REPORT

Geotechnical Review of Selected Sites

City of Windsor Sewer Master Plan, Windsor, Ontario

Submitted to:

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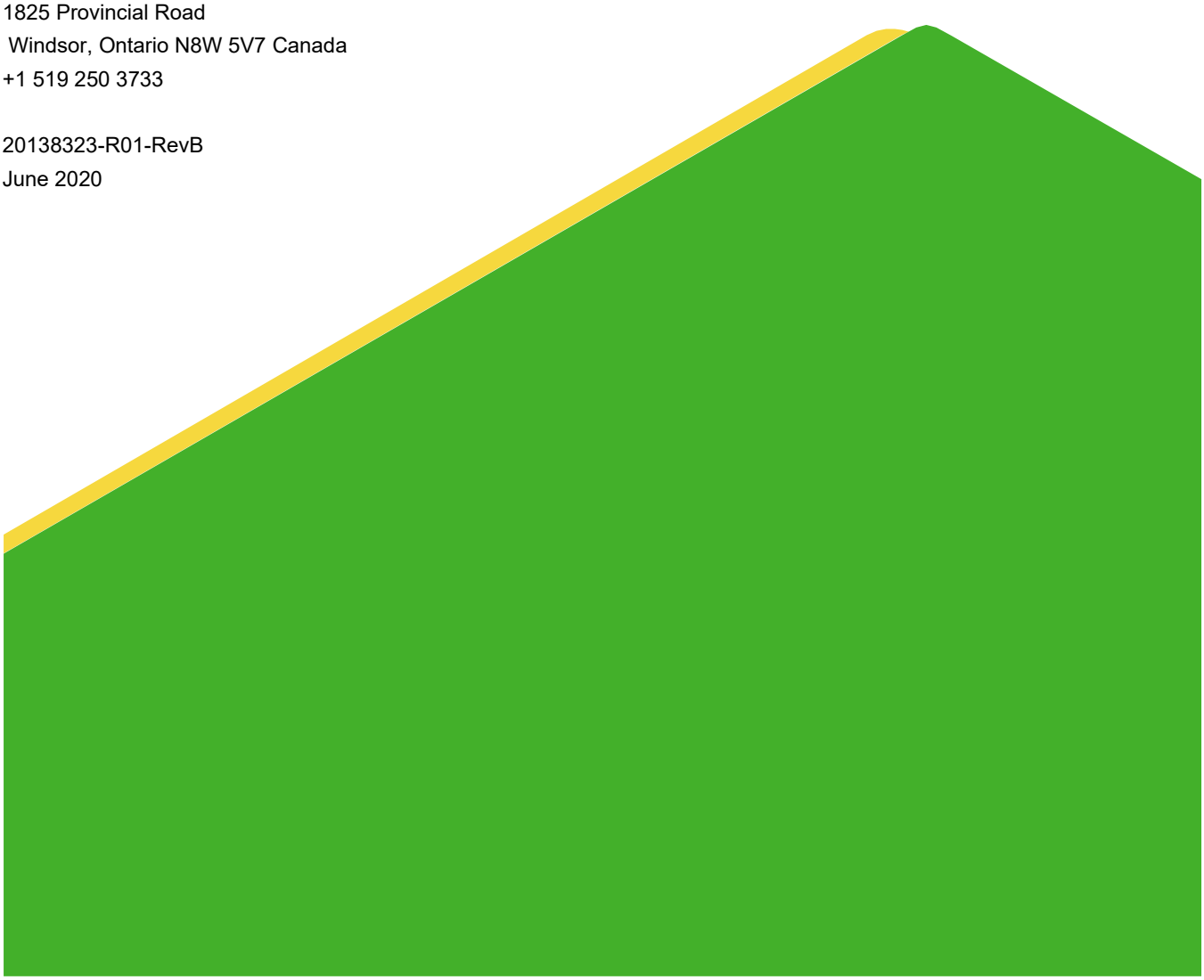

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APPENDICES

1.0 INTRODUCTION

This report provides the results of a geotechnical assessment carried out to support the functional design being carried out by Dillon Consulting Limited (Dillon) for the City of Windsor Sewer Master Plan. As part of the functional design process, Dillon has requested that Golder carry out a geotechnical desktop review of several sites for proposed surcharge surface storage ponds, underground storage facilities, sewer outfalls, and pumping stations. It is understood that low impact development (LID) solutions such as exfiltration trenches are being considered for some of these locations.

The purpose of this geotechnical desktop review was to evaluate the subsurface soil and groundwater conditions, outline the general geotechnical conditions and delineate potential areas of geotechnical opportunities and constraints for the various project improvement areas consistent with the level of detailed required for functional design. These include comments on the geotechnical aspects of:

- anticipated subsurface groundwater conditions;
- anticipated soil conditions as they pertain to the functional design of surface storage ponds, underground storage facilities, sewer outfalls, pumping stations, and LID solutions;
- other potential geotechnical issues, as applicable; and
- recommended geotechnical explorations for the detailed design phase.

Authorization to proceed with the geotechnical desktop review, in accordance with our February 14, 2020 proposal, was provided by Mr. Flavio Forest, P.Eng. of Dillon via a work order dated February 24, 2020.

This report should be read in conjunction with the attached document “Important Information and Limitations of this Report”, which comprises an integral component hereof. The reader’s attention is specifically drawn to this material, as it is essential for proper use and interpretation of the information presented and discussed herein.

2.0 BACKGROUND

Golder Associates Ltd. (“Golder”) has previously carried out investigations in the general vicinity of several of the project improvement areas. The results of the previous geotechnical work were provided in the following reports:

- Golder Report No. 71509 titled “Subsurface Investigation, Proposed R.C.M.P. Detachment Building, Riverside Drive, Windsor, Ontario”, dated March 1971;
- Golder Report No. 764111 titled “Preliminary Geotechnical Investigation, Proposed Prince Road Storm Sewer, Windsor, Ontario”, dated November 1976;
- Golder Report No. 791-4012 titled “Subsurface Investigation, Proposed External Sanitary Services Interim Works, Walker Farms Industrial Park, Windsor, Ontario”, dated March 1979;
- Golder Report No. 991-4120 titled “Geotechnical Investigation, Proposed New Warehouse Building”, dated June 1999;
- Golder Report No. 001-4009 titled “Subsurface Investigation, Windsor Riverfront Lands, Moy Avenue and Langlois Avenue, Windsor, Ontario”, dated February 2000;
- Golder Report No. 001-4014 titled “Preliminary Geotechnical Investigation, Proposed 4-Storey Development, Existing Riverfront Property, 9150 Riverside Drive, Windsor, Ontario”, dated February 2000;

- Golder Report No. 001-4067 titled “Geotechnical Investigation, Rotary Gazebo, Lakeview Marina, Windsor, Ontario”, dated April 2000;
- Golder Report No. 001-4238 titled “Geotechnical Investigation, Proposed Rose City Ford Auto Dealership, Forest Glade Drive Area, Windsor, Ontario”, dated October 2000;
- Golder Report No. 001-4247 titled “Geotechnical Investigation, Proposed Beachview Villas, Townhouse Development, 10039/10049 Riverside Drive East, Windsor, Ontario”, dated October 2000;
- Golder Report No. 011-4128 titled “Geotechnical Investigation, Proposed Addition, St. Rose Elementary School, St. Rose Avenue, Windsor, Ontario”, dated June 12, 2001;
- Golder Letter No. 011-4136 titled “Riverfront Interceptor Project”, dated July 6, 2001;
- Golder Report No. 011-4205 titled “Geotechnical Investigation, Riverside Drive Interceptor Sewer Extension, Albert Road to George Avenue, Windsor, Ontario”, dated September 19, 2001;
- Golder Report No. 011-4226 titled “Geotechnical Investigation, Proposed Addition, Lajeunesse Ecole Catholique, Bruce Avenue, Windsor, Ontario”, dated October 17, 2001;
- Golder Report No. 011-4276 titled “Geotechnical Investigation, Proposed Condominium Structure, Wyandotte Street East, City of Windsor, Ontario”, dated January 3, 2002;
- Golder Report No. 021-4035 titled “Geotechnical Investigation, Grand Marais Drain Re-Alignment, Windsor, Ontario”, dated June 10, 2002;
- Golder Report No. 031-140060 titled “Geotechnical Investigation, Ypres Boulevard Trunk Sanitary Sewer, Turner Road to Gladstone Avenue, Windsor, Ontario”, dated April 29, 2003;
- Golder Report No. 031-140094 titled “Geotechnical Investigation, Proposed Classroom, Parking Lot and Athletic Track Addition, Lassaline School, Windsor, Ontario”, dated June 2, 2003;
- Golder Draft Report No. 031-145072 titled “Phase II Environmental Site Assessment, Riverfront Property, Southwest Corner of Mill Street and Russell Street, Windsor, Ontario”, dated June 17, 2003;
- Golder Report No. 031-140333 titled “Geotechnical Investigation, Proposed Bridge Over Little River, Wyandotte Street East Extension, City of Windsor, Ontario”, dated February 27, 2004;
- Golder Report No. 06-1140-020 titled “Geotechnical Investigation, Tecumseh Road East Improvements from Canadian National Railway East of Jefferson Boulevard to Lauzon Parkway, Windsor, Ontario”, dated June 16, 2006;
- Golder Report No. 06-1140-006 titled “Geotechnical Investigation, Walker-Wyandotte Intersection Improvements, Windsor, Ontario”, dated July 4, 2006;
- Golder Report No. 041-140048 titled “Foundation Investigation Report, Walker Road Grade Separation Project, Windsor, Ontario”, dated December 6, 2006;
- Golder Report No. 06-1140-142 titled “Geotechnical Investigation, Proposed Building Addition and New Material Recovery Facility, Central Avenue Transfer Station, Windsor, Ontario”, dated August 31, 2006;

- Golder Report No. 07-1140-0022 titled “Geotechnical Investigation, Sewer Replacement and Road Reconstruction, Lincoln Road, Memorial Avenue to Ypres Boulevard, Windsor, Ontario”, dated March 23, 2007;
- Golder Report No. 07-1140-0027 titled “Geotechnical Investigation, Riverside Drive Barrier Landform, Windsor, Ontario”, dated March 26, 2007;
- Golder Letter No. 07-1140-0098 titled “Factual Geotechnical Investigation, Proposed Sewer Upgrading and Road Reconstruction, Prado Place, Riverside Drive to Wyandotte Street, Windsor, Ontario”, dated July 4, 2007;
- Golder Report No. 08-1140-W028 titled “Geotechnical Investigation, Grand Marais Drain Improvements, Phase I, Windsor, Ontario”, dated May 12, 2008;
- Golder Report No. 08-1140-W054 titled “Geotechnical Investigation, Proposed Trunk Storm Sewer and Road Reconstruction, Parent Avenue and Lens Avenue, City of Windsor, Ontario”, dated June 4, 2008;
- Golder Report No. 09-1140-W011 titled “Geotechnical Investigation, Grand Marais Drain Improvements, Phase II, Windsor, Ontario”, dated March 11, 2009;
- Golder Report No. 09-1140-W091B-R01 titled “Geotechnical Investigation, Sandwich South Trunk Sanitary Sewer, Peppervine Street to Little River Pollution Control Plant, Windsor, Ontario”, dated October 2009;
- Golder Report No. 09-1140-W037 titled “Supplemental Geotechnical Investigation, Highway 401 Undercrossing, Proposed Steel Casing, Trunk Sanitary Sewer, North Talbot Road, Town of Tecumseh, Ontario”, dated December 2009;
- Golder Report No. 09-1140-W025-R01 titled “Geotechnical Design Report, Prince Road Storm Sewer Outlet, Prince Road Sewer, Phase 9, Outlet to Detroit River, City of Windsor, Ontario”, dated May 2010;
- Golder Report No. 09-1140-W025 Ph2000 R01 titled “Supplementary Geotechnical Investigation, Storm Sewer Outlet, Prince Road Sewer, Phase 9B, City of Windsor, Ontario”, dated June 2011;
- Golder Report 09-1140-W028 titled “Geotechnical Investigation, Proposed Wyandotte Street Extension, Florence Avenue to Bellagio Drive, Windsor, Ontario”, dated April 7, 2009;
- Golder Letter No. 10-1140-0090 PH1000-L02 titled “Supplementary Geotechnical Investigation, Retention Treatment Basin (RTB) Facility, Contract No. 1B, Tender 34-10, City of Windsor, Ontario”, dated July 6, 2010;
- Golder Report No. 11-1140-0200-R01 titled “Geotechnical Investigation, Parking Lot Reconstruction, St. Francis School, Windsor, Ontario”, dated March 2012;
- Golder Report No. 13-1140-0026-R01 titled “Geotechnical Investigation, Proposed Road Reconstruction, Fairview Boulevard, Wyandotte Street East to St. Rose Avenue, Windsor, Ontario”, dated March 2013;
- Golder Report No. 13-1140-0031-R01 titled “Geotechnical Investigation, Proposed Building Addition, St. John Vianney Catholic Elementary School, 8405 Cedarview Street, Windsor, Ontario”, dated March 2013;
- Golder Report No. 13-1140-0207-R01 titled “Geotechnical Investigation, Proposed Utility Installation and Road Reconstruction, Outer Drive, Moro Drive and Burke Street, Town of Tecumseh, Ontario”, dated December 2013;

- Golder Report No. 1400977-R01 titled “Geotechnical Investigation, Abars on the River, Proposed Building and Parking Lot, Windsor, Ontario”, dated April 2014;
- Golder Report No. 13-1140-0188-R01 titled “Geotechnical Investigation, Proposed Electrical Buildings, Elm Avenue and Dougall Avenue, CSO Interceptor Chambers, Windsor, Ontario”, dated May 2014;
- Golder Report No. 1405019-R01 titled “Subsurface Investigation, Banwell Road and McHugh Street, Windsor, Ontario”, dated October 2014;
- Golder Report No. 1405768-R01 titled “Geotechnical Investigation and Environmental Sampling, Roberts Pond Decommissioning and Storm Sewer Installation, City of Windsor, Ontario”, dated July 2014;
- Golder Report No. 1406552-R01 titled “Geotechnical Investigation, Proposed 4 Storey Apartment Building and 2 Storey Townhouse, 8475 Wyandotte Street East, Windsor, Ontario”, dated July 2014;
- Golder Report No. 1520407-2000-R03 titled “Supplemental Phase II Environmental Site Assessment, 75 Mill Street, Windsor, Ontario”, dated August 2015;
- Golder Report No. 1527635-1000-R01 titled “Preliminary Geotechnical and Hydrogeological Investigation, Parts of Lots 119 to 121, Concession 1, Geographic Township of Sandwich East, Windsor, Ontario”, dated May 2015;
- Golder Report No. 1546452-R01 titled “Geotechnical Investigation, Proposed EMS Station Reconstruction, 2620 Dougall Avenue, Windsor, Ontario”, dated May 2016;
- Golder Report No. 1660023-3000-R01 titled “Geotechnical Exploration, Proposed New Sandwich Library, 363 Mill Street, Windsor, Ontario”, dated December 2016; and
- Golder Report No. 1668632-R01 titled “Geotechnical Exploration, Proposed Multi-Use Trail Underpass, CN Railway at Dougall Avenue, Windsor, Ontario”, dated August 2017.

Relevant Record of Borehole and Test Pit Sheets from the above-listed Golder reports are attached in Appendix A and the approximate borehole and test pit locations are shown on Figures 2 to 20.

Relevant Ontario Ministry of the Environment, Conservation and Parks (MECP) well records are attached in Appendix B and the approximate well locations are shown on Figure 6. Well records were referenced where previous geotechnical exploration data was not available near the project area.

3.0 METHODOLOGY

The preliminary geotechnical assessment consisted of assembling and reviewing information from the following sources:

- topographic mapping;
- surficial soil and bedrock geological mapping;
- MECP well records; and
- existing Golder or publicly available geotechnical data for the improvement areas.

No new boreholes were drilled for this geotechnical assessment and it understood that intrusive exploration activities will be deferred to the detailed design phase. The available information referenced above was used to prepare this desktop geotechnical assessment report.

4.0 SITE DESCRIPTION

The subject sites are located throughout the City of Windsor. Based on the information provided by Dillon, geotechnical review has been requested for the following locations:

- Dougall Avenue Underpass New Surcharge Surface Storage Pond – New surcharge surface storage pond on vacant land south of Northwood Street, will have 26,800 cubic metres (m^3) of storage, a surface area of 15,000 square metres (m^2), and a maximum depth of 4 metres (m);
- Howard Avenue at E.C. Row Expressway New Surcharge Surface Storage Pond – New surcharge surface storage pond on land with existing building that will be removed, located at the north west corner of the Howard Avenue underpass at E.C. Row Expressway. The proposed pond will have 2,433 m^3 of storage, a surface area of 3,500 m^2, and a maximum depth of 3 to 4 m;
- Central Avenue, Pillette Road Expanded Central Pond – Expansion of Central pond to 105,300 m^3 of storage on vacant lands having a surface area of 40,000 m^2, and a maximum depth of between 4 to 5 m;
- Chrysler Center New Underground Surcharge Storage – New below grade surcharge storage with 11,000 m^3 of storage under the existing Chrysler parking lot, with open bottomed storage chambers to permit infiltration. The parking lot is to be reinstated following construction. A footprint of 13,200 m^2 and depth of 3 m are planned;
- Southwood Lakes Lowered Normal Water Level in Existing Ponds – Lowering of normal pond water levels by increasing depth of Lake Como, Lake Grande, and Lake Laguna by approximately 0.2 m, 0.5 m, and 0.5 m, respectively. The depth of the existing ponds will vary between 4.5 m and 7 m;
- Detroit Street Trunk Sewer Upgrade – Upgrade of 300-m length of existing 900-millimetre (mm) diameter storm outfall to Detroit River with 1,200-mm diameter storm sewer;
- Cameron Avenue Trunk Sewer Upgrade – New 2,700-mm diameter storm outfall to Detroit River with 2,400-mm by 3,300-mm box culvert;
- Bruce Avenue Trunk Sewer – New 3,600-mm diameter storm outfall to Detroit River;
- Marentette Avenue Trunk Sewer – New outfall to Detroit River with 1,800-mm diameter storm sewer at Marentette Avenue;
- Albert Road Trunk Sewer– New 1,650-mm diameter trunk sewer over a 350 m length. Existing 450-mm diameter to 600-mm diameter sewers to be replaced with new 450-mm and 750-mm diameter sewers over a 190 m length along Wyandotte Street East. A new outfall pipe will be constructed at Albert Road and the Detroit River;
- Droulliard Underpass Pump Station – New pump station within Cadillac Street Park, located north east of the Drouillard Road underpass at Wyandotte Street East. Upgrade 270 m of downstream sewer with 825-mm diameter sewer;

- Pontiac Pump Station – A new wet well pump station to be constructed directly adjacent to the existing Pontiac pump station with 2 new pumps having a 1.25 and 1.8 cubic metre per second (m^3/s) capacity, 7.3 m depth;
- St. Rose Pump Station – New St. Rose pump station having a proposed capacity of 11 m^3/s, and a depth of 11.5 m;
- St. Paul Pump Station - New St. Paul pump station having a proposed capacity of 15 m^3/s, and a depth of 13 m;
- Lakeview Pumping Station Capacity Increase – Lakeview pump station capacity increase from 0.7 m^3/s to 1.4 m^3/s by constructing a new pump station adjacent to the existing Lakeview pump station, with pump station depth of 10 m, outfall pipe size increase, and new outlet at Blue Heron Pond;
- Brumpton Park –New underground stormwater management facility at the southwest area of Brumpton Park. The underground facility will have a bottom elevation of 173.80 m measuring approximately 40 m by 100 m in plan with a storage volume capacity of 4,725 m^3;
- Hawthorne Avenue, Lauzon Parkway, Jefferson Boulevard Offline Storage Volumes/Improvements – New Lauzon golf course storm water management pond volume is 30,000 m^3, surface area of 25,000 m^2 and depth of 4 to 5 m, new Meadowbrook Park underground storage facility volume is 10,000 m^3, surface area of 2,200 m^2 with a depth of 3.5 m. Road regrading and low impact development (LID) swales are planned for Lauzon Parkway between Cantelon Avenue and Hawthorne Avenue;
- Wyandotte Street East, west of Little River, off-line storage – Two new off-line underground stormwater management facilities having capacities of 8,000 m^3 and 3,000 m^3, surface areas of 5,400 m^2 and 1,400 m^2 ,respectively, and depths of about 3 m;
- Roseville Garden Drive and Hawthorn Avenue/Kew Drive Underground Stormwater Detention System Improvements – New underground surcharge storage of 28,000 m^3 having a footprint of 21,850 m^2 and depth of 5 m and open bottomed storage chambers to permit infiltration;
- Ypres Avenue Underground Storage System – New below grade surcharge storage of 3,000 m^3 under the existing Optimist Memorial Park parking lot. A footprint of 3,360 m^2 and depth of about 3 m are planned;
- Prince Road outlet at Chappelle/Sandwich St. – This solution includes approximately 200 m of new storm sewer to the 2,700-mm diameter outlet to McKee Creek; and
- Proposed Earth Berm Along Riverside Drive between approximately Ford Boulevard and the east City Limits. The preferred solution is to construct the landform barrier crest to elevation 176.5 m. Existing property grading that meets or exceeds the target elevation will be utilized to limit the required new berm construction. Areas not meeting the target elevation will require new landform barriers to be constructed and localized improvements/grade alterations for areas of trail and road crossings.

It is understood that LID solutions such as exfiltration trenches are being considered for some of the project locations.

5.0 SUBSURFACE CONDITIONS DISCUSSION FOR PROJECT LOCATIONS

The subsurface conditions encountered in the previous boreholes and test pits within the general vicinity of the proposed project locations are detailed on the attached Record of Borehole and Record of Test Pit sheets in Appendix A, and MECP Well Records in Appendix B.

The soil boundaries indicated are inferred from non-continuous samples and observations of drilling and sampling resistance and typically represent transitions from one soil type to another rather than exact planes of geological change. Further, subsurface conditions may vary significantly between and beyond the borehole and test pit locations. It should be noted that the subsurface soil and groundwater conditions discussed in this report are based on previous boreholes and test pits from investigations dated as early as 1971 and may have been altered by subsequent development and infrastructure construction.

5.1 Dougall Underpass New Surcharge Surface Storage Pond

The proposed Dougall Avenue underpass surcharge surface storage pond will be located on vacant land south of Northwood Street. The pond will have a storage capacity of 26,800 m^3, a surface area of 15,000 m^2, side slope inclinations of 4 horizontal to 1 vertical, and a depth of 4 m. The pond location is shown on Figure 2.

5.1.1 Suburface Soil and Groundwater Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the vicinity of the storage pond encountered native soils generally consisting of silty clay below surficial organic soils (topsoil) and fill. To the west of the pond, one borehole encountered a surficial deposit of silty sand overlying the silty clay. A measurement carried out for one groundwater monitoring well installed to the west of the pond location, where the surficial silty sand was encountered, indicated a groundwater level about 0.8 m below ground surface. This may indicate a perched groundwater level where surficial granular soils are present overlying the lower permeability cohesive materials. In general, the borehole logs indicate that the boreholes in this area remained dry during drilling.

5.1.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pond will be approximately 4 m in depth, with side slopes having an inclination of 4 horizontal to 1 vertical. Pond side slopes having an inclination of 4 horizontal to 1 vertical are not anticipated to be problematic and can be used for functional design purposes for ponds excavated into the native soils in this area. In areas proposed for equipment access for periodic maintenance, an inclination of 6 horizontal to 1 vertical or flatter should be considered.

Erosion protection should be provided around the perimeter of the surcharge storage pond at the elevation of the normal operating level. The form of erosion protection should match with the requirements of aquatic vegetation to be planted and developed. Consideration could be given to protecting the active water line zone (i.e., from the low-water level to the high-water level) with a minimum 150-mm thick layer of Ontario Provincial Standard Specification (OPSS).PROV 1004 (Aggregates) R-10 rip-rap, constructed in accordance with OPSS 150 (Rip-Rap, Rock Protection); however, this may not be necessary if appropriate vegetation can be established in this zone. The pond slopes above the operating water level should be vegetated as soon as practical after construction to address the potential for erosion due to surface water run-off. Care should be taken to ensure filter compatibility between the native soils and any imported granular materials.

Care should be taken to minimize construction traffic on the base of the pond following excavation and inspection to limit the generation of fines that will go into suspension when the pond is filled. Rip-rap should be provided over the full extent of the side slopes and base below and adjacent to the sewer inlet/outlet locations.

All excavations for the surcharge surface storage pond should be carried out in accordance with the current Ontario Occupational Health & Safety Act (OHSA, the Act) criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

Based on the subsurface conditions anticipated for the project area, headwalls associated with the stormwater management pond may be founded on the native soils at a minimum depth of 1.2 m below finished grade. The geotechnical resistance/reaction used for the design of headwall foundations should be confirmed in the detailed design phase.

5.1.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the surcharge surface storage pond. Geotechnical explorations for the pond should consist of a minimum of 4 soil borings advanced within the stormwater pond footprint, extending a minimum of 1.5 m below the pond bottom elevation.

Following the completion of the exploration and testing program, the recommendations in this report may be revised based on the new information.

5.2 Howard at E.C. Row New Surcharge Surface Storage Pond

The proposed new surcharge surface storage pond at the north west corner of the Howard Avenue underpass at E.C. Row Expressway will be located on the land currently occupied by a commercial building which will be removed. The pond will have a storage capacity of 2,433 m^3, a surface area of 3,500 m^2, side slope inclinations of 4 horizontal to 1 vertical, and a depth of 3 to 4 m. The pond location is shown on Figure 3.

5.2.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the storage pond encountered native soils generally consisting of silty clay below surficial organic soils (topsoil) and fill. One groundwater monitoring well installed to the east of the pond location indicated a groundwater level about 0.9 m below ground surface (see applicable Record of Borehole sheets). This may indicate a perched groundwater level where surficial granular soils are present overlying the lower permeability cohesive materials. In general, the borehole logs indicate that the boreholes in this area encountered groundwater seepage following drilling.

5.2.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pond will be approximately 3 to 4 m in depth, with side slopes having an inclination of 4 horizontal to 1 vertical. Pond side slopes having an inclination of 4 horizontal to 1 vertical are not anticipated to be problematic and can be used for functional design purposes for ponds excavated into the native soils in this area. In areas proposed for equipment access for periodic maintenance, an inclination of 6 horizontal to 1 vertical or flatter should be considered.

Erosion protection should be provided around the perimeter of the surcharge storage pond at the elevation of the normal operating level. The form of erosion protection should match with the requirements of aquatic vegetation to be planted and developed. Consideration could be given to protecting the active water line zone (i.e., from the low-water level to the high-water level) with a minimum 150-mm thick layer of OPSS.PROV 1004 (Aggregates) R-10 rip-rap, constructed in accordance with OPSS 150 (Rip-Rap, Rock Protection); however, this may not be necessary if appropriate vegetation can be established in this zone. The pond slopes above the operating water level should be vegetated as soon as practical after construction to address the potential for erosion due to surface water run-off. Care should be taken to ensure filter compatibility between the native soils and any imported granular materials.

Care should be taken to minimize construction traffic on the base of the pond following excavation and inspection to limit the generation of fines that will go into suspension when the pond is filled. Rip-rap should be provided over the full extent of the side slopes and base below and adjacent to the sewer inlet/outlet locations.

It is anticipated that the existing building, foundations, and surrounding pavement structures will be fully removed from within the pond footprint. All excavations for the surcharge surface storage pond should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that

might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

Based on the subsurface conditions anticipated for the project area, headwalls associated with the stormwater management pond may be founded on the native soils at a minimum depth of 1.2 m below finished grade. The geotechnical resistance/reaction used for the design of headwall foundations should be confirmed in the detailed design phase.

5.2.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the surcharge surface storage pond. Geotechnical explorations for the pond should consist of a minimum of 2 soil borings advanced within the stormwater pond footprint, extending a minimum of 1.5 m below the pond bottom elevation.

Following the completion of the exploration and testing program, the recommendations in this report may be revised based on the new information.

5.3 Central Avenue, Pillette Road Expanded Central Pond

The existing Central Avenue and Pillette Road pond is proposed to be expanded to have a storage capacity of 105,300 m^3, a surface area of 40,000 m^2, side slope inclinations of 6 horizontal to 1 vertical and existing side slope inclinations, and a maximum depth of between 4 and 5 m. The pond location is shown on Figure 4.

5.3.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the storage pond encountered native soils generally consisting of clayey silt, sand, and silty sand, underlain by an extensive deposit of silty clay. The native soils were encountered below surficial organic soils (topsoil), fill, and silty sand (where present). Groundwater monitoring wells installed in previous boreholes west of the pond had measured groundwater levels between about 2.8 m and 3 m below ground surface. A monitoring well south of the pond location had a recorded water level about 0.9 m below ground surface. In general, the borehole logs indicate that the boreholes were dry upon completion of drilling.

5.3.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pond will be approximately 4 to 5 m in depth, with side slopes having an inclination of 6 horizontal to 1 vertical. Pond side slopes having an inclination of 6 horizontal to 1 vertical are not anticipated to be problematic and can be used for functional design purposes for ponds excavated into the native soils in this area, and would be suitable for equipment access for periodic maintenance.

Erosion protection should be provided around the perimeter of the surcharge storage pond at the elevation of the normal operating level. The form of erosion protection should match with the requirements of aquatic vegetation to be planted and developed. Consideration could be given to protecting the active water line zone (i.e., from the low-water level to the high-water level) with a minimum 150-mm thick layer of OPSS.PROV 1004 (Aggregates) R-10 rip-rap, constructed in accordance with OPSS 150 (Rip-Rap, Rock Protection); however, this may not be necessary if appropriate vegetation can be established in this zone. The pond slopes above the operating water level should be vegetated as soon as practical after construction to address the potential for erosion due to surface water run-off. Care should be taken to ensure filter compatibility between the native soils and any imported granular materials.

Care should be taken to minimize construction traffic on the base of the pond following excavation and inspection to limit the generation of fines that will go into suspension when the pond is filled. Rip-rap should be provided over the full extent of the side slopes and base below and adjacent to the sewer inlet/outlet locations.

All excavations for the surcharge surface storage pond should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any to firm silty clay/clayey silt and loose to compact sand encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay/clayey silt materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

Based on the subsurface conditions anticipated for the project area, headwalls associated with the stormwater management pond may be founded on the native soils at a minimum depth of 1.2 m below finished grade. The geotechnical resistance/reaction used for the design of headwall foundations should be confirmed in the detailed design phase.

5.3.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the expanded central pond. Geotechnical explorations for the pond should consist of a minimum of 6 soil borings advanced within the stormwater pond footprint, extending a minimum of 1.5 m below the pond bottom elevation.

Following the completion of the exploration and testing program, the recommendations in this report may be revised based on the new information.

5.4 Chrysler Centre New Underground Surcharge Storage

The proposed Chrysler Center underground surcharge storage will consist of a 11,000 m^3 capacity tank under the existing Chrysler parking lot, with the possibility of having open bottomed storage chambers to permit infiltration. The parking lot will be reinstated following construction. The proposed tank will have a footprint of 13,200 m^2 and a depth of 3 m. The storage tank location is shown on Figure 5.

5.4.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the proposed underground surcharge storage tank encountered native soils generally consisting of silty clay/clayey silt, with occasional sand layers, below surficial organic soils (topsoil) and fill (where present). Many of the boreholes advanced within the area encountered groundwater seepage. Where encountered, water levels recorded in boreholes upon completion of drilling and in installed monitoring wells ranged between about 1.2 m and 16.5 m below ground surface (see Record of Borehole sheets for details).

5.4.2 Discussion on Geotechnical Aspects of Functional Design

It understood that the storage chamber planned in the Chrysler Centre parking lot will extend to a depth of approximately 3 m. The bearing resistance/reaction for the tank/chambers will be dependant on the soil conditions present at chamber location. Based on the general soil conditions encountered from previous geotechnical explorations in the area, it is anticipated that the foundations or base for the proposed tank/chambers will probably encounter firm to hard brown or grey silty clay. These soils in their undisturbed state are considered to be an acceptable founding medium to support the storage chambers. Based on the anticipated cohesive nature of the soils at and below the tank/chamber base elevation, infiltration rates would be very low.

All excavations for the storage chamber should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

5.4.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the underground surcharge storage tank. Geotechnical explorations for underground storage chamber in should consist of at least 4 soil borings advanced within the chamber/tank footprint, extending a minimum of 3 m below the chamber base elevation.

Following the completion of the exploration and testing program, the recommendations in this report may be revised based on the new information.

5.5 Southwood Lakes Existing Ponds

The normal water levels are proposed to be lowered in the existing Southwood Lakes subdivision ponds. Lowering of normal pond water levels will be achieved by increasing the depths of the Lake Como, Lake Grande, and Lake Laguna ponds by approximately 0.2 m, 0.5 m, and 0.5 m, respectively. The existing side slope inclinations of the ponds will not change. The depths of the ponds will vary between 4.5 m and 7 m in depth. The pond locations are shown on Figure 6.

5.5.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the storage pond encountered native soils generally consisting of an extensive deposit of silty clay. The native soils were encountered below surficial organic soils (topsoil), and fill, where present. One historical water well record for w well installed north of the ponds indicates an approximately 1.8 m thick sand layer extending to a depth of about 4.3 m. In general, the records for the boreholes east of the ponds indicate that the boreholes were dry upon completion of drilling.

5.5.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the existing pond depths will be marginally increased by up to 0.5 m, with the existing side slope inclinations remaining the same. If the existing pond side slopes have inclination of 3 horizontal to 1 vertical or flatter, the proposed deepening of the ponds are not anticipated to be problematic. Steeper side slopes may feasible, and can be analyzed for long term stability, if required.

At this time, it is anticipated that current erosion protection features will be kept in place; however, if instabilities and erosion of the existing pond side slopes are evident, additional erosion control measures should be considered to be incorporated with the pond deepening.

Care should be taken to minimize construction traffic on the base of the pond following excavation and inspection to limit the generation of fines that will go into suspension when the pond is filled. Rip-rap should be provided over the full extent of the side slopes and base below and adjacent to the sewer inlet/outlet locations.

All excavations for the surcharge surface storage ponds should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any to firm silty clay and loose to compact sand encountered in the project area and above the water table would be classified as Type 3 soils. Stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay/clayey silt materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

5.5.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. Due to the nominal increase of the pond depths being proposed, a site-specific geotechnical exploration for the ponds may not be warranted provided there have been no stability issues with the current pond slopes. During detailed design, the geotechnical consultant should undertake a review of the final design for the pond deepening, any existing site-specific geotechnical information from the pond's original construction, and carry out a site review. Following this detailed review, if a geotechnical exploration is not warranted, a site review of the subgrade soils should be carried out during construction by the geotechnical engineer.

Following the completion of the detailed design review, the recommendations in this report may be revised based on the new information.

5.6 Detroit Street Trunk Sewer Upgrade

West of the intersection of Detroit Street and Sandwich street, an approximately 300 m length of existing 900-mm diameter storm outfall to Detroit River will be upgraded to a 1,200-mm diameter storm sewer with an outfall to the Detroit River, having a hydraulic invert elevation of 172.6 m and a ground elevation of 176.3 m at the river. The Detroit River 100-Year high water level elevation is 176.15 m. The sewer and outfall location are shown on Figure 7.

5.6.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes and test pits previously advanced in the general vicinity of the proposed outfall encountered native soils generally consisting of silty clay/clayey silt, with occasional sand and silt layers, below surficial organic soils (topsoil/peat) and fill (where present). The fill thickness in the available boreholes and test pits south of the outfall were measured to be between about 1.7 m and 4.5 m. The encountered fill has been described as having a mixed composition, consisting of silty clay, sand, and silt, with debris including wood, brick, concrete, cinders and organic materials. Groundwater level observations made in the available test pits located south of the outfall location indicated seepage into the test pits at depths of between about 1.2 m and 2.7 m below ground surface.

5.6.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the proposed outfall invert will be about 3.7 m below existing ground elevation at the outfall location and about 3.6 m below the Detroit River 100-year high water level. Based on the available soils information from the nearby boreholes, the outfall is expected to be located within fill or the underlying native silty clay/clayey silt. The existing fill is not considered to be an acceptable founding medium to support the outfall pipe or associated headwall. If fill is present at the outfall founding elevation, consideration could be given to excavating existing uncontrolled fill materials from underneath the outfall, and backfilling with engineered fill. This approach would require an excavation to be carried out in braced sheeting, extending below the river level, with the steel sheeting extending into the underlying native silty clay/clayey silt. The driving of sheeting through the existing fill may be difficult due to the presence of concrete rubble or other deleterious materials such as wood and brick in the fill. An alternative to the removal of the existing fill material would be to support the outfall pipe and associated structures on a grade beam type foundation, supported on deep foundations. The deep foundations could consist of relatively small diameter caissons or helical piles extending into underlying competent native soils. Similarly, deleterious materials encountered in the existing fill may require additional effort to advance helical piles and caissons through the fill. This approach would also require a cofferdam structure to reach the design invert elevations below the river level. The native silty clay encountered in the boreholes in the project vicinity are considered to be an acceptable founding medium to support the outfall pipe or associated headwall. Any excavations adjacent for the outfall at the river and extending below the river level would require a cofferdam structure to reach the design invert elevations. Further geotechnical exploration will be required to evaluate the thickness of fill in the area, and the depth to competent native soil for steel sheeting or deep foundations.

It is understood that some Detroit riverfront areas in Windsor are supported on dock structures. The presence and configuration of such structures will need to be determined during the detailed design phase either by review of as-built drawings (if available) or further field exploration.

All excavations for the outfall should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA

criteria, the fill or firm silty clay or loose to compact silty encountered in the project area and above the water table would be classified as Type 3 soils. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information and site location, groundwater inflow is expected to be significant, particularly for excavations near the river and extending below the prevailing river water level. Careful planning will be required to control water levels and inflows.

5.6.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Detroit Street Detroit River outfall. Geotechnical explorations for the outfall should consist of at least 4 soil borings advanced along the outfall alignment (west of Russell Street), extending a minimum of 5 m into the underlying native soils.

5.7 Cameron Avenue Trunk Sewer Upgrade

The construction of 2,700 m of new storm sewers is planned along Tecumseh Road, Curry Avenue, McKay Avenue, and Cameron Avenue to a new outfall at the Detroit River. The proposed new outfall will consist of a 2,400-mm by 3,300-mm box culvert, having a hydraulic invert elevation of 173.2 m and a ground elevation of 176.8 m at the river. The Detroit River 100 Year high water level elevation is 176.15 m. The location of the outfall and adjoining sewer are shown on Figure 8.

5.7.1 Suburface Conditions

Based on our review of the available information, quaternary geology mapping indicates the predominant native soils in the area to consist of glaciolacustrine silty clay. A previous borehole advanced east of the proposed outfall location and north of Riverside Drive encountered a significant thickness of fill material, extending to the maximum boring depth of about 5 m. The encountered fill has been described as silty clay, including wood, brick, concrete, and organic materials. The borehole was observed to be dry upon completion of drilling.

5.7.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the proposed box culvert outfall invert will be about 3.6 m below existing ground elevation at the outfall location and 3 m below the Detroit River 100-year high water level. The bearing resistance/reaction for the box culvert will be dependant on several factors including the soil conditions present and the culvert founding elevations. Based on the available soils information from the nearby borehole, the outfall is expected to be located within fill. The existing fill soils are not considered to be an acceptable founding medium to support the outfall or associated headwall. Consideration could be given to excavating existing uncontrolled fill materials from underneath the outfall, and backfilling with engineered fill. This approach would require an excavation to be carried out in braced sheeting, extending below the river level, assuming there are suitable underlying silty clay or clayey silt soils to drive the sheet piles into to reduce the inflow of river water into the excavation. The driving of sheeting through the existing fill may be difficult due to the presence of concrete rubble or other deleterious materials such as wood and brick in the fill. An alternative to the removal of the existing fill material would be to support the outfall pipe and associated structures on a grade beam type foundation, supported on deep foundations. The deep foundations could consist of relatively small diameter caissons or helical piles extending into underlying competent native soils. This approach would also require a cofferdam structure to reach the design invert elevations below the river level. Similarly, deleterious materials encountered in the existing fill may require additional effort to advance helical piles and caissons through the fill. In either approach, further geotechnical exploration will be required to evaluate the thickness of fill in the area, and the depth to competent native soil for steel sheeting or deep foundations.

It is understood that some Detroit riverfront areas in Windsor are supported on dock structures. The presence and configuration of such structures will need to be determined during the detailed design phase either by review of as-built drawings (if available) or further field exploration.

All excavations for the outfall should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill encountered in the project area and above the water table would be classified as Type 3 soils. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction,

the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information and site location, groundwater inflow is expected to be significant, particularly for excavations near the river and extending below the prevailing river water level. Careful planning will be required to control water levels and inflows.

5.7.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Cameron Avenue Detroit River outfall. Geotechnical explorations for the outfall should consist of at least 2 soil borings advanced along the outfall alignment (north of Riverside Drive), extending a minimum of 5 m into the underlying native soils.

5.8 Bruce Avenue Trunk Sewer

The construction of 2,000 m of new storm sewers are planned along Bruce Avenue to a proposed outlet to the Detroit River. The proposed outfall at the Detroit River will consist of a 3,600-mm diameter pipe, having a hydraulic invert elevation of 171.8 m and a ground elevation of 176.9 m at the river. The Detroit River 100 Year high water level elevation is 176.15 m. The outfall and adjoining sewer location are shown on Figure 9.

5.8.1 Suburface Conditions

Based on our review of the available information, quaternary geology mapping indicates the predominant native soils in the area to consist of glaciolacustrine silty clay. A previous borehole advanced east of the proposed outfall location and north of Riverside Drive encountered a significant thickness of fill material, extending to the maximum boring depth of about 3.9 m. The encountered fill has been described as silty clay, silty sand, with pieces of wood, slag, and refuse debris consisting of concrete pieces and brick fragments. The borehole was terminated due to encountering an obstruction. Groundwater seepage was observed in the borehole at a depth of about 3 m during drilling.

5.8.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the proposed outfall invert will be about 5.1 m below existing ground elevation at the outfall location and 4.4 m below the Detroit River 100-year high water level. Based on the available soils information from the nearby borehole, the outfall may be located within fill. The fill encountered nearby is not considered to be an acceptable founding medium to support the outfall pipe or associated headwall. Consideration could be given to excavating existing uncontrolled fill materials from underneath the outfall, and backfilling with engineered fill. This approach would require an excavation to be carried out in braced sheeting, extending below the river level, and assumes there are suitable underlying silty clay or clay silt soils to drive the sheet piles into to reduce the inflow of river water into the excavation. The driving of sheeting through the existing fill may be difficult due to the presence of concrete rubble or other deleterious materials such as wood and brick in the fill. An alternative to the removal of the existing fill material would be to support the outfall pipe and associated structures on a grade beam type foundation, supported on deep foundations. The deep foundations could consist of relatively small diameter caissons or helical piles extending into underlying competent native soils. This approach would also require a cofferdam structure to reach the design invert elevations below the river level. Similarly, deleterious materials encountered in the existing fill may require additional effort to advance helical piles and caissons through the fill. In either approach, further geotechnical exploration will be required to evaluate the thickness of fill in the area, and the depth to competent native soil for steel sheeting or deep foundations.

It is understood that some Detroit riverfront areas in Windsor are supported on dock structures. The presence and configuration of such structures will need to be determined during the detailed design phase either by review of as-built drawings (if available) or further field exploration.

All excavations for the outfall should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill encountered in the project area and above the water table would be classified as Type 3 soils. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction,

the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information and site location, groundwater inflow is expected to be significant, particularly for excavations near the river and extending below the prevailing river water level. Careful planning will be required to control water levels and inflows.

5.8.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Bruce Avenue Detroit River outfall. Geotechnical explorations for outfall should consist of at least 2 soil borings advanced along the outfall alignment (north of Riverside Drive), extending a minimum of 5 m into the underlying native soils.

5.9 Marentette Avenue Trunk Sewer

The construction of the new Marentette Avenue trunk sewer will include an 1,800-mm diameter outfall at the Detroit River, having a hydraulic invert elevation of 171.9 m and a ground elevation of 176.2 m at the river. The Detroit River 100 Year high water level elevation is 176.15 m. The location of the outfall and adjoining sewer are shown on Figure 10.

5.9.1 Suburface Conditions

Based on our review of the available information, quaternary geology mapping indicates the predominant native soils in the area to consist of glaciolacustrine silty clay. Previous borehole advanced east and west of the proposed outfall location and north of Riverside Drive encountered a significant thickness of fill material, extending to depths of between about 2.1 and 3.2 m. The encountered fill has been described as mixed, consisting of silty clay, sand, clayey silt, cinders, organics, and debris consisting of wood, metal and brick fragments. A layer of silty sand to sand and gravel was encountered under the fill, underlain by an extensive deposit of silty clay to clayey silt in borehole to the west (See Record of Borehole sheets for details). Groundwater seepage was observed in the boreholes at depths ranging between about 1.5 m and 3.1 m during drilling.

