APPENDIX C. GEOTECHNICAL INVESTIGATION

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
5154VE	03/12/1974	UTILITY RIGHT OF WAY GRANTEE - ICG UTILITIES (PLAINS-WESTERN) LTD. "DATA UPDATED BY: TRANSFER OF UTRW NO. 822122817"
752 092 943	25/07/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN NATURAL RESOURCES LIMITED. CALGARY PLACE POSTAL OUTLET P.O.BOX 20004 CALGARY ALBERTA T2P4J2 AS TO PORTION OR PLAN:7620813 (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 942096623) (DATA UPDATED BY: CHANGE OF ADDRESS 982395065)

TOTAL INSTRUMENTS: 002

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 7 DAY OF MARCH, 2024 AT 06:23 P.M.

ORDER NUMBER: 49926079

CUSTOMER FILE NUMBER:

END OF CERTIFICATE

REPORT NO: 6542-14

GEOTECHNICAL INVESTIGATION – SECOND SUBMISSION
PROPOSED FEE SIMPLE LANDS INDUSTRIAL ASP
SE ¼ SEC 3-58-11-W4M
NW of HWY 652 & HWY 29,
COUNTY OF ST. PAUL #19, ALBERTA

OCTOBER 2022

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GEOTECHNICAL INVESTIGATION

PROJECT: Fee Simple Lands Industrial ASP
SE ¼ SEC 3-58-11-W4M

LOCATION: SE ¼ 3-58-11-W4M
NW of Intersection of Highway 652 & Highway 29
County of St. Paul#19, Alberta

CLIENT: Saddle Lake Cree Nation
c/o Urban Systems
Suite # 200, 10345 105 Street NW
Edmonton, Alberta
T5J 1E8

ATTENTION: **Matt Slorstad, P.L.(Eng.), P.TECH (Eng.)**

1.0 INTRODUCTION

This report presents the results of geotechnical investigation conducted by Hoggan Engineering & Testing (1980) Ltd. (Hoggan) on the site of the proposed industrial area structure plan in County of St. Paul #19, Alberta. The objective of the investigation was to determine the subsoil data for use in the geotechnical planning and design aspects of the industrial development project. Any environmental and previous land use issues are beyond the scope of this report. Authorization to proceed and permission to enter the site was received from Matt Slorstad with Urban Systems.

It should be noted that building foundation designs are beyond the scope of this report. A separate geotechnical investigation should be performed on each building lot.

2.0 PROJECT AND SITE DESCRIPTION

The project is understood to consist of industrial or commercial lots with associated underground and surface utilities. At least one stormwater management facility (SWMF) is planned for this project, although its location is unknown to our firm at this time. A typical rural cross section is likely to be utilized for the construction of the surface utilities. It is assumed the maximum trench and pond depth will be approximately 7 metres below the existing grade. The subject site consists

of a portion of land approximately 160 acres in size, northwest of the intersection of Highway 652 and Highway 29. The existing trading post lot in the northeast corner of the 1/4 section was not included in the study.

The subject site at the time of investigation was snow covered, and consisted of farm field. Large elevation differences up to 15 metres were seen, and the terrain was noted to be gently rolling throughout the site. The topography was sloped downwards toward the southeast. A narrow, wooded area was located north to south across the west border of the field. Three wet areas were observed onsite. The most significant of these wet areas was a local depression holding water noted near Hwy 652, the south site boundary, covering a large portion of the central bottom third of the field. A few scattered trees and other vegetation were growing at this wet area. A smaller depression, which appeared to contain seasonal water, was seen around the middle of the site. The third local depression was surrounded with taller grass and cattails. This last depression was located approximately one third of the way north along Hwy 29, the east site boundary. A pipeline was noted running from the southeast to the northwest of the site. The surrounding lands in each direction were also farm fields, with a homestead to the east of the project area.

Snow ploughing had been completed to provide a path. Tracked and 4-wheel drive vehicles were utilized to travel the site. Access to the site was gained at the south site boundary via two approaches off Hwy 652.

Geology

According to maps provided by the Alberta Geological Survey, the geology of the area and subject site starts at the surface with Pleistocene age glacial till. The till consists of an unsorted mixture of clay, silt, sand and gravel, with local water sorted material and bedrock. This site location is identified as stagnation moraine. A stagnation moraine is classified as layered up to 30 metres thick, having gently rolling to hummocky topography, reflecting variations in till thickness. Here the topography is weakly to moderately developed hummocks with irregularly shaped and poorly defined knobs and kettles. Local elevation change is described as 5 to 20 metres.

Bedrock would be encountered below the glacial till. The bedrock geology in the region was identified as the Lea Park Formation of upper Cretaceous age. The Lea Park Formation is generally comprised of shallow to offshore marine deposits of mudstone with significant sandstone tongues.

Geotechnical Report Review

No report of any previous geotechnical investigation that covered the subject site were found in our library or provided to our firm.

Coal Mine Atlas Review

No coal mining information of the area was found in the Alberta Coal Mine Atlas ST45 made available by Energy Resources Conservation Board. Coal mining related issues should not be a concern for this site and were not investigated further.

Aerial Photography Review

Historical images taken between 1985 and 2019, covering the subject site and surrounding areas, were obtained from the Alberta Sustainable Resource Development Library or found in Google Earth. The images were compared and reviewed for any signs of disturbances within the site. However, observations from early images were restricted due to limited resolution.

In the 1985 air photograph no major changes are noted from the current conditions. The vegetation appears to be in similar condition. A couple low lying areas are noted that may contain water, and the pond in the bottom central third of the site is visible and holds water. The land appears to be utilized for farming.

In the 2012 air photograph, no significant changes are noted at the subject property. The wet area in the bottom third also contains water, and its general shape is unchanged.

In the 2019 air photograph, no significant changes are noted at the subject property.

The limited review of aerial photographs and available geotechnical information has revealed several low lying areas. No other major geotechnical concerns were highlighted as part of the review.

3.0 FIELD INVESTIGATION

The soils investigation for this project was undertaken on January 29th to 30th, and March 9, 2022 utilizing a track or truck mounted drill rig owned and operated by SPT Drilling Ltd. Augers & Research Ltd. of St. Albert, Alberta. A total of sixteen (16) testholes were drilled at locations shown on the attached site plan. The testholes were advanced to depths of 8.8 metres below ground surface (BGS). The testhole layout was selected and surveyed by Urban Systems.

The testholes were advanced with 150 millimeter diameter solid stem augers in 1.5 meter increments. A continuous visual description was recorded on site that included the soil types, depths, moisture, transitions, and other pertinent observations. Disturbed samples were removed from the auger at 750 millimeter intervals for laboratory testing. Standard Penetration Tests (SPT) c/w split spoon sampling was also taken at regular 1.5 meter intervals.

Following the drilling operations, a slotted piezometric standpipe was inserted into each testhole for watertable level measurement. The testholes were backfilled with drill cuttings, and then a bentonite seal was placed near the surface to help prevent surface water infiltration. Two sets of watertable readings were obtained.

4.0 LABORATORY TESTING

All soil samples returned to the laboratory were tested for moisture content. In addition, the plastic and liquid Atterberg Limits and soluble soil sulphate concentrations were determined on selected samples. A grain size analysis was conducted on selected coarse grained samples. Lab results are included on the attached testhole logs located in the Appendix. No Shelby Tube samples were taken for unconfined compressive strength and dry density.

5.0 SOIL CONDITIONS

A detailed description of the soils encountered is found on the attached testhole logs in the Appendix. In general, the soil conditions encountered in the testholes at this site consisted of surficial organic topsoil followed by native clay or glacial clay till with interbedded layers of sand. This stratigraphy matches the expected soil geology of the area, with the clay layer likely deposited in lakes formed near the melting glacier front.

Organic Topsoil

Organic clay or topsoil was encountered at the ground surface in the testholes and was approximately 50 to 100 millimetres thick, however frozen conditions do hamper topsoil thickness measurements. The topsoil depths are known at testhole locations only and may significantly vary in

between testhole locations. In addition, due to cold weather drilling conditions, the provided thicknesses should be considered rough approximations only.

Lacustrine Clay

Native clay was encountered below the surficial topsoil in Testholes 3000, 3008, 3009, 3014 and 3015 to depths of approximately 1.5 to 3.5 metres BGS and below the near surface clay till in Testhole 3003 from 3.5 to 4.3 metres BGS. The near surface native clay encountered was generally silty, sandy, medium plastic, damp to moist, firm to stiff/friable and brown in colour with some till like features.

