaries of the facilities and detect attempts at unauthorized entry and exit.

The site layout will be designed so that surface water does not drain into treatment process units. All surface storm water will be piped underground to a natural drainage course. Adequate drainage slopes and pipes shall be provided to accommodate run off along any earthworks or structures constructed. Drainage from access roads and parking lots shall be captured and discharged to a common location, as approved by the Town and authorities having jurisdiction.

The WWTP will rely on electricity to operate most of the equipment required for operations. An emergency generator will be located on site to provide power to all the equipment in the case of a power outage so that releases of inadequately treated effluent and excessive odours do not occur due to loss of power.

4.2.1.2 Linear Infrastructure

Sewers and force mains will connect the existing Town sewers at the locations of the current WWTPs to the proposed WWTP. The proposed linear infrastructure will include approximately 4.3

km of new sewers and sewage force mains, and one sewage lift station (Figure 4.2). Much of the proposed locations are currently forested, and will need to be cleared in order to construct the pipelines. Sewer pipes and water mains shall be installed in separate trenches with a minimum of 3 m of undisturbed soil in between. Sewer pipes shall have a minimum cover of 1.8 m to prevent freezing.

4.2.1.3 Access Road

The access road will be 2.2 km long and will connect Cooper Boulevard in Gander to the proposed WWTP site (Figure 4.2). A new entrance will be established off of this new roadway to give direct access to the site. The roadway will run adjacent to the proposed new trunk sewer alignment to the WWTP, and power will be brought to site along the access road. The road will have a minimum width of 6 m. The proposed cleared road alignment is 15 m in width. The new access road and onsite parking lots shall be serviceable and free draining under all weather conditions.

4.2.1.4 Outfall Ditch and Effluent Discharge

The outfall ditch will connect the WWTP to in Whitman's Pond (Figure 4.2).

The WWTP shall produce water of quality that meets or exceeds the values presented below in Table 4.2.

Table 4.2 Treated Effluent Quality Objective

Parameter	Units	Measurement Method	Value
Carbonaceous Biochemical Oxygen Demand - $CBOD_5$	mg/L	Composite	25
Total Suspended Solids -TSS	mg/L	Composite	25
Un-ionized Ammonia	mg/L	Composite	1.25
Total Residual Chlorine (TRC)	mg/L	Grab	0.00
Total Coliforms	MPN/mL	Grab	5,000
E.Coli	MPN/mL	Grab	1,000
pH		Composite	6.5–9.0

4.2.2 Physical and Biological Setting

Setting & Major Vegetation: The project is located in the Northcentral Subregion of the Central Newfoundland Forest Ecoregion. The Ecoregion is characterized by the Hylocomium-Balsam Fir (*Hylocomium splendens* and *Abies balsamea* respectively) forest type. As result of fire occurrences, much of the Hylocomium-Balsam Fir forest type has been converted to a black spruce (*Picea mariana*) forest type with white birch (*Betula papyrifera*) and aspen (*Populus tremuloides* and *P. grandidentata*) hardwood forests noted at richer sites. Aspen within the Central Newfoundland forest is more abundant than in other regions. Other species that are abundant in other regions, but absent within the Central Newfoundland Forest, include yellow birch (*Betula alleghaniensis*) due to the short frost-free period. Unique to this subregion, the high summer temperatures may stimulate aspen root suckering and contribute to the local success of aspen (Damman 1983). This subregion can be susceptible to regeneration failure due to low moisture, coarse soils and the prevalence of black spruce cover types. Succession to dwarf shrub heath dominated by sheep laurel

(*Kalmia angustifolia*) may occur where tree regeneration is lacking, and nutrient-poor, coarse textured till is present.

The Project site itself is relatively flat, heavily forested, and falling slightly in elevation from west to east. The Ecoregion is generally characterized with rolling to undulating topography below 200 m.

Forestry: The Project is located in Forest Management District 5 of the Eastern Region of Newfoundland. There are no known Corner Brook Pulp and Paper Limited (CBPPL) Timber Harvest Rights on the property.

Soils: Soils within the region are generally medium quality till that is shallow, lighter in colour, and has lower organic matter content compared to other ecoregions. The soil texture ranges from sandy loam to loam. Soils in the northern part of this ecoregion can display moisture deficiency, because of seasonal warm summer temperatures and high evapo-transpiration losses (Government of Newfoundland and Labrador 2017). Shallow groundwater is present in the project area ranging from 0.2 to 3.7 m (Englobe 2016; Appendix B).

Climate: The Central Newfoundland Ecoregion has the highest summer and lowest winter temperatures of the Newfoundland ecoregions (Government of Newfoundland and Labrador 2017). The coldest day on average is recorded in January and February (daily average -7.1 °C), with peak summer temperature observed in July (16.3 °C, Environmental Canada 2017). Despite an average summer temperature above 0°C, night frost can occur in any summer month (Government of Newfoundland and Labrador 2017). Average annual precipitation is 1,270.2 mm, with most precipitation falling as rain. The highest precipitation is recorded in December with an average of 126.7 mm (Environment Canada 2017). The Northcentral sub region is known to higher summer maximum temperatures, lower rainfall and higher frequency of fires than the other regions of Newfoundland (Government of Newfoundland and Labrador 2017). Prevailing winds at this location are to the west, and will generally be in the direction of populated areas (Environment Canada 2017).

Hydrology: Whitman's Pond is located approximately 200 m north of the proposed WWTP. Whitman's Pond is within the Jonathan's Brook watershed and flows to Jonathan's Pond, which is outside of the Gander Lake watershed. The Jonathan's Pond series of lakes is used for recreational activities (camping, swimming, canoeing, etc.). Surface water generally flows northward from the site toward Whitman's Pond or east toward a wetland located south of Whitman's Pond. Whitman's Pond is a shallow lake, with an average depth of 1.2 m and a maximum depth of 2.2 m (D Keefe, pers. comm. March 21, 2017). Whitman's Pond currently receives effluent from the Magee Road WWTP. Sampling by NL ECC Aquatic Research Program found that the background conditions of the Pond exceeded the CCME guideline for iron (2004 and 2005), and Chlorophyll A (2004). The othro-phosphate concentration range from 30 to 40 µg/L in 2004 and 2005.

Wildlife and Species of Concern: Common mammal wildlife that may be present within the Project area include moose, snowshoe hare, Arctic hare, fox, muskrat, otter, mink, black bear, beaver, lynx, and other small fur bearing mammals (Government of Newfoundland and Labrador 2016).

Bird species that may be present in the forest vegetated areas include raptors species (Bald Eagle, Osprey, Merlin, Boreal Owl, Great Horned Owl and Sharp-shinned Hawk), and grouse species (Ruffed Grouse and Spruce Grouse). The Project is located in close proximity to the Whitman's Pond area

identified in the Gander – Benton Stewardship Agreement, which provides productive waterfowl wetlands, with abundant aquatic vegetation providing important cover for protection from predators (Government of Newfoundland and Labrador 2007). Waterfowl species that may be observed include Green-winged Teal, Ring-necked Duck and Canada Goose.

Within the Gander region, the Gander River is located approximately 12 km north of the Project and is designated as Scheduled Salmon Rivers (DFO 2017a, b). Species present within Whitman's Pond include brook trout, Atlantic salmon, three spined stickleback, and nine spined stickleback (D Keefe, pers. comm. March 21, 2017). Both Atlantic salmon and brook trout have special harvesting management plans for this area (DFO 2017b). Also within the watershed (Jonathans Pond), American eel can be present (D Keefe, pers comm. March 21, 2017).

The Atlantic Canada Conservation Data Centre (AC CDC) documented 2 rare plant observations and 80 rare animal observations within 5km of the Project. Of the 80 rare animal records, the following species of conservation concern were observed: Rusty Blackbird, Gray-Cheeked Thrush, Barn Swallow, Olive-sided Flycatcher and Red Crossbill. The remaining species observed where not provincially or nationally listed, but are considered rare on the island and include American Tree Sparrow, Brown Creeper, Bufflehead, Mourning Dove, Northern Goshawk, Northern Harrier and insects. The 2 rare plant records included species that are not provincially or federally listed, and outside of Newfoundland & Labrador are not considered globally rare (A. Durocher, AC CDC, pers comm. March 21, 2017).

Based on AC CDC Expert opinion maps of provincially and federally listed species, no species have been identified within 5 km of the project location; however, the Expert Opinion Maps suggest that banded killifish presence is possible, while boreal felt lichen, Newfoundland marten and Short-eared Owl are possible, but unlikely (A. Durocher, AC CDC, pers comm. March 21, 2017).

Species of conservation concern are species that are protected by provincial and/or federal legislation. Species that are or may be found in the project area include the following (Table 4.3):

Table 4.3 Species of Conservation Concern

Species	NL *Endangered Species Act* Status	Canadian *Species at Risk Act* (SARA)	Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
Bird			
Barrow's Goldeneye *Bucephala islandica*	Vulnerable	Schedule 1 – Special Concern	Special Concern
Bobolink *Dolichonyx oryzivorus*	Vulnerable	No Status	Threatened
Chimney Swift *Chaetura pelagica*	Threatened	Schedule 1 – Threatened	Threatened
Common Nighthawk *Chordeiles minor*	Threatened	Schedule 1 – Threatened	Threatened

Species	NL *Endangered Species Act* Status	Canadian *Species at Risk Act* (SARA)	Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
Eskimo Curlew *Numenius borealis*	Endangered	Schedule 1 – Endangered	Endangered
Gray-cheeked Thrush *Catharus minimus*	Vulnerable	No Status	
Harlequin Duck *Histrionicus*	Vulnerable	Schedule 1 – Special Concern	Special Concern
Newfoundland Gray-cheeked Thrush *Catharus minimus*	Threatened	No Status	
Olive-sided Flycatcher *Contopus cooperi*	Threatened	Schedule 1 – Threatened	Threatened
Red Crossbill *Loxia curvirostra percna*	Endangered	Schedule 1 – Endangered	Endangered
Red Knot *Calidris canutus rufa*	Endangered	Schedule 1 – Endangered	Endangered
Rusty Blackbird *Euphagus carolinus*	Vulnerable	Schedule 1 – Special Concern	Special Concern
Short-eared Owl *Asio flammeus*	Vulnerable	Schedule 1 – Special Concern	Special Concern
Fish			
American eel *Anguilla rostrata*	Vulnerable	No Status	Threatened
Banded Killifish *Fundulus diaphanous*	Vulnerable	Schedule 1 – Special Concern	Special Concern

Protected Areas: There are no existing Provincial protected areas or Federal parks/reserves on the property; however, the Project is located upstream of the Jonathan's Pond Provincial Park reserve. The Town of Gander signed a Municipal Wetland Stewardship Agreement with the Province of Newfoundland in 1993 and recommitted to this initiative in 2007 for another 30-year period. Several wetlands and waterbodies were identified as part of this agreement, including the area around Whitman's Pond and a 100 m area from the high water mark, and associated marsh south of Whitman's Pond (Government of Newfoundland and Labrador, 2007). The construction and operation of this proposed WWTP will align with the initiative as stated in the Stewardship Agreement.

4.3 Construction

Regular Project hours for construction are to be Monday to Friday from 07:00 to 18:00 hours and on Saturdays, Sundays and statutory holidays from 08:00 to 17:00. Approval is required to work

outside of regular hours or days of the Project. Request approval from the Owner's Engineer at least 72 hours in advance if work is scheduled outside these times.

The site will be prepped, backfilled, graded, and compacted for the purposes of construction. All surfaces within the boundary of the WWTP will be either newly paved, top soil and seeded, sodded, planted, undisturbed or low maintenance river stone around tankage. Buildings, hardscape, roads and parking areas will not be developed within 30.5 m of any natural wetlands or watercourses. Excluding buried infrastructure, power sourcing and road access, no component of the treatment facility shall be constructed within a 25 m buffer around the entire site perimeter.

The following construction activities will be required for site preparation activities:

- Site clearing (road and site);
- Site excavation and backfilling;
- Site compaction;
- Roadway construction;
- Construction of onsite infrastructure;
- Paving;
- Use of temporary facilities;
- Security perimeter fencing installation;
- Storm water management; and
- Sodding and seeding.

4.3.1 Environmental Impacts during Construction

The Project will be designed and constructed so as to minimize risk and potential environmental impacts. Potential environmental impacts that have been identified include:

- Removal of vegetation;
- Disruption of wildlife, including fish;
- Silt and sedimentation runoff;
- In-water works (outfall placement);
- Smoke from brush burning;
- Dust;
- Construction debris;
- Risk of fuel, lubricant and hydraulic fluid release;
- Airborne emissions from construction equipment;
- Noise pollution from construction activities; and
- Temporary disruption of traffic.

4.3.2 Potential Source of Pollutants during Construction

Potential sources of pollutants that may occur as a result of construction include the following:

- Spills and releases (sewage from temporary toilets, fuel, lubricant and hydraulic fluid release);
- Silt and sedimentation runoff;
- Airborne exhaust emissions from construction equipment;
- Noise from construction activities;
- Dust; and
- Construction debris.

4.3.3 Mitigation Measures

The Town and their contractors will follow all specified permit conditions and construction best management practices during construction. The following project specific mitigation measures will be implemented during construction so as to mitigate potential sources of pollutants from entering the environment:

- A site specific Environmental Management Plan (EMP) will be developed and followed.
- All debris and waste materials will be disposed of in accordance with the latest regulations respecting Solid Waste Resource Management issued by the Newfoundland and Labrador Department of Municipal Affairs and Environment (MAE). Non-hazardous construction and demolition debris will be either recycled or salvaged; items may include cardboard, metal, brick, mineral fibre panel, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. A construction waste management plan will be developed and will include designated specific area(s) on the construction site for segregated or comingled collection of recyclable materials.
- On completion of the Project, all construction equipment, surplus materials and temporary works will be cleared away and removed from the site.
- Temporary weather tight enclosures and protection for exterior openings will be used until permanently enclosed.
- Only new or reused, clean materials will be used for the purposes of backfill, and grading.
- Surface soil stripping will be minimized where possible; material will be stockpiled and reused where possible.
- Dust mitigation measures will be implemented. Specific measures might include dust suppression activities such as wetting of the construction areas and sweeping and washing of paved road surfaces.
- All equipment used on site will be in good working order to reduce effects of noise.
- All construction activities will occur during working hours as defined in the permit.
- As required, traffic control will be provided by certified traffic control persons, in accordance with the Traffic Control Manual issued by the Newfoundland and Labrador Department of Transportation and Works. Access will be maintained for all emergency vehicles in construction areas.
- The Project will be designed to minimize disruption to existing natural areas. All removal and disposal of trees, brush, stumps, surface litter, boulders and grubbings will follow applicable permits and best management practices.
- An Erosion and Sediment Control Plan will be implemented prior to construction and will describe the measures implemented to prevent loss of soil during construction by stormwater run-off and wind erosion. The Plan will include protecting topsoil by stockpiling for reuse; preventing sedimentation of storm sewer or receiving streams; and preventing air pollution by dust and particulate matter. Temporary erosion and pollution control devices such as silt fences will be used to mitigate possible sources of pollutants.
- Dewatering plans and associated measures will be implemented to control the inflow of groundwater into excavations. Measures may include use of earthworks such as perimeter ditches and sump pumps. Any discharge of water from the site will be conducted in accordance with applicable environmental guidelines.
- All soils and surface water impacted via spills and releases will be disposed of off-site in accordance with all applicable environmental regulations and legislation.
- Any liners will be tested for leakage during commissioning.

- It is proposed that the outfall will be installed by a means to reduce impact to the environment. If possible, it will be installed in a dry environment, i.e. cofferdams, to isolate the sediment and erosion during outfall installation.
- The proposed location of the WWTP will be fenced to minimize unauthorized access and wildlife conflicts.

4.3.4 Potential Causes of Resource Conflict

Mitigation measures and best management procedures will be established and monitored to minimize all potential resource conflicts.

Land Disturbance: Construction equipment will not be permitted to operate outside the construction zone to prevent damaging adjacent areas. Where possible, surface soil will be reused. Standard safety and environmental practices will be enforced to reduce and prevent potential conflicts caused by construction equipment and tasks. The project is located in a rural and undeveloped area; disturbance to surrounding properties is not anticipated.

Surface Water and Surface Water Management: An Erosion and Sediment Control Plan will be implemented prior to construction and will describe the measures implemented to prevent loss of soil during construction by stormwater run-off or wind erosion, including protecting topsoil by stockpiling for reuse; prevent sedimentation of storm sewer or receiving streams; prevent pollution of the air with dust and particulate matter. Temporary erosion and pollution control devices such as silt fences will be used to mitigate the possible sources of pollutants. Following these requirements, minimal conflicts are expected.

Groundwater: During excavation activities or removal of existing soil materials, there is a potential for interactions with groundwater. Dewatering plans and associated measures will be implemented to control the inflow of groundwater. Discharge of water from the site will be conducted in accordance with applicable environmental guidelines. All liners will be tested for leakage during commissioning. Following these requirements, no conflicts are expected.

Fish and Fish Habitat: Construction activities will be designed and executed so as to minimize impacts to any body of water and, therefore, minimize effects on any fish or fish habitat areas. As such, all activities related to the outfall construction will be coordinated with the regulatory agencies at both Provincial and Federal levels. It is proposed that the outfall will be installed by a means that would reduce impact to the environment. If possible, the outfall will be installed in-the-dry with measures such as silt fencing and cofferdams installed to isolate the sediment and erosion during installation. Any culvert installations will follow best management practices and guidelines to reduce impacts to watercourses and fisheries. Following these requirements, minimal conflicts are expected.

Wildlife: Short-term effects to wildlife are expected during the construction period. Operation of machinery, equipment, human presence, and noise may result in temporary avoidance behaviours by animals in the vicinity of the WWTP and associated Project components. Best management practices will be implemented for the handling of domestic refuse generated during construction in order to reduce potential for wildlife (i.e. bears) to opportunistically forage on these materials, hence becoming a nuisance. If problem wildlife/nuisance animals are encountered, the appropriate authorities will be contacted. Following these requirements, minimal conflicts are expected.

Vegetation and Forestry: The project area consists of forested areas. All equipment used on site will be clean and clear to prevent the spread of invasive weeds. Where practical, vegetation removal should be completed outside of the bird breeding period (typically April 1st to August 31st). If clearing is required within the bird breeding period, pre-clearing bird nest surveys will be required to be completed by a qualified biologist to ensure no active nests are destroyed or impacted by clearing. Following these requirements, no conflicts are expected.

Air Emissions and Quality: Air emissions and air quality measures will be implemented into the Environmental Management Plan to prevent pollution of the air with dust and particulate matter. All equipment and construction activities on site will occur during approved working hours and all equipment used on site will be in good working order to reduce effects of noise. Following these requirements, no conflicts are expected.

Human Activities: The access road will be aligned from the existing roadway (Cooper Blvd.) to the WWTP site. This private road will be gated in order to restrict any unauthorized access to the WWTP area. If required, temporary traffic management will be implemented at the connection to Cooper Blvd. There are no registered homes or cabins in the vicinity of the proposed project. Though snowmobile and ATV trails in the area may intersect with the proposed access road, there is no expectation of any significant level of human conflicts.

4.4 Operations

The WWTP will operate year round following construction, and will be sized to treat the future design flows shown in Table 4.4 for the year 2040. Flows were monitored at the existing treatment plants to establish current flows, and census data was used for 2016 populations. A program of sewer separation and rehabilitation is underway to reduce wet weather flows and bring average and peak flows per capita down to more typical ranges.

Table 4.4 Proposed WWTP Flows

Parameter	Units	2016 (Measured)	2040 (Design)
Connected Population	capita	11,688	17,500
Average Day Flow (ADF)	m^3/day	8,994	10,500
Peak Day Flow (PDF)	m^3/day	20,346	23,800

4.4.1 Environmental Impacts during Operation

The Project will be operated so as to minimize risk and potential environmental impacts. Potential environmental impacts that have been identified include:

- Controlled release of treated effluent (liquid or odour);
- Uncontrolled release of treated effluent (liquid or odour);
- Noise pollution from operation activities; and
- Silt and sedimentation runoff.

4.4.2 Potential Source of Pollutants during Operations

Potential sources of pollutants that may occur as a result of operation include the following:

- Treated effluent;
- Dewatered and biodegraded solids;

- Treatment chemicals;
- Airborne exhaust emissions from operational equipment;
- Odours;
- Noise pollution from operational equipment; and
- Storm water runoff from site.

4.4.3 Mitigation Measures during Operations

The Town will follow all specified permit conditions and best management practices during operation. The following project specific mitigation measures will be implemented during operations to mitigate potential sources of pollutants from entering the environment:

- All chemical systems shall be contained with separate drainage systems for each chemical dosing system.
- Each chemical storage tank will be corrosion proof and shall have at least 110% the storage capacity of the largest tank.
- Sumps will be located in the containment areas such that they can be pumped out with a small portable pump.
- Unloading of tankers shall be carried out within a shallow containment or sloping area draining to an isolated sump (road tanker containment area). This sump shall be capable of being pumped out using the same pump as that provided to pump out the chemical tank containment areas. The drains adjacent to the sumps shall be connected to the sanitary sewerage system.
- The treatment plant and related infrastructure shall be designed to minimize the production of odours. Specific engineered measures shall be in place to mitigate the propagation of odours, such as aeration, ventilation, and odour removal through bio-filters or chemical scrubbers. The proposed treatment plant location is in a rural area in order to avoid the risk of odour nuisance to neighbouring properties.
- Noise from the WWTP when operating at full capacity with all systems operating normally, not including the emergency generator, shall not exceed 65 dBA at the plant boundary. Noise generation will be limited using the following design practices:
    - Design equipment for normal operation at lower rotational speeds;
    - Locate noise generating equipment away from points of compliance;
    - Orient discharge stacks directly upwards; and
    - Use features such as sound traps, silencers, enclosures and sound walls.
- Odour monitoring shall occur four times throughout the first year with a minimum of two months between samples. During each sampling event, six air samples, taken at two-hour intervals, will be taken at four sampling sites at the plant perimeter using a flux chamber. At least one sample shall be taken during worst-case odour dispersion scenarios (high temperatures, low wind speed) during a period of low flow. Samples shall be tested offsite using independent testing staff for odour units.
- Provide adequate dust control and ventilation to any areas where dry powders are batched or stored.
- Effluent quality will be monitored for compliance with applicable permits (Table 4.5).

Table 4.5 Compliance Sampling Requirements (WSER)

Parameter	Units	Sampling	Frequency[1]	Monitoring Location	Quarterly Average[2]
$CBOD_5$	mg/L	Composite	Every 2 weeks	Final Effluent	25
TSS	mg/L	Composite	Every 2 weeks	Final Effluent	25
pH	-	Composite	Every 2 weeks	Final Effluent	6.5 to 9.0
Un-Ionized Ammonia	mg/L	Composite	Every 2 weeks	Final Effluent	1.25
Total Coliforms	MPN/ 100 mL	Grab	Every 2 weeks	Final Effluent	5,000
Fecal Coliforms	MPN/ 100 mL	Grab	Every 2 weeks	Final Effluent	1,000

[1] Effluent samples for compliance determination shall be based on the collection of a 24-hour composite sample every two weeks, separated by at least 7 days. Each composite sample shall include a minimum of 2 discrete samples, with samples evenly distributed throughout the 24-hour period.

[2] Quarterly average compliance shall be based on composite sample results from each Quarter as defined in the WSER regulations.

4.4.4 Potential Causes of Resource Conflict

Surface Water and Surface Water Management: The effluent from the proposed WWTP will meet or surpass the WSER and Provincial requirements. An effluent sampling program will be implemented to confirm that the effluent meets or exceeds the requirements for discharge into the environment. Following these requirements, no conflicts are expected.

Groundwater: All liners will be tested for leakage during operations. Following these requirements, no conflicts are expected.

Fish and Fish Habitat: The outfall will be both designed and scheduled for installation to reduce and minimize the impact on fish and fish habitat. All of the outfall work will be coordinated with the MAE and the Department of Fisheries and Oceans. The effluent to be discharged to Whitman's Pond from the WWTP will be of better quality than the effluent from the current WWTP. Following these requirements, no conflicts are expected.

Wildlife: There are no additional resource conflicts expected for wildlife during operation.

Vegetation and Forestry: There are no additional resource conflicts expected for vegetation and forestry during operations.

Air Emissions and Quality: Operations will be implemented so as to reduce effects from noise and odour. The WWTP is over 1,000 m from the nearest residential area; therefore, the undertaking is not expected to impact everyday human activity given the secluded location of the site. As such, no additional conflict is expected.

Human Activities: The private road will be gated to restrict unauthorized access to the WWTP area. Though snowmobile and ATV trails in the area may intersect with the proposed Trunk sewer and access road, there is no expectation of any significant level of human conflicts.

4.5 Occupations

Design and construction will be the responsibility of the Build contractor with input from the Town, the Town's Project Manager, and the Town's Engineer. The Design-Build contractor will ultimately decide on the numbers and types of employees working on the project following final design. Anticipated project estimates have been provided below for evaluation; however, final estimates will be dependent on the successful contractor.

Employment equity will be the responsibility of the successful contractors during the design and construction. The Town of Gander has already developed employment equity policies that will be followed in any employment opportunities.

4.5.1 Construction Phase

It is projected that the following occupations will be required for employment during the construction phase of the project. Table 4.6 displays the approximate anticipated number of positions during construction and their associated National Occupational Classification (NOC) codes.

Table 4.6 Anticipated Positions / Occupations Required during Construction Phase

Position	National Occupational Classification Group Title Code	Number Positions Anticipated	Duration of Employment (months)
Construction Manager	0711	1	18
Construction Trades Helpers & Laborers	7611	4	18
Land Surveyors	2154	2	6
Contractors & Supervisors, Heavy Construction Equipment Crews	7217	6	18
Contractors and Supervisors, Other Construction Trades, Installers, Repairs and Services	7219	6	18
Construction Inspectors	2264	2	18
Electricians	7241	4	6
Heavy Equipment Operators	7412	4	12
Carpenters	7271	8	6
Bricklayers	7281	4	6
Truck Drivers	7411	4	12
Landscape Architects	2185	0	0
Other Trades Helpers and Laborers	7612	6	18

4.5.2 Operations Phase

The Town already employs staff to handle daily operations and maintenance at the active WWTPs; however, new positions may be required. It is projected that the following occupations will required for employment during the operations phase of the project. Table 4.7 displays the approximate anticipated number of positions during operations and their NOC code.