5.9.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the proposed outfall invert will be about 4.3 m below existing ground elevation at the outfall location and 4.3 m below the Detroit River 100-year high water level. Based on the available soils information from the nearby boreholes, the outfall is expected to be located within fill or the underlying native silty clay to clayey silt. The existing fill is not considered to be an acceptable founding medium to support the outfall pipe or associated headwall. If fill is present at the outfall founding elevation, consideration could be given to excavating existing uncontrolled fill materials from underneath the outfall, and backfilling with engineered fill. This approach would require an excavation to be carried out in braced sheeting, extending below the river level, and assumes there is suitable underlying silty clay or clayey silt soils to drive the sheet piles into to reduce the inflow of river water into the excavation. The driving of sheeting through the existing fill may be difficult due to the presence of concrete rubble or other deleterious materials such as wood and brick in the fill. An alternative to the removal of the existing fill material would be to support the outfall pipe and associated structures on a grade beam type foundation, supported on deep foundations. The deep foundations could consist of relatively small diameter caissons or helical piles extending into underlying competent native soils. This approach would also require a cofferdam structure to reach the design invert elevations below the river level. Similarly, deleterious materials encountered in the existing fill may require additional effort to advance helical piles and caissons through the fill. In either approach, further geotechnical exploration will be required to evaluate the thickness of fill in the area, and the depth to competent native soil for steel sheeting or deep foundations.

It is understood that some Detroit riverfront areas in Windsor are supported on dock structures. The presence and configuration of such structures will need to be determined during the detailed design phase either by review of as-built drawings (if available) or further field exploration.

All excavations for the outfall should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill or firm silty clay or loose to compact silty encountered in the project area and above the water table would be classified as Type 3 soils. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based

on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information and site location, groundwater inflow is expected to be significant, particularly for excavations near the river and extending below the prevailing river water level. Careful planning will be required to control water levels and inflows.

5.9.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Marentette Avenue Detroit River outfall. Geotechnical explorations for outfall should consist of at least 2 soil borings advanced along the outfall alignment (north of Riverside Drive), extending a minimum of 5 m into the underlying native soils.

5.10 Albert Road Trunk Sewer

The construction of a new 1,650-mm diameter trunk sewer over 350 m length, and replacing the existing 450-mm diameter to 600-mm diameter sewers with new 450-mm and 750-mm diameter sewers over a 190 m length along Wyandotte Street East and includes the construction of a new outfall pipe at Albert Road and the Detroit River. The proposed outfall at the Detroit River will consist of a 1,650-mm diameter pipe, having a hydraulic invert elevation of 173.4 m and a ground elevation of 176.9 m at the river. The Detroit River 100 Year high water level elevation is 176.15 m. The location of the outfall and adjoining sewer are shown on Figure 11.

5.10.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the outfall encountered native soils generally consisting of silty clay below surficial organic soils (topsoil) and fill. One groundwater monitoring well was installed to the east of the outfall location on Riverside Drive and a water level about 2.8 m below ground surface was recorded at the time of reading (see Record of Borehole sheets). Two boreholes in the area encountered groundwater seepage at depths of about 0.8 m and 5.3 m below ground surface. This may indicate a perched groundwater level where surficial granular soils are present overlying the lower permeability cohesive materials. The remaining boreholes in the area were observed to be dry upon completion of drilling.

5.10.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the proposed outfall invert will be about 3.5 m below existing ground elevation at the outfall location and about 2.8 m below the Detroit River 100-year high water level. Based on the available soils information from the nearby boreholes, the outfall is expected to be located within underlying native silty clay; however, due to previous experiences with projects located on the Detroit riverfront, it is expected that fill from previous site uses will be encountered overlying the native silty clay. Any existing uncontrolled fill is not considered to be an acceptable founding medium to support the outfall pipe or associated headwall.

If fill is present at the outfall founding elevation, consideration could be given to excavating existing uncontrolled fill materials from underneath the outfall, and backfilling with engineered fill. This approach would require an excavation to be carried out in braced sheeting, extending below the river level into underlying silty clay soils to drive the sheet piles into to reduce the inflow of river water into the excavation. The driving of sheeting through the existing fill may be difficult due to the presence of concrete rubble or other deleterious materials such as wood and brick if present in the fill. An alternative to the removal of the existing fill material would be to support the outfall pipe and associated structures on a grade beam type foundation, supported on deep foundations. The deep foundations could consist of relatively small diameter caissons or helical piles extending into underlying competent native soils. Similarly, deleterious materials encountered in the existing fill may require additional effort to advance helical piles and caissons through the fill. The native silty clay encountered in the boreholes in the project vicinity are considered to be an acceptable founding medium to support the outfall pipe or associated headwall. Any excavations adjacent for the outfall at the river and extending below the river level would require a cofferdam structure to reach the design invert elevations. Further geotechnical exploration will be required to evaluate the thickness of fill in the area, depth to competent native soil for steel sheeting or deep foundations.

It is understood that some Detroit riverfront areas in Windsor are supported on dock structures. The presence and configuration of such structures will need to be determined during the detailed design phase either by review of as-built drawings (if available) or further field exploration.

All excavations for outfall should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations

extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, fill, topsoil, and any to firm silty clay and loose to compact sand encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information and site location, groundwater inflow should be expected and may be significant for excavations near the river and extending below the prevailing river water level. Careful planning will be required to control water levels and inflows.

5.10.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Albert Road Detroit River outfall. Geotechnical explorations for outfall should consist of at least 2 soil borings advanced along the outfall alignment (north of Riverside Drive), extending a minimum of 5 m into the underlying native soils.

5.11 Drouillard Underpass Pump Station

The construction of a new pump station is proposed within Cadillac Street Park, located north east of the Drouillard Road underpass at Wyandotte Street East and includes the upgrading of 270 m of downstream sewer with 825-mm diameter sewer. It is understood that the new pump station will have a footprint of 20 m by 15 m, a ground elevation of 181.4 m and bottom of wet well elevation of 171.6 m. The pump station location is shown on Figure 11.

5.11.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the pump station encountered native soils generally consisting of silty clay below surficial organic soils (topsoil) and fill. One ground water monitoring well was installed to the north of the pump station on Riverside Drive and a water level about 2.8 m below ground surface was recorded at the time of reading (see Record of Borehole sheets). Two boreholes in the area encountered groundwater seepage at depths of about 0.8 m and 5.3 m below ground surface. This may indicate a perched groundwater level where surficial granular soils are present overlying the lower permeability cohesive materials. The remaining boreholes in the area were observed to be dry upon completion of drilling.

5.11.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pump station will measure about 20 m by 15 m in plan, with a wet well depth of 9.8 m. The soil bearing resistance/reaction for the pump station will be dependant on several factors including the soil conditions present below the pump station and the pump station founding elevation. Based on the available soils information from the nearby boreholes, the pump station base is expected to be located within native silty clay. In general, the native silty clay soils are considered to be an acceptable founding medium to support a pump station. The silty clay material tends to decrease in shear strength with depth, therefore, the soil bearing capacity and base stability of the excavation will need to be confirmed by means of specific geotechnical exploration at the site. It is anticipated that the overburden pressure within the founding soils beneath the pumping station will be reduced by the construction of the station.

In the case of soft clays underlying the base of an excavation where the factor of safety against basal instability is less than 2, substantial deformations may occur and if sheeting is used it should be extended a distance of at least half the excavation width below the base of the excavation or unloading of the soil around the perimeter of the excavation will have to be carried out.

If the excavation is carried out in a closed driven sheeted excavation, no major problems due to groundwater are anticipated. The seepage volumes into the excavation can likely be controlled by means of pumping from conventional filtered sumps located within the base of the excavation.

All open excavations for the pump station should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, fill, topsoil, and any to firm silty clay and loose to compact sand or silt encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that

might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

5.11.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Drouillard underpass pump station. Prior to final design, it is recommended that a borehole be advanced at the pump station location, extending to a depth of about 2 times the width of the pump station foundation below the pump station invert. A groundwater level monitoring well should be installed and monitored to evaluate if artesian groundwater conditions exist in underlying soil strata.

5.12 Pontiac Pump Station

A new wet well pump station is proposed to be constructed directly adjacent to the existing Pontiac pump station. The new wet well pump station will have a footprint of 13 m by 8m. The ground elevation is 175.9 m and the elevation of the bottom of wet well will be 168.6 m. The existing pump station is located north of the Little River Pollution Control Plant, as shown on Figure 12.

5.12.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the pump station encountered native soils generally consisting of silty clay/silty clay with sandy silt and sand layers, below surficial organic soils (topsoil) and fill where present. One ground water monitoring well installed east of pump station recorded a water level about 5.1 m below ground surface at the time of reading (see Record of Borehole sheets). Two boreholes recorded water levels at depths of about 5.1 m and 9.5 m upon completion of drilling. The remaining boreholes in the area were observed to be dry upon completion of drilling.

5.12.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the wet well pump station will measure about 13 m by 8 m in plan, with a depth of 7.3 m. The soil bearing resistance/reaction for the pump station will be dependant on several factors including the soil conditions present below the pump station and the pump station founding elevation. Based on the available soils information from the nearby boreholes, the wet well base is expected to be located within native silty clay. In general, the native silty clay soils are considered to be an acceptable founding medium to support a wet well. The silty clay material tends to decrease in shear strength with depth, therefore, the soil bearing capacity and base stability of the excavation will need to be confirmed by means of specific geotechnical exploration at the site. It is anticipated that the overburden pressure within the founding soils beneath the wet well will be reduced by its construction. There is the potential for the base of the wet well to be located within or above a silty sand or sandy silt stratum, and exploration will be required to confirm whether such layers are present, and whether artesian groundwater conditions exist in them.

In the case of soft clays underlying the base of an excavation where the factor of safety against basal instability is less than 2, substantial deformations may occur and if sheeting is used it should be extended a distance of at least half the excavation width below the base of the excavation or unloading of the soil around the perimeter of the excavation will have to be carried out.

In general, temporary excavations into the predominantly silty clay nearby Little River should not encounter significant groundwater inflow, however, it is possible that more permeable sand lenses, hydraulically connected to Little River may be present within the excavation area. It may be advantageous to carry out construction during at a time of the year when the Little River water level is at its lowest. Excavations for the wet well base extending to Little River's water edge will likely require a cofferdam to keep out river water. If the excavation is carried out in a closed driven sheeted excavation, no major problems due to groundwater are anticipated. The seepage volumes into the excavation can likely be controlled by means of pumping from conventional filtered sumps located within the base of the excavation.

All open excavations for the pump station should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, fill, topsoil, and any to firm silty clay and loose to compact sand or silt encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be

classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

5.12.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the new wet well at the Pontiac pump station. Prior to final design, it is recommended that a borehole be advanced at the pump station location, extending to a depth of about 2 times the width of the wet well foundation below the wet well invert. A groundwater level monitoring well should be installed and monitored to evaluate if artesian groundwater conditions exist in underlying soil strata.

5.13 St. Rose Pump Station

The proposed new St. Rose pump station is to be located north east of the intersection of St. Rose Avenue and Riverside Drive. The new pump station will have a footprint of 32 m by 21 m. The ground elevation is 176.5 m and bottom of wet well elevation will be 165.0 m. The location of the pump station is shown on Figure 13.

5.13.1 Suburface Conditions

Quaternary geology mapping in the area of the pump station indicates glaciolacustrine silty clay as the predominant soil deposit in the area. The available borehole data in this area is somewhat distant from the pump station location, however, the soil conditions encountered in the boreholes south and south east of the pump station were comprised mainly of silty clay, below surficial topsoil and fill (where present). These boreholes were observed to be dry upon completion of drilling.

5.13.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pump station will measure about 32 m by 21 m in plan, with a wet well depth of 11.5 m. The soil bearing resistance/reaction for the pump station will be dependant on several factors including the soil conditions present below the pump station and the pump station founding elevation. Based on the available soils information from the nearby boreholes, the pump station base is expected to be located within native silty clay. In general, the native silty clay soils are considered to be an acceptable founding medium to support a pump station. The silty clay material tends to decrease in shear strength with depth, therefore, the soil bearing capacity and base stability of the excavation will need to be confirmed by means of specific geotechnical exploration at the site. It is anticipated that the overburden pressure within the founding soils beneath the pump station will be reduced by the construction of the station.

From aerial imaging of the pump station location, it appears that the west and north sides of the site fronting the Detroit river are lined with steel sheeting. Alterations to the site from its natural condition has likely resulted in fill placement, which should be expected to be encountered, the depth and extent of which will need to be explored.

In the case of soft clays underlying the base of an excavation where the factor of safety against basal instability is less than 2, substantial deformations may occur and if sheeting is used it should be extended a distance of at least half the excavation width below the base of the excavation or unloading of the soil around the perimeter of the excavation will have to be carried out.

If the excavation is carried out in a closed driven sheeted excavation into underlying silty clay, no major problems due to groundwater are anticipated. The seepage volumes into the excavation can likely be controlled by means of pumping from conventional filtered sumps located within the base of the excavation.

All open excavations for the pump station should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, fill, topsoil, and any to firm silty clay and loose to compact sand or silt encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

For open excavations below the prevailing river elevation, groundwater inflow from soil layers hydraulically connected to the river should be expected to be significant. Careful planning will be required to control water levels and inflows.

5.13.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the St. Rose pump station. Prior to final design, it is recommended that a borehole be advanced at the pump station location, extending to a depth of about 2 times the width of the pump station foundation below the pump station invert. A groundwater level monitoring well should be installed and monitored to evaluate if artesian groundwater conditions exist in underlying soil strata. Several shallow boreholes should be advanced across the site to explore the possible variation of fill thicknesses across the site.

5.14 St. Paul Pump Station

The proposed expansion of the St. Paul pump station will be located east of the existing pump station building and will include new outlet sewers to the Detroit River from the proposed expansion. The new pump station will have a footprint of 23 m by 13 m. The ground elevation is 176.5 m and the bottom of wet well elevation will be 163.5 m. The location of the pump station is shown on Figure 13.

5.14.1 Suburface Conditions

Quaternary geology mapping in the area of the pump station indicates that glaciolacustrine silty clay is the predominant soil deposit in the area. Available borehole data east of the pump station on the riverfront encountered soils comprised mainly of native silty sand to sand, with underlying clayey silt to silty clay at depth, all below surficial topsoil and fill (where present). Where fully explored by the boreholes, the sand and silty sand deposit extended to depths of between about 11.6 m and 14 m blow ground surface. Ground water levels in the boreholes were observed between 1.2 m and 2.1 m below ground surface upon completion of drilling.

5.14.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pump station will measure about 23 m by 13 m in plan, with a wet well depth of 13 m. The soil bearing resistance/reaction for the pump station will be dependant on several factors including the soil conditions present below the pump station and the pump station founding elevation. Based on the available soils information from the nearby boreholes, the pump station base is expected to be located within native sand or silty clay/clayey silt. In general, the native silty clay soils are considered to be an acceptable founding medium to support a pump station. The silty clay material tends to decrease in shear strength with depth, therefore, the soil bearing capacity and base stability of the excavation will need to be confirmed by means of specific geotechnical exploration at the site. It is anticipated that the overburden pressure within the founding soils beneath the pump station will be reduced by the construction of the station. Founding of the pump station on the underlying sand/silty sand if present at the foundation elevation may be feasible, however precautions will need to be taken to ensure the sand is not disturbed during construction and disturbance due to differential hydraulic head inside and surrounding the excavation.

From aerial imaging of the pump station locations, it appears that the north side of the site fronting the Detroit river are lined with steel sheeting. Alterations to the site from its natural condition has likely resulted in fill placement, which should be expected to be encountered, the depth and extent of which will need to be explored.

In the case of soft clays underlying the base of an excavation where the factor of safety against basal instability is less than 2, substantial deformations may occur and if sheeting is used it should be extended a distance of at least half the excavation width below the base of the excavation or unloading/excavation of the soil around the perimeter of the excavation will have to be carried out.

If the excavation is carried out in a closed driven sheeted excavation into underlying silty clay, it is anticipated that groundwater seepage volumes into the excavation can likely be controlled by means of pumping from conventional filtered sumps located within the base of the excavation.

All open excavations for the pump station should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, fill, topsoil, and any to firm silty clay and loose to compact sand or silt encountered in the project area and above the water table would be classified as Type 3 soils. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA

soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

For open excavations below the prevailing river elevation, groundwater inflow from the sand layers hydraulically connected to the river should be expected to be significant. Careful planning will be required to control water levels and inflows.

5.14.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the St. Paul pump station. Prior to final design, it is recommended that a borehole be advanced at the pump station location, extending to a depth of about 2 times the width of the pump station foundation below the pump station invert. A groundwater level monitoring well should be installed and monitored to evaluate if artesian groundwater conditions exist in underlying soil strata. Several shallow boreholes should be advanced across the site to explore the possible variation of fill thicknesses.

5.15 Lakeview Pump Station

The proposed improvements to the Lakeview pump station will include outlet and pump station improvements, including increased pump station capacity by constructing a new pump station adjacent to the existing Lakeview pump station, larger outlet sewers to Lake St. Clair, and new outlet at Blue Heron Pond. The pump station will have a footprint of 8 m by 7 m. The ground elevation is 176.9 m and bottom of wet well elevation will be 167.0 m. The pump station location is shown on Figure 14.

5.15.1 Suburface Conditions

Based on our review of the available information, quaternary geology mapping indicates the predominant native soils in the area to consist of glaciolacustrine silty clay, with modern beach deposits consisting of sand, gravel and cobbles present north of Riverside Drive. Shallow boreholes advanced south west of Blue Heron Pond encountered silty clay below surficial fill. No existing borehole data was available in the vicinity of the new pump station and the Detroit river.

5.15.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pump station will measure about 8 m by 7 m in plan, with a wet well depth of 9.9 m. The soil bearing resistance/reaction for the pump station will be dependant on several factors including the soil conditions present below the pump station and the pump station founding elevation. Based on the limited available soils information, the pump station base is expected to be located within native silty clay. In general, the native silty clay soils are considered to be an acceptable founding medium to support a pump station. The silty clay material tends to decrease in shear strength with depth, therefore, the soil bearing capacity and base stability of the excavation will need to be confirmed by means of specific geotechnical exploration at the site. It is anticipated that the overburden pressure within the founding soils beneath the pump station will be reduced by the construction of the pump station.

In the case of soft clays underlying the base of an excavation where the factor of safety against basal instability is less than 2, substantial deformations may occur and if sheeting is used it should be extended a distance of at least half the excavation width below the base of the excavation or unloading of the soil around the perimeter of the excavation will have to be carried out.

If the excavation is carried out in a closed driven sheeted excavation, no major problems due to groundwater are anticipated. The seepage volumes into the excavation can likely be controlled by means of pumping from conventional filtered sumps located within the base of the excavation. If open cut techniques are used, proactive dewatering may be required if saturated granular layers are present within the silty clay.

All open excavations for the pump station should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, fill, topsoil, and any to firm silty clay and loose to compact sand or silt encountered in the project area and above the water table would be classified as Type 3 soils. Stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

5.15.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Lakeview pump station. Prior to final design, it is recommended that a borehole be advanced at the pump station location, extending to a depth of about 2 times the width of the pump station foundation below the pump station invert. A groundwater level monitoring well should be installed and monitored to evaluate if artesian groundwater conditions exist in underlying soil strata.

5.16 Brumpton Park Underground Stormwater Management Facility

The proposed Brumpton Park underground stormwater management facility will consist of a 4,725 m^3 capacity facility at the southwest area of Brumpton Park. The proposed tank/chambers will have a footprint of 4,000 m^2 and a depth of 2.2 m. The stormwater management facility location is shown on Figure 15.

5.16.1 Suburface Conditions

Based on our review of the available information, boreholes previously advanced in the general vicinity of the underground stormwater management facility encountered native soils generally consisting of silty clay below surficial organic soils (topsoil) and fill (where present). In general, boreholes advanced in the area were dry upon completion of drilling, with one borehole having a recorded water level at about 6.4 m depth below ground surface upon completion of drilling.

5.16.2 Discussion on Geotechnical Aspects of Functional Design

It understood that the underground storage facility planned in Brumpton Park will extend to a depth of approximately 2.2 m. The bearing resistance/reaction for the tank/chambers will be dependant on the soil conditions present at the tank/chamber location. Based on the general soil conditions encountered from previous geotechnical explorations in the area, it is anticipated that the foundations or base for the proposed stormwater management facility tank/chambers will likely encounter firm to stiff brown or grey silty clay. These soils in their undisturbed state are considered to be an acceptable founding medium to support underground stormwater storage tank/chambers.

All excavations for the underground stormwater management facility should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

5.16.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the underground surcharge storage facility. Geotechnical explorations for underground stormwater management facility should consist of at least 3 soil borings advanced within the stormwater management facility chamber/tank footprint, extending a minimum depth of 3 m below the base elevation.

Following the completion of the exploration and testing program, the recommendations in this report may be revised based on the new information.

5.17 Hawthorne Avenue, Lauzon Parkway, Jefferson Boulevard Offline Storage Volumes

The proposed Hawthorne Avenue, Lauzon Parkway, Jefferson Boulevard Offline Storage Volumes/Improvements include a new stormwater management pond at Little River golf course having 30,000 m^3 of storage capacity, surface area of 25,000 m^2, side slope inclinations of 4 horizontal to 1 vertical, and depth of 4 to 5 m.

The proposed Meadowbrook Park underground surcharge storage will consist of a 10,000 m^3 capacity tank. The tank will have a footprint of 2,200 m^2 and depth of 3.5 m. Road regrading and low impact development (LID) swales are planned for Lauzon Parkway between Cantelon Avenue and Hawthorne Avenue. The pond and storage tank locations are shown on Figure 16.

5.17.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in previously boreholes advanced in the general vicinity of the storage pond encountered native soils generally consisting of silty clay below surficial organic soils (topsoil) and fill (where present). In general, boreholes advanced in the area were dry upon completion of drilling, however in two boreholes, groundwater seepage into the boreholes was encountered to depths of 2.3 m and 4 m below ground surface upon completion of drilling.

5.17.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the pond will be approximately 4 to 5 m in depth, with side slopes having an inclination of 4 horizontal to 1 vertical. Pond side slopes having an inclination of 4 horizontal to 1 vertical are not anticipated to be problematic and can be used for functional design purposes for ponds excavated into the native soils in this area. In areas proposed for equipment access for periodic maintenance, an inclination of 6 horizontal to 1 vertical or flatter should be considered.

Erosion protection should be provided around the perimeter of the surcharge storage pond at the elevation of the normal operating level. The form of erosion protection should match with the requirements of aquatic vegetation to be planted and developed. Consideration could be given to protecting the active water line zone (i.e., from the low-water level to the high-water level) with a minimum 150-mm thick layer of OPSS.PROV 1004 (Aggregates) R-10 rip-rap, constructed in accordance with OPSS 150 (Rip-Rap, Rock Protection); however, this may not be necessary if appropriate vegetation can be established in this zone. The pond slopes above the operating water level should be vegetated as soon as practical after construction to address the potential for erosion due to surface water run-off. Care should be taken to ensure filter compatibility between the native soils and any imported granular materials.

Care should be taken to minimize construction traffic on the base of the pond following excavation and inspection to limit the generation of fines that will go into suspension when the pond is filled. Rip-rap should be provided over the full extent of the side slopes and base below and adjacent to the sewer inlet/outlet locations.

It understood that the storage tank planned in Meadowbrook Park will extend to a depth of approximately 3.5 m. The bearing resistance/reaction for the tank will be dependant on the soil conditions present at tank location. Based on the general soil conditions encountered from previous geotechnical explorations in the area, it is anticipated that the foundations or base for the proposed tank will probably encounter stiff to very stiff brown or grey silty clay. These soils in their undisturbed state are considered to be an acceptable founding medium to support the storage tank.

All excavations for the surcharge surface storage pond and storage tank should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

Based on the subsurface conditions anticipated for the project area, headwalls associated with stormwater management ponds may be founded on the native soils at a minimum depth of 1.2 m below finished grade. The geotechnical resistance/reaction used for the design of headwall foundations should be confirmed in the detailed design phase.

5.17.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the surcharge surface storage pond. Geotechnical explorations for the pond should consist of a minimum of 6 soil boring carried out within the stormwater pond footprint, extending a minimum of 1.5 m below the pond bottom elevation.

Geotechnical explorations for underground storage tank in Meadowbrook Park should consist of at least 2 soil borings advanced within the tank footprint, extending a minimum of 3 m below the tank base elevation.

Following the completion of the exploration and testing program, the recommendations in this report may be revised based on the new information.

5.18 Wyandotte Street East Off-Line Storage

The two proposed underground surcharge storage tanks on Wyandotte Street East, west of Little River have capacities of 8,000 m^3 and 3,000 m^3 and surface areas of 5,400 m^2 and 1,400 m^2, respectively, and depths of about 3 m. The locations of the storage tanks are shown on Figure 17.

5.18.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in previously boreholes advanced in the general vicinity of the proposed underground surcharge storage tanks encountered native soils generally consisting of silty clay, below surficial organic soils (topsoil) and fill (where present). The available boreholes advanced within the area were dry upon completion of drilling.

5.18.2 Discussion on Geotechnical Aspects of Functional Design

It understood that the storage tanks planned for Wyandotte Street East will extend to a depth of approximately 3 m. The bearing resistance/reaction for the tanks will be dependant on the soil conditions present at the tank locations. Based on the general soil conditions encountered from previous geotechnical explorations in the area, it is anticipated that the foundations or base for the proposed tanks will probably encounter stiff to very stiff grey silty clay. These soils in their undisturbed state are considered to be an acceptable founding medium to support the storage chambers.

All excavations for the storage tanks should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

5.18.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the underground surcharge storage tanks. Geotechnical explorations for underground storage chamber in should consist of at least 2 soil borings advanced within each of the tank footprints, extending a minimum of 3 m below the tank base elevation.

5.19 Roseville Garden Drive and Hawthorne Avenue/Kew Drive Underground Stormwater Detention System

The proposed Roseville Garden Drive and Hawthorn Avenue/Kew Drive underground surcharge storage will consist of a 28,000 m^3 tank. The tank will have a footprint of 21,850 m^2 and depth of 5 m and open bottomed storage chambers to permit infiltration. The location of the storage tank is shown on Figure 18.

5.19.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the proposed underground surcharge storage tank encountered native soils generally consisting of silty clay, below surficial organic soils (topsoil) and fill (where present). The available boreholes advanced within the area were dry upon completion of drilling.

5.19.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the storage chamber planned for Roseville Garden Drive and Hawthorn Avenue/Kew Drive will extend to a depth of approximately 5 m. The bearing resistance/reaction for the chamber will be dependant on the soil conditions present at the chamber location. Based on the general soil conditions encountered from previous geotechnical explorations in the area, it is anticipated that the foundations or base for the proposed chamber will probably encounter stiff to very stiff grey silty clay. These soils in their undisturbed state are considered to be an acceptable founding medium to support the storage chambers. Based on the anticipated cohesive nature of the soils at and below the tank/chamber base elevation, infiltration rates would be very low.

All excavations for the storage chamber should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to very stiff silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

5.19.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the underground surcharge storage tank. Geotechnical explorations for underground storage chamber in should consist of at least 6 soil borings advanced within the chamber footprint, extending a minimum of 3 m below the chamber base elevation.

5.20 Ypres Avenue Underground Stormwater Storage System

The proposed Ypres Avenue underground surcharge storage system will have a storage capacity of 3,000 m^3 under the existing Optimist Memorial Park parking lot. The proposed storage system will have a footprint of 3,360 m^2 and a depth of about 3 m. The storage system location is shown on Figure 19.

5.20.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in boreholes previously advanced in the general vicinity of the proposed underground surcharge storage tank encountered native soils generally consisting of silty clay, with occasional sand layers, below surficial organic soils (topsoil) and fill (where present). In general, boreholes advanced in the area were dry upon completion of drilling; however, in two boreholes, groundwater seepage into the boreholes was encountered to depths of 2.3 m and 4 m below ground surface upon completion of drilling. Many of the boreholes advanced within the area encountered groundwater seepage. Where encountered, water levels recorded in boreholes upon completion of drilling and in installed monitoring wells ranged between about 0.3 m and 0.6 m below ground surface (see Record of Borehole sheets for details).

5.20.2 Discussion on Geotechnical Aspects of Functional Design

It understood that the storage chambers planned in the Optimist Memorial Park parking lot will extend to a depth of approximately 3 m. The bearing resistance/reaction for the tank/chambers will be dependant on the soil conditions present at chamber location. Based on the general soil conditions encountered from previous geotechnical explorations in the area, it is anticipated that the excavations for the foundations or base for the proposed tank/chambers will probably encounter very stiff to hard brown silty. These soils in their undisturbed state are considered to be an acceptable founding medium to support the storage chambers. Based on the anticipated cohesive nature of the soils at and below the tank/chamber base elevation, infiltration rates would be very low.

All excavations for the storage system should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, the fill, topsoil, and any firm silty clay encountered in the project area and above the water table would be classified as Type 3 soils. The stiff to hard silty clay would be classified as a Type 2 soil. Any soft to very soft silty clay or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. Water inflows due to perched groundwater within surficial granular fills overlying the less permeable cohesive materials should be expected. It is anticipated that an experienced contractor should be able to handle the anticipated seepage volumes by pumping from properly constructed and filtered sumps within the excavation. Care should be taken to direct all surface water away from the excavations.

5.20.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing

program should be carried out for the underground stormwater storage chamber. Geotechnical explorations for the underground storage chamber should consist of at least 3 soil borings advanced within the chamber footprint, extending a minimum of 3 m below the chamber base elevation.

Following the completion of the exploration and testing program, the recommendations in this report may be revised based on the new information.

5.21 Prince Road Outlet at Chappelle/Sandwich Street

The proposed Prince Road outlet at Chappelle/Sandwich Street will consist of approximately 200 m of new storm sewer including the construction of a new outfall pipe to McKee Creek. The proposed outfall at McKee Creek will consist of a 2,700-mm diameter pipe, having a hydraulic invert elevation of 172.1 m and a ground elevation of 176.6 m at the river. The Detroit River 100-year high water level elevation is 176.15 m. The location of the outfall and adjoining sewer are shown on Figure 20.

5.21.1 Suburface Conditions

Based on our review of the available information, the subsurface soils encountered in previously boreholes advanced in the general vicinity of the outfall encountered native soils generally consisting of silty clay/clayey silt below surficial sand, organic soils (topsoil) and fill (where present). One borehole encountered seepage at a depth of about 1.5 m (see Record of Borehole sheets). The remaining boreholes in the area were observed to be dry upon completion of drilling.

5.21.2 Discussion on Geotechnical Aspects of Functional Design

It is understood that the proposed outfall invert will be about 4.5 m below existing ground elevation at the outfall location and about 4.1 m below the Detroit River 100-year high water level. Based on the available soils information from the nearby boreholes, the outfall is expected to be located within underlying native silty clay/clayey silt, however, due to previous experiences with projects located on the Detroit Riverfront it is expected that fill from previous site uses will be encountered overlying the native silty clay. Any existing uncontrolled fill is not considered to be an acceptable founding medium to support the outfall pipe or associated headwall.

If fill is present at the outfall founding elevation, consideration could be given to excavating existing uncontrolled fill materials from underneath the outfall, and backfilling with engineered fill. This approach would require an excavation to be carried out in braced sheeting, extending below the river level into underlying silty clay soils to drive the sheet piles into to reduce the inflow of river water into the excavation. The driving of sheeting through the existing fill may be difficult due to the presence of concrete rubble or other deleterious materials such as wood and brick if present in the fill. An alternative to the removal of the existing fill material would be to support the outfall pipe and associated structures on a grade beam type foundation, supported on deep foundations. The deep foundations could consist of relatively small diameter caissons or helical piles extending into underlying competent native soils. Similarly, deleterious materials encountered in the existing fill may require additional effort to advance helical piles and caissons through the fill. The native silty clay encountered in the boreholes in the project vicinity are considered to be an acceptable founding medium to support the outfall pipe or associated headwall. Any excavations for the outfall at the river and extending below the river level would require a cofferdam structure to reach the design invert elevations. Further geotechnical exploration will be required to evaluate the thickness of fill in the area, depth to competent native soil for steel sheeting or deep foundations.

All excavations for the outfall should be carried out in accordance with the current OHSA criteria. The OHSA regulations governing excavation support and maximum side wall slope inclinations apply only to excavations extending to depths of greater than 1.2 m below the adjacent ground surface. In general, under the OHSA criteria, fill, topsoil, and any to firm silty clay/clayey and loose to compact sand encountered in the project area and above the water table would be classified as Type 3 soils. Any soft to very soft silty clay/clayey silt or silty sand, sand, and silt layers below the water table would be classified as Type 4 soils. In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can

change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Based on the available borehole information and site location, groundwater inflow is expected to be nominal from the fine-grained silty clay materials. However, water inflows due to perched groundwater or within surficial sands overlying the less permeable cohesive materials should be expected. Inflows from sand layers hydraulically connected to the river should be expected to be significant, particularly for excavations near the river and extending below the prevailing river water level. Careful planning will be required to control water levels and inflows.

5.21.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the Prince Road McKee Creek outfall. Geotechnical explorations for the outfall should consist of at least 2 soil borings advanced along the outfall alignment (west of Russel Street), extending a minimum of 5 m into the underlying native soils.

5.22 Earth Berm Along Riverside Drive Between Ford Boulevard and East City Limits

The proposed landform barrier along Riverside Drive would extend between Ford Boulevard and the east City limits. The objective of constructing the landform barrier is to reduce the potential for inland flooding due to coastal high water levels. The preferred solution is to construct the landform barrier crest to elevation 176.5 m. Existing property grading that meets or exceeds the target elevation were utilized to limit the required berm construction. Areas not meeting the target elevation will require new landform barriers to be constructed and localized improvements/grade alterations for areas of trail and road crossings. The general areas along Riverside Drive between Ford Boulevard and the east City limits are shown on Figures 21A to 21D.

5.22.1 Suburface Conditions

Based on our review of the available information, quaternary geology mapping indicates the predominant native soils in the area to consist of either glaciolacustrine silty clay or modern beach deposits consisting of sand, gravel and cobbles present north of Riverside Drive. In the area shown on Figure 21A, some of the glaciolacustrine silty clay deposits are indicated by geological mapping to be overlain by thin discontinuous sand and gravel deposits.

The subsurface soils encountered in previously boreholes advanced along the proposed land barrier length generally encountered native soils consisting of silty clay underlying organic soils (topsoil) and fill (where present). In some areas of Riverside Drive, sand to silty sand of varying thickness was encountered over the silty clay.

5.22.2 Discussion on Geotechnical Aspects of Functional Design

The proposed landform barrier is intended to use the existing Ganatchio trail and landform features meeting the target elevation to reduce the potential for inland flooding. The landform barrier being proposed will fill in gaps to create a nearly continuous barrier along the project length. In constructing the new landform barrier, existing topsoil and deleterious fill materials should be removed prior to soil placement for the embankment construction.

To optimize containment of water on the river side of the barrier, the new landform barrier should be constructed of silty clay/clayey silt free of organics. Where underlying silty clay material is present, the embankment soils should be keyed into the underlying materials. In areas where significant thicknesses of underlying sand are present, this approach may not be practical due to required depth of excavation to reach underlying silty clay. The landform barrier could also be constructed with other materials such as sand or granular fill; however, in this case, seepage through the barrier should be expected if it is containing flood waters on one side. More seepage should be expected the more permeable the landform barrier material is. During placement, the materials for the landform barrier should be placed in maximum loose lift thicknesses of 300 mm and uniformly compacted to at least 98 per cent standard Prcotor maximum dry density.

5.22.3 Recommended Geotechnical Explorations for Detailed Design Phase

Continued geotechnical involvement is required during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out for the landform barrier. Geotechnical explorations should consist of relatively shallow boreholes approximately 1.5 m deep and spaced along the berm length to explore existing fill and topsoil thicknesses, and the presence of underlying native sand or silty clay.

5.23 Low Impact Development Measures

It is understood that low impact development (LID) measures such as exfiltration trenches are being considered for various project locations. The suitability of the soils at the various site locations to provide drainage for exfiltration trenches is dependent on several soil properties, including the soil gradation, density, clay percentage, mineralogy of clay portion, plasticity characteristics of the soil and orgainic content. For functional design purposes, the following table provides approximate coefficients of permeability and percolocation time ranges for the typical soils encountered at the project locations.

Table 1: Approximate Relationship of Permeability and Percolation Time by Soil Type[1]

Soil Type (Unified Soil Classification System)	Coefficient of Permeability, K – cm/sec	Percolation Time, T – mins/cm
SW – Well graded sands, gravelly sands little or no fines	10^{-1} – 10^{-4}	2-12
SP – Poorly graded sands, gravelly sand, little or no fines	10^{-1} – 10^{-3}	2-8
SM - Silty sands, sand-silt mixtures	10^{-3} – 10^{-5}	8-20
ML – Inorganic silts and very fine sands, rock flour, silty or clayey fine snads, clayey silts with slight plasticity	10^{-5} – 10^{-6}	20-50
CL – Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	10^{-6} and less	Over 50

The predominantly silty clay soils encountered at the project locations will have very low permeabilities. Where encountered, sands will have a relatively medium permeability, with silty sands having a medium to low permeability and may be suitable depending on the required exfiltration rates. The suitability of soils for exfiltration trenches will need to be evaluated on a site-by-site basis.

Geotechnical involvement is required to evaluate the actual permeability of the soils present at each site and at the proposed depth of the LIDs during the design and construction stages of this project. As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out to evaluate the permeability of the soils. Methods to evaluate soil permeability can include grain size analyses and Atterberg limits tests on samples of the site soils, laboratory permeability of a relatively undisturbed samples (Shelby tube samples) of the soil, or in situ percolation or permeability testing. In situ testing is recommended.

5.24 Environmental Contamination Considerations

Ontario Regulation (O.Reg.) 406/19 (which comes into effect January 1, 2021), will govern the management of excess soils that are anticipated to be generated during construction activities associated with the above-

[1] From 2012 Ontario Building Code Compendium, Volume 2, SB-6.

discussed projects. Specifically, O.Reg. 406/19 imposes new requirements on both generators and receivers of excess soil, outlines a defined process for assessing excess soil, and provides new standards for the assessment of excess soil quality *(including specific considerations for the management of excess soils and sediments from stormwater ponds).*

Central to O.Reg. 406/19, and the accompanying "Soil Rules", are prescribed planning and reporting requirements. Although many types of projects are exempt from certain regulatory requirements, proper characterization and documentation is still recommended, and in many cases, are ultimately required by O.Reg. 406/19. The sampling requirements (frequency and analytical parameters) and reporting requirements for the above-noted project sites will ultimately depend on a number of factors, including (but not necessarily limited to) the volume of excess soil (or sediment) to be removed from the site, the specific requirements of the intended receiver of the soil (the "Re-Use Site"), and on the results of the initial site characterization activities.

Understanding of Site Conditions

During the construction of the above-discussed projects, there is the possibility of encountering contaminants as a result of historical site use or placement of fill materials on the sites. Specific contaminants of concern may be identified through understanding the origin(s) of the fill (or sediment) material in consideration, and historical operations on and near the site where the fill was placed (or sediment has accumulated) (i.e., through completion of "Phase I Environmental Site Assessment" or "Assessment of Past Uses").

With respect to the above-discussed projects, we understand that there is a potential for these project sites to be situated near existing railways and/or in locations where foundry sand fill is likely to be encountered during constuction.

Typical contaminants of concern associated with general **rail activity** (rail corridors) include heavy metals and polycyclic aromatic hydrocarbons (PAHs) associated with rail ballast, as well as petroleum hydrocarbons associated with the use of diesel fuel. Additional contaminants of concern for areas where engine or rail car maintenance has been carried out include volatile organic compounds (VOCs) (i.e., related to solvent use).

Contaminants of concern associated with **foundry sand** vary, depending on the source of the foundry sand. Typical contaminants of concern for foundry sand include heavy metals and petroleum hydrocarbons. Where foundry sand has been re-used as fill material, and mixed in with other fill materials, there is also the potential for other contaminants (associated with general industrial activities at the originating property) to be present (e.g., VOCs, PAHs).

With respect to **storm water managment (SWM) ponds**, O.Reg. 406/19 sets out minimum sampling and analysis requirements based on the likelihood for various contaminants to be present (petroleum hydrocarbons, PAHs, metals and other inorganics). Due to the physical properties of SWM pond sediment (primarily high-water content silts and clays, potentially with significant organic content), beneficial reuse opportunities may be limited even if the material meets the applicable soil quality standards. O.Reg. 406/19, and the accompanying Soil Rules, outline specific requirements relating to dewatering or solidifying liquid soils (i.e., including, but not limited to, sediment).

6.0 CLOSURE

As the functional design progresses to the detailed design phase, a site-specific geotechnical exploration and testing program should be carried out to address design aspects relating to each of the proposed structures discussed in this report. Following the completion of the exploration and testing program, the comments provided in this report may be revised based on the new information.

The factual data, interpretation and recommendations presented in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, Golder Associates Ltd. should be given an opportunity to confirm that the recommendations are still valid. The subject geotechnical assessment and this report address only the geotechnical aspects of the proposed project. Potential environmental impacts or related issues are beyond the defined scope of the work and have not been addressed.

We trust that this report provides the preliminary geotechnical information currently required. Should any point require further clarification, please contact this office.

Signature Page

Golder Associates Ltd.