Clay Till

Clay till was encountered below the surficial topsoil in Testholes 3001 to 3007 and 3010 to 3013 and below the near surface native clay in Testholes 3000, 3008, 3009, 3014 and 3015 at depths of approximately 0.05 to 3.5 metres BGS. The till was generally silty, sandy, medium plastic, damp to very moist, stiff and brown in colour with traces of coal, oxides and pebbles. The clay till generally became very stiff to hard and olive/dark grey in colour with depth. Small coarse grained, wet sand lenses were encountered within the clay till at varying depths in some testholes. All the testholes were terminated in the clay till at a depth of 8.8 metres BGS.

Sand

Native sand was encountered within the clay till in Testholes 3003, 3004 and 3013 and below the near surface clay in Testhole 3014 at depths of approximately 2.7 to 3.4 metres BGS. The sand was generally clayey, fine to coarse grained, moist to wet, compact, poorly graded and brown/grey in colour with trace to some gravel. Significant sloughing was noted due to the wet sands encountered in Testholes 3013 and 3014.

Testhole Condition at Completion

During drilling, free water or slough was observed at the bottom of several testholes as summarized in the table below. Free water was observed on the samples or SPT equipment during drilling and in some testholes as well.

Table 1: Accumulations of Slough and Free Water at Completion of Drilling

Testhole	Accumulation of Slough (m)	Accumulation of Water at Hole Bottom (m)
3000	None	None
3001	None	None
3002	None	None
3003	None	None
3004	None	None
3005	None	None
3006	None	None
3007	None	None
3008	None	None
3009	None	None
3010	None	None
3011	None	None
3012	None	None
3013	3.4	None
3014	3.5	0.6
3015	None	0.2

6.0 GROUNDWATER CONDITIONS

Two sets of watertable readings were taken after the completion of drilling. The highest recorded level at each testhole was utilized in the geotechnical evaluation. The watertable readings and corresponding elevations are summarized on the following page.

Table 2: 2022 Groundwater Table Readings				
Testhole		Reading - Depth below surface (m)		
Number	Elevation	February 22, 2022 (23 - 24 Days)	March 23, 2022 (14 or 52 - 53 Days)	Watertable Elevation (m)
3000	634.22	Not drilled	2.91	631.31
3001	637.72	Not drilled	5.41	632.31
3002	640.99	Not drilled	5.47	635.52
3003	645.33	Not drilled	Dry to 8.15	< 637.18
3004	640.34	4.63	4.52	635.82
3005	636.42	2.67	2.69	633.75
3006	632.70	3.00	3.12	629.70
3007	633.74	3.76	3.81	629.98
3008	632.90	-	-	-
3009	632.07	2.71	2.76	629.36
3010	638.00	4.55	4.29	633.71
3011	634.04	2.40	2.45	631.64
3012	633.22	3.83	3.78	629.44
3013	632.68	3.07	3.02	629.66
3014	632.36	2.72	2.84	629.64
3015	631.58	2.66	2.53	629.05

It should be noted that water table levels may fluctuate on a seasonal or yearly basis with the highest readings obtained in the spring or after periods of heavy rainfall. The above readings would be considered below the seasonal average levels.

7.0 RECOMMENDATIONS

7.1 Site Grading

1. All topsoil on site is considered unsuitable to support footing foundations, slab-on-grade, and road structures. All topsoil and organic soil should be stripped away, stockpiled, and reused for landscaping purposes only. Conventional clearing and stripping should be possible for the majority of the site, with the low areas requiring possible hoe and truck work. The topsoil depth is known only at the testhole locations, and may vary between testholes. Strip checking by qualified geotechnical personnel is recommended.
2. The site featured a gently rolling terrain with grade changes of larger than 15 metres throughout the site. Low areas containing water were noted, and should be drained prior to stripping. Low areas were not investigated and encountering considerable organics in

these areas is possible. Environmental access issues should be addressed by others for all low areas prior to disturbance.

3. Engineered fill may be considered in areas where low elevations necessitate deep fill zones. Basically, engineered fill is fill which is placed in a controlled manner under the part-time monitoring and inspection of a qualified soils technician. Hoggan recommends that engineered fill is placed and compacted to a minimum 98 percent of its Standard Proctor Density near its optimum moisture content, in maximum 150 millimetre lifts, and throughout the full depth of engineered fill. Any topsoil or non-engineered fill must first be stripped from the engineered fill area. High plastic clay must be placed and compacted above the optimum moisture content to help limit swelling potential.

Engineered fill construction requires part-time monitoring and extensive testing by the geotechnical consultant during construction. Hoggan does not recommend placing commercial or industrial footings on clay fill. However, proper placement of engineered fill will negate the need for structural slabs in deep lot fill areas, and possibly reduce the foundation costs to the builders and developer. This option should be reviewed prior to implementation to evaluate site conditions and borrow material sources. Fill deeper than 4.0 metres should be reviewed by our firm to address potential settlement prior to construction. In addition, engineered fill requires fill depth differentials across the building footprint of less than 1.5 metres if not waiting a minimum of 2 years after fill completion to start construction. In some cases, removal of native material may allow for the minimum fill depth or the maximum fill differential conditions to be met. However, this may not always be the most economical solution. High plastic clay is not recommended for slab-on-grade support. If the client chooses to place high plastic clay in building pockets they must accept the risk of movement due to shrinkage and swelling. High plastic clay may be used in pavement or non building areas with the acceptance of shrinkage or swelling movement risk inherent with such clays.

It should be noted that engineered fill construction may be very difficult in some situations. One of these situations occurs when soft, very moist, underlying soils are exposed once stripping has been completed, which may be seen in high water table areas or low-lying areas where standing water accumulates. The measured watertables ranged from approximately 2.5 to greater than 8.2 (Dry at 8.2) metres BGS, therefore this may be

an issue due to the watertable for the majority of the site. Compaction the first lift of fill material over these soft underlying soils to the engineered fill standard may be impossible. Initial evaluation of these soft areas should look at drying of the soils. As well, removing the soft soil to reveal more competent platform material is an option when stiff soils exist near the surface. Where a minimum fill depth condition is met, construction of a clay pad approximately of 300 to 500 millimetres in thickness can be utilized to obtain an adequate working platform to start from. This pad however will be subject to long-term settlement and is not recommended for use below building slabs-on-grade or underground utilities. This pad should be compacted to a minimum of 95 percent of Standard Proctor Density where possible. The normal engineered fill lift thickness and compaction criteria mentioned above should be applied to successive lifts. To employ this method, a minimum of 1.0 meter of engineered fill must be placed on top of the clay pad. If this condition is not met, the fill would not be considered to have met engineered fill standards. If a 500 millimetre thick clay pad cannot bridge the underlying soft soils, then engineered fill becomes difficult and increased measures will be required. Please contact Hoggan for more information.

4. All fill below roads, sidewalks, and utilities should be comprised of inorganic material and be free of frost and deleterious matter. The fill below public roads and sidewalks should be placed in maximum 150 mm thick compacted lifts to a minimum density of 98 percent of standard Proctor density. Below 1.5 meters from the design road or sidewalk subgrade elevation, the fill can be compacted to a minimum 95 percent standard Proctor density.
5. The inorganic clays encountered throughout the site would be considered suitable to be used as engineered lot and road fill. The moisture contents of the clays were variable ranging from below or near optimum to almost 10 percent over. Minor to moderate moisture conditioning may be required to reach the above mentioned compaction standard.
6. The observed watertable was variable, measured between approximately 2.5 and greater than 8.2 (Dry at 8.2) metres BGS in the testholes. The near surface site clays and clay till are of moderate frost susceptibility throughout the site. A high watertable within approximately 3.0 meters of the surface is required for significant frost heaving to occur. The closer the watertable is to the surface, the higher is the frost heave potential. The standpipes for the testholes at this project have stabilized near or above this level and the potential for frost

heave in this area will be a concern. Therefore, the design grade should be set as high as possible in the high watertable areas, with the goal of having the design subgrade elevation a minimum 3.0 metres above the watertable. No cuts for design grade are recommended in high watertable areas.