Table 4.7 Anticipated Positions / Occupations Required during Operation Phase

Position	National Occupational Classification Group Title Code	Number Positions Anticipated	Duration of Employment (months)
Utilities Manager	0912	0.5	Indefinite

4.6 Project Related Documents

4.6.1 Public Meeting

The Town of Gander held an Open House and Public Meeting on March 28, 2017 to present information on the project and to outline the process for the registration of the undertaking according to the *Environmental Protection Act* and *Environmental Assessment Regulations*. The public was able to ask questions and present areas of concerns during this session. A summary of the topics covered and concerns raised are presented in Appendix C.

4.6.2 Reference Documents

The following resources were used to form this document

Damman, A.W.H. 1983. An Ecological Subdivision of the Island of Newfoundland, pp. 163-206. South, G.R. (ed.), *Biogeography and Ecology of the Island of Newfoundland*. Dr. W. Junk Publ., The Hague.

Durocher, Adam. Data Manager, Atlantic Canada Conservation Data Centre, Corner Brook, Newfoundland and Labrador. March 21, 2017.

Fisheries and Oceans Canada. 2017a. Newfoundland and Labrador Angler's Guide 2016-2017. Available: http://www.nfl.dfo-mpo.gc.ca/NL/AG/MWatershedManagementPlans. Accessed March 16, 2017.

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Government of Canada. 2017. Canadian Climate Normals 1981 – 2010 Station Data – Gander Int'L A – Climate ID: 8401700 Available: http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=6633&autofwd=1. Accessed: March 10, 2017.

Government of Newfoundland and Labrador. Department of Fisheries, Forestry, and Agrifoods – Ecoregions of Newfoundland. Available http://www.faa.gov.nl.ca/forestry/maps/central_eco.html. Accessed: March 10, 2017.

Government of Newfoundland and Labrador, Department of Environment and Climate Change. 2016. Hunting & Trapping Guide 2016-2017. Available: http://www.ecc.gov.nl.ca/wildlife/pdf/Hunting_Trapping_Guide.pdf. Accessed: March 17, 2017.

Government of Newfoundland and Labrador. 2007. Stewardship Agreement between Her Majesty the Queen in Right of Newfoundland and Labrador and the Town Council of Gander dated March 14, 2007. Available: http://www.ecc.gov.nl.ca/wildlife/stewardship/community_profiles/pdf/Gander.pdf. Accessed March 16, 2017.

Keefe, Donald. Ecosystem Management Ecologist, Aquatic, Wildlife Division, Newfoundland and Labrador, Department of Municipal Affairs and Environment, Corner Brook, Newfoundland and Labrador. March 21, 2017.

Statistics Canada. 2017. Census Profile – Gander, Newfoundland. Available http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=POPC&Code1=0311&Geo2=PR&Code2=12&Data=Count&SearchText=&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1. Accessed March 30, 2017.

The following Project related documents have been provided for further information:

Englobe. 2016. Geotechnical Investigation - Proposed New Wastewater Treatment Facilities, Ref. N°: 20784. Report Prepared for Town of Gander, c/o MHPM Project Managers Inc. by Englobe, Mount Pearl, NL, Canada dated June 2016.

CHAPTER 5 APPROVAL OF UNDERTAKING

Additional permits, approvals and authorizations may be required for the construction and operation of the Gander WWTP. The following permits, approvals, and authorizations from various issuing agencies that may be required include, but are not limited to, the items listed in Table 5.1.

Table 5.1 List of Permits, approvals and authorization for the Undertaking

Permit, Approval or Authorization	Applicable Legislation	Issuing Body
Approval for the Undertaking	*Environmental Protection Act* / *Environmental Assessment Regulation*	Minister of Municipal Affairs and Environment
Certificate of Approval • Certificate of Approval – Sewage Treatment Plant • Certificate of Approval – Water and Sewer Distribution System (update)	*Water Resources Act*	Water Resources Division, Department of Environment and Climate Change
Alterations to a Body of Water – Schedule A - Culvert	*Water Resources Act*	Water Resources Division, Department of Environment and Climate Change
Crown Lands Applications/Licenses	*Lands Act*	Customer Services, Department of Municipal Affairs
Permit to Cut Crown Timber	*Forestry Act* / *Cutting of Timber Regulations*	Department of Fisheries, Forestry and Agrifoods
• Burn Permit • Operating Permit	*Forestry Act* / *Forest Fire Regulations*	Department of Fisheries, Forestry and Agrifoods
Approval under the National Building Code of Canada		Service NL, Department of Government Services
Storage and Handling of Gasoline and Associated Products Application	*Environmental Protection Act*/ *Gasoline and Associated Products Regulations*	Department of Municipal Affairs and Environment

Access agreements with neighbouring properties may be required for right-of-way and access allowances during construction and operations. These will be negotiated by the Town of Gander and other parties such as the GIAA.

CHAPTER 6 SCHEDULE

The project design is scheduled to commence in July, 2017. Upon receipt of all required approvals and authorizations, the estimated start date for construction is October, 2017. Project operations are estimated to commence in April, 2019.

CHAPTER 7 FUNDING

The estimated capital cost for the design, construction and commissioning of the Gander WWTP is $35M. The annual operation and maintenance costs will be estimated when the final technology has been selected. For the purpose of evaluation, annual operation and maintenance costs could range from $50,000 to $500,000 annually.

Funding will be obtained from Federal, Provincial and Municipal sources. The breakdown is as follows:

- Federal: $11.7M
- Provincial: $10.3M
- Municipal: $13M

Upon successful award of government funding, the Town will contribute the remainder of the funding.

APPENDIX A

Figures

No.	Description	No.	Description	No.	Description

Date	Scale	Designed	Drawn	Checked	Approved	CBCL No.	Contract
APR 06, 2017	NTS		CTG	GES		173020.00	

CBCL LIMITED
Consulting Engineers

TOWN OF GANDER
WASTEWATER TREATMENT PLANT

LOCATION PLAN

Drawing

FIG-4.1

NORTH

LEGEND:

SITE BOUNDARY

PROPOSED SEWER MAIN

PROPOSED SEWAGE FORCE MAIN

WHITMAN'S POND

PROPOSED EFFLUENT OUTFLOW

N: 5428510.67
E: 409039.34

N: 5428347.04
E: 408669.50

PROPOSED WASTE WATER TREATMENT PLANT SITE

PROPOSED SITE ACCESS ROAD

PROPOSED SEWAGE PUMP STATION

N: 5427972.87
E: 409277.28

N: 5427809.24
E: 408907.44

PROPOSED SEWAGE FORCE MAIN

MAGEE ROAD WWTP

PROPOSED SEWER

FIRE HALL

COOPER BLVD

PROPOSED SEWER

WATERSHED BOUNDARY

MEMORIAL DR

NAVY RD

BEAVERWOOD WWTP

COORDINATE SYSTEM = NAD83, MTM, ZONE 2

DRAWN: C. GLOVER	SCALE: 1:15,000	TOWN OF GANDER WASTEWATER TREATMENT PLANT	CBCL LIMITED Consulting Engineers 187 KENMOUNT ROAD ST. JOHN'S, NL, A1B 3P9 Phone: (709) 364-8623 Fax: (709) 364-8627
PROJECT NO: 173020.00	DATE: APR 06, 2017		
DRAWING NO: FIG-4.2-REV 0		SITE PLAN	

11 X 17

APPENDIX B

Geotechnical Investigation Proposed New Wastewater Treatment Facilities

Englobe
Soils Materials Environment

Town of Gander
c/o MHPM Project Managers Inc.

Geotechnical Investigation
Proposed New Wastewater Treatment Facilities

Report

Date: June 2016
Ref. N°: 20784

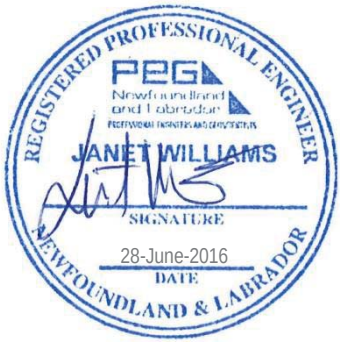
Town of Gander
c/o MHPM Project Managers Inc.

Geotechnical Investigation
Proposed New Wastewater Treatment Facilities

Report | 20784

Prepared by:

Janet Williams, P.Eng.
Geotechnical Engineer



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Property and Confidentiality

REVISION AND PUBLICATION REGISTER		
Revision N°	**Date**	**Modification And/Or Publication Details**
A	2016-03-21	Draft Report Issued for Information and Review
1	2016-06-28	Final Report Issued

1 INTRODUCTION

Englobe Corp (Englobe), at the request of MHPM Project Managers Inc., on behalf of the Town of Gander, has carried out a geotechnical investigation at the locations of a proposed new wastewater treatment plant (WWTP) and the associated new pipeline corridors. The purpose of the work was to assess the subsurface and groundwater conditions in these areas.

This report presents the observations of the geotechnical investigation of the proposed locations. Included herein are the factual results of the field investigation including discussion of field procedures, subsurface conditions, and laboratory analysis.

It is understood that the Owner's Technical Consultant (OTC) for the wastewater treatment facility project is CBCL Limited (CBCL).

2 PROJECT DESCRIPTION

It is understood that the Town of Gander is planning for the replacement of their two existing wastewater treatment plants, namely the Magee Road Sewage Treatment Plant and the Beaverwood Sewage Treatment Plant, with a new wastewater treatment plant. The new facility will be capable of treating all of Gander's current needs as well as having the built-in capacity to handle future growth of the municipality. The scope of work associated with this project includes the construction of new trunk sewers, construction of a new wastewater treatment facility, and decommissioning of one or both of the two existing sewage treatment plants or possible refurbishment of the Beaverwood plant to serve as a combined sewage and storm water treatment facility during high flow events.

The planned location of the new WWTP is northeast of Town of Gander and south of Whitman's Pond. Site reconnaissance with the CBCL, found that the original proposed location of the WWTP, just south of Whitman's Pond, was a marsh. The proposed location was moved by CBCL to along the northeastern boundary of the Bowater property. The new proposed location generally slopes down gently to the northwest to Whitman's Pond.

3 INVESTIGATION PROCEDURE

The fieldwork for the test pit investigation was carried out between November 27, 2015 and April 8, 2016. Sixty-two (62) test pits were excavated using an excavator supplied by ANW Construction Limited. The locations of all test pits were provided by CBCL. Due to accessibility issues, primarily boggy areas, some locations had to be altered. The approximate as-built test pit locations are indicated on the enclosed site plans, Figure 1 and Figure 2. Test pit locations were referenced in the field to UTM-NAD-83 Zone 22 Grid system using a held-held GPS unit. The co-ordinates for each test pit location are shown in Table 1.

The site investigation was carried out by qualified geotechnical engineering personnel who located the test pits in the field and logged the subsurface conditions. Grab samples were obtained from the test pits and placed in waterproof bags and transported to our Mount Pearl laboratory for further examination and testing.

The fieldwork for the monitoring well installation was carried out between June 21, 2016 and June, 2016. Eight (8) boreholes were drilled using a truck-mounted drill rig supplied to the project by Logan Geotech Inc. and were advanced through the overburden using standard solid stem augers. Standard Penetration Testing and soil sampling were performed (where possible) in the overburden using a 50-mm diameter split-spoon sampler. A 50 mm diameter PVC monitoring well was installed in each borehole. Well details are shown on the Borehole Logs in Appendix 2. The approximate as-built test pit locations are indicated on the enclosed site plan, Figure 3. Borehole locations were referenced in the field to UTM-NAD-83 Zone 22 Grid system using a held-held GPS unit. The co-ordinates for each monitoring well location are shown in Table 3.

4 SUBSURFACE CONDITIONS

4.1 Soil Conditions

An explanation of terms and symbols used in the report is provided in Appendix 1. A summary of the encountered geologic conditions is provided in the Test Pit Logs in Appendix 2. Laboratory test results are provided in Appendix 3.

It should be noted that the stratigraphic boundaries on the Test Pit Logs typically represent a transition of one soil type to another and do not necessarily indicate an exact plane of geologic change. Subsurface conditions may vary between and beyond the test pit locations.

Groundwater observations were made during the field investigation through open-hole measurement at the test pit locations. A summary of the accumulated groundwater information is provided on the Test Pit Logs in Appendix 2 and in Table 1.

Table 1. Summary of Test Pit Locations, Termination Depths and Groundwater Depths

Test Pit	Northing	Easting	Depth (m)		Water Seepage Location
			Termination	Groundwater	
TP-01	5426329	676195	3.0	0.9	Rootmat/till surface
TP-02	5426526	676262	3.0	0.3	Rootmat/till surface
TP-03	5426751	676153	3.4	ne	-
TP-04	5426958	676063	3.0	0.3	Rootmat/till surface
TP-05	5427202	675936	2.7	0.3	Rootmat/till surface
TP-06	5427427	675827	2.7	0.8	Peat/till surface
TP-07	5427652	675718	3.0	2.9	Within till

Test Pit	Northing	Easting	Depth (m)		Water Seepage Location
			Termination	Groundwater	
TP-08	5427877	675607	3.0	ne	
TP-09	5427545	674848	2.9	0.0	Through peat
TP-10	5427508	675095	3.4	1.2	Rootmat/till surface
TP-11	5427471	675311	3.0	2.7	Within till
TP-12	5427513	675544	3.2	0.5	Rootmat/till surface
TP-13	5428131	675649	3.0	0.9	Peat/till surface
TP-14	5427475	676055	2.1	1.2	Peat/till surface
TP-15	5427478	676305	3.0	0.6	Peat/till surface
TP-16	5427565	676519	4.6	ne	-
TP-17	5427747	676684	2.7	0.9	Within till
TP-18	5427899	676883	2.4	ne	-
TP-19	5428015	677111	3.0	0.9	Within till
TP-A0	5428443	676940	4.0	3.7	Within bedrock
TP-A1	5428486	677031	3.7	ne	-
TP-A2	5428529	677121	4.3	ne	-
TP-A3	5428570	677213	4.3	2.7	Within till
TP-A4	5428606	677312	4.3	3.0	Within till
TP-A5	5428401	676848	2.7	2.4	Within till
TP-A6	5428359	676757	1.5	0.6	Rootmat/till surface
TP-A7	5428318	676666	4.0	1.5	Within till
TP-B0	5428355	676976	3.4	ne	-
TP-B1	5428379	677069	3.4	1.5	Peat/till surface
TP-B2	5428437	677163	4.9	0.3	Rootmat/till surface
TP-B3	5428479	677254	2.4	1.5	Within till
TP-B4	5428521	677345	3.0	0.9	Peat/till surface
TP-B5	5428310	676890	2.3	0.6	Peat/till surface
TP-B6	5428268	676799	2.7	1.5	Within till
TP-B7	5428227	676708	3.0	0.9	Peat/till surface
TP-C0	5428263	677031	3.7	0.9	Within till
TP-C1	5428305	677114	3.4	1.5	Within till
TP-C2	5428347	677205	4.3	0.5	Peat/till surface
TP-C3	5428388	677296	2.7	0.6	Peat/till surface
TP-C4	5428436	677398	2.7	1.4	Peat/till surface

Test Pit	Northing	Easting	Depth (m)		Water Seepage Location
			Termination	Groundwater	
TP-C5	5428219	676931	3.7	ne	-
TP-C6	5428178	676841	4.0	0.6	Peat/till surface
TP-C7	5428136	676750	3.4	0.5	Peat/till surface
TP-D0	5428170	677064	4.6	ne	-
TP-D1	5428214	677155	3.0	1.2	Peat/till surface
TP-D2	5428261	677236	3.7	0.5	Peat/till surface
TP-D3	5428297	677337	2.7	0.9	Peat/till surface
TP-D4	5428339	677428	2.7	0.8	Peat/till surface
TP-D5	5428128	676973	3.4	2.7	Within till
TP-D6	5428087	676882	4.0	0.3	Peat/till surface
TP-D7	5428045	676791	3.4	0.3	Peat/till surface
TP-E0	5428086	677111	4.3	0.5	Peat/till surface
TP-E1	5428118	677201	3.0	0.9	Within till
TP-E2	5428165	677288	3.7	ne	-
TP-E3	5428220	677381	4.6	0.9	Peat/till surface
TP-E4	5428239	677455	4.6	0.9	Peat/till surface
TP-E5	5428037	677015	2.7	0.5	Peat/till surface
TP-E6	5427996	676924	3.4	0.5	Peat/till surface
TP-E7	5427954	676833	2.7	1.8	Within till
TP-F1	5428033	677242	4.6	0.9	Within till
TP-F2	5428074	677329	4.6	1.2	Within till
TP-F3	5428116	677421	4.6	0.9	Within till
TP-F4	5428157	677511	4.0	0.8	Within till
TP-F5	5428199	677603	4.6	ne	-

4.2 Laboratory Testing

Grab samples were obtained from each test pit during the geotechnical investigation. 29 samples were submitted to our Mount Pearl laboratory for moisture content and grain size analysis. . A summary of the laboratory testing results is provided on the Test Pit Logs in Appendix 2 and in Table 1. The laboratory results are provided in Appendix 3.

Table 2. Summary of Laboratory Results

Test Pit	Depth (m)	Gravel (%)	Sand (%)	Fines (%)	Moisture Content (%)	Liquid Limit	Plastic Limit
TP-01	2.7	24	33	43	10.2	Non-plastic	
TP-02	2.4	15	41	44	-	18	12
TP-03	3.0	34	36	30	11.2	Non-plastic	
TP-04	2.4	26	46	28	-	Non-plastic	
TP-05	2.4	33	35	32	10.3	Non-plastic	
TP-06	2.4	36	30	34	-	19	13
TP-07	2.7	19	39	42	10.1	Non-plastic	
TP-10	3.0	26	41	32	9.7	Non-plastic	
TP-11	3.0	27	39	34	-	Non-plastic	
TP-12	2.7	32	42	27	10.1	Non-plastic	
TP-16	3.0	29	39	32	12.7	Non-plastic	
TP-A0	2.7	30	36	34	10.1	19	14
TP-A2	3.0	38	33	29	8.7	Non-plastic	
TP-A3	3.0	29	35	36	12.5	Non-plastic	
TP-A7	3.7	30	36	34	8.8	Non-plastic	
TP-B1	2.4	31	29	39	9.2	Non-plastic	
TP-B3	1.2	52	26	22	7.9	Non-plastic	
TP-B6	2.4	31	34	35	9.9	18	14
TP-C0	3.0	17	54	29	12.6	Non-plastic	
TP-C2	3.0	39	31	30	10.3	Non-plastic	
TP-C4	1.8	40	34	26	8.1	21	15
TP-C5	3.4	29	39	32	10.4	Non-plastic	
TP-D1	3.0	19	42	40	13.3	Non-plastic	
TP-D3	2.4	21	38	41	11.9	20	13
TP-E0	2.4	39	32	29	10.5	19	12
TP-E7	2.4	23	34	43	12.7	19	14
TP-F3	1.5	18	34	48	13.0	17	12
TP-F4	2.4	28	33	39	10.5	Non-plastic	
TP-F4	3.7	25	45	30	8.6	Non-plastic	

4.3 Groundwater Conditions

Each monitoring well was drilled adjacent to previous excavated test pit and the monitoring well soil profile shown on the borehole logs is based on each corresponding test pit. The approximate elevations shown in Table 3 are based on current available topographical mapping of the site area. Note that for MW-B3 and MW-E3 elevation could not be determined since available mapping did not cover these locations. For MW-C0 and MW-E0, the water level in the wells had not stabilized when groundwater level was taken.

Table 3. Summary of Monitoring Well Locations and Levels

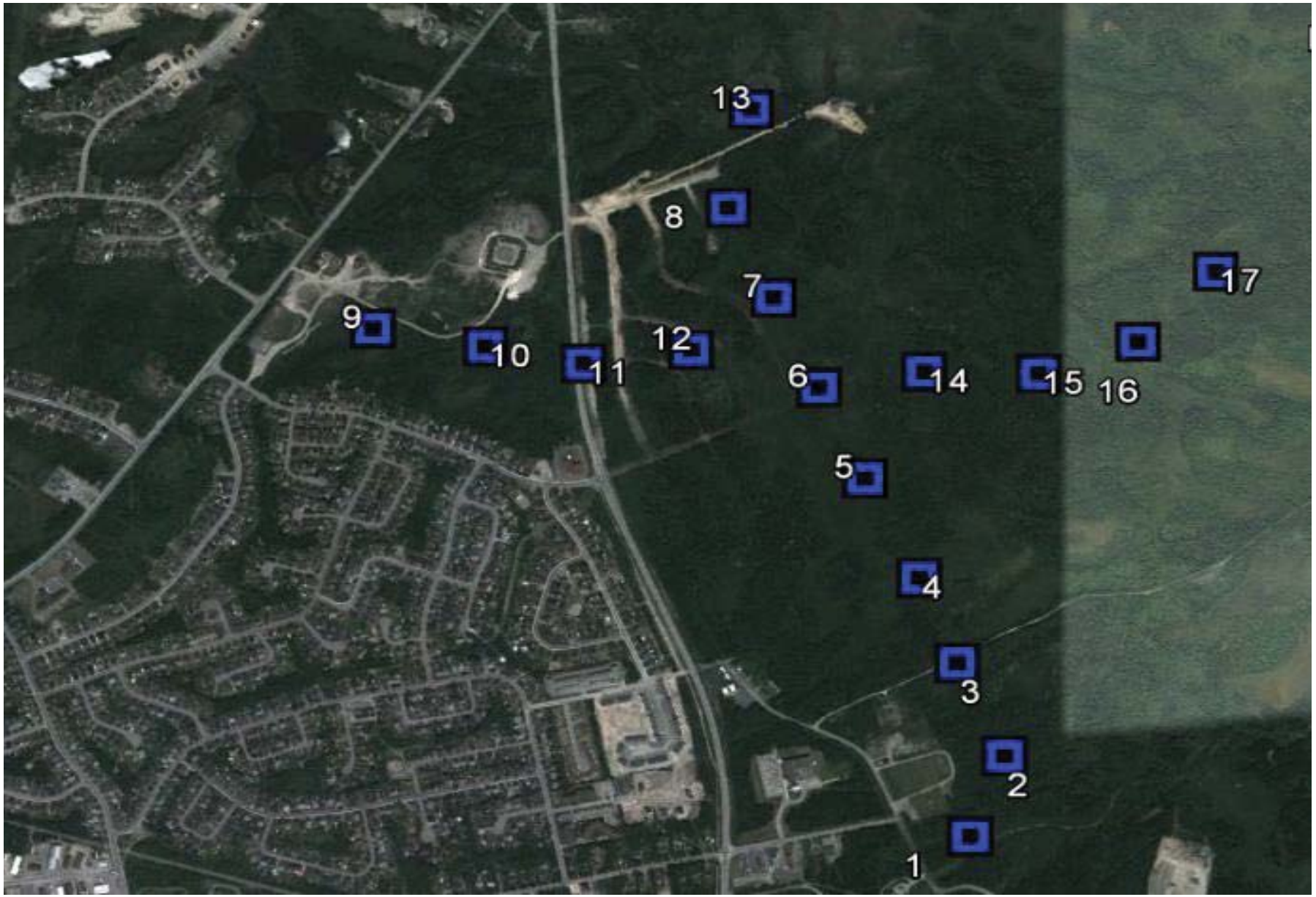
Monitoring Well	Northing	Easting	Approximate Surface Elevation (m)	Groundwater	
				Depth (m)	Approximate Elevation (m)
MW-A0	5428443	676940	104.5	2.2	102.3
MW-A7	5428318	676666	103	1.7	101.3
MW-B3	5428479	677254	Na[1]	1.2	-
MW-C0	5428263	677031	106	3.2[2]	102.8
MW-C7	5428136	676750	105	0.2	104.8
MW-E0	5428086	677111	109.5	3.2[2]	106.3
MW-E3	5428220	677381	Na[1]	0.2	-
MW-E7	5427954	676833	108	0.5	107.5

Notes: 1. Elevation not available
2. Water level not stabilized.

