APPENDIX C8

Hydrogeology

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Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

DRAFT
HYDROGEOLOGIC STUDY
KIRBY ROAD EXTENSION
CITY OF VAUGHAN, ONTARIO

Prepared For: Rizmi Holdings Limited
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File No. 1-15-0700-54
May 10, 2019

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1.0 INTRODUCTION

1.1 Study Scope and Purpose

Terraprobe Inc. was retained by Rizmi Holdings Ltd. to conduct a Hydrogeological Study in support of the proposed design for Kirby Road extension from Dufferin Street to Bathurst Street, hereinafter referred to as the Site. The Site is bounded to the east by Bathurst Street and to the west by Dufferin Street (Figure 1). The lands to the north generally consist of rural or agricultural properties. The lands adjacent to the south are occupied by a golf course and further south by estate residential developments. There is scattered residential development found along Dufferin Street and Bathurst Street, adjacent to the Site.

Schaeffers & Associates Ltd. (Schaeffers) as a lead consultant had proposed five (5) alternative alignments (i.e., Alignments 4, 5, 5A, 6 and 6A) of the Kirby Road extension for consideration (Figure 2A and 2B), as part of a Class Environmental Assessment (Class EA) Study. The proposed alignment 5A is selected as the final alignment for the project. The finding of the Hydrogeological Study is only assessed for Alignment 5A. The configuration of Alignment 5A is identified in Appendix M.

The purpose of this report is to assess local and regional hydrogeological conditions and the potential impacts of the proposed Kirby Road Extension on the ground water system. Based on the findings of the Hydrogeological and Geotechnical Investigation, a cost-benefit analysis will be considered for each alignment option.

1.2 Summary of Work Program

A summary of the work program conducted for the study is provided below:

- Background Information Review: A review of available background geologic and hydrogeological information for the Site and the surrounding areas was conducted. This provided background information to allow for characterization of regional hydrogeological conditions. The information reviewed included topographic mapping, geologic mapping, and Ministry of Environment and Climate Change (MOECC) well records.
- Detailed Site Inspection: An inspection of the Site was conducted to review existing site conditions including identification of any hydrogeological features such as significant areas of potential ground water recharge or areas of ground water discharge. In particular, the area in the vicinity of the creek bank was inspected for evidence of ground water seepage or springs.
- Drilling of Boreholes and Installation of Monitoring Wells: A total of twenty one (21) boreholes were drilled to depths varying from 6m to 20m below existing grade. Seven (7) of the boreholes were instrumented with monitoring wells. These boreholes and monitoring wells were completed as part of the geotechnical investigation to obtain subsurface soil and ground water data. Three (3) additional monitoring wells were installed for the hydrogeological assessment. In addition, four (4) drive point piezometers will be installed in the vicinity of the creek crossing.
- Private Well Survey: A well survey was conducted for properties within 1 km of the Site boundary. Well information was obtained from the property owner where possible.

- Hydraulic Conductivity Tests: In-situ hydraulic conductivity tests were conducted in select monitoring wells to assess hydraulic conductivity of the strata. In-situ hydraulic conductivity of the underlying soils were assessed in order to determine potential dewatering requirements.
- Instrumentation and Monitoring: Installation of dataloggers in monitoring wells and drive point piezometers to measure water levels at 1-hour intervals. Monitoring will include monthly monitoring of wells & drive point piezometers, download of dataloggers, data collection and preparation of hydrographs for a period of 1-year. Monitoring well elevations were surveyed relative to a geodetic benchmark.
- Assessment of ground water discharge volumes: Assessed the ground water discharge volumes and requirements for Environmental Activity and Sector Registry (EASR) for construction dewatering to ensure a safe and dry working conditions for construction activities and ground water control plan. The assessment included recommendations for pumping rate, discharge location, and water quality control measures was developed.
- Preparation of Hydrogeologic Study Report: Based on the above information a detailed Hydrogeologic Study report was prepared. The report provides information on existing ground water features and functions of the Site and potential impact of development on ground water resources and surface water features in the area and recommendations for storm water management requirements for infiltration or other low impact development measures. The report provides the following information:
    - Description of the work program and factual information gathered during the study including the results of site inspection and water level measurements. The results of the subsurface investigations conducted in conjunction with Geotechnical Investigation including borehole logs and grain size analysis will be reviewed and summarized
    - Presentation of all the factual information gathered during the study including the background information and results of site subsurface investigation.
    - Identification of significant hydrogeological features and functions at the Site.
    - Provision of a conceptual site model for local and regional hydrogeologic conditions. The conceptual site model will be used as a basis to assess impacts to local surface and ground water features.
    - Calculations of expected ground water inflow if excavations are carried below the ground water table.
    - Calculation of water balance for pre-development and post-development conditions, along with recommendations for appropriate LID measures to maintain ground water infiltration rates.
    - Assessment of the requirements for ground water monitoring in order to confirm long-term impacts.