7.2 Commercial / Industrial Buildings – Preliminary Discussion

7.2.1 Foundation Types

1. While actual building foundation design parameters are beyond the scope of this report, some preliminary comments on the general suitability of different foundation types can be made. Each lot will require its own specific soils investigation.
2. Footings are considered a suitable option in the drier lacustrine clays or clay till for smaller industrial/commercial buildings. Footings should be placed on native, non-organic clay or clay till. Some of the clay and native sand materials encountered in the testholes were very moist, and low bearing capacities and large footing sizes can be expected from these materials. The watertable was high in areas which is a concern for footing foundations. It is envisioned that footing foundations will not be suitable for industrial buildings in some areas. Topsoil, existing fill, and other deleterious materials are not considered suitable for footing support.
3. Skin friction bored cast-in-place piles are also a suitable option in many testholes. Lower skin friction values can be expected in the wet sands and moister soils below the watertable. Free water and/or slough material was encountered in 3 of the 16 testholes advanced to a depth of 8.8 metres BGS. Therefore, for piles, casing will likely be required in the moderate to high watertable areas. At the very least, casing should be readily available on site. Concrete should also be readily available on-site for immediate placement once excavation is complete. It should be noted that casing at increased depths will be difficult if not impossible due to the wet sands encountered in the some of testholes. Casing capabilities should be addressed for each building separately during detailed soils investigation. The sand soils in high watertable areas will likely not be suitable for open hole concrete piles.
4. Suitable end bearing clay till soils were encountered in the testholes at this site to depths of 8.8 metres BGS. Although the clay till encountered would be suitable for belled, end bearing piles, the very moist to wet sands encountered above the clay till in some testholes featured

significant ingressing and water condition which may make belling difficult. Careful inspection is recommended and preliminary belled test piles are suggested.

5. Screw piles, driven piles and/or continuous flight auger are considered suitable foundation options for many testholes.

7.2.2 Slabs-On-Grade

1. The native, non-organic materials encountered at this site will be satisfactory for supporting a slab-on-grade. Topsoil and other deleterious materials are not considered suitable for slab-on-grade support.
2. The soils encountered below the topsoil in the testholes were medium plastic, and have a low to moderate swelling and shrinkage potential. If high plastic clay soils are placed below building slab-on-grade areas as fill, additional building design considerations should be taken into account in order to deal with the increased risk of swelling and shrinkage. It is important to moisture condition the soils to above optimum moisture content, and then to avoid changes in moisture content both during construction, and throughout the life of the project. In addition, building owners must accept some risk of slab movement from the higher plastic clays if used as clay fill. An intolerance for slab movement will necessitate a structural slab, or other design measures. Placing engineered fill with an approved low to medium plastic clay in building pockets should be considered where fill is required.
3. In such areas as furnace rooms where there is an intense concentrated heat, adequate provisions should be made to protect the supporting subsoil from excessive desiccation. These areas should be well-insulated so that soil volume changes beneath the floor slabs may be kept to a tolerable amount. Our firm should be consulted if under slab insulation will be utilized.

7.3 Underground Utilities

1. The subsurface soil conditions encountered in the testholes are considered generally fair for the installation of underground utilities with open cut trenches. The wet sands encountered in Testholes 3013 and 3014 below depths of approximately 2.7 to 3.4 metres

BGS are considered poor for the installation of underground utilities. Topsoil and other organic materials are not considered suitable for backfill material.

2. Stabilized groundwater levels were recorded between approximately 2.5 to greater than 8.2 (Dry at 8.2) metres BGS. These groundwater conditions indicate that saturated conditions may be encountered in the trenches. Free water was also noted in some of the testholes at the time of drilling. Groundwater seepage is expected to be fast where sand seams are encountered and construction delays should be anticipated. As a result, the conditions noted during drilling indicate that trenches left open for extended periods of time may experience ingressing water. A moderate amount of ingressing water is anticipated below the water table. Temporary dewatering may be required. Opening relatively long portions of utility trench is not recommended for this site. More recommendations on groundwater issues are provided in Section 7.5.

3. Standard trenching cutback angles of approximately 45 degrees from the vertical are anticipated for the native clay soils in most areas of the site. However, if very moist to wet sand layers are encountered increased cutback angles of more than 45 degrees may be required in order to remain stable. Actual cutback angles should be determined in the field during construction. Exact stable slope values cannot be pinpointed without detailed and extensive analysis. For this reason, this information should be used as a guideline only and that the optimum cutback angles for utility trenches should be determined in the field during construction. The Occupational Health and Safety Act should be strictly followed, except where superseded by this report. Temporary surcharge loads, such as spill piles, should not be allowed within 3.0 metres of an unsupported excavation face, while vehicles and machineries should be kept back at least 1.0 metre.

   All excavation side slopes should be checked regularly for signs of sloughing, cracking, movements, or failures, especially after periods of rainfall. Remediation should be performed immediately wherever such signs are observed.

4. To reduce pipe loading, trench widths should be minimized but be compatible with safe construction operations. The trench width must be wide enough to accommodate pipe bedding and compaction equipment.

5. The moisture content of the till was damp to very moist, with moisture content typically between 8 to 19 percent, approximately near optimum to 10 percent above the optimum

moisture content. The clay encountered in Testholes 3000, 3003, 3008, 3009, 3014 and 3015 was damp to moist, with moisture content typically between 10 and 22 percent. Sand encountered in Testholes 3003, 3004, 3013 and 3014 was moist to wet, with moisture content between 6 to 19 percent. The variable condition of the soils will cause a corresponding variability in the utility trench pipe bedding and backfill conditions. Moderate moisture conditioning will likely be required at this site to meet the moisture content criteria and adequately construct a platform for surface utility construction. The very moist to wet sands would likely require significant drying to attain adequate compaction. Trenching operations will likely be slowed down due to the required moisture conditioning. Failure to adequately moisture condition the trench backfill may result in subgrade softening of the trench backfill. Careful planning of the trenching and backfilling operations is recommended to address the lower very moist to wet sand soils versus the upper considerably drier soils in some testholes. Sands should be placed below 1.5 metres from subgrade.

6. Pipe bedding procedures should adhere to the City of Edmonton Design and Construction Standards Volume 3 Drainage, or similar acceptable Standard. The backfill material immediately beneath and above the pipe should be an approved bedding sand material where conditions allow. This material should be hand placed and hand tamped, with care taken to fill the underside of the pipe, and compacted to a minimum 95 percent of the SPD. Gradations suggested in the Table 2.1.2: Aggregate Gradation Specifications (2018) are provided below in Table 2 for Designation 7-10 sewer backfill, also known as pipe bedding.

Table 4: Designation 7-10, Sewer Backfill or Pipe Bedding Gradation

Sieve Size (mm)	Minimum Passing	Maximum Passing
10.0	100	100
5.0	70	100
0.160	5	20
0.080	0	12

If groundwater seepage or saturated conditions are encountered in the trenches, wrapped washed rock completely surrounded by geotextile separator is recommended for pipe

bedding in these areas. The washed rock and geotextile configuration should be determined in the field during construction. The need for this configuration will likely be low at this site.

7. All trench backfill above bedding material should compose of suitable uniform non-frozen inorganic soil. Trench backfill placed above the bedding material should be compacted to a minimum of 95 percent of the SPD in minimum 300 millimetre lifts below 1.5 metres below subgrade. Trench backfill placed in the top 1.5 metres below subgrade should be compacted to a minimum of 98 percent of the SPD in minimum 300 millimetre lifts. To strengthen the road subgrade, uniform placement of the upper most 1.5 meters of trench backfill, where lifts encompass the entire width of the roadway and roadway structures is also recommended. Trench backfill material should be moisture conditioned to near the optimum level in order to meet the compaction specifications. Weather conditions should be considered during trench backfill operations.

   As previously noted, moderate to significant drying will be required to meet compaction specifications.

8. It should be noted that the ultimate performance of the trench backfill is directly related to the consistency and uniformity of the backfill compaction, as well as the contractor's underground construction procedures. In order to achieve this uniformity, the lift thickness and compaction criteria should be strictly enforced. The quality of the trench backfill compaction affects the subgrade and pavement design.

7.4 Surface Utilities

1. The subsurface soil conditions encountered throughout this site are considered generally fair to satisfactory for the construction of roads, curbs, and sidewalks in undisturbed areas. The existing topsoil and other deleterious materials should be removed prior to construction of roads, sidewalks and other surface utilities.