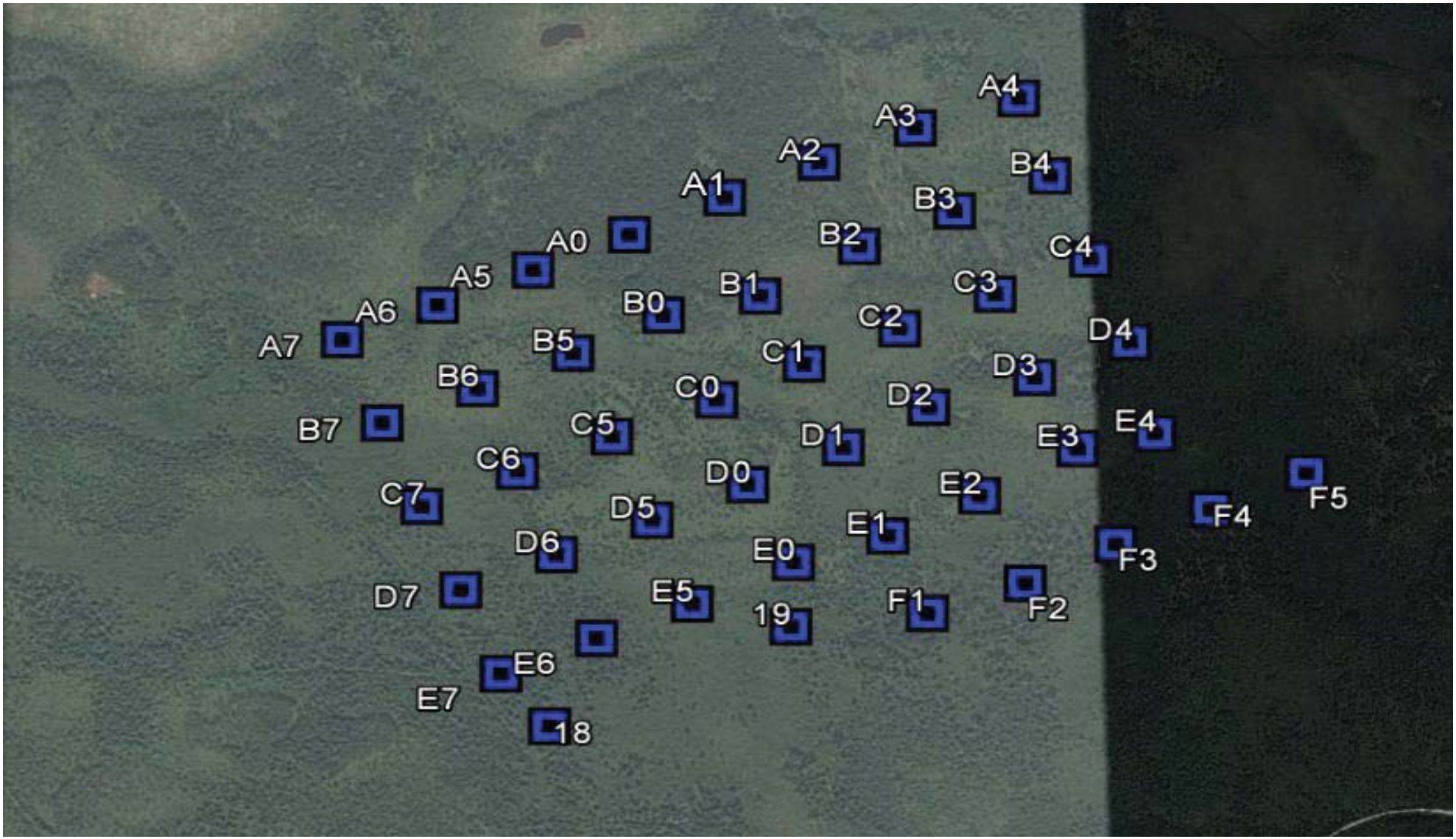
Based on observations during both field investigations, intermittent bog areas were encountered in the proposed WWTP location. Therefore during excavation and removal of existing peat/rootmat materials soils, control of inflow of groundwater into excavations will be required. Where appropriate, the flow of water should be controlled by the earthworks contractor by using perimeter ditches and sump pumps. Control of groundwater during site preparation is a critical factor and dewatering plans should be reviewed by designers prior to start of any construction activities. Discharge of water from the site must be conducted in accordance with applicable environmental guidelines for sediment and any potential environmental contamination concentrations.

5 CLOSURE

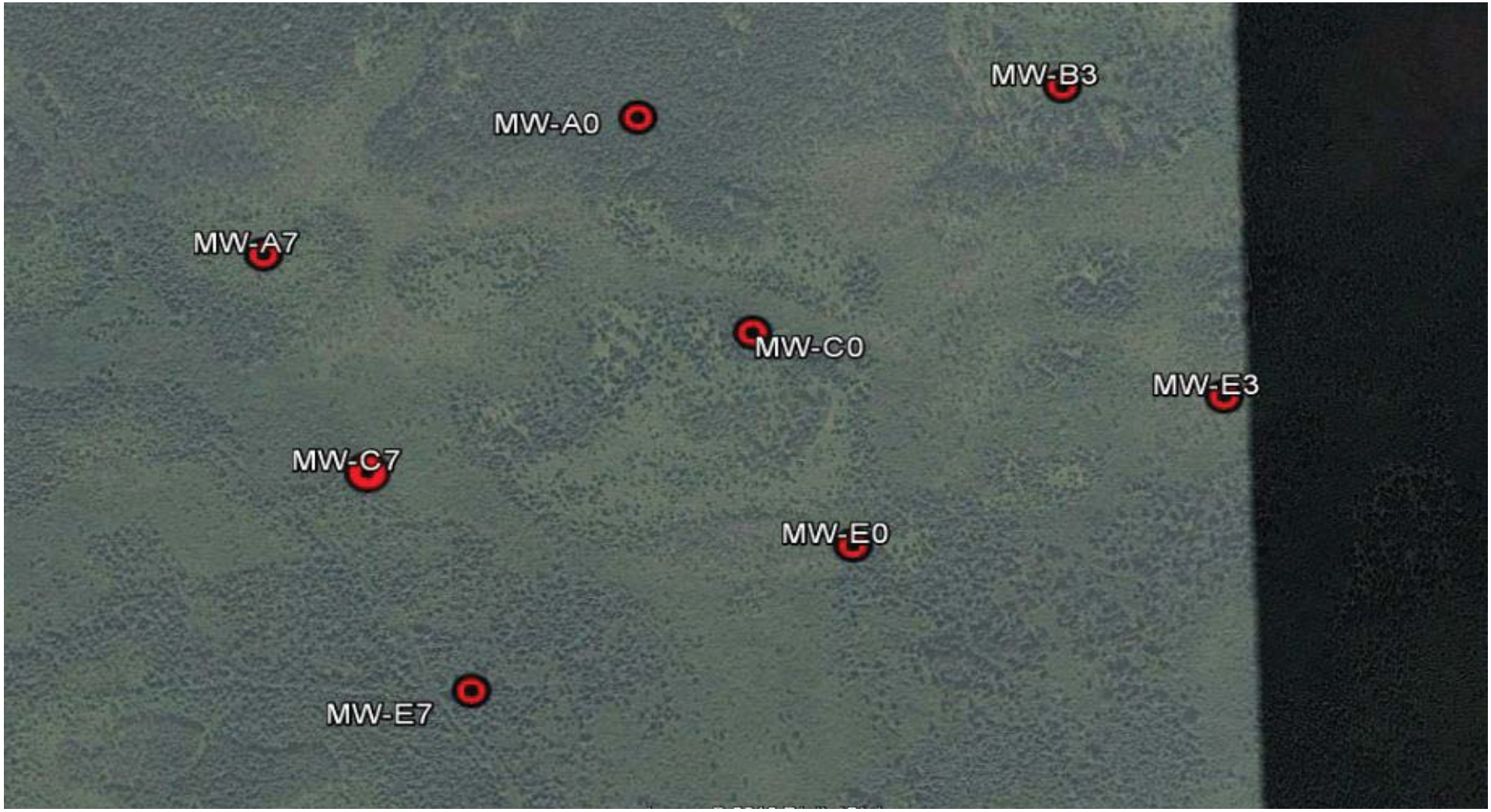
The geotechnical investigation undertaken has involved random sampling of site conditions. Should any conditions be encountered during constructions that are contrary to those reported herein, we request immediate notification so that reassessment can be undertaken.



Englobe			Project: Town of Gander Proposed New Wastewater Treatment Facilities		
			TEST PIT LOCATION PLAN - PIPELINE		
Date: June 2016	Scale: N/A	Drawn by: JLW	Checked by: SS	Job Number: 20784	Figure 1



Englobe			Project: Town of Gander Proposed New Wastewater Treatment Facilities		
			TEST PIT LOCATION PLAN - WWTP SITE		
Date: June 2016	Scale: N/A	Drawn by: JLW	Checked by: SS	Job Number: 20784	Figure 2



Englobe			Project: Town of Gander Proposed New Wastewater Treatment Facilities		
			MONITORING WELL LOCATION PLAN - WWTP SITE		
Date: June 2016	Scale: N/A	Drawn by: JLW	Checked by: SS	Job Number: 20784	Figure 3

Appendix 1 Explanation of Terms and Symbols

SYMBOLS AND TERMS USED ON THE BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidation of clay minerals, shrinkage cracks etc.
Fissured	- having cracks, and hence a blocky structure
Varved	-composed of regular alternating layers of silt and clay
Stratified	- composed of alternating layers or different soil types, e.g. silt and sand or silt and clay
Well Graded	- having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded	- predominantly of one grain size.

Terminology used for describing soil strata based upon the proportion of individual particle size present:

Trace, or occasional	Less than 10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. silt and sand)	35-50%

The standard terminology to describe cohesionless soils includes the relative density, as determined by laboratory test or by the Standard Penetration Test 'N' - value: the number of blows of 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil.

Relative Density	'N' Value	Relative Density %
Very loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression test, or occasionally by standard penetration tests.

Consistency	Undrained Shear Strength		'N' Value
	Kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25-0.5	12.5-25	2-4
Firm	0.5-1.0	25-50	4-8
Stiff	1.0-2.0	50-100	8-15
Very Stiff	2.0-4.0	100-200	15-30
Hard	>4.0	>200	>30

SOIL CLASSIFICATION SYSTEM (MODIFIED U.S.C.)

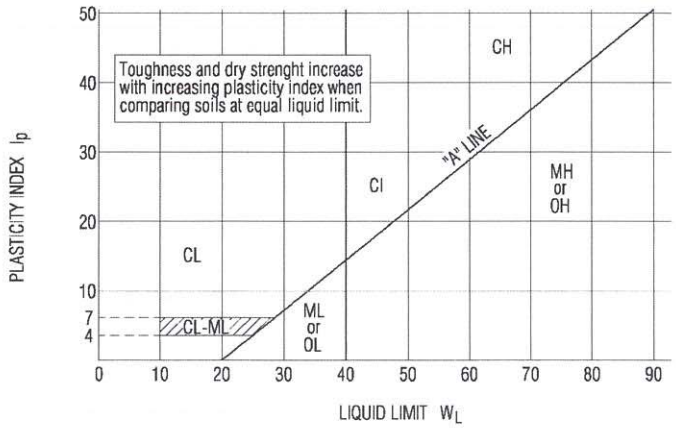
MAJOR DIVISION			GROUP SYMBOL	GRAPHIC SYMBOL	COLOR CODE	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
HIGHLY ORGANIC SOILS			Pt		ORANGE	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOR OR ODOR, AND OFTEN FIBROUS TEXTURE	
COARSE-GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS MORE THAN HALF COARSE FRACTION LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS	GW		RED	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, <5% FINES	$Cu = \frac{D_{60}}{D_{10}} > 4$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			GP		RED	POORLY-GRADED GRAVELS, AND GRAVEL-SAND MIXTURES, <5% FINES	NOT MEETING ALL ABOVE REQUIRMENTS	
		DIRTY GRAVELS	GM		YELLOW	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR $Ip < 4$	
			GC		YELLOW	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE OR $Ip > 7$	
	SANDS MORE THAN HALF COARSE FRACTION SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS	SW		RED	WELL-GRADED SANDS, GRAVELLY SANDS, <5% FINES	$Cu = \frac{D_{60}}{D_{10}} > 6$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			SP		RED	POORLY-GRADED SANDS, OR GRAVELLY SANDS, <5% FINES	NOT MEETING ALL ABOVE REQUIRMENTS	
		DIRTY SANDS	SM		YELLOW	SILTY SANDS, SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR $Ip < 4$	
			SC		YELLOW	CLAYEY SANDS, SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE OR $Ip > 7$	
FINE - GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSES NO.200 SIEVE SIZE)	SILTS BELOW "A" LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		ML		GREEN	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$	SEE CHART BELOW
			MH		BLUE	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$	
	CLAYS ABOVE "A" LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		CL		GREEN	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$	
			CI		GREEN-BLUE	INORGANIC CLAYS OF MEDIUM PLASTICITY SILTY CLAYS	$W_L > 30, < 50$	
			CH		BLUE	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$	
	ORGANIC SILTS & ORGANIC CLAYS BELOW "A" LINE ON PLASTICITY CHART		OL		GREEN	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$	
			OH		BLUE	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$	

FILL TILL BEDROCK

1. All sieve sizes mentioned on this chart are U.S. Standard, ASTM E11.
2. Boundary classifications possessing characteristics of two groups are given combined group symbols eg GW-GC is a well-graded gravel-sand mixture wtih clay binder between 5% and 12%.
3. Soil fractions and limiting textural boundaries are in accordance with the Unified Soil Classification System, except that an inorganic clay of medium plasticity (CI) is recognized.
4. The following adjectives may be employed to define percentage ranges by weight of minor components:

and	50 - 36%
gravelly, sandy, silty, clayey, ect.	35 - 21%
some	20 - 11%
trace	10 - 1%

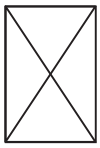
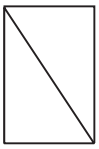
PLASTICITY CHART



Englobe

SOIL SAMPLES

CONDITION – This column graphically indicates the depth and condition of the sample:

 undisturbed  disturbed  not recovered

TYPE – The type of sample is indicated in this column as follows:

A auger sample
B block sample
C rock core, or frozen soil core
D drive sample
G grab sample
SS split spoon
P Pitcher tube sample
U tube sample (usually thin-walled)
W wash or air return sample
O other (see report text)

PENETRATION RESISTANCE – Unless otherwise noted this column refers to the number of blows (N) of a 140 pound (63.5 kg) hammer freely dropping 30 inches (0.76 m) required to drive a 2 inch (50.8 mm) O.D. open-end sampler 0.5 feet (0.15 m) to 1.5 feet (0.45 m) into the soil, or until 100 blows have been applied, in which case, the penetration is stated. This is the standard penetration test referred to in ASTM D 1586.

OTHER TESTS

In this column are tabulated results of other laboratory tests as indicated by the following symbols:

*C	Consolidation test
Fines	Percentage by weight smaller than #200 sieve
D_R	Relative density (formerly specific gravity)
k	Permeability coefficient
*MA	Mechanical grain size analysis and hydrometer test (if appropiate)
pp	Pocket pentrometer strength
*q	Triaxial compression test
q_U	Unconfined compressive strength
*SB	Shearbox test
SO_4	Concentration of water-soluble sulphate
*ST	Swelling test
TV	Torvane shear strength
VS	Vane Shear Strength (undistrubed-remolded)
ε_f	Unit strain at failure
γ	Unit weight of soil or rock
γ_d	Dry unit weight of soil or rock
ρ	Density of soil or rock
ρ_d	Dry density of soil or rock

* The results of these tests usually are reported separately

Appendix 2 Test Pit and Monitoring Well Logs

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 11/27/15	JOB NO. 20784	TEST PIT TP-01

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

EQUIPMENT: SK210LG Excavator

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
0				ROOTMAT/TOPSOIL - coarse grained sand, some gravel, trace to some cobbles, roots, dark brown, wet.			
3	1			TILL - Silt, sandy, some gravel, trace cobbles, low plastic, firm, compact, grey, wet. ... trace seepage at silt surface at 0.9 m.			
9						G	Grain Size Analysis: 24% Gravel 33% Sand 43% Fines
10	3			End of Test Pit at 3.0 m below ground surface in Till.			
16	5						

PLATE 1

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/3/15	JOB NO. 20784	TEST PIT TP-02

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0	0			ROOTMAT/TOPSOIL - sand and silt, roots, dark brown, wet.			
1				... ponded water, rapid seepage into hole.			
2				WEATHERED TILL - Silt and Sand, trace gravel, loose to compact, light brown, moist.			
3	1			TILL - Silt and Sand, some gravel, compact, brown, moist.			
4							
5							
6	2						
7							
8							
9						G	Grain Size Analysis: 15% Gravel 41% Sand 44% Fines
10	3			End of Test Pit at 3.1 m below ground surface in Till.			
11							
12							
13	4						
14							
15							
16	5						

PLATE 2

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/3/15	JOB NO. 20784	TEST PIT TP-03

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
0				ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			EQUIPMENT: SK210LG Excavator
1				WEATHERED TILL: Sand, silty, gravelly, loose to compact, reddish brown, moist.			
2				TILL: Sand, silty, gravelly, trace cobbles, trace boulders, compact, brown/grey, moist.			
3	1						
4							
5							
6	2						
7							
8							
9							
10	3					G	Grain Size Analysis: 34% Gravel 36% Sand 30% Fines
11				End of Test Pit at 3.4 m below ground surface in Till.			
12							
13	4						
14							
15							
16	5						

PLATE 3

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/4/15	JOB NO. 20784	TEST PIT TP-04

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT: SK210LG Excavator COMMENTS
1				ROOTMAT/TOPSOIL - silty sand, abundant roots, dark brown, moist. ... rapid seepage below rootmat.			
2				TILL: Sand, silty, gravelly, compact, trace cobbles, trace boulders, compact, brown/grey, moist.			
3	1						
4							
5							
6							
7	2						
8						G	Grain Size Analysis: 26% Gravel 46% Sand 28% Fines
9							
10	3			End of Test Pit at 3.1 m below ground surface in Till.			
11							
12							
13	4						
14							
15							
16	5						

PLATE 4

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/2/15	JOB NO. 20784	TEST PIT TP-05

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT: SK210LG Excavator COMMENTS
1				ROOTMAT/TOPSOIL - fibrous, cobbles and boulders. ... moderate water seepage under rootmat.			
2				WEATHERED TILL: Sand, some silt, some gravel, loose to compact, trace roots, brown, moist.			
3	1			TILL - Sand, gravelly, some silt, trace cobbles and boulders, light brown, compact, moist.			
4							
5							
6	2			... sand-gravel-silt mixture, some cobbles, compact to dense, light grey below 1.8 m.			
7							
8						G	Grain Size Analysis: 33% Gravel 35% Sand 32% Fines
9				End of Test Pit at 2.7 m below ground surface in Till.			
10	3						
11							
12							
13	4						
14							
15							
16	5						

PLATE 5

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/2/15	JOB NO. 20784	TEST PIT TP-06

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0	0	PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.			
3	1			TILL - Gravel, silty, sandy, trace cobbles and boulders, compact, low plastic silt pockets, wet.			
8	2					G	Grain Size Analysis: 36% Gravel 30% Sand 34% Fines
9	3			End of Test Pit at 2.7 m below ground surface in Till.			
16	5						

PLATE 6

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/2/15	JOB NO. 20784	TEST PIT TP-07

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT: SK210LG Excavator COMMENTS
0				ROOTMAT/TOPSOIL - silty sand, abundant roots, dark brown, moist.			
1				TILL - Sand, some silt, gravelly, compact, trace cobbles, trace boulders, compact, brown/grey, moist.			
3	1			... some gravel, firm, light brown below 1.0 m.			
9				... trace water seepage at 2.9 m.		G	Grain Size Analysis: 19% Gravel 39% Sand 42% Fines
10	3			End of Test Pit at 3.0 m below ground surface in Till.			
16	5						

PLATE 7

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/2/15	JOB NO. 20784	TEST PIT TP-08

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
1				FILL: Sand, silty, some gravel, compact, reddish brown, moist.			SK210LG Excavator
2							
3	1			TILL - Sand, some gravel, some silt, compact, grey, moist.			
4							
5							
6							
7	2						
8							
9							
10	3			End of Test Pit at 3.1 m below ground surface in Till.			
11							
12							
13	4						
14							
15							
16	5						

PLATE 8

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/4/15	JOB NO. 20784	TEST PIT TP-09

WC % wp- □ w- ● wl- △
10 20 30 40 50

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
		PT		PEAT: fibrous, dark brown, wet. ... rapid seepage through peat layer.		
1						
2						
3	1					
4						
5				TILL - Sand, silty, some gravel, trace cobbles, compact, grey, moist.		
6						
7	2					
8						
9						
10	3			End of Test Pit at 2.9 m below ground surface in Till.		
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 9

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 12/4/15 | JOB NO. 20784 | TEST PIT TP-10

EQUIPMENT: SK210LG Excavator

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			
0	0			ROOTMAT/TOPSOIL - silty sand, roots, dark brown, trace cobbles and boulders, moist.			
3	1			... minor seepage at bottom of rootmat.			
4				TILL - Sand, silty, gravelly, trace cobbles, compact, brown/grey, moist.			
10	3					G	Grain Size Analysis: 26% Gravel 41% Sand 32% Fines
11				End of Test Pit at 3.4 m below ground surface in Till.			
16	5						

PLATE 10

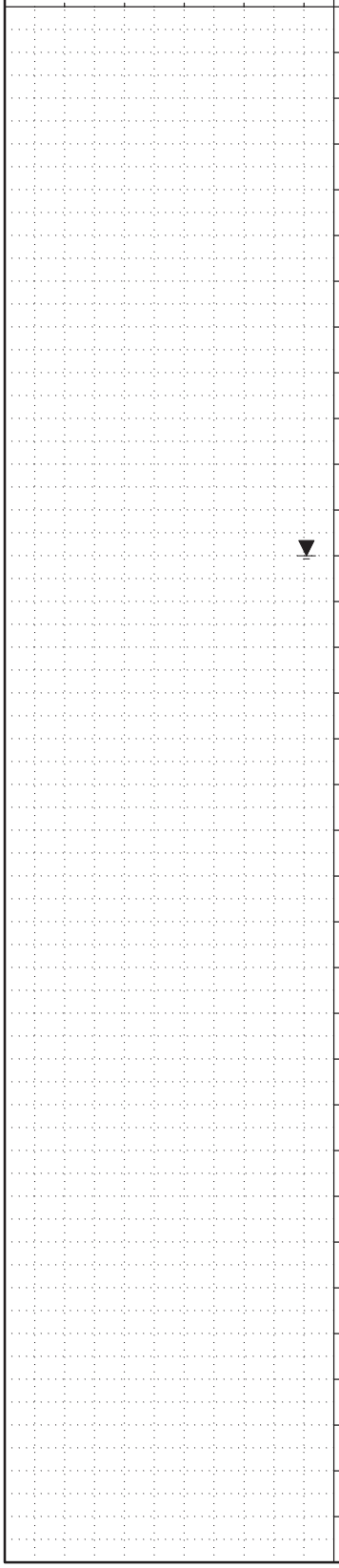
TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 12/4/15 | JOB NO. 20784 | TEST PIT TP-11

EQUIPMENT: SK210LG Excavator



DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			
0	0			FILL - grubbing, cobbles, boulders, branches, topsoil.			
5	1			TILL: Sand, silty, gravelly, trace cobbles, compact, grey, moist.			
6				... minor seepage at 2.7 m.			
10	3					G	Grain Size Analysis: 27% Gravel 39% Sand 34% Fines
11				End of Test Pit at 3.4 m below ground surface in Till.			

PLATE 11

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/4/15	JOB NO. 20784	TEST PIT TP-12

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

EQUIPMENT: SK210LG Excavator

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
0				ROOTMAT/TOPSOIL - silty sand, trace boulders, roots, dark brown, moist. ... trace water seepage through rootmat.			
1				TILL - Sand, gravelly, some silt, trace cobbles and boulders, compact, brown, moist.			
9	3					G	Grain Size Analysis: 32% Gravel 42% Sand 27% Fines
10				End of Test Pit at 3.2 m below ground surface in Till.			

PLATE 12

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 12/2/15	JOB NO. 20784	TEST PIT TP-13

DATUM Existing Ground Surface

SURFACE ELEVATION

EQUIPMENT: SK210LG Excavator

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
0	0	PT		PEAT: fibrous, dark brown, wet. ... rapid seepage below peat layer.			
3	1			TILL - Sand, some gravel, some silt, compact, grey, moist.			
9	3					G	
10	3			End of Test Pit at 3.1 m below ground surface in Till.			

PLATE 13

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 2/11/16	JOB NO. 20784	TEST PIT TP-14

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
1		PT		PEAT - fibrous, cobbles and boulders. ... rapid water seepage through bottom of peat layer.			EQUIPMENT SK210LG Excavator COMMENTS
4	1			TILL - Silt and sand, some gravel, compact, grey, wet.			
6	2			BEDROCK - Slate, dark grey, highly fractured.			
7				End of Test Pit at 2.1 m below ground surface in Bedrock.			
10	3						
13	4						
16	5						

PLATE 14

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 2/11/16	JOB NO. 20784	TEST PIT TP-15

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0	PT		PEAT - fibrous, cobbles and boulders.		
1				... rapid water seepage through bottom of peat layer.		
2				TILL - Silt and sand, some gravel, compact, brown, wet.		
3	1					
4						
5						
6	2					
7						
8						
9						G
10	3			BEDROCK - Slate, dark grey, highly fractured.		
				End of Test Pit at 3.0 m below ground surface in Bedrock.		
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 15

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 2/11/16	JOB NO. 20784	TEST PIT TP-16

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0	0			ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			
1				WEATHERED TILL: Sand, silty, gravelly, trace boulders, loose to compact, reddish brown, moist.			
2				TILL: Sand, silty, gravelly, some cobbles, trace boulders, compact, brown/grey, moist.			
3	1						
4							
5							
6	2						
7							
8							
9							
10	3					G	Grain Size Analysis: 29% Gravel 39% Sand 32% Fines
11							
12							
13	4						
14							
15				End of Test Pit at 4.6 m below ground surface in Till.			
16	5						

PLATE 16

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 1/11/16 | JOB NO. 20784 | TEST PIT TP-17

WC % wp- □ w- ● wl- △
10 20 30 40 50

DEPTH ft m

MODIFIED USCS

SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE

COND.

TYPE

EQUIPMENT

SK210LG Excavator

COMMENTS

ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.

WEATHERED TILL: Sand, silty, gravelly, compact, loose to compact, light brown, moist.

TILL: Sand, silty, gravelly, compact, trace cobbles, compact, brown, moist.

... minor seepage at 0.9 m.

G

End of Test Pit at 2.7 m below ground surface in Till.