  It is noted that there is a requirement for monitoring of long-term ground water levels to assess seasonal variations.

2.0 PROPERTY AND PROJECT DESCRIPTION

2.1 Property Location and Project Description

The proposed development at the Site includes the extension of Kirby Road from Dufferin Street to Bathurst Street. The property is bounded to the east by Bathurst Street and to the west by Dufferin Street. The lands to the north generally consist of rural or agricultural properties. The lands adjacent to the south are occupied by a golf course and further south by estate residential developments. There is scattered residential development found along Dufferin Street and Bathurst Street, adjacent to the Site.

The Site is predominantly covered with natural vegetation (grass, shrubs & trees). A tributary of the Don River East Branch traverses the central portion of the Site in a northwest-southeast direction.

2.2 Property Topography and Drainage

The Site is characterized by moraine-type topography consisting of rolling or hummocky ground. The Site elevation varies from approximately 285 to 300 m above mean sea level (asl). The maximum topographic relief across the Site is approximately 15 m. Runoff at the Site is expected to follow the local topography within the Site. The Site is located within the Don River Watershed.

An inspection of the Site was conducted on January 8, 2018 to establish the Site's hydrogeological setting. Generally the Site is well-drained. A tributary of the Don River East Branch is found in the central portion of the Site traversing the Site in a general northwest-southeast direction. At the time of the Site inspection, there was little to no water in the creek. A drainage ditch was noted along Bathurst Street and Dufferin Street. Catch basins were noted to exist along Bathurst Street.

The Site is situated on a height of land or drainage divide, within the headwaters of the Don River. There is a drainage divide approximately 1 km north of the Site, as shown in Appendix B (MOECC's Water Well Record Map). Drainage to the north of the divide is directed towards the Humber River, while drainage to the south of the divide is directed towards the Don River.

The Site is located within an area that is partially regulated by the Toronto and Region Conservation Authority (TRCA).

2.3 Surrounding Land Uses and Servicing

The Site is located in a rural/undeveloped area of the City of Vaughan. The Site is bounded to the east by Bathurst Street and to the west by Dufferin Street. The lands to the north generally consist of rural or agricultural properties. The lands to the south are occupied by golf course and estate residential developments. There is scattered residential development found along Dufferin Street and Bathurst Street, adjacent to the Site. The surrounding area comprise of properties under municipal service and private servicing for sewer and water.

2.4 Regional Physiography and Geology

From a regional perspective, the Site is situated within a physiographic feature known as the Oak Ridges Moraine and within a physiographic landform feature known as the Kame Moraine. The Oak Ridges Moraine forms a regional surface and ground water divide and is the highest point of land between Lake Ontario to the south and Lake Simcoe and Scugog to the north. The Kame Moraine is a glacial depositional feature seen due to the separation of an ice block from a glacial body resulting in the deposition of accumulated sediments from subsequent melting (Chapman & Putnam, 1984).

The Site is situated within a specific sub-area of the moraine known as the Maple Spur. The Maple Spur consists of a hummocky ridge of kame and outwash material consisting mostly of sand. The northern terminus of the deposit is found on the western portion of the Site (i.e., west half of Lot 30 and Lot 31, Concession 2). The deposit extends considerably to the west of the Site (i.e., west of Dufferin Street). To the west of Dufferin Street, the deposit has been extensively developed through a series of sand and gravel pits.