Peter Giuliani, P.Eng.
Senior Geotechnical Engineer

Mark A. Swallow, P.E., P.Eng.
Principal and Senior Practice Leader

PG/MAS/vf

https://golderassociates.sharepoint.com/sites/122185/project files/6 deliverables/rev0/20138323-r01-rev0 aug 7 2020 (final) geo review dillon cow master sewer plan.docx

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground Water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

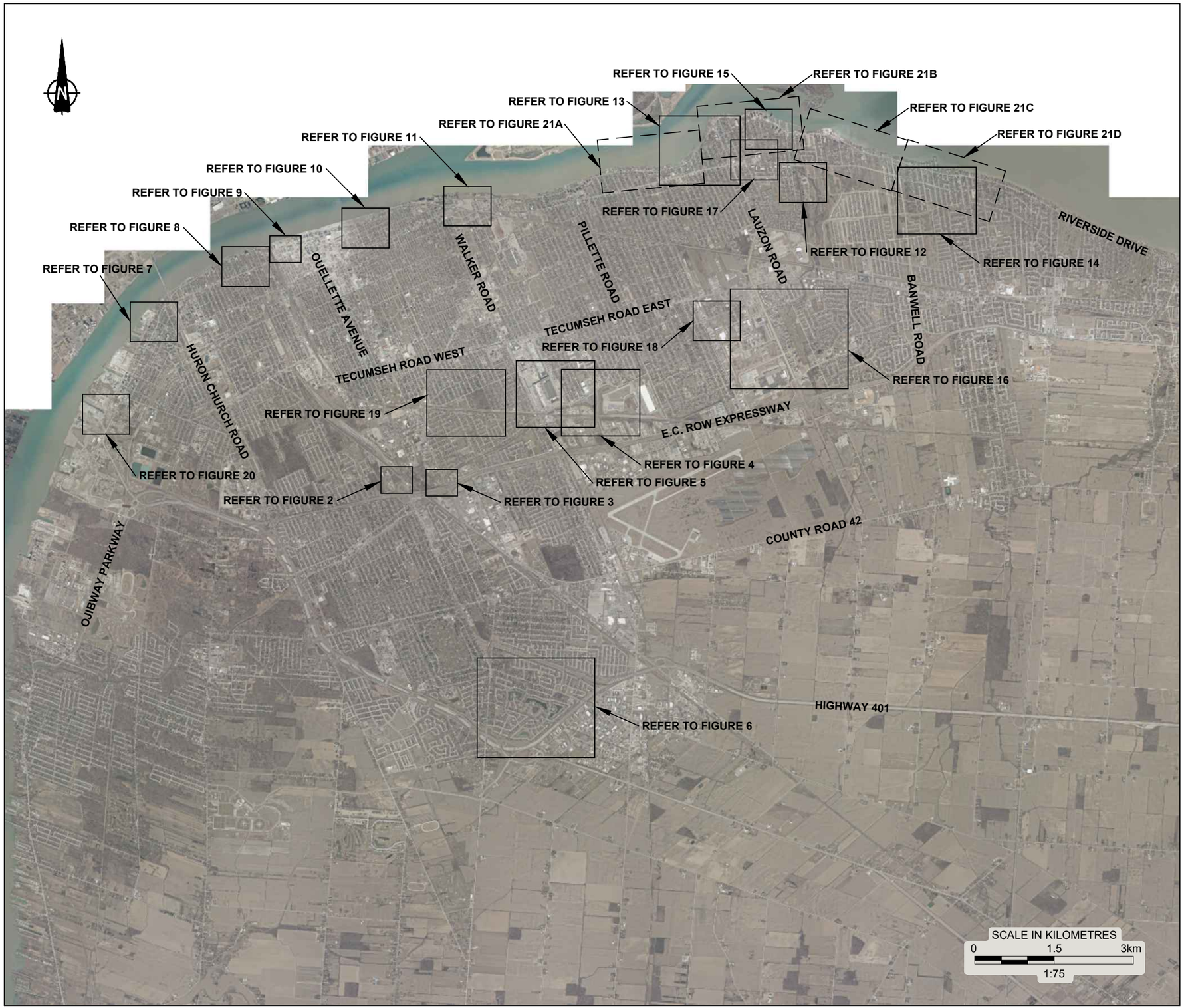
Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION; AND
DATA PROVIDED BY DILLON CONSULTING.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

LOCATION PLAN

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01001
			SCALE	AS SHOWN
CADD	ZJB	May 19/20	REV.	
CHECK				

FIGURE 1

LEGEND

PROPOSED SURCHARGE STORAGE POND OUTLINE

BOREHOLE PREVIOUS GOLDER REPORT:

- 1668632-R01
- 1546452-R01
- 011-4226

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

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MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

DOUGALL UNDERPASS NEW SURCHARGE SURFACE STORAGE POND

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE	AS SHOWN
CADD	ZJB	Mar 23/20	REV.	
CHECK	PH			

FIGURE 2

LEGEND

PROPOSED SURCHARGE STORAGE POND OUTLINE

BOREHOLE PREVIOUS GOLDER REPORT:

021-4035

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

HOWARD AT E.C. ROW NEW SURCHARGE SURFACE STORAGE POND

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE	AS SHOWN
CADD	ZJB	Mar 23/20	REV.	
CHECK				

FIGURE 3

LEGEND

PROPOSED SURCHARGE STORAGE POND OUTLINE

EXISTING STORM RETENTION POND

BOREHOLE PREVIOUS GOLDER REPORT:

- 09-1140-W011
- 06-1140-142
- 1405768
- 791-4012

QUATERNARY GEOLOGY

(3) Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

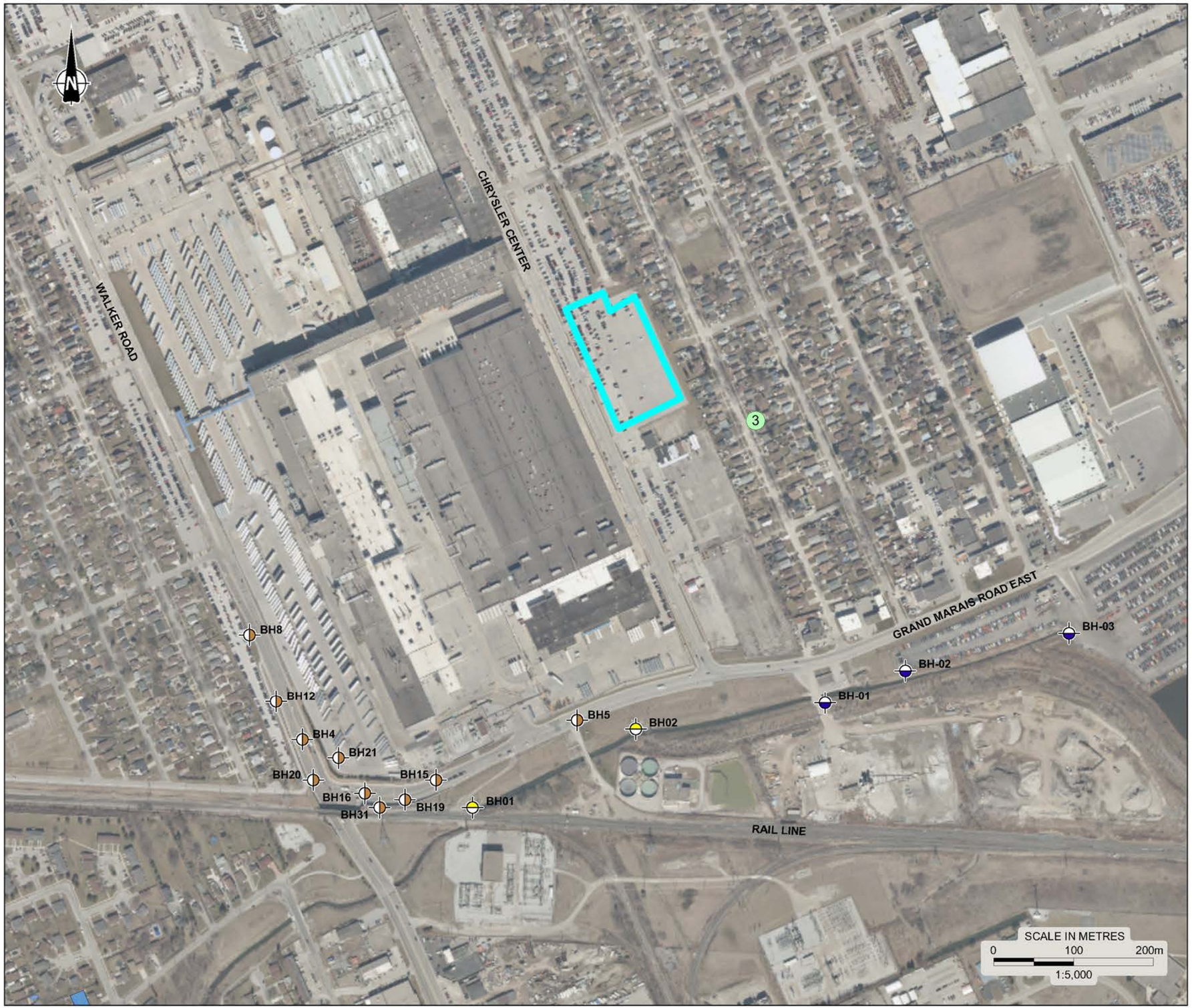
TITLE

CENTRAL AVENUE, PILLETTE ROAD EXPANDED CENTRAL POND

GOLDER

PROJECT No.			20138323	FILE No.	20138323-R01002
				SCALE AS SHOWN	REV.
CADD	ZJB	Mar 23/20			
CHECK	P.H.				

FIGURE 4



LEGEND

PROPOSED UNDERGROUND SURCHARGE STORAGE TANK

BOREHOLE PREVIOUS GOLDER REPORT:

- 09-1140-W011-R01
- 08-1140-W028-R01
- 041-140048

QUATERNARY GEOLOGY

(3) Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

CHRYSLER CENTER NEW UNDERGROUND SURCHARGE STORAGE

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE AS SHOWN	REV.
CADD	Z.B	Apr 2/20		
CHECK	P.H.		**FIGURE 5**	

LEGEND

PROPOSED SURCHARGE STORAGE POND OUTLINE

EXISTING STORM RETENTION POND

WATER WELL AS LISTED IN MECP RECORDS

BOREHOLE PREVIOUS GOLDER REPORT:

13-1140-0207-R01

09-1140-W037-R01

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND
DATA PROVIDED BY DILLON CONSULTING; AND
WATER WELLS AS LISTED IN MECP RECORDS AS OF DECEMBER 2019.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

SOUTHWOOD LAKES LOWERED NORMAL WATER LEVEL IN EXISTING PONDS

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE	AS SHOWN
CADD	Z.B	Mar 25/20	REV.	
CHECK	P.H.			

FIGURE 6

LEGEND

PROPOSED NEW OR UPGRADED STORM SEWER

PROPOSED NEW STORM SEWER OUTFALL

BOREHOLE PREVIOUS GOLDER REPORT:

1660023-3000-R01

1520407-2000-R03

11-1140-0200-R01

TEST PIT PREVIOUS GOLDER REPORT:

031-145072

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

DETROIT STREET TRUNK SEWER UPGRADE

GOLDER

PROJECT No.	20138323	FILE No.	20138323–R01002
		SCALE	AS SHOWN
CADD	ZJB	Mar 25/20	REV.
CHECK	PH		

FIGURE 7

Client: Dillon Consulting

Original Format is Tabloid 279mm x 432mm

25mm 0

Mar 25, 2020 – 3:01pm

Drawing file: 20138323–R01002.dwg

LEGEND

PROPOSED NEW OR UPGRADED STORM SEWER

PROPOSED NEW STORM SEWER OUTFALL

BOREHOLE PREVIOUS GOLDER REPORT:

13-1140-0188-R01

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

CAMERON AVENUE TRUNK SEWER UPGRADE

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE AS SHOWN	REV.
CADD	ZJB	Mar 23/20		
CHECK	P.H.			

FIGURE 8

LEGEND

PROPOSED NEW OR UPGRADED STORM SEWER

PROPOSED NEW STORM SEWER OUTFALL

BOREHOLE PREVIOUS GOLDER REPORT:

13-1140-0188-R01

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

BRUCE AVENUE TRUNK SEWER

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE	AS SHOWN
CADD	Z.B	Mar 23/20	REV.	
CHECK	P.H.			

FIGURE 9

LEGEND

PROPOSED NEW OR UPGRADED STORM SEWER

PROPOSED NEW STORM SEWER OUTFALL

BOREHOLE PREVIOUS GOLDER REPORT:

10-1140-0090-1000-L02

001-4009

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

MARENTETTE AVENUE TRUNK SEWER

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE AS SHOWN	REV.
CADD	ZJB	Mar 23/20		
CHECK	P.H.			

FIGURE 10

LEGEND

- PROPOSED NEW OR UPGRADED STORM SEWER
- PROPOSED NEW STORM SEWER OUTFALL
- DROUILLARD UNDERPASS PUMP STATION

BOREHOLE PREVIOUS GOLDER REPORT:

- 08-1132-033-0-R01
- 06-1140-006
- 011-4205
- 011-4136

QUATERNARY GEOLOGY

- 3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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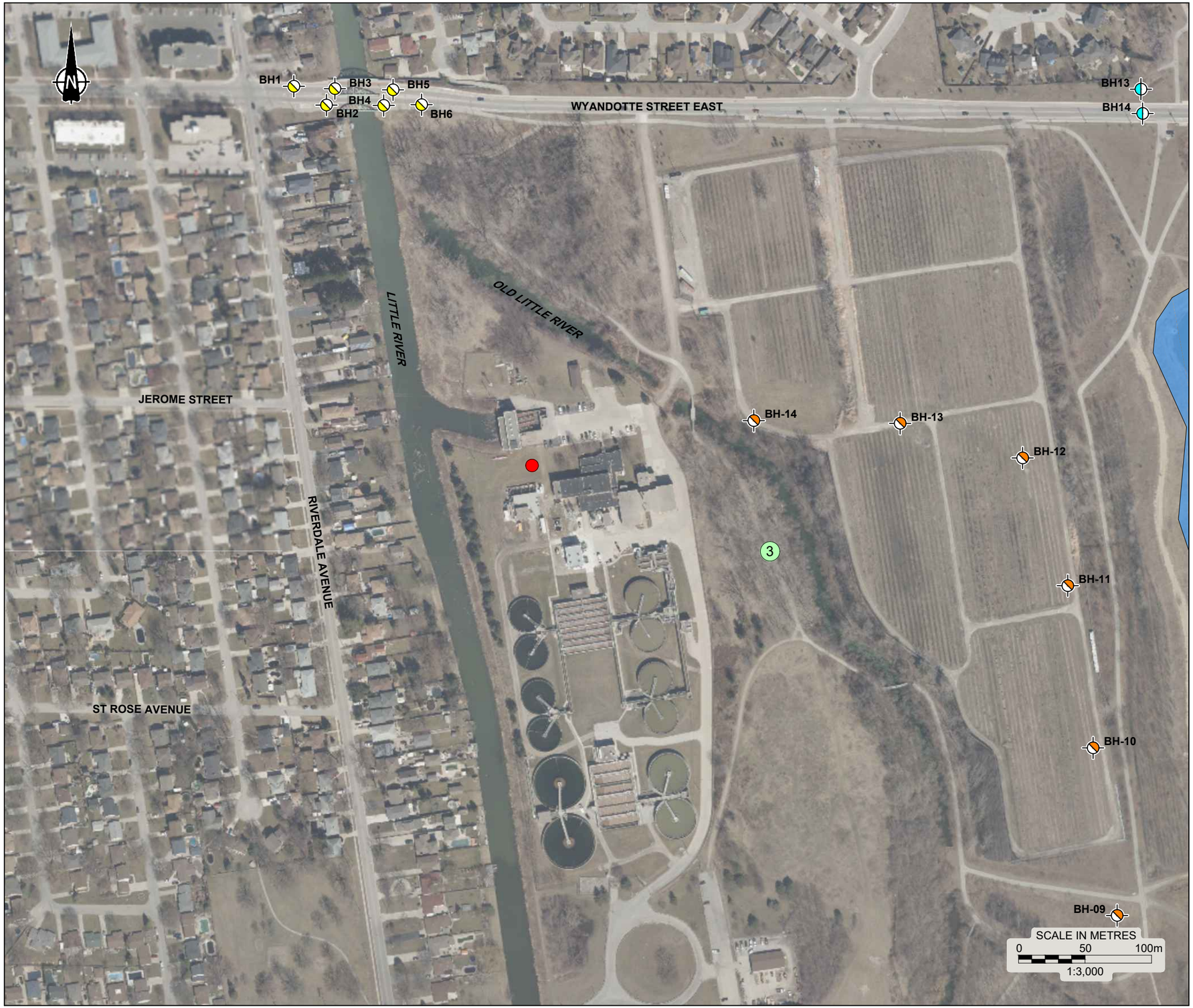
ALL LOCATIONS ARE APPROXIMATE.

PROJECT
GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE
ALBERT ROAD TRUNK SEWER AND DROUILLARD UNDERPASS PUMP STATION

GOLDER

PROJECT No.		20138323	FILE No.	20138323–R01002
			SCALE AS SHOWN	REV.
CADD	ZJB	May 29/20		
CHECK	PH		**FIGURE 11**	



LEGEND

- PONTIAC PUMP STATION

BOREHOLE PREVIOUS GOLDER REPORT:

- 09-1140-W091B
- 031-140318
- 031-140333

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

PONTIAC PUMP STATION

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE	AS SHOWN
CADD	ZJB	Aug 6/20	REV.	
CHECK	PH			

FIGURE 12

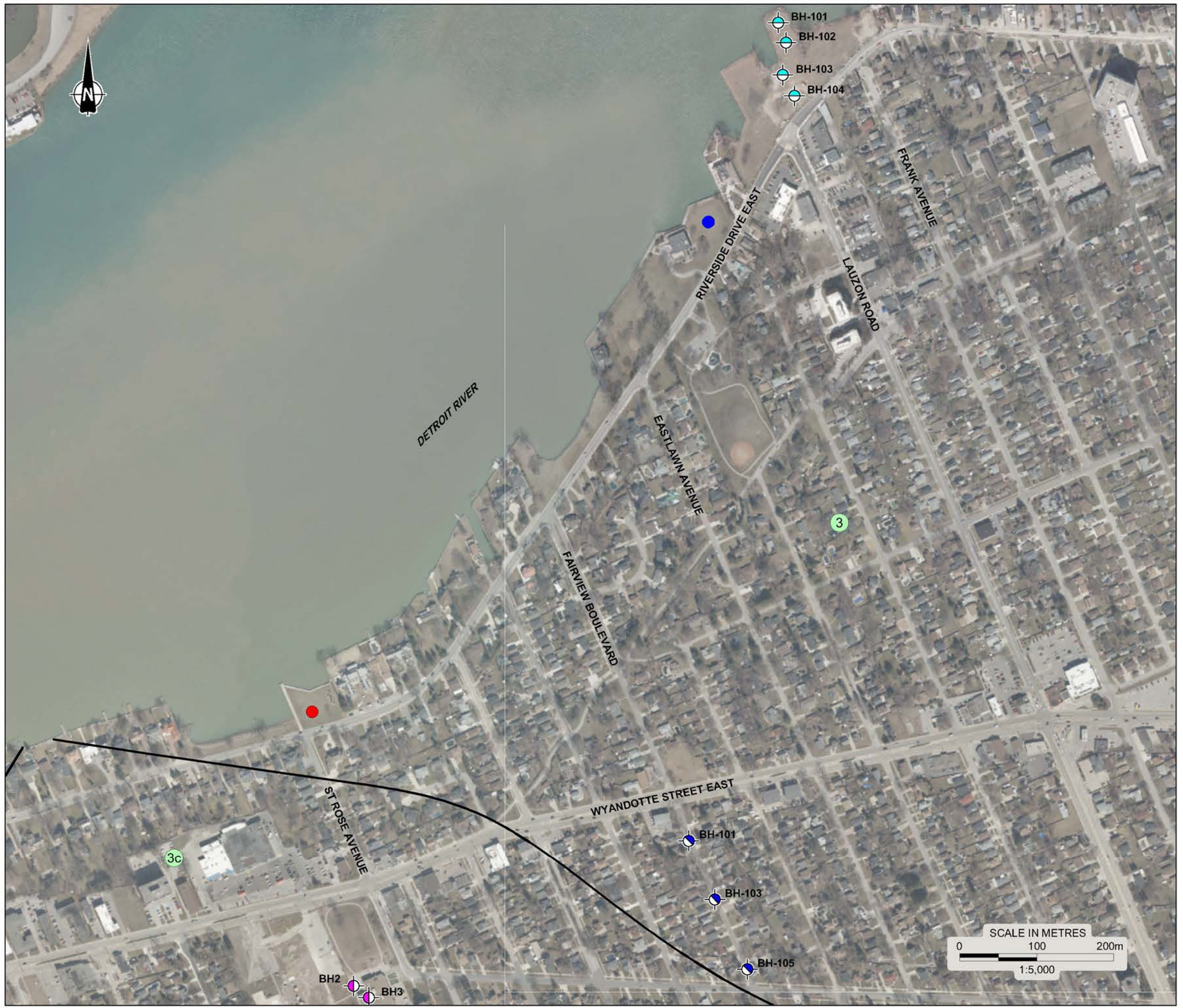
Client: Dillon Consulting

Original Format is Tabloid 279mm x 432mm

25mm 0

Aug 06, 2020 – 2:38pm

Drawing file: 20138323-R01002.dwg



LEGEND

- ST. ROSE PUMP STATION
- ST. PAUL PUMP STATION

BOREHOLE PREVIOUS GOLDER REPORT:

- 1400977-R01
- 13-1140-0026-R01
- 011-4128

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay:
3c. Glaciolacustrine: silty clay deposits overlain by thin, discontinuous sand and gravel deposits

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT
GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE
ST. ROSE AND ST. PAUL PUMP STATIONS

GOLDER

PROJECT No.			20138323	FILE No. 20138323-R01002
				SCALE AS SHOWN REV.
CADD	ZJB	Apr 2/20		
CHECK	PH			**FIGURE 13**

LEGEND

- LAKEVIEW PUMP STATION
- PROPOSED NEW OR UPGRADED STORM SEWER
- EXISTING STORM RETENTION POND

BOREHOLE PREVIOUS GOLDER REPORT:

- 1405019-R01

QUATERNARY GEOLOGY

- 3 Glaciolacustrine Silty Clay
- 7 Modern Beach Deposits: sand, gravel and cobbles

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

LAKEVIEW PUMPING STATION CAPACITY INCREASE

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE	AS SHOWN
CADD	ZJB	Apr 2/20	REV.	
CHECK	PH			

FIGURE 14

Client: Dillon Consulting

Original Format is Tabloid 279mm x 432mm

25mm 0

Apr 02, 2020 - 2:05pm

Drawing file: 20138323-R01002.dwg

LEGEND

PROPOSED UNDERGROUND STORMWATER MANAGEMENT FACILITY

BOREHOLE PREVIOUS GOLDER REPORT:

- 13-1140-0031-R01
- 001-4014

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

BRUMPTON PARK UNDERGROUND STORMWATER MANAGEMENT FACILITY

GOLDER

PROJECT No.		20138323	FILE No.	20138323–R01002
			SCALE	AS SHOWN
CADD	ZJB	Aug 6/20	REV.	
CHECK	PH			

FIGURE 15

LEGEND

PROPOSED SURCHARGE STORAGE POND OUTLINE

PROPOSED UNDERGROUND SURCHARGE STORAGE TANK

BOREHOLE PREVIOUS GOLDER REPORT:

031-140094

001-4238

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

HAWTHORNE AVENUE, LAUZON PARKWAY, JEFFERSON BOULEVARD OFFLINE STORAGE VOLUMES/IMPROVEMENTS

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE AS SHOWN	REV.
CADD	ZJB	Apr 2/20		
CHECK	PH			

FIGURE 16

LEGEND

PROPOSED UNDERGROUND SURCHARGE STORAGE TANK

BOREHOLE PREVIOUS GOLDER REPORT:

- 1406552-R01
- 13-1140-0031-R01
- 011-4276

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

WYANDOTTE STREET EAST, WEST OF LITTLE RIVER, OFFLINE STORAGE

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE	AS SHOWN
CADD	ZJB	Apr 2/20	REV.	
CHECK	P.H.			

FIGURE 17

LEGEND

PROPOSED UNDERGROUND SURCHARGE STORAGE TANK

BOREHOLE PREVIOUS GOLDER REPORT:

1527635-1000-R01

06-1140-020

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

ROSEVILLE GARDEN DRIVE AND HAWTHORNE AVENUE/KEW DRIVE UNDERGROUND STORMWATER DETENTION SYSTEM

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01002
			SCALE AS SHOWN	REV.
CADD	ZJB	Apr 2/20		
CHECK	P.H.			

FIGURE 18

LEGEND

PROPOSED UNDERGROUND SURCHARGE STORAGE TANK

BOREHOLE PREVIOUS GOLDER REPORT:

- 08-1140-W054
- 07-1140-0022
- 031-140060

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

YPRES AVENUE UNDERGROUND STORMWATER STORAGE SYSTEM

GOLDER

PROJECT No.		20138323	FILE No.	20138323–R01002
			SCALE	AS SHOWN REV.
CADD	ZJB	May 19/20		
CHECK			**FIGURE 19**	

Client: Dillon Consulting

Original Format is Tabloid 279mm x 432mm

Drawing file: 20138323–R01002.dwg May 25, 2020 – 11:34am

0 25mm

LEGEND

PROPOSED NEW OR UPGRADED STORM SEWER

PROPOSED NEW STORM SEWER OUTFALL

BOREHOLE PREVIOUS GOLDER REPORT:

09-1140-W025-R01

764111

QUATERNARY GEOLOGY

3 Glaciolacustrine Silty Clay:
3c. Glaciolacustrine: silty clay deposits overlain by thin, discontinuous sand and gravel deposits

5 Lacustrine Beach, Bar and near shore deposits:
sand with minor gravel

10 Cultural Features: quarries, landfills, mine waste, aggregate excavations and sewage lagoons

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT

GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE

PRINCE ROAD OUTLET AT CHAPPELLE/SANDWICH STREET

GOLDER

PROJECT No.		20138323	FILE No.	20138323–R01002
			SCALE	AS SHOWN REV.
CADD	ZJB	May 19/20		
CHECK	PH			

FIGURE 20

LEGEND

- ST. ROSE PUMP STATION
- PROPOSED BERM ALIGNMENT

BOREHOLE PREVIOUS GOLDER REPORT:

- 07-1140-0098
- 011-4128
- 71509

QUATERNARY GEOLOGY

(3) Glaciolacustrine Silty Clay:
3c. Glaciolacustrine: silty clay deposits overlain by thin, discontinuous sand and gravel deposits

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT
GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE
PROPOSED EARTH BERM ALONG RIVERSIDE DRIVE (FORD BOULEVARD TO EAST CITY LIMITS) (1 OF 4)

GOLDER

PROJECT No.			20138323
			SCALE AS SHOWN REV.
CADD	ZJB	May 25/20	
CHECK	PH		

FILE No. 20138323-R01021

FIGURE 21A

Client: Dillon Consulting
Original Format is Tabloid 279mm x 432mm
0 25mm
May 25, 2020 – 9:46am
Drawing file: 20138323-R01021.dwg

LEGEND

- ST. PAUL PUMP STATION
- PROPOSED UNDERGROUND STORMWATER MANAGEMENT FACILITY
- PROPOSED BERM ALIGNMENT

BOREHOLE PREVIOUS GOLDER REPORT:

- 1400977-R01
- 13-1140-0031-R01
- 001-4014

QUATERNARY GEOLOGY

- 3 Glaciolacustrine Silty Clay

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT
GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE
PROPOSED EARTH BERM ALONG RIVERSIDE DRIVE (FORD BOULEVARD TO EAST CITY LIMITS) (2 OF 4)

GOLDER

PROJECT No.		20138323	FILE No.	20138323-R01021
			SCALE AS SHOWN	REV.
CADD	ZJB	Aug 6/20		
CHECK				

FIGURE 21B

LEGEND

PROPOSED BERM ALIGNMENT

BOREHOLE PREVIOUS GOLDER REPORT:

- 09-1140-W028-R01
- 07-1140-0027
- 001-4247
- 001-4067

QUATERNARY GEOLOGY

- (3) Glaciolacustrine Silty Clay
- (7) Modern Beach Deposits: sand, gravel and cobbles

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

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PROJECT
GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE
PROPOSED EARTH BERM ALONG RIVERSIDE DRIVE (FORD BOULEVARD TO EAST CITY LIMITS) (3 OF 4)

GOLDER

PROJECT No.		20138323	FILE No. 20138323-R01021
			SCALE AS SHOWN REV.
CADD	ZJB	May 25/20	
CHECK	P.H.		

FIGURE 21C

LEGEND

- EXISTING PUMP STATION
- PROPOSED NEW OR UPGRADED STORM SEWER
- PROPOSED BERM ALIGNMENT

QUATERNARY GEOLOGY

- (3) Glaciolacustrine Silty Clay
- (7) Modern Beach Deposits: sand, gravel and cobbles

REFERENCE

DRAWING BASED ON 2019 AERIAL IMAGE PROVIDED BY THE COUNTY OF ESSEX INTERACTIVE WEB MAPPING SITE, BY PERMISSION;
MINISTRY OF NORTHERN DEVELOPMENT AND MINES, MAP P.3253, QUATERNARY GEOLOGY, ESSEX COUNTY AREA (WEST HALF) SOUTHERN ONTARIO, 1994; AND DATA PROVIDED BY DILLON CONSULTING.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT
GEOTECHNICAL REVIEW OF SELECTED SITES
CITY OF WINDSOR SEWER MASTER PLAN
WINDSOR, ONTARIO

TITLE
PROPOSED EARTH BERM ALONG RIVERSIDE DRIVE (FORD BOULEVARD TO EAST CITY LIMITS) (4 OF 4)

GOLDER

PROJECT No.			20138323	FILE No. 20138323-R01021
				SCALE AS SHOWN REV.
CADD	ZJB	May 25/20		
CHECK	P.H.			**FIGURE 21D**

APPENDIX A

Previous Records of Boreholes and Test Pits by Golder Associates Ltd.

Form G.A. - D - 1

Project No 71509

RECORD OF BOREHOLE 1

LOCATION See Figure 1 BORING DATE FEB. 5, 1971 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD: POWER AUGER 4.5" DIA. (UNCASED)

ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FT.
578.3 / 0	GROUND LEVEL				
578.0 / 0.3	SAND AND GRAVEL (FILL)				
576.8 / 1.5	VERY STIFF BROWN SILTY CLAY (FILL)		1	2" D.O.	18
573.8 / 4.5	FIRM BLACK CLAYEY SILT WITH ORGANICS		2	"	7
571.3 / 7.0	HARD BROWN SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		3	"	30
			4	"	48
564.3 / 14.0			5	"	37
	FIRM TO VERY STIFF GREY SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		6	"	25
			7	"	11
			8	3" T.O.	Ph
			9	2" D.O.	6
545.8 / 32.5	END OF HOLE				

ELEVATION SCALE: 580, 575, 570, 565, 560, 555, 550, 545

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. (20, 40, 60, 80)

SHEAR STRENGTH Cu., LB./SQ.FT. (500, 1000, 1500, 2000) NAT. V. - + Q. - ● REM. V. - ⊕ U. - O

COEFFICIENT OF PERMEABILITY, K., CM./SEC. (1x10, 1x10, 1x10, 1x10)

WATER CONTENT, PERCENT (Wp, W, WL) (10, 20, 30, 40)

ADDITIONAL LAB. TESTING: MH; MH; MH; MH-CONS-U

PIEZOMETER OR STANDPIPE INSTALLATION: WATER LEVEL IN OPEN BOREHOLE AT ELEV - 577.8 FEB 19, 1971

(Golder Report No. 71509)

"Note: This Drawing has been Reduced and is in Imperial Units"

0 / 15 5 / 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN V. J. K.

CHECKED PB

Form G.A. - D - 1

Project No 71509

RECORD OF BOREHOLE 2

LOCATION See Figure 1 BORING DATE FEB. 5, 1971 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD: POWER AUGER 4.5" DIA. (UNCASED)

ELEV'N / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS/FT.
	TOPSOIL				
578.6	GROUND LEVEL				
0.2	FIRM TO STIFF BROWN SILTY CLAY, TRACE RUBBLE (FILL)		1	2" D.O.	12
572.6			2	"	4
6.0	FIRM BLACK CLAYEY SILT WITH WOOD PIECES & ORGANICS		3	"	4
569.6					
9.0	FIRM GREY SILTY CLAY (TILL-LIKE)		4	"	5
567.6					
11.0	HARD BROWN SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		5	"	51
			6	"	58
561.6					
17.0	FIRM TO STIFF GREY SILTY CLAY, SOME SAND, OCC. GRAVEL (TILL-LIKE)		7	"	9
			8	"	7
			9	"	4
546.1					
32.5	END OF HOLE				

ELEVATION SCALE: 580, 575, 570, 565, 560, 555, 550, 545

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. — 20 40 60 80

SHEAR STRENGTH Cu., LB./SQ.FT. — NAT. V. - + Q. - ● REM. V. - ⊕ U. - O — 500 1000 1500 2000

COEFFICIENT OF PERMEABILITY, K., CM./SEC. — 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT — Wp W WL — 10 20 30 40

ADDITIONAL LAB. TESTING

(Golder Report No. 71509)

"Note: This Drawing has been Reduced and is in Imperial Units"

MH

145%

PIEZOMETER OR STANDPIPE INSTALLATION

PROTECTIVE PIPE & CAP

GROUND SURFACE

SURFACE SEAL

PLASTIC TUBING

CLAY BACKFILL

GRAVEL BACKFILL

STANDPIPE

WATER LEVEL IN STANDPIPE AT ELEV. 574.1 FEB. 26, 1971

15 0 5 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN V.J.K.

CHECKED PB

Form G.A. - D - 1

Project No 71509

RECORD OF BOREHOLE 3

LOCATION See Figure 1 BORING DATE FEB. 8, 1971 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD: POWER AUGER 4.5" DIA. (UNCASED)

ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS/FT.
575.8	GROUND LEVEL				
	TOPSOIL				
0.3					
	FIRM TO STIFF BROWN SILTY CLAY (FILL)		1	2" D.O.	13
			2	"	5
572.3					
6.5	FIRM BLACK CLAYEY SILT WITH ORGANICS		3	"	6
568.8					
10.0	FIRM GREY SILTY CLAY (TILL-LIKE)		4	"	6
565.8					
12.0	HARD BROWN SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		5	"	27
			6	"	71
560.8					
18.0					
	FIRM TO STIFF GREY SILTY CLAY, SOME SAND, OCC. GRAVEL (TILL-LIKE)		7	"	11
			8	"	8
			9	"	6
			10	"	7
			11	"	7
			12	"	8
530.8					
48.0	END OF HOLE				

ELEVATION SCALE: 580, 575, 570, 565, 560, 555, 550, 545, 540, 535, 530

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. 20 40 60 80

SHEAR STRENGTH Cu., LB./SQ.FT. NAT. V. - + Q. - ● REM. V. - ⊕ U. - O 500 1000 1500 2000

COEFFICIENT OF PERMEABILITY, K., CM./SEC. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W WL 10 20 30 40

81%

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

WATER LEVEL IN OPEN BOREHOLE AT ELEV. 575.8 FEB. 26, 1971

0 / 15 5 / 10 Percent axial strain at failure

(Golder Report No. 71509)

"Note: This Drawing has been Reduced and is in Imperial Units"

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN V.J.K.

CHECKED PB

Form G.A. - D - 1

Project No 71509

RECORD OF BOREHOLE 4

LOCATION See Figure 1 BORING DATE FEB. 9, 1971 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD	SOIL PROFILE: ELEV'N. / DEPTH	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRAT. PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/FT.	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. (20 40 60 80) / SHEAR STRENGTH Cu., LB./SQ.FT. NAT. V. - + Q. -● REM. V. - ⊕ U. -O (500 1000 1500 2000)	COEFFICIENT OF PERMEABILITY, K., CM./SEC. (1x10 1x10 1x10 1x10) / WATER CONTENT, PERCENT Wp W WL (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
POWER AUGER 4.5" DIA. (UNCASED)		TOPSOIL					580				
	578.7	GROUND LEVEL									
	0.4	STIFF BROWN SILTY CLAY WITH RUBBLE (FILL)		1	2"	9					
	574.2				0.0		575				
	4.5	SOFT TO FIRM BLACK CLAYEY SILT WITH SAND, GRAVEL AND ORGANIC		2	=	3					
	569.7			3	=	3			104.9%		
	9.0	FIRM GREY SILTY CLAY (TILL-LIKE)		4	=	8	570		68.3%		
	567.7										
	11.0	HARD BROWN SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		5	=	43	565				
				6	=	55					
	560.7						560				
	18.0	FIRM TO STIFF GREY SILTY CLAY, SOME OCC. GRAVEL (TILL-LIKE)		7	=	14					
				8	=	6	555				
							550				
				9	=	7					
	546.2										
	32.5	END OF HOLE					545				

(Golder Report No. 71509)

"Note: This Drawing has been Reduced and is in Imperial Units"

WATER LEVEL IN OPEN BOREHOLE AT ELEV. 575.7 FEB. 26, 1971

15 ◆ 0 5 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN V. J. K.

CHECKED RB

Form G.A. - D - 1

Project No 71509

RECORD OF BOREHOLE 5

LOCATION See Figure 1 BORING DATE FEB. 9 & 10, 1971 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD	ELEV'N / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FT.
POWER AUGER 4.5" DIA. (UNCASED)	578.5 / 0.0	TOPSOIL GROUND LEVEL				
	574.0 / 0.3	VERY STIFF BROWN SILTY CLAY (FILL)		1	2" O.D.	17
	570.0 / 4.5	VERY LOOSE TO COMPACT BROWN SAND (FILL)		2		21
				3		2
	568.5 / 6.0	VERY STIFF BLACK CLAYEY SILT				
	567.5 / 9.5	VERY STIFF GREY SILTY CLAY (TILL-LIKE)		4		20
	560.5 / 11.0	HARD BROWN SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		5		49
				6		66
	547.5 / 18.0	FIRM TO STIFF GREY SILTY CLAY, SOME SAND, OCC. GRAVEL (TILL-LIKE)		7		11
				8		5
				9		7
	31.0	END OF HOLE				

ELEVATION SCALE: 580, 575, 570, 565, 560, 555, 550, 545

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. — 20, 40, 60, 80

SHEAR STRENGTH Cu., LB./SQ.FT. — NAT. V. - + Q. - ● REM. V. - ⊕ U. - O — 500, 1000, 1500, 2000

COEFFICIENT OF PERMEABILITY, K., CM./SEC. — 1x10, 1x10, 1x10, 1x10

WATER CONTENT, PERCENT — Wp, W, WL — 10, 20, 30, 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

(Golder Report No. 71509)

"Note: This Drawing has been Reduced and is in Imperial Units"

WATER LEVEL IN OPEN BOREHOLE AT ELEV.-574.5 FEB. 26, 1971

0 / 15 ◆ 5 / 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN V.J.K.

CHECKED RB

Form G.A. - D - 1

Project No 71509

RECORD OF BOREHOLE 6

LOCATION See Figure 1 BORING DATE FEB. 10, 1971 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD: POWER AUGER 4.5" DIA (UNCASED)

ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS/FT.
578.3 / 0.0	GROUND LEVEL				
	TOPSOIL				
578.3 / 0.3	STIFF BROWN SILTY CLAY (FILL)		1	2" O.D.	11
			2	"	14
573.0 / 5.3	VERY LOOSE TO COMPACT BROWN SAND (FILL)		3	"	3
568.3 / 10.0	VERY STIFF TO HARD BROWN SILTY CLAY, OCC. GRAVEL (TILL-LIKE)		4	"	23
			5	"	62
			6	"	67
560.3 / 18.0	FIRM TO VERY STIFF GREY SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		7	"	9
			8	"	16
			9	"	8
547.3 / 31.0	END OF HOLE				

ELEVATION SCALE: 580, 575, 570, 565, 560, 555, 550, 545

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. (20, 40, 60, 80)

SHEAR STRENGTH Cu., LB./SQ.FT. NAT. V.- + C.-● REM. V.- ⊕ U.-○

COEFFICIENT OF PERMEABILITY, K., CM./SEC. (1x10, 1x10, 1x10, 1x10)

WATER CONTENT, PERCENT (Wp, W, WL)

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

WATER LEVEL IN OPEN BOREHOLE AT ELEV. 576.3 FEB. 19, 1971

BOREHOLE CAVED TO ELEV. - 576.3 FEB. 26, 1971

(Golder Report No. 71509)

"Note: This Drawing has been Reduced and is in Imperial Units"

0 / 15 ◆ 5 / 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN V.J.K.

CHECKED

Form G.A. - D - 1

Project No 71509

RECORD OF BOREHOLE 7

LOCATION See Figure 1 BORING DATE FEB. 15, 1971 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD: POWER AUGER 7.5" DIA. (HOLLOW STEM)

ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FT.
	TOPSOIL				
577.0	GROUND LEVEL				
0.3	VERY STIFF BROWN SILTY CLAY (FILL)		1	2" D.O.	19
572.0					
5.0	COMPACT BROWN SAND (FILL)		2	"	14
568.5					
8.5	FIRM GREY SILTY CLAY (TILL-LIKE)		3	"	8
566.0					
11.0	HARD BROWN SILTY CLAY SOME SAND OCC. GRAVEL (TILL-LIKE)		4	"	52
			5	"	34
560.5					
16.5			6	"	11
			7	2" TO	PH
	FIRM TO STIFF GREY SILTY CLAY, SOME SAND, OCC. GRAVEL (TILL-LIKE)		8	2" D.O.	4
			9	"	8
			10	"	6
			11	"	7
530.0					
47.0	FIRM GREY SILTY CLAY		12	"	6
528.0					
49.0	END OF HOLE				

ELEVATION SCALE: 575, 570, 565, 560, 555, 550, 545, 540, 535, 530

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. 20 40 60 80

SHEAR STRENGTH Cu., LB./SQ.FT. NAT. V. - + Q. - ● REM. V. - ⊕ U. - O
500 1000 1500 2000

COEFFICIENT OF PERMEABILITY, K., CM./SEC. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W WL
10 20 30 40

(Golder Report No. 71509)

"Note: This Drawing has been Reduced and is in Imperial Units"

ADDITIONAL LAB. TESTING: MH

PIEZOMETER OR STANDPIPE INSTALLATION: WATER LEVEL IN OPEN BOREHOLE AT ELEV. - 575.0 FEB 19, 1971

BOREHOLE CAVED TO ELEV. - 575.0 FEB. 26, 1971

15 0 5 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN V. J. K.

CHECKED DE

Form G.A.-D-1.

Project No. 764111

RECORD OF BOREHOLE 101

LOCATION See Figure 1 BORING DATE OCT. 5, 1976 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD: POWER AUGER 4.5" DIA. (UNCASED)

ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FT.
584.0 / 0.0	GROUND SURFACE				
	STIFF BLACK CLAYEY TOPSOIL		1	2" D.O.	20
580.5 / 3.5			2	"	6
	STIFF TO VERY STIFF GREY TO BROWN SILTY CLAY TRACE SAND		3	3" T.O.	P.H.
576.0 / 8.0			4	2" D.O.	3
	STIFF BECOMING FIRM TO STIFF GREY WITH RED FLECKS SILTY CLAY SOME SAND TRACE GRAVEL (TILL-LIKE)		5	"	3
564.5 / 19.5	END OF HOLE				

ELEVATION SCALE: 585, 580, 575, 570, 565, 560

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. 20 40 60 80

SHEAR STRENGTH Cu., LB./SQ.FT. NAT. V. - + Q. - ● REM.V. - ⊕ U. - ○
500 1000 1500 2000

COEFFICIENT OF PERMEABILITY, k, CM./SEC. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W WL
10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

(Golder Report No. 764111)

"Note: This Drawing has been Reduced and is in Imperial Units"

2560+

GROUND SURFACE
CLAYEY BACKFILL
PLASTIC TUBING
GRANULAR MATERIAL
PERFORATED STANDPIPE

SIDES OF UNLINED BOREHOLE STABLE DURING DRILLING

BOREHOLE DRY ON COMPLETION OF DRILLING OCTOBER 5, 1977

STANDPIPE DESTROYED

15 ◆ 0 5 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN A.K.D.
CHECKED [illegible]

Form G.A.-D-1.

Project No. 764111

RECORD OF BOREHOLE 102

LOCATION See Figure 1 BORING DATE OCT. 6 & 7, 1976 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD: POWER AUGER 4.5" DIA. (UNCASED)

ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FT.
591.0 / 0.0	GROUND SURFACE				
589.5 / 1.5	BLACK TOPSOIL		1	2" D.O.	14
	COMPACT BROWN FINE TO MEDIUM GRAINED SAND TRACE SILT		2	"	21
586.0 / 5.0	COMPACT BROWN SILTY SAND		3	"	19
584.0 / 7.0	(A)		4	"	5
	(A) FIRM TO STIFF GREY WITH SOME BROWN CLAYEY SILT, OCCASIONAL THIN SAND SEAMS		5	"	2
579.5 / 11.5	FIRM GREY WITH RED FLECKS SILTY CLAY SOME SAND TRACE GRAVEL (TILL-LIKE)		6	3" T.O.	P.H.
			7	2" D.O.	W.H.
565.0 / 26.0			8	"	W.H.
	FIRM TO STIFF GREY WITH RED FLECKS SILTY CLAY SOME SAND TRACE GRAVEL (TILL-LIKE)		9	"	W.H.
			10	3" T.O.	P.H.
551.0 / 40.0	END OF HOLE				

ELEVATION SCALE: 590, 585, 580, 575, 570, 565, 560, 555, 550

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. — 20 40 60 80

SHEAR STRENGTH Cu., LB./SQ.FT. — NAT. V.-+ Q.-● REM. V.-⊕ U.-○ — 500 1000 1500 2000

COEFFICIENT OF PERMEABILITY, k, CM./SEC. — 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT — W_P W W_L — 10 20 30 40

ADDITIONAL LAB. TESTING: M, MH, MH, MH

PIEZOMETER OR STANDPIPE INSTALLATION: GROUND SURFACE; CLAYEY BACKFILL; PLASTIC TUBING; GRANULAR MATERIAL; PERFORATED STANDPIPE; CAVED MATERIAL; MINOR CAVING IN SIDES OF UNLINED BOREHOLE FROM 5 TO 8 FEET BELOW GROUND SURFACE; SLOW TO MEDIUM SEEPAGE AT ABOUT ELEV. 584.0 DURING DRILLING; STANDPIPE DESTROYED

0 15 5 10 Percent axial strain at failure

(Golder Report No. 764111)

"Note: This Drawing has been Reduced and is in Imperial Units"

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN A.V.D.

CHECKED bwe

Form G.A. -0-1

Project No. 764111

RECORD OF BOREHOLE 103

LOCATION See Figure 1 BORING DATE OCT. 5, 1976 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

(Golder Report No. 764111)

Note: This drawing has been reduced and is in Imperials units.

BORING METHOD	ELEV. / DEPTH	SOIL DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/FT.	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. (20 40 60 80) / SHEAR STRENGTH Cu, LB./SQ.FT. (500 1000 1500 2000) NAT. V. - + REM. V. - ⊕	COEFFICIENT OF PERMEABILITY, k, CM./SEC. (1x10 1x10 1x10 1x10) / WATER CONTENT, PERCENT (Wp W WL; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
POWER AUGER 7.5" DIA. HOLLOW STEM	576.0 0.0	GROUND SURFACE									
		(A)		1	2" D.O.	18	575	(A) COMPACT BROWN AND GREY STONE, ASH, CINDER AND TOPSOIL FILL MATERIALS			
	574.0 2.0	VERY LOOSE GREY TO BLACK SILTY SAND TRACE CLAY AND ORGANICS		2	"	5					
				3	"	3	570			MH	
				4	"	3					
	566.0 10.0	VERY LOOSE GREY FINE TO MEDIUM GRAINED SAND TRACE TO SOME SILT		5	"	1	565				WATER LEVEL AT ELEVATION 571.0 ON COMPLETION OF DRILLING OCTOBER 5, 1977
	561.5 14.5			6	"	1					
				7	"	W.H.	560				
		FIRM GREY WITH RED FLECKS SILTY CLAY SOME SAND TRACE FINE GRAVEL (TILL-LIKE)		8	3" T.O.	P.H.	555				
				9	2" D.O.	W.H.	550				
	546.5 29.5	END OF HOLE					545				

Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN A.K.D.