PLATE 17

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/11/16	JOB NO. 20784	TEST PIT TP-18

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, gravelly, loose to compact, dark brown, damp.		
2				TILL - Sand and silt, some gravel, stiff, grey, moist.		
3	1			... sand-silt-gravel mixture, brown below 0.9 m		G
4						
5						
6	2					
7						
8				End of Test Pit at 2.4 m below ground surface in Till.		
9						
10	3					
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 18

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/12/16	JOB NO. 20784	TEST PIT TP-19

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

EQUIPMENT: SK210LG Excavator

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles, dark brown, moist.			
1				WEATHERED TILL - Sand, silty, gravelly, loose to compact, brown, damp.			
2				TILL - Sand, silty, gravelly, some cobbles, compact, brown, damp.			
3	1			... minor water seepage at 0.9 m.			
4							
5							
6	2						
7							
8							
9						G	
10	3			End of Test Pit at 3.0 m below ground surface in Till.			
11							
12							
13	4						
14							
15							
16	5						

PLATE 19

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-A0

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.			
1				WEATHERED TILL - Sand, silty, some gravel, loose to compact, orange brown, damp.			
2				TILL - Sand, gravelly, silty, trace cobbles, compact to dense, brown/grey, damp.			
3	1						
4							
5							
6							
7	2						
8							
9				BEDROCK - Slate, dark grey, highly fractured.		G	Grain Size Analysis: 30% Gravel 36% Sand 34% Fines
10	3						
11							
12				... minor seepage at 3.7 m.			
13	4			End of Test Pit at 4.0 m below ground surface in Bedrock.			
14							
15							
16	5						

PLATE 20

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-A1

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, some gravel, loose to compact, orange brown, damp.		
2				TILL - Sand, gravelly, silty, trace cobbles, compact to dense, brown,grey, damp.		
3	1					
4						
5						
6						
7	2					
8						
9				BEDROCK - Slate, dark grey, highly fractured.		
10	3					G
11						
12				End of Test Pit at 3.7 m below ground surface in Bedrock.		
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 21

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-A2

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

EQUIPMENT: SK210LG Excavator

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
0				ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			
1				WEATHERED TILL: Sand and silt, gravelly, compact, orange brown, moist.			
2				TILL: Gravel, sandy, silty, compact to dense, trace to some cobbles, trace boulders, compact, brown, moist.			
3	1						
4							
5							
6	2						
7							
8							
9							
10	3					G	Grain Size Analysis: 38% Gravel 33% Sand 29% Fines
11							
12							
13	4						
14				End of Test Pit at 3.4 m below ground surface on Possible Bedrock.			
15							
16	5						

PLATE 22

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-A3

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.		
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.		
2				TILL: Sand and silt, gravelly, compact to dense, trace cobbles, trace boulders, compact, brown/grey, moist.		
3	1					
4						
5						
6	2					
7						
8						
9				... minor seepage at 2.7 m.		
10	3				G	
11						
12						
13	4					
14				End of Test Pit at 3.4 m below ground surface in Till.		
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 23

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-A4

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
				ROOTMAT/TOPSOIL - silty sand, abundant roots, black, moist.			EQUIPMENT: SK210LG Excavator
1							
2				TILL - Sand and silt, gravelly, compact, trace cobbles, trace boulders, compact, grey, moist.			
3	1						
4							
5							
6				... some cobbles below 1.8 m.			
7	2						
8							
9							
10	3			... minor to moderate seepage at 3.0 m.		G	
11				TILL - Sand and gravel, silty, compact, compact, grey, moist.			
12							
13	4						
14				End of Test Pit at 4.3 m below ground surface in Till.			
15							
16	5						

PLATE 24

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-A5

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0			ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.		
1				WEATHERED TILL: Sand and silt, gravelly, trace boulders up to 0.8 m^3, compact, reddish brown, moist.		
2				TILL: Sand, silty, gravelly, compact, brown/grey, moist.		
3	1			... sand and gravel, some silt, compact to dense below 1.0 m.		
4						
5						
6						
7	2					
8				... minor seepage at 2.4 m.		
9						
10	3			End of Test Pit at 2.7 m below ground surface on Possible Bedrock.		
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 25

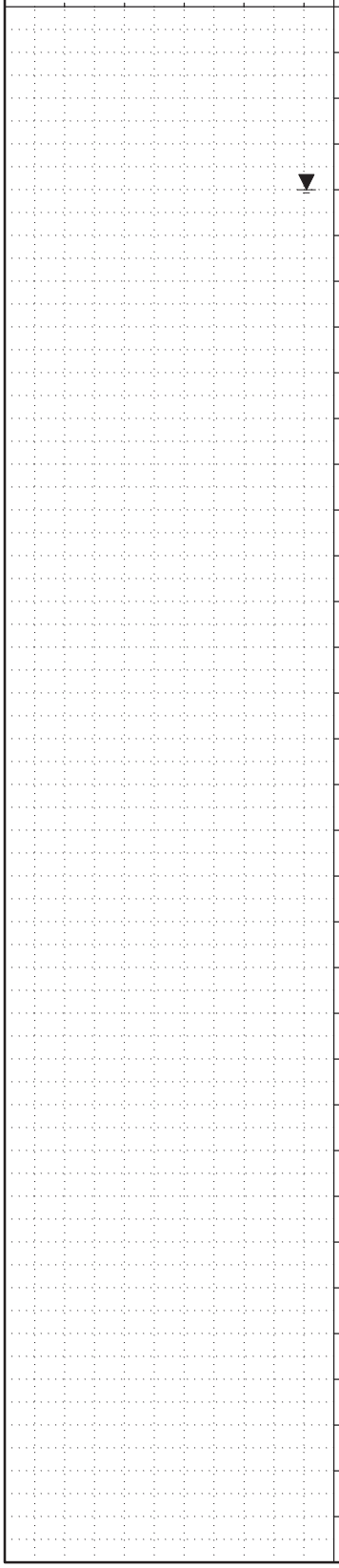
TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 4/8/16 | JOB NO. 20784 | TEST PIT TP-A6

EQUIPMENT: SK210LG Excavator



DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface			
0		PT		PEAT - fibrous, trace cobbles. ... rapid water seepage through bottom of peat layer.			
2				COBBLES and BOULDERS - subangular.			
3	1			TILL - Sand and silt, gravelly, compact, grey/brown, wet.			
5				End of Test Pit at 1.5 m below ground in TILL.			
6	2						
10	3						
13	4						
16	5						

PLATE 26

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-A7

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0	0			ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.			
2				TILL: Sand, silty, gravelly, trace cobbles and boulders, compact, brown, moist.			
3	1						
4							
5				... minor seepage at 1.5 m.			
6							
7	2						
8							
9							
10	3						
11							
12						G	Grain Size Analysis: 30% Gravel 36% Sand 34% Fines
13	4			End of Test Pit at 4.0 m below ground surface on Possible Bedrock.			
14							
15							
16	5						

PLATE 27

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-B0

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, some gravel, loose to compact, orange brown, damp.		
2				TILL - Sand, gravelly, silty, trace cobbles, compact to dense, brown,grey, damp.		
3	1					
4						
5						
6						
7	2					
8				BEDROCK - Slate, dark grey, highly fractured.		
9						G
10	3					
11				End of Test Pit at 3.4 m below ground surface in Bedrock.		
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 28

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-B1

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
		PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.			EQUIPMENT: SK210LG Excavator
1							
2							
3	1						
4							
5				TILL - Silt, sandy, gravelly, compact, brown, wet.			
6							
7	2						
8						G	Grain Size Analysis: 31% Gravel 29% Sand 39% Fines
9							
10	3			BEDROCK - Slate, dark grey, highly fractured.			
11				End of Test Pit at 3.4 m below ground surface in Bedrock.			
12							
13	4						
14							
15							
16	5						

PLATE 29

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-B2

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0				ROOTMAT/TOPSOIL - fibrous, cobbles and boulders. ... moderate water seepage under rootmat.			COMMENTS
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.			
2				TILL: Sand and gravel, silty, compact, some cobbles, compact, brown/grey, wet..			
3	1						
4							
5							
6	2						
7							
8							
9							
10	3						
11							
12							
13	4						
14							
15							
16	5			End of Test Pit at 4.9 m below ground surface in Till.			

PLATE 30

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 2/11/16	JOB NO. 20784	TEST PIT TP-B3

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0	0			ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.			
2				TILL: Gravel, sandy, some silt, compact to dense, trace cobbles, trace boulders, brown/grey, moist.			
3	1						
4						G	Grain Size Analysis: 52% Gravel 26% Sand 22% Fines
5				... minor seepage at 1.5 m.			
6							
7	2			BEDROCK - Slate, dark grey, highly fractured.			
8				End of Test Pit at 2.4 m below ground surface in Bedrock.			
9							
10	3						
11							
12							
13	4						
14							
15							
16	5						

PLATE 31

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-B4

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
		PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.		
1						
2						
3	1			TILL - Silt and sand, gravelly, firm to stiff, low plastic, brown, moist.		
4						
5						
6	2					G
7						
8						
9				BEDROCK - Slate, dark grey, highly fractured.		
10	3			End of Test Pit at 3.0 m below ground surface in Bedrock.		
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 32

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-B5

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
		PT		PEAT - fibrous, trace cobbles. ... rapid water seepage through bottom of peat layer.		
1						
2				Coarse GRAVEL and COBBLES - subangular.		
3	1					
4				TILL - Sand and silt, gravelly, compact, grey/brown, wet.		
5						
6						
	2					
7				End of Test Pit at 2.3 m below ground on Possible Bedrock.		
8						
9						
10	3					
11						
12						
13	4					
14						
15						
16						
	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 33

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-B6

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
0				ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.			
2				TILL: Sand, silty, gravelly, compact, brown, moist.			
3	1						
4							
5				... minor seepage at 1.5 m.			
6				... compact to dense, grey below 1.8 m.			
7	2						
8						G	Grain Size Analysis: 31% Gravel 34% Sand 35% Fines
9				End of Test Pit at 2.7 m below ground surface on Possible Bedrock.			
10	3						
11							
12							
13	4						
14							
15							
16	5						

PLATE 34

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-B7

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft / m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE: COND. | TYPE

EQUIPMENT: SK210LG Excavator

COMMENTS

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	COND.	TYPE
0	0	PT		PEAT - fibrous, trace cobbles. ... rapid to moderate water seepage through bottom of peat layer.		
3	1			TILL - Sand, silty, gravelly, compact, grey/brown, wet.		
10	3			End of Test Pit at 3.0 m below ground in TILL.		

PLATE 35

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-C0

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

EQUIPMENT: SK210LG Excavator

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.			
1				WEATHERED TILL - Sand, silty, some gravel, loose to compact, brown, damp.			
2				TILL - Sand, silty, some gravel, compact, brown,grey, damp.			
3	1			... minor seepage at 0.9 m.			
4							
5							
6	2						
7							
8							
9							
10	3					G	Grain Size Analysis: 17% Gravel 54% Sand 29% Fines
11				BEDROCK - Slate, dark grey, highly fractured.			
12				End of Test Pit at 3.7 m below ground surface in Bedrock.			
13	4						
14							
15							
16	5						

PLATE 36

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-C1

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, some gravel, loose to compact, orange brown, damp.		
2				TILL - Sand, gravelly, silty, trace cobbles, compact to dense, brown/grey, damp.		
3	1					
4						
5				... minor seepage at 1.5 m.		
6						
7	2					
8						
9				BEDROCK - Slate, dark grey, highly fractured.		G
10	3					
11				End of Test Pit at 3.4 m below ground surface in Bedrock.		
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 37

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-C2

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface			EQUIPMENT: SK210LG Excavator
				SURFACE ELEVATION			
0	0	PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.			
1				TILL - Silt and sand, some gravel, compact, grey, wet.			
3	1			... trace cobbles and boulders, brown, moist below 2.1 m.			
10	3				G		Grain Size Analysis: 39% Gravel 31% Sand 30% Fines
13	4			BEDROCK - Slate, dark grey, highly fractured.			
14				End of Test Pit at 4.3 m below ground surface in Bedrock.			

PLATE 38

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 1/22/16 | JOB NO. 20784 | TEST PIT TP-C3

WC % wp- □ w- ● wl- △
10 20 30 40 50

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
		PT		PEAT - fibrous. ... moderate water seepage through bottom of peat layer.		
1						
2				TILL - Silt, sandy, some gravel, compact, brown, wet.		
3	1					
4						
5						
6						
7	2					
8						G
9				BEDROCK - Slate, dark grey, highly fractured.		
10	3			End of Test Pit at 2.7 m below ground surface in Bedrock.		
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 39

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-C4

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT: SK210LG Excavator COMMENTS
1		PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.			
2							
3	1						
4							
5				TILL - Gravel, sandy, silty, compact, grey, wet.			
6						G	Grain Size Analysis: 40% Gravel 34% Sand 26% Fines
7	2						
8							
9							
10	3						
11				BEDROCK - Slate, dark grey, highly fractured.			
12				End of Test Pit at 2.7 m below ground surface in Bedrock.			
13	4						
14							
15							
16	5						

PLATE 40

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-C5

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
				ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.			
2				TILL: Sand, silty, gravelly, trace cobbles, compact, brown/grey, moist.			
3	1						
4							
5							
6	2						
7							
8							
9							
10	3						
11						G	Grain Size Analysis: 29% Gravel 39% Sand 32% Fines
12				End of Test Pit at 3.7 m below ground surface on Possible Bedrock.			
13	4						
14							
15							
16	5						

PLATE 41

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-C6

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
		PT		PEAT - fibrous, trace cobbles. ... rapid to moderate water seepage through bottom of peat layer.		
1						
2				COBBLES and BOULDERS - subangular.		
3	1			TILL - Sand, silty, gravelly, some cobbles, compact, grey/brown, wet.		
4						
5						
6	2					
7						
8						
9						
10	3					
11						
12						
13	4			End of Test Pit at 4.0 m below ground on Possible Bedrock.		
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 42

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-C7

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0	PT		PEAT - fibrous, trace cobbles. ... rapid to moderate water seepage through bottom of peat layer.		
1				TILL - Sand, silty, gravelly, compact, grey/brown, wet.		
2						
3	1					
4						
5						
6	2					
7						
8						
9						
10	3			... gravel, sandy silty, some cobbles below 2.9 m.		
11				End of Test Pit at 3.4 m below ground on Possible Bedrock.		
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 43

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-D0

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, gravelly, loose to compact, brown, damp.		
2				TILL - Sand, silty, some gravel, compact, brown, damp.		
3	1					
4						
5						
6						
7	2					
8						
9						
10	3					
11						
12						
13	4					
14				BEDROCK - Slate, dark grey, highly fractured.		
15				End of Test Pit at 4.6 m below ground surface in Bedrock.		
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 44

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 1/14/16 | JOB NO. 20784 | TEST PIT TP-D1

EQUIPMENT: SK210LG Excavator

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface			
		PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.			
1							
2							
3	1						
4				TILL - Silt and sand, some gravel, compact, brown, wet.			
5							
6	2						
7							
8							
9							
10	3					G	Grain Size Analysis: 19% Gravel 42% Sand 40% Fines
11							
12							
13	4						
14							
15				End of Test Pit at 4.6 m below ground surface in Till.			
16	5						

PLATE 45

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-D2

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft / m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE: COND. | TYPE

EQUIPMENT: SK210LG Excavator

COMMENTS

ft	m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	COND.	TYPE
0	0	PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.		
1				TILL - Silt and sand, some gravel, compact, grey, wet.		
3	1			... trace cobbles and boulders, brown, moist below 2.1 m.		
8						G
10	3			BEDROCK - Slate, dark grey, highly fractured.		
12				End of Test Pit at 3.7 m below ground surface in Bedrock.		
13	4					
16	5					

PLATE 46

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-D3

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE	EQUIPMENT / COMMENTS
		PT		PEAT - fibrous. ... moderate water seepage through bottom of peat layer.			EQUIPMENT: SK210LG Excavator
1							
2							
3	1			TILL - Silt, sandy, some gravel, compact, grey, wet.			
4							
5							
6							
7	2						
8						G	Grain Size Analysis: 21% Gravel 38% Sand 41% Fines
9				BEDROCK - Slate, dark grey, highly fractured.			
10	3			End of Test Pit at 2.7 m below ground surface in Bedrock.			
11							
12							
13	4						
14							
15							
16	5						

PLATE 47

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-D4

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0	PT		PEAT - fibrous, trace boulders. ... moderate water seepage through bottom of peat layer.		
1						
2						
3	1			TILL - Silt and sand, some gravel, compact, grey/brown, wet. ... trace cobbles and boulders, brown, moist below 2.1 m.		
4						
5						G
6	2					
7						
8				BEDROCK - Slate, dark grey, highly fractured.		
9				End of Test Pit at 2.7 m below ground surface in Bedrock.		
10	3					
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 48

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-D5

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0			ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.		
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.		
2				TILL: Sand, some silt, gravelly, compact, brown, moist.		
3	1			... sand and gravel, some silt, compact to dense below 1.0 m.		
4						
5						
6	2					
7						
8						
9				... minor seepage at 2.7 m.		
10	3			... frequent angular cobble, grey below 2.7 m.		
11				End of Test Pit at 3.4 m below ground surface on Possible Bedrock.		
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 49

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-D6

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0	PT		PEAT - fibrous, trace cobbles. ... rapid water seepage through bottom of peat layer.		
1				COBBLES and BOULDERS - subangular.		
2						
3	1			TILL - Sand, gravelly, silty, trace cobbles and boulders, compact, grey, wet.		
4						
5						
6	2					
7						
8						
9						
10	3			... gravel and sand, some silt, frequent cobbles below 3.0 m.		
11						
12						
13	4			End of Test Pit at 4.0 m below ground on Possible Bedrock.		
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 50

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-D7

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0			ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.		
1				... minor water seepage through bottom of rootmat.		
				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.		
2				TILL: Sand, silty, gravelly, compact, brown, moist.		
3	1					
4						
5						
6	2					
7						
8						
9						
10	3					
11				End of Test Pit at 3.4 m below ground surface on Possible Bedrock.		
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 51

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 1/22/16 | JOB NO. 20784 | TEST PIT TP-E0

EQUIPMENT: SK210LG Excavator

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface			
				SURFACE ELEVATION			
		PT		PEAT - fibrous, trace boulders. ... rapid water seepage through bottom of peat layer.			
1							
2				TILL - Gravel, sandy, silty, compact, brown, wet.			
3	1						
4							
5							
6	2						
7							
8						G	Grain Size Analysis: 39% Gravel 32% Sand 29% Fines
9							
10	3						
11							
12							
13	4						
14				End of Test Pit at 4.3 m below ground surface in Till.			
15							
16	5						

PLATE 52

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-E1

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, gravelly, loose to compact, brown, damp.		
2				TILL - Sand, silty, some gravel, compact, brown, damp.		
3	1			... minor water seepage at 0.9 m.		
4						
5						
6	2					
7						
8						
9						
10	3				G	
11						
12						
13	4					
14						
15				End of Test Pit at 4.6 m below ground surface in Till.		
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 53

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-E2

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, some gravel, loose to compact, orange brown, damp.		
2				TILL - Sand, gravelly, silty, trace cobbles, compact to dense, brown/grey, damp.		
3	1					
4						
5						
6						
7	2					
8						
9						
10	3					G
11				BEDROCK - Slate, dark grey, highly fractured.		
12				End of Test Pit at 3.7 m below ground surface in Bedrock.		
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 54

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/22/16	JOB NO. 20784	TEST PIT TP-E3

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft / m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE: COND. | TYPE

EQUIPMENT: SK210LG Excavator

COMMENTS

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
0	0	PT		PEAT - fibrous.		
3	1			... rapid water seepage through bottom of peat layer.		
				TILL - Silt, sandy, gravelly, trace cobbles and boulders, compact, brown, wet.		
9	3					G
15	4.6			End of Test Pit at 4.6 m below ground surface in Till.		

PLATE 55

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-E4

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0	PT		PEAT - fibrous, trace boulders.		
1				... moderate water seepage through bottom of peat layer.		
2						
3	1			TILL - Silt and sand, some gravel, compact, grey/brown, wet.		
4						
5						
6	2					
7				... trace cobbles, damp to moist below 2.1 m.		
8						
9						
10	3					G
11						
12						
13	4					
14						
15				End of Test Pit at 4.6 m below ground surface in Till.		
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 56

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW | CKD. SS | DATE OF INVEST. 4/8/16 | JOB NO. 20784 | TEST PIT TP-E5

WC % wp- □ w- ● wl- △
10 20 30 40 50

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0	0	PT		PEAT - fibrous, trace cobbles.		
1				... rapid water seepage through bottom of peat layer.		
2				TILL - Sand, gravelly, silty, trace cobbles and boulders, compact, grey/brown, wet.		
3	1					
4				... gravel, sandy, some silt, some cobbles below 1.2 m.		
5						
6	2					
7						
8						
9				End of Test Pit at 2.7 m below ground on Possible Bedrock.		
10	3					
11						
12						
13	4					
14						
15						
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 57

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-E6

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist. ... moderate water seepage through bottom of rootmat.		
2				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.		
3	1			TILL: Sand, silty, gravelly, trace boulders up to 0.6 m^3, compact, brown/grey, moist.		
10	3			End of Test Pit at 3.4 m below ground surface on Possible Bedrock.		

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 58

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 4/8/16	JOB NO. 20784	TEST PIT TP-E7

EQUIPMENT: SK210LG Excavator

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface			
				SURFACE ELEVATION			
				ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.			
1				WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.			
2				TILL: Silt, sandy, some gravel, compact, brown, moist.			
3	1						
4							
5							
6				... minor seepage at 1.8 m.			
7	2						
8						G	Grain Size Analysis: 23% Gravel 34% Sand 43% Fines
9				End of Test Pit at 2.7 m below ground surface on Possible Bedrock.			
10	3						
11							
12							
13	4						
14							
15							
16	5						

PLATE 59

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/12/16	JOB NO. 20784	TEST PIT TP-F1

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
				DATUM Existing Ground Surface		
				SURFACE ELEVATION		
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, gravelly, loose to compact, brown, damp.		
2				TILL - Sand, silty, some gravel, compact, brown, damp.		
3	1			... minor water seepage at 0.9 m.		
4				... sand and gravel, trace cobbles below 1.2 m.		
5						
6	2					
7						
8						G
9						
10	3					
11						
12						
13	4					
14						
15				End of Test Pit at 4.6 m below ground surface in Till.		
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 60

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/12/16	JOB NO. 20784	TEST PIT TP-F2

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION DATUM Existing Ground Surface SURFACE ELEVATION	SAMPLE COND.	SAMPLE TYPE
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, gravelly, loose to compact, light brown, damp.		
2				TILL - Sand and gravel, silty, trace cobbles, compact, brown, moist.		
3	1					G
4				... minor water seepage at 1.2 m.		
5						
6	2					
7						
8						
9						
10	3					
11						
12						
13	4					
14						G
15				End of Test Pit at 4.6 m below ground surface in TILL.		
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 61

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/13/16	JOB NO. 20784	TEST PIT TP-F3

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
1				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.			
2				TILL - Silt, sandy, some gravel, trace cobbles, brown, moist.			
3	1			... minor water seepage at 0.9 m.			
4							
5						G	Grain Size Analysis: 18% Gravel 34% Sand 48% Fines
6							
7	2			TILL - Sand and gravel, silty, brown/grey, moist.			
8							
9							
10	3						
11							
12							
13	4						
14							
15				End of Test Pit at 4.6 m below ground surface in Till.			
16	5						

PLATE 62

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/13/16	JOB NO. 20784	TEST PIT TP-F4

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			EQUIPMENT: SK210LG Excavator
1				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.			
2				TILL - Silt, sandy, gravelly, trace cobbles, brown, moist. ... minor water seepage at 0.8 m.			
3	1						
4							
5							
6							
7	2						
8						G	Grain Size Analysis: 28% Gravel 33% Sand 30% Fines
9				TILL - Sand, gravelly, silty, brown/grey, moist.			
10	3						
11							
12						G	Grain Size Analysis: 25% Gravel 45% Sand 30% Fines
13	4			End of Test Pit at 4.6 m below ground surface on Possible Bedrock.			
14							
15							
16	5						

PLATE 63

TEST PIT LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. JLW	CKD. SS	DATE OF INVEST. 1/14/16	JOB NO. 20784	TEST PIT TP-F5

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DATUM Existing Ground Surface

SURFACE ELEVATION

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE TYPE
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1				WEATHERED TILL - Sand, silty, gravelly, loose to compact, light brown, damp.		
2				TILL - Sand and gravel, silty, trace cobbles and boulders, compact, brown, damp to moist.		
3	1					
4						
5						
6	2					
7						
8						
9						
10	3					
11						
12						
13	4					
14						
15				End of Test Pit at 4.6 m below ground surface in TILL.		
16	5					

EQUIPMENT

SK210LG Excavator

COMMENTS

PLATE 64

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/22/16	JOB NO. 20784	HOLE NO. MW-A0

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft / m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE: COND. | SPT 'N'

EQUIPMENT: CME-55

Well Details | COMMENTS

Depth (ft)	Depth (m)	Soil Description	SPT 'N'	Comments
0	0	ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.		
1		WEATHERED TILL - Sand, silty, some gravel, loose to compact, orange brown, damp.		
2		TILL - Sand, gravelly, silty, trace cobbles, compact to dense, brown/grey, damp.		
3	1			
4				
5				
6			26	
7	2			
8				
9		BEDROCK - Slate, dark grey, highly fractured.		
10	3			SPT Refusal
11				
12				
13	4			
14				
15		End of Borehole at 4.3 m on Bedrock. Monitoring well installed to 4.3 m. Water level at 2.3 m on June 22, 2016.		
16	5			

PLATE 1

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/21/16	JOB NO. 20784	HOLE NO. MW-A7

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ 10 20 30 40 50

DEPTH ft m

MODIFIED USCS

SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE COND. SPT 'N'

EQUIPMENT CME-55

Well Details

COMMENTS

Depth (ft)	Depth (m)	Soil Description	SPT 'N'	Comments
0	0	ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.		
1		WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.		
2		TILL: Sand, silty, gravelly, trace cobbles and boulders, compact, brown, moist.	14	
3	1			
4				
5				
6	2			
7				
8				
9				
10	3			SPT 8/31/50 for 125 mm
11				
12				
13	4	End of Borehole at 4.0 m on Possible Bedrock. Monitoring well installed to 4.0 m. Water level at 1.7 m on June 22, 2016.		Auger Refusal
14				
15				
16	5			

PLATE 2

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/22/16	JOB NO. 20784	HOLE NO. MW-B3

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △

10 20 30 40 50

DEPTH ft m

MODIFIED USCS

SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE

COND.

SPT 'N'

EQUIPMENT

CME-55

Well Details

COMMENTS

Depth (ft)	Depth (m)	Soil Description	SPT 'N'	Comments
0	0	ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.		
1		WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.		
2		TILL: Gravel, sandy, some silt, compact to dense, trace cobbles, trace boulders, brown/grey, moist.	25	
8	2			Auger Refusal
8		End of Borehole at 2.4 m on Possible Bedrock. Monitoring well installed to 2.4 m. Water level at 1.2 m on June 22, 2016.		