The kame material has been generally deposited on top of an extensive sheet of glacial till. The glacial till deposit is part of the bevelled till plain of the South Slope physiographic region. The till deposit is defined as part of the Halton Till and comprises of brown to grey silt till material. Generally, the areas immediately to the south and east of the Site are characterized by deposits of glacial till. Glacial till is also found in the eastern portion of the Site.

The geologic conditions in the vicinity of the Site have also been characterized on the basis of water well records. As noted, the area is characterized by a relatively complex sequence of surficial deposits of kame material, underlain by glacial till, and further alternating deposits of sand or sand and gravel. The bedrock in the area consists of shale of the Georgian Bay Formation. Typically, the depth to bedrock is in excess of 100 m deep in this area.

2.5 Regional Hydrogeology

The Oak Ridges Moraine is a regional hydrogeological feature. The Site is situated on the south slope of the Oak Ridges Moraine, approximately 2 km south of the height of land for the moraine. In this area, the moraine forms a zone of regional ground water recharge. Ground water recharge is particularly pronounced in the sandy moraine deposits. Ground water recharge in the glacial till materials is relatively limited.

As noted, the moraine typically consists of alternating layered deposits of coarse grained materials (such as kame sand or sand and gravel), and finer grained materials (such as glacial till). Surficial deposits of sand or sand and gravel provide significant ground water recharge to aquifer systems beneath the moraine, and also provide for ground water discharge or baseflow into the headwaters of local river systems.

The hydrogeology of the moraine is complex due to variations in soil type, elevation, and surface drainage throughout the moraine area. However, in the vicinity of the Site there are several distinct ground water flow systems. The shallow flow system occurs in the upper kame deposits. The system is generally an unconfined (water table) aquifer system. This system receives considerable local ground water recharge. The ground water discharges into topographically lower areas, such as intermittent water courses and headwaters of the Don River, within approximately 1 km of the Site.

There are intermediate and deep ground water flow systems found beneath confining layers of glacial till. These systems obtain some recharge from the upper system. They typically form aquifer or water bearing zones which are extensive over a distance of several kilometers. These deeper systems discharge near the base of the moraine several kilometers to the south of the Site.

The flow system in the moraine typically follows the regional topography. Generally, shallow flow is directed towards local water courses, valleys and low lying areas such as the Don River East Branch and its tributaries. The deeper ground water flow systems typically follow the regional topography. Flow is generally directed southward, with discharge into major river system such as the Don River.

2.6 Regional Climate

The following general climate data was obtained from Environment Canada publications and from the Environment Canada online database. Average climate data was taken from the Woodbridge climate station for the period of 1939 – 2004.

Table 2-1: Summary of Aurora Station Climate Normal

Mean annual precipitation	744 mm
Mean annual evapotranspiration.	533 mm
Mean annual water surplus	211 mm

The climate is typical for Southern Ontario, with rainfall exceeding evapotranspiration. It is noted that the above are average values, which are representative in a regional context. There will be seasonal and annual variations in these values. However, the average values will govern long-term ground water recharge and discharge rates. Therefore, average values are appropriate for assessment of hydrogeological conditions at the Site.

2.7 Ground Water Resources

The Oak Ridges Moraine is a major regional aquifer complex. Within the moraine there are generally moderate to high yields of good quality water available from intermediate and deep aquifer systems. Terraprobe previously conducted a Hydrogeological Evaluation of a larger Property, which includes the subject Site. The findings of this previous Hydrogeological Evaluation are presented in the report entitled

"Hydrogeologic Evaluation, Proposed Aggregate Extraction Area, Lots 30 and 31, Conc. 2, City of Vaughan, File No. 96250" dated January 23, 1998. As part of this Hydrogeological Evaluation, a review of the Ministry of the Environment and Climate Change's (MOECC's) water well records was conducted to assess the use of the local ground water resources. Records for approximately 180 wells, within 1 km of the Site were reviewed. A listing of the well records reviewed in this study is provided in the accompanying Appendix A. Selected wells have been plotted in Appendix B, and cross-sections are presented in Appendix C & D. These cross-sections provide an indication of the depth and nature of aquifer systems in the vicinity of the Site.