2. One concern for surface utility construction at this site is the elevated moisture content of the wet sand materials. Most of the upper clay and clay till materials were near or slightly above optimum moisture content, and mixing and disturbance during underground utility installation will likely degrade the soil conditions. If the lower, wetter sands are allowed to mix into the upper portion of the trench, the road subgrade may be soft and provide inadequate support for normal pavement structures. Sands should be placed below 1.5

metres below subgrade. Extra subgrade work would then be required in order to construct an adequate working platform for the pavement structure placement and long term support. Addition of moisture may also be required depending upon the local conditions and amount of soil mixing in the upper damp to moist clay layers encountered near the surface in some testholes. It is noted that the degree of material separation and trench backfill drying during underground utility installation affects the soil conditions for road and sidewalk construction, with increased drying improving the soil conditions.

3. The near surface, inorganic clays and silts, encountered in most of the testholes were generally low to medium plastic in nature, and are low to moderately susceptible to swelling.

   Care must be taken not to allow any excess moisture into these soils. It is important that subgrade soils not be allowed to dry excessively when exposed, and moisture contents are kept slightly over optimum. It is recommended that all areas beyond the back of curb/sidewalk be landscaped as soon as possible to avoid water permeating into the subgrade from free standing puddles. Weather conditions should be considered during construction.

4. The observed water table depths are variable at this site, ranging from approximately 2.5 to greater than 8.2 (Dry at 8.2) metres BGS. The near surface site clays and clay till are of moderate frost susceptibility throughout the site. Sands are highly frost susceptible and should not be placed in the top 1.5 metres below roads. A high watertable within approximately 3.0 meters of the surface is required for significant frost heaving to occur. The closer the watertable is to the surface, the higher is the frost heave potential. The standpipes for the testholes at this project have stabilized near or above this level and the potential for frost heave in this area will be a low to moderate concern. Proper site drainage is key to preventing frost heave.

5. Standard subgrade preparation of scarifying a minimum of 150 millimetres and recompacting to 100 percent of the SPD at the optimum moisture content is recommended. After completion of the subgrade compaction, the entire subgrade should be proof-rolled and any areas showing visible deflection should be investigated and repaired.

   If wet, loosened or rain water softened soil is present, cement stabilization or thicker pavement structures may be required. At a minimum, the addition of 10 kilograms of cement per square meter of subgrade mixed to a depth of 150 millimetres and compacted to 100

percent SPD is recommended. Any soft areas may require 20 to 30 kilograms of cement per square metre of subgrade mixed to a depth of 300 millimetres and recompacted to a minimum 100 percent SPD. The exact application rates and mixing depths would need to be determined in the field at the time of construction by proofroll.

The finished subgrade should be proof rolled with our representative present to observe any deflecting areas. Any areas showing visible deflection should be repaired as required. In the unlikely event that cement stabilization is not feasible or fails to produce an adequate subgrade, replacing the subgrade with a gravel subbase with geogrid should be considered and should be determined during construction.

6. Good drainage of the clay subgrade is imperative for lasting structural performance. All subgrade, granular base and pavement surface should be constructed with proper cross falls at minimum of 2.0 percent grade towards the gutter or roadway edge.

7. It is understood that a rural road cross section will be utilized. For a typical rural road cross section, it is recommended that the gravel road base is day lighted to the ditch. A minimum ditch depth of 0.8 metres below subgrade is suggested. Ditch grading should be designed to eliminate water accumulation. Landscaping should only cover below the bottom of the gravel.

8. The following 20 year staged pavement designs are recommended for this site. An estimated resilient modulus (M_r) of 30 MPa was used in the design. The stated Equivalent Single Axle Load (ESAL) values for the proposed pavement structures are noted in the table. The stated ESAL values are based on our experience and judgment as no traffic loading information was available. These structures may be modified if a more accurate traffic loading estimate is forwarded to Hoggan.

Table 5: Recommended Staged Roadway Structures

160 Acre Fee Simple Lands Industrial ASP

	Local Industrial ($1.0x10^6$ ESALs)	**Industrial Collector ($3.0x10^6$ ESALs)**
Asphaltic Concrete	140 mm (H2 or M1) (2 lifts, 70/70)	160 mm (H2 or M1) (2 lifts, 80/80)
Crushed Gravel (4-20 mm)	350 mm	425 mm

Note: (H2) = Alberta Transportation Des. 1 Cl. 12.5 Type H2 ACP
(M1) = Alberta Transportation Des. 1 Cl. 12.5 Type M1 ACP
(L1) = Alberta Transportation Des. 1 Cl. 12.5 Type L1 ACP
(4-20mm) = Alberta Transportation Des. 4 Class 20 or 25
All granular base material should be compacted to a minimum 100% of Standard Proctor Density in maximum 200 mm lifts

9. It is critical where structures of varying depths meet that adequate drainage is provided at the base of the deeper gravel structure such that ponding of water is not allowed.

10. Areas that experience channeled truck traffic or point loads, such as in front of garbage bins or truck loading bays should be specifically designed. Concrete pavement in these areas is recommended.

11. It is understood that if an asphalt roadway is not economically feasible, a gravel roadway will be utilized. For industrial areas and collectors, granular structures of 300 millimetres and 450 millimetres (Alberta Transportation 4-20mm), respectively, are recommended. As with all gravel surfaces, maintenance will be required on a regular basis to repair damages caused by wearing and tearing and maintain adequate performance. This includes blading and the addition of gravel. The gravel surface structure will deteriorate if left unattended for an extended period of time.

7.5 Groundwater & Drainage Issues

1. The groundwater readings in the proposed subdivision ranged from low to high. The observed water table depths at this site were recorded at 2.5 to greater than 8.2 (Dry at 8.2 m) metres BGS. Immediate groundwater seepage was encountered in Testholes 3014 and 3015. The amount of groundwater seepage encountered will depend on the excavation

depth below the watertable and the soil stratum encountered. Moderate dewatering effort consisting of in-trench sumps and pumping will likely be necessary in high watertable areas and construction delays can be expected. The amount of dewatering effort is hard to determine as sand lenses are random and discontinuous. Special measures cannot be ruled out in large sand layers similar to those encountered in Testhole 3013 and 3014. Design grade should be kept as high as possible and cuts are not recommended in high watertable areas.

2. The groundwater seepage rates into utility trenches from the native clay and clay till materials encountered at depth should be low, but will be high in the sand materials. It is expected that trench dewatering will be required. Opening relatively long portions of trench should be avoided.

3. Any attempt to lower the watertable would benefit the construction and maintenance of the development. One option is to hydraulically connecting the bedding materials to the storm manholes, allowing groundwater to seep into the sewer. When employing this method, it is important to wrap the bedding in filter cloth to prevent silting. It is recommended that a storm sewer of sub-drain be employed throughout this site at a minimum 3 metres from finished grade to intercept the watertable above this level. The exact configuration and need of the sub-drains should be determined in the field during construction.

4. Water dispersed on the property from the roof leaders must not be allowed to accumulate against the foundation walls. To ensure positive drainage, the soil surface of all lots should be made sloping away from all buildings. This will require a positive lot grading of at least five percent away from the foundation walls for a minimum of 3.0 metres. In cases where the lot drainage runs from the back of the lot to the front, runoff should be kept 1.2 metres away from the building.

5. As noted in Section 7.2.1, conventional pile drilling will likely intercept the wet sand below the watertable. Therefore, the need for casing should be expected. CFA piles and screw piles are options that would eliminate the need for casing and should be considered.

7.6 Storm Water Management Facility

1. It is understood that at least one stormwater management facilities (SWMF) is planned for this project, but the location is not known to our firm at this time. Future additional testholes

may be required at specific SWMF locations for detailed design and construction depending on the SWMF design depths and site soil conditions. The following recommendations are preliminary in nature.

2. The native clay, and clay till encountered should yield sufficiently low permeability characteristics for water retention purposes. The permeability of the sand layers encountered within the clay till in Testholes 3003, 3004, 3013 and 3014 is not sufficient for water retention purposes. If sand or other permeable material is encountered during pond excavation, liner may be required to plug the permeable material. Our firm should be contacted to inspect the presence of any sand material to determine the need for liner during construction.