PLATE 3

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/21/16	JOB NO. 20784	HOLE NO. MW-C0

DATUM Existing Ground Surface

SURFACE ELEVATION

EQUIPMENT: CME-55

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE SPT 'N'	Well Details	COMMENTS
0				ROOTMAT/TOPSOIL - silty sand, roots, cobbles and boulders, dark brown, moist.				
1				TILL - Sand, silty, some gravel, compact, brown,grey, damp.				
2								
3	1							
4								
5								
6						17		
7	2							
8								
9								
10	3							SPT 25/50 for 75 mm
11				BEDROCK - Slate, dark grey, highly fractured.				
12								
13	4			End of Borehole at 4.0 m on Possible Bedrock. Monitoring well installed to 4.0 m. Water level at 3.2 m on June 22, 2016.				
14								
15								
16	5							

PLATE 4

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/21/16	JOB NO. 20784	HOLE NO. MW-C7

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft / m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE: COND. | SPT 'N'

EQUIPMENT: CME-55

Well Details | COMMENTS

ft	m	USCS	Description	SPT 'N'	Comments
0	0	PT	PEAT - fibrous, trace cobbles.		
4	1		TILL - Sand, silty, gravelly, compact, grey/brown, wet.		
10	3			22	12/15/50 for 125 mm
12	3.7		Auger Refusal		
12	4		End of Borehole at 3.7 m on Possible Bedrock. Monitoring well installed to 3.7 m. Water level at 0.2 m on June 22, 2016.		
16	5				

PLATE 5

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/22/16	JOB NO. 20784	HOLE NO. MW-E0

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft / m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE: COND. | SPT 'N'

EQUIPMENT: CME-55

Well Details | COMMENTS

ft	m	USCS	Description	SPT 'N'
0	0	PT	PEAT - fibrous, trace boulders.	
2	0.5		TILL - Gravel, sandy, silty, compact, brown, wet.	
6	2			8
10	3			33
14	4.3		End of Borehole at 4.3 m in Till. Monitoring well installed to 4.3 m. Water level at 3.2 m on June 22, 2016.	

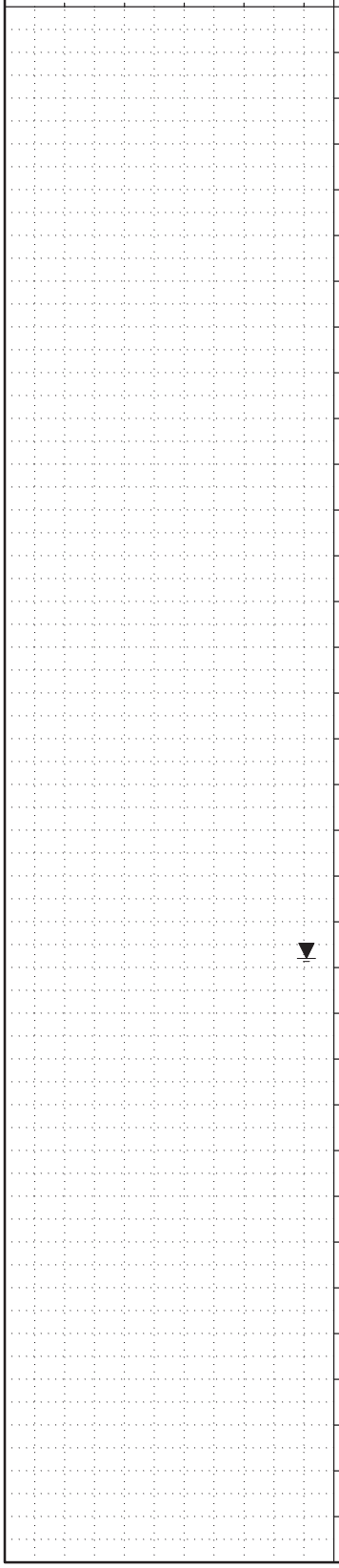


PLATE 6

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/22/16	JOB NO. 20784	HOLE NO. MW-E3

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft m

MODIFIED USCS

SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE COND.

SAMPLE SPT 'N'

EQUIPMENT

CME-55

Well Details

COMMENTS

ft	m	USCS	Soil Description	SPT 'N'	Comments
0	0	PT	PEAT - fibrous.		
3	1		TILL - Silt, sandy, gravelly, trace cobbles and boulders, compact, brown, wet.	8	
10	3				SPT 20/50 for 100 mm
15	4.6		End of Borehole at 4.6 m on Possible Bedrock. Monitoring well installed to 4.6 m. Water level at 0.6 m on June 22, 2016.		Auger Refusal

PLATE 7

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/21/16	JOB NO. 20784	HOLE NO. MW-E7

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ (10 20 30 40 50)

DEPTH ft / m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Existing Ground Surface

SURFACE ELEVATION

SAMPLE: COND. | SPT 'N'

EQUIPMENT: CME-55

Well Details | COMMENTS

ROOTMAT/TOPSOIL - silty sand, roots, dark brown, moist.

WEATHERED TILL: Sand and silt, gravelly, compact, reddish brown, moist.

TILL: Silt, sandy, some gravel, compact, brown, moist.

SPT 28/50 for 75 mm

End of Borehole at 4.9 m below ground surface on Possible Bedrock. Monitoring well installed to 4.9 m.

Depth (ft)	Depth (m)	SPT 'N'
6	2	12
15	4	62

PLATE 8

BOREHOLE LOG

PROJECT

Geotechnical Investigation - Water Treatment Plant
Gander, NL

LOGGED/DWN. BL	CKD. JLW	DATE OF INVEST. 6/21/16	JOB NO. 20784	HOLE NO. MW-E7

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △

10 20 30 40 50

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE COND.	SAMPLE SPT 'N'	EQUIPMENT	Well Details	COMMENTS
				DATUM Existing Ground Surface SURFACE ELEVATION			CME-55		
18				Water level at 0.5 m on June 22, 2016.					
19									
20	6								
21									
22									
23	7								
24									
25									
26	8								
27									
28									
29	9								
30									
31									
32									
33	10								

PLATE 9

Appendix 3 Laboratory Test Results

Englobe
Soils Materials Environment

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.7m
Sample No: 1
Lab ID: MTPL-0130
Location: TP01

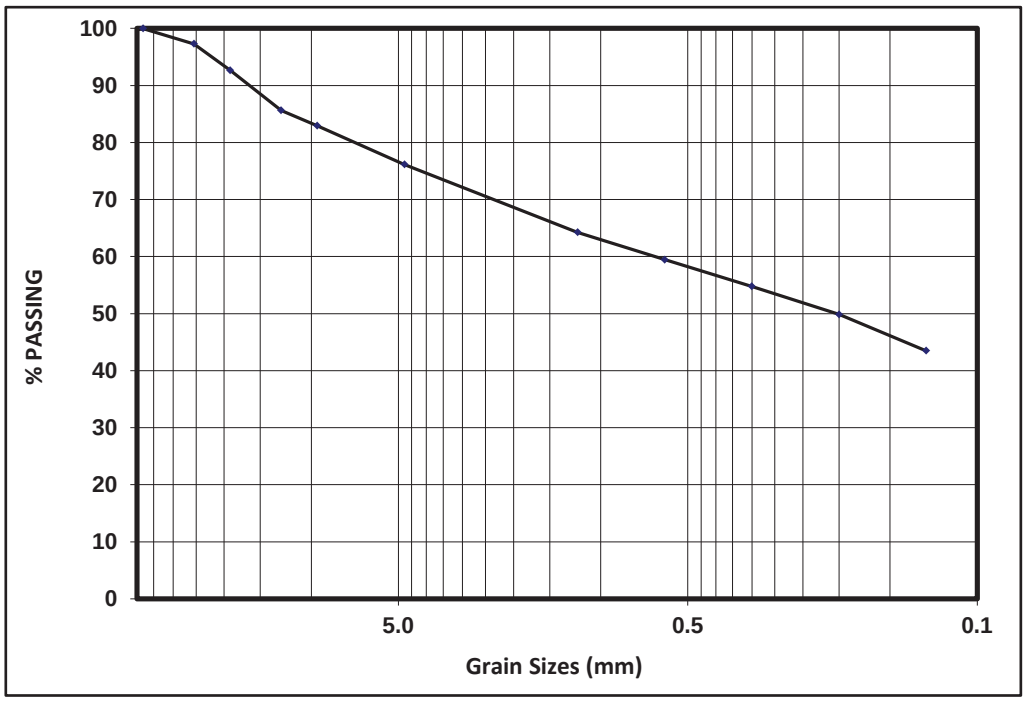
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 7/Dec/15
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	24	Plastic Limit		Coarse Specific Gravity	
Sand %	33	Plasticity Index		Fractured Faces, %	
Silt and Clay %	43	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	97
19.1	93
12.7	86
9.53	83
4.76	76
1.20	64
0.600	59
0.300	55
0.150	50
0.075	43.5

Moisture Content, %: 10.2



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 1
Lab ID: MTPL-0131
Location: TP02

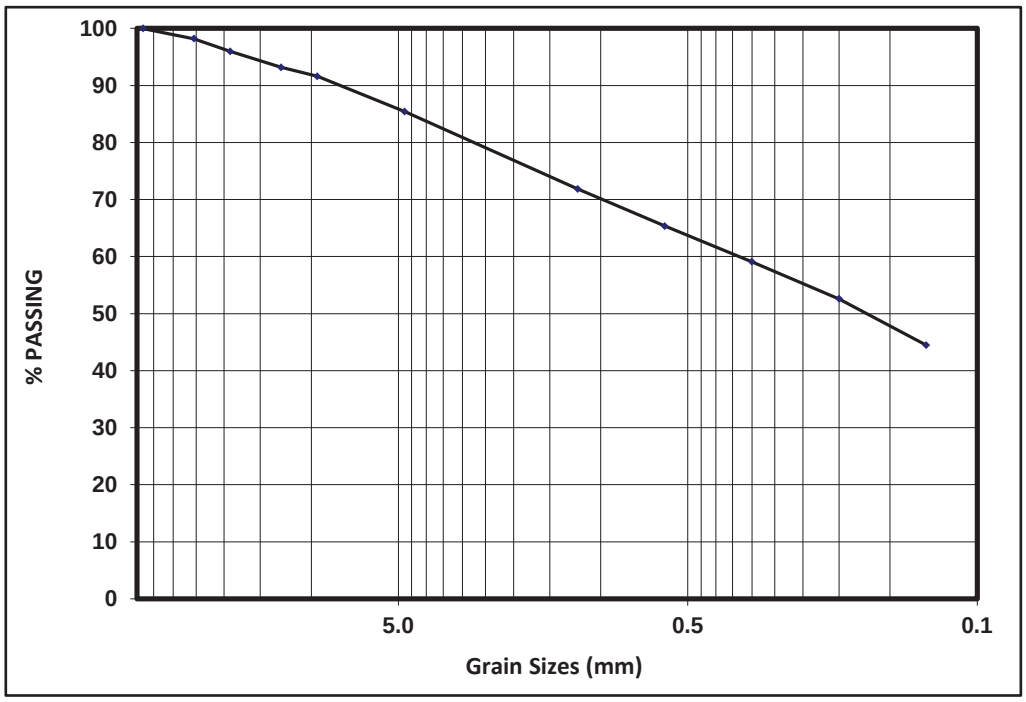
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 18/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	18	Flat & Elongated Particles, %	
Gravel %	15	Plastic Limit	12	Coarse Specific Gravity	
Sand %	41	Plasticity Index	6	Fractured Faces, %	
Silt and Clay %	44	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	98
19.1	96
12.7	93
9.53	92
4.76	85
1.20	72
0.600	65
0.300	59
0.150	53
0.075	44.5

Moisture Content, %: 0.3



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 2
Lab ID: MTPL-0132
Location: TP03

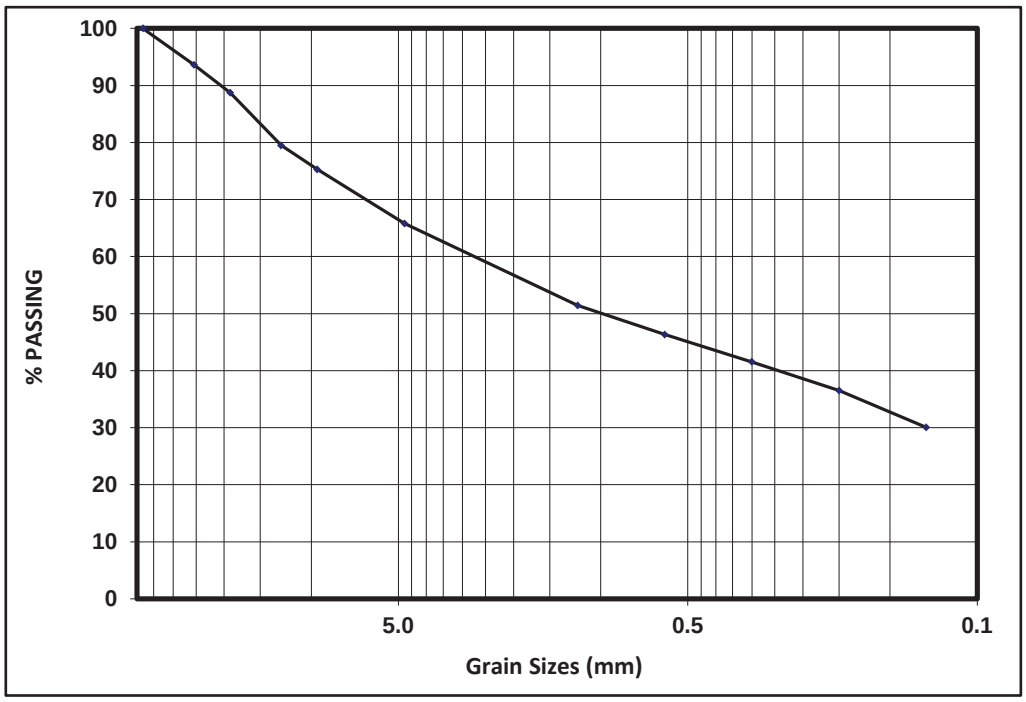
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 7/Dec/15
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	34	Plastic Limit		Coarse Specific Gravity	
Sand %	36	Plasticity Index		Fractured Faces, %	
Silt and Clay %	30	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	94
19.1	89
12.7	79
9.53	75
4.76	66
1.20	51
0.600	46
0.300	42
0.150	36
0.075	30.1

Moisture Content, %: 11.2



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 1
Lab ID: MTPL-0133
Location: TP04

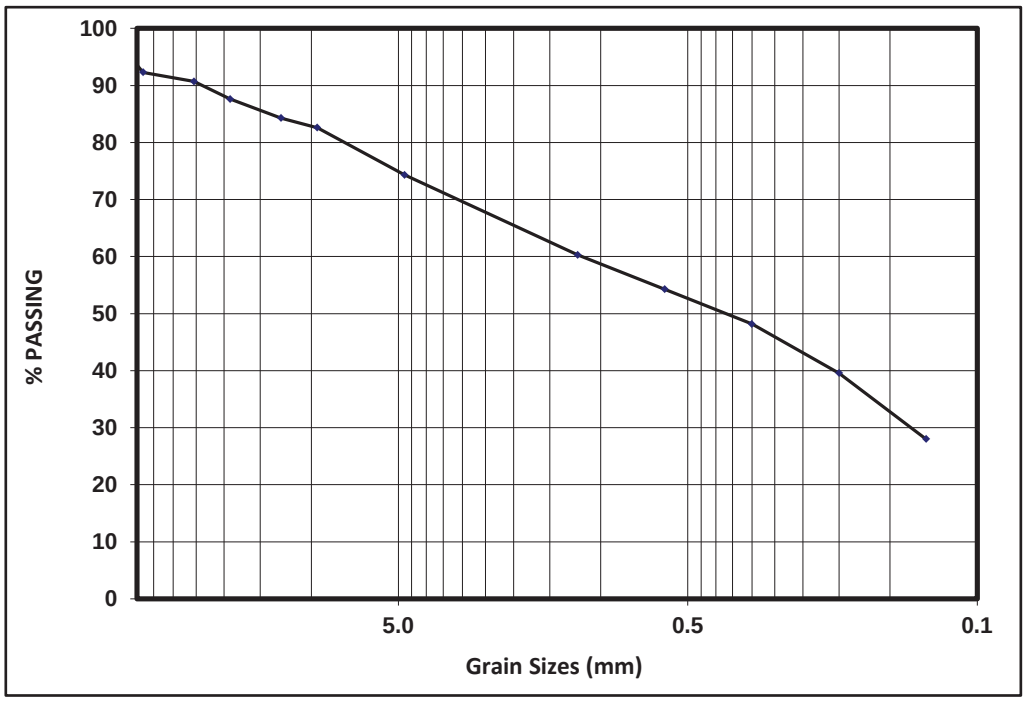
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 18/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	26	Plastic Limit		Coarse Specific Gravity	
Sand %	46	Plasticity Index		Fractured Faces, %	
Silt and Clay %	28	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	92
25.4	91
19.1	88
12.7	84
9.53	83
4.76	74
1.20	60
0.600	54
0.300	48
0.150	40
0.075	28.0

Moisture Content, %: 0.1



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.7m
Sample No: 3
Lab ID: MTPL-0134
Location: TP05

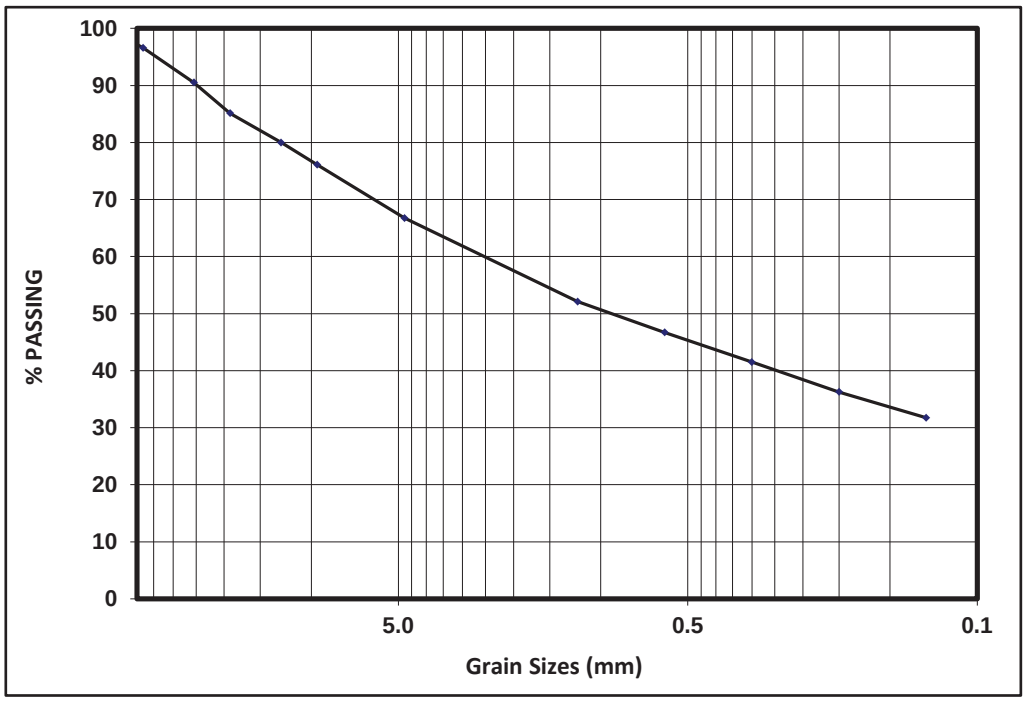
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 7/Dec/15
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	33	Plastic Limit		Coarse Specific Gravity	
Sand %	35	Plasticity Index		Fractured Faces, %	
Silt and Clay %	32	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	97
25.4	90
19.1	85
12.7	80
9.53	76
4.76	67
1.20	52
0.600	47
0.300	42
0.150	36
0.075	31.7

Moisture Content, %: 10.3



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 1
Lab ID: MTPL-0135
Location: TP06

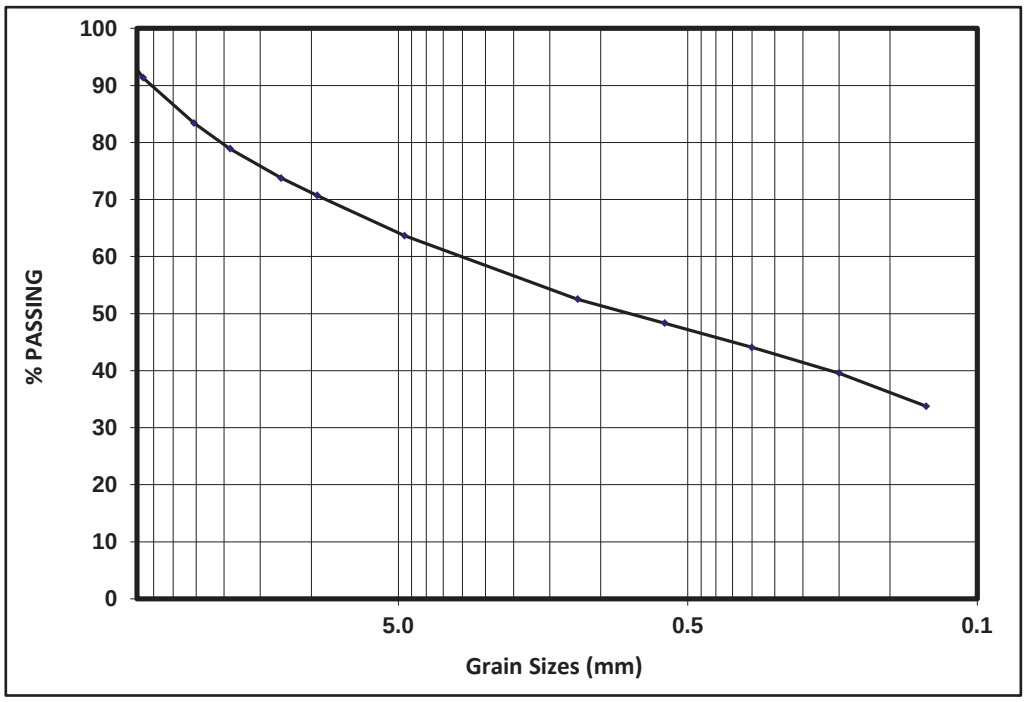
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 18/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	19	Flat & Elongated Particles, %	
Gravel %	36	Plastic Limit	13	Coarse Specific Gravity	
Sand %	30	Plasticity Index	6	Fractured Faces, %	
Silt and Clay %	34	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	91
25.4	83
19.1	79
12.7	74
9.53	71
4.76	64
1.20	53
0.600	48
0.300	44
0.150	40
0.075	33.7

Moisture Content, %: 0.1



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

Englobe
Soils Materials Environment

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.7m
Sample No: 4
Lab ID: MTPL-0136
Location: TP07

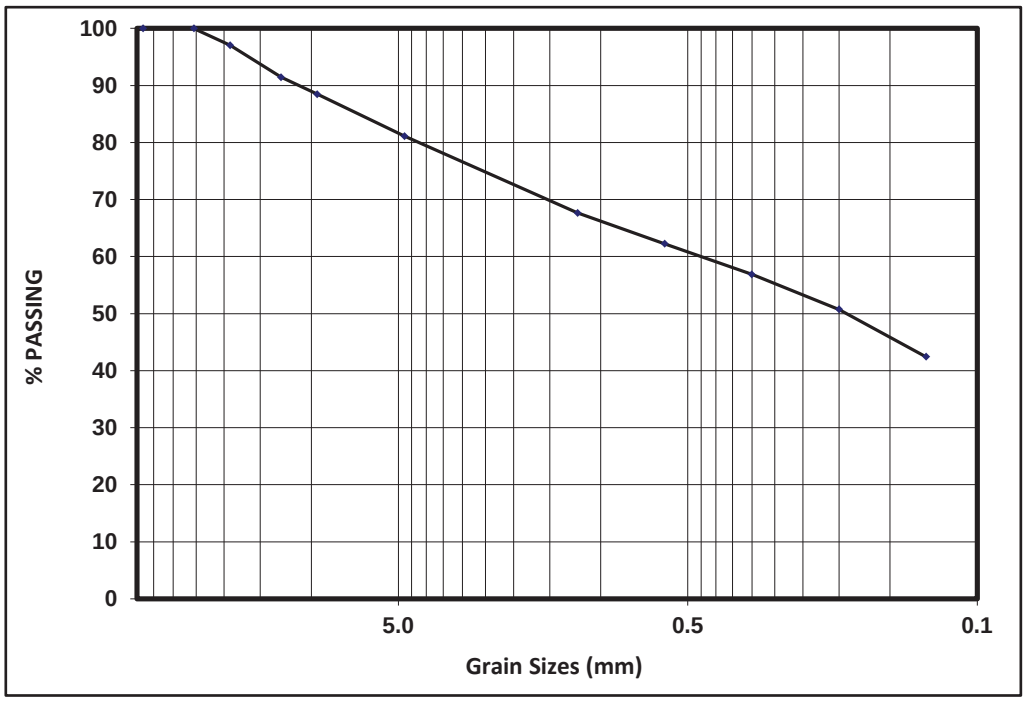
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 7/Dec/15
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	19	Plastic Limit		Coarse Specific Gravity	
Sand %	39	Plasticity Index		Fractured Faces, %	
Silt and Clay %	42	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	100
19.1	97
12.7	91
9.53	88
4.76	81
1.20	68
0.600	62
0.300	57
0.150	51
0.075	42.4

Moisture Content, %: 10.1



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

Englobe
Soils Materials Environment

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 5
Lab ID: MTPL-0138
Location: TP10