There are relatively few wells in the direct vicinity of the Site, since most of the Site is agricultural or forested in nature and has not been developed. Similarly, the land immediately to the south, east and west of the Site are urban or estate in nature and are generally provided with piped municipal water. There are several wells used for irrigation purposes associated with the golf course to the south. The irrigation wells for the golf course draw water from a confined sand and gravel aquifer, found at depths of approximately 110 m. The ground water level in this aquifer is lower than that found in the unconfined or surficial aquifer at the Site.

Based on the available information, it is apparent that most domestic wells draw water from intermediate to deep confined aquifers at depths of about 30 to 60 m. There are no records for shallow wells completed in the unconfined kame deposits in the vicinity of the Site. This suggests that kame deposits are generally dry, or that higher or more dependable yields of water can be found at depths in the deeper confined aquifer systems.

Piped municipal water is available in the area. Currently, there is development of residential subdivisions found immediately to the south and west of the Site in the vicinity the Concession 3, Lots 29 and 30. These developed areas are supplied with municipal water from a lake-based source.

2.8 Results of Door to Door Survey

A door-to-door well survey was conducted on September 5, 2017 to assess the locations of water wells in the vicinity of the proposed development. All properties within a 500 m radius of the subject Site were visited. During the survey, a questionnaire was completed with the well owner, where possible. At residences where no one was available to complete the questionnaire, a letter was left informing the resident about the survey encouraging the resident to contact our office.

There are four (4) private residences or wells situated in the immediate vicinity of the Site. A representative of Terraprobe visited each residence to obtain information regarding their well(s) and water supply. The findings of the water well survey program are summarized as follows:

- The residents were not at home at the time of the Site visit; as such, a letter was left behind. No response was received from three (3) residents. One (1) resident responded by email (September 7, 2017) and provided the following information on his well:

- Type of Well: Drilled
- Pump Type: Submersible Pump in well
- Water Treatment System in use: Water Softener
- Well Construction Date: 1974
- Well Depth: 36.6 m (120 ft.)
- Well Use: Residential
- Number of residents: 2-3
- Water Quality Issues (in the past): High Iron Concentration
- Water Quantity Issues (in the past): None
- Well Water Consumed/Purchased: Consumed (for potable purposes)

Currently, the surrounding residential subdivisions are supplied with piped municipal water from a lake-based source.

2.9 Property Inspection to Assess Hydrogeologic Features

A detailed property inspection was conducted to assess the presence of features which are significant from a hydrogeologic viewpoint. In particular, the property was inspected to assess the following:

- Areas of visible ground water discharge, springs or seepage at the property or in the vicinity of the on-property water courses.
- Areas of potential enhanced ground water recharge such as closed drainage features or depressions or large flat areas which may allow for significant ground water infiltration.
- Inspection of swales and drainage courses for evidence of ground water seepage or springs.
- Evidence of phreatophytic vegetation, which may indicate seasonally high ground water levels and/or ground water discharge and seepage.

The Site is predominantly comprised of natural vegetation (grass, shrubs & trees).

The topography at the Site is generally hilly to rolling with an elevation ranging from 280 to 305 masl. The topography relief across the Site is in the order of 25 m. The western half of the Property consists of forested/vegetated lands and the eastern portion consists of agricultural farm lands. No significant evidence of ground water discharge (i.e., springs or seepage areas) along slopes of the tributary of the East Don River were noted during the site inspection. However, there is a possibility of potential seepage along the slope of the drainage feature within the property. Due to the hilly and rolling topography at the Site, it is likely that precipitation and overland flow water pools in lower areas at the Site which allows for infiltration and recharge of the ground water system. It is likely that the ground water may provide base flow to the tributary of the East Don River.

There are low lying depression areas located throughout the Site, which may allow for ponding and enhanced infiltration of ground water within the proposed development areas.