   The depth of the storm ponds are not known at this time and hence, in areas where medium plastic clay and clay till is encountered, no liner is considered necessary. The medium plastic native clays and till excavated from the pond would be considered suitable as liner material. A minimum 900 millimetres liner of clay is recommended. The initial 0.6 to 1.0 metres of this liner may need to be padded in to provide equipment support. Subsequent liner lifts should be a maximum 150 millimetres thick to a minimum 95 percent of SPD.

   It is recommended that the SWMF not be located in the high watertable areas, if at all possible, in order to avoid slope and base stability issues including piping and base heave.

3. Excavation of the drier clays and clay tills will likely be possible by scrapers. However, the lower wet sands will likely not support scraper traffic and a backhoe operating remotely from the excavation will likely be required for SWMF excavation in these moister soils. Excavation side slopes of 4:1 should be geotechnically stable in the moist medium plastic lacustrine clays or clay till soils. Side slopes of 7:1 or greater are required in the wet sands encountered. Gentler slopes may be desirable for landuse, maintenance, or recreational activities. Excavation and grading below the watertable will experience some ingressing groundwater, and should be expected. Further investigation of the stability of the sideslopes should be considered once the SWMF location is known.

4. All containment areas of a dry pond and the above waterline portion of wet ponds should be sodded to minimize erosion. The sideslopes of wet ponds should be protected from wave and ice erosion by a rip-rap cover, or establishing suitable vegetative cover.

5. The fill excavated from the stormwater pond is likely suitable for engineered lot fill with low to moderate moisture conditioning, depending upon the final location of the SWMF. In addition, some of the lower sands encountered in the testholes are highly frost susceptible, and these soils should not be used as fill in roadway or lot areas within 1.5 metres of subgrade elevation.
6. Dry pond construction below the watertable may produce constant water seepage into the outlets, and eventually a soft, saturated pond bottom, therefore construction may be difficult and extra engineering measures may be required. Excavations below the watertable will require dewatering during construction. Please contact Hoggan for a review if a dry pond is desired.
7. Any walkway or other surface utilities around the pond should be kept as high as possible.

7.7 Cement

Tests on selected soil samples indicated negligible to severe concentrations of water soluble soil sulphates in the near surface clay deposits. The following alternatives are advised to address the sulphate content:

1. Underground Concrete Pipe

   Concrete used for all underground pipes must be constructed of C.S.A. Type HS (high sulphate resistant hydraulic cement).

2. Curbs and Sidewalks

   All concrete for surface improvements such as sidewalks and curbs may be constructed using C.S.A. Type GU (general use hydraulic cement).

3. Foundation Construction

   Based on C.S.A. Standards A23.1-14, class exposure S-2 should be applied to the design requirements for concrete in contact with the soil and subject to sulphate degradation. The class S-2 exposure requires Type HS (high sulphate resistant hydraulic cement) and a minimum 56 day concrete strength of 32 MPa, as well as other requirements as given in the noted C.S.A. guideline. All concrete exposed to freezing conditions should be air entrained to between 5 to 7 percent. Other exposure factors should be considered when choosing a minimum strength for the concrete.

Individual locations may show higher or lower concentrations of soluble soil sulphates, and thus additional soil testing on particular sites or lots may prove valuable.

8.0 CLOSURE

This report has been prepared for the exclusive and confidential use of Urban Systems, Saddle Lake First Nation and their authorized agents. Use of this report is limited to the subject proposed industrial subdivision only. The recommendations given are based on the subsurface soil conditions encountered during test boring, current construction techniques and generally accepted engineering practices. No other warranty, expressed or implied, is made. Due to geological randomness of many soils formations, no interpolation of soil conditions between or away from the testholes has been made or implied. Soil conditions are known only at the test boring location. Should other soils be encountered during construction or other information pertinent becomes available, the undersigned should be contacted as the recommendations may be altered or modified.

We trust this information is satisfactory. If you should have any questions, please contact our office.

Yours truly,

Reviewed by, HOGGAN ENGINEERING & TESTING (1980) LTD.

PROFESSIONAL ENGINEER ALBERTA
RICHARD A. EVANS

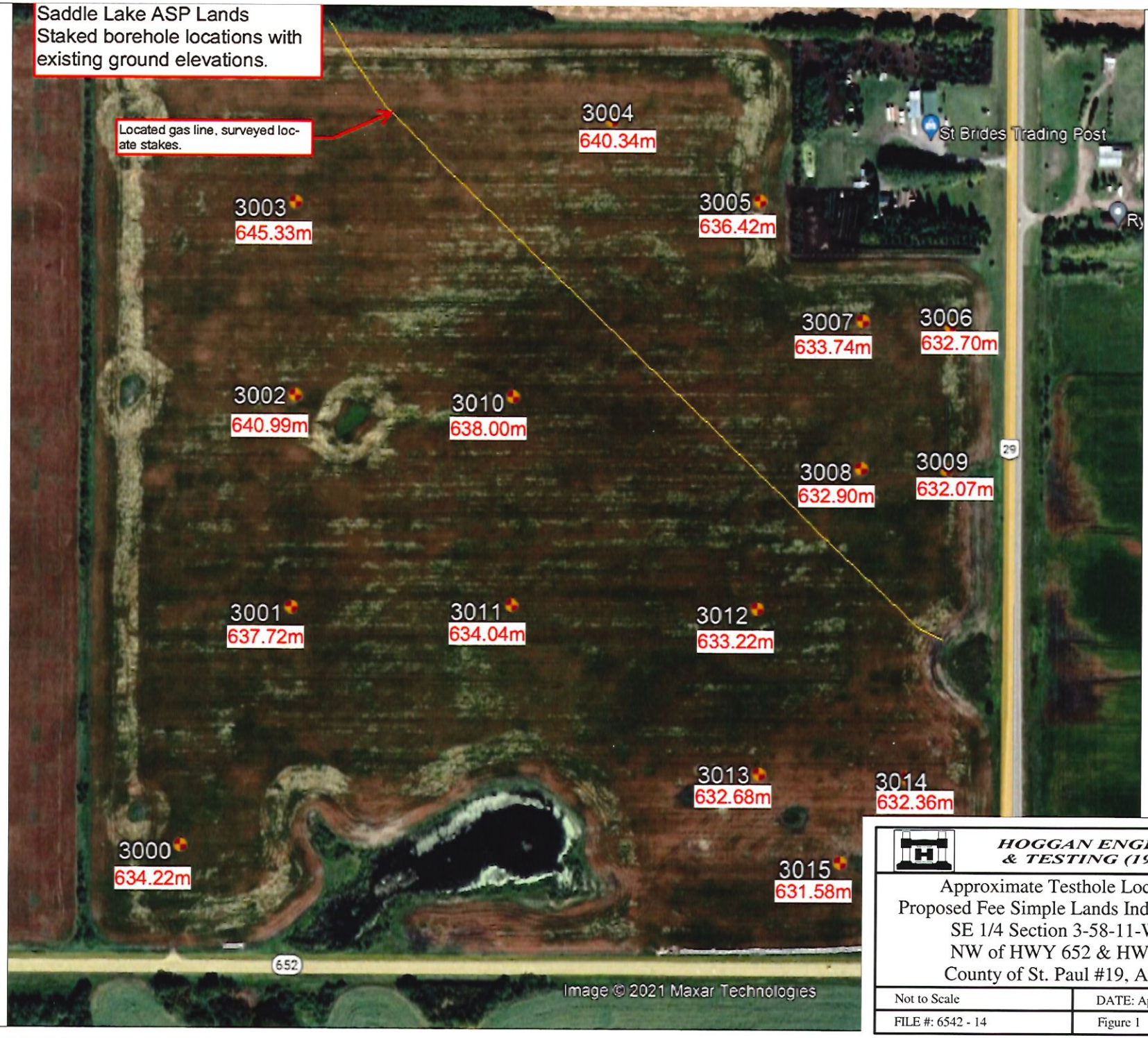
October 5, 2022

Rick Evans, P. Eng. J.P. Deys, E.I.T.