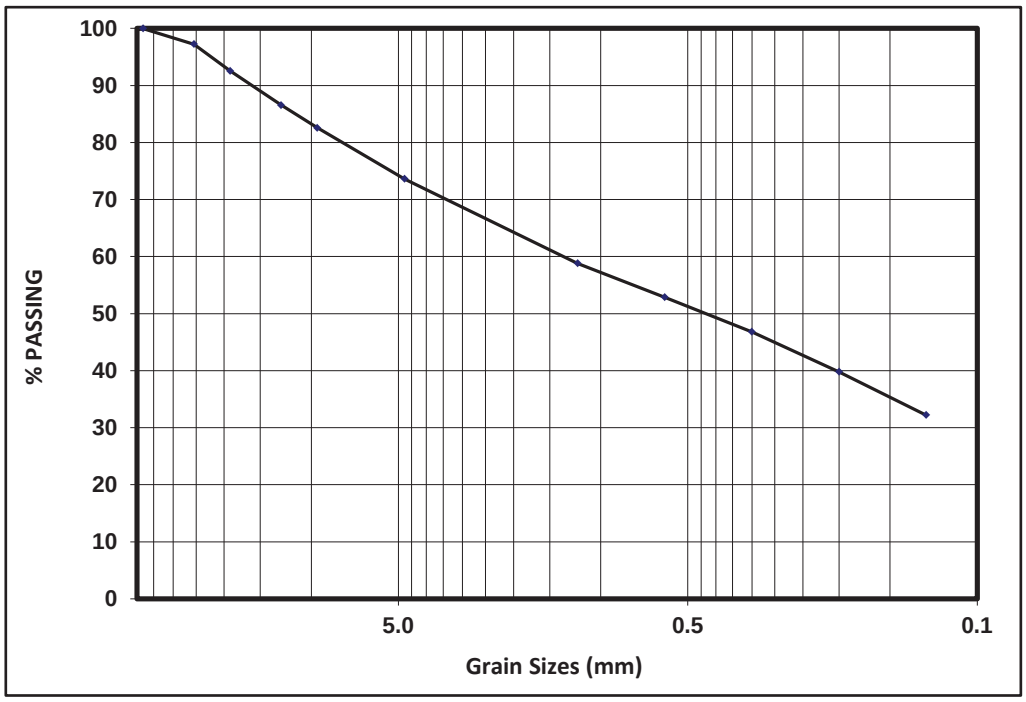
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 7/Dec/15
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	26	Plastic Limit		Coarse Specific Gravity	
Sand %	41	Plasticity Index		Fractured Faces, %	
Silt and Clay %	32	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	97
19.1	93
12.7	87
9.53	83
4.76	74
1.20	59
0.600	53
0.300	47
0.150	40
0.075	32.2

Moisture Content, %: 9.7



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 1
Lab ID: MTPL-0139
Location: TP11

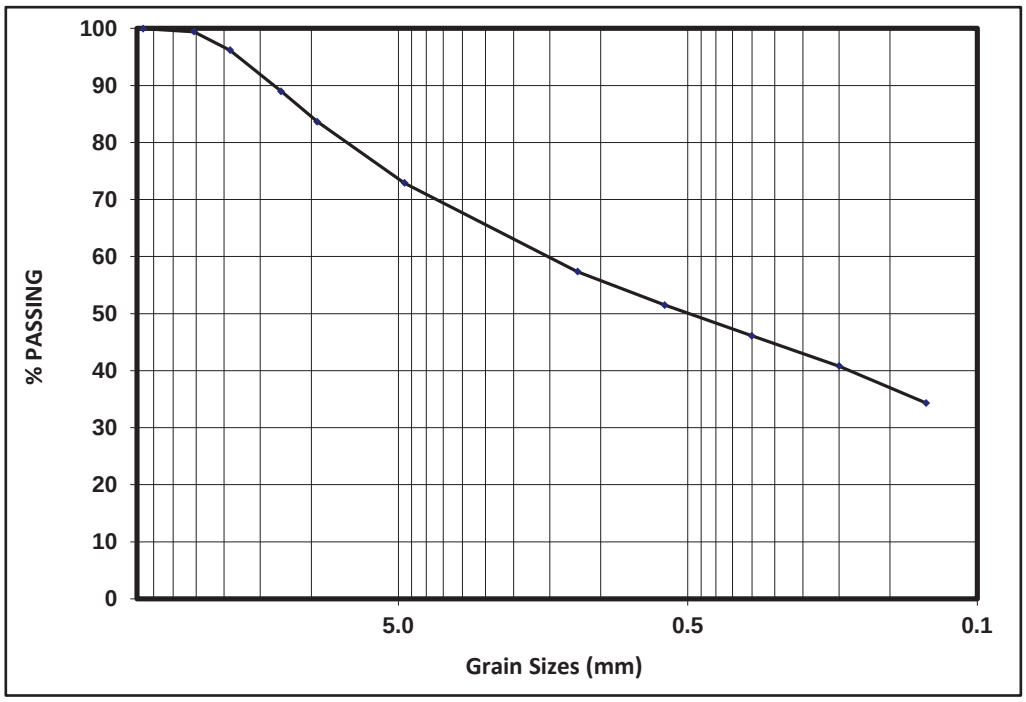
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 18/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	27	Plastic Limit		Coarse Specific Gravity	
Sand %	39	Plasticity Index		Fractured Faces, %	
Silt and Clay %	34	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	99
19.1	96
12.7	89
9.53	84
4.76	73
1.20	57
0.600	51
0.300	46
0.150	41
0.075	34.3

Moisture Content, %: 0.3



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.7m
Sample No: 6
Lab ID: MTPL-0140
Location: TP12

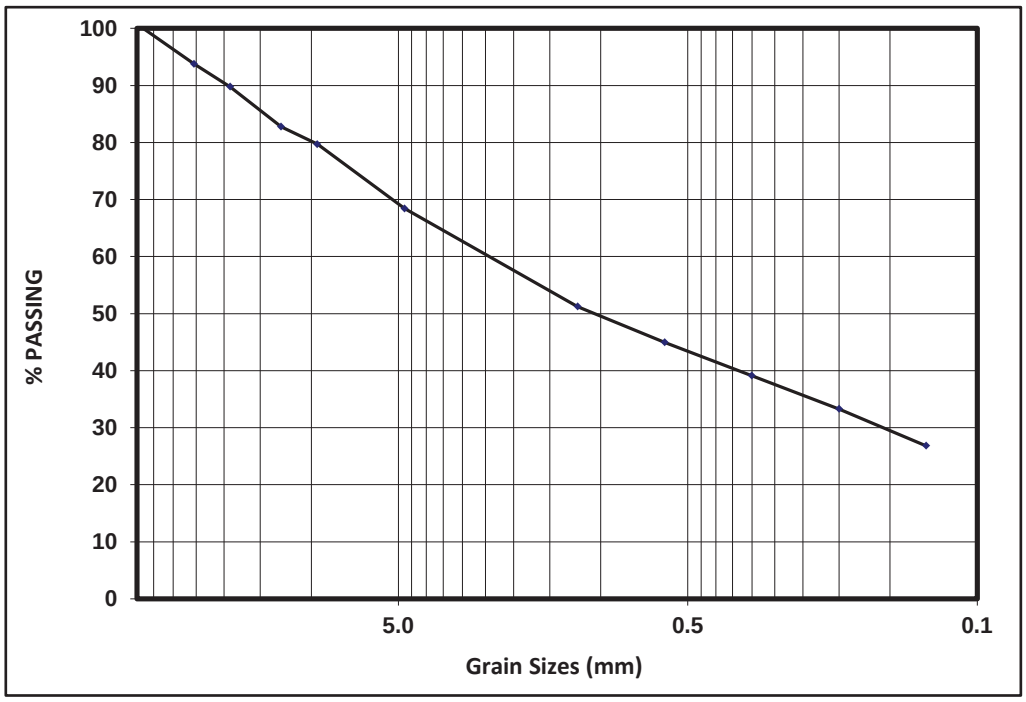
Sampled By: J. Williams of Englobe
Date Received: 7/Dec/15
Date Tested: 7/Dec/15
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	32	Plastic Limit		Coarse Specific Gravity	
Sand %	42	Plasticity Index		Fractured Faces, %	
Silt and Clay %	27	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	94
19.1	90
12.7	83
9.53	80
4.76	68
1.20	51
0.600	45
0.300	39
0.150	33
0.075	26.8

Moisture Content, %: 10.1



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 1
Lab ID: MTPL-0203
Location: TP 16

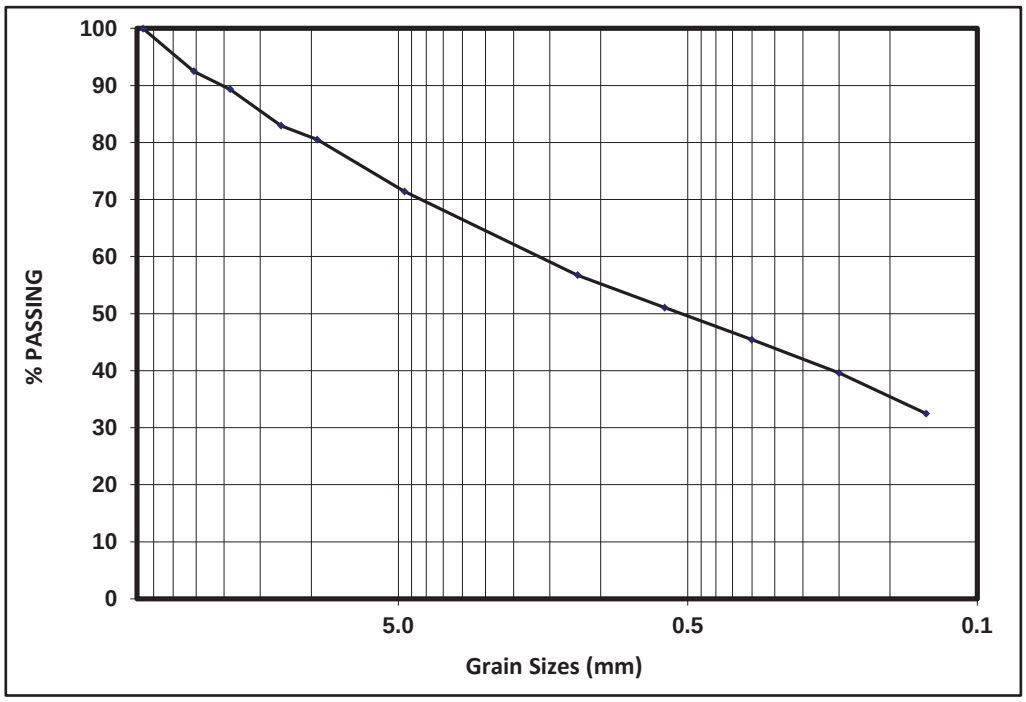
Sampled By: J. Williams of Englobe
Date Received: 16/Feb/16
Date Tested: 22/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	29	Plastic Limit		Coarse Specific Gravity	
Sand %	39	Plasticity Index		Fractured Faces, %	
Silt and Clay %	32	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	92
19.1	89
12.7	83
9.53	80
4.76	71
1.20	57
0.600	51
0.300	45
0.150	40
0.075	32.5

Moisture Content, %: 12.7



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.7m
Sample No: 1
Lab ID: MTPL-0185
Location: TP A0

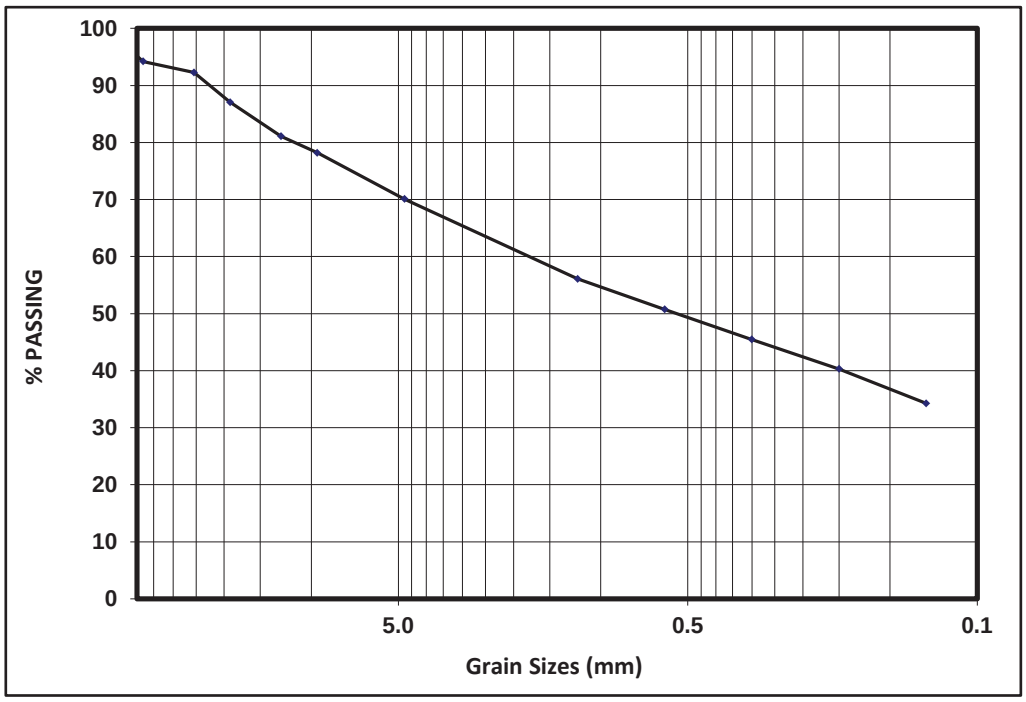
Sampled By: J. Williams of Englobe
Date Received: 26/Jan/16
Date Tested: 1/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	19	Flat & Elongated Particles, %	
Gravel %	30	Plastic Limit	14	Coarse Specific Gravity	
Sand %	36	Plasticity Index	5	Fractured Faces, %	
Silt and Clay %	34	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	94
25.4	92
19.1	87
12.7	81
9.53	78
4.76	70
1.20	56
0.600	51
0.300	45
0.150	40
0.075	34.3

Moisture Content, %: 10.1



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 1
Lab ID: MTPL-0180
Location: TP A2

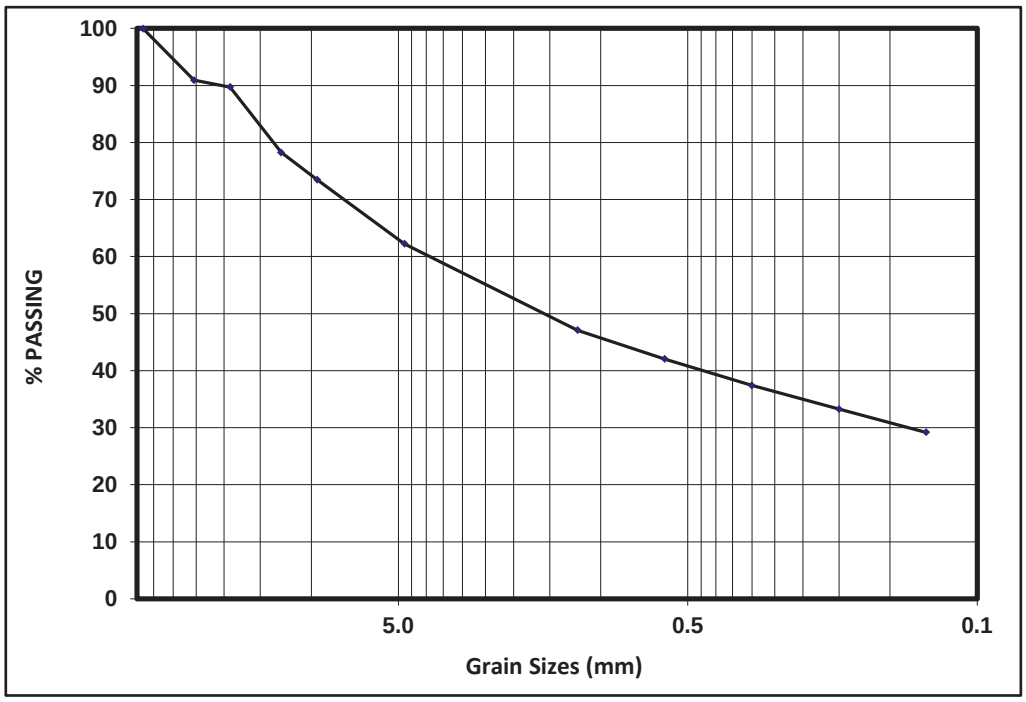
Sampled By: J. Williams of Englobe
Date Received: 26/Jan/16
Date Tested: 1/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	38	Plastic Limit		Coarse Specific Gravity	
Sand %	33	Plasticity Index		Fractured Faces, %	
Silt and Clay %	29	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	91
19.1	90
12.7	78
9.53	73
4.76	62
1.20	47
0.600	42
0.300	37
0.150	33
0.075	29.2

Moisture Content, %: 8.7



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

Englobe
Soils Materials Environment

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 10ft
Sample No: 1
Lab ID: MTPL-0160
Location: TP A3

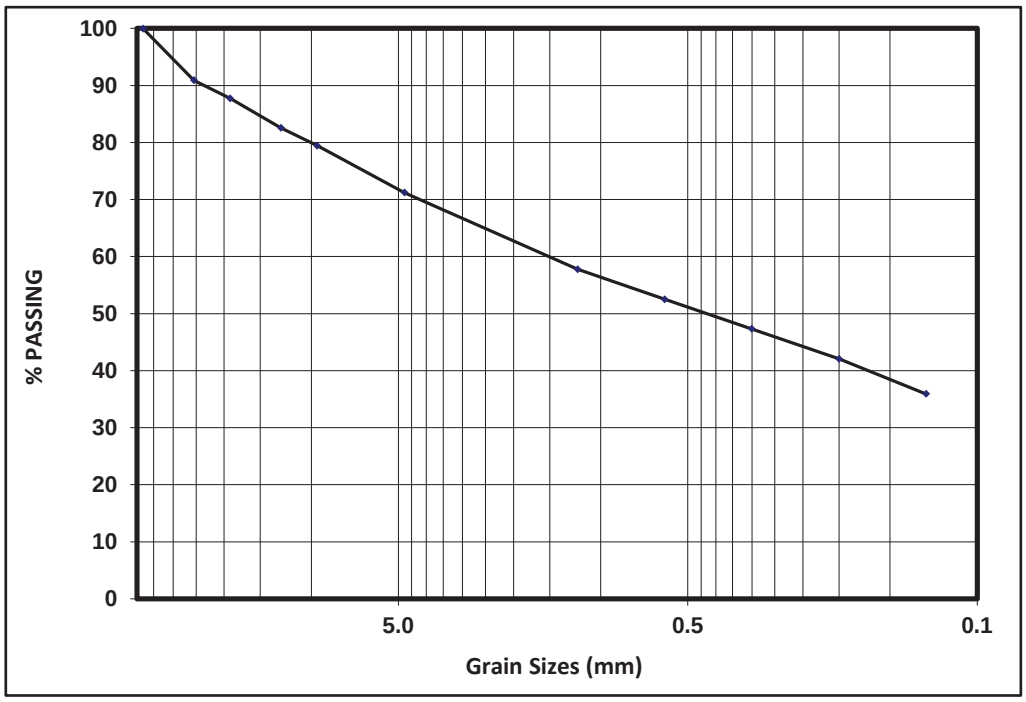
Sampled By: J. Williams of Englobe
Date Received: 20/Jan/16
Date Tested: 28/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	29	Plastic Limit		Coarse Specific Gravity	
Sand %	35	Plasticity Index		Fractured Faces, %	
Silt and Clay %	36	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	91
19.1	88
12.7	83
9.53	79
4.76	71
1.20	58
0.600	52
0.300	47
0.150	42
0.075	35.9

Moisture Content, %: 12.5



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
Colliers Project Leaders
Suite 306 Terrace on the Square, 8-10 Rowan Street
St. John's, Newfoundland
A1B 2X1

Attn: Steve Matthews
Phone: 709-237-8700 ext. 203 **Cell:** 709-699-9729 **E-Mail:** steve.matthews@collersprojectleaders.com

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.7m
Sample No: 27
Lab ID: MTPL-0213
Location: TP A7

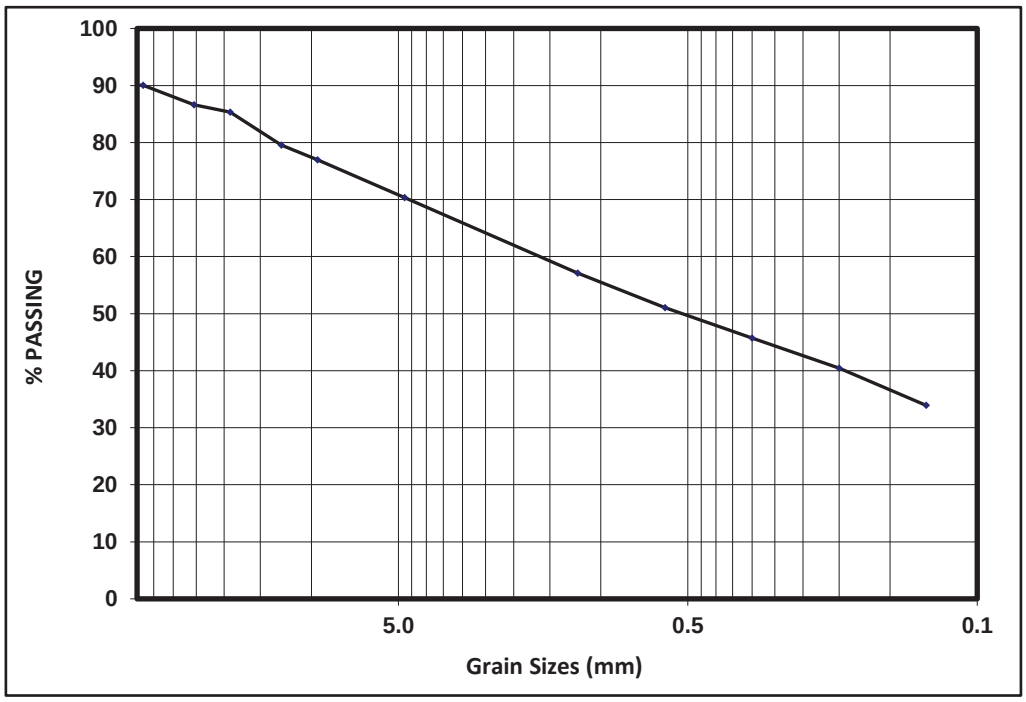
Sampled By: J. Williams of Englobe
Date Received: 8-Apr-16
Date Tested: 8-Apr-16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	30	Plastic Limit		Coarse Specific Gravity	
Sand %	36	Plasticity Index		Fractured Faces, %	
Silt and Clay %	34	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
76.2	100
50.8	90
38.1	90
25.4	87
19.1	85
12.7	80
9.53	77
4.76	70
1.20	57
0.600	51
0.300	46
0.150	40
0.075	33.9

Moisture Content, %: 8.8



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 1
Lab ID: MTPL-0189
Location: TP B1

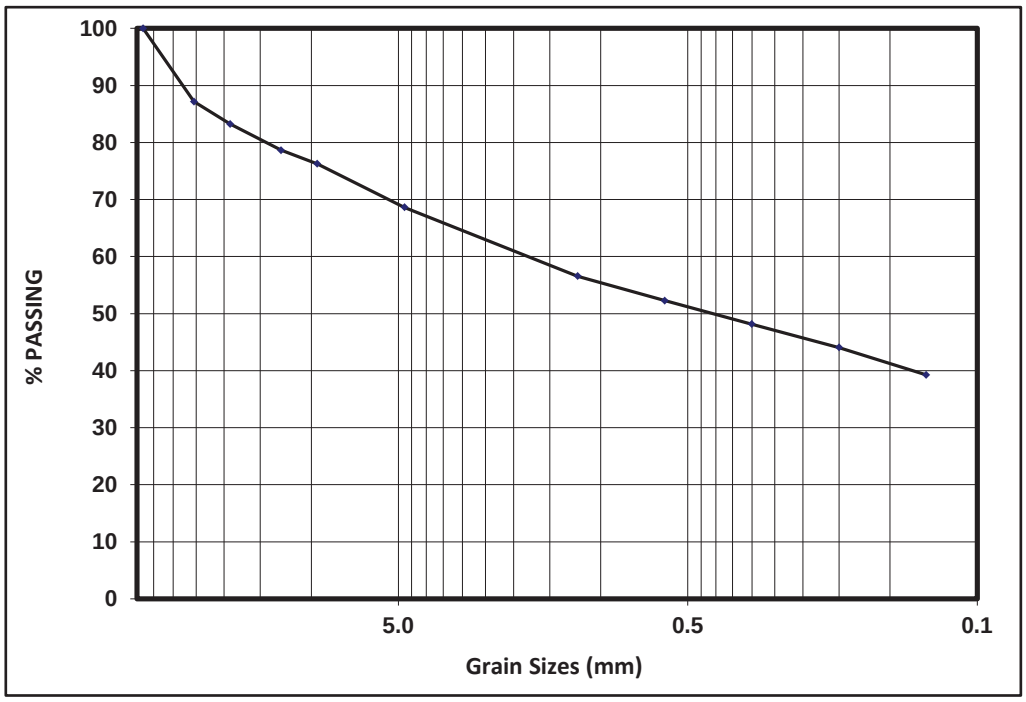
Sampled By: J. Williams of Englobe
Date Received: 26/Jan/16
Date Tested: 1/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	31	Plastic Limit		Coarse Specific Gravity	
Sand %	29	Plasticity Index		Fractured Faces, %	
Silt and Clay %	39	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	87
19.1	83
12.7	79
9.53	76
4.76	69
1.20	57
0.600	52
0.300	48
0.150	44
0.075	39.3

Moisture Content, %: 9.2



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 1.2m
Sample No: 1
Lab ID: MTPL-0202
Location: TP B3