CHECKED [illegible]

NOT TO SCALE

Form G.A. - D - 1

Project No. 791-4012

RECORD OF BOREHOLE 3

LOCATION See Figure 1 BORING DATE FEB. 12, 1979 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD	ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FT.
	610.9	ICE SURFACE				
POWER AUGER 4.5" O.D. SOLID STEMS	0.0 609.9	ICE				
	1.0	VERY STIFF TO HARD BROWN **SILTY-CLAY** SOME SAND OCC. GRAVEL OCC. OXIDIZED FISSURES **(TILL-LIKE)**		1	2" O.D.	22
	603.9			2	"	39
	7.0			3	"	41
		HARD TO VERY STIFF GREY **SILTY-CLAY** SOME SAND OCC. GRAVEL OCC. FISSURES AT ELEVATION 602.5 FEET **(TILL-LIKE)**		4	"	19
				5	"	22
				6	"	24
				7	"	19
				8	"	16
				9	"	17
				10	"	16
	584.4					
	26.5	END OF BOREHOLE				

ELEVATION SCALE: 610, 605, 600, 595, 590, 585, 580

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. — 20, 40, 60, 80

SHEAR STRENGTH Cu., LB./SQ.FT. — NAT. V. - + Q. - ● REM. V. - ⊕ U. - ○ — 500, 1000, 1500, 2000

COEFFICIENT OF PERMEABILITY, K., CM./SEC. — 1x10, 1x10, 1x10, 1x10

WATER CONTENT, PERCENT — Wp, W, WL — 10, 20, 30, 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

(Golder Report No. 791-4012)

"Note: This Drawing has been Reduced and is in Imperial Units"

BOREHOLE DRY DURING DRILLING FEB. 12, 1979.

15 — 0 / 10 — 5 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN L. BORTOLUSSI

CHECKED JPH

Form G.A. - D - 1

Project No. 791-4012

RECORD OF BOREHOLE 4

LOCATION See Figure 1 BORING DATE FEB. 12, 1979. DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

(Golder Report No. 791-4012)

"Note: This Drawing has been Reduced and is in Imperial Units"

BORING METHOD	ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FT.	ELEVATION SCALE
	610.5	ICE SURFACE					610
POWER AUGER 4.5" O.D. SOLID STEMS	0.0 609.6	ICE					
	0.9	VERY STIFF TO HARD BROWN **SILTY-CLAY** SOME SAND OCC. GRAVEL OCC. OXIDIZED FISSURES **(TILL-LIKE)**		1	2" DO.	26	
				2	"	40	605
				3	"	51	
	599.0			4	"	39	600
	11.5	HARD TO STIFF GREY **SILTY-CLAY** SOME SAND OCC. GRAVEL **(TILL-LIKE)**		5	"	36	
				6	"	24	595
				7	"	21	
				8	"	18	590
				9	"	19	
				10	"	26	585
				11	"	24	
				12	"	24	580
				13	"	17	
	574.0			14	"	9	575
	36.5	END OF BOREHOLE					

DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. — 20 40 60 80

SHEAR STRENGTH Cu., LB./SQ.FT. — NAT. V. - + Q. - ● REM.V. - ⊕ U. - ○ — 500 1000 1500 2000

COEFFICIENT OF PERMEABILITY, K., CM./SEC. — 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT — W_P W W_L — 10 20 30 40

0 15 ◆ 5 10 Percent axial strain at failure

ADDITIONAL LAB. TESTING: γ 141 p.c.f. ; MH.

PIEZOMETER OR STANDPIPE INSTALLATION: PLASTIC TUBING; CLAY BACKFILL; GRAVEL FILTER; STANDPIPE

BOREHOLE DRY DURING DRILLING FEB. 12, 1979.

WATER LEVEL IN STANDPIPE AT ELEVATION 606.7 FEET FEB. 19, 1979.

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN L. BORTOLUSSI

CHECKED DPM

Form G.A. - D - 1

Project No. 791-4012

RECORD OF BOREHOLE 5, 6 & 7

LOCATION See Figure 1 BORING DATE FEB. 13, 1979 DATUM GEODETIC

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. PENETRATION TEST HAMMER WEIGHT 140 LB., DROP 30 IN.

BORING METHOD	ELEV'N. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FT.	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/FT. (20 40 60 80) / SHEAR STRENGTH Cu., LB./SQ.FT. (500 1000 1500 2000) NAT. V.- + Q.-● REM.V.- ⊕ U.-○	COEFFICIENT OF PERMEABILITY, K., CM./SEC. (1x10 1x10 1x10 1x10) / WATER CONTENT, PERCENT (Wp W WL) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
								BOREHOLE 5			
								(Golder Report No. 791-4012)			
							615	*"Note: This Drawing has been Reduced and is in Imperial Units"*			
POWER AUGER 4.5" O.D. SOLID STEMS	613.0	GROUND SURFACE									
	611.5	BLACK CLAYEY **TOPSOIL**									
	1.5	STIFF MOTTLED BROWN AND GREY **SILTY-CLAY** SOME SAND OCC. GRAVEL **(TILL-LIKE)**		1	2" DO	9	610	HARD BROWN **SILTY-CLAY** SOME SAND OCC. GRAVEL OCC. OXIDIZED FISSURES **(TILL-LIKE)**			BOREHOLE DRY DURING DRILLING FEB. 13, 1979.
	608.0			2	"	12					
	5.0										
	606.5			3	"	36					
	6.5	END OF BOREHOLE					605				
								BOREHOLE 6			
	611.3	GROUND SURFACE					615				
POWER AUGER 4.5" O.D. SOLID STEMS	0.0										
	610.3	BLACK CLAYEY **TOPSOIL**									
	1.0	VERY STIFF MOTTLED BROWN AND GREY **SILTY-CLAY** SOME SAND OCC. GRAVEL **(TILL-LIKE)**		1	2" DO.	15	610				PLASTIC TUBING / CLAY BACKFILL / GRAVEL FILTER / STANDPIPE
				2	"	17					
				3	"	23	605	HARD BROWN **SILTY-CLAY** SOME SAND OCC. GRAVEL OCC. OXIDIZED FISSURES **(TILL-LIKE)**			
	604.3										
	7.0										
	602.3			4	"	48					
	9.0	END OF BOREHOLE					600				BOREHOLE DRY DURING DRILLING FEB. 13, 1979. BOREHOLE DRY ON FEB. 19, 1979.
								BOREHOLE 7			
	612.9	GROUND SURFACE					615				
	612.4							BLACK CLAYEY **TOPSOIL**			
POWER AUGER 4.5" O.D. SOLID STEMS	0.5	VERY STIFF TO HARD MOTTLED BROWN AND GREY **SILTY-CLAY** SOME SAND OCC. GRAVEL **(TILL-LIKE)**		1	2" DO.	18					
				2	"	16	610				BOREHOLE DRY DURING DRILLING FEB. 13, 1979
				3	"	40		HARD BROWN **SILTY-CLAY** SOME SAND OCC. GRAVEL OCC. OXIDIZED FISSURES **(TILL-LIKE)**			
	607.9										
	5.0										
	606.4			4	"	57					
	6.5	END OF BOREHOLE					605				

0 / 15 5 / 10 Percent axial strain at failure

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

DRAWN L. BORTOLUSSI

CHECKED

PROJECT: 001-4009

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: January 25, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	ELEVATION
0	POWER AUGER SOLID STEM	GROUND SURFACE		177.56				
		Black clayey topsoil (FILL)		0.09	1	AS		
		Compact granular (FILL)		177.17				
		Stiff to very stiff brown silty clay, mixed with topsoil, some sand and gravel (FILL)		0.40	2	50 DO	9	177
1					3	50 DO	19	
				176.34				
		Compact black fine to medium sand, mixed with slag and cinders (FILL)		1.22	4	50 DO	10	176
				175.73				
2		Firm brown silty clay, some sand, occ. gravel mixed with occ. topsoil pockets (FILL)		1.83	5	50 DO	7	
				175.28				
		Loose brown clayey silt, occ. pockets and lenses of sand (FILL)		2.29	6	50 DO	6	175
				174.82				
		Firm grey silty clay, some sand, layers of organic material (FILL)		2.74	7	50 DO	6	
3				174.36				
		END OF BOREHOLE		3.20				

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● rem V. ⊕ U - ○

20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl

10 20 30 40

(Golder Report No. 001-4009)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Water seepage encountered into borehole at elevation 175.8 m. during drilling on January 25, 2000

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: R.W.W.

CHECKED

LDN_BHS 001-4009.GPJ GLDR_CAN.GDT 2/21/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4009

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: January 25, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		177.03					*(Golder Report No. 001-4009)*			
		Compact granular (FILL)		176.85								
		Very stiff brown silty clay, some sand, trace of gravel (FILL)		0.18	1	AS						
				176.45								
		Dense black slag and cinders (FILL)		0.58	2	50 DO	33					
1				176.12				176				
		Compact brown fine to medium sand (FILL)		0.91	3	50 DO	10					
				175.81								
		Stiff brown to grey SILTY CLAY, some sand, trace of gravel with pockets and lenses of sand (FILL)		1.22	4	50 DO	8					
2					5	50 DO	9	175				
				174.74								
		Very stiff grey SILTY CLAY, with occ. partings of black organic silt and peat (FILL)		2.29	6	50 DO	62					
				174.44								
		Dense brown medium to coarse SAND and GRAVEL		2.59	7	50 DO	34	174				Water seepage encountered into borehole at elevation 174.4 m. during drilling on January 25, 2000
3				173.83								
		END OF BOREHOLE		3.20								
4												
5												
6												
7												
8												
9												
10												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: R.W.W.
CHECKED:

LDN_BHS 001-4009.GPJ GLDR_CAN.GDT 2/21/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4009

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: January 25, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	GROUND SURFACE		177.11								
		Compact granular (FILL)		176.96								
		Brown SILTY CLAY, some sand, trace of gravel (FILL)		0.15	1	AS						
				176.50								
		Dense to compact black slag and cinders (FILL)		0.61	2	50 DO	32					
1				175.89	3	50 DO	10	176				
		Compact brown fine to medium sand, trace of slag (FILL)		175.74								
		Firm brown to grey silty clay, some sand, trace of gravel with pockets and lenses of black peat (FILL)		1.37	4	50 DO	7					
2					5	50 DO	6	175				
				174.46	6	50 DO	27					
		Compact brown SILTY SAND, and gravel		2.65	7	50 DO	27					
3				173.91				174				
		END OF BOREHOLE		3.20								
4												
5												
6												
7												
8												
9												
10												

(Golder Report No. 001-4009)

Water seepage encountered into borehole at elevation 174.4 m. during drilling on January 25, 2000

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: R.W.W.

CHECKED:

LDN_BHS 001-4009.GPJ GLDR_CAN.GDT 2/21/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4009

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: January 25, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		177.29								
		Compact granular (FILL)		0.00 / 177.02	1	AS		177				
		Stiff brown silty clay, some sand, trace of gravel (FILL)		0.27 / 176.53	2	50 DO	33					
1		Dense to compact black slag and cinders (FILL)		0.76 / 176.07	3	50 DO	27					
		Compact brown fine to medium sand (FILL)		175.92				176				
		Stiff to firm to stiff brown to grey SILTY CLAY, some sand, trace of gravel, pockets and lenses of sand and peat (FILL)		1.37	4	50 DO	9					
2					5	50 DO	5					
					6	50 DO	12	175				
				174.55								
		Compact brown SILTY SAND, and gravel		2.74 / 174.09	7	50 DO	19					
3		END OF BOREHOLE		3.20								Water seepage encountered into borehole at elevation 174.2 m. during drilling on January 25, 2000
4												
5												
6												
7												
8												
9												
10												

(Golder Report No. 001-4009)

LDN_BHS 001-4009.GPJ GLDR_CAN.GDT 2/21/00 DATA INPUT: Tony Mastroianni

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: R.W.W.
CHECKED:

PROJECT: 001-4009

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: January 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	GROUND SURFACE		177.90								
		Black clayey topsoil (FILL)		0.09	1	AS						
1		firm to stiff brown silty clay, some sand and gravel mixed with clayey topsoil (FILL)			2	50 DO	5	177				
					3	50 DO	14					
				176.62								
		Compact black slag and cinders (FILL)		1.28	4	50 DO	23					
				176.16								
2		Compact brown to black fine to coarse sand, trace gravel (FILL)		1.74								
				175.95				176				
		Firm to stiff brown SILTY CLAY, some sand and gravel mixed with occ. organic pockets (FILL)		1.95	5	50 DO	9					
					6	50 DO	11					
				175.16								
3		Very dense brown SILTY SAND and gravel		2.74	7	50 DO	53	175				
				174.70								
		END OF BOREHOLE		3.20								
4												
5												
6												
7												
8												
9												
10												

(Golder Report No. 001-4009)

▽ Water seepage encountered into borehole at elevation 175.2 m. during drilling on January 28, 2000

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: R.W.W.

CHECKED:

LDN_BHS 001-4009.GPJ GLDR_CAN.GDT 2/21/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4009

RECORD OF BOREHOLE 6

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: January 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE		ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○; 20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp ⊢ W ⊣ Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		178.67								
		Brown clayey topsoil (FILL)										
		Brown silty clay, some sand and gravel (FILL)		178.43	1	AS						
		Compact granular (FILL)		0.24 178.21								
				0.46	2	50 DO	10	178				
1		Stiff to very stiff brown silty clay, some sand and gravel mixed with black clayey topsoil (FILL)			3	50 DO	11					
					4	50 DO	10	177				
2				176.60	5	50 DO	30					
		Compact black slag and cinders (FILL)		2.07 176.38								
		Compact brown SILTY SAND, and gravel		2.29 176.02	6	50 DO	13					
		Stiff brown SILTY CLAY, some sand, trace of gravel with pockets and lenses of sand		2.65	7	50 DO	10	176				
3				175.47								
		END OF BOREHOLE		3.20								
4												
5												
6												
7												
8												
9												
10												

(Golder Report No. 001-4009)

Water seepage encountered into borehole at elevation 175.9 m. during drilling on January 28, 2000

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: R.W.W.

CHECKED:

LDN_BHS 001-4009.GPJ GLDR_CAN.GDT 2/21/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4009

RECORD OF BOREHOLE 7

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: January 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: N	ELEVATION
0	POWER AUGER, SOLID STEM	GROUND SURFACE		177.61				
		Brown clayey topsoil (FILL)		0.06	1	AS		
		Stiff to very stiff brown silty clay, some sand and gravel mixed with topsoil (FILL)			2	50 DO	9	177
1				176.54	3	50 DO	47	
		Dense to compact black slag and cinders (FILL)		1.07				
		Compact brown fine to medium sand, occ. gravel (FILL)		176.24 1.37	4	50 DO	14	176
				175.93 1.68	5	50 DO	6	
2		Firm brown silty clay, some sand and gravel with pockets of topsoil, pieces of wood, metal and clay brick (FILL)			6	50 DO	7	175
				174.71	7	50 DO		
3		Compact brown SILTY SAND, and gravel		2.90 174.41				
		END OF BOREHOLE AT REFUSAL TO AUGER		3.20				
4								
5								
6								
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT (10 20 30 40) Wp W Wl

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4009)

Water seepage encountered into borehole at elevation 174.9 m. during drilling on January 28, 2000

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: R.W.W.

CHECKED:

LDN_BHS 001-4009.GPJ GLDR_CAN.GDT 2/21/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4014

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JANUARY 27, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION
0	POWER AUGER HOLLOW STEM	PAVMENT SURFACE		100.16				100
		ASPHALT		0.09				
		Brown silty clay, some sand and gravel (FILL)		99.70				
				0.46	1	AS	35	
1		Black mould sand, some grey silty clay (FILL)			2	AS	42	99
				98.64				
				1.52	3	AS	10	
2		Black organic silty clay (FILL)		98.03				98
				2.13	4	AS	7	
3		Stiff mottled brown and grey SILTY CLAY, some sand, occ. gravel (TILL)			5	AS	10	97
				96.35				
4				3.81	6	AS	25	96
					7	AS	44	
5		Very stiff to hard brown SILTY CLAY, some sand, occ. gravel (TILL)			8	AS	18	95
6				94.06				
				6.10	9	50 DO	9	94
7		Very stiff to stiff grey SILTY CLAY, some sand, occ. gravel (TILL)						93
					10	50 DO	8	
8				92.08				
		END OF BOREHOLE		8.08				
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT (10 20 30 40) Wp W Wl

(Golder Report No. 001-4014)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole dry during drilling on January 27, 2000

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: P.N.

CHECKED: GAM

LDN_BHS 001-4014.GPJ GLDR_CAN.GDT 2/9/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4014

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JANUARY 27, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER, HOLLOW STEM	PAVMENT SURFACE		100.03				100
		ASPHALT		99.85	1	AS		
		Granular base (FILL)		0.18				
		Brown silty clay (FILL)		99.57				
				0.46	2	50 DO	63	
1		Black sand and gravel, some silt, pieces of wood (FILL)			3	50 DO	21	99
				98.66				
		Black organic clayey TOPSOIL		1.37				
				98.20	4	50 DO	10	
2		Stiff mottled brown and grey SILTY CLAY, some sand, occ. gravel (TILL)		1.83				98
					5	50 DO	8	
3								97
					6	50 DO	12	
				96.52				
		Very stiff brown SILTY CLAY, occ. sand and gravel (TILL)		3.51	7	50 DO	21	
4								96
				95.46				
		Very stiff to stiff grey SILTY CLAY, some sand, occ. gravel (TILL)		4.57	8	50 DO	27	
5								95
6								94
					9	50 DO	15	
7								93
					10	50 DO	9	
8				91.95				92
		Grey medium to fine SILTY SAND		8.08	11	50 DO	PH	
				91.19				
9		Grey SANDY SILT, some gravel		8.84				91
					12	50 DO	8	
				90.43				
10		END OF BOREHOLE		9.60				

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl (10 20 30 40)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4014)

Backfill Material

Water level in borehole at elevation 93.9m during drilling on January 27, 2000

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: P.N.

CHECKED: GAM

LDN_BHS 001-4014.GPJ GLDR_CAN.GDT 2/8/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4014

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JANUARY 27, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, Q - ●; rem V. ⊕, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVMENT SURFACE		99.89								
		ASPHALT										
		Granular base (FILL)		99.64								
				0.25	1	50 DO	12			○		
1		Brown to grey silty clay, pockets of organic material (FILL)			2	50 DO	16	99		○		
					3	50 DO	7			○		
2								98				
				97.45	4	50 DO	7			○ ○		
				2.44								
3		Stiff mottled brown and grey SILTY CLAY, some sand, occ. gravel (TILL)			5	50 DO	15	97		○		Borehole dry during drilling on January 27, 2000
				96.23								
				3.66	6	50 DO	36	96		○		
4												
		Very stiff to hard brown SILTY CLAY, some sand, occ. gravel (TILL)			7	50 DO	26	95		○		
5												
					8	50 DO	17			○		
				94.10								
6				5.79				94				
					9	50 DO	11			○		
7		Stiff to very stiff grey SILTY CLAY, some sand, occ. gravel (TILL)						93	⊕ +			
									⊕ +			
					10	50 DO	9	92				
8				91.81								
		END OF BOREHOLE		8.08								
9												
10												

(Golder Report No. 001-4014)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: P.N.

CHECKED: GAM

LDN_BHS 001-4014.GPJ GLDR_CAN.GDT 2/8/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4014

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JANUARY 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	PAVMENT SURFACE		100.00					*(Golder Report No. 001-4014)*			
		ASPHALT		0.08								
		Granular base (FILL)		99.69								
				0.30	1	50 DO	15					
1		Brown to grey silty clay, some organic material and sand, occ. gravel (FILL)			2	50 DO	21	99				
					3	50 DO	50					
2				97.87				98				
		Grey fine SILTY SAND (ALLUVIAL)		2.13								
				97.49	4	50 DO	7					
		Grey to brown SILTY CLAY, some sand, occ. gravel (TILL)		2.51								
3				96.80				97				Borehole dry during drilling on January 28, 2000
				3.20	5	50 DO	15					
4		Very stiff to hard brown SILTY CLAY, some sand, occ. gravel (TILL)			6	50 DO	23	96				
					7	50 DO	23					
5				94.82				95				
				5.18	8	50 DO	12					
6								94				
					9	50 DO	8					
7		Stiff to very stiff grey SILTY CLAY, some sand, occ. gravel (TILL)						93				
					10	50 DO						
8				91.92				92				
		END OF BOREHOLE		8.08								
9												
10												

LDN_BHS 001-4014.GPJ GLDR_CAN.GDT 2/8/00 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: P.N.

CHECKED: GAM

PROJECT: 001-4014

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JANUARY 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVMENT SURFACE		100.00					*(Golder Report No. 001-4014)*			
		ASPHALT		0.08								
		Granular road base (FILL)		99.72								
				0.28	1	50 DO	19					
1		Brown silty clay with black mould sand layers (FILL)			2	50 DO	16	99				
					3	50 DO	33					
				98.17								
2		Brown silty clay (FILL)		1.83				98				
				97.71								
		Grey fine to medium SILTY SAND, some organic material (ALLUVIAL)		2.29	4	50 DO	4					
				97.26								
3		Stiff mottled brown and grey SILTY CLAY, some sand, occ. gravel (TILL)		2.74	5	50 DO	9	97				Borehole dry during drilling on January 28, 2000
				96.34								
4		Very stiff to hard brown SILTY CLAY, some sand, occ. gravel (TILL)		3.66	6	50 DO	30	96				
					7	50 DO	17					
5				94.82				95				
		Stiff to very stiff grey SILTY CLAY, some sand, occ. gravel (TILL)		5.18	8	50 DO	11					
6								94				
					9	50 DO	8					
7								93				
					10	50 DO	8					
8				91.92				92				
		END OF BOREHOLE		8.08								
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: P.N.

CHECKED: GAM

LDN_BHS 001-4014.GPJ GLDR_CAN.GDT 2/8/00 DATA INPUT: Tony Mastrojanni

PROJECT: 001-4067

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: March 29, 2000

DATUM: LOCAL

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION
0	POWER AUGER, HOLLOW STEM	GROUND SURFACE		100.41 / 0.00				100
		Black clayey topsoil (FILL)		100.18 / 0.23	1	50 DO	9	
		Stiff brown and grey silty clay, some organic topsoil pockets (FILL)		99.57 / 0.84	2	50 DO	22	99
1		Compact medium to coarse brown SAND, trace silt			3	50 DO	12	
2				98.43 / 1.98	4	50 DO	5	98
		Firm grey SILTY CLAY, some sand		97.51 / 2.90	5	50 DO	17	
3					6	50 DO	40	97
4								
		Hard to firm brown becoming grey SILTY CLAY, some sand, occ. gravel and sand pockets (TILL)			7	50 DO	12	96
5								
					8	50 DO	9	95
6				93.86 / 6.55				94
		END OF BOREHOLE						
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20, 40, 60, 80

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● / rem V. ⊕ U - ○: 20, 40, 60, 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10, 20, 30, 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4067)

Water level in borehole at elevation 98.43m during drilling on March 29, 2000

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.P.

CHECKED:

LDN_BHS 001-4067.GPJ GLDR_CAN.GDT 4/4/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4067

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: March 29, 2000

DATUM: LOCAL

SAMPLER HAMMER, 29kg; DROP, 19305mm

PENETRATION TEST HAMMER, 29kg; DROP, 19305mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: N	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STM	GROUND SURFACE		100.41								
		Black clayey topsoil (FILL)		100.23								
		Mottled brown and grey SILTY CLAY, some organic topsoil pockets (FILL)		0.18	1	50 DO	6	100				
1					2	50 DO	16					
				98.89				99				
2		Compact to loose medium to coarse brown SAND, trace silt, some gravel		1.52	3	50 DO	25					Water level in borehole at elevation 98.43m during drilling on March 29, 2000
					4	50 DO	4	98				
3				97.29								
		Stiff grey SILTY CLAY, some sand trace gravel		3.12	5	50 DO	13	97				
				96.75								
4		Hard to very stiff brown and grey SILTY CLAY, some sand, occ. gravel, some sand (TILL)		3.66	6	50 DO	39					
								96				
					7	50 DO	17					
5				95.38								
		END OF BOREHOLE		5.03								
6												
7												
8												
9												
10												

(Golder Report No. 001-4067)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AP

CHECKED:

LDN_BHS 001-4067.GPJ GLDR_CAN.GDT 4/4/00 DATA INPUT: Tony Mastroianni

PROJECT: 001-4238

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 27, 2000

DATUM: LOCAL

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	ELEVATION
0	POWER AUGER SOLID STEM	GROUND SURFACE		97.8				
		Black clayey TOPSOIL		0.0	1	2" DO	11	
				0.7				
		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, occ. gravel, fissured (TILL)			2	2" DO	22	
5					3	2" DO	14	
				90.8				
				7.0	4	2" DO	40	90
10		Hard to very stiff, brown SILTY CLAY, occ. gravel, fissured (TILL)			5	2" DO	37	
				84.3	6	2" DO	23	85
				13.5				
15					7	2" DO	18	
		Stiff to very stiff, grey SILTY CLAY, some sand, trace gravel (TILL)						80
20					8	2" DO	13	
				76.3				
		END OF BOREHOLE		21.5				
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ● rem V. ⊕ U - ○ : 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl : 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4238)

"Note: This Drawing has been Reduced and is in Imperial Units"

Borehole remained dry during drilling on September 27, 2000

LDN_BHS 001-4238.GPJ GLDR_CAN.GDT 10/10/00 DATA INPUT: M. Napier

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: P.N.

CHECKED: GM

PROJECT: 001-4238

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 27, 2000

DATUM: LOCAL

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	ELEVATION
0		GROUND SURFACE		97.4				
	POWER AUGER SOLID STEM	Stiff, black clayey TOPSOIL		0.0 / 96.6	1	2" DO	11	
				0.8				
		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, fissured, oxidized (TILL)			2	2" DO	16	
5				91.6	3	2" DO	20	
				5.8				
		Very stiff to hard, brown SILTY CLAY, some sand, trace gravel, fissured (TILL)			4	2" DO	39	
					5	2" DO	37	
10				85.4				
				12.0	6	2" DO	22	
					7	2" DO	14	
15		Stiff to very stiff, grey SILTY CLAY, some sand, trace gravel (TILL)						
20					8	2" DO	12	
				75.9				
		END OF BOREHOLE		21.5				
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ● rem V. ⊕ U - ○ : 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl : 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4238)

"Note: This Drawing has been Reduced and is in Imperial Units"

95 90 85 80

Borehole remained dry during drilling on September 27, 2000

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: P.N.

CHECKED: GM

LDN_BHS 001-4238.GPJ GLDR_CAN.GDT 10/16/00 DATA INPUT: M. Napier

PROJECT: 001-4238

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 27, 2000

DATUM: LOCAL

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: N	ELEVATION
0	POWER AUGER SOLID STEM	GROUND SURFACE		96.9				
		Stiff, black clayey TOPSOIL		0.0	1	2" DO	10	
				0.7				
		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, tarce gravel, wet fissures, organic pockets (TILL)			2	2" DO	13	
5				90.9	3	2" DO	27	
				6.0				
		Very stiff to hard, brown SILTY CLAY, some sand, trace gravel, fissured (TILL)			4	2" DO	42	90
				87.4				
10				9.5	5	2" DO	25	
					6	2" DO	14	85
15		Stiff to very stiff, grey SILTY CLAY, some sand, trace gravel (TILL)			7	2" DO	15	
								80
20					8	2" DO	13	
		END OF BOREHOLE		75.4				
				21.5				
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ● rem V. ⊕ U - ○

400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl

10 20 30 40

ADDITIONAL LAB TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4238)

"Note: This Drawing has been Reduced and is in Imperial Units"

Borehole remained dry during drilling on September 27, 2000

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: P.N.

CHECKED: GM

LDN_BHS 001-4238.GPJ GLDR_CAN.GDT 10/10/00 DATA INPUT M. Napier

PROJECT: 001-4238

RECORD OF BOREHOLE 7

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 27, 2000

DATUM: LOCAL

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (400 800 1200 1600) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		97.1								
		Stiff, black clayey TOPSOIL		0.0	1	2" DO	10					
				0.7								
		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, fissured (TILL)			2	2" DO	12					
5					3	2" DO	15					
				90.6								
				6.5				90				
					4	2" DO	39					
		Very stiff to hard, brown SILTY CLAY, some sand, trace gravel, fissured, oxidized (TILL)										Borehole remained dry during drilling on September 27, 2000
10					5	2" DO	34					
				84.1				85				
				13.0	6	2" DO	26					
15					7	2" DO	13					
		Stiff, grey SILTY CLAY, some sand, trace gravel, fissured, oxidized (TILL)						80				
20					8	2" DO	13					
				75.6								
		END OF BOREHOLE		21.5								
25												
30												
35												

(Golder Report No. 001-4238)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: P.N.

CHECKED: GM

LDN_BHS 001-4238.GPJ GLOR_CAN.GDT 10/10/00 DATA INPUT: M. Napier

PROJECT: 001-4238

RECORD OF BOREHOLE 10

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 27, 2000

DATUM: LOCAL

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION
0	POWER AUGER, SOLID STEM	GROUND SURFACE		97.8				
		Very stiff, black clayey TOPSOIL		0.0 / 97.0	1	2" DO	15	
				0.8				
5		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. silt pockets, fissured (TILL)			2	2" DO	16	
					3	2" DO	11	
				90.8 / 7.0				
10		Hard, brown SILTY CLAY, some sand, trace gravel, fissured, oxdized (TILL)			4	2" DO	37	
					5	2" DO	38	
				85.3 / 12.5				
15		Stiff, grey SILTY CLAY, some sand, trace gravel (TILL)			6	2" DO	17	
					7	2" DO	14	
20					8	2" DO	14	
		END OF BOREHOLE		76.3 / 21.5				
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ● rem V. ⊕ U - ○ : 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl : 10 20 30 40

ELEVATION: 95 90 85 80

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole remained dry during drilling on September 27, 2000

(Golder Report No. 001-4238)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: P.N.

CHECKED: GM

LDN_BHS 001-4238.GPJ GLDR_CAN.GDT 10/10/00 DATA INPUT: M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (nat V. + Q - ● rem V. ⊕ U - ○) (400 800 1200 1600)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		574.4								
		Compact, black sandy TOPSOIL		0.0 / 572.4	1	2" DO	15					
		Compact, brown SAND, trace silt, occ. gravel, few grey silty fine sand seams			2	2" DO	11					
5		Firm grey SILTY CLAY, some sand, trace gravel (TILL)		569.9 / 4.5 / 567.4	3	2" DO	7	570				Borehole remained dry during drilling on September 28, 2000
	POWER AUGER SOLID STEM	Hard, brown SILTY CLAY, some sand and gravel, fissured (TILL)		7.0	4	2" DO	44		>2000			
10					5	2" DO	52	565				
				562.4 / 12.0	6	2" DO	13					
15		Stiff to very stiff, grey SILTY CLAY, trace to some sand and gravel (TILL)			7	2" DO	11	560				
				556.4 / 18.0					>2000			
20		Very stiff grey CLAYEY SILT, some sand and gravel (TILL)			8	2" DO	18	555				
		END OF BOREHOLE		552.9 / 21.5								
25												
30												
35												

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/31/00 DATA INPUT: M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0		GROUND SURFACE		576.8				
	POWER AUGER SOLID STEM	Compact, black sandy topsoil (FILL)		0.0 575.3	1	2" DO	10	
		Stiff brown silty clay, some sand, trace gravel (FILL)		1.5 572.3	2	2" DO	13	
5		Stiff grey and black clayey silt, occ. sand seams, occ. peat inclusions (FILL)		4.5 570.6	3	2" DO	13	570
		Black PEATY ORGANIC MATERIAL, some clay		6.3 7.0				
		Stiff, grey SILTY CLAY,trace to some sand and gravel (TILL)		567.3	4	2" DO	12	
10		Very stiff to hard, brown SILTY CLAY, some sand, trace gravel, fissured (TILL)		9.5 562.3	5	2" DO	38	565
					6	2" DO	38	
15		Very stiff to hard, grey SILTY CLAY, trace to some sand and gravel (TILL)		14.5	7	2" DO	16	560
20				555.6	8	2" DO	33	
		Hard grey CLAYEY SILT, some sand and gravel (TILL)		21.3 21.5				
		END OF BOREHOLE						
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20, 40, 60, 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ●, rem V. ⊕ U - ○; 400, 800, 1200, 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp, W, Wl; 10, 20, 30, 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

165.7

Minor water seepage into borehole encountered at 574.9 ft. during drilling on September 28, 2000

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/31/00 DATA INPUT: M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0		GROUND SURFACE		574.2				
	POWER AUGER SOLID STEM	Stiff, brown silty clay and black clayey topsoil (FILL)		0.0 / 572.2	1	2" DO	14	
		Soft black clayey TOPSOIL, some peaty material		2.0 / 570.4	2	2" DO	4	570
5		Firm to stiff, grey SILTY CLAY, some sand, trace gravel (TILL)		3.8 / 567.2	3	2" DO	11	
		Hard to stiff brown SILTY CLAY, some sand and gravel, fissured (TILL)		7.0 / 561.2	4	2" DO	47	565
10					5	2" DO	38	
		Stiff, grey SILTY CLAY, trace to some sand and gravel (TILL)		13.0 / 557.7	6	2" DO	13	560
15					7	2" DO	12	
		END OF BOREHOLE		16.5				

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf — nat V. + Q - ● rem V. ⊕ U - ○: 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl; 10 20 30 40

>2000

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

Minor water seepage into borehole encountered at about elevation 571.2 ft. during drilling on September 28, 2000

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/30/00 DATA INPUT: M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET		DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS/ft
0		GROUND SURFACE		574.5			
		Loose, black sandy TOPSOIL		0.0 / 572.5	1	2" DO	9
		Loose, brown to grey SILTY SAND, trace gravel, occ. clayey zones		2.0 / 571.2	2	2" DO	4
5		Soft to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel (TILL)		3.3 / 566.5	3	2" DO	12
10	POWER AUGER SOLID STEM	Hard, brown SILTY CLAY, some sand and gravel, fissured (TILL)		8.0 / 562.5	4	2" DO	45
					5	2" DO	52
		Very stiff, grey SILTY CLAY, trace to some sand and gravel, occ. sand partings/pokets (TILL)		12.0 / 560.0	6	2" DO	18
15		Dense, grey fine to medium SAND, trace gravel		14.5 / 558.7	7	2" DO	38
		Dense to compact grey SAND, some gravel, occ. fine sand seam		15.8 / 553.0	8	2" DO	27
20		END OF BOREHOLE		21.5			
25							
30							
35							

ELEVATION

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf — nat V. + Q - ● rem V. ⊕ U - ○: 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl; 10 20 30 40

570

565

560

555

>2000

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

ADDITIONAL LAB TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

▽

Minor water seepage into borehole encountered at about elevation 571.5 ft. during drilling on September 28, 2000

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/11/00 DATA INPUT M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0	POWER AUGER SOLID STEM	GROUND SURFACE		576.6				
		Compact, black sandy topsoil mixed with crushed gravel, some silt (FILL)		0.0 / 574.6	1	2" DO	13	575
		Loose, brown fine to medium SAND, trace gravel		2.0 / 572.1	2	2" DO	6	
5		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, fissured, occ. silt pockets (TILL)		4.5 / 567.1	3	2" DO	8	570
					4	2" DO	9	
10		Very stiff grey SILTY CLAY, trace to some sand and gravel (TILL)		9.5 / 564.6	5	2" DO	15	565
		Hard to very stiff, brown SILTY CLAY, some sand and gravel, fissured (TILL)		12.0 / 560.1	6	2" DO	36	
15					7	2" DO	21	
		END OF BOREHOLE		16.5				
20								
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf — nat V. + Q - ● rem V. ⊕ U - ○: 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl; 10 20 30 40

>2000

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole remained dry during drilling on September 28, 2000

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/30/00 DATA INPUT: M. Napier

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

PROJECT: 001-4247

RECORD OF BOREHOLE 6

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET		DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0		GROUND SURFACE		574.5				
		Stiff black clayey TOPSOIL		0.0 / 572.5	1	2" DO	8	
		Soft grey and black ORGANIC CLAYEY SILT, some sand, occ. gravel and rootlets		2.0 / 570.8	2	2" DO	4	570
5		Firm to stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. silt pockets (TILL)		3.8 / 567.5	3	2" DO	11	
	POWER AUGER SOLID STEM	Hard, brown SILTY CLAY, some sand and gravel, fissured (TILL)		7.0 / 562.5	4	2" DO	41	565
10					5	2" DO	44	
		Stiff, grey SILTY CLAY, trace to some sand and gravel (TILL)		12.0 / 558.0	6	2" DO	11	560
15					7	2" DO	13	
		END OF BOREHOLE		16.5				

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ● rem V. ⊕ U - ○ : 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl : 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole remained dry during drilling on September 28, 2000

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/11/00 DATA INPUT: M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 7

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION
0	GROUND SURFACE		575.7				
	Compact, black sandy TOPSOIL		0.0 / 574.6	1	2" DO	10	
	Stiff brown and grey CLAYEY SILT, some sand		1.1 / 573.7				
	Firm to stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, some sand seams/layers near surface (TILL)		2.0	2	2" DO	7	
5				3	2" DO	11	570
	Very stiff to hard, brown SILTY CLAY, some sand and gravel fissured (TILL)		568.7 / 7.0	4	2" DO	28	
10				5	2" DO	40	565
			562.2 / 13.5	6	2" DO	22	
15	Very stiff to stiff, grey SILTY CLAY, trace to some sand and gravel (TILL)			7	2" DO	13	560
			559.2				
	END OF BOREHOLE		16.5				

POWER AUGER
SOLID STEM

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: 400 800 1200 1600 — nat V. + Q - ● — rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

Borehole remained dry during drilling on September 28, 2000

DEPTH SCALE
1 inch to 5 feet

Golder Associates

LOGGED: C.C.
CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/11/00 DATA INPUT: M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 8

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET		DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	ELEVATION
0		GROUND SURFACE		575.9				
		Loose, black silty TOPSOIL		0.0 / 574.9	1	2" DO	6	
				1.0				
		Firm to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. sand seams/zones near surface (TILL)			2	2" DO	6	
5					3	2" DO	16	570
				568.9 / 7.0				
		Very stiff to hard, brown SILTY CLAY, some sand and gravel, fissured (TILL)			4	2" DO	24	
10	POWER AUGER SOLID STEM				5	2" DO	49	565
				563.9 / 12.0				
					6	2" DO	15	
15		Very stiff, grey SILTY CLAY, trace to some sand and gravel (TILL)			7	2" DO	17	560
20					8	2" DO	23	555
		END OF BOREHOLE		554.4 / 21.5				
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf — nat V. + Q - ● rem V. ⊕ U - ○: 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

>2000

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole remained dry during drilling on September 28, 2000

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/11/00 DATA INPUT: M. Napier

PROJECT: 001-4247

RECORD OF BOREHOLE 9

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: SEPTEMBER 28, 2000

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0	POWER AUGER SOLID STEM	GROUND SURFACE		576.9				
		Loose, black sandy TOPSOIL		0.0 / 574.9	1	2" DO		
		Very stiff brown CLAYEY SILT, some sand, occ. sandier zones/pockets		2.0 / 572.4	2	2" DO	16	
5		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel (TILL)		4.5 / 567.4	3	2" DO	12	570
					4	2" DO	17	
10		Hard, brown SILTY CLAY, some sand and gravel, fissured (TILL)		9.5 / 562.4	5	2" DO	41	565
					6	2" DO	50	
15		Very stiff, grey SILTY CLAY, trace to some sand and gravel (TILL)		14.5 / 560.4	7	2" DO	21	
		END OF BOREHOLE		16.5				

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ● rem V. ⊕ U - ○ : 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl : 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole remained dry during drilling on September 28, 2000

(Golder Report No. 001-4247)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 001-4247.GPJ GLDR_CAN.GDT 10/31/00 DATA INPUT: M. Napier

PROJECT: 011-4009

RECORD OF BOREHOLE 7

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 14, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES		SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		188.45								
		ASPHALT		0.00								
				188.12								
		CONCRETE		0.33								
				0.48				188				
1		Very stiff to stiff, mottled brown and grey silty clay mixed with some sand, gravel and pockets of topsoil (FILL)			1	50 DO	18					
								187				Borehole dry during drilling on February 14, 2001
2					2	50 DO	10					
					3	50 DO	12	186				
				185.71								
3		END OF BOREHOLE		2.74								
4												
5												
6												
7												
8												
9												
10												

(Golder Report No. 011-4009)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: C.C.
CHECKED: GM

LDN_BHS 011-4009.GPJ GLDR_CAN.GDT 3/2/01 DATA INPUT: Tony Mastroianni

PROJECT: 011-4128

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 6, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (nat V. + Q - ●, rem V. ⊕ U - ○) (400 800 1200 1600)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		581.5								
		ASPHALT		0.1								
		Granular base (FILL)		0.8	1	AS	-					
		Very stiff mottled brown and grey SILTY CLAY, some sand, trace gravel (TILL)			2	2" DO	24					
				577.0								
5				4.5	3	2" DO	32					
								575				Borehole dry during drilling on June 6, 2001
					4	2" DO	28					
10		Hard to very stiff brown SILTY CLAY, some sand and gravel, some to occ. grey fissures (TILL)			5	2" DO	24					
								570				
					6	2" DO	27					
				567.2								
15				14.3								
		Very stiff brown SILTY CLAY, some sand and gravel (TILL)			7	2" DO	26					
				565.0				565				
		END OF BOREHOLE		16.5								
20												
25												
30												
35												

(Golder Report No. 011-4128)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 011-4128.GPJ GLDR_CAN.GDT 6/12/01 DATA INPUT: Tony Mastroianni

PROJECT: 011-4128

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 6, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (400 800 1200 1600) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	PAVEMENT SURFACE		580.5								
		ASPHALT		0.1								
		Granular base (FILL)		0.8				580				
		Black clayey TOPSOIL		578.5	1	AS	-					
		Stiff mottled brown and grey SILTY CLAY, some sand, trace gravel (TILL)		2.0	2	2" DO	14					
5				576.0	3	2" DO	28	575				Borehole dry during drilling on June 6, 2001
				4.5	4	2" DO	30					
10		Very stiff to hard brown SILTY CLAY, some sand and gravel, some to occ. grey fissures (TILL)			5	2" DO	21	570				
					6	2" DO	20					
15					7	2" DO	17	565				
				564.0								
		END OF BOREHOLE		16.5								
20												
25												
30												
35												

(Golder Report No. 011-4128)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 011-4128.GPJ GLDR_CAN.GDT 6/12/01 DATA INPUT: Tony Mastroianni

PROJECT: 011-4128

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 6, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (400 800 1200 1600) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		581.4								
		ASPHALT		0.1								
		Granular base (FILL)		0.8	1	AS	-	580				
		Black to brown clayey topsoil and brown silty clay (FILL)		578.9								
		Firm mottled brown and grey SILTY CLAY, some sand, trace gravel (TILL)		2.5	2	2" DO	5					
				577.1						>2000		
5				4.3	3	2" DO	15	575				Borehole dry during drilling on June 6, 2001
		Very stiff brown SILTY CLAY, some sand and gravel, some to occ. grey fissures (TILL)			4	2" DO	26					
10					5	2" DO	24	570				
				569.9								
		END OF BOREHOLE		11.5								
15												
20												
25												
30												
35												

(Golder Report No. 011-4128)

"Note: This Drawing has been Reduced and is in Imperial Units"

LDN_BHS 011-4128.GPJ GLDR_CAN.GDT 6/12/01 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

PROJECT: 011-4136

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: 106m. W. centreline of Belleview and 5m. S. centerline of Riverside Dr.BORING DATE: June 6, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION
0		PAVEMENT SURFACE		179.30				179
		ASPHALT		0.00				
		Broken CONCRETE		0.18				
				0.37				
1	POWER AUGER SOLID STEM	Very stiff mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. silt and sand pockets, fissured (TILL)			1	50 DO	17	
				177.77				178
2				1.52	2	50 DO	31	
								177
3		Very stiff to hard brown SILTY CLAY, some sand, trace gravel, fissured (TILL)			3	50 DO	24	
					4	50 DO	22	176
				175.49				
4				3.81	5	50 DO	12	
								175
5					6	50 DO	10	
		Stiff grey SILTY CLAY, some sand, trace gravel (TILL)						174
6					7	50 DO	8	173
				172.75				
		END OF BOREHOLE		6.55				
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● rem V. ⊕ U - ○: 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl: 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 011-4136)

Borehole dry during drilling on June 6, 2001

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 011-4136.GPJ GLDR_CAN.GDT 9-7-01 DATA INPUT: Tony Mastroianni

PROJECT: 011-4205

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: AUGUST 29, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (25 50 75 100) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		177.15				177	*(Golder Report No. 011-4205)*			
		ASPHALT		0.00								
		CONCRETE		0.18 / 176.74								
		Mottled brown and grey silty clay, some sand, trace gravel, occ. sand and topsoil pockets (FILL)		0.41	1	50 DO	12			○		
				176.24 / 0.91								
1					2	50 DO	32	176		○		
					3	50 DO	42			○		
2		Hard to very stiff, brown SILTY CLAY, some sand, trace gravel, fissured (TILL)						175				
					4	50 DO	47			○		
3					5	50 DO	22	174		○		
				173.49 / 3.66								Borehole dry during drilling on August 29, 2001
4					6	50 DO	17	173		○		
					7	50 DO	13			○		
5								172				
6		Very stiff to stiff, grey SILTY CLAY, some sand, trace gravel (TILL)										
					8	50 DO	9	171		○		
7									⊕ +			
								170	⊕ +			
				169.07	9	50 DO	5			○		
8		END OF BOREHOLE		8.08								
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 011-4205.GPJ GLDR_CAN.GDT 9-17-01 DATA INPUT: Tony mastroianni

PROJECT: 011-4205

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: AUGUST 28, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (25 50 75 100)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	PAVEMENT SURFACE		178.45				178				
		ASPHALT		0.00								
		CONCRETE with steel wire mesh at base		0.18 / 178.07								
				0.38	1	50 DO	7					
		Firm, black clayey TOPSOIL		177.61								
1		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, fissured, occ. silt pockets, intrusions (TILL)		0.84	2	50 DO	11	177				
					3	50 DO	16					Backfill Material
2				176.47								
				1.98	4	50 DO	53	176				
3		Hard to very stiff, brown SILTY CLAY, some sand, trace gravel (TILL)			5	50 DO	37	175				September 13, 2001
4					6	50 DO	18					
				174.06				174				
				4.39	7	50 DO	14					
5		Stiff, grey SILTY CLAY, trace gravel (TILL)										
6				172.13				173				Bentonite Seal
				6.32	8	50 DO	12	172				August 28, 2001
7		Compact, grey SILTY FINE SAND, trace gravel		171.35								Backfill Material
				7.10				171				
		Stiff, grey SILTY CLAY, some sand, trace gravel (TILL)			9	50 DO	9					
8				170.37								
		END OF BOREHOLE		8.08								
9												
10												

(Golder Report No. 011-4205)

Water seepage into borehole encountered at about elevation 172.0 m. during drilling on August 28, 2001

Water level in standpipe at elevation 175.7 m. on September 13, 2001

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 011-4205.GPJ GLDR_CAN.GDT 9-17-01 DATA INPUT: Tony mastroianni

PROJECT: 011-4226

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: October 10, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS/ft	ELEVATION
0		GROUND SURFACE		606.3				
		Black clayey TOPSOIL		0.0 604.9	1	AS	-	
		Loose brown, SILTY SAND, some clay, trace gravel		1.4 601.8	2	2" DO	6	
5		Very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, some silt pockets and fissures (TILL)		4.5 598.3	3	2" DO	23	600
10	POWER AUGER SOLID STEM	Very stiff to hard, brown SILTY CLAY, some sand, trace gravel, some oxidation and fissures (TILL)		8.0 589.3	4	2" DO	42	595
15					5	2" DO	19	590
20		Stiff, grey SILTY CLAY, some sand, trace gravel (TILL)		17.0 584.8	6	2" DO	9	585
		END OF BOREHOLE		21.5				
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20, 40, 60, 80

SHEAR STRENGTH Cu, psf: 400, 800, 1200, 1600 — nat V. + Q - ● — rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

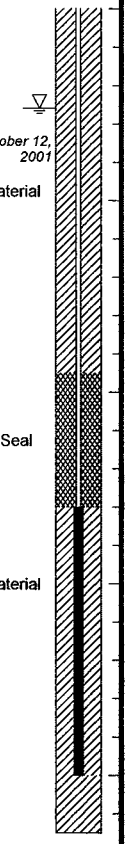
WATER CONTENT PERCENT: Wp, W, Wl — 10, 20, 30, 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 011-4226)

"Note: This Drawing has been Reduced and is in Imperial Units"



Borehole dry during drilling on October 10, 2001

Water level in standpipe at elevation 603.7 ft. on October 12, 2001

LDN_BHS 011-4226.GPJ GLDR_CAN.GDT 10-17-01 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: J.S.