PERMIT TO PRACTICE
HOGGAN ENGINEERING & TESTING (1980) LTD.
RM SIGNATURE: R. Evans
RM APEGA ID #: 49679
DATE: October 5 2022
PERMIT NUMBER: P003691
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

H:\DATA 2022\6542 Urban Systems Ltd\6542-14 Fee Simple Lands Ind ASP, Hwy 652 & Hwy 29\hr1859urb 160 Acre - 2nd Submission.docx
RE&JP/rc&jp

APPENDIX



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Approximate Testhole Locations
Proposed Fee Simple Lands Industrial ASP
SE 1/4 Section 3-58-11-W4M
NW of HWY 652 & HWY 29
County of St. Paul #19, Alberta

Not to Scale	DATE: April 5, 2022
FILE #: 6542 - 14	Figure 1

PROJECT: Geo - Fee Simple Lands		PROJECT NO: 6542-14	BOREHOLE NO: **3000**
	DRILL METHOD: Solid Stem Auger		ELEVATION: 634.22 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan		

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	Soil Symbol	Modified USCS	SOIL DESCRIPTION	Sample Type	Standard Penetration Test (N)	Pocket Pen. (kPa) / Atterberg Limits	Other Data	Slotted Piezometer	Elevation (m)
0		OR	**TOPSOIL** : black. 50 mm						634
			CLAY : silty, medium plastic, damp, stiff/friable, brown, some till like features, frozen to approximately 1.0 m.			9.7			
1		Cl							633
			1.5 m **CLAY TILL** : medium plastic, moist, stiff, brown, trace coal, oxides and pebbles.			15			
2						16.1			632
			Well 1: 2.91		10	16.6			
3			Below 3.1 m : very stiff, brown/dark brown.			13.7			631
						13.3			
4			Below 4.0 m : very stiff to hard, olive grey.		27	12.7			630
						13.3 (11.4 : 28.2)	P.L. = 11.4 L.L. = 28.2 M.C. = 13.3 **Soluble Sulphates:** Negligible		
5		Cl				12.6			629
					27	12			
6						12.5			628
			Below 6.7 m : olive/darkgrey, trace gravel.			11.8			
7			At 7.0 m : trace water on SPT.		18	12.1			627
						11.3			
8						12.3			626
					39	12.8			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.						625
			14 day waterlevel reading: 2.91 m bgs.						
10									624
11									

Well 1: 631.31

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LOGGED BY: JP Deys	COMPLETION DEPTH: 8.84 m
REVIEWED BY: R Evans	COMPLETION DATE: 3/9/22
	Page 1 of 1

JRP 6542-14.GPJ JRPV3_1.GDT 7/5/22

PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3001**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 637.72 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : black. 50 mm **CLAY TILL** : silty, sandy, medium plastic, moist, very stiff, brown, trace coal and oxides, frozen to approximately 1.0 m.			9.8			637
1									
2			Below 2.0 m : brown/dark brown.			12.8			636
						13.1			
					16	11.5			635
3						10.5			
						12	P.L. = 10.8 L.L. = 27.8 M.C. = 12.0		634
4					19	10.8 27.8 13.2	**Soluble Sulphates:** Severe		
		CI				12.5			
5						13.7		Well 1: 632.31	633
	Well 1: 5.41		Below 5.5 m : grey/brown.		28	12.6			
6						12.9			632
			Below 6.7 m : very stiff to hard, grey, trace coal, oxides and gravel.			12.3			
7					29	12.8			631
						11.9			
8						12.2			630
					30	11.2			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.						629
			14 day waterlevel reading: 5.41 m bgs.						
10									628
11									627

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PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3002**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 640.99 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : black. 50 mm **CLAY TILL** : medium plastic, moist, very stiff, brown, frozen to approximately 1.1 m.			10.8			640
1						13.6 16.8 32.2	P.L. = 10.8 L.L. = 32.2 M.C. = 13.8 **Soluble Sulphates:** Negligible		
2			Below 1.8 m : brown/grey.			13.8			639
3					12	14.2			
4						11.6			638
					16	12.3 12			637
		CI	Below 4.6 m : very stiff to hard.			12.4			
5						12.3		Well 1: 635.52	636
			Below 5.6 m : very stiff to hard in seams, grey/dark grey.		26	13			
6						12.4			635
7					40	12.1 13			634
8						12.5			633
						11.8			
					22	11.5			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.						632
10			14 day waterlevel reading: 5.47 m bgs.						631
11									

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PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3003**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 645.33 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	MODIFIED USCS	SOIL DESCRIPTION	Standard Penetration Test (N)	OTHER DATA	Elevation (m)
0	OR	**TOPSOIL** : black. 50 mm **CLAY TILL** : medium plastic, moist, very stiff, brown, trace coal, oxides and pebbles, frozen to approximately 1.0 m.			645
1	CI				
2			18		643
3	SP	**SAND** : clayey, fine grained, moist, poorly graded, brown. 2.9 m			642
4	CI	**CLAY** : silty, medium plastic, moist, friable, brown, moderate oxides. 3.5 m	10		641
5		**CLAY TILL** : very silty, medium palstic, moist to very moist, stiff, brown. 4.3 m below 4.6 m : moist, very stiff, trace coal, oxides and gravel.			640
6			12		639
7	CI		15	P.L. = 10.8 L.L. = 26.3 M.C. = 12.9 **Soluble Sulphates:** Negligible	638
8		Below 7.9 m : hard, grey/dark grey.	47		637
9		**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m. 14 day waterlevel reading: 8.20 m bgs.			636
10					635
11					

POCKET PEN. (kPa): 100 200 300 400

ATTERBERG LIMITS: PLASTIC M.C. LIQUID; 20 40 60 80

Pocket pen. values: 10.3, 11.8, 12, 11.4, 6.3, 21.9, 16.5, 18.1, 17.8, 15.7, 14.1, 12.8, 12.9, 10.8, 26.3, 12.8, 13.1

SLOTTED PIEZOMETER — Well 1: 637.13

Well 1: 8.20

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REVIEWED BY: R Evans	COMPLETION DATE: 3/9/22

JRP 6542-14.GPJ JRPV3_1.GDT 7/5/22

PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: 3004
	DRILL METHOD: Solid Stem Auger	ELEVATION: 640.34 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	Soil Symbol	Modified USCS	SOIL DESCRIPTION	Sample Type	Standard Penetration Test (N)	Pocket Pen. (kPa) / Atterberg Limits	Other Data	Slotted Piezometer	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/grey. 100 mm						640
1			**CLAY TILL** : silty, sandy, medium plastic, moist, friable, brown, trace coal, oxides and pebbles, frozen to approximately 0.9 m.						
			Below 0.9 m : very stiff/hard, trace white precipitates.		15	10.8, 9.9	At 0.8 m : SPT high due to frozen conditions.		
		CI							639
2						11.3			
						11.9			
					18	11.8			638
			2.9 m						
3		SC	**SAND** : coarse grained, damp, loose, poorly graded, brown. 3.1 m			12.2			
			CLAY TILL : silty, sandy, medium plastic, moist, very stiff, brown, trace coal, oxides and pebbles.						637
						12.9	P.L. = 11.4 L.L. = 30.1 M.C. = 12.9		
4					19	11.4 30.1 12.9	**Soluble Sulphates:** Negligible	Well 1: 635.82	
									636
						13.5			
5			Below 5.2 m : olive grey/brown.			13.5			
					17	13.5			635
		CI							
6						13.5			
						12.8			634
7					26	13.2			
			Below 7.6 m : moist, hard, grey/dark grey.			11.6			
8						11.3			633
					24	11.7			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.						632
			24 day waterlevel reading: 4.65 m bgs. 53 day waterlevel reading: 4.52 m bgs.						
10									631
									630
11									

Well 1: 4.52

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REVIEWED BY: R Evans	COMPLETION DATE: 1/29/22

PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3005**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 636.42 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) / ATTERBERG LIMITS	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, sandy, damp, black/grey. 100 mm						636
			CLAY TILL : silty, sandy, medium plastic, moist, firm to stiff/friable, brown/light brown, trace coal, oxides and pebbles, frozen to approximately 0.9 m.						
1					16	14.4, 16.3	At 0.8 m : SPT high due to frozen conditions.		635
			Below 1.5 m : stiff to very stiff.			16.2			
2						17			634
			Well 1: 2.69		12	15.9		Well 1: 633.73	
3						14.5			633
4					11	15.3, 15.3			
		CI				12.9 (10.4 : 28.4)	P.L. = 10.4 L.L. = 28.4 M.C. = 12.9 **Soluble Sulphates:** Negligible		632
5						13.3			
			Below 5.5 m : very stiff to hard, olive grey.		27	12.1			631
6			Below 6.1 m : grey.			12.3			630
7						12.5			
					25	13.1			629
8						12.1			
						11.3			628
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.		34	11.5			
			24 day waterlevel reading: 2.67 m bgs. 53 day waterlevel reading: 2.69 m bgs.						627
10									626
11									