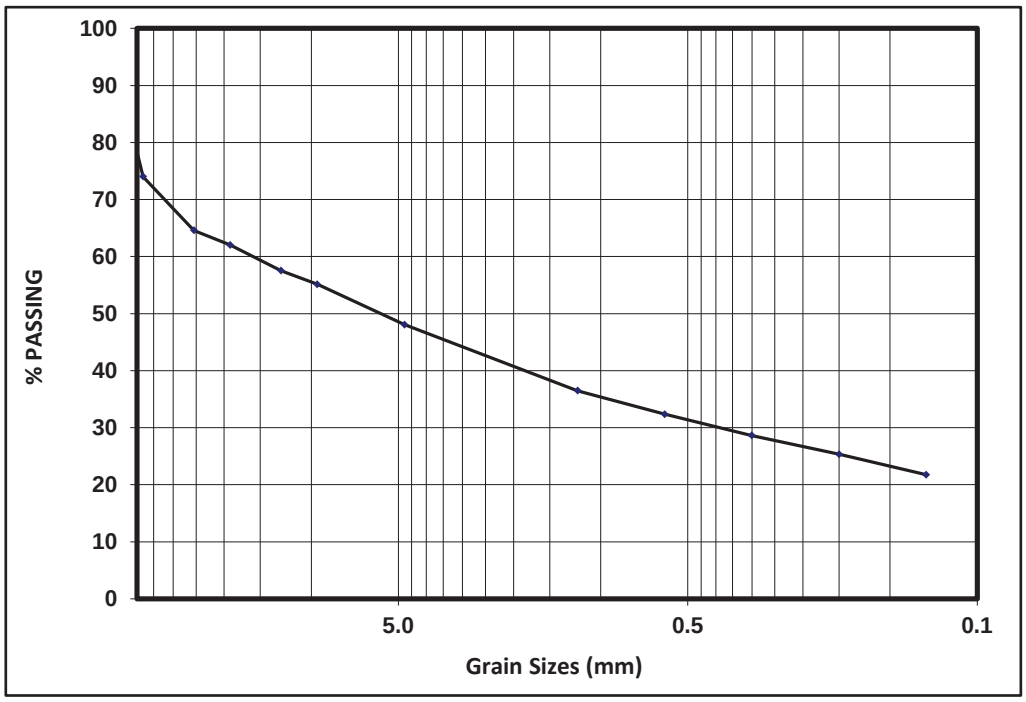
Sampled By: J. Williams of Englobe
Date Received: 16/Feb/16
Date Tested: 22/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	52	Plastic Limit		Coarse Specific Gravity	
Sand %	26	Plasticity Index		Fractured Faces, %	
Silt and Clay %	22	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	74
25.4	65
19.1	62
12.7	58
9.53	55
4.76	48
1.20	36
0.600	32
0.300	29
0.150	25
0.075	21.7

Moisture Content, %: 7.9



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
Colliers Project Leaders
Suite 306 Terrace on the Square, 8-10 Rowan Street
St. John's, Newfoundland
A1B 2X1

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Attn: Steve Matthews
Phone: 709-237-8700 ext. 203 **Cell:** 709-699-9729 **E-Mail:** steve.matthews@collersprojectleaders.com

Project: Gander WWTP
Source: 2.4m
Sample No: 26
Lab ID: MTPL-0220
Location: TP B6

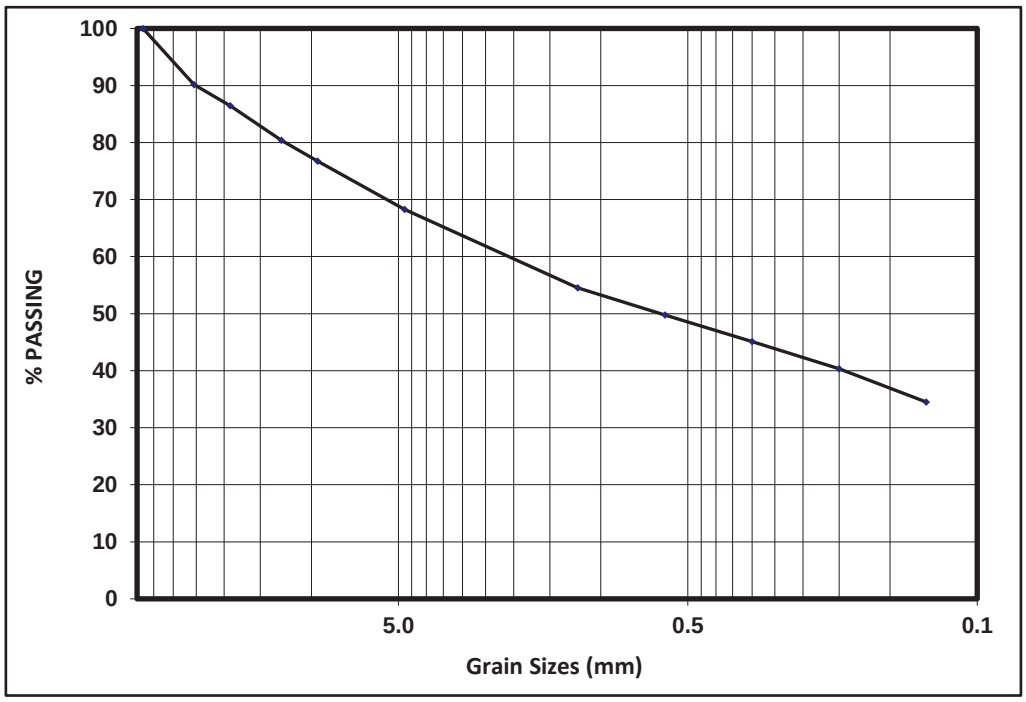
Sampled By: J. Williams of Englobe
Date Received: 8-Apr-16
Date Tested: 8-Apr-16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	18	Flat & Elongated Particles, %	
Gravel %	31	Plastic Limit	14	Coarse Specific Gravity	
Sand %	34	Plasticity Index	4	Fractured Faces, %	
Silt and Clay %	35	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	90
19.1	86
12.7	80
9.53	77
4.76	68
1.20	55
0.600	50
0.300	45
0.150	40
0.075	34.5

Moisture Content, %: 9.9



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 1
Lab ID: MTPL-0187
Location: TP C0

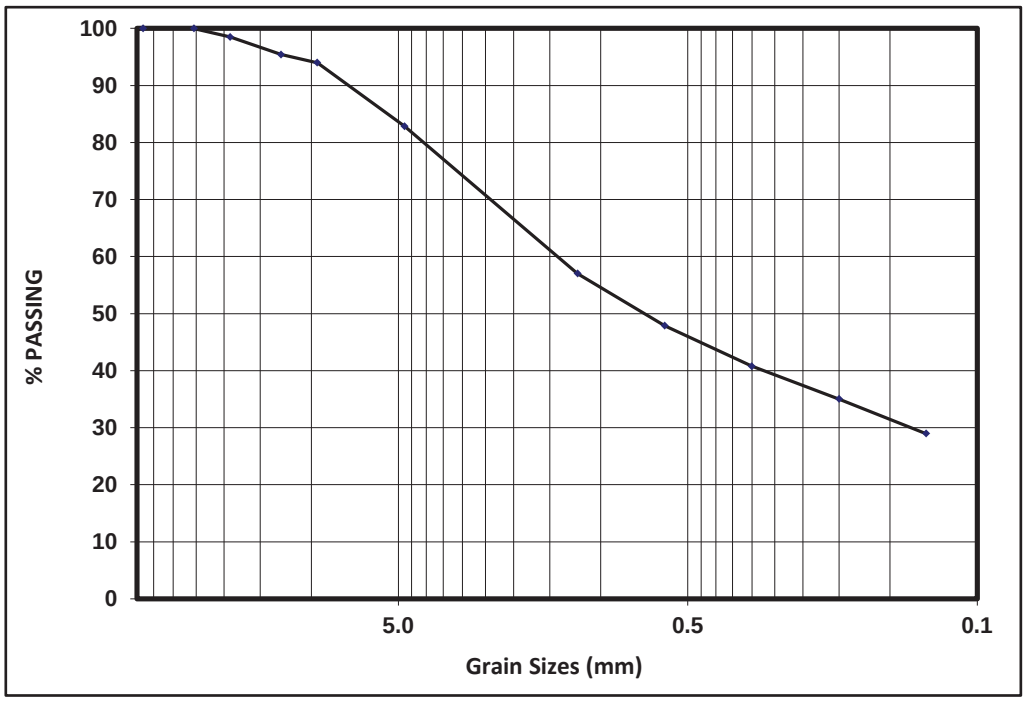
Sampled By: J. Williams of Englobe
Date Received: 26/Jan/16
Date Tested: 1/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	17	Plastic Limit		Coarse Specific Gravity	
Sand %	54	Plasticity Index		Fractured Faces, %	
Silt and Clay %	29	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	100
19.1	99
12.7	95
9.53	94
4.76	83
1.20	57
0.600	48
0.300	41
0.150	35
0.075	29.0

Moisture Content, %: 12.6



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

Englobe
Soils Materials Environment

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 1
Lab ID: MTPL-0186
Location: TP C2

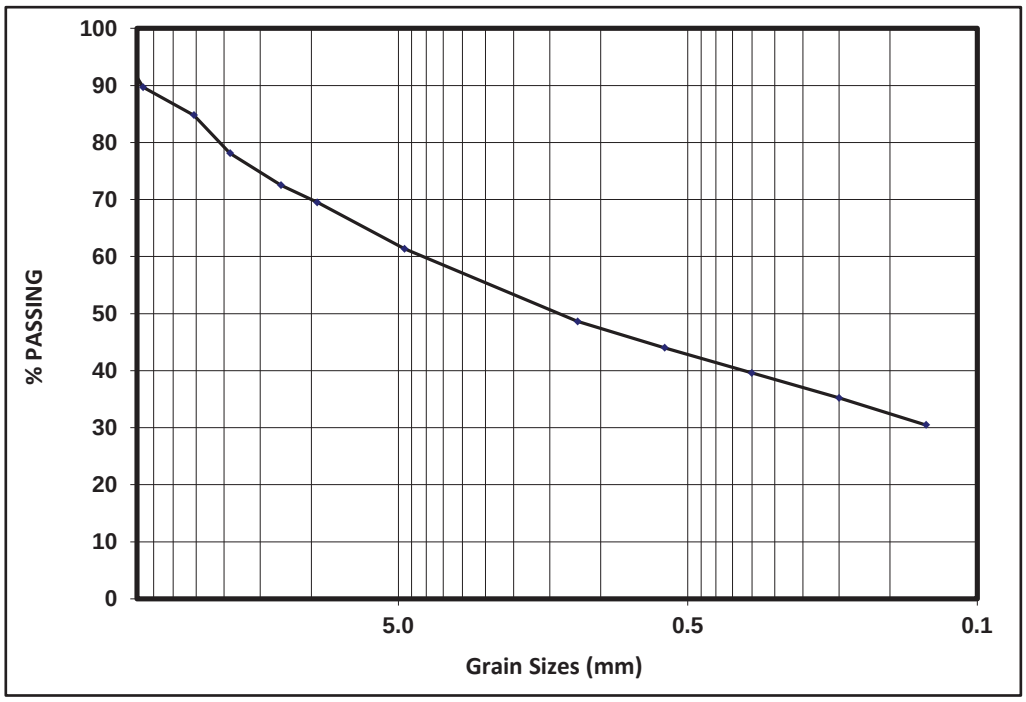
Sampled By: J. Williams of Englobe
Date Received: 26/Jan/16
Date Tested: 1/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	39	Plastic Limit		Coarse Specific Gravity	
Sand %	31	Plasticity Index		Fractured Faces, %	
Silt and Clay %	30	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	90
25.4	85
19.1	78
12.7	72
9.53	70
4.76	61
1.20	49
0.600	44
0.300	40
0.150	35
0.075	30.5

Moisture Content, %: 10.3



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 1.8m
Sample No: 1
Lab ID: MTPL-0161
Location: TP C4

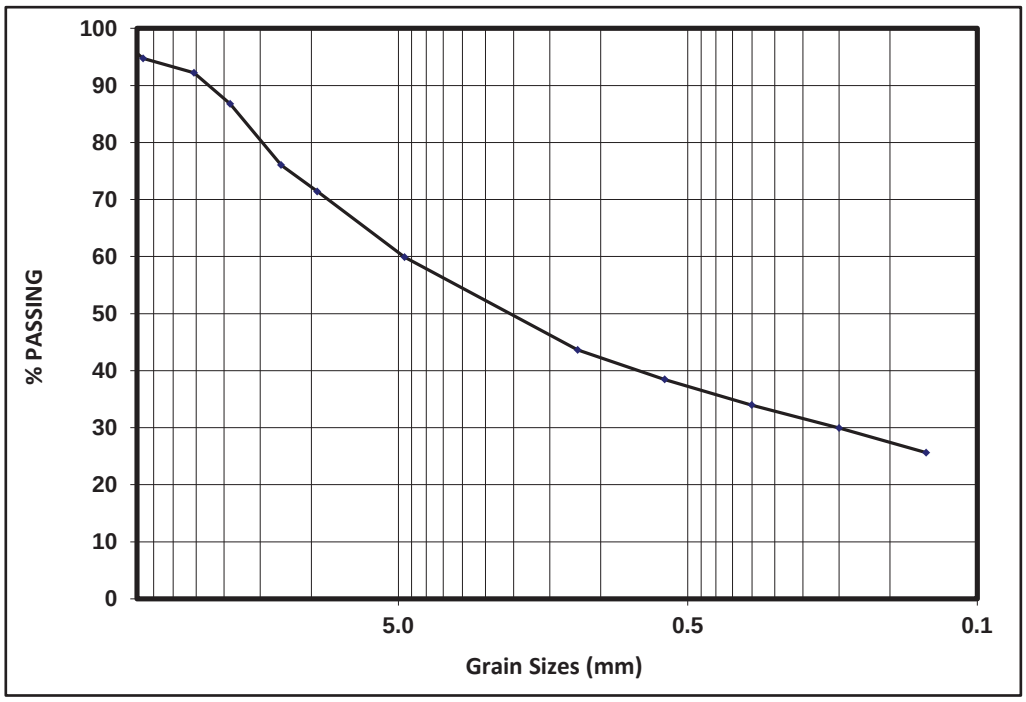
Sampled By: J. Williams of Englobe
Date Received: 20/Jan/16
Date Tested: 28/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	21	Flat & Elongated Particles, %	
Gravel %	40	Plastic Limit	15	Coarse Specific Gravity	
Sand %	34	Plasticity Index	6	Fractured Faces, %	
Silt and Clay %	26	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	95
25.4	92
19.1	87
12.7	76
9.53	71
4.76	60
1.20	44
0.600	38
0.300	34
0.150	30
0.075	25.6

Moisture Content, %: 8.1



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
Colliers Project Leaders
Suite 306 Terrace on the Square, 8-10 Rowan Street
St. John's, Newfoundland
A1B 2X1

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Attn: Steve Matthews
Phone: 709-237-8700 ext. 203 **Cell:** 709-699-9729 **E-Mail:** steve.matthews@collersprojectleaders.com

Project: Gander WWTP
Source: 3.4m
Sample No: 28
Lab ID: MTPL-0215
Location: TP C5

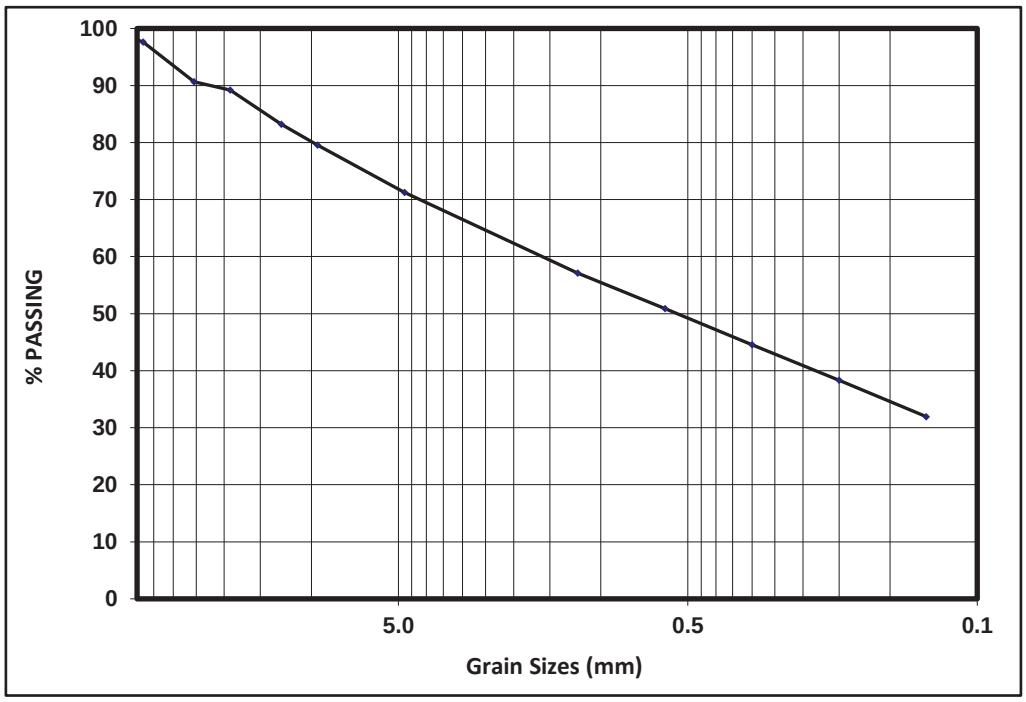
Sampled By: J. Williams of Englobe
Date Received: 8-Apr-16
Date Tested: 8-Apr-16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	29	Plastic Limit		Coarse Specific Gravity	
Sand %	39	Plasticity Index		Fractured Faces, %	
Silt and Clay %	32	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
76.2	100
50.8	100
38.1	98
25.4	91
19.1	89
12.7	83
9.53	80
4.76	71
1.20	57
0.600	51
0.300	45
0.150	38
0.075	31.9

Moisture Content, %: 10.4



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.0m
Sample No: 1
Lab ID: MTPL-0174
Location: TP D1

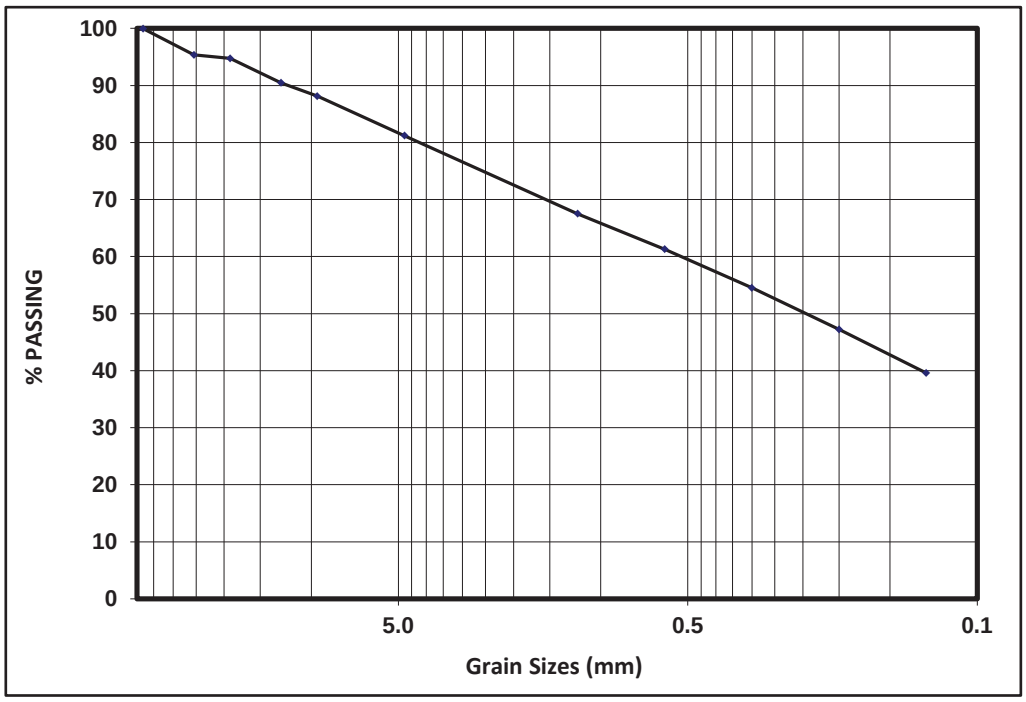
Sampled By: J. Williams of Englobe
Date Received: 20/Jan/16
Date Tested: 28/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	19	Plastic Limit		Coarse Specific Gravity	
Sand %	42	Plasticity Index		Fractured Faces, %	
Silt and Clay %	40	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	95
19.1	95
12.7	90
9.53	88
4.76	81
1.20	67
0.600	61
0.300	55
0.150	47
0.075	39.6

Moisture Content, %: 13.3



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 1
Lab ID: MTPL-0181
Location: TP D3

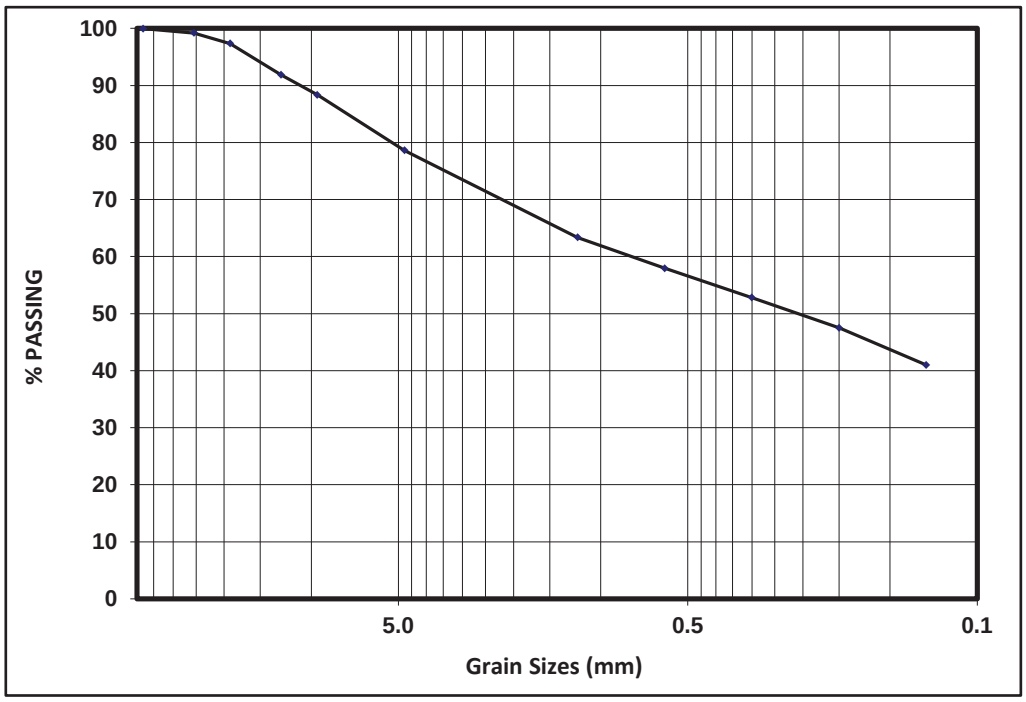
Sampled By: J. Williams of Englobe
Date Received: 26/Jan/16
Date Tested: 1/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	20	Flat & Elongated Particles, %	
Gravel %	21	Plastic Limit	13	Coarse Specific Gravity	
Sand %	38	Plasticity Index	7	Fractured Faces, %	
Silt and Clay %	41	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	99
19.1	97
12.7	92
9.53	88
4.76	79
1.20	63
0.600	58
0.300	53
0.150	47
0.075	41.0

Moisture Content, %: 11.9



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

Englobe
Soils Materials Environment

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 1
Lab ID: MTPL-0188
Location: TP E0

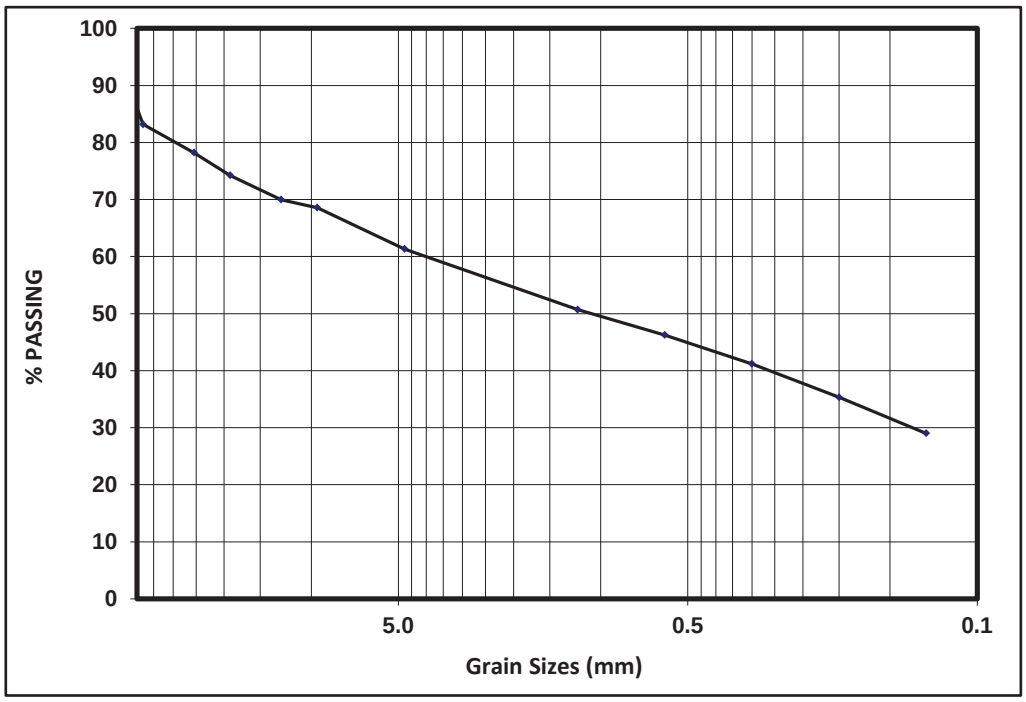
Sampled By: J. Williams of Englobe
Date Received: 26/Jan/16
Date Tested: 1/Feb/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	19	Flat & Elongated Particles, %	
Gravel %	39	Plastic Limit	12	Coarse Specific Gravity	
Sand %	32	Plasticity Index	7	Fractured Faces, %	
Silt and Clay %	29	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	83
25.4	78
19.1	74
12.7	70
9.53	69
4.76	61
1.20	51
0.600	46
0.300	41
0.150	35
0.075	29.0