CHECKED:

PROJECT: 011-4226

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: October 10, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (400 800 1200 1600); nat V. + Q - ●; rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		606.2								
		Black clayey TOPSOIL		0.0 605.0								
				1.2	1	AS	-					
		Very stiff, mottled brown and grey, SILTY CLAY, some sand, trace gravel, occ. silt seams (TILL)			2	2" DO	18					
5					3	2" DO	18	600				
				599.2 7.0								
					4	2" DO	27					Borehole dry during drilling on October 10, 2001
10		Very stiff to hard, brown and grey SILTY CLAY, some sand, occ. gravel, occ. fissures (TILL)			5	2" DO	45	595				
					6	2" DO	31					
				592.2 14.0								
15					7	2" DO	15	590				
		Very stiff to stiff, grey SILTY CLAY, some sand, trace gravel (TILL)										
20					8	2" DO	11	585				
				584.7 21.5								
		END OF BOREHOLE										
25												
30												
35												

(Golder Report No. 011-4226)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: J.S.

CHECKED:

LDN_BHS 011-4226.GPJ GLDR_CAN.GDT 10-17-01 DATA INPUT: Tony Mastroianni

PROJECT: 011-4226

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: October 10, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (nat V. + Q - ●, rem V. ⊕ U - ○; 400 800 1200 1600)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / SOLID STEM	GROUND SURFACE		606.9								
		Black clayey TOPSOIL		0.0	1	AS	-					
				605.3								
				1.6	2	2" DO	42					
5		Hard, mottled brown and grey, SILTY CLAY, some sand, trace gravel, occ. silt pockets (TILL)			3	2" DO	36					
				600.4				600				
				6.5	4	2" DO	31					Borehole dry during drilling on October 10, 2001
10		Very stiff to hard, brown SILTY CLAY, some sand, trace gravel, occ. silt pockets and sand partings, fissured (TILL)			5	2" DO	49					
					6	2" DO	23	595				
				592.9								
				14.0	7	2" DO	17					
15		Very stiff, grey SILTY CLAY, some sand, trace gravel, occ. silt or sand layer (TILL)						590				
20					8	2" DO	15					
				585.4								
		END OF BOREHOLE		21.5								
25												
30												
35												

(Golder Report No. 011-4226)

"Note: This Drawing has been Reduced and is in Imperial Units"

LDN_BHS 011-4226.GPJ GLDR_CAN.GDT 10-17-01 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: J.S.

CHECKED: Qc

PROJECT: 011-4226

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: October 11, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION
0	POWER AUGER, SOLID STEM	GROUND SURFACE		607.0				
		Black clayey TOPSOIL		0.0 / 606.0				
		Very stiff, mottled brown and grey SILTY CLAY to CLAYEY SILT, some sand, trace gravel, occ. silt seams or pockets (TILL)		1.0	1	AS	-	
					2	2" DO	26	
5					3	AS	-	
					4	2" DO	18	
				600.0				600
		Hard, brown SILTY CLAY, some sand, trace gravel, fissured (TILL)		7.0				
10					5	2" DO	58	
				593.0				595
		Very stiff, grey, SILTY CLAY, some sand, trace gravel (TILL)		14.0	6	2" DO	27	
15								
								590
20					7	2" DO	16	
				585.5				
		END OF BOREHOLE		21.5				
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20, 40, 60, 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ●, rem V. ⊕ U - ○; 400, 800, 1200, 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp, W, Wl; 10, 20, 30, 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 011-4226)

"Note: This Drawing has been Reduced and is in Imperial Units"

Borehole dry during drilling on October 11, 2001

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: J.S.

CHECKED:

LDN_BHS 011-4226.GPJ GLDR_CAN.GDT 10-17-01 DATA INPUT: Tony Mastroianni

PROJECT: 011-4226

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: October 10, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (nat V. + Q - ●, rem V. ⊕ U - ○; 400 800 1200 1600)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		606.6								
		Black clayey TOPSOIL		0.0								
				605.2	1	AS	-					
				1.4								
		Stiff to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. silt or sand pockets (TILL)			2	2" DO	8					
5					3	2" DO	26	600				
				599.1								
				7.5	4	2" DO	37					Borehole dry during drilling on October 10, 2001
	POWER AUGER	Hard, brown SILTY CLAY, some sand, trace gravel, fissures, some silt pockets (TILL)			5	2" DO	47					
10	SOLID STEM							595				
					6	2" DO	30					
				591.6								
15				15.0	7	2" DO	13					
		Stiff, grey SILTY CLAY, some sand, trace gravel (TILL)						590				
20					8	2" DO	11					
				585.1								
		END OF BOREHOLE		21.5								
25												
30												
35												

(Golder Report No. 011-4226)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: J.S.

CHECKED:

LDN_BHS 011-4226.GPJ GLDR_CAN.GDT 10-17-01 DATA INPUT: Tony Mastroianni

PROJECT: 011-4226

RECORD OF BOREHOLE 6

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: October 11, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (400 800 1200 1600); nat V. + Q - ●; rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		607.2 / 0.0								
		Black clayey TOPSOIL		606.1 / 1.1	1	AS	-					
		Stiff to very stiff mottled brown and grey SILTY CLAY, some sand, trace gravel, some silt and sand pockets, fissures (TILL)			2	2" DO	14					
5					3	2" DO	20					
				599.2 / 8.0				600				
10	POWER AUGER / SOLID STEM	Hard brown SILTY CLAY, some sand, trace gravel, fissures (TILL)			4	2" DO	43					Borehole dry during drilling on October 11, 2001
				593.2 / 14.0				595				
15		Stiff to very stiff, grey SILTY CLAY, some sand, trace gravel (TILL)			5	2" DO	17					
								590				
20					6	2" DO	12					
		END OF BOREHOLE		585.7 / 21.5								
25												
30												
35												

(Golder Report No. 011-4226)

"Note: This Drawing has been Reduced and is in Imperial Units"

LDN_BHS 011-4226.GPJ GLDR_CAN.GDT 10-17-01 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: J.S.

CHECKED:

PROJECT: 011-4276

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: NOVEMBER 21, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0		GROUND SURFACE		575.2				
		Black clayey TOPSOIL		0.0 / 573.2	1	AS	-	
		Stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. silt pockets and fissures (TILL)		2.0 / 568.7	2	2" DO	8	
5					3	2" DO	12	570
		Very stiff, brown SILTY CLAY, some sand, trace gravel, fissured (TILL)		6.5 / 562.7	4	2" DO	26	
10	POWER AUGER SOLID STEM				5	2" DO	15	565
				12.5	6	2" DO	8	
15					7	2" DO	8	560
		Stiff, grey SILTY CLAY, some sand, trace gravel (TILL)			8	2" DO	6	555
20								
25				548.7	9	2" DO	9	550
		END OF BOREHOLE		26.5				
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: 400 800 1200 1600 — nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl — 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 011-4276)

"Note: This Drawing has been Reduced and is in Imperial Units"

Borehole dry during drilling on November 21, 2001

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 011-4276.GPJ GLDR_CAN.GDT 1-3-02 DATA INPUT: Tony Mastroianni

PROJECT: 011-4276

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: NOVEMBER 22, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0	POWER AUGER, SOLID STEM	GROUND SURFACE		575.1 / 0.0				
		Black clayey TOPSOIL		573.1 / 2.0	1	AS	-	
		Firm to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. silt and sand pockets, topsoil intrusions (TILL)			2	2" DO	6	
5					3	2" DO	20	570
		Very stiff, brown SILTY CLAY, some sand, trace gravel, occ. fissures, silt pockets (TILL)		568.6 / 6.5	4	2" DO	26	
10					5	2" DO	21	565
				562.6 / 12.5	6	2" DO	10	
15					7	2" DO	8	560
20		Very stiff to stiff, grey SILTY CLAY, some sand, trace gravel (TILL)			8	2" DO	6	555
25				548.6 / 26.5	9	2" DO	10	550
		END OF BOREHOLE						
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20, 40, 60, 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ●; rem V. ⊕ U - ○; 400, 800, 1200, 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp, W, Wl; 10, 20, 30, 40

>2000

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole dry during drilling on November 22, 2001

(Golder Report No. 011-4276)

"Note: This Drawing has been Reduced and is in Imperial Units"

LDN_BHS 011-4276.GPJ GLDR_CAN.GDT 1-3-02 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

PROJECT: 011-4276

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: NOVEMBER 22, 2001

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (nat V. + Q - ● rem V. ⊕ U - ○) (400 800 1200 1600)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		575.1 / 0.0								
		Black clayey TOPSOIL		574.1 / 1.0	1	AS	-					Backfill Material
		Soft to very stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. silt and sand pockets, fissured (TILL)			2	2" DO	4					Bentonite Seal
5								570	>2000			
					3	2" DO	6		>2000			
				568.6 / 6.5								
		Stiff to very stiff, brown SILTY CLAY, some sand, trace gravel, fissured (TILL)			4	2" DO	18					
10								565				
					5	2" DO	14					
	POWER AUGER SOLID STEM			563.1 / 12.0								Backfill Material
					6	2" DO	11					
15								560				
					7	2" DO	7					
		Stiff, grey SILTY CLAY, some sand, trace gravel (TILL)										
20					8	2" DO	8	555				
25					9	2" DO	8	550				
				548.6 / 26.5								Borehole dry during drilling on November 22, 2001
		END OF BOREHOLE										
30												
35												

(Golder Report No. 011-4276)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 011-4276.GPJ GLDR_CAN.GDT 1-3-02 DATA INPUT: Tony Mastroianni

PROJECT: 021-4035

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: APRIL 9, 2002

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		183.96				
		Black clayey topsoil, mixed with gravel (FILL)		0.00 183.65				
		Stiff, brown silty clay, some sand, trace gravel, occ. topsoil pockets (FILL)		0.30	1	AS	-	
1				182.89	2	50 DO	12	183
		Stiff, black clayey TOPSOIL		1.07 182.43				
		Stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel (TILL)		1.52	3	50 DO	9	
2				181.98				182
		Very stiff, brown SILTY CLAY, some sand, trace gravel, numerous silt/ sand pockets (TILL)		1.98	4	50 DO	26	
3					5	50 DO	26	181
				180.30				
		Very stiff, grey SILTY CLAY, some sand, trace gravel (TILL)		3.66	6	50 DO	22	
4								180
					7	50 DO	16	
5				178.93				179
		END OF BOREHOLE		5.03				
6								
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

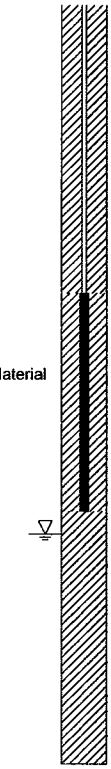
HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT (10 20 30 40) Wp W Wl

(Golder Report No. 021-4035)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS



Water level in borehole at about elevation 180.5 m. approximately 2 hrs. after completion of drilling on April 9, 2002

Water level in standpipe at about elevation 183.1 m. on April 23, 2002

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 021-4035.GPJ GLDR_CAN.GDT 6-10-02 DATA INPUT: Tony Mastroianni

PROJECT: 021-4035

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: APRIL 9, 2002

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		184.07				184
		Granulated recycled asphalt and concrete (FILL)		0.00 / 183.87				
		Very stiff, brown, silty clay, some sand, trace gravel, occ. topsoil pockets (FILL)		0.20	1	AS	-	
1					2	50 DO	20	183
				182.85				
		Black clayey TOPSOIL		1.22 / 182.54				
		Stiff, mottled brown and grey SILTY CLAY, some sand, trace gravel, occ. sand pockets (TILL)		1.52	3	50 DO	9	
2				182.09				
		Hard, brown SILTY CLAY, some sand, trace gravel (TILL)		1.98	4	50 DO	34	182
					5	50 DO	42	181
3				180.56				
		Very stiff, grey SILTY CLAY, some sand, trace gravel (TILL)		3.51	6	50 DO	28	180
4					7	50 DO	23	
5				179.04				
		END OF BOREHOLE		5.03				
6								
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT Wp — W — Wl (10 20 30 40)

(Golder Report No. 021-4035)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Water Seepage

Water seepage into borehole encountered at about elevation 182.3 m. during drilling on April 9, 2002

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 021-4035.GPJ GLDR_CAN.GDT 6-10-02 DATA INPUT: Tony Mastroianni

PROJECT: 031-140094

RECORD OF BOREHOLE 9

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 14, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (400 800 1200 1600); nat V. + Q - ●; rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		594.0								
		ASPHALT		0.2								
		Granular base (FILL)		0.3	1	AS	-					
		Firm, brown, silty clay, some sand, trace gravel, some topsoil (FILL)			2	2" DO	5	590				
				589.5								
5		Firm, mottled brown and grey, SILTY CLAY, some sand, trace gravel (TILL)		4.5	3	2" DO	7					
				587.0								
		Very stiff to hard, brown, SILTY CLAY to CLAYEY SILT, some sand, trace gravel, occ. silt pockets (TILL)		7.0	4	2" DO	20	585				
10					5	2" DO	35					
				582.5								
		Very stiff, brown to grey, SILTY CLAY, some sand, trace gravel (TILL)		11.5	6	2" DO	26	580				Water seepage into borehole encountered at about elevation 581.0 ft. during drilling on May 14, 2003
15					7	2" DO	17					
				577.5								
		END OF BOREHOLE		16.5								
20												
25												
30												
35												

(Golder Report No. 031-140094)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 031-140094.GPJ GLDR_CAN.GDT 6/3/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-140094

RECORD OF BOREHOLE 10

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 14, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (400 800 1200 1600) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		594.0								
		ASPHALT		0.2								
		Granular base (FILL)		0.6	1	AS	-					
		Firm, mottled brown and grey, silty clay mixed with topsoi, some sand, trace gravel (FILL)			2	2" DO	6	590				
5				589.0								
		Firm, mottled brown and grey, SILTY CLAY, some sand, trace gravel (TILL)		5.0	3	2" DO	6					
				587.0								
		Very stiff to hard, brown, SILTY CLAY, some sand, trace gravel, occ. silt pockets (TILL)		7.0	4	2" DO	22	585				Water seepage into borehole encountered at about elevation 586.5 ft. during drilling on May 14, 2003
10					5	2" DO	30					
				581.5								
		Very stiff, grey, SILTY CLAY, some sand, trace gravel (TILL)		12.5	6	2" DO	22	580				
15					7	2" DO	18					
				577.5								
		END OF BOREHOLE		16.5								
20												
25												
30												
35												

(Golder Report No. 031-140094)

"Note: This Drawing has been Reduced and is in Imperial Units"

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 031-140094.GPJ GLDR_CAN.GDT 6/3/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 113

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 1, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		175.83								
		Black, clayey topsoil (FILL)		0.00	1	AS	-					
				175.22								
1		Stiff dark brown silty clay, occasional pockets of topsoil (FILL)		0.61	2	50 DO	13	175				
				174.69								
		Stiff to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, fissured (TILL)		1.14	3	50 DO	17	174				
2					4	50 DO	30					
				173.09								
3		Hard to very stiff, brown, **SILTY CLAY**, some sand, trace gravel, fissured (TILL)		2.74	5	50 DO	45	173				
					6	50 DO	30	172				Borehole dry during drilling on December 1, 2003
4				171.26								
				4.57	7	50 DO	13	171				
5												
6		Stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel (TILL)			8	50 DO	11	170				
7								169	>96+ >96+			
8				167.75	9	50 DO	9	168				
		END OF BOREHOLE		8.08								
9												
10												

(Golder Report No. 031-140318)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C

CHECKED: GM

LDN_BHS 031-140318.GPJ GLDR_CAN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 114

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 1, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION
0	POWER AUGER, HOLLOW STEM	GROUND SURFACE		175.37 / 0.00				175
		Black, clayey **TOPSOIL**			1	AS	-	
				174.61 / 0.76				
1		Stiff to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)			2	50 DO	11	
								174
					3	50 DO	22	
2				173.27 / 2.10				
		Hard to very stiff, brown, **SILTY CLAY**, some sand, trace gravel, fissured (TILL)			4	50 DO	39	173
3								
				172.09 / 3.28	5	50 DO	20	
		Very stiff to firm, grey, **SILTY CLAY**, some sand, trace gravel (TILL)						172
4					6	50 DO	11	
								171
					7	50 DO	8	
5								
								170
6								
					8	50 DO	11	169
7				168.27 / 7.10				
		Compact, grey, **SILTY FINE SAND**, trace gravel, occ. clay pockets						168
					9	50 DO	21	
8				167.29 / 8.08				
		END OF BOREHOLE						
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80)

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● rem V. ⊕ U - ○ (20, 40, 60, 80)

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3})

WATER CONTENT PERCENT — Wp, W, Wl (10, 20, 30, 40)

(Golder Report No. 031-140318)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole dry during drilling on December 1, 2003

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C

CHECKED: GM

LDN_BHS 031-140318.GPJ GLDR_CAN.GDT 2/13/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		175.11				175
		Grey/ brown, granular base (**FILL**)		0.00				
		Black, clayey **TOPSOIL**		0.18	1	AS	-	
1		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		174.35 0.76	2	50 DO	10	174
					3	50 DO	14	
2				172.97 2.13	4	50 DO	31	173
3		Hard to very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)			5	50 DO	26	172
				171.45 3.66	6	50 DO	13	171
4		Stiff, grey, **SILTY CLAY**, trace to some sand and gravel (**TILL**)						
					7	50 DO	11	
5				170.08				
		END OF BOREHOLE		5.03				
6								
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)

(Golder Report No. 031-140333)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole dry during drilling on December 16, 2003

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		176.43 / 0.00					*(Golder Report No. 031-140333)*			
		Black, clayey topsoil **(FILL)**		176.18 / 0.25	1	AS	-	176				
1		Stiff to firm, brown, silty clay, some sand, trace gravel, with some topsoil intermixing/ pockets and layers **(FILL)**			2	50 DO	12					
					3	50 DO	11	175				
2					4	50 DO	6	174				
3		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**		173.53 / 2.90	5	50 DO	15					
				173.08 / 3.35				173				
4		Very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured **(TILL)**			6	50 DO	27					
					7	50 DO	20	172				
5	POWER AUGER HOLLOW STEM			171.40 / 5.03								
6					8	50 DO	15	171				
7		Very stiff to firm, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt pockets/ seams **(TILL)**						170				
					9	50 DO	9	169				
8												Water seepage into borehole encountered at about 166.98m during drilling on Deember 16, 2003
9				166.98 / 9.45	10	50 DO	16	168	⊕ + ⊕ +			
		Compact, grey, **SANDY SILT (TILL)**		166.68				167				
10		END OF BOREHOLE		9.75								

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastrojanni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

PROJECT: 031-140333

RECORD OF BOREHOLE 3

SHEET 1 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16-17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80): nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		177.06								
	POWER AUGER HOLLOW STEM	Stiff to very stiff, brown, silty clay, some sand, trace gravel, with black topsoil, intermixing, pockets and layers **(FILL)**		0.00	1	AS	-	177	*(Golder Report No. 031-140333)*			
1					2	50 DO	14	176				
2					3	50 DO	21	175				
					4	50 DO	20					
3								174				
					5	50 DO	21					
				173.25								
4		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, occ. fine sand partings **(TILL)**		3.81	6	50 DO	26	173				
				172.64								
		Very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured **(TILL)**		4.42	7	50 DO	27					Borehole dry during drilling on December 16, 2003 prior to commencing wash boring
5								172				
				171.88								
		Stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till pockets/ seams **(TILL)**		5.18	8	50 DO	13					
6								171				
					9	50 DO	9					
7								170	⊕ +			
									⊕ +			
8	WASH BORING HQ CASING				10	50 DO	9					
				168.53				169				
		Dense, grey, **SANDY SILT**, trace to some clay and gravel **(TILL)**		8.53	11	50 DO	35		>96+ >96+			
9	WASH BORING UNCASED			167.76				168				
		Firm to stiff, grey, **SILTY CLAY**, trace sand and gravel, occ. silt and fine sand partings/ pockets **(TILL)**		9.30								
				167.31								
10				9.75								
		— CONTINUED NEXT PAGE —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 27/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 3

SHEET 2 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16-17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —							(Golder Report No. 031-140333)			
10	WASH BORING, UNCASED	Stiff to very stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till partings/ layers **(TILL)**			12	50 DO	5	167		○		
11								166				
12					13	50 DO	5	165		○		
13								164				
14					14	50 DO	5	163		○		
15					15	50 DO	4	162		○		
16								161				
17					16	50 DO	4	160	⊕ + ⊕ +	○		
18					17	50 DO	7	159				
19								158				
20					18	50 DO	10			○		
		— CONTINUED NEXT PAGE —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastrolanni

PROJECT: 031-140333

RECORD OF BOREHOLE 3

SHEET 3 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16-17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
20								157				
21					19	50 DO	10	156				
22					20	50 DO	17	155				
23		Stiff to very stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till partings/ layers **(TILL)**						154				
24					21	50 DO	17	153				
25	WASH BORING							152				
26					22	50 DO	10	151				
27	UNCASED			150.09 / 26.97	23	50 DO	7	150				
		Loose, grey, **SILTY FINE SAND**		149.48 / 27.58								
28								149				
29		Very stiff, grey, **SILTY CLAY**, trace to some sand and gravel **(TILL)**			24	50 DO	17	148				
30		*— CONTINUED NEXT PAGE —*										

(Golder Report No. 031-140333)

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

PROJECT: 031-140333

RECORD OF BOREHOLE 3

SHEET 4 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16-17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - O) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
30		*— CONTINUED FROM PREVIOUS PAGE —*										
	UNCASED	Very stiff, grey, **SILTY CLAY**, trace to some sand and gravel **(TILL)**		146.58	25	50 DO	25	147				
		END OF BOREHOLE		30.48								
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

(Golder Report No. 031-140333)

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastrojanni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

PROJECT: 031-140333

RECORD OF BOREHOLE 4

SHEET 1 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 8-11, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		177.16				177				
		Black, clayey topsoil, occ. gravel and brick fragments (**FILL**)		0.00 / 176.40	1	AS	-					
1		Very stiff, brown to brown and grey, silty clay, some sand, trace gravel, some black topsoil intermixing (**FILL**)		0.76 / 175.03	2	50 DO	19	176				
					3	50 DO	15					
2		Stiff dark brown to black, clayey **TOPSOIL**		2.13 / 174.26	4	50 DO	14	175				
3		Stiff to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.90	5	50 DO	10	174				
4					6	50 DO	19	173				
		Very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)		4.42 / 172.74	7	50 DO	28				MH	Borehole dry during drilling on December 8, 2003 prior to commencing washboring
5					8	50 DO	28	172				
6		Very stiff to stiff, grey, **SILTY CLAY**, trace to some sand and gravel (**TILL**)		5.94 / 171.22	9	50 DO	9	171	>96+			
7					10	50 DO	14	170				
	WASH BORING / HQ CASING	Compact, grey, **SILTY FINE SAND**		7.16 / 169.69								
8				7.47	11	50 DO	9	169				
	WASH BORING / UNCASED	Stiff to very stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till pockets/ seams (**TILL**)							>96+ / >96+			
9					12	50 DO	8	168	⊕ +			
10		*— CONTINUED NEXT PAGE —*										

(Golder Report No. 031-140333)

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 27/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 4

SHEET 2 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 8-11, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
10				167.18								
		Compact, grey, **SANDY SILT (TILL)**		10.06	13	50 DO	20	167				
				166.64								
				10.52								
11								166				
12					14	50 DO	8				MH	
								165				
13												
					15	50 DO	11	164				
14												
								163				
15	WASH BORING UNCASED	Firm to stiff, grey, **SILTY CLAY**, trace to some sand and gravel, with occ. silty sand and sandy silt till pockets/ seams **(TILL)**			16	50 DO	10					
								162				
16												
					17	50 DO	6	161				
17												
								160				
18					18	50 DO	8					
								159				
19												
					19	50 DO	9	158				
20		— CONTINUED NEXT PAGE —										

(Golder Report No. 031-140333)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 4

SHEET 3 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 8-11, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
20	WASH BORING UNCASED	Firm to stiff, grey, **SILTY CLAY**, trace to some sand and gravel, with occ. silty sand and sandy silt till pockets/ seams **(TILL)**						157				
21					20	50 DO	8	156				
22												
23					21	50 DO	8	155				
24								154				
25					22	50 DO	10	153				
26								152				
27					23	50 DO	9	151				
28												
29					24	50 DO	7	150				
30								149				
					25	50 DO	12	148				
					26		14					
		— CONTINUED NEXT PAGE —										

(Golder Report No. 031-140333)

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: C.C.

CHECKED: MD

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 4

SHEET 4 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 8-11, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
30	WASH BORING UNCASED	Firm to stiff, grey, **SILTY CLAY**, trace to some sand and gravel, with occ. silty sand and sandy silt till pockets/ seams **(TILL)**			26	50 DO	14	147				
31								146				
32					27	50 DO	15	145				
				144.85 32.31								
33		Very stiff to hard grey, **SILTY CLAY**, some sand, occ. gravel, with some silt partings **(TILL)**			28	50 DO	21	144				
34								143				
				142.26 34.90	29	50 DO	36					
35		Hard, grey, **SILTY CLAY**, occ. siltier/ sandier zones **(TILL)**						142				
				141.19 35.97								
36		Hard, grey, **CLAYEY SILT**, some sand and gravel, occ. cobbles/ boulders **(TILL)**			30	50 DO	143	141				
37								140				
38					31	50 DO	107					
				139.09 38.07				139				
39	ROTARY DRILL ROCK CORE	Grey, highly fractured dolomitic, **LIMESTONE**			32	NX RC	PH					
				137.87 39.29	33	NX RC	PH	138				
		Grey, **WEATHERED SHALE**		137.44								
40		END OF BOREHOLE		39.72								

(Golder Report No. 031-140333)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: C.C.
CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 15, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		175.66 0.00								
	POWER AUGER HOLLOW STEM	Very stiff to stiff, brown, silty clay, some sand, trace gravel, with black topsoil intermixing pockets (**FILL**)			1	AS	-	175				
1					2	50 DO	17					
								174				
2					3	50 DO	12					
				173.37 2.29								
		Hard mottled, brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			4	50 DO	30	173				
3				172.76 2.90								
		Hard to very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)			5	50 DO	32					
								172				
4				171.69 3.96	6	50 DO	15					
								171				Borehole dry during drilling on December 15, 2003
5					7	50 DO	7					
									>96+			
								170	+			
6					8	50 DO	6					
								169				
7		Very stiff to stiff, grey, **SILTY CLAY**, trace to some sand and gravel (**TILL**)							>96+			
									>96+			
								168				
8					9	50 DO	7					
									⊕ +			
								167	⊕ +			
9												
					10	50 DO	5					
				165.90				166				
10		END OF BOREHOLE		9.75								

(Golder Report No. 031-140333)

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

PROJECT: 031-140333

RECORD OF BOREHOLE 6

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 15, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		175.45				175
		Brown, silty clay, some sand, trace gravel, occ. topsoil pockets (**FILL**)		0.00 / 174.84	1	AS	-	
1		Stiff, black, clayey topsoil, with brown silty clay pockets (**FILL**)		0.61 / 174.08	2	50 DO	9	174
2		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		1.37 / 173.32	3	50 DO	15	
		Very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)		2.13 / 171.79	4	50 DO	27	173
3					5	50 DO	17	
4		Stiff to firm, grey, **SILTY CLAY**, trace to some sand and gravel (**TILL**)		3.66 / 170.42	6	50 DO	9	172
5		END OF BOREHOLE		5.03	7	50 DO	7	171
6								
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: 20 40 60 80 — nat V. + Q - ● — rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 031-140333)

Borehole dry during drilling on December 15, 2003

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE						*(Golder Report No. 031-145072)*		
	BACKHOE 0.60m x 1.80m	Dark brown to black, silty topsoil, some clay, asphalt, concrete and brick fragments, cinders, some roots (FILL)		0.00	1	CS				
				0.28						
1		Mottled brown and grey, silty clay, some concrete and brick fragments (FILL)			2	CS				
					3	CS				
				1.73						
2		Black, fine sand and cinders (FILL)			4	CS			Chem	▽
		Black, clayey silt, some sand, some galss fragments, trace gravel some organics (FILL)		2.23						
		Grey, SILTY CLAY, some sand, trace gravel (TILL)		2.51	5	CS				Water seepage into Test pit encountered at about 2.2m depth, during digging on May 22, 2003
3		END OF TEST PIT		3.05						
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: K.B.

CHECKED:

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: MAY 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	ELEVATION
0		GROUND SURFACE					
	BACKHOE 0.60m x 2.13m	Dark brown, clayey TOPSOIL, some roots, some sand, occ. gravel (FILL)		0.00	1	CS	
		Mottled brown and grey, clayey silt, pieces of wood, concrete and brick, some slag, and roots (FILL)		0.30	2	CS	
1		Mottled brown and grey, silty clay, pieces of concrete and brick (FILL)		1.22	3	CS	
2		Dark brown to black, fine to medium sand, some oxidation staining, occ. gravel, some clay and silt (FILL)		1.98	4	CS	
		Grey to black, ORGANIC SILT, some clay, trace sand and gravel		2.44	5	CS	
3		Grey, SILTY CLAY, some sand, trace gravel (TILL)			6	CS	
		END OF TEST PIT		3.05			

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○

20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl

10 20 30 40

(Golder Report No. 031-145072)

ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
Chem	▽ Water seepage into Test pit encountered at about 2.2m depth, during digging on May 22, 2003

LDN_BHS 031-145072.GPJ GLDR_CAN.GDT 6/17/03 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RSD

PROJECT: 031-145072

RECORD OF TEST PIT 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.13m	GROUND SURFACE						*(Golder Report No. 031-145072)*		
		Dark brown, clayey silt topsoil, some roots, sand, occ. gravel (FILL)		0.00						
				0.25	1	CS				
1		Mottled brown and grey, silty clay, some concrete and brick pieces, trace roots, trace gravel (FILL)			2	CS				
		Mottled brown and grey, silty clay, some sand, trace gravel, fissured, oxidized (FILL)		1.22	3	CS				
2		Black, sandy silt, some clay, trace gravel (FILL)		1.98	4	CS			Chem	
		Grey to black, silty clay, some organics, trace gravel (FILL)		2.29	5	CS				Water seepage into Test pit at about 2.29m during digging on May 22, 2003
		Mottled brown and grey, SILTY CLAY, some sand, trace gravel (TILL)		2.51						
3		END OF TEST PIT		3.05						
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: PGO

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.44m	GROUND SURFACE						*(Golder Report No. 031-145072)*		
		Dark brown, clayey silt topsoil, some sand and gravel, occ. roots (FILL)		0.00						
		Mottled brown and grey, silty clay, some concrete and brick pieces, trace gravel (FILL)		0.15	1	CS				
1		Mottled brown and grey, clayey silt, occ. sand and gravel (FILL)		0.61	2	CS				
2		Black, fine to medium sand, some clay, occ. gravel, pieces of brick (FILL)		1.37	3	CS			Chem	
		Mottled grey and black, silty clay, some sand, some organics (FILL)		2.13	4	CS				Water seepage into Test pit encountered at about 2.3m depth, during digging on May 22, 2003
3		Mottled brown and grey, SILTY CLAY, some sand, trace gravel (TILL)		2.44	5	CS				
		END OF TEST PIT		3.05						
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RJD

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE								
	BACKHOE 0.60m x 2.13m	Dark brown, clayey topsoil, some sand, trace gravel, roots (FILL)		0.00	1	CS				
		Mottled brown and grey, clayey silt, some sand, trace gravel, some wood, concrete and brick fragments (FILL)		0.33	2	CS				
1		Dark brown, fine to medium sand, some silt, some gravel, trace clay, glass fragments (FILL)		1.22	3	CS			Chem	
2		Dark grey, silty clay, some sand, trace gravel, some organics (FILL)		1.83	4	CS				▽ Water seepage into Test pit at about 2.44m during digging on May 22, 2003
					5	CS				
3					6	CS				
		Grey, SILTY CLAY, some sand, trace gravel (TILL)		3.35	7	CS				
4		END OF TEST PIT		3.96						
5										
6										
7										
8										
9										
10										

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

(Golder Report No. 031-145072)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RED

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 6

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.74m	GROUND SURFACE						*(Golder Report No. 031-145072)*		
		Dark brown, clayey topsoil, some sand, silt and roots (FILL)		0.00						
		Mottled brown and grey, silty clay, some concrete and brick fragments, trace gravel (FILL)		0.15	1	CS				
1		Dark brown, fine to coarse sand, some pieces of concrete, brick and glass fragments, some slag and gravel, trace silt and clay (FILL)		0.81	2	CS				
					3	CS			Chem	
2		Brown, medium to coarse sand and gravel, some shell fragments, trace silt, clay (FILL)		1.83	4	CS				▽ Water seepage into Test pit at about 2.13m during digging on May 22, 2003
3		Dark grey, silty clay, some sand, trace organics (FILL)		2.59	5	CS				
		Grey, SILTY CLAY, some sand, trace gravel (TILL)		3.35	6	CS				
4		END OF TEST PIT		3.96						
5										
6										
7										
8										
9										
10										

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RED

PROJECT: 031-145072

RECORD OF TEST PIT 7

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.74m	GROUND SURFACE		0.00				*(Golder Report No. 031-145072)*		
		Dark brown, clayey topsoil, some sand, some silt, trace to some roots, brick fragments (FILL)		0.08	1	CS				
1		Mottled brown and grey, silty clay, some concrete and brick pieces, some sand (FILL)			2	CS				
					3	CS				
2		Grey, silty clay, some organics, trace sand, pieces of wire (FILL)		1.98	4	CS				▽ Water seepage into Test pit encountered at about 2.0m depth, during digging on May 22, 2003
		Black, fine to coarse sand, some gravel, some wood, steel and glass fragments, trace clay (FILL)		2.59	5	CS			Chem	
3		Grey, SILTY CLAY, some sand, trace gravel (TILL)		3.05	6	CS				
					7	CS				
4		END OF TEST PIT		4.11						
5										
6										
7										
8										
9										
10										

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RBO

PROJECT: 031-145072

RECORD OF TEST PIT 8

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.74m	GROUND SURFACE		0.00				10^{-6} 10^{-5} 10^{-4} 10^{-3}; Wp — W — Wl; 10 20 30 40		
		Dark brown, clayey topsoil, some sand, some silt and roots, trace gravel (FILL)		0.10	1	CS		*(Golder Report No. 031-145072)*		
1		Mottled brown and grey, silty clay, some concrete, brick pieces and wood fragments (FILL)			2	CS				
					3	CS				
2					4	CS			Chem	▽ Water seepage into Test pit encountered at about 2.1m depth, during digging on May 22, 2003
				2.44	5	CS				
3		Grey, silty clay, some sand, some organics, trace brick fragments (FILL)			6	CS				
				3.66						
4		Grey, SILTY CLAY, some sand, trace gravel (TILL)			7	CS				
		END OF TEST PIT		4.27						
5										
6										
7										
8										
9										
10										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: REO

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 9

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE						*(Golder Report No. 031-145072)*		
	BACKHOE 0.60m x 2.44m	Dark brown, clayey topsoil, some sand, silt and roots, trace gravel (FILL)		0.00						
				0.25	1	CS				
1		Mottled brown and grey, silty clay, some concrete and brick fragments, trace gravel (FILL)			2	CS				
		Concrete and brick debris (FILL)		1.37						
		Black, fine to medium sand, some silt, trace clay (FILL)		1.52	3	CS			Chem	
2		Brown PEAT		1.68	4	CS				
		Dark grey, ORGANIC SILT, some clay, some sand		2.13	5	CS				Water seepage into Test pit at about 2.13m during digging on May 22, 2003
3		Grey, SILTY CLAY, some sand, trace gravel (TILL)		2.74	6	CS				
		END OF TEST PIT		3.35						
4										
5										
6										
7										
8										
9										
10										

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: REJ

PROJECT: 031-145072

RECORD OF TEST PIT 10

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.13m	GROUND SURFACE						*(Golder Report No. 031-145072)*		
		Dark brown, clayey topsoil, some sand, trace gravel(FILL)		0.00						
		Mottled brown and grey, silty clay, some topsoil, some sand, trace gravel (FILL)		0.30	1	CS				
1		Brown, fine to coarse sand, some glass and steel fragments (FILL)		0.76	2	CS			Chem	
		Mottled brown and grey, silty clay, some organics, some sand (FILL)		1.22	3	CS				
2		Grey, silty clay, some sand, some organics (FILL)		1.83	4	CS				Water seepage into Test pit encountered at about 1.8m depth, during digging on May 22, 2003
					5	CS				
3		Grey, SILTY CLAY, some sand, trace gravel (TILL)		3.05	6	CS				
		END OF TEST PIT		3.66						
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RGA

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastrojanni

PROJECT: 031-145072

RECORD OF TEST PIT 11

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.13m	GROUND SURFACE								
		Granular base (FILL)		0.00						
		Mottled brown and grey, silty clay, some sand, occ. gravel (FILL)		0.15	1	CS				
		Brown, medium to coarse sand, some concrete, brick and glass fragments, some silt (FILL)		0.41					Chem	
1		Mottled brown and grey, clayey silt, some sand, trace gravel (FILL)		0.76	2	CS				▽ Water seepage into Test pit at about 1.22m during digging on May 22, 2003
					3	CS				
2		Grey, silty clay, some sand, trace organics (FILL)		1.83	4	CS				
		Grey, SILTY CLAY, some sand, trace gravel (TILL)		2.59	5	CS				
3		END OF TEST PIT		3.20						
4										
5										
6										
7										
8										
9										
10										

(Golder Report No. 031-145072)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: K.B.

CHECKED:

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 12

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	BACKHOE 0.60m x 2.13m	GROUND SURFACE						*(Golder Report No. 031-145072)*		
		Mottled brown and grey, silty clay, some sand, trace gravel, trace rootlets (FILL)		0.00						
		Brown, medium to coarse silty sand, some gravel (FILL)		0.15	1	CS				
		Mottled brown and grey, silty clay, some sand, trace gravel, concrete and brick fragments (FILL)		0.56	2	CS				
1		Gravel (FILL)		0.91						
		Black, silty clay, some black and white fine sand (FILL) Solvent odour		1.22	3	CS			Chem	
2		Grey, SILTY CLAY, some organics, some sand		1.83	4	CS				
					5	CS				▽ Water seepage into Test pit at about 2.74m during digging on May 22, 2003
3		Grey, SILTY CLAY, some sand, trace gravel (TILL)		3.05	6	CS				
		END OF TEST PIT		3.66						
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RED

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/17/03 DATA INPUT: Tony Mastroianni

PROJECT: 031-145072

RECORD OF TEST PIT 13

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

EXCAVATION DATE: May 22, 2003

DATUM:

DEPTH SCALE METRES	METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE								
	BACKHOE 0.60m x 2.44m	Dark brown to black, clayey topsoil, some sand, occ. gravel (FILL)		0.00	1	CS				
		Mottled brown and grey, clayey silt, some medium to coarse silty sand, occ. gravel, topsoil (FILL)		0.33	2	CS				
1		Mottled brown and grey, silty clay, some sand, occ. gravel, concrete and brick fragments (FILL)		1.22	3	CS				
2		Black, fine to medium sand, some gravel, some clay (FILL)		2.13	4	CS			Chem	Water seepage into Test pit at about 2.3m during digging on May 22, 2003
		Brown and grey, clayey silt and sand, concrete, glass, steel and clay tile fragments (FILL)		2.44	5	CS				
3					6	CS				
4		Grey, SILTY CLAY, some sand, trace gravel (TILL)		3.96	7	CS				
		END OF TEST PIT		4.27						
5										
6										
7										
8										
9										
10										

(Golder Report No. 031-145072)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: K.B.