2.10 Results of Subsurface Investigation

A subsurface investigation was conducted at the property by Terraprobe during the period of October 30 to November 9 and December 7, 2017. The subsurface investigation was conducted in conjunction with the geotechnical investigation. The findings of the Geotechnical Investigation are provided under a separate cover. A total of twenty one (21) boreholes were drilled to depths varying from 6 m to 20 m below existing grade. All boreholes were advanced using a track-mounted auger. Monitoring wells were installed in ten (10) selected boreholes to permit monitoring of ground water levels. The borehole and monitoring well locations are presented on Figure 2A and 2B.

The soil samples were observed and recorded by a member of our field engineering staff, who logged the borings and examined the samples as they were obtained. All samples obtained during the investigation were sealed into plastic jars, and transported to our geotechnical testing laboratory for detailed inspection and testing.

The geotechnical laboratory testing consisted of grain size distribution (Sieve and Hydrometer) on twelve (12) selected native soil samples from eleven (11) borehole locations. The results of the Sieve and Hydrometer analysis are provided in Appendix F.

The results of the individual boreholes are summarized below and recorded on the accompanying Borehole Logs (Appendix E).

It should be noted that the soil conditions are confirmed at the borehole locations only and may vary between and beyond the boreholes. The stratigraphic boundaries as shown on the logs are based on a non-continuous sampling. These boundaries represent an inferred transition between the various strata, rather than a precise plane of geologic change.

In summary the subsurface conditions encountered in the boreholes advanced across the Site were found to be generally consistent. Boreholes encountered a surficial layer of asphalt pavement and/or topsoil underlain by sand and silt, gravelly sand and clayey silt earth fill which was in turn underlain by undisturbed native soil extending to the full depth of investigation. The native soils predominantly consisted of sand/sandy silt to silty sand with inconsistent layers/lenses of silt or clayey silt at varying depths. Cross-Sections of the site are provided in Figures 3.

2.10.1 Topsoil/Pavement

A topsoil layer was encountered at the ground surface at each borehole location with the exception of Borehole 1, 4, 20 and 21. The topsoil thickness ranged from about 150 to 350 mm. The above-noted thickness of the topsoil layer was measured from the borehole drilling and is approximate.
An asphalt pavement structure was encountered in Boreholes 1 and 21.

2.10.2 Earth Fill

Earth fill materials, consisting of the matrix of sand and silt, gravelly sand and clayey silt were encountered beneath the topsoil/pavement layer or at the ground surface in all boreholes with the exception of Boreholes 1 and 21 and extended to about 0.8 m to 6.1 m depths below grade. The relatively deep earth fill zones were encountered in Boreholes 10 and 17, extending to about 6.1 m to 4.6 m depth below grade, respectively. The earth fill materials generally consist of trace amounts of organic matter.

2.10.3 Sand/Sandy Silt to Silty Sand

The sand/sandy silt to silty sand, with trace to some gravel and clay were encountered beneath the earth fill zones or the asphalt pavement structure at depths ranging from 0.4 m (Borehole 21) to 6.1 m (Borehole 10) depths below grade and extended to depths varying from about 2.3 m (Borehole 21) to about 20.3 m (Borehole 3) below grade at each borehole location.

2.10.4 Silt

Silt with trace to some clay and sand was encountered beneath the sand/sandy silt to silty sand layers at depths ranging from about 6.1 to 12.2 m below grade and extended to depths of about 6.6 m to 14.2 m below grade (the full depths of the investigation) in Boreholes 5, 6, 10, 19 and 20.

2.10.5 Clayey Silt

Clayey silt deposit, with trace to some gravel and trace amounts of gravel was encountered beneath the silt layer, earth fill zone or sand layer at depths varying from about 1.5 to 10.7 m below grade and extended to depth ranging from about 4.6 m to 12.6 m (the full depth of investigation) below grade in Boreholes 5, 18 and 21.

2.11 Geotechnical Laboratory Test Results

Geotechnical laboratory testing consisted of conducting a sieve and hydrometer analysis on selected soil samples. The results of the Sieve and Hydrometer analysis are appended and summarized below.