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REVIEWED BY: R Evans	COMPLETION DATE: 1/29/22
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PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3006**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 632.7 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, clayey, damp, black/grey. 50 mm **CLAY TILL** : silty, sandy, medium plastic, moist, stiff, brown, trace coal, oxides and pebbles, frozen to approximately 1.0 m.			9; 15.2; 14.5			632
1									
2			Below 2.4 m : very stiff.		11	15.7; 13.8			631
3	Well 1: 3.12					13.7 (10.2 29.6)	P.L. = 10.2 L.L. = 29.6 M.C. = 13.7 **Soluble Sulphates:** Negligible	Well 1: 629.58	630
4		CI	Below 4.3 m : olive grey.		20	13.7; 13.2			629
5			Below 5.0 m : olive grey/grey.			12.9; 13.3			628
6			Below 6.4 m : moist, very stiff, grey, trace oxides and pebbles.		15	13.9; 12.3			627
7			At 7.0 m : sand seam, coarse grained, wet, grey/brown, trace ingressing water.		18	12.3; 12			626
8						13.4			625
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.		26	13.4; 12.3			624
10			23 day waterlevel reading: 3.00 m bgs. 52 day waterlevel reading: 3.12 m bgs.						623
11									622

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REVIEWED BY: R Evans	COMPLETION DATE: 1/30/22
	Page 1 of 1

PROJECT: Geo - Fee Simple Lands		PROJECT NO: 6542-14	BOREHOLE NO: **3007**
	DRILL METHOD: Solid Stem Auger		ELEVATION: 633.74 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan		

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	▲POCKET PEN. (kPa)▲ 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/grey, trace rootlets. 100 mm						
			CLAY TILL : silty, medium plastic, damp, very stiff, light brown, trace coal, oxides and pebbles, frozen to approximately 0.9 m.			8.4			
1					20	10.5	At 0.8 m : SPT high due to frozen conditions.		633
			Below 1.4 m : moist, stiff to very stiff.			14.8			
2									632
						16	P.L. = 11.1 L.L. = 29.8 M.C. = 16.0		
						11.1 29.8			
					16	13.6	**Soluble Sulphates:** Negligible		
3									631
	Well 1: 3.81		Below 3.1 m : very stiff, brown/dark brown.			13.2			
						11.5		Well 1: 629.93	
4					22	13			630
		CI							
						13			
5			Below 4.9 m : olive grey.						629
						13			
			Below 5.5 m : grey.		17	12.9			
6									628
						13.1			
						12.8			
7					27	12.3			627
						12.4			
8									626
						12.1			
					25	12.5			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.						625
			24 day waterlevel reading: 3.76 m bgs. 53 day waterlevel reading: 3.81 m bgs.						
10									624
11									623

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LOGGED BY: JP Deys | COMPLETION DEPTH: 8.84 m

REVIEWED BY: R Evans | COMPLETION DATE: 1/29/22

PROJECT: Geo - Fee Simple Lands		PROJECT NO: 6542-14	BOREHOLE NO: **3008**
	DRILL METHOD: Solid Stem Auger		ELEVATION: 632.9 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan		

SAMPLE TYPE ☐ SHELBY TUBE ☐ CORE SAMPLE ☒ SPT SAMPLE ■ GRAB SAMPLE ▥ NO RECOVERY

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/grey. 50 mm					
			CLAY : silty, sandy, medium plastic, damp, stiff/friable, brown, frozen to approximately 0.9 m.					
1			Below 1.4 m : moist, stiff, trace oxide, pebbles and white precipitates.		21	9.5, 15.3	At 0.8 m : SPT high due to frozen conditions.	632
		CI				15.3		
2						17, 11.5, 32.2, 18.2	P.L. = 11.5 L.L. = 32.2 M.C. = 17.0 **Soluble Sulphates:** Negligible	631
			2.9 m		10			
3			**CLAY TILL** : silty, sandy, medium plastic, moist, very stiff to hard, brown, trace oxides.			13		630
4					27	12.7, 12.4		629
5			Below 4.9 m : olive grey.			14.5, 11.6		628
6		CI	Below 5.8 m : very stiff, grey.		26	11.2		627
			Below 6.1 m : trace coarse sand, wet.			12.5		
7					19	13.1, 11.7		626
8						16.9		625
					28	11.9, 11.6		
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole.					624
10								623
11								622

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REVIEWED BY: R Evans
COMPLETION DEPTH: 8.84 m
COMPLETION DATE: 1/30/22

JRP 6542-14.GPJ JRPV3_1.GDT 7/5/22

PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: 3009
	DRILL METHOD: Solid Stem Auger	ELEVATION: 632.07 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	▲POCKET PEN. (kPa)▲ 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/grey. 100 mm						632
			CLAY : silty, sandy, medium plastic, moist, stiff, brown/light brown, frozen to approximately 0.9 m.			11.8, 15.5			
1		CI			14		At 0.8 m : SPT high due to frozen conditions.		631
						15.9			
2			2.3 m			16.6			630
	Well 1: 2.76		**CLAY TILL** : silty, sandy, medium plastic, moist, very stiff, brown.		15	13.2		Well 1: 629.31	
3						12.8			629
						12.4			
4					32	12.6			628
			Below 4.3 m : olive grey, trace oxides.						
5						12.5			627
			Below 5.0 m : very stiff to hard, grey, trace coarse grained wet sand lense.			11.9			
		CI	At 5.5 m : very moist, brown sand lense in SPT.		27	11.1			
6						11.6			626
						11.2			
7					25	11.1 25.7 11.6	P.L. = 11.1 L.L. = 25.7 M.C. = 11.2 **Soluble Sulphates:** Negligible		625
						11.4			
8						11.7			624
					24	13.6			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.5m.						623
			23 day waterlevel reading: 2.71 m bgs. 52 day waterlevel reading: 2.76 m bgs.						
10									622
11									

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REVIEWED BY: R Evans | COMPLETION DATE: 1/30/22

PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: 3010
	DRILL METHOD: Solid Stem Auger	ELEVATION: 638 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/dark grey. 100 mm						638
			CLAY TILL : silty, medium plastic, damp to moist, stiff to very stiff, brown/light brown, trace oxides and gravel, frozen to approximately 0.6 m.			9.8, 34.8	At 0.8 m : SPT high due to frozen conditions.		
1					11				637
			Below 1.8 m : moist, very stiff.			13.9; 11.2 33.1	P.L. = 11.2 L.L. = 33.1 M.C. = 13.9 **Soluble Sulphates:** Negligible		
2						13.9			636
			Below 2.7 m : very stiff to hard, brown.		13	12.5			
3						12.5			635
4					27	12.4, 12.3		Well 1: 633.71	634
		CI	At 4.4 m : coarse grained, damp sand lense.			12.3			
5						12.4			633
			At 5.3 m : rock in SPT.		30	12.1			
6						12.4			632
			Below 6.4 m : olive grey, moist, hard.			11.9			
7					24	11.8			631
			Below 7.3 m : very stiff to hard, grey.			12.7			
8						11.9			630
					30	11.9			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.5m.						629
			23 day waterlevel reading: 4.55 m bgs. 52 day waterlevel reading: 4.29 m bgs.						
10									628
11									

Well 1: 4.29

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REVIEWED BY: R Evans | COMPLETION DATE: 1/30/22

PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3011**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 634.04 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	▲POCKET PEN. (kPa)▲ 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/dark grey. 100 mm **CLAY TILL** : sandy, medium plastic, damp to moist, stiff, brown, frozen to approximately 0.6 m.			9.7			
1			Below 1.2 m : moist.		17	17.1	At 0.8 m : SPT high due to frozen conditions.		633
2	Well 1: 2.45					15.2		Well 1: 631.59	632
3			Below 2.9 m : very stiff, brown/dark brown, trace oxides.		12	16.3 14.6 13.7			631
4					19	13.2 13.5			630
5		CI	Below 4.6 m : olive grey.			12.9			629
6			Below 5.5 m : very stiff to hard, grey.		37	11.9 11.2 27.8 12.3	P.L. = 11.2 L.L. = 27.8 M.C. = 11.9 **Soluble Sulphates:** Negligible		628
7					22	12.9 11.9 11.8			627
8						12			626
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.5m.		23	11.9 11.9			625
10			23 day waterlevel reading: 2.40 m bgs. 52 day waterlevel reading: 2.45 m bgs.						624
11									