CHECKED: RGD

LDN_ENV 031-145072.GPJ GLDR_LDN.GDT 6/11/03 DATA INPUT: Tony Mastrojanni

PROJECT: 041-140048

RECORD OF BOREHOLE 4

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 14, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		PAVEMENT SURFACE		188.21				188	*(Golder Report No. 041-140048)*			
		ASPHALT		0.00								
				0.18								
		CONCRETE		187.78	1	AS	-					
				0.43								
1		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**			2	50 DO	8					
					3	50 DO	11	187				
2				186.08								
				2.13	4	50 DO	34	186				
3		Hard, brown, **SILTY CLAY**, some sand, trace gravel, occ. sand and silt partings, oxidized, fissured **(TILL)**			5	50 DO	33	185				
				184.40								
4		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**			6	50 DO	28	184				
				183.59								Water seepage into borehole encountered at about elevation 183.59m during drilling on May 12, 2004
				4.62	7	50 DO	27					
5	POWER AUGER / HOLLOW STEM	Compact, grey, **SILTY FINE SAND**, trace gravel										
				183.03				183				
				5.18								
6					8	50 DO	11	182				
7									>96+			
		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel, sand pockets **(TILL)**			9	50 DO	15	181			MH	
8								180				
9												
					10	50 DO	12	179				
10		*--- CONTINUED NEXT PAGE ---*										

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 4

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 14, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W Wl)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10								178	>96+			
11	POWER AUGER HOLLOW STEM	Very stiff, grey, **SILTY CLAY**, some sand, trace gravel, sand pockets **(TILL)**			11	50 DO	15	177				
12					12	50 DO	15	176				
13								175				
14					13	50 DO	13	174				
15								173				
16					14	50 DO	15	172				
17					15	50 DO	12	171				
18								170				
19		END OF BOREHOLE		169.47 / 18.75	16	50 DO	16					
20												

(Golder Report No. 041-140048)

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 18, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		187.20				187				
		ASPHALT		0.00								
		Granular road base (**FILL**)		0.18								
		Very dense, brown, fine to medium sand, some gravel, trace silt (**FILL**)		0.30	1	AS	-					
1					2	50 DO	64	186				
				185.83								
		Stiff, black, clayey topsoil, some sand trace gravel (**FILL**)		1.37								
				185.50								
2		Stiff, mottled brown and grey, silty clay, some sand, trace gravel, trace topsoil (**FILL**)		1.70	3	50 DO	12	185				
				184.91								
		Stiff, black, clayey topsoil, some sand, trace gravel (**FILL**)		2.29	4	50 DO	11					
				184.45								
3		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.74	5	50 DO	11	184				Borehole dry during drilling on May 18, 2004
				183.54								
		Hard, brown, **SILTY CLAY**, some sand, trace gravel, occ. silt partings, oxidized (**TILL**)		3.66	6	50 DO	34	183				
4												
5					7	50 DO	41					
				181.71				182				
		Stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		5.49								
6					8	50 DO	12	181				
				180.64								
		END OF BOREHOLE		6.55								
7												
8												
9												
10												

(Golder Report No. 041-140048)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 8

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 18, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		188.60				188	*(Golder Report No. 041-140048)*			
		ASPHALT		0.00								
		CONCRETE		0.19								
				188.18	1	AS	-					
				0.42								
1		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, occ. silt partings **(TILL)**			2	50 DO	16					
				187.23				187				
				1.37								
2		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel, oxidized **(TILL)**			3	50 DO	28					
					4	50 DO	41	186				
3					5	50 DO	39					Borehole dry during drilling on May 18, 2004
				184.94				185				
				3.66	6	50 DO	18					
4												
					7	50 DO	17	184				
5		Stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**										
								183				
6					8	50 DO	14					
				182.04								
		END OF BOREHOLE		6.55								
7												
8												
9												
10												

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

PROJECT: 041-140048

RECORD OF BOREHOLE 12

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 18, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		188.67				188	*(Golder Report No. 041-140048)*			
		ASPHALT		0.00								
		CONCRETE		0.18 / 188.26								
		Black, topsoil, some sand, trace gravel **(FILL)**		0.41 / 188.06								
				0.61								
1		Brown, silty fine to medium sand, trace gravel, trace clay **(FILL)**			1	AS	7					
				187.30								
		Compact, greyish brown, fine to coarse silty sand, trace gravel, trace silt **(FILL)**		1.37 / 186.94	2	50 DO	14	187				Water seepage into borehole encountered at about elevation 187.45m during drilling on May 18, 2004
2		Stiff, brown to grey, **SILTY CLAY**, some sand, trace gravel, fissured, silt partings		1.73								
				186.23								
		Compact, grey, fine to medium **SAND**, trace gravel		2.44 / 185.77	3	50 DO	29	186				
3				2.90								
					4	50 DO	26					
4								185				
					5	50 DO	28					
					6	50 DO	30	184				
5												
		Very stiff to hard, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**						183				
6												
					7	50 DO	14					
								182				
7												
								181				
					8	50 DO	15					
8				180.59								
		END OF BOREHOLE		8.08								
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 15

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 18, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		186.49				
		ASPHALT		0.00				
		Granular road base (**FILL**)		0.14 / 186.09	1	AS	-	
				0.41	2	AS	-	186
1		Stiff, brown, silty clay, some sand, trace gravel, pockets of topsoil and silty sand (**FILL**)			3	50 DO	8	
				184.92				185
		Firm, black, topsoil, some sand, roots, organics (**FILL**)		1.58	4	50 DO	7	
2				184.36				
		Stiff, brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.13	5	50 DO	14	184
				183.75				
3		Hard, brown, **SILTY CLAY**, some sand, trace gravel, occ. silt pockets, fissured (**TILL**)		2.74	6	50 DO	36	
					7	50 DO	41	183
4								
					8	50 DO	34	182
5								
								181
6				180.35				
		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel, silt pockets (**TILL**)		6.15	9	50 DO	19	
				179.94				180
		END OF BOREHOLE		6.55				
7								
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)

(Golder Report No. 041-140048)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole dry during drilling on May 18, 2004

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 16

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 18, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		187.30				187				
		ASPHALT		0.00 / 187.09								
		Granular road base (**FILL**)		0.20 / 186.84	1	AS	-					
				0.46								
1		Very stiff, mottled brown and grey, silty clay, some sand, trace gravel, trace topsoil (**FILL**)			2	50 DO	15	186				
				185.77								
		Firm, mottled brown and grey, silty clay, some sand, trace gravel, topsoil pockets (**FILL**)		1.52	3	50 DO	7					
2				185.16								
				2.13								
					4	50 DO	24	185				
3		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel, silt partings, fissured (**TILL**)			5	50 DO	30	184				
4					6	50 DO	22					
				183.05				183				
				4.24								
					7	50 DO	10					Borehole dry during drilling on May 18, 2004
5												
								182	>96+			
6												
					8	50 DO	8	181				
7		Very stiff to stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)							⊕ +			
								180	⊕ +			
					9	50 DO	6					
8												
								179	⊕ +			
9									⊕ +			
					10	50 DO	6	178				
10												

(Golder Report No. 041-140048)

--- CONTINUED NEXT PAGE ---

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 16

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 18, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
10	POWER AUGER / HOLLOW STEM	--- CONTINUED FROM PREVIOUS PAGE ---										
11		Very stiff to stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			11	50 DO	WH	177				
12					12	50 DO	WH	176				
13								175				
14					13	50 DO	7	174				
15								173	>96+			
16					14	50 DO	8	172				
17					15	50 DO	7	171				
18								170				
19		END OF BOREHOLE		168.55 / 18.75	16	50 DO	8	169				
20												

(Golder Report No. 041-140048)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: S.R.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 19

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 25, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		186.81				
		ASPHALT		0.00				
				0.15				
		Granular road base (**FILL**)		186.37	1	AS	-	
				0.43				
1		Stiff to hard, brown and grey, silty clay, some sand, trace gravel (**FILL**)			2	50 DO	9	186
				185.13				
				1.68	3	50 DO	43	
2		Hard to stiff, brown and black, silty clay, some slag, some sand, trace gravel, trace organics (**FILL**)			4	50 DO	12	185
				183.91				
3				2.90				
		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			5	50 DO	12	184
				183.15				
				3.66				
4					6	50 DO	31	183
					7	50 DO	29	
5		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel, silt pockets (**TILL**)						182
6								181
					8	50 DO	17	
7				179.80				180
				7.01				
					9	50 DO	8	179
8								
		Firm to very stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)						178
9								
					10	50 DO	6	
10								177
		--- CONTINUED NEXT PAGE ---						

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ○; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 041-140048)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 19

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 25, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10												
11	POWER AUGER HOLLOW STEM				11	50 DO	4	176				
12					12	50 DO	2	175				
13		Firm to very stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)						174	>96+			
14					13	50 DO	WH	173				
15								172				Water seepage into borehole encountered at about elevation 172.18m during drilling on May 25, 2004
					14	50 DO	WH					
16		END OF BOREHOLE		171.11 / 15.70								
17												
18												
19												
20												

(Golder Report No. 041-140048)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: S.P.
CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 20

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 26, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		PAVEMENT SURFACE		187.93								
		ASPHALT		0.00								
		CONCRETE		0.13								
				187.42								
				0.51								
1		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, silty pockets **(TILL)**			1	50 DO	25	187				
				186.55								
				1.37								
2					2	50 DO	31	186				
					3	50 DO	30					
3		Hard, brown, **SILTY CLAY**, some sand, trace gravel, fissured, silt pockets and sand layers **(TILL)**						185				
		-70mm sand seam @ 4.0m			4	50 DO	34					
4					5	50 DO	36	184				
				183.51								
				4.42	6	50 DO	18					
5	POWER AUGER HOLLOW STEM							183				
6					7	50 DO	13	182			MH	
7		Hard to very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**						181	>96+			
8					8	50 DO	12	180				
									>96+			
9								179				
					9	50 DO	10					
10								178				
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 041-140048)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 20

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 26, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
10		--- CONTINUED FROM PREVIOUS PAGE ---							(Golder Report No. 041-140048)			
11	POWER AUGER HOLLOW STEM	Hard to very stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			10	50 DO	7	177	>96+	○		
12					11	50 DO	6	176		○		
13								175	⊕ + >96+			
14					12	75 TO		174	>96+	○		
15								173				
16				171.77 16.15	13	50 DO	14	172		○		
17		Compact to loose, **SANDY SILT**, some clay, occ. sand seams and clayey layer			14	50 DO	12	171	>96+	○		Water seepage into borehole encountered at about elevation 171.48m on May 26, 2004
18								170				
19		END OF BOREHOLE		169.18 18.75	15	50 DO	2			○		
20												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 21

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 26, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, HOLLOW STEM	PAVEMENT SURFACE		187.76								
		ASPHALT		0.00								
		Granular road base (**FILL**)		0.13								
		Brown, silty clay, some sand, trace gravel (**FILL**)		187.41 0.36	1	AS	-					
				187.00				187				
1		Hard, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		0.76	2	50 DO	32					
				186.39								
				1.37	3	50 DO	28	186				
2												
		Hard, brown, **SILTY CLAY**, some sand, trace gravel, fissured, occ. silty sand partings (**TILL**)			4	50 DO	33					
								185				
3					5	50 DO	30					
				184.11								
				3.66				184				
4					6	50 DO	22				MH	
												Borehole dry during drilling on May 26, 2004
					7	50 DO	17	183				
5												
								182				
6					8	50 DO	14					
		Very stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)						181				
7												
					9	50 DO	11	180				
8									>96+			
								179				
9												
					10	50 DO	8					
								178				
10		--- *CONTINUED NEXT PAGE* ---										

(Golder Report No. 041-140048)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

RECORD OF BOREHOLE 21

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: MAY 26, 2004

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							(Golder Report No. 041-140048)			
10												
11					11	50 DO	6	177		○		
									>96+			
12					12	50 DO	5	176		○		
13								175	⊕ +			
									>96+			
14	POWER AUGER HOLLOW STEM	Very stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**			13	50 DO	9	174		○		
									>96+			
15								173		○		
					14	50 DO	8					
16								172	>96+			
17					15	50 DO	7	171		○		
									⊕ +			
18								170	⊕ +			
					16	50 DO	4			○		
		END OF BOREHOLE		169.02 / 18.75								
19												
20												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 8/26/04 DATA INPUT: Tony Mastroianni

PROJECT: 041-140048

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 31

BORING DATE: JUNE 7, 2004

SHEET 1 OF 1

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

(Golder Report No. 041-140048)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		187.30 0.00				187				
1		Brown, silty clay, some sand, trace gravel (**FILL**)			1	AS	-					
2					2	50 DO	10	186				
				184.86 2.44				185				
3		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, fissured (**TILL**)			3	50 DO	8	184				Borehole dry during drilling on June 7, 2004
				183.64 3.66								
4		Hard, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)						183				
5					4	50 DO	33					
				181.81 5.49				182				
6					5	50 DO	32	181				
7		Stiff to hard, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)						180				
8		END OF BOREHOLE		179.22 8.08	6	50 DO	10					
9												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.P.

CHECKED:

LDN_BHS 041-140048.GPJ GLDR_CAN.GDT 10/12/04 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-006

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 6, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (20 40 60 80); nat V. + Q - ●; rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		181.04				181	*(Golder Report No. 06-1140-006)*			
		ASPHALT		0.00								
		CONCRETE		0.09								
		Stiff, brown, silty clay, some sand and gravel, trace organics (**FILL**)		0.28	1	SS	10			○		
				180.28								
1		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		0.76	2	SS	17	180		○		
				179.52								
				1.52	3	SS	24			○		
2					4	SS	28	179		○		
3		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)			5	SS	33	178		○		Borehole dry during drilling on June 6, 2006
4					6	SS	25	177		○		
				176.62								
				4.42	7	SS	13			○		
5								176				
6								175				
		Very stiff to stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			8	SS	9			○		
7								174	>96+			
					9	SS	7			○		
8				172.96				173				
		END OF BOREHOLE		8.08								
9												
10												

LDN_BHS 06-1140-006.GPJ GLDR_CAN.GDT 6/14/06 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: B.G.

CHECKED: BG

PROJECT: 06-1140-006

RECORD OF BOREHOLE 7

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 7, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

(Golder Report No. 06-1140-006)

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER, SOLID STEM	PAVEMENT SURFACE		181.55 / 0.00				
		ASPHALT		181.35 / 0.20	1	AS	-	
		Grey, sand and gravel (**FILL**)		0.30	2	SS	4	181
		Brown to black, silty clay, some organics, clay tile fragments (**FILL**)		180.48 / 1.07	3	SS	2	
1		Firm to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			4	SS	23	180
2				179.57 / 1.98	5	SS	26	179
3		Very stiff, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)			6	SS	27	
4					7	SS	26	178
				177.13 / 4.42				
5					8	SS	13	177
6		Very stiff to stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			9	SS	9	176
7							>96+	175
					10	SS	7	174
8				173.47				
		END OF BOREHOLE		8.08				
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● rem V. ⊕ U - ○: 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT — Wp W Wl: 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Water seepage into borehole encountered at about a depth of 0.76m during drilling

Water level in borehole at about a depth of 7.32m upon completion of drilling on June 7, 2006

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: B.G.

CHECKED: BG

LDN_BHS 06-1140-006.GPJ GLDR_CAN.GDT 6/14/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-020

RECORD OF BOREHOLE 9

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 20, 2006

DATUM:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SHOULDER SURFACE							*(Golder Report No. 06-1140-020)*			
		Granular road base (**FILL**)		0.00	1	AS	-					
		Stiff, mottled brown and grey, silty clay, some sand, trace gravel (**FILL**)		0.30	2	SS	10					
1		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		0.76	3	SS	10					
					4	SS	9					
2		Hard, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.13	5	SS	40					
3					6	SS	38					Borehole dry during drilling on February 20, 2006
4		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		3.66	7	SS	29					
					8	SS	22					
5												
6					9	SS	15					
		END OF BOREHOLE		6.55								
7												
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.A.

CHECKED:

LDN_BHS 06-1140-020.GPJ GLDR_CAN.GDT 6/15/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-020

RECORD OF BOREHOLE 17

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 20, 2006

DATUM:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		0.00								
		ASPHALT		0.15								
		CONCRETE		0.28	1	AS	-					
		Granular road base (**FILL**)		0.30	2	SS	14					
		Compact, brown, medium to coarse sand, some clay and silt, trace gravel (**FILL**)		0.76	3	SS	12					
1		Stiff, mottled brown, silty clay, some sand, trace gravel, sand pockets (**Possible FILL**)		1.22	4	SS	29					
2		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)			5	SS	50					
3					6	SS	47					Borehole dry during drilling on February 20, 2006
4				3.66	7	SS	30					
5		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			8	SS	21					
6					9	SS	15					
		END OF BOREHOLE		6.55								
7												
8												
9												
10												

(Golder Report No. 06-1140-020)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.A.

CHECKED: NR

LDN_BHS 06-1140-020.GPJ GLDR_CAN.GDT 6/15/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-142

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JULY 13, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (400 800 1200 1600) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		614.7								
		Black, clayey **TOPSOIL**, rootlets		0.0								
				0.4	1	AS	-					
		Stiff to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**			2	SS	11					
5								610				
				609.0	3	SS	22					
				5.8								Borehole dry durring drilling on July 13, 2006
					4	SS	37					
		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel, occ. oxidized, fissured **(TILL)**						605				
10					5	SS	34					
				601.5	6	SS	22					
				13.3								
		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**						600				
15					7	SS	16					
				598.2								
		END OF BOREHOLE		16.5								
20												
25												
30												
35												

(Golder Report No. 06-1140-142)

LDN_BHS 06-1140-142.GPJ GLDR_CAN.GDT 8/31/06 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: N.R.

CHECKED:

PROJECT: 06-1140-142

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JULY 13, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/ft	ELEVATION
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		614.2				
		ASPHALT		0.0				
		Brown, granular road base (**FILL**)		0.4 / 612.2	1	AS	-	
		Firm to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.0 / 608.5	2	AS	-	
					3	SS	7	610
5					4	SS	17	
		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel, occ. oxidized, fissured (**TILL**)		5.7 / 600.7	5	SS	38	605
10					6	SS	35	
					7	SS	21	
		Very stiff to stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		13.5 / 597.7	8	SS	13	600
15		END OF BOREHOLE		16.5				
20								
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ● rem V. ⊕ U - ○ : 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl : 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 06-1140-142)

Borehole dry durring drilling on July 13, 2006

LDN_BHS 06-1140-142.GPJ GLDR_CAN.GDT 8/31/06 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: N.R.

CHECKED:

PROJECT: 06-1140-142

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JULY 13, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/ft	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80) / SHEAR STRENGTH Cu, psf (400 800 1200 1600) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		613.8								
		ASPHALT		0.0								
		Brown, granular road base (**FILL**)		0.5 / 611.3	1	AS	-			○		
		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.5 / 609.3	2	SS	9	610		○		
5		Very stiff to hard, brown, **SILTY CLAY**, some sand, trace gravel, occ. silt seams, occ. fissures (**TILL**)		4.5 / 601.8	3	SS	16			○		Borehole dry durring drilling on July 13, 2006
					4	SS	35	605		○		
10					5	SS	30			○		
		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel, occ. fissures (**TILL**)		12.0 / 597.3	6	SS	24	600		○		
15					7	SS	17					
		END OF BOREHOLE		16.5								
20												
25												
30												
35												

(Golder Report No. 06-1140-142)

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-142.GPJ GLDR_CAN.GDT 8/31/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-142

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JULY 13, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS/ft	ELEVATION
0		GROUND SURFACE		613.8				
		Black, clayey **TOPSOIL**		0.0				
	POWER AUGER SOLID STEM	Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**		0.8	1	AS	-	
					2	SS	13	610
5					3	SS	9	
				606.8				
		Hard, brown, **SILTY CLAY**, some sand, trace gravel **(TILL)**		7.0	4	SS	34	605
10					5	SS	39	
				599.8	6	SS	30	600
		Very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**		14.0	7	SS	20	
15				597.3				
		END OF BOREHOLE		16.5				
20								
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20, 40, 60, 80

SHEAR STRENGTH Cu, psf: nat V. +, rem V. ⊕, Q - ●, U - ○; 400, 800, 1200, 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp, W, WI; 10, 20, 30, 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 06-1140-142)

Borehole dry durring drilling on July 13, 2006

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-142.GPJ GLDR_CAN.GDT 8/31/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-142

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JULY 13, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 140lb; DROP, 30in

PENETRATION TEST HAMMER, 140lb; DROP, 30in

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS/ft	ELEVATION
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		614.4				
		ASPHALT		0.0				
		Brown, granular road base (FILL)		0.5 611.9	1	AS	-	
		Stiff, mottled brown and grey, SILTY CLAY, some sand, trace gravel (TILL)		2.5 608.1	2	SS	9	610
5					3	SS	11	
		Stiff to hard, brown, SILTY CLAY, some sand, trace gravel (TILL)		6.3 600.6	4	SS	33	605
10					5	SS	34	
					6	SS	28	
		Very stiff to stiff, grey, SILTY CLAY, some sand, trace gravel (TILL)		13.8 597.9	7	SS	13	600
15		END OF BOREHOLE		16.5				
20								
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ●; rem V. ⊕ U - ○; 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W WI; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 06-1140-142)

Borehole dry durring drilling on July 13, 2006

LDN_BHS 06-1140-142.GPJ GLDR_CAN.GDT 8/31/06 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: N.R.

CHECKED:

PROJECT: 07-1140-0027

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 1

BORING DATE: MARCH 7, 2007

SHEET 1 OF 2

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		175.79										
		Compact, black, sandy topsoil, trace gravel and rootlets (**FILL**)		0.00										
				0.15										
		Compact, brown, sand and gravel (**FILL**)		0.25	1	SS	18							
		Compact, black, silty sand, some clay, trace gravel, cinders (**FILL**)		175.18										
1		Hard, black, silty clay, some sand, trace gravel, mixed with topsoil (**FILL**)		0.61	2	SS	33	175						Borehole dry during drilling on March 7, 2007
				174.72										
		Dense, black, sand, trace gravel, some cinders (**FILL**)		1.07										
		END OF BOREHOLE		1.22										
2														
3														

(Golder Report No. 07-1140-0027)

PROJECT: 07-1140-0027

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 2

BORING DATE: MARCH 7, 2007

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		176.11										
		Stiff, black, sandy topsoil, trace gravel and rootlets (**FILL**)		0.00	1	SS	14	176						
				175.63										
		Compact, brown, sand and gravel (**FILL**)		0.48										
1		Stiff, black, silty clay, some sand, and gravel, mixed with topsoil (**FILL**)		0.61	2	SS	9	175						Borehole dry during drilling on March 7, 2007
				174.89										
		END OF BOREHOLE		1.22										
2														
3														

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.G.

CHECKED:

LDN_DBL 07-1140-0027.GPJ GLDR_LDN.GDT 20/3/07 DATA INPUT: Tony Mastroianni

PROJECT: 07-1140-0027

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MARCH 7, 2007

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	PAVEMENT SURFACE		175.91								
		ASHALT		0.03								
		Compact, brown, granular road base (FILL)		175.43	1	SS	30					Borehole dry during drilling on March 7, 2007
		Hard, black, silty topsoil, some sand, trace gravel and clay (FILL)		0.48								
1		Firm, brown, silty clay, some sand, trace gravel, mixed with black topsoil (FILL)		0.63	2	SS	7	175				
				174.67								
		END OF BOREHOLE		1.24								
2												
3												

(Golder Report No. 07-1140-0027)

PROJECT: 07-1140-0027

RECORD OF BOREHOLE 4

LOCATION: SEE LOCATION PLAN

BORING DATE: MARCH 7, 2007

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	PAVEMENT SURFACE		175.87								
		ASPHALT		0.03								
		Compact, brown, granular road base (FILL)		175.62	1	SS	28					Borehole dry during drilling on March 7, 2007
				0.25								
1		Very stiff to stiff, black to brown, silty clay, some sand, trace gravel mixed with topsoil (FILL)			2	SS	9	175				
				174.63								
		END OF BOREHOLE		1.24								
2												
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.G.

CHECKED:

LDN_DBL 07-1140-0027.GPJ GLDR_LDN.GDT 23/3/07 DATA INPUT: Tony Mastroianni

PROJECT: 07-1140-0098

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 22, 2007

DATUM: LOCAL

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		98.75								
		ASPHALT		0.00								
		CONCRETE		0.10								
		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, occ. roots (**TILL**)		0.29	1	SS	15	98				
1					2	SS	20					
				97.37								
		Very stiff, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)		1.37	3	SS	28	97				Borehole dry during drilling on June 22, 2007
2					4	SS	28					
								96				
3					5	SS	19					
				95.09								
		Stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		3.66	6	SS	11	95				
4												
					7	SS	9	94				
5				93.72								
		END OF BOREHOLE		5.03								
6												
7												
8												
9												
10												

(Golder Report No. 07-1140-0098)

LDN_BHS 07-1140-0098.GPJ GLDR_CAN.GDT 27/6/07 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: B.G.

CHECKED:

PROJECT: 07-1140-0098

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 22, 2007

DATUM: LOCAL

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / SOLID STEM	PAVEMENT SURFACE		98.21								
		ASPHALT		0.00								
		CONCRETE		0.15								
1		Firm, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, numerous to occ. organic pockets **(TILL)**		0.33	1	AS	-	98				
					2	SS	5					
				96.84				97				
2		Stiff to very stiff, brown, **SILTY CLAY**, some sand, trace gravel, occ. rootlets **(TILL)**		1.37	3	SS	13					
					4	SS	20	96				Borehole dry during drilling on June 22, 2007
3												
					5	SS	12	95				
4					6	SS	13					
				93.79				94				
		Firm, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**		4.42	7	SS	6					
5				93.18								
		END OF BOREHOLE		5.03								
6												
7												
8												
9												
10												

(Golder Report No. 07-1140-0098)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: B.G.

CHECKED:

LDN_BHS 07-1140-0098.GPJ GLDR_CAN.GDT 29/6/07 DATA INPUT: Tony Mastroianni

PROJECT: 07-1140-0098

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: JUNE 22, 2007

DATUM: LOCAL

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		PAVEMENT SURFACE		98.15								
		CONCRETE		0.00 / 97.94				98				
		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		0.20 / 97.39	1	AS	-					
1	POWER AUGER			0.76	2	SS	17	97				
	SOLID STEM				3	SS	20					
2		Very stiff to stiff, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)			4	SS	21	96				Borehole dry during drilling on June 22, 2007
3					5	SS	21	95				
4				93.97	6	SS	14	94				
		Stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		4.18 / 93.12	7	SS	9					
5		END OF BOREHOLE		5.03								
6												
7												
8												
9												
10												

(Golder Report No. 07-1140-0098)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: B.G.

CHECKED:

LDN_BHS 07-1140-0098.GPJ GLDR_CAN.GDT 27/6/07 DATA INPUT: Tony Mastroianni

PROJECT: 08-1132-033-0

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: APRIL 11, 2008

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
								(Golder Report No. 08-1132-033-0)			
0	PAVEMENT SURFACE		181.29				181				
	ASPHALT		0.00								
	CONCRETE		0.10 / 180.99								
			0.30								
1	Firm to stiff mottled brown and grey **SILTY CLAY**, some sand, trace gravel, with silt pockets and topsoil inclusions **(TILL)**			1	SS	7	180				
			179.46	2	SS	10					
2			1.83				179				
	Stiff to hard brown **CLAYEY SILT**, some sand, trace gravel **(TILL)**			3	SS	36					
3				4	SS	37	178			MH	Borehole dry during drilling on April 11, 2008
			177.63								
			3.66	5	SS	23					
4							177				
				6	SS	12					
5	Very stiff to firm grey **CLAYEY SILT**, some sand, trace gravel **(TILL)**										
				7	SS	8	176				
6											
				8	SS	6	175				
			174.74								
	END OF BOREHOLE		6.55								
7											
8											
9											

POWER AUGER

SOLID STEM

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.M.

CHECKED:

LDN_BHS_02 08-1132-033-0.GPJ GLDR_LDN.GDT 5/17/08 DATA INPUT: Jason Scott

PROJECT: 08-1132-033-0

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: APRIL 11, 2008

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
	CONCRETE SURFACE		181.51								
0	**CONCRETE**		0.00 / 181.30								
	Grey granular **(FILL)**		0.21 / 180.81				181				
1	Black fine to coarse slag and cinders **(FILL)** (Hydrocarbon Odour)		0.70 / 180.14	1	SS	6					
	Firm mottled brown and grey **SILTY CLAY**, some sand, trace gravel, with rootlets **(TILL)**		1.37 / 179.38	2	SS	6	180				
2											
	Very stiff to hard brown **CLAYEY SILT**, some sand, trace gravel **(TILL)**		2.13 / 177.85	3	SS	22	179				
3				4	SS	35					
							178				
	Very stiff to stiff grey **CLAYEY SILT**, some sand, trace gravel **(TILL)**		3.66 / 174.96	5	SS	28				MH	
4											
				6	SS	11	177				
5											
				7	SS	10	176				Water seepage into borehole at about elev. 176.2m during drilling on April 11, 2008
6											
				8	SS	9					
	END OF BOREHOLE		6.55				175				Borehole dry upon completion of drilling on April 11, 2008
7											
8											
9											

POWER AUGER

SOLID STEM

(Golder Report No. 08-1132-033-0)

LDN_BHS_02 08-1132-033-0.GPJ GLDR_LDN.GDT 5/17/08 DATA INPUT: Jason Scott

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.M.

CHECKED:

PROJECT: 08-1140-W028

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: APRIL 2, 2008

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0		GROUND SURFACE		186.84				
	POWER AUGER HOLLOW STEM	Loose, black, sand and gravel with slag **(FILL)**		0.00	1	CS		
				186.44				
				0.41	2	SS	5	
1		Loose, brown, fine sand, some gravel, trace silt, clay and organic material **(FILL)**			3	SS	4	186
				185.14				
				1.70	4	SS	4	
2		Loose, black, fine sand, some organic material, occ. clay pockets **(FILL)**						185
				184.33	5	SS	6	
				2.51				
3					6	SS	6	184
		Firm, black, clayey silt, some organic material, some sand **(FILL)**						
4					7	SS	7	183
				182.14				
				4.70	8	SS	8	
5		Very stiff, grey, **SILTY CLAY**, some sand, silt seams/partings						182
				181.28				
				5.56				
6					9	SS	8	181
		Very stiff to stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**						
7								180
					10	SS	7	179
8				178.77				
		END OF BOREHOLE		8.08				
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● / rem V. ⊕ U - ○: 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 08-1140-W028)

51.48

>96+

>96+

Water seepage into borehole at about elevation 180.9m during drilling on April 2, 2008

Water level in borehole at about elevation 180.7m upon completion of drilling on April 2, 2008

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: S.M.

CHECKED:

LDN_BHS 08-1140-W028.GPJ GLDR_CAN.GDT 5/12/08 DATA INPUT: Jason Scott

PROJECT: 08-1140-W028

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: APRIL 2, 2008

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		184.97								
		Black, clayey topsoil, rootlets **(FILL)**		0.00 / 184.69	1	CS						
		Stiff to firm, brown, silty clay, mixed with sand and gravel **(FILL)**		0.28 / 184.00	2	SS	9					
1		Loose, black to brown, fine sand, trace gravel, occ. organics, trace clay **(FILL)**		0.96 / 183.60	3	SS	7	184				
		Firm, brown, silty clay, some sand and gravel, trace organics **(FILL)**		1.37 / 182.83	4	SS	7					
2		Loose, brown, **MEDIUM TO COARSE SAND**, trace silt		2.13 / 182.45	5	SS	7	183				Water seepage into borehole at about elevation 182.7m during drilling on April 2, 2008
		Firm, brown, **CLAYEY SILT**, numerous silt partings		2.51 / 181.31	6	SS	8	182				
3		Stiff, grey, **CLAYEY SILT**, numerous silt partings		3.66 / 179.94	7	SS	12	181				
					8	SS	12					
4		Very stiff to firm, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**		5.03 / 176.89	9	SS	12	180	>96+			
5									>96+			
6								179				
7					10	SS	7	178	>96+			Water level in borehole at about elevation 178.11m upon completion of drilling on April 2, 2008
8		END OF BOREHOLE		8.08				177	>96+			
9												
10												

(Golder Report No. 08-1140-W028)

DEPTH SCALE

1 : 50

LOGGED: S.M.

CHECKED:

Golder Associates

LDN_BHS 08-1140-W028.GPJ GLDR_CAN.GDT 5/12/08 DATA INPUT: Jason Scott

PROJECT: 09-1140-W011

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: February 19, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
									(Golder Report No. 09-1140-W011)			Top of Pipe Elev. 185.76m
0		GROUND SURFACE		185.30				185				
		Concrete rubble **(FILL)**		0.00 / 184.92								
1		Compact, dark brown silty sand, some clay lumps, some gravel mixed with topsoil, cinders **(FILL)**		0.38	1	SS	19			○		
				183.93				184				
2		Firm, black clayey topsoil, some sand **(FILL)**		1.37	2	SS	8			○		Cuttings
				183.17				183				
		Firm, greenish grey **CLAYEY SILT**, some sand, topsoil intrusions - *faint petroleum odour*		2.13	3	SS	4			○		WL
				182.40				182				
3		Stiff, grey **CLAYEY SILT**, some sand, numerous sand partings		2.90	4	SS	10			○		
				181.64				181				
4	POWER AUGER / HOLLOW STEM	Loose to compact, grey, medium to coarse **SAND**, trace gravel		3.66	5	SS	7			○		Bentonite
					6	SS	22			○		
5				180.12				180				
		Very stiff to stiff, grey **SILTY CLAY**, some sand, trace gravel, sand partings **(TILL)**		5.18	7	SS	7		>96 +			Sand
6								179	>96 +			
7					8	SS	9			○		
								178	⊕ +			
8									>96 +			Screen
					9	SS	7	177		○		
				176.61								
9		END OF BOREHOLE		8.69								

Water level in stand pipe at about elevation 182.48m on February 20, 2009.

Stand pipe removed on February 20, 2009.

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 091140W011.GPJ GLDR_LON.GDT 3/11/09 DATA INPUT: SJL

PROJECT: 09-1140-W011

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: February 20, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
									(Golder Report No. 09-1140-W011)			
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		185.12				185				
		ASPHALT		0.00								
		Brown, granular roadbase **(FILL)**		0.09	1	CS						
		Compact, brown sandy silt, clay lumps, trace gravel, cinders **(FILL)**		0.21	2	SS	12					
1				184.36				184				
		Stiff, brown clayey silt, some sand, trace gravel, sand partings mixed with topsoil **(FILL)**		0.76	3	SS	9					
					4	SS	8					
2				182.99				183				
		Very loose, grey **SILTY SAND**, trace gravel, numerous clay lumps		2.13	5	SS	3					
				182.22								
3		Compact, grey, medium to coarse **SAND**, trace silt and gravel		2.90	6	SS	12	182				Seepage ▽
				181.46								Groundwater seepage encountered at about elevation 182.07m during drilling on February 20, 2009.
4				3.66	7	SS	13	181				
					8	SS	14					
5								180				
6		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**			9	SS	5	179				
7								178	⊕ + ⊕ +			
					10	SS	4					
8				177.04								
		END OF BOREHOLE		8.08								
9												

LDN_BHS_02 091140W011.GPJ GLDR_LON.GDT 3/11/09 DATA INPUT: SJL

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

PROJECT: 09-1140-W011

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: February 20, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
									(Golder Report No. 09-1140-W011)			
0	POWER AUGER / HOLLOW STEM	PAVEMENT SURFACE		185.73								
		ASPHALT		0.00								
		Compact, brown granular roadbase **(FILL)**		0.11	1	CS						
					2	SS	17					
				184.97				185				
1		Stiff to firm, brown clayey silt, some sand, trace gravel, numerous sand partings **(FILL)**		0.76	3	SS	10					
					4	SS	6	184				
2				183.60								
		Firm, greenish grey **CLAYEY SILT**, some sand, topsoil intrusions, sand partings		2.13 183.37								
		Loose, grey **SILTY SAND**, some clay lumps		2.36	5	SS	7					
				182.99				183				
3		Compact, grey, fine to medium **SAND**, trace silt		2.74	6	SS	20					WL Water level at about elevation 182.68m upon completion of drilling on February 20, 2009.
				182.07				182				
4				3.66	7	SS	14					
					8	SS	17	181				
5												
		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, sand partings **(TILL)**						180				
6					9	SS	14					
								179				
7												
								178				
8				177.65	10	SS	11					
		END OF BOREHOLE		8.08								
9												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 091140W011.GPJ GLDR_LON.GDT 3/11/09 DATA INPUT: SJL

PROJECT: 09-1140-W025

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 1

BORING DATE: November 26, 2009

SHEET 1 OF 2

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

(Golder Report No. 09-1140-W025)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI) (5 10 15 20)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	PAVEMENT SURFACE		179.85								
		ASPHALT		0.05								Asphalt patch
		CONCRETE		179.55								
		Brown granular roadbase, occ. clayey inclusions (FILL)		0.30	1	AS						Bentonite
		Brown clayey silt, some sand, trace gravel (FILL)		179.29 0.56								
				179.09								
1		Loose brown fine SAND, trace to some silt		0.76 178.89	2	SS	7	179				
		Loose brown SAND, some gravel, trace silt		0.96								
				178.15	3	SS	9	178				Nov. 27/09 ▽
2		Stiff brown SILTY CLAY, some sand, with silt partings		1.70								
				177.71								
				2.14	4	SS	4					Cuttings
3		Soft to stiff grey SILTY CLAY to CLAYEY SILT, some sand with silt and fine sand partings, few scattered fine gravel			5	SS	3	177			27.68	
4					6	SS	3	176			29.08	
				175.43								
				4.42	7	SS	2	175			45.45	
5												Screen
6					8	SS	2	174			40.26 MH 39.7	Bentonite
7		Firm to soft grey SILTY CLAY, trace to some sand, occ. silty fine sand partings, few scattered fine gravel						173				
					9	SS	2	172			35.25	
8												Cuttings
9								171				
					10	SS	3				25.27	
		— CONTINUED NEXT PAGE —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED: NR

LDN_BHS_02 09-1140-W025.GPJ GLDR_LON.GDT 3/3/10 DATA INPUT: DMB

PROJECT: 09-1140-W025

RECORD OF BOREHOLE 1

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: November 26, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W Wl) (5 10 15 20)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							***(Golder Report No. 09-1140-W025)***			
10	POWER AUGER HOLLOW STEM	Firm to soft grey **SILTY CLAY**, trace to some sand, occ. silty fine sand partings, few scattered fine gravel						170				
11					11	SS	2	169		34.53		Cuttings
12								168				
					12	SS	2			29.79		
		END OF BOREHOLE		167.05 / 12.80								Borehole dry during drilling on November 26, 2009. Water level in standpipe at about elev. 177.8m on November 27, 2009.
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED: NP

LDN_BHS_02 09-1140-W025.GPJ GLDR_LON.GDT 3/3/10 DATA INPUT: DMB

PROJECT: 09-1140-W025

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 2

BORING DATE: November 26, 2009

SHEET 1 OF 2

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

(Golder Report No. 09-1140-W025)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-3} 10^{-1} 10^{1} 10^{3}); WATER CONTENT PERCENT (Wp, W, Wl) (5 10 15 20)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	PAVEMENT SURFACE		180.45				180				
		ASPHALT		0.00								
		Grey-brown granular roadbase (FILL)		0.10								
				180.10								
				0.35	1	AS						
1		Loose brown **SILTY SAND**, trace to some gravel, occ. fine sand/silt seams/layers			2	SS	5	179				
					3	SS	7					
2				178.32								
		Soft brown **SILTY CLAY**, some sand with silt/fine sand partings		2.13	4	SS	3	178		29.6		
				177.86								
				2.59								
3					5	SS	3	177		27.75		
		Soft grey **SILTY CLAY** to **CLAYEY SILT**, trace to some sand, with occ. silt/fine sand partings										
4								176				
					6	SS	1			47.59 MH 35.3		
5				175.42								
				5.03				175	⊕ + ⊕ +			
6					7	SS	1			48.94		
								174				
7		Soft grey **SILTY CLAY**, trace sand, occ. silt/fine sand partings, few scattered fine gravel							⊕ + ⊕ +			
								173				
8					8	SS	1			39.41		
								172				
9					9	SS	1			32.09		
								171				

Borehole dry during drilling on November 26, 2009.

--- CONTINUED NEXT PAGE ---

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED: NP

PROJECT: 09-1140-W025

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 2

BORING DATE: November 26, 2009

SHEET 2 OF 2

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3); WATER CONTENT PERCENT (Wp W Wl) (5 10 15 20)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
				170.55								
10				9.90				170				
11					10	SS	1			27.18		
								169				
12												
	POWER AUGER HOLLOW STEM	Firm to soft grey **SILTY CLAY**, trace sand, occ. silt/fine sand partings, few scattered fine gravel			11	SS	WH	168		37.9		
13												
								167				
14					12	SS	1			35.77		
								166				
15												
					13	SS	2	165		29.54		
		END OF BOREHOLE		164.75 / 15.70								
16												
17												
18												
19												

(Golder Report No. 09-1140-W025)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED: NR

LDN_BHS_02 09-1140-W025.GPJ GLDR_LON.GDT 3/3/10 DATA INPUT: DMB

PROJECT: 09-1140-W025

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 3

BORING DATE: November 25, 2009

SHEET 1 OF 2

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

(Golder Report No. 09-1140-W025)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W Wl) (5 10 15 20)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		176.90								
		ASPHALT		0.00 / 176.72								
		CONCRETE		0.18								
		Grey-brown granular roadbase(FILL)		0.38	1	AS						
1		Compact brown fine **SAND**, trace to some silt			2	SS	17	176				
				175.53								
		Stiff brown and grey **SILTY CLAY**, trace to some sand, occ. silt partings, fissured		1.37	3	SS	11			28.79		
2				174.77				175				
		Stiff grey **SILTY CLAY**, trace to some sand and gravel		2.13	4	SS	9			30.15		Bentonite
				174.00								
3				2.90	5	SS	6	174		38.61		
					6	SS	2	173		39.01		
4												
					7	SS	2			43.54 MH 42.3		
5								172	⊕ +			Screen
									⊕ +			
6		Firm soft grey **SILTY CLAY**, trace sand, few scattered fine gravel			8	SS	2	171		31.6		
7								170	⊕ +			
									⊕ +			
8					9	SS	2	169		32.79		Cuttings
									⊕ +			
9								168	⊕ +			
					10	SS	2			47.24		

--- CONTINUED NEXT PAGE ---

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED: NP

LDN_BHS_02 09-1140-W025.GPJ GLDR_LON.GDT 3/3/10 DATA INPUT: DMB

PROJECT: 09-1140-W025

RECORD OF BOREHOLE 3

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: November 25, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 30)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-3} 10^{-1} 10^{1} 10^{3}); WATER CONTENT PERCENT (Wp W Wl) (5 10 15 20)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							***(Golder Report No. 09-1140-W025)***			
				167.15	10	SS	2					Cuttings
10		END OF BOREHOLE		9.75				167				Borehole dry after drilling on November 25, 2009. Standpipe dry on November 27, 2009.
11												
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED: NR

LDN_BHS_02 09-1140-W025.GPJ GLDR_LON.GDT 3/3/10 DATA INPUT: DMB

PROJECT: 09-1140-W028

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: March 24, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	GROUND SURFACE		175.45				175				
		Black clayey topsoil, silty clay, occasional sand seams and gravel **(FILL)**		0.00	1	SS	8					Borehole dry during drilling on March 24, 2009.
1				174.74				174				
		Firm to stiff, mottled, brown and grey **SILTY CLAY**, some sand, trace gravel **(TILL)**		0.71	2	SS	4					
2					3	SS	14				MH	
				173.32				173				
		Very stiff, brown **SILTY CLAY**, some sand, trace gravel **(TILL)**		2.13	4	SS	28					
3												
				172.10	5	SS	25	172				
		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, some sand pockets/partings **(TILL)**		3.35	6	SS	20					
4								171				
					7	SS	17					
5												
								170				
6												
					8	SS	14	169				
7												
								168				
					9	SS	22					
8				167.37								
		END OF BOREHOLE		8.08								
9												

(Golder Report No. 09-1140-W028)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W028.GPJ GLDR_LON.GDT 4/7/09 DATA INPUT: SJL

PROJECT: 09-1140-W028

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: March 24, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		174.61								
0	POWER AUGER, SOLID STEM	Black clayey topsoil, some dark grey silty clay, occasional sand seams **(FILL)**		0.00	1	SS	5	174				Borehole dry during drilling on March 24, 2009.
				173.74								
1		Firm, mottled, brown and grey **SILTY CLAY**, some sand, trace gravel, occasional topsoil pockets **(TILL)**		0.87	2	SS	6					
				173.24				173				
2		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, some sand pockets **(TILL)**		1.37	3	SS	23					
					4	SS	27	172				
3					5	SS	21					
				170.95				171				
4		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, some sand seams/pockets with depth **(TILL)**		3.66	6	SS	12					
					7	SS	9	170	>96 +			
5								169	>96 +			
6					8	SS	10	168				
7									>96 + >96 +			
					9	SS	20	167				
8				166.53								
		END OF BOREHOLE		8.08								
9												

(Golder Report No. 09-1140-W028)

DEPTH SCALE

1 : 50

LOGGED: TA

CHECKED:

Golder Associates

LDN_BHS_02 091140W028.GPJ GLDR_LON.GDT 4/7/09 DATA INPUT: SJL

PROJECT: 09-1140-W028

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: March 24, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 09-1140-W028)

GROUND SURFACE — 175.10

0.00 — Black **CLAYEY TOPSOIL** — 174.82

0.28 — Firm, mottled, brown and grey **SILTY CLAY**, some sand, trace gravel, some topsoil pockets **(TILL)**

NUMBER	TYPE	BLOWS/0.3m
1	SS	4
2	SS	6

173.73 — 1.37

NUMBER	TYPE	BLOWS/0.3m
3	SS	15
4	SS	32

Very stiff to hard, brown **SILTY CLAY**, some sand, trace gravel **(TILL)**

171.72 — 3.38

NUMBER	TYPE	BLOWS/0.3m
5	SS	26
6	SS	12
7	SS	12

Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional sand seams/pockets **(TILL)**

NUMBER	TYPE	BLOWS/0.3m
8	SS	8
9	SS	9

167.02 — 8.08 — END OF BOREHOLE

POWER AUGER, SOLID STEM

ELEVATION: 175, 174, 173, 172, 171, 170, 169, 168

>96 + (at elevation ~170)

>96 + (at elevation ~170)

>96 + (at elevation ~168)

>96 + (at elevation ~168)

ADDITIONAL LAB. TESTING: MH

Seepage

Minor groundwater seepage into borehole at about elevation 174.2m.

Seepage

Groundwater seepage observed at about elevation 169.0m during drilling on March 24, 2009.