Moisture Content, %: 10.5



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
Colliers Project Leaders
Suite 306 Terrace on the Square, 8-10 Rowan Street
St. John's, Newfoundland
A1B 2X1

Attn: Steve Matthews
Phone: 709-237-8700 ext. 203 **Cell:** 709-699-9729 **E-Mail:** steve.matthews@collersprojectleaders.com

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 29
Lab ID: MTPL-0216
Location: TP E7

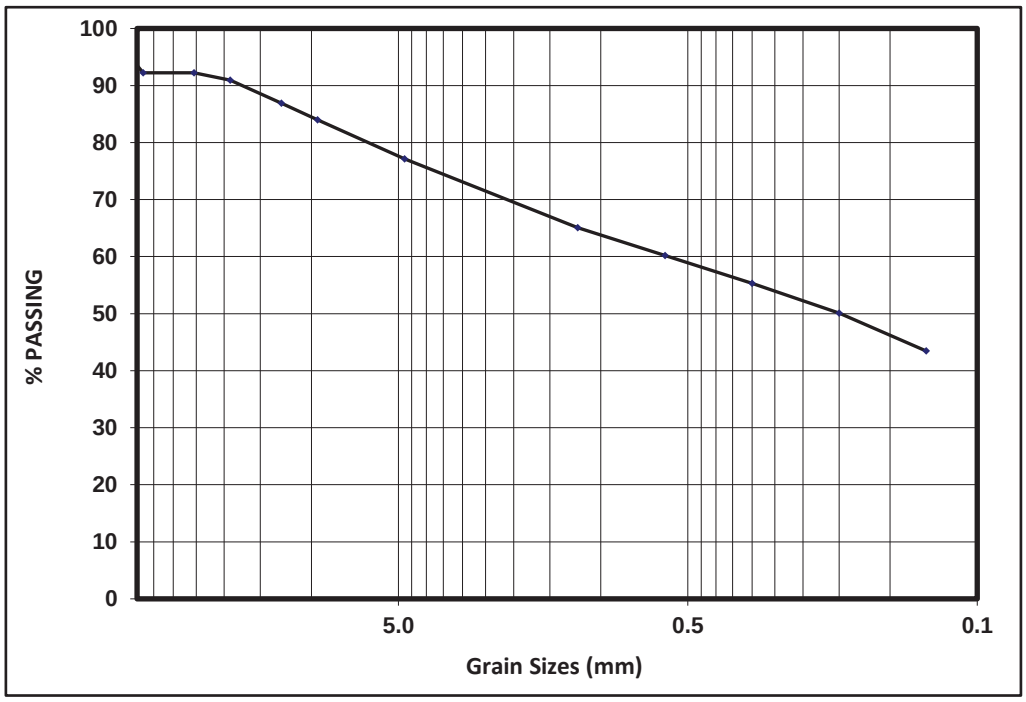
Sampled By: J. Williams of Englobe
Date Received: 8-Apr-16
Date Tested: 8-Apr-16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	19	Flat & Elongated Particles, %	
Gravel %	23	Plastic Limit	14	Coarse Specific Gravity	
Sand %	34	Plasticity Index	5	Fractured Faces, %	
Silt and Clay %	43	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
76.2	100
50.8	100
38.1	92
25.4	92
19.1	91
12.7	87
9.53	84
4.76	77
1.20	65
0.600	60
0.300	55
0.150	50
0.075	43.4

Moisture Content, %: 12.7



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 1.5m
Sample No: 1
Lab ID: MTPL-0159
Location: TP F3

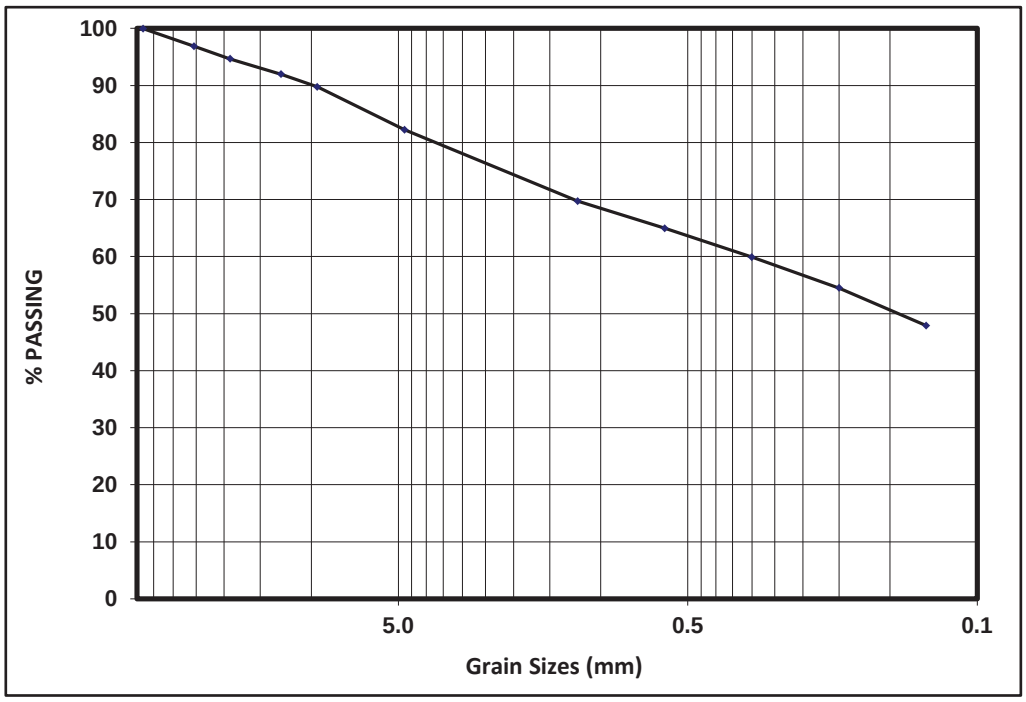
Sampled By: J. Williams of Englobe
Date Received: 20/Jan/16
Date Tested: 28/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit	17	Flat & Elongated Particles, %	
Gravel %	18	Plastic Limit	12	Coarse Specific Gravity	
Sand %	34	Plasticity Index	5	Fractured Faces, %	
Silt and Clay %	48	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	100
25.4	97
19.1	95
12.7	92
9.53	90
4.76	82
1.20	70
0.600	65
0.300	60
0.150	54
0.075	47.9

Moisture Content, %: 13.0



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 2.4m
Sample No: 1
Lab ID: MTPL-0167
Location: TP F4

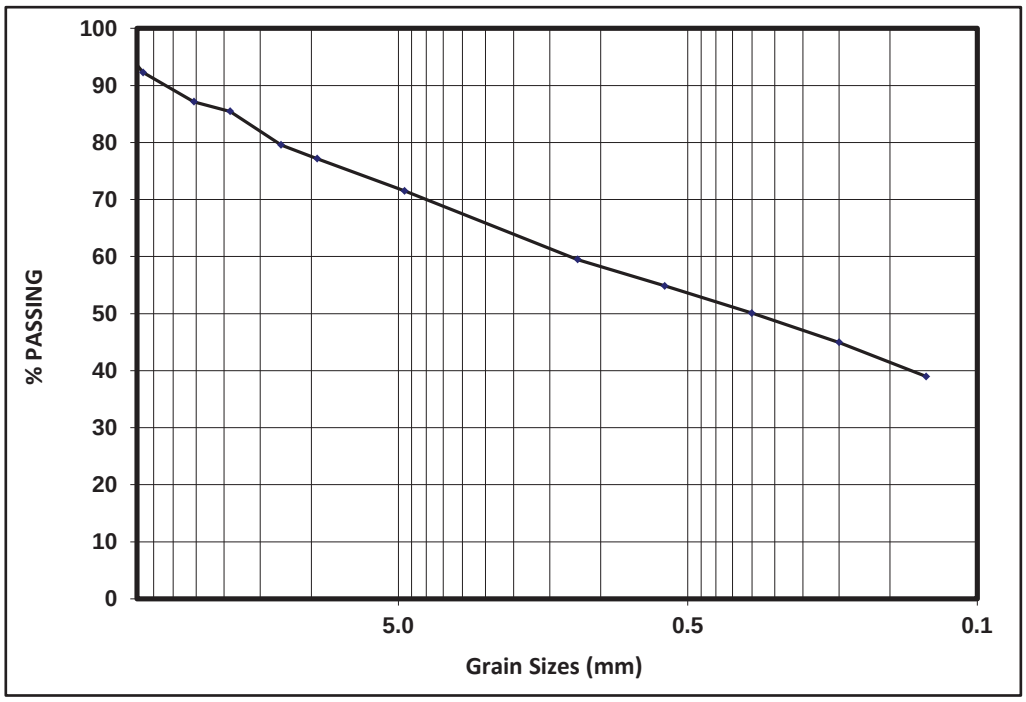
Sampled By: J. Williams of Englobe
Date Received: 20/Jan/16
Date Tested: 28/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	28	Plastic Limit		Coarse Specific Gravity	
Sand %	33	Plasticity Index		Fractured Faces, %	
Silt and Clay %	39	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	92
25.4	87
19.1	85
12.7	80
9.53	77
4.76	72
1.20	59
0.600	55
0.300	50
0.150	45
0.075	39.0

Moisture Content, %: 10.5



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

SIEVE ANALYSIS REPORT

Englobe
Soils Materials Environment

39 Sagona Ave, Mount Pearl, NL, A1N 4P9 - TEL (709)576-8148 FAX (709)576-3713

Client:
MHPM Project Managers Inc.
1559 Brunswick Street, Suite 501
Halifax, Nova Scotia
B3J 2G1

Attn: Steve Matthews
Phone: **Fax:** **E-Mail:**

Our Project No: 20784
Client Contract No: NA
Client PO: NA
CC: NA

Project: Gander WWTP
Source: 3.7m
Sample No: 1
Lab ID: MTPL-0165
Location: TP F4

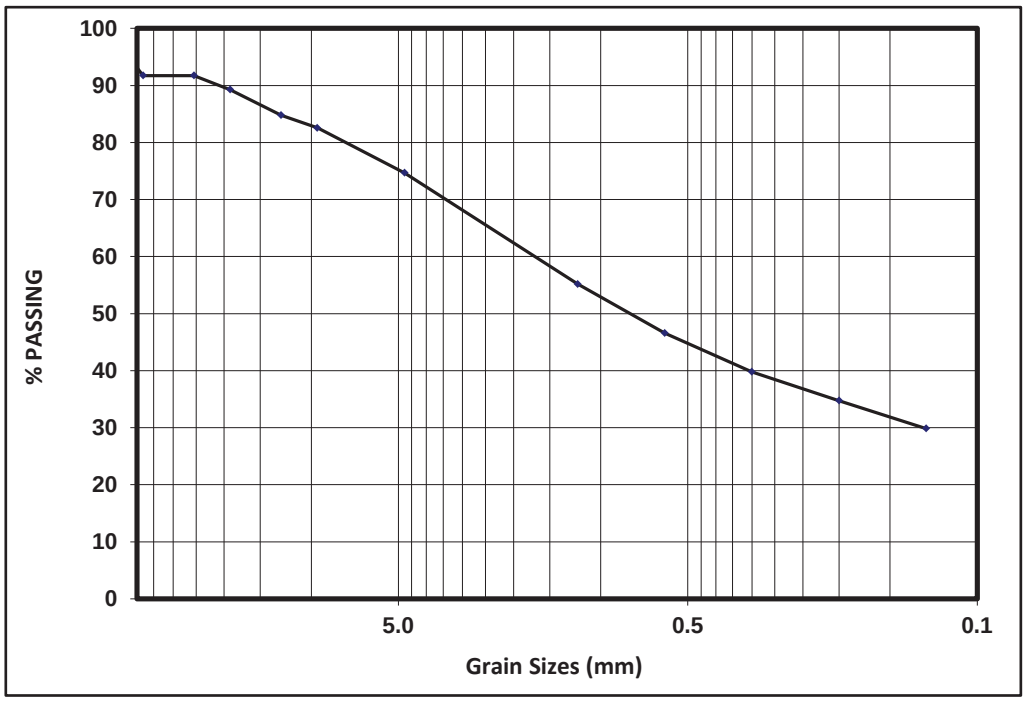
Sampled By: J. Williams of Englobe
Date Received: 20/Jan/16
Date Tested: 28/Jan/16
Soil Description: Grab Sample

PHYSICAL PROPERTY TESTS

Soil Type	Grab Sample	Liquid Limit		Flat & Elongated Particles, %	
Gravel %	25	Plastic Limit		Coarse Specific Gravity	
Sand %	45	Plasticity Index		Fractured Faces, %	
Silt and Clay %	30	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m³)	
Abrasion Loss, %		Micro-Deval Loss, %		Optimum Moisture, %	

SIEVE SIZE (mm)	PERCENT PASSING
50.8	100
38.1	92
25.4	92
19.1	89
12.7	85
9.53	83
4.76	75
1.20	55
0.600	47
0.300	40
0.150	35
0.075	29.9

Moisture Content, %: 8.6



Comments:

Record No: **Englobe Tech:** J. Hill **Per:** CCIL Certified Laboratory For Testing Concrete

APPENDIX C

Town of Gander
Open House / Public Meeting

QUICK LINKS

Calendar of Events
Publications & Forms
Public Notices
Job Opportunities
Complaints | Comments
Business Directory
GIS Map | Getting Here
Cool Stuff
Contact Us

ENVIRONMENT CANADA

Public Notices

Current Public Notices

DISCRETIONARY NOTICE - 131 ROE AVENUE

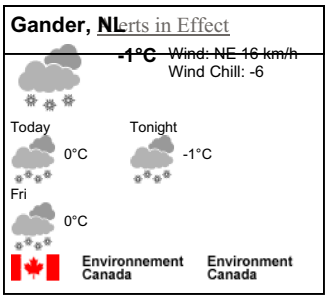
Posted: March 27, 2017

Notice is hereby given that the Town Council of Gander has received an application to operate a taproom, retail beer sales and on-site brewing company at the above noted property.

It is noted that this area is zoned Commercial General and the use is permitted as a Discretionary Use under the Town of Gander Development Regulations.

Anyone wishing to make representation on this matter must do so in writing and the representation must be received by the Engineering Department, Town of Gander, no later than 12:00 noon on Monday, April 3, 2017.

Further information on this matter may be obtained by contacting the Engineering Department at 651-5915.



John Boland
Planning & Control Technician
Town of Gander
100 Elizabeth Drive
Gander, NL
A1V 1G7

Notice of Open House / Public Meeting

Posted: March 17, 2017

The Town of Gander invites residents and concerned stakeholders to an Open House / Project Introduction Meeting for the Proposed New Wastewater Treatment Facility in Gander, Newfoundland, as part of the pre-submission of an Environmental Assessment Registration to Newfoundland and Labrador Department of Environment and Climate Change.

Prepared materials will provide a project concept, and project personnel will be available to document / answer questions and share information.

The event details are as follows:

Nature of Meeting: Information Session for the New Proposed Wastewater Treatment Facility
Date: Tuesday, March 28, 2017
Time: 7:00 p.m. to 9:00 p.m.
Location: Council Chambers, 100 Elizabeth Drive, Gander, NL

Anyone wishing to understand more about this project or provide comments or concerns on this matter may do so in person during the meeting or provide written comments to the Engineering Department, Town of Gander, no later than 12:00 p.m., Friday, April 28, 2017.

Further information on this matter may be obtained by contacting the Engineering Department at 709-651-5915.

James Blackwood
Director of Engineering
Town of Gander
100 Elizabeth Drive
Gander, NL
A1V 1G7

VARIANCE FROM REGULATIONS - 176 ROE AVENUE

Posted: March 14, 2017

Notice is hereby given that the Town Council of Gander has received an application to construct an addition to the rear of the existing building at the above noted address which will extend to within 4.78 metres of the side property line.

It is noted that this area is zoned Commercial General (CG) and requires a minimum sideyard of 5.0 meters.

The addition will encroach into this sideyard.

Anyone wishing to make representation on this matter must do so in writing and the representation must be received by the Engineering Department, Town of Gander, no later than 12:00 noon, Tuesday, March 21, 2017.

Further information on this matter may be obtained by contacting the Engineering Department at 651-5915.

John Boland
Planning & Control Technician
Town of Gander
100 Elizabeth Drive
Gander, NL
A1V 1G7

SNOW CLEARING NOTICE

Posted: November 14, 2016

The Town of Gander advises that winter parking restrictions are in effect from Nov. 1, 2016, up to and including April 30, 2017.

During this time, no vehicle shall be parked on any street between midnight and 8 a.m., regardless of weather conditions, nor may any vehicle be
parked such as to impede or interfere with snow clearing operations at any time of the day or night, at any time of the year.

Citizens are also reminded that it is illegal to throw, sweep, shovel or place snow or ice from any private property upon any Town street or sidewalk, or such that it obstructs access to fire hydrants.

Snow clearing regulations include Sections 23-26 of Town of Gander Traffic Regulations, which are available for inspection at Town Hall or in PDF format
on the Town's official website at www.gandercanada.com, in the 'Residents' section under 'Protection Services'

The Town thanks residents for their patience and cooperation in keeping our streets and sidewalks clear and safe throughout the year.

Additional links: **http://www.gandercanada.com/index.php/residents/public-works/snow-clearing**.

SUMMARY OF CHANGES – GARBAGE AND REFUSE REGULATIONS

Posted: November 10, 2016

Residents are advised that the following changes to the Garbage and Refuse Regulations are now in effect:

• Garbage shall be covered at all times throughout the year to prevent birds accessing garbage.

• There will no longer be a collection of garden waste (leaves & grass) during special clean-up week. Residents may access the compost facility at 34 McCurdy Drive for the disposal of garden waste at any time.

• C & D material must have nails removed or bent into wood when placed for collection during spring clean-up.

• Material must be sorted when placed for collection during special clean-up week

BOARDWALK OPEN

Updated: September 16, 2016

The Town of Gander is advising the public that the Cobb's Pond Rotary Park boardwalk has been reopened.

Thank you for your patience while this work was being completed.

Please use caution when using the Boardwalk.

For more information please contact the Recreation Dept at 709-651-5927.

WASTE TRANSFER STATION

Updated: December 22, 2016

The Town of Gander waste transfer station on McCurdy Drive will be accepting refuse on selected Saturdays only, year-round, from 8 a.m. to 4 p.m.

Residents are encouraged to use this facility for all household debris and surplus items that cannot otherwise be reused, re-purposed or recycled. Click **here** for transfer station drop-off fees in PDF format.

The next dates the waste transfer station will accept materials during 2017 are:

January 7
February 4
March 4
April 1, 15 & 29
May 27
June 10 & 24
July 8 &22
August 12 & 26
September 9 & 23
October 14 & 28
November 4 & 25
December 16

TREE & PARK BENCH MEMORIAL PROGRAM

Updated: August 2016

The Town of Gander, in conjunction with the Civic Enhancement Committee, has adopted a Memorial Park Bench and Tree Placement Program for public and business participation.

The program provides the opportunity to purchase a tree and/or bench for many occasions, i.e., in memory of a loved one, in honour of a dedicated service member, family celebrations, etc. This program is tax deductible.

For more information, please contact the Town of Gander at 651-5927 or email **recreation@gandercanada.com** . The program will serve as a remembrance to many people for years to come.

GARBAGE REGULATIONS & SCHEDULES

Updated: August 2016

The Town of Gander reminds residents that Garbage and Refuse Regulations require that household garbage be placed at the concrete curb no earlier than 6 a.m. and no later than 8 a.m. on your scheduled collection day. Household waste must be separated into two streams, with all recyclables placed in transparent blue bags and non-recyclable waste in transparent clear bags.

Note: All garbage placed for collection shall be covered by metal or plastic container, netting or blanket from April 1st to November 30th every year.

A limit of six (6) bags per household will be accepted on each scheduled collection day. Empty containers and any garbage/refuse not collected under these regulations must be removed from the curb before 8:30 p.m. the same day.

Please heed the following guidelines for safe disposal of hazardous items:

• Needles must be in a container such as steel or heavy plastic that will prevent accidental puncture to those collecting it.

• Broken glass should be placed in a separate container and marked as such.

• Hot coals/ashes must not be put out for collection.

Complete Garbage and Refuse Regulations, along with the regular collection schedule, may be found by clicking **here**, or by calling the Public Works Depot at 709-651-5938.

For questions on proper sorting of household waste, contact Central Newfoundland Waste Management by telephone at 709-653-2900 or by emailing **info@cnwmc.com** .

Thursday, March 30th 2017 | 9:19:am

PUBLIC MEETING

Information Session for the New Proposed Wastewater Treatment Facility

Tuesday March 28th, 2017 at 7:00 p.m.

Attendees

Name	Address	Email
Tara Pollett	112 Memorial Dr.	tarapollett@gmail.com.
REG HEDGES	28 SOLBERG	reg.hodges@dng.nf.ca
JERRY PARSONS	229 MAGEE	tparsons@dng.nf.CA
Sid Small	201 Bondal	bevandsid@hotmail.com
BARRY THOMSON	93 EDINBURGH.	B.THOMSON@CBLOK.CA
Eric Cook	St Phillips	cook@abydoz.com
T. BARRAN	105 PEILWELL	
Jackie Watkins	Gander	jackiewatkins@gov.nl.ca
W Baird	8A Memorial	billbaird4r@gmail.com
Doyle White	15 Hamell St.	dwhitt@gandercanada.com
Gayle Whitt	15 Hamell St	gayle-w@hotmail.com

CBCL LIMITED
Consulting Engineers

187 Kenmount Road
ICON Building
St. John's, NL
Canada A1B 3P9

Telephone: 709 364 8623
Fax: 709 364 8627
E-mail: info@cbcl.ca
URL: http://www.cbcl.ca

MINUTES

TAKEN BY	M Rutherford	**PROJECT NO:**	173020.00	**DATE**	03/28/2017
MINUTES OF	Town of Gander - Wastewater Treatment Plant (WWTP) Environmental Assessment Open House / Public Meeting: 7:00pm - 9:00 pm				
PROJECT NAME	Gander WWTF	**SUBJECT**	#01		
ATTENDING	James Blackwood, Director of Engineering, Town of Gander Stephen Mathews, Project Manager, Colliers Greg Sheppard, Project Manager, CBCL Limited Melissa Rutherford, Environmental Scientist, CBCL Limited Also see list of Attendees				
ABSENT	N/A				
COPIES TO	Town of Gander				

7:00 – Introductions by Town Council (Cyril Abbott, Deputy Mayor)

James Blackwood, Director of Engineering, Town of Gander
Stephen Mathews, Project Manager, Colliers
Greg Sheppard, Project Manager, CBCL Limited
Melissa Rutherford, Environmental Scientist, CBCL Limited

7:02 – Introduction of Project (Greg Sheppard)

CBCL started with the project in 2014.
Project delivery methodology is Design-Build.
Preliminary engineering was completed in early 2015.
Eight design-build teams responded to a Request for Quotations (similar to an Expression of Interest) which was issued in 2015. Four teams were short-listed and will be invited to respond to a Request for Proposals. Teams will be evaluated using various criteria; parameters may include: technology, price, and schedule.

7:05 – Introduction to the Environmental Assessment Process (Melissa Rutherford)

Project is required to be registered as an undertaking under Environmental Protection Act and the Environmental Assessment Regulations.
The Registration Document will be submitted to Newfoundland and Labrador Department of Municipal Affairs and Environment (MAE).
The Minister will have 45 days to review and provide comment on the Registration Document. MAE will post notice of their decision within 10 days of the 45 after registration.
After submission, MAE will have 7 days to publish the notice and the public will have 35 days to provide comment after the notice is published.
The Registration Document will include the information as required by the Environmental Assessment Regulations and includes information such as the description of the project, environmental background, employment , schedule, and funding.

The Registration Document will include information for that important to the community, for example environmental components and human activities. This forum allows for us to include specific things that are important to the community that cannot be completed via desktop reviews.

7:15 – Questions

The floor was open for question: Specific Question were not recorded. Question themes and summarized responses are presented in Table 1.

8:10 – Meeting closed by Council

Table 1 Question Themes and Responses

Theme	Topic	Response
Environmental Assessment Process	Environmental Assessment Timeline	The Minister has 45 days to review the registration document and 10 days to post the decision after the 45 days.
	How will the Registration Document be submitted in absence of the final process technology?	CBCL has been in discussions with MAE regarding this issue; the Registration Document will be submitted outlining the potential technology processes at a high level.
Project	Process Detail	The WWTP will use either land-based or mechanical processes. The technology will be decided on during the design-build contractor selection process.
	How does the Environmental Assessment impact the overall project schedule?	Construction activities will not be able to occur until after the undertaking is released from the Environmental Assessment process and other permits have been obtained.
	How was the location selected?	Site selection was based on the need to be outside of the Gander Lake watershed, the need to be close to existing treatment plants, and the need to reserve adequate space for future land development.
	What buffer will be around the proposed WWTP?	The buffer is 100 metres.
	How far is the project from the development areas?	The proposed site is located ~ 2 km East of Cooper Blvd.
	Has the location been selected based on allowing adequate space for future development?	Yes, this was considered in consultation with the town.

Theme	Topic	Response
	How will the location of the trunk sewer be selected?	The trunk sewer alignment will be selected as to minimize effects to potential development areas and current rights-of-way.
Environmental Concerns	Have studies been complete to determine how the project will affect Jonathon's Pond?	Specific studies have not been completed on Jonathon's Pond. The effluent to be discharged to Whitman's pond will be improved over the current discharged effluent from the Magee Road WWTP.
	Will snowmobile trails be impacted; one trail might intersect the trunk sewer and road alignment?	Access along the access road may be restricted. Snowmobile crossings can be marked along the road alignment. Impacts are not expected.
	There may be an unregistered winter cabin on Whitman's pond.	The comment was noted by CBCL; no impacts expected for cabin use if present.