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REVIEWED BY: R Evans	COMPLETION DATE: 1/30/22
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JRP 6542-14.GPJ JRPV3_1.GDT 7/5/22

PROJECT: Geo - Fee Simple Lands		PROJECT NO: 6542-14	BOREHOLE NO: 3012
	DRILL METHOD: Solid Stem Auger		ELEVATION: 633.22 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan		

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	▲ POCKET PEN. (kPa) ▲ 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/dark grey. 100 mm						633
			CLAY TILL : silty, sandy, medium plastic, moist, firm to stiff, brown, trace oxides and pebbles, frozen to approximately 0.6 m.			14	At 0.6 m : large rock encountered, hole moved 1.0 m east.		
1			Below 0.8 m : very stiff.		14	15.7	At 0.8 m : SPT high due to frozen conditions.		632
						14.2			
2						14.7			631
					8	13.7			
3						13.7		Well 1: 629.44	630
			Below 3.4 m : very stiff to hard, brown/dark brown.			12.4			
4					21	12.9			629
		CI	Below 4.3 m : olive grey, trace oxides.			12.7 (10.6 28)	P.L. = 10.6 L.L. = 28.0 M.C. = 12.7 **Soluble Sulphates:** Negligible		
5						13.2			628
			Below 5.2 m : grey.		20	12.6			
6						12.1			627
						12.5			
7			At 7.0 m : trace free water on SPT.		24	13			626
			Below 7.3 m : trace coarse grained, wet sand lenses, free water on auger.			12			
8						13.2			625
					27	11.7			
9			**END OF TESTHOLE @ 8.8 m.** No water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.5m.						624
10			23 day waterlevel reading: 3.83 m bgs. 52 day waterlevel reading: 3.78 m bgs.						623
11									

Well 1: 3.78

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REVIEWED BY: R Evans | COMPLETION DATE: 1/30/22

PROJECT: Geo - Fee Simple Lands		PROJECT NO: 6542-14	BOREHOLE NO: **3013**
	DRILL METHOD: Solid Stem Auger		ELEVATION: 632.68 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan		

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	▲ POCKET PEN. (kPa) ▲ 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black/dark grey. 50 mm						632
			CLAY TILL : medium plastic, damp to moist, stiff, brown, frozen to approximately 0.7 m.			9.9			
1					15	16.9	At 0.8 m : SPT high due to frozen conditions.		631
		CI				15.8 (11.8 – 34.6)	P.L. = 11.8 L.L. = 34.6 M.C. = 15.8 **Soluble Sulphates:** Negligible		
2						16.8			
					12	16.5			630
3			At 2.6 m : fine grained, very moist sand lense in SPT. 2.7 m **SAND** : coarse grained, very moist, compact, poorly graded, ingressing water.			18.4		Well 1: 3.02	
						18.2	**Sieve Analysis**: at 3.7m depth. Gravel: 2.1 % Sand: 93.9 % Fines: 4 %		629
4		SP			16	17.5			
			Below 4.3 m : wet, grey, significant sloughing.			16.1			628
5			Below 4.9 m : trace gravel.			15.6			
			5.5 m			12.9			627
			CLAY TILL : medium plastic, moist, very stiff, grey, trace oxides and gravel.		24				
6						14.3			626
7		CI	At 6.9 m : no SPT due to significant sloughing.			13.8			
						13.8			625
8						13.2			
			END OF TESTHOLE @ 8.4 m. No water and 3.4 m of slough on completion of testhole. Well 1: Slotted standpipe installed to 4.9m. 23 day waterlevel reading: 3.07 m bgs. 52 day waterlevel reading: 3.02 m bgs.						624
9									
									623
10									
									622
11									

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REVIEWED BY: R Evans	COMPLETION DATE: 1/30/22

PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3014**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 632.36 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m) Water Level	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) / ATTERBERG LIMITS	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0		OR	**TOPSOIL** : silty, damp, black. 50 mm **CLAY** : medium plastic, damp to moist, firm, brown/light brown, trace coal, oxides and gravel, frozen to approximately 0.7 m.			17.4 18.9	At 0.8 m : SPT high due to frozen conditions.		632
1					15				
			Below 1.4 m : moist to very moist, stiff, brown.			16			631
2		CI				17.5			
					10	14.7		Well 1: 629.52	630
3						17.4 10.8 28.8	P.L. = 10.8 L.L. = 28.8 M.C. = 17.4 **Soluble Sulphates:** Negligible		
			3.4 m **SAND** : fine grained, very moist, compact, poorly graded.			19			629
4					23				
						16.7	**Sieve Analysis**: at 4.6m depth. Gravel: 4.8 % Sand: 86.7 % Fines: 8.5 %		628
5			Below 4.9 m : coarse grained, trace gravel.						
		SP	At 5.3 m : no SPT due to significant sloughing.			16.3			627
6						16.8			
			Below 6.4 m : some gravel.						626
			At 6.9 m : no SPT due to significant sloughing.			16.7	**Sieve Analysis**: at 6.7m depth. Gravel: 22.1 % Sand: 74.9 % Fines: 3 %		
7									625
			7.6 m **CLAY TILL** : medium plastic, moist, very stiff, grey, trace oxides and gravel.			13			
8		CI				12.9			624
			END OF TESTHOLE @ 8.4 m. 0.6 m of water and 3.5 m of slough on completion of testhole. Well 1: Slotted standpipe installed to 4.9m. 23 day waterlevel reading: 2.72 m bgs. 52 day waterlevel reading: 2.84 m bgs.						
9									623
10									622
11									

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REVIEWED BY: R Evans	COMPLETION DATE: 1/30/22
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PROJECT: Geo - Fee Simple Lands	PROJECT NO: 6542-14	BOREHOLE NO: **3015**
	DRILL METHOD: Solid Stem Auger	ELEVATION: 631.58 m
OWNER: Urban Systems Ltd.	LOCATION: As per site plan	

SAMPLE TYPE: SHELBY TUBE | CORE SAMPLE | SPT SAMPLE | GRAB SAMPLE | NO RECOVERY

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	Water Level	SOIL SYMBOL	MODIFIED USCS	SOIL DESCRIPTION	SAMPLE TYPE	Standard Penetration Test (N)	POCKET PEN. (kPa) 100 200 300 400 / ATTERBERG LIMITS PLASTIC M.C. LIQUID 20 40 60 80	OTHER DATA	SLOTTED PIEZOMETER	Elevation (m)
0			OR	**TOPSOIL** : silty, damp, black. 50 mm **CLAY** : medium plastic, moist, firm, brown, some till like features, frozen to approximately 0.6 m.						631
1				Below 1.1 m : moist to very moist, trace oxides and gravel.		12	14.4, 17.8	At 0.8 m : SPT high due to frozen conditions.		
2	▼ Well 1: 2.53		CI			9	15.9, 17.6, 17.9		Well 1: 629.05 ▼	630, 629
3							17.8			
4				3.5 m **CLAY TILL** : medium plastic, moist, very stiff, brown, trace oxides and gravel.		29	14.1, 11.5, 29.4, 13.6	P.L. = 11.5 L.L. = 29.4 M.C. = 14.1 **Soluble Sulphates:** Negligible		628
5				Below 4.6 m : olive grey. Below 5.2 m : grey. At 5.5 m : trace free water on SPT.		15	13.5, 12.8, 12.8			627, 626
6			CI	Below 5.8 m : some ingressing water.			13.8			
7						19	13.1, 12.3			625
8							15.1			624
9				**END OF TESTHOLE @ 8.8 m.** 0.2 m of water and no slough on completion of testhole. Well 1: Slotted standpipe installed to 8.8m.		28	14.9, 12			623
10				23 day waterlevel reading: 2.66 m bgs. 52 day waterlevel reading: 2.53 m bgs.						622
11										621

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REVIEWED BY: R Evans | COMPLETION DATE: 1/30/22