LDN_BHS_02 091140W028.GPJ GLDR_LON.GDT 4/7/09 DATA INPUT: SJL

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

PROJECT: 09-1140-W037

RECORD OF BOREHOLE 1

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: April 8, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		PAVEMENT SURFACE		197.77 0.00				197				
1												Borehole dry during drilling on April 8, 2009.
2		Auger through approach fill material (No samples taken)						196				
3								195				
4								194				
5	POWER AUGER / HOLLOW STEM			193.20 4.57	1	SS	12	193		○		
6		Stiff to firm grey silty clay, some sand, trace gravel **(Approach Fill Material)**			2 3	SS SS	12 13	192		○		
7					4	SS	5	191				
8		Black **CLAYEY TOPSOIL**, trace sand and gravel		190.15 7.62 189.92 7.85	5	SS	14	190		○ ○		
9		Stiff, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional sand pockets and organic pockets **(TILL)**			6	SS	9	189		○		
		Very stiff to hard, brown **SILTY CLAY**, some sand, trace gravel, occasional sand partings, fissured **(TILL)**		188.78 8.99	7	SS	22		>96 +	○		
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 09-1140-W037)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 091140W037.GPJ GLDR_LON.GDT 7/2/09 DATA INPUT: SJL

PROJECT: 09-1140-W037

RECORD OF BOREHOLE 1

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: April 8, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER / HOLLOW STEM	Very stiff to hard, brown **SILTY CLAY**, some sand, trace gravel, occasional sand partings, fissured **(TILL)**			8	SS	34	188				
11				186.80 / 10.97	9	SS	31	187				
12					10	SS	12	186				
13		Hard to very stiff, grey **SILTY CLAY**, some sand, trace gravel **(TILL)**			11	SS	10	185	>96 +			
14					12	SS	7	184	>96 +			
15					13	SS	7	183	>96 +			
16		END OF BOREHOLE		182.07 / 15.70								

(Golder Report No. 09-1140-W037)

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 091140W037.GPJ GLDR_LON.GDT 7/2/09 DATA INPUT: SJL

PROJECT: 09-1140-W037

RECORD OF BOREHOLE 10

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: March 12, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		189.69 / 0.00								
0	POWER AUGER / HOLLOW STEM	Dark grey **CLAYEY TOPSOIL**		189.46 / 0.23								
1		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional fissures with oxidation **(TILL)**			1	SS	6	189				Borehole dry during drilling on March 12, 2009.
				188.32 / 1.37								
2		Hard, brown **SILTY CLAY**, some sand, trace gravel, fissured **(TILL)**			2	SS	37	188				
					3	SS	69	187			MH	
3				186.62 / 3.07								
					4	SS	35					
4					5	SS	25	186				
					6	SS	17	185				
5												
6		Hard to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**			7	SS	15	184				
								183				
7												
					8	SS	10	182	>96			
8								181	>96			
					9	SS	12					
9				180.09								
		END OF BOREHOLE		9.60								

(Golder Report No. 09-1140-W037)

DEPTH SCALE

1 : 50

LOGGED: NG

CHECKED:

Golder Associates

LDN_BHS_02 091140W037.GPJ GLDR_LON.GDT 7/2/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 9

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 1, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE										
0	POWER AUGER / HOLLOW STEM	Black clayey topsoil, trace rootlets **(FILL)**		0.00	1	CS						
		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional sand pockets **(TILL)**		0.30	2	SS	6					Borehole dry during drilling on September 1, 2009.
1					3	SS	6					
		Stiff to very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt seams/partings **(TILL)**		1.37	4	SS	15					
2					5	SS	18					
3					6	SS	13					
		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		3.28	7	SS	2					
4					8	SS	4					
5												
6		Compact, grey **SILTY SAND**, some clay, trace to some gravel		5.94	9	SS	16					
7		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		6.71	10	SS	3					
8												
9					11	SS	3					
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 09-1140-W091B)

>96

DEPTH SCALE

1 : 50

LOGGED: TA

CHECKED:

Golder Associates

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 9

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 1, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							***(Golder Report No. 09-1140-W091B)***			
10	POWER AUGER HOLLOW STEM	Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**							⊕ + ⊕ +			
		Soft, grey **SILTY CLAY**		10.67	12	SS	3			○		
11		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 10

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE										
	POWER AUGER / HOLLOW STEM	Stiff, black clayey topsoil, trace rootlets **(FILL)**		0.00	1	CS						
		Stiff, brown silty clay, some sand, trace gravel, topsoil pockets **(FILL)**		0.36	2	SS	13					Borehole dry during drilling on September 2, 2009.
1		Soft to firm, brown and grey silty clay, some sand, trace gravel, trace organics **(FILL)**		0.76	3	SS	6					
					4	SS	5					
2					5	SS	3					
3					6	SS	2					
		Soft, brown **SILTY CLAY**, some sand, trace gravel, trace organics **(TILL)**		3.40	7	SS	2					
4		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		4.42	8	SS	3					
5												
6					9	SS	3					
7		Compact, grey **SANDY SILT**, trace to some clay, trace gravel **(TILL)**		7.32	10	SS	24					
8		Stiff, grey **SILTY CLAY**, some sand, occasional gravel **(TILL)**		8.23	11	SS	8					
9		Dense, grey **SANDY SILT**, some clay **(TILL)**		9.14	12	SS	36					
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 09-1140-W091B)

>96

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 10

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							***(Golder Report No. 09-1140-W091B)***			
10	POWER AUGER / HOLLOW STEM	Dense, grey **SANDY SILT**, some clay **(TILL)**										
		Firm, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		10.74	13	SS	6					
11		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 11

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

(Golder Report No. 09-1140-W091B)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE										
		Black clayey topsoil, trace rootlets **(FILL)**		0.00	1	CS						Cuttings
				0.25	2	SS	7					
1		Firm, brown silty clay, some sand, trace gravel, trace rootlets, trace organics **(FILL)**			3	SS	6					Bentonite
		Soft, brown and grey **SILTY CLAY**, some sand, trace gravel, trace to some organics **(TILL)**		1.52	4	SS	3					
2				2.13	5	SS	29					
		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt seams/partings **(TILL)**			6	SS	21					Cuttings
3				3.66	7	SS	7					
		Firm, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**										
4				4.57	8	SS	13					
		Compact, grey **SANDY SILT**, some clay, occasional silty clay layers **(TILL)**										WL Sept. 3
5				5.49								Bentonite
					9	SS	2					
6												
		Firm to very stiff, grey **SILTY CLAY to CLAYEY SILT**, some sand, occasional silt pockets and seams **(TILL)**										Cuttings
7												
					10	SS	2					
8												WL Sept. 2
												Screen
9		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

LOGGED: TA

CHECKED:

Golder Associates

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 11

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Firm to very stiff, grey **SILTY CLAY to CLAYEY SILT**, some sand, occasional silt pockets and seams **(TILL)**			11	SS	9		>96 +	○		Screen
11		Soft, grey **SILTY CLAY**, occasional silt pockets		10.67	12	SS	3			○		
		END OF BOREHOLE		11.13								Water level in borehole at a depth of about 8.4m upon completion of drilling on September 2, 2009. Water level in standpipe at a depth of about 5.1m on September 3, 2009.
12												
13												
14												
15												
16												
17												
18												
19												

(Golder Report No. 09-1140-W091B)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 12

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE										
0	POWER AUGER / HOLLOW STEM	Firm to stiff, black clayey topsoil **(FILL)**		0.00	1	CS						
		Firm, brown and grey silty clay, some topsoil **(FILL)**		0.30	2	SS	8					Borehole dry during drilling on September 2, 2009.
1					3	SS	6					
		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional sand pockets **(TILL)**		1.37	4	SS	6					
2		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		2.13	5	SS	20					
3		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silty partings **(TILL)**		3.05	6	SS	12					
		Stiff, grey **CLAYEY SILT**, some sand, trace gravel **(TILL)**		3.66	7	SS	10					
4				4.42	8	SS	8					
5									>96 +			
									>96 +			
6					9	SS	2					
7		Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt and sand partings at depth **(TILL)**							⊕ +			
									⊕ +			
8					10	SS	WH					
									⊕ +			
9									⊕ +			
					11	SS	3					
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 09-1140-W091B)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 12

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt and sand partings at depth **(TILL)**										
				10.67								
11		Very soft, grey **SILTY CLAY**			12	SS	WH					
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

(Golder Report No. 09-1140-W091B)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 13

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE										
		Grey crushed limestone **(FILL)**		0.00	1	AS						
		Very stiff, black clayey topsoil, some sand, trace gravel **(FILL)**		0.15	2	SS	19					Borehole dry during drilling on September 3, 2009.
1		Firm to stiff, brown silty clay, some sand, trace gravel, occasional sand seams/pockets **(FILL)**		0.76	3	SS	8					
					4	SS	4					
2		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel **(TILL)**		2.13								
				2.44	5	SS	8					
3		Firm to stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt seams/partings **(TILL)**			6	SS	15					
4					7	SS	7					
				4.42	8	SS	6					
5												
6					9	SS	3					
7		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**										
8					10	SS	5					
9												
		Compact, grey **SANDY SILT**, trace to some clay, trace gravel **(TILL)**		9.30	11	SS	23					
				9.75								
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 09-1140-W091B)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 13

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							***(Golder Report No. 09-1140-W091B)***			
10	POWER AUGER HOLLOW STEM	Stiff, grey **SILTY CLAY**, some sand, trace gravel **(TILL)**			12	SS	6			○		
11					13	SS	2			○		
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 14

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE										
0	POWER AUGER / HOLLOW STEM	Black clayey topsoil, numerous rootlets **(FILL)**		0.00	1	CS						
		Firm, brown silty clay, some sand, trace gravel **(FILL)**		0.20	2	SS	7					Borehole dry during drilling on September 3, 2009.
1					3	SS	4					
		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel **(TILL)**		1.37	4	SS	4					
2		Stiff to very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		2.13	5	SS	19					
3					6	SS	14					
				3.66	7	SS	3					
4												
					8	SS	3					
5		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**										
6					9	SS	4					
				7.01								
7		Loose, grey **SANDY SILT**, some clay, trace gravel **(TILL)**			10	SS	9					
8				8.23								
		Very stiff to stiff, grey **CLAYEY SILT**, some sand and gravel **(TILL)**			11	SS	7					
9												
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 09-1140-W091B)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 14

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Very stiff to stiff, grey **CLAYEY SILT**, some sand and gravel **(TILL)**							>96 +			
11		Soft, grey **SILTY CLAY**		10.82	12	SS	3					
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

(Golder Report No. 09-1140-W091B)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 10-1140-0090

RECORD OF BOREHOLE 1

SHEET 1 OF 5

LOCATION: SEE LOCATION PLAN

BORING DATE: May 25, 2010 - May 27, 2010

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 10-1140-0090-1000-L02)

GROUND SURFACE — 177.23 / 0.00

Compact to dense, dark brown sand, trace gravel, trace silt **(FILL)**

1 SS 25; 2 SS 37; 3 SS 12

175.10 / 2.13

Stiff, brown and bluish grey **SILTY CLAY**, some sand, trace gravel, occasional sand layers/pockets, occasional trace organics **(LACUSTRINE)**

4 SS 4; 5 SS 5

173.57 / 3.66

Very stiff to stiff, grey **CLAYEY SILT to SILTY CLAY**, some sand, trace to some gravel, occasional to numerous sand layers/pockets

6 SS 9; 7 SS 4; 8 SS 15; 9 SS 7

>96 >96

POWER AUGER HOLLOW STEM

ROTARY DRILLING HQ ROCK CORE

--- CONTINUED NEXT PAGE ---

WL in piezometer May 31/10

Bentonite

Seepage May 25/10

Grout

DEPTH SCALE 1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 1011400090.GPJ GLDR_LON.GDT 7/6/10 DATA INPUT: SJL

PROJECT: 10-1140-0090

RECORD OF BOREHOLE 1

SHEET 2 OF 5

LOCATION: SEE LOCATION PLAN

BORING DATE: May 25, 2010 - May 27, 2010

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
									(Golder Report No. 10-1140-0090-1000-L02)			
8	ROTARY DRILLING	Very stiff to stiff, grey **CLAYEY SILT to SILTY CLAY**, some sand, trace to some gravel, occasional to numerous sand layers/pockets						169				
9					10	SS	8					
10								168				
11					11	SS	7	167				
12	HQ ROCK CORE				12	SS	6	166				
13								165				Grout
14					13	SS	8	164				
15								163				
16								162				
17					14	SS	8	161				
								160				
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 1011400090.GPJ GLDR_LON.GDT 7/6/10 DATA INPUT: SJL

PROJECT: 10-1140-0090

RECORD OF BOREHOLE 1

SHEET 3 OF 5

LOCATION: SEE LOCATION PLAN

BORING DATE: May 25, 2010 - May 27, 2010

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
		(Golder Report No. 10-1140-0090-1000-L02)										
18								159				
19								158				
					15	SS	11					
20								157				
21								156				
22								155				
	ROTARY DRILLING				16	SS	15					Grout
23	HQ ROCK CORE	Very stiff to stiff, grey **CLAYEY SILT to SILTY CLAY**, some sand, trace to some gravel, occasional to numerous sand layers/pockets						154				
24								153				
25								152				
					17	SS	27					
26								151				
27								150				
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 1011400090.GPJ GLDR_LON.GDT 7/6/10 DATA INPUT: SJL

PROJECT: 10-1140-0090

RECORD OF BOREHOLE 1

SHEET 4 OF 5

LOCATION: SEE LOCATION PLAN

BORING DATE: May 25, 2010 - May 27, 2010

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
28								149				
					18	SS	10					
29								148				Grout
		Very stiff to stiff, grey **CLAYEY SILT to SILTY CLAY**, some sand, trace to some gravel, occasional to numerous sand layers/pockets										
30								147				
31								146				
	ROTARY DRILLING	Very dense, grey **BOULDERS**		145.84 31.39 145.61	19	SS	>100					
				31.62								
32		Grey, **CLAYEY SILT to SILTY CLAY**, some sand, trace gravel, occasional boulders			20	NQ RC	DD	145				Bentonite (coated)
				144.69 32.54								
33					21	SS	>100	144				
		Very dense, grey **SANDY SILT**, some clay, some gravel **(TILL)**										
34				143.09 34.14	22	NQ RC	DD	143				
35					23	HQ RC	DD	142	T.C.R. (%) 69 / S.C.R. (%) 57 / R.Q.D. (%) 37	qu=107.9mPa qu=98.6mPa		
		Poor to excellent quality, grey **DOLOSTONE BEDROCK**, occasionally fractured, occasional sand seams *- occasional light petroleum odour*										Sand
36								141				
	ROTARY DRILLING				24	NQ RC	DD		80 / 69 / 43			
37												Screen
					25	NQ RC	DD	140	93 / 86 / 82	qu=90.3mPa		
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 10-1140-0090-1000-L02)

HQ ROCK CORE

NQ ROCK CORE

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 1011400090.GPJ GLDR_LON.GDT 7/6/10 DATA INPUT: SJL

PROJECT: 10-1140-0090

RECORD OF BOREHOLE 1

SHEET 5 OF 5

LOCATION: SEE LOCATION PLAN

BORING DATE: May 25, 2010 - May 27, 2010

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
38	ROTARY DRILLING / NQ ROCK CORE	Poor to excellent quality, grey **DOLOSTONE BEDROCK**, occasionally fractured, occasional sand seams *- occasional light petroleum odour*			25	NQ RC	DD	139	T.C.R. (%): 93 / S.C.R. (%): 86 / R.Q.D. (%): 82	*qu=96.8mPa*		
39					26	NQ RC	DD	138	T.C.R. (%): 98 / S.C.R. (%): 97 / R.Q.D. (%): 96	*qu=74.3mPa*		
40					27	NQ RC	DD	137	T.C.R. (%): 94 / S.C.R. (%): 92 / R.Q.D. (%): 92	*qu=72.5mPa*		
				136.74								
		END OF BOREHOLE		40.49								
41												Groundwater seepage encountered at about elevation 175.7m during drilling on May 25, 2010. Water level in piezometer at about elevation 179.2m on May 31, 2010.
42												
43												
44												
45												
46												
47												

(Golder Report No. 10-1140-0090-1000-L02)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: SM
CHECKED:

LDN_BHS_02 1011400090.GPJ GLDR_LON.GDT 7/6/10 DATA INPUT: SJL

PROJECT: 11-1140-0200

RECORD OF BOREHOLE 1

SHEET 1 OF 3

LOCATION: SEE LOCATION PLAN

BORING DATE: February 10, 2012

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 140mm OD SOLID STEM	PAVEMENT SURFACE		182.91										
		ASPHALT		0.05										
		(GM) SILTY GRAVEL and SAND, angular; grey, (GRANULAR BASE).		0.18										
		(ML) CLAYEY SILT, some sand, trace gravel; brown, some organic pockets, trace red brick, (FILL); firm.			1	SS	9							
1					2	SS	8	182						
				181.69										
		(ML) CLAYEY SILT, some sand, trace gravel; brown and grey, some organic pockets, sand pockets (possible FILL); cohesive, w~PL, firm to stiff.		1.22	3	SS	5							
2								181						
				180.78										
		(ML) CLAYEY SILT, trace sand; brown and grey, laminated with silt partings; cohesive, w>PL, firm.		2.13	4	SS	6							
				180.17										
3		END OF BOREHOLE		2.74										

(Golder Report No. 11-1140-0200-R01)

Borehole dry during and after drilling on February 10, 2012.

PROJECT: 11-1140-0200

RECORD OF BOREHOLE 2

LOCATION: SEE LOCATION PLAN

BORING DATE: February 10, 2012

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 140mm OD SOLID STEM	PAVEMENT SURFACE		181.54										
		ASPHALT		0.05										
		(GM) SILTY GRAVEL and SAND, angular; grey, (GRANULAR BASE).		0.20										
				181.16										
		(SW) SAND, trace to some gravel; brown, (FILL).		0.38	1	CS		181						
1		(ML) CLAYEY SILT, some sand, trace gravel; brown, trace organic pockets; cohesive, w>PL.			2	CS								
				180.02										
		END OF BOREHOLE		1.52										
2														
3														

Borehole dry during and after drilling on February 10, 2012.

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

PROJECT: 11-1140-0200

RECORD OF BOREHOLE 3

SHEET 2 OF 3

LOCATION: SEE LOCATION PLAN

BORING DATE: February 10, 2012

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		181.13					SHEAR STRENGTH Cu, kPa: nat V. + Q - ● / rem V. ⊕ U - ○ (20 40 60 80)	WATER CONTENT PERCENT: Wp W WI (10 20 30 40)		
0	POWER AUGER 140mm OD SOLID STEM	(SW) SAND, some clay, trace gravel; black, trace organic pockets, (FILL); firm.		0.00 / 180.83				181	*(Golder Report No. 11-1140-0200-R01)*			Borehole dry during and after drilling on February 10, 2012.
1		(ML) CLAYEY SILT, some sand, trace gravel; grey, trace organic pockets, trace red brick, (FILL); firm to soft.		0.30 / 179.76	1	SS	6	180				
					2	SS	4					
2		(CL) SILTY CLAY, some sand, trace gravel; brown, silt partings; cohesive, w>PL, soft.		1.37 / 179.00	3	SS	3	179				
		(CL) SILTY CLAY, trace sand; grey, trace silt partings; cohesive, w>PL, soft.		2.13 / 178.39	4	SS	2					
3		END OF BOREHOLE		2.74								

PROJECT: 11-1140-0200

RECORD OF BOREHOLE 4

LOCATION: SEE LOCATION PLAN

BORING DATE: February 10, 2012

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		181.34					SHEAR STRENGTH Cu, kPa: nat V. + Q - ● / rem V. ⊕ U - ○ (20 40 60 80)	WATER CONTENT PERCENT: Wp W WI (10 20 30 40)		
0	POWER AUGER 140mm OD SOLID STEM	(SW/ML) SAND and SILT, some gravel, trace clay; brown and black, some organic material, trace red brick, (FILL).		0.00 / 180.90	1	CS		181				Borehole dry during and after drilling on February 10, 2012.
1		(ML) CLAYEY SILT, some sand, trace gravel; mottled brown and grey; cohesive, w~PL.		0.44 / 180.29	2	CS		180				
		(SM) SILTY SAND; brown; moist.		1.05 / 179.82	3	CS						
2		END OF BOREHOLE		1.52								
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_03 11-1140-0200.GPJ GLDR_LDN.GDT 06/03/12 DATA INPUT: DMB

PROJECT: 11-1140-0200

RECORD OF BOREHOLE 5

SHEET 3 OF 3

LOCATION: SEE LOCATION PLAN

BORING DATE: February 10, 2012

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		PAVEMENT SURFACE		181.19								
0	POWER AUGER 140mm OD SOLID STEM	ASPHALT		0.00								
		(GM) SILTY GRAVEL and SAND, angular; grey, (GRANULAR BASE).		0.10 / 180.73				181				
				0.46	1	SS	4					
1		(ML) CLAYEY SILT, some sand, trace gravel; mottled brown and grey, some silt partings; cohesive, firm.			2	SS	8					
				179.82 / 1.37				180				
		(CL) SILTY CLAY, trace sand; brown, silt partings; cohesive, w>PL, stiff.			3	SS	8				MH	
2				179.06 / 2.13				179				
		(CL) SILTY CLAY, trace sand; grey; cohesive, w>PL, firm.			4	SS	7					
				178.45								
3		END OF BOREHOLE		2.74								

SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) 20 40 60 80

WATER CONTENT PERCENT Wp W WI 10 20 30 40

(Golder Report No. 11-1140-0200-R01)

Borehole dry during and after drilling on February 10, 2012.

PROJECT: 11-1140-0200

RECORD OF BOREHOLE 6

LOCATION: SEE LOCATION PLAN

BORING DATE: February 10, 2012

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		PAVEMENT SURFACE		181.45								
0	POWER AUGER 140mm OD SOLID STEM	ASPHALT		0.05								
		(GM) SILTY GRAVEL and SAND, angular; grey, (GRANULAR BASE).		0.18				181				
		(SW/ML) SAND and SILT, some gravel; brown, trace red brick, (FILL).			1	CS						
1				180.08				180				
		(ML) CLAYEY SILT, some sand, trace gravel; brown; cohesive, w>PL.		1.37	2	CS						
		END OF BOREHOLE		1.52								
2												
3												

SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) 20 40 60 80

WATER CONTENT PERCENT Wp W WI 10 20 30 40

Borehole dry during and after drilling on February 10, 2012.

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_03 11-1140-0200.GPJ GLDR_LDN.GDT 06/03/12 DATA INPUT: DMB

PROJECT: 13-1140-0026

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 13, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER 83mm ID HOLLOW STEM	ROAD SURFACE		175.85				176
		ASPHALT		0.00				
		CONCRETE		0.10 / 175.57				
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, **(TILL)**; cohesive, w~PL, stiff.		0.28	1	SS	8	
1				174.84	2	SS	10	175
		(CL) sandy **SILTY CLAY**, trace gravel; brown, **(TILL)**, cohesive, w~PL, very stiff to stiff.		1.01	3	SS	18	
2								174
					4	SS	17	
3								173
					5	SS	13	
4				171.74	6	SS	12	172
		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w~PL, stiff to firm.		4.11				
					7	SS	5	171
5				170.82				
		END OF BOREHOLE		5.03				170
6								
7								
8								
9								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ○; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W WI; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 13-1140-0026-R01)

Borehole dry upon completion of drilling on March 13, 2013.

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: LS

CHECKED:

LDN_BHS_02 1311400026.GPJ 22/03/13 DATA INPUT: DMB

PROJECT: 13-1140-0026

RECORD OF BOREHOLE BH-103

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 13, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
		ROAD SURFACE		175.97				176
0	POWER AUGER 83mm ID HOLLOW STEM	**ASPHALT**		0.00				
		CONCRETE		0.06				
				0.22				
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, with organic pockets, **(TILL)**; cohesive, w>PL, firm to stiff.			1	SS	6	
1					2	SS	8	175
				174.60				
				1.37				
					3	SS	19	
2								174
		(CL) sandy **SILTY CLAY**, trace gravel; brown, **(TILL)**, cohesive, w~PL, very stiff to stiff.			4	SS	14	
3					5	SS	11	173
				172.31				
				3.66				
					6	SS	6	172
4		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w~PL, very stiff to firm.						
					7	SS	3	
				170.94				171
5		END OF BOREHOLE		5.03				
6								170
7								
8								
9								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT (10 20 30 40) Wp W WI

(Golder Report No. 13-1140-0026-R01)

>96 +

⊕ +

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole dry upon completion of drilling on March 13, 2013.

DEPTH SCALE

1 : 50

LOGGED: LS

CHECKED:

Golder Associates

LDN_BHS_02 1311400026.GPJ 22/03/13 DATA INPUT: DMB

PROJECT: 13-1140-0026

RECORD OF BOREHOLE BH-105

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 13, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 83mm ID HOLLOW STEM	ROAD SURFACE		176.21				176				
		ASPHALT		0.00								
		CONCRETE		0.10								
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, layers/pockets of topsoil, **(TILL)**; cohesive, w>PL, stiff to firm.		0.25	1	SS	8					Borehole dry upon completion of drilling on March 13, 2013.
1					2	SS	6	175				
				174.84								
		(CL) sandy **SILTY CLAY**, trace gravel; brown, **(TILL)**, cohesive, w~PL, stiff to very stiff.		1.37	3	SS	12					
2								174				
					4	SS	15					
3								173				
				172.86	5	SS	9					
		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w~PL, very stiff to firm.		3.35					>96			
4					6	SS	5	172				
					7	SS	4					
5				171.18								
		END OF BOREHOLE		5.03				171				
6												
7												
8												
9												

(Golder Report No. 13-1140-0026-R01)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: LS

CHECKED:

LDN_BHS_02 1311400026.GPJ 22/03/13 DATA INPUT: DMB

PROJECT: 13-1140-0031

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 13, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 lb; DROP, 760 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FT	ELEVATION
0	POWER AUGER 3/4" ID HOLLOW STEM	PAVEMENT SURFACE		574.8				575
		ASPHALT		0.0				
		(SW/GW) SAND AND GRAVEL, angular; brown, **(GRANULAR BASE)**; moist.		0.3 / 573.6	1	AS		
		(CL) SILTY CLAY, trace sand; black, **(TOPSOIL)**; cohesive, w>PL.		1.2	2	AS		
				571.3	3	SS	2	
5		(CL/CI) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, **(TILL)**; cohesive, w~PL, soft to very stiff.		3.5	4	SS	4	570
				567.8				
		(CL/CI) sandy **SILTY CLAY**, some gravel; brown, **(TILL)**; cohesive, w<PL, very stiff.		7.0	5	SS	22	
10					6	SS	19	565
				562.8				
		(CL/CI) sandy **SILTY CLAY**, trace to some gravel; grey, **(TILL)**; cohesive, w>PL, stiff to firm.		12.0	7	SS	6	
15					8	SS	5	560
				558.3				
		END OF BOREHOLE		16.5				
20								555
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20, 40, 60, 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ●; rem V. ⊕ U - ○; 400, 800, 1200, 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp, W, Wl; 10, 20, 30, 40

(Golder Report No. 13-1140-0031-R01)

>2000

ADDITIONAL LAB. TESTING: MH

INSTALLATION AND GROUNDWATER OBSERVATIONS: Borehole dry upon completion of drilling on March 13, 2013.

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: LS

CHECKED:

LDN_BHS_02 1311400031.GPJ 21/03/13 DATA INPUT: DMB

PROJECT: 13-1140-0031

RECORD OF BOREHOLE BH-102

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 13, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 lb; DROP, 760 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/FT	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (400 800 1200 1600); nat V. + Q - ●; rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 3/4" ID HOLLOW STEM	PAVEMENT SURFACE		574.5				575				
		ASPHALT		0.2	1	AS						
		(SW/GW) SAND AND GRAVEL, angular; brown, **(GRANULAR BASE)**; moist.		0.8 / 572.5	2	AS						
		(CL) SILTY CLAY, some sand; black, **(TOPSOIL)**; cohesive, w>PL.		2.0	3	SS	5					
5		(CL/CI) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, **(TILL)**; cohesive, w~PL, firm to very stiff.			4	SS	6	570				
				567.5 / 7.0					>2000			
		(CL/CI) sandy **SILTY CLAY**, some gravel; brown, **(TILL)**; cohesive, w<PL, very stiff to stiff.			5	SS	25					
10					6	SS	11	565				
				562.5 / 12.0								
		(CL/CI) sandy **SILTY CLAY**, trace to some gravel; grey, **(TILL)**; cohesive, w>PL, very stiff to firm.			7	SS	8					
15								560	>2000			
				558.0	8	SS	4					
		END OF BOREHOLE		16.5								
20								555				
25												
30												
35												

(Golder Report No. 13-1140-0031-R01)

Borehole dry about 2 hours after completion of drilling on March 13, 2013.

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: LS

CHECKED:

LDN_BHS_02 1311400031.GPJ 21/03/13 DATA INPUT: DMB

PROJECT: 13-1140-0188

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: May 01, 2014

DATUM: LOCAL

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		(Golder Report No. 13-1140-0188-R01)										
		GROUND SURFACE		101.31				102				
0	POWER AUGER 152mm OD SOLID STEM	**FILL** - (CL) sandy clayey TOPSOIL		0.00 / 101.11	1	AS						
				0.20								
					2	SS	6	101				
1					3	SS	8					
								100				
2		**FILL** - (CL) sandy SILTY CLAY, trace gravel; brown to grey, with pieces of wood, brick, concrete; cohesive, moist, soft to stiff			4	SS	5					
								99				
					5	SS	5					
3					6	SS	4	98				
				97.65 / 3.66								
4		**FILL** - (CL) sandy SILTY CLAY, trace gravel; black to dark grey, with sand seams, pieces of wood, brick, organic material; cohesive, soft			7	SS	3	97				
					8	SS	3					
5				96.28								
		END OF BOREHOLE		5.03				96				
6												
7												
8												
9												

Borehole dry upon completion of drilling on May 1, 2014.

DEPTH SCALE

1 : 50

LOGGED: LS

CHECKED:

Golder Associates

LDN_BHS_02 1311400188.GPJ 12/05/14 DATA INPUT: DMB

PROJECT: 13-1140-0188

RECORD OF BOREHOLE BH-102

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: May 01, 2014

DATUM: LOCAL

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
								101	***(Golder Report No. 13-1140-0188-R01)***			
0	POWER AUGER 152mm OD SOLID STEM	GROUND SURFACE		100.02				100				
		FILL, TOPSOIL - (CL) sandy SILTY CLAY; black		0.00 / 99.36	1	AS						
					2	SS	5					
1		**FILL** - (CL) sandy SILTY CLAY, trace gravel; brown to grey, with pieces of wood; cohesive, firm to stiff		0.66 / 98.82	3	SS	13	99				
		FILL - (SM) SILTY SAND; brown to black, with pieces of wood, slag, foundry sand, brick; non-cohesive, dry, compact to loose		1.20 / 97.89	4	SS	8					
2		**FILL** - (CL) sandy SILTY CLAY; grey-brown, with pieces of brick, sand pockets; cohesive, very stiff		2.13 / 97.12	5	SS	22	98				Groundwater seepage into borehole encountered at about elev. 97.0m during drilling on May 1, 2014.
3		**FILL** - Refuse debris, brick fragments, concrete pieces; loose		2.90 / 96.14	6	SS	16	97				*Seepage* ▽
					7	SS	50/75mm					*May 1/14* ▼
4		END OF BOREHOLE Obstruction		3.88				96				Water level in borehole at about elev. 96.2m upon completion of drilling on May 1, 2014.
5												
6												
7												
8												
9												

LDN_BHS_02 1311400188.GPJ 12/05/14 DATA INPUT: DMB

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: LS

CHECKED:

PROJECT: 13-1140-0207

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: November 25, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 184mm ID HOLLOW STEM	ROAD SURFACE		190.85				191				
		ASPHALT		0.00								
		FILL - (SM/GW) SILTY SAND and GRAVEL, angular; grey, **(GRANULAR BASE)**; dry		0.13	1	AS						
				190.34	2	SS	14					
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, organic pockets, **(TILL)**; cohesive, w~PL, firm		0.51	3	SS	7	190				
					4	SS	4					
2				188.72				189				
		(CL) sandy **SILTY CLAY**, trace gravel; brown, fissured, **(TILL)**; cohesive, w<PL, very stiff		2.13	5	SS	24		>96 +			
3					6	SS	28	188				
				187.19								
		(CL) sandy **SILTY CLAY**, trace gravel; grey, fissured in upper portion, **(TILL)**; cohesive, w<PL, very stiff		3.66	7	SS	21	187				
4												
					8	SS	12	186				
5												
								185				
6					9	SS	10					
								184	>96 +			
7									>96 +			
					10	SS	10	183				
8									>96 +			
								182	>96 +			
9					11	SS	6					
				181.25								
		END OF BOREHOLE		9.60								

(Golder Report No. 13-1140-0207-R01)

Borehole dry upon completion of drilling on November 25, 2013.

DEPTH SCALE

1 : 50

LOGGED: SG

CHECKED:

Golder Associates

LDN_BHS_07 1311400207.GPJ GLDR_LON.GDT 05/12/13 DATA INPUT: DMB

PROJECT: 13-1140-0207

RECORD OF BOREHOLE BH-102

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: November 25, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 184mm ID HOLLOW STEM	ROAD SURFACE		190.75								
		ASPHALT		0.00								
		FILL - (SM/GW) SILTY SAND and GRAVEL, angular; grey, **(GRANULAR BASE)**; dry		0.08	1	AS						
		TOPSOIL - (ML) sandy CLAYEY SILT; black; cohesive, w~PL, stiff		0.25	2	SS	11					Borehole dry upon completion of drilling on November 25, 2013.
1				189.99				190				
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, organic pockets, **(TILL)**; cohesive, w~PL, firm		0.76	3	SS	6					
2					4	SS	4	189				
				188.62								
		(CL) sandy **SILTY CLAY**, trace gravel; brown, fissured, **(TILL)**; cohesive, w<PL, very stiff		2.13	5	SS	24					
3					6	SS	27	188				
				187.09								
		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w~PL, very stiff		3.66	7	SS	16					
4								187				
					8	SS	12					
5								186				
					9	SS	7					
6								185				
7								184	>96 +			
					10	SS	6	183				
8				182.67								
		END OF BOREHOLE		8.08				182				
9												

(Golder Report No. 13-1140-0207-R01)

DEPTH SCALE

1 : 50

LOGGED: SG

CHECKED:

Golder Associates

LDN_BHS_07 1311400207.GPJ GLDR_LON.GDT 05/12/13 DATA INPUT: DMB

PROJECT: 13-1140-0207

RECORD OF BOREHOLE BH-103

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: November 25, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER 184mm ID HOLLOW STEM	ROAD SURFACE		190.50				190
		ASPHALT		0.00				
		FILL - (SM/GW) SILTY SAND and GRAVEL, angular; grey, **(GRANULAR BASE)**; dry		0.15 / 189.94	1	AS		
				0.56	2	SS	30	
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, organic pockets, **(TILL)**; cohesive, w~PL, firm			3	SS	7	189
					4	SS	4	
2				188.37				
		(CL) sandy **SILTY CLAY**, trace gravel; brown, fissured, **(TILL)**; cohesive, w<PL, very stiff		2.13	5	SS	26	188
3					6	SS	29	187
				186.84				
		(CL) sandy **SILTY CLAY**, trace gravel; grey, fissured, **(TILL)**; cohesive, w<PL, very stiff to stiff		3.66	7	SS	17	
4								186
					8	SS	12	
5				185.47				
		END OF BOREHOLE		5.03				185
6								
7								
8								
9								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80)

SHEAR STRENGTH Cu, kPa (20, 40, 60, 80) — nat V. +, Q - ●; rem V. ⊕, U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3})

WATER CONTENT PERCENT (10, 20, 30, 40) — Wp, W, Wl

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 13-1140-0207-R01)

>96 +

Borehole dry upon completion of drilling on November 25, 2013.

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SG

CHECKED:

LDN_BHS_07 1311400207.GPJ GLDR_LON.GDT 05/12/13 DATA INPUT: DMB

PROJECT: 13-1140-0207

RECORD OF BOREHOLE BH-104

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: November 25, 2013

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 184mm ID HOLLOW STEM	ROAD SURFACE		190.30				190				
		ASPHALT		0.00								
		FILL - (SM/GW) SILTY SAND and GRAVEL, angular; grey, **(GRANULAR BASE)**; dry		0.13 189.92 0.38	1	AS						
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, organic pockets, **(TILL)**; cohesive, w~PL, very stiff to stiff			2 3	SS SS	16 8	189				
				188.78								
2		(CL) sandy **SILTY CLAY**, trace gravel; brown, fissured, **(TILL)**; cohesive, w<PL, very stiff		1.52	4 5 6	SS SS SS	18 28 27	188 187				
				186.64								
4		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w<PL, stiff		3.66	7 8 9	SS SS SS	13 12 9	186 185 184				
				183.75								
6		END OF BOREHOLE		6.55				183				
7												
8												
9												

(Golder Report No. 13-1140-0207-R01)

Borehole dry upon completion of drilling on November 25, 2013.

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SG

CHECKED:

LDN_BHS_07 1311400207.GPJ GLDR_LON.GDT 05/12/13 DATA INPUT: DMB

PROJECT: 1400977

RECORD OF BOREHOLE BH-101

SHEET 1 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 27, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 140 lb; DROP, 30 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/FT	ELEVATION
0		GROUND SURFACE		579.0				
	POWER AUGER 3/4" ID HOLLOW STEM	**FILL** - (SM) SILTY SAND mixed with clay and gravel; brown, organic pockets, asphalt and concrete fragments; moist, compact		0.0	1	AS		
				576.5	2	SS	25	
		FILL - (CL) sandy SILTY CLAY, trace gravel; brown, with concrete fragments; cohesive, w<PL, very stiff		2.5	3	SS	18	
5				574.5				575
		FILL - (SW) SAND and CONCRETE; grey; non-cohesive, moist, compact		4.5	4	SS	23	
				572.0				
		FILL - (SM) SILTY SAND, trace gravel; black, with pockets of foundry sand, cemented; non-cohesive, wet, compact		7.0	5	SS	15	
				570.5				570
				8.5				
10					6	SS	5	
					7	SS	2	
								565
15					8	SS	2	
20		(SM) **SILTY SAND**; grey, with organic fibres, shells, rootlets; non-cohesive, wet, loose			9	SS	1	
								560
25					10	SS	1	
								555
30					11	SS	1	
				546.0				550
				33.0				
35		(SW) **SAND**; grey, with organic fibres, shells, rootlets; non-cohesive, wet, compact			12	SS	5	545
		--- CONTINUED NEXT PAGE ---						

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ●; rem V. ⊕ U - ○; 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W WI; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 1400977-R01)

Mar. 27/14 ▼

Water level in borehole at about elev. 571.99 ft upon completion of drilling on March 27, 2014.

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 1400977.GPJ 23/04/14 DATA INPUT: DMB

PROJECT: 1400977

RECORD OF BOREHOLE BH-101

SHEET 2 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 27, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 140 lb; DROP, 30 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/FT	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (400 800 1200 1600); nat V. + Q - ●; rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
40	POWER AUGER 3/4" ID HOLLOW STEM	(SW) **SAND**; grey, with organic fibres, shells, rootlets; non-cohesive, wet, compact			13	SS	1	540				
45				533.0	14	SS	2	535				
		(ML) **CLAYEY SILT**, some sand; grey; cohesive, w>PL, soft		46.0 / 531.5								
		(ML) **CLAYEY SILT**, some sand, trace gravel; grey, sand and gravel layers and pockets, **(TILL)**; cohesive, w>PL, stiff to very stiff		47.5				530	⊕ >2000			
50					15	SS	12					
		END OF BOREHOLE		527.5 / 51.5				525				
55												
60												
65												
70												
75												

(Golder Report No. 1400977-R01)

LDN_BHS_02 1400977.GPJ 23/04/14 DATA INPUT: DMB

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: SM

CHECKED:

PROJECT: 1400977

RECORD OF BOREHOLE BH-102

SHEET 1 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 27, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 140 lb; DROP, 30 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/FT	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (nat V. + Q - ●, rem V. ⊕ U - ○) (400 800 1200 1600)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 3/4" ID HOLLOW STEM	GROUND SURFACE		578.5				575				
		FILL - (SM) SILTY SAND and GRAVEL, angular; grey, **(GRANULAR BASE)**; non-cohesive, moist, compact		0.0	1	AS						
				576.5	2	SS	33					
		FILL - (SM) SILTY SAND, trace gravel; brown, with glass fragments; non-cohesive, moist, compact		2.0	3	SS	26					
5				574.0								
		FILL - (SM) SILTY SAND, trace gravel; grey, with clay pockets, concrete fragments; non-cohesive, moist, compact		4.5	4	SS	15					
				572.0				570				
		(SW) **SAND**, some silt, trace gravel; grey to black, with shells; non-cohesive, wet, loose to compact		6.5	5	SS	6					Mar. 27/14 ▼ Water level in borehole at about elev. 571.52 ft upon completion of drilling on March 27, 2014.
10				569.0								
		(SM) **SILTY SAND**; grey, with organic fibres, shells, rootlets; non-cohesive, wet, loose to compact		9.5	6	SS	7					
					7	SS	7	565				
15					8	SS	2					
20					9	SS	1	560				
								555				
25					10	SS	2					
				550.5				550				
		(SW) **SAND**; grey, with organic fibres and shells; non-cohesive, wet, loose to compact		28.0	11	SS	5					
30								545				
35					12	SS	5					
				540.5								

(Golder Report No. 1400977-R01)

--- CONTINUED NEXT PAGE ---

DEPTH SCALE
1 inch to 5 feet

Golder Associates

LOGGED: SM
CHECKED:

LDN_BHS_02 1400977.GPJ 23/04/14 DATA INPUT: DMB

PROJECT: 1400977

RECORD OF BOREHOLE BH-102

SHEET 2 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 27, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 140 lb; DROP, 30 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS/FT	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/ft (20 40 60 80); SHEAR STRENGTH Cu, psf (400 800 1200 1600); nat V. + Q - ●; rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							*(Golder Report No. 1400977-R01)*			
40	POWER AUGER 3/4" ID HOLLOW STEM	(CL) **SILTY CLAY**, some sand, trace gravel; grey, with sand seams and shells; cohesive, w~PL, stiff to firm		38.0	13	SS	4	540				
45		(Cl) **SILTY CLAY**, trace sand; grey; cohesive, w>PL, firm to soft		534.0 44.5	14	SS	3	535				
50					15	SS	WH	530				
		END OF BOREHOLE		527.0 51.5				525				
55												
60												
65												
70												
75												

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 1400977.GPJ 23/04/14 DATA INPUT: DMB

PROJECT: 1400977

RECORD OF BOREHOLE BH-103

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 27, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 140 lb; DROP, 30 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FT	ELEVATION
0	POWER AUGER 3/4" ID HOLLOW STEM	PAVEMENT SURFACE		577.3				575
		ASPHALT		0.0 / 0.2	1	AS		
		FILL - (SM) SILTY SAND and GRAVEL, angular; grey, **(GRANULAR BASE)**; non-cohesive, moist		0.5	2	SS	10	
		FILL - (SP) SAND, some silt; brown, with red brick fragments; moist, compact		574.8 / 2.5				
		FILL - (SW) SAND and CONCRETE; grey; non-cohesive, moist, loose		574.1 / 3.3	3	SS	6	
5		(SW) **SAND**, trace silt; dark brown; non-cohesive, moist, compact		572.8 / 4.5				
		(SW) **SAND**, fine to coarse, trace silt; brown; non-cohesive, wet, compact		570.3 / 7.0	4	SS	9	570
		(SM) **SILTY SAND**, trace gravel; grey; non-cohesive, wet, compact to loose			5	SS	4	
10					6	SS	3	
		END OF BOREHOLE		565.8 / 11.5				565

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20 40 60 80

SHEAR STRENGTH Cu, psf — nat V. + Q - ● rem V. ⊕ U - ○: 400 800 1200 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W WI: 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 1400977-R01)

Mar. 27/14 ▼

Water level in borehole at about elev. 573.31 ft upon completion of drilling on March 27, 2014.

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 1400977.GPJ 23/04/14 DATA INPUT: DMB

PROJECT: 1400977

RECORD OF BOREHOLE BH-104

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: March 27, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 140 lb; DROP, 30 in

PENETRATION TEST HAMMER, 63.5 lb; DROP, 760 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FT	ELEVATION
0	POWER AUGER 3/4" ID HOLLOW STEM	GROUND SURFACE		577.8				
		FILL, TOPSOIL - (CL) SILTY CLAY; brown, with wood and roots; moist		0.0 / 576.8	1	AS		
		(SW) SAND, fine; trace gravel; brown; non-cohesive, dry, loose to compact		1.0	2	SS	6	
					3	SS	13	575
5		(SM) **SILTY SAND**, some gravel; brown, with rootlets; non-cohesive, wet, compact		573.3 / 4.5	4	SS	26	
				570.8 / 7.0	5	SS	7	570
10		(SM) **SILTY SAND**, trace clay; grey; non-cohesive, wet, loose			6	SS	3	
		END OF BOREHOLE		566.3 / 11.5				565
15								
20								
25								
30								
35								

DYNAMIC PENETRATION RESISTANCE, BLOWS/ft: 20, 40, 60, 80

SHEAR STRENGTH Cu, psf: nat V. + Q - ●; rem V. ⊕ U - ○; 400, 800, 1200, 1600

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp, W, WI; 10, 20, 30, 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 1400977-R01)

Mar. 27/14 ▼

Water level in borehole at about elev. 573.56 ft upon completion of drilling on March 27, 2014.

DEPTH SCALE

1 inch to 5 feet

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 1400977.GPJ 23/04/14 DATA INPUT: DMB

PROJECT: 1405019

RECORD OF BOREHOLE BH-101

SHEET 1 OF 14

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 2, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
										(Golder Report No. 1405019-R01)				
0	GEOPROBE 6620 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE **ASPHALT**		0.00										
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, moist		0.13	1	SC								
		FILL - (SP-GP) SAND and GRAVEL, angular; greyish brown, with asphalt, red brick, and concrete pieces, **(RECYCLED SUB-BASE)**; non-cohesive, moist		0.36	2	SC							M	Borehole dry upon completion of drilling on July 2, 2014.
1		(CL) sandy **SILTY CLAY**; mottled brown and grey, **(TILL)**; cohesive, w~PL		0.66	3	SC								
		END OF BOREHOLE		1.22										
2														
3														

PROJECT: 1405019

RECORD OF BOREHOLE BH-102

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 2, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	GEOPROBE 6620 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE **ASPHALT**		0.00										
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, dry		0.10	1	SC								
		FILL - (SP-GP) SAND and GRAVEL, angular; greyish brown, with asphalt, red brick, and concrete pieces, **(RECYCLED SUB-BASE)**; non-cohesive, moist		0.36	2	SC							M	Borehole dry upon completion of drilling on July 2, 2014.
1		(CL) sandy **SILTY CLAY**; mottled brown and grey, **(TILL)**; cohesive, w~PL		0.61	3	SC								
		END OF BOREHOLE		1.22										
2														
3														

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: LS

CHECKED:

PROJECT: 1405019

RECORD OF BOREHOLE BH-103

SHEET 2 OF 14

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 2, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	GEOPROBE 6620 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE **ASPHALT**		0.00	1	SC								
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, dry		0.10	2	SC								
		FILL - (SP-GP) SAND and GRAVEL, angular; greyish brown, with asphalt, red brick, and concrete pieces, **(RECYCLED SUB-BASE)**; non-cohesive, moist to wet		0.38	3	SC								
1		(CL) sandy **SILTY CLAY**; brown, **(TILL)**; cohesive, w~PL		0.58	4	SC								
		END OF BOREHOLE		1.22										
2														
3														

(Golder Report No. 1405019-R01)

Borehole dry upon completion of drilling on July 2, 2014.

PROJECT: 1405019

RECORD OF BOREHOLE BH-104

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 2, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	GEOPROBE 6620 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE **ASPHALT**		0.00										
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, dry		0.10	1	SC								
		FILL - (SP-GP) SAND and GRAVEL, angular; greyish brown, with asphalt, red brick, and concrete pieces, **(RECYCLED SUB-BASE)**; non-cohesive, moist		0.46	2	SC								
1		(CL) sandy **SILTY CLAY**; mottled brown and grey, **(TILL)**; cohesive, w~PL		0.71	3	SC								
		END OF BOREHOLE		1.22										
2														
3														

Water present in borehole from coring asphalt.

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: DS

CHECKED:

1405019.GPJ GLDR_LDN.GDT 03/10/14 DATA INPUT: DMB
LDN_BHS_03

PROJECT: 1405019

RECORD OF BOREHOLE BH-118

SHEET 9 OF 14

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 1, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	GEOPROBE 7822 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE										
		ASPHALT		0.00								
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, moist		0.13	1	SC						
1		(CL) sandy **SILTY CLAY**; mottled brown and grey, **(TILL)**; cohesive, w~PL		0.69	2	SC						
		END OF BOREHOLE		1.52								
2												
3												

(Golder Report No. 1405019-R01)

WL
Water level in borehole at about 1.5m depth upon completion of drilling on July 1, 2014.

PROJECT: 1405019

RECORD OF BOREHOLE BH-119

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 1, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	GEOPROBE 7822 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE										
		ASPHALT		0.00								
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, moist		0.13	1	SC						
1		(CL) sandy **SILTY CLAY**; mottled brown and grey, **(TILL)**; cohesive, w>PL to w~PL		0.69	2	SC						
					3	SC						
		END OF BOREHOLE		1.52								
2												
3												

Borehole dry upon completion of drilling on July 1, 2014.

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: LS
CHECKED:

LDN_BHS_03 1405019.GPJ GLDR_LDN.GDT 03/10/14 DATA INPUT: DMB

PROJECT: 1405019

RECORD OF BOREHOLE BH-120

SHEET 10 OF 14

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 1, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		(Golder Report No. 1405019-R01)										
0	GEOPROBE 7822 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE **ASPHALT**		0.00								
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, moist		0.13	1	SC						
1		(CL) sandy **SILTY CLAY**; mottled brown and grey, **(TILL)**; cohesive, w~PL		0.56	2	SC						
		END OF BOREHOLE		1.52								
2												
3												

Borehole dry upon completion of drilling on July 1, 2014.

PROJECT: 1405019

RECORD OF BOREHOLE BH-121

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 1, 2014

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	GEOPROBE 7822 MACRO CORE SAMPLING SYSTEM	ROAD SURFACE **ASPHALT**		0.00								
		FILL - (SW-GW) SAND and GRAVEL, angular; grey, **(ROADBASE)**; non-cohesive, moist		0.10	1	SC						
					2	SC						
1		**FILL** - (CL) sandy SILTY CLAY; mottled brown and grey, with topsoil nodules; cohesive, w>PL		0.66	3	SC						
		END OF BOREHOLE		1.22								
2												
3												

Borehole dry upon completion of drilling on July 1, 2014.

DEPTH SCALE
1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 1405768

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 16, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		185.59				186				
0	POWER AUGER 83mm ID HOLLOW STEM	**TOPSOIL** - (SP) SAND, trace silt; brown; non-cohesive, moist		0.00 / 185.31	1	AS						Borehole dry during and on completion of drilling on July 16, 2014.
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, with topsoil nodules, **(TILL)**; cohesive, w~PL, stiff		0.28	2	SS	8	185				
					3	SS	10					
				184.22 / 1.37				184				
2		(CL) sandy **SILTY CLAY**, trace gravel; brown, oxidized, fissured, **(TILL)**; cohesive, w<PL, very stiff			4	SS	20					
					5	SS	20	183				
3					6	SS	23					
				181.93 / 3.66				182				
4					7	SS	12					
					8	SS	9	181				
5		(CL) sandy **SILTY CLAY**, trace gravel; grey, with silt partings, **(TILL)**; cohesive, w~PL, very stiff to firm							>96 +			
								180	>96 +			
6					9	SS	7					
				179.04				179				
		END OF BOREHOLE		6.55								
7												
8												
9												

(Golder Report No. 1405768-R01)

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 1405768.GPJ 31/07/14 DATA INPUT: DMB

PROJECT: 1405768

RECORD OF BOREHOLE BH-102

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 16, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W WI (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		185.27								
0	POWER AUGER 83mm ID HOLLOW STEM	**TOPSOIL, FILL** - (SP) SAND, trace silt; brown; non-cohesive, moist		0.00 184.97	1	AS		185				Borehole dry during and on completion of drilling on July 16, 2014.
		FILL - (CL) sandy SILTY CLAY, trace gravel; brown, with topsoil pockets; cohesive, w<PL, stiff to firm		0.30 184.36	2	SS	9					
1		**TOPSOIL** - (CL) sandy SILTY CLAY; black; cohesive, w>PL, firm		0.91 183.90	3	SS	5	184				
		(SM) clayey **SILTY SAND**, trace gravel; brown and grey; cohesive, w>PL, firm		1.37 183.14	4	SS	5					
2								183				
		(CL) sandy **SILTY CLAY**, trace gravel; grey, with sand pockets and partings, **(TILL)**; cohesive, w<PL to w>PL, very stiff to firm		2.13	5	SS	18					
3					6	SS	16	182				
4					7	SS	9					
								181				
5					8	SS	6					
								180	>96 +			
6									>96 +			
					9	SS	4	179				
		END OF BOREHOLE		178.72 6.55								
7								178				
8												
9												

(Golder Report No. 1405768-R01)

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 1405768.GPJ 31/07/14 DATA INPUT: DMB

PROJECT: 1405768

RECORD OF BOREHOLE BH-103

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 16, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		185.72								
0	POWER AUGER 83mm ID HOLLOW STEM	**TOPSOIL, FILL** - (SP) SAND, trace silt; brown; non-cohesive, moist		0.00	1	AS		186				
				0.15	2	SS	8					
1		**FILL** - (CL) sandy SILTY CLAY, trace gravel; brown and grey; cohesive, w~PL, stiff to firm			3	SS	6	185				
				184.35								
				1.37	4	SS	15	184			MH	
2		(CL) sandy **SILTY CLAY**, trace gravel; brown, oxidized, fissured, **(TILL)**; cohesive, w<PL, very stiff			5	SS	21					
3					6	SS	26	183				
				182.06								
				3.66	7	SS	21	182				
4												
					8	SS	11	181				
5		(CL) sandy **SILTY CLAY**, trace gravel; grey, with oxidized fissures, **(TILL)**; cohesive, w<PL to w>PL, very stiff to firm										
6					9	SS	6	180				
				179.17								
		END OF BOREHOLE		6.55				179				
7												
8												
9												

(Golder Report No. 1405768-R01)

Borehole dry during and on completion of drilling on July 16, 2014.

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 1405768.GPJ 31/07/14 DATA INPUT: DMB

PROJECT: 1406552

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 03, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		175.48								
0	POWER AUGER 83mm ID HOLLOW STEM	**TOPSOIL, FILL** - (CL) sandy SILTY CLAY; black; cohesive, w>PL		0.00 / 175.18	1	AS						Borehole dry during drilling on July 3, 2014.
		FILL - (CL) sandy SILTY CLAY, trace gravel; mottled brown and grey, topsoil pockets, some sand pockets; cohesive, w>PL, firm		0.30 / 174.73	2	SS	5	175				
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, trace sand pockets, **(TILL)**; cohesive, w>PL, firm		0.75 / 174.11	3	SS	6					
		(CL) sandy **SILTY CLAY**, trace gravel; brown, oxidized fissures, **(TILL)**; cohesive, w<PL, stiff to very stiff		1.37 / 172.58	4	SS	13	174				
2					5	SS	20	173				
3		(CL) sandy **SILTY CLAY**, trace gravel; brown to grey, **(TILL)**; cohesive, w<PL, stiff		2.90 / 171.82	6	SS	11	172				
4				3.66	7	SS	9					
								171	>96			
5		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w~PL, very stiff to firm			8	SS	5					
								170				
6					9	SS	4					
				168.93				169				
		END OF BOREHOLE		6.55								
7								168				
8												
9												

(Golder Report No. 1406552-R01)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_02 1406552.GPJ 11/07/14 DATA INPUT: DMB

PROJECT: 1406552

RECORD OF BOREHOLE BH-102

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 03, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		175.41								
0	POWER AUGER 83mm ID HOLLOW STEM	**TOPSOIL, FILL** - (CL) sandy SILTY CLAY; black; cohesive, w>PL		0.00 / 175.11	1	AS		175				Borehole dry during drilling on July 3, 2014.
		FILL - (CL) sandy SILTY CLAY, trace gravel; mottled brown and grey, topsoil pockets, some sand pockets; cohesive, w>PL, firm		0.30 / 174.80	2	SS	5					
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, sand pockets, **(TILL)**; cohesive, w>PL, firm to stiff		0.61	3	SS	5	174				
					4	SS	8					
2				173.28								
		(CL) sandy **SILTY CLAY**, trace gravel; brown, oxidized fissures, **(TILL)**; cohesive, w<PL, very stiff		2.13 / 172.51	5	SS	21	173				
3				2.90	6	SS	9	172				
4					7	SS	7					
								171				
		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w~PL, very stiff to firm			8	SS	4		>96 +			
5												
								170	⊕ + ⊕ +			
6												
					9	SS	5	169				
				168.86								
		END OF BOREHOLE		6.55								
7												
								168				
8												
9												

(Golder Report No. 1406552-R01)

LDN_BHS_02 1406552.GPJ 11/07/14 DATA INPUT: DMB

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

PROJECT: 1406552

RECORD OF BOREHOLE BH-103

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 03, 2014

DATUM: GEODETIC

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		175.31								
0	POWER AUGER 83mm ID HOLLOW STEM	**TOPSOIL, FILL** - (CL) sandy SILTY CLAY; black; cohesive, w>PL		0.00 / 175.01	1	AS		175				Borehole dry during drilling on July 3, 2014.
		FILL - (CL) sandy SILTY CLAY, trace gravel; mottled brown and grey, topsoil pockets, some sand pockets; cohesive, w>PL, firm		0.30 / 174.56	2	SS	6					
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, trace sand pockets, shale fragments, **(TILL)**; cohesive, w<PL, firm to stiff		0.75	3	SS	6	174				
					4	SS	8					
2				173.18				173				
		(CL) sandy **SILTY CLAY**, trace gravel; brown, oxidized fissures, **(TILL)**; cohesive, w<PL, very stiff		2.13 / 172.41	5	SS	20					
3				2.90	6	SS	11	172				
					7	SS	8					
4								171				
		(CL) sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive, w~PL, stiff to firm			8	SS	5					
5								170				
6					9	SS	4	169				
		END OF BOREHOLE		168.76 / 6.55								
7								168				
8												
9												

(Golder Report No. 1406552-R01)

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED:

Golder Associates

LDN_BHS_02 1406552.GPJ 11/07/14 DATA INPUT: DMB

PROJECT: 1527635 (1000)

RECORD OF BOREHOLE BH-103

SHEET 1 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: April 27, 2015

DATUM: GEODETIC

DRILLING CONTRACTOR: London Soil Test Ltd.

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
								181				
		GROUND SURFACE		180.06								
0	POWER AUGER 152mm OD SOLID STEM	**TOPSOIL** - sandy SILTY CLAY; black		0.00 / 179.76	1	AS		180				
		sandy **SILTY CLAY**, trace gravel; mottled brown and grey, trace organic pockets and roots, **(TILL)**; firm		0.30	2	SS	5					Granular Bentonite
1					3	SS	6	179				
				178.38								
		sandy **SILTY CLAY**, trace gravel; brown, oxidized fissures, silt partings, **(TILL)**; stiff to hard		1.68	4	SS	14					
2								178				
					5	SS	30					
3								177				
					6	SS	27					
				176.40								
		sandy **SILTY CLAY**, trace gravel; grey, some sand seams/pockets with depth, **(TILL)**; very stiff to firm		3.66	7	SS	13	176				
4												
					8	SS	9					
5								175	>96 >96			Cuttings/ Bentonite
6					9	SS	8	174				
7								173	>96			
					10	SS	7					
8								172				
9		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 1527635-1000-R01)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_07 1527635.GPJ GLDR_LON.GDT 25/05/15 DATA INPUT: DMB

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-201

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (50, 100, 150, 200)	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS: MW-201

(Golder Report No. 1520407-2000-R01)

0	GEOPROBE 7822DT / DT SAMPLING SYSTEM	GROUND SURFACE		97.96				98				Top of Pipe Elev. 97.75m; Flushmount Protective Casing
		FILL - SILTY CLAY, some sand and gravel; brown to dark brown, trace ash, brick and organic material		0.00	1	1A	SC					Concrete
				97.15								
1		**FILL** - SAND, fine to coarse, with gravel; brown		0.81		1B	SC	97				Granular Bentonite
				96.59		2A	SC					
		FILL - SILTY CLAY, trace sand, trace gravel; grey to brown and black, mixed with glass, cinders and wood		1.37	2	2B	SC					
				96.13								Sand
2		sandy **SILTY CLAY**, trace gravel; grey, **(TILL)**; cohesive		1.83		2C	SC	96				
				95.52								
		SAND AND GRAVEL, fine to coarse; brown, mixed with grey-brown silty clay		2.44		3A	SC					
				95.22								
3		sandy **SILTY CLAY**, trace gravel; grey, mixed with grey and black organics, **(TILL)**; w>PL		2.74	3	3B	SC	95				50mm Dia. Slot 10 Sch. 40 PVC Screen
4					4	4A	SC	94				
						4B	SC					
				93.39								
		SILTY CLAY, trace sand, trace gravel; grey, **(TILL)**		4.57		4C	SC					
				93.08								
5		END OF BOREHOLE		4.88				93				
6												
7												
8												
9												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-202

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (50, 100, 150, 200) ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80) □	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
									(Golder Report No. 1520407-2000-R01)		
0	GEOPROBE 7822DT DT SAMPLING SYSTEM	GROUND SURFACE		97.83				98			
		TOPSOIL - SILTY CLAY, trace sand, trace gravel; brown		0.00 / 97.65	1	1A	SC				
		FILL - SILTY CLAY; grey, mixed with sand, gravel, glass, brick and cinders		0.18		1B	SC	97			
1				96.71		1C	SC				
		FILL - SAND; dark brown, with ash, cinders,brick, glass and organics		1.12	2	2A	SC				
				96.26							
		sandy **SILTY CLAY**, trace gravel; dark grey to light grey, mixed with ash, trace organics; w>PL		1.57		2B	SC	96			
2						3A	SC				
				94.96				95			
		sandy **SILTY CLAY**, trace sand; grey, mixed with ash and wood, with decaying wood at about elev. 93.5m		2.87	3	3B	SC				
3											
						4A	SC	94			
4				93.51	4						
		DECAYING WOOD; brown		4.32		4B	SC				
		SILTY CLAY, trace sand, trace gravel; grey, **(TILL)**		4.42				93			
				92.98							
5		**ORGANIC SILTY CLAY**; dark brown		4.88							
		END OF BOREHOLE						92			
6											
7											
8											
9											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-203

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (50, 100, 150, 200) ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80) □	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
									(Golder Report No. 1520407-2000-R01)		
0	GEOPROBE 7822DT DT SAMPLING SYSTEM	GROUND SURFACE		98.08				98			
		TOPSOIL - SILTY CLAY, trace sand, trace gravel; brown		0.00							
				0.13	1	1A	SC				
1		**FILL** - SILTY CLAY, trace sand, trace gravel; brown, mixed with ash, glass, cinders, wood and concrete debris						97			
						2A	SC				
				96.23	2						
2		**FILL** - DEBRIS; brown, black and grey, ash, cinders, wood, brick, glass, copper, porcelain, some silty clay		1.85		2B	SC	96			
					3	3	SC				
3								95			
						4A	SC				
				94.07							
4		**SILTY CLAY**, trace sand, trace gravel; grey, with shells and silt layers, **(TILL)**		4.01	4			94			
						4B	SC				
				93.20							
5		END OF BOREHOLE		4.88				93			
6											
7											
8											
9											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-204

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

(Golder Report No. 1520407-2000-R01)

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	RUN No.	NUMBER	TYPE	ELEVATION
0	GEOPROBE 7822DT DT SAMPLING SYSTEM	GROUND SURFACE		97.85				98
		TOPSOIL - SILTY CLAY, trace sand, trace gravel; brown		0.00 / 0.13				
		FILL - SILTY CLAY; brown, mixed with cinders, gravel and organics		97.30		1A	SC	
		FILL - SAND and GRAVEL, some silt and clay, medium to coarse; brown		0.55 / 96.99	1	1B	SC	97
1		**FILL** - SILTY CLAY; brown-black, mixed with sand, ash, brick and porcelain		0.86				
						2A	SC	
				96.10				96
2		sandy **SILTY CLAY**; grey, mixed with wood; w>PL		1.75	2	2B	SC	
				95.26				
		SILTY CLAY, trace sand, trace gravel; dark grey, with grey silty sand layers, with layer of organics at about elev. 93.7m		2.59	3	3	SC	95
3								
4				93.63		4A	SC	94
		ORGANIC SILTY CLAY; dark brown		4.22 / 93.43	4			
		SILTY CLAY, trace sand, trace gravel; grey, **(TILL)**		4.42		4B	SC	
				92.97				93
5		END OF BOREHOLE		4.88				
6								92
7								
8								
9								

HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕
ND = Not Detected
50 100 150 200

HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] *ND = Not Detected* □
20 40 60 80

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-205

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

(Golder Report No. 1520407-2000-R01)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (50, 100, 150, 200) ⊕	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80) □	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS: MW-205
0	GEOPROBE 7822DT DT SAMPLING SYSTEM	GROUND SURFACE		97.81				98				Top of Pipe Elev. 97.67m; Flushmount Protective Casing
		TOPSOIL - SILTY CLAY, trace sand, trace gravel; brown		0.00 / 0.10								Concrete
		FILL - SILTY CLAY; brown-grey, mixed with gravel, sand and ash			1	1	SC	97				Granular Bentonite
1												
2					2	2	SC	96				Sand
				95.09								
		FILL - SILTY CLAY; brown, mixed with blue-grey silty clay, glass, brick and ash		2.72 / 94.76				95				
3		**FILL** - SILTY CLAY, trace sand, trace gravel; grey, mixed with ash, gravel brick, glass and concrete debris		3.05	3	3A	SC					50mm Dia. Slot 10 Sch. 40 PVC Screen
4					4	4A	SC	94				
				93.34								
		SILTY CLAY, trace sand, trace gravel; dark grey, with layers of organics at about elev. 97.1m		4.47 / 93.09 / 4.72		4B	SC	93				
5		**SILTY CLAY**, trace sand, trace gravel; grey		4.88								
		END OF BOREHOLE										
6								92				
7												
8												
9												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-206

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

(Golder Report No. 1520407-2000-R01)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 50, 100, 150, 200) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ (ND = Not Detected; 20, 40, 60, 80)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS: MW-206
0	GEOPROBE 7822DT DT SAMPLING SYSTEM	GROUND SURFACE		97.98				98			Top of Pipe Elev. 97.87m; Flushmount Protective Casing
		TOPSOIL - SILTY CLAY, trace sand, trace gravel; brown		0.00							
		FILL - SILTY CLAY, some sand and gravel; brown-grey, with ash and brick		0.15	1	1	SC				Concrete
1		**FILL** - SAND, medium to coarse, with gravel; brown, with pockets of silty clay		97.09 0.89				97			Granular Bentonite
					2	2A	SC				Sand
2		**FILL** - SILTY CLAY; grey to grey-brown, mixed with grey-blue silty clay, sand, gravel, wood, ash, brick, cinders, concrete, glass, porcelain and copper		96.00 1.98		2B	SC	96			
				95.54							
		FILL - SAND, medium to coarse, with gravel, with pockets of silty clay		2.44	3	3A	SC	95			50mm Dia. Slot 10 Sch. 40 PVC Screen
4				93.86				94			
		SILTY CLAY, trace sand, trace gravel; dark grey, with organics		4.12	4	4A	SC				
				93.38							
		SILTY CLAY, trace sand, trace gravel; grey		4.60 93.10		4B	SC				
5		END OF BOREHOLE		4.88				93			
6											
7											
8											
9											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-207

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (50, 100, 150, 200) ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80) □	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 1520407-2000-R01)

0	GEOPROBE 7822DT DT SAMPLING SYSTEM	GROUND SURFACE		97.87				98	
		TOPSOIL - SILTY CLAY, trace sand, trace gravel; brown		0.00					
		FILL - SILTY CLAY; brown - grey, mixed with sand and gravel, trace glass		0.10	1	1A	SC		
1		**FILL** - SAND, medium to coarse, with gravel; brown, with pockets of silty clay		97.03 0.84		1B	SC	97	
		FILL - SILTY CLAY; grey-brown, mottled, mixed with cinders and brick		96.24 1.63	2	2A	SC		
2		**FILL** - SILTY SAND; brown, with pockets of silty clay, cinders, ash and glass		95.89 1.98		2B	SC	96	
				94.87	3	3A	SC	95	
3		**SILTY CLAY**, trace sand, trace gravel; dark grey, with rootlets, with organic silty clay at about elev. 93.6m		3.00		3B	SC		
4					4	4A	SC	94	
		SILTY CLAY, trace sand, trace gravel; grey-blue		93.37 4.50		4B	SC		
5		END OF BOREHOLE		92.99 4.88				93	
6								92	
7									
8									
9									

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1520407 (2000)

RECORD OF BOREHOLE BH-208

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 30, 2015
DRILLING CONTRACTOR: Landshark Drilling

DATUM: LOCAL

(Golder Report No. 1520407-2000-R01)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: RUN No.	NUMBER	TYPE	ELEVATION	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected; 50, 100, 150, 200)	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] (ND = Not Detected)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
												MW-208
0	GEOPROBE 7822DT DT SAMPLING SYSTEM	GROUND SURFACE		97.76				98				Top of Pipe Elev. 97.87m; Flushmount Protective Casing; Concrete
		TOPSOIL - SILTY CLAY, trace sand, trace gravel; brown		0.00 / 0.10	1	1						
1		**FILL** - SILTY CLAY; mottled brown and grey, mixed with sand and gravel						97				Granular Bentonite
				95.80	2	2A	SC	96				Sand
2		**FILL** - SAND; medium to coarse, with gravel; brown, with pockets of silty clay		1.96		2B	SC					
						3A	SC	95				
3				94.64	3							
		sandy **SILTY CLAY**, trace gravel; dark grey; w>PL at top to w~PL at bottom		3.12		3B	SC					50mm Dia. Slot 10 Sch. 40 PVC Screen
4						4A	SC	94				
				93.42	4							
		ORGANIC SILTY CLAY; dark brown		4.40								
		SILTY CLAY, trace sand, trace gravel; grey				4B	SC	93				
				92.88								
5		END OF BOREHOLE		4.88				92				
6												
7												
8												
9												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: KL
CHECKED:

LDN_ENV_11 1520407-2000.GPJ GLDR_LON.GDT 25/08/15 DATA INPUT: WDF/DCH

PROJECT: 1527635 (1000)

RECORD OF BOREHOLE BH-103

SHEET 1 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: April 27, 2015

DATUM: GEODETIC

DRILLING CONTRACTOR: London Soil Test Ltd.

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
								181				
		GROUND SURFACE		180.06								
0	POWER AUGER 152mm OD SOLID STEM	**TOPSOIL** - sandy SILTY CLAY; black		0.00 / 179.76	1	AS		180				
		sandy **SILTY CLAY**, trace gravel; mottled brown and grey, trace organic pockets and roots, **(TILL)**; firm		0.30	2	SS	5					Granular Bentonite
1					3	SS	6	179				
				178.38								
		sandy **SILTY CLAY**, trace gravel; brown, oxidized fissures, silt partings, **(TILL)**; stiff to hard		1.68	4	SS	14					
2								178				
					5	SS	30					
3								177				
					6	SS	27					
				176.40								
		sandy **SILTY CLAY**, trace gravel; grey, some sand seams/pockets with depth, **(TILL)**; very stiff to firm		3.66	7	SS	13	176				
4												
					8	SS	9					
5								175	>96 >96			Cuttings/ Bentonite
6					9	SS	8	174				
7								173	>96			
					10	SS	7					
8								172				
9		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 1527635-1000-R01)

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_07 1527635.GPJ GLDR_LON.GDT 25/05/15 DATA INPUT: DMB

PROJECT: 1527635 (1000)

RECORD OF BOREHOLE BH-103

SHEET 2 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: April 27, 2015

DATUM: GEODETIC

DRILLING CONTRACTOR: London Soil Test Ltd.

SAMPLER HAMMER, 63.5 kg; DROP, 760 mm

PENETRATION TEST HAMMER, 63.5 kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							*(Golder Report No. 1527635-1000-R01)*			
9	POWER AUGER 152mm OD SOLID STEM	sandy **SILTY CLAY**, trace gravel; grey, some sand seams/pockets with depth, **(TILL)**; very stiff to firm			11	SS	6	171				Cuttings/ Bentonite
10								170				May 12/15
11					12	SS	9	169				Granular Bentonite
12								168				
13					13	SS	6	167				
14					14	SS	5	166			MH	Screen
15					15	SS	7	165				Sand
		END OF BOREHOLE		164.36 / 15.70				164				Borehole dry during and upon completion of drilling on April 27, 2015. Water level in standpipe measured at elev. 170.06m on May 12, 2015.
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED:

LDN_BHS_07 1527635.GPJ GLDR_LON.GDT 25/05/15 DATA INPUT: DMB

PROJECT: 1546452

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: January 12, 2016
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: GEODETIC

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
		GROUND SURFACE		185.12				186
0	POWER AUGER 83mm ID HOLLOW STEM	**ASPHALT**		0.00				
		FILL, gravelly sand, crushed; brown		0.11 184.79				185
		FILL, sand, trace gravel; brown; compact		0.33 184.36	1	SS	13	
1		**TOPSOIL**, silty; black; firm		0.76 183.75	2	SS	4	184
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, **TILL**; firm		1.37 182.99	3	SS	4	
2								183
				2.13	4	SS	19	
3		(CL) sandy **SILTY CLAY**, trace gravel; brown, silt partings, **TILL**; very stiff			5	SS	28	182
4					6	SS	24	181
				180.85				
		END OF BOREHOLE		4.27				180
5								
6								
7								
8								
9								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● / rem V. ⊕ U - ○ (20 40 60 80)

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT — Wp W WI (10 20 30 40)

(Golder Report No. 1546452-R01)

>96+

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Borehole dry during drilling on January 12, 2016.

DEPTH SCALE
1 : 50

LOGGED: SM
CHECKED:

Golder Associates

LDN_BHS_07 1546452.GPJ GLDR_LON.GDT 05/02/16 DATA INPUT: LMK

PROJECT: 1546452

RECORD OF BOREHOLE BH-102

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: January 12, 2016
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: GEODETIC

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER 83mm ID HOLLOW STEM	GROUND SURFACE		184.99				185
		TOPSOIL, silty; brown		0.00				
		ASPHALT		0.15				
		FILL, gravelly sand, crushed; brown		0.23				
		FILL, sandy clayey silt; brown, gravel pockets, sand layers; stiff		0.33	1	SS	14	
				184.23				
1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, **TILL**; stiff to firm		0.76	2	SS	9	184
					3	SS	7	
2				182.86				183
		(CL) sandy **SILTY CLAY**, trace gravel; brown, silt partings, **TILL**; very stiff to hard		2.13	4	SS	18	
3					5	SS	31	182
4					6	SS	22	181
				180.72				
		END OF BOREHOLE		4.27				180
5								
6								
7								
8								
9								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa — nat V. + Q - ● / rem V. ⊕ U - ○: 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — WI; 10 20 30 40

(Golder Report No. 1546452-R01)

ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
MH	Borehole dry during drilling on January 12, 2016.

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: SM
CHECKED:

LDN_BHS_07 1546452.GPJ GLDR_LON.GDT 05/02/16 DATA INPUT: LMK

PROJECT: 1546452

RECORD OF BOREHOLE BH-103

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: January 12, 2016
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: GEODETIC

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
									(Golder Report No. 1546452-R01)			
0	POWER AUGER 83mm ID HOLLOW STEM	GROUND SURFACE		184.96				185				
		TOPSOIL, silty; brown		0.00								
		FILL, gravelly silty clay, some sand; brown; stiff		0.13								
				184.45	1	SS	11					
		TOPSOIL, silty; black; stiff		0.51 / 184.20								
1				0.76	2	SS	8	184				
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, **TILL**; stiff			3	SS	8					Borehole dry during drilling on January 12, 2016.
2				182.83				183				
				2.13	4	SS	22					
3		(CL) sandy **SILTY CLAY**, trace gravel; brown, **TILL**; very stiff			5	SS	24	182				
4				180.69	6	SS	24	181				
		END OF BOREHOLE		4.27				180				
5												
6												
7												
8												
9												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: SM
CHECKED:

LDN_BHS_07 1546452.GPJ GLDR_LON.GDT 05/02/16 DATA INPUT: LMK

PROJECT: 1660023

RECORD OF BOREHOLE BH-101

SHEET 1 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: October 27, 2016
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: LOCAL

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION
0	POWER AUGER 171mm OD HOLLOW STEM	PAVEMENT SURFACE		99.58				100
		ASPHALT		0.00 0.10				
		FILL - sand and gravel; grey			1	AS		99
				98.82				
1		(SP) - gravelly **SAND**, coarse; brown; loose		0.76	2	SS	5	
					3	SS	9	98
				97.60				
2		(MI) - **CLAYEY SILT**, some sand, trace gravel; brown, **TILL**; firm		1.98	4	SS	7	97
				96.84				
3				2.74	5	SS	2	
								96
4					6	SS	1	
								95
5					7	SS	WH	
								94
6		(CH) - **SILTY CLAY**, some sand, trace gravel; grey, **TILL**; very soft to soft			8	SS	WH	
								93
7								
								92
8					9	SS	2	
								91
9		--- *CONTINUED NEXT PAGE* ---						

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT (10 20 30 40) Wp W WI

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

(Golder Report No. 1660023-R01)

Borehole dry during drilling on October 27, 2016

DEPTH SCALE
1 : 50

LOGGED: AP
CHECKED:

Golder Associates

LDN_BHS_07 1660023.GPJ GLDR_LON.GDT 13/12/16 DATA INPUT: ZJB

PROJECT: 1660023

RECORD OF BOREHOLE BH-101

SHEET 2 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: October 27, 2016
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: LOCAL

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							***(Golder Report No. 1660023-R01)***			
9	POWER AUGER 171mm OD HOLLOW STEM	(CH) - **SILTY CLAY**, some sand, trace gravel; grey, **TILL**; very soft to soft			10	SS	3	90				
10												
11				88.45	11	SS	4	89				
		END OF BOREHOLE		11.13				88				
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AP
CHECKED:

LDN_BHS_07 1660023.GPJ GLDR_LON.GDT 13/12/16 DATA INPUT: ZJB

PROJECT: 1668632

RECORD OF BOREHOLE BH-101

SHEET 1 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 11, 2017

DATUM: GEODETIC

DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

HAMMER TYPE: Auto Hammer

(Golder Report No. 1668632-R01)

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 108mm ID HOLLOW STEM	GROUND SURFACE		189.60				190				
		FILL, gravel		0.05	1	AS						
1					2	SS	13	189				
								188				
2		**FILL**, gravelly sand, some silt; brown; compact			3	SS	11					
					4	SS	12	187				
3					5	SS	16					
				185.87				186				
		TOPSOIL, sandy clayey silt; black		3.73								
4				185.56	6	SS	7					
				4.04				185				
5		(CI) sandy **SILTY CLAY**, trace gravel; mottled brown and grey, **TILL**; firm to very stiff			7	SS	7					
				183.96				184	>96 +			
				5.64					>96 +			
6					8	SS	30	183				
7		(CL) sandy **SILTY CLAY**, trace gravel; brown, some oxidized fissures, some silt partings and pockets, **TILL**; hard to very stiff										
				181.68	9	SS	24	182				
8				7.92								
		(CL-CI) sandy **SILTY CLAY**, trace gravel; grey, some silt pockets, **TILL**; very stiff to stiff						181				
9												
		--- CONTINUED NEXT PAGE ---										

Borehole dry during drilling on July 11, 2017.

DEPTH SCALE

1 : 50

LOGGED: SM

CHECKED: P.H.

LDN_BHS_07 1668632.GPJ GLDR_LON.GDT 28/07/17 DATA INPUT: ZJB

PROJECT: 1668632

RECORD OF BOREHOLE BH-101

SHEET 2 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 11, 2017
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DATUM: GEODETIC

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
9		*--- CONTINUED FROM PREVIOUS PAGE ---*							***(Golder Report No. 1668632-R01)***			
10	POWER AUGER 108mm ID HOLLOW STEM	(CL-CI) sandy **SILTY CLAY**, trace gravel; grey, some silt pockets, **TILL**; very stiff to stiff			10	SS	12	180	⊕ 111 >144	○		
11					11	SS	9	179		○		
		END OF BOREHOLE		178.32 11.28				178				
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: SM
CHECKED: P.H.

LDN_BHS_07 1668632.GPJ GLDR_LON.GDT 28/07/17 DATA INPUT: ZJB

PROJECT: 1668632

RECORD OF BOREHOLE BH-102

SHEET 1 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 11, 2017

DATUM: GEODETIC

DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 108mm ID HOLLOW STEM	GROUND SURFACE		189.56				190				
		FILL, gravel		0.05	1	AS						
1					2	SS	10	189				
		FILL, gravelly sand, some silt; brown; comapct to very loose			3	SS	13	188				
2					4	SS	15	187				
3				186.28								
				3.28	5	SS	2	186				
4		**FILL**, gravelly sand, some silt, some coal, some wood; black; very loose to compact			6	SS	3					
					7	SS	20	185			MH	
5				184.38								
				5.18	8	SS	11	184				
6		(ML-CL) sandy **SILTY CLAY**, trace gravel; brown, some silt pockets and partings; stiff to very stiff			9	SS	25	183				
7												
				181.71	10	SS	24	182				
8				7.85								
		(CL-CI) sandy **SILTY CLAY**, trace gravel; grey, some silt layers and pockets; very stiff to stiff						181				
9												
		--- CONTINUED NEXT PAGE ---										

(Golder Report No. 1668632-R01)

Borehole dry during drilling on July 11, 2017.

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: SM

CHECKED: P.H.

LDN_BHS_07 1668632.GPJ GLDR_LON.GDT 28/07/17 DATA INPUT: ZJB

PROJECT: 1668632

RECORD OF BOREHOLE BH-102

SHEET 2 OF 2

LOCATION: REFER TO LOCATION PLAN

BORING DATE: July 11, 2017
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DATUM: GEODETIC

HAMMER TYPE: Auto Hammer

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---							***(Golder Report No. 1668632-R01)***			
9	POWER AUGER 108mm ID HOLLOW STEM	(CL-CI) sandy **SILTY CLAY**, trace gravel; grey, some silt layers and pockets; very stiff to stiff			11	SS	13	180		W		
10								179				
11				178.43	12	SS	12			W		
		END OF BOREHOLE		11.13				178				
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: SM
CHECKED: P.H.

LDN_BHS_07 1668632.GPJ GLDR_LON.GDT 28/07/17 DATA INPUT: ZJB

APPENDIX B

Ontario Ministry of Environment, Conservation and Parks Well Records

22

UTM 17 Z 331612 1410 E
19 R 4617818 6115 N
Elev. 19 R 016110
Basin 23

ONTARIO

The Well Drillers Act
Department of Mines, Province of Ontario

21 No 2706

RECEIVED
JAN 25 1951
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

Water Well Record

County or Territorial District ESSEX

Township, ~~Village, Town or City~~ Sandwich South (WINDSOR)

[redacted] own or City) .....

..... Roseland

Date Completed ..... (day) (month) (year) Cost of Well (excluding pump) 1/2 2 3

Pipe and Casing Record

Casing diameter(s) 2½ 2
Length(s) of casing(s) 139
Type of screen —
Length of screen —
Distance from top of screen to ground level .....
Is well a gravel-wall type? Rock

Pumping Test

Date June 21 1950
Static level 30
Pumping level 35
Pumping rate 270 p.p.H.
Duration of test .....
Distance from cylinder or bowls to ground level n.a. ft.

Water Record

Kind (fresh or mineral) fresh
Quality (hard, soft, contains iron, sulphur, etc.) Soft
Appearance (clear, cloudy, coloured) Clear
For what purpose(s) is the water to be used? Stock
.....
How far is well from possible source of contamination? Drain
What is the source of contamination? .....
Enclose a copy of any mineral analysis that has been made of water .....

Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
142	fresh	117

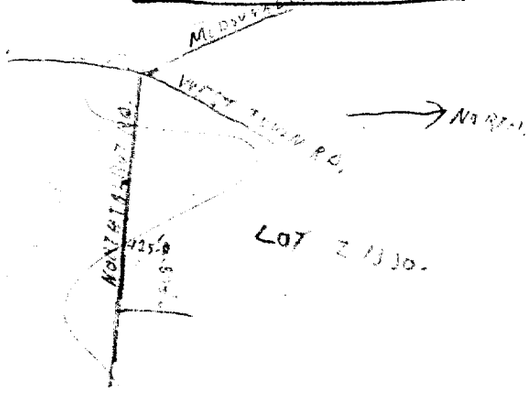
Well Log

Overburden and Bedrock Record	From	To
	0 ft.	....ft.
Brown Clay	1	20
Blue Clay	20	55
Blue Sand Clay	55	75
Blue Clay	75	105
Sand	105	110
Blue Clay	110	136
Fine Sand	136	139
Rock	139	142

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.

1320' W.E.Rd
1251' N.S.L.L.



Situation: Is well on upland, in valley, or on hillside? upland
Drilling Firm .....
Address .....
Name of Driller Wesley Johnson Address R.R. 2 Maidstone
Date Jan 22/51 Licence Number 127
W. Johnson
Signature of Licensee

FORM 5

CSS.88

UTM 17 Z 313161415 E
19 R 4617181410 10 N
Elev. 19 R 016210

Basin 23 Talbot Rd. North
Lot 306

ONTARIO

RECEIVED
SEP 24 1956
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

21 No 2897

40 52 E

The Water-well Drillers Act, 1954
Department of Mines

Water-Well Record

County or Territorial District Essex Township, ~~Village, Town or City~~ Sandwich South Windsor
[redacted] Village, Town or City)
[redacted] Address
(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 3"
Length(s) 126'
Type of screen
Length of screen

Pumping Test

Static level 34 ft.
Pumping rate 40 G.P.M.
Pumping level 44'
Duration of test

Well Log

Overburden and Bedrock Record	From ft.	To ft.
brown clay	0	28
blue clay	28	122
sand	122	126
limestone rock	126	~~154~~ 133

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
133 ~~154~~	~~28~~ 99'	sulphur

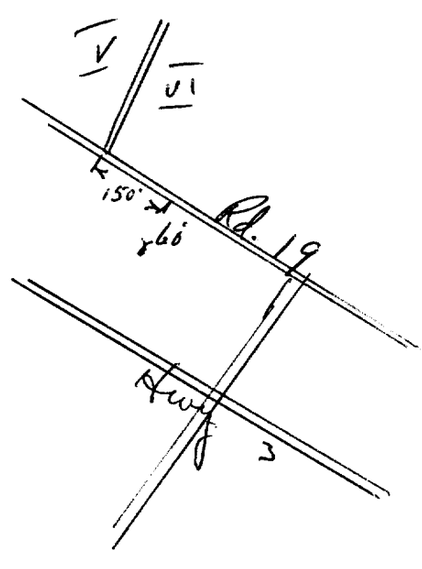
For what purpose(s) is the water to be used?
Small farm & House
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside?
upland
Drilling firm
Address Tobias F. Heil St
Name of Driller
Address 61 Russell East
Licence Number 1028

I certify that the foregoing statements of fact are true.

Date Tobias Heil
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

UTM 17 Z 3 3 6 2 7 5 E

19 R 4 6 7 8 4 9 0 N

Elev. 19 R 0 6 1 5

Talbot & 3 Rd. North

LOT 307

ONTARIO

RECEIVED 21 JUL 11 1955 GEOLOGICAL BRANCH DEPARTMENT OF MINES

№ 2899

The Water-well Drillers Act, 1954

Department of Mines

Water-Well Record

County or Territorial District Essex Township, ~~Village, Town or City~~ ~~Sandwich South~~ Windsor

[redacted] Village, Town or City)

[redacted] ddress Oldcastle

[redacted] (day) (month) (year)

Pipe and Casing Record		Pumping Test	
Casing diameter(s)	3"	Static level	35 ft.
Length(s)	135 ft	Pumping rate	6 gal per min.
Type of screen		Pumping level	40
Length of screen		Duration of test	3 hours

Well Log / **Water Record**

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
yellow clay	0	8			
sand	8	14			
blue clay	14	135'			
white ~~granite~~ rock	135'	139			
LIMESTONE			139	104	fresh

For what purpose(s) is the water to be used? House

Is water clear or cloudy? clear

Is well on upland, in valley, or on hillside? upland

Drilling firm

Address

Name of Driller L. J. Levesque

Address 306 Westminster Windsor

Licence Number 141

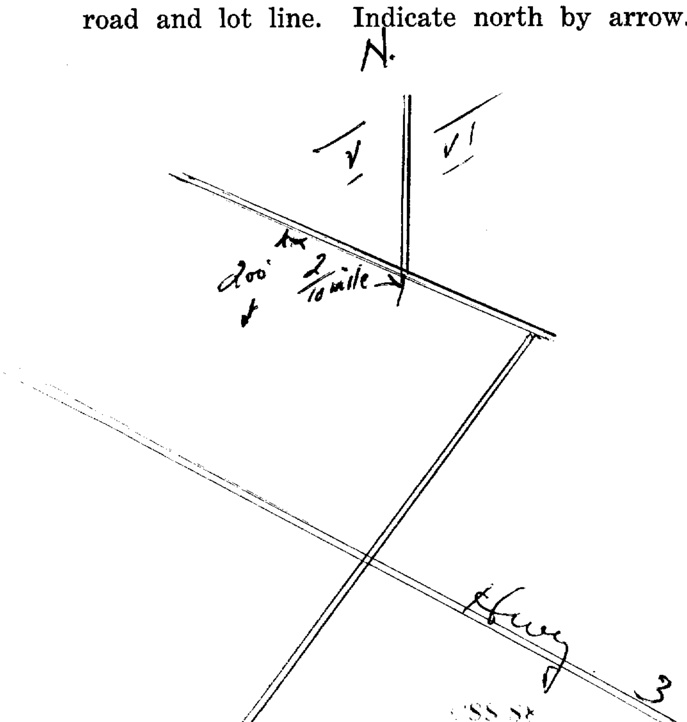
I certify that the foregoing statements of fact are true.

Date .... Lancelot Levesque

Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

golder.com