Table 2-3: Summary of Geotechnical Laboratory Test Results

Borehole No. Sample No.	Sampling Depth below Grade	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description (MIT System)
Borehole 1 Sample 5	3.3 m	0	69	29	2	SILTY SAND, trace clay
Borehole 2 Sample 14	2.5 m	1	22	70	7	SANDY SILT, trace clay, trace gravel
Borehole 3 Sample 7	6.3m	0	94	4	2	SAND, trace silt, trace clay
Borehole 3 Sample 14	17.0 m	0	76	21	3	SILTY SAND, trace clay
Borehole 5 Sample 9	9.4 m	0	1	84	15	SILT, some clay, trace sand
Borehole 8 Sample 4	2.5 m	0	92	6	2	SAND, trace silt, trace clay
Borehole 10 Sample 8	7.8	0	3	87	10	SILT, some clay, trace sand
Borehole 13 Sample 6	4.8	0	93	5	2	SAND, trace silt, trace clay
Borehole 15 Sample 4	2.5	5	22	54	19	SANDY SILT, some clay, trace gravel
Borehole 18 Sample 5	3.3	1	17	48	34	CLAYEY SILT, some sand, trace gravel
Borehole 20 Sample 4	2.5	10	67	20	3	SILTY SAND, trace gravel, trace clay
Borehole 21 Sample 4	2.5	0	12	63	25	CLAYEY SILT, some sand

2.12 Ground Water

Ground water level observations were made in each of the boreholes as they were drilled and after completion. The observations are reported on the borehole logs (Appendix E).

All boreholes and monitoring wells were surveyed using an R10 Trimble GPS using a Geodetic Datum. The ground water levels were measured in the monitoring wells installed in boreholes. Details of the measured ground water elevations are summarised in the Table below.

Table 2-4: Summary of Ground Water Elevations

Monitoring Well	Well Depth (Elevation)	Water Level on January 8, 2018		Water Level on January 25, 2018	
		Depth of Ground Water (mbgs)	Ground water Elevation (masl)	Depth of Ground Water (mbgs)	Ground Water Elevation (masl)
MW 2	6.44	6.3	283.1	DRY	DRY
MW 3	18.92	17.9	283.1	17.9	283.1
MW 6	4.91	1.8	276.8	1.6	277.0
MW 8	13.17	-	-	DRY	DRY
MW 9	5.94	5.4	275.7	5.2	275.9
MW 10	7.66	3.1	272.6	3	272.7
MW 13	13.09	DRY	DRY	DRY	DRY
MW 14	18.2	17.9	281.4	DRY	DRY
MW 16	8.58	DRY	DRY	DRY	DRY
MW 20	-	-	-	-	-

Note: mbgs: meter below ground surface; masl: meters above mean sea level
Ground Surface elevations were referenced to a geodetic benchmark

The ground water level at the Property ranges from 1.6 m to 17.9 m below the existing grade level. It should be noted that ground water levels will fluctuate seasonally, and additional monitoring events throughout the year will be required to assess seasonal variations. The shallow ground water at the Site is expected to follow the local topography.

The hydraulic conductivities of the subsurface soils were estimated based on in-situ single well response tests and grain size analysis. The hydraulic conductivity determined based on the grain size analysis are summarized in the Table below:

Table 2-5: Summary of Hydraulic Conductivities

Borehole # Sample #	Sampling Depth below Grade	Description (MIT System)	Estimated Hydraulic Conductivity (m/sec)
Borehole 1 Sample 5	3.3 m	SILTY SAND, trace clay	10^{-5}
Borehole 2 Sample 4	2.5 m	SANDY SILT, trace clay, trace gravel	10^{-7}
Borehole 3 Sample 7	6.3 m	SAND, trace silt, trace clay	10^{-5}
Borehole 3 Sample 14	17.0 m	SILTY SAND, trace clay	10^{-5}
Borehole 5 Sample 9	9.4 m	SILT, some clay, trace sand	10^{-8}
Borehole 8 Sample 4	2.5 m	SAND, trace silt, trace clay	10^{-5}
Borehole 10 Sample 8	7.8 m	SILT, some clay, trace sand	10^{-8}
Borehole 13 sample 6	4.8 m	SAND, trace silt, trace clay	10^{-5}
Borehole 15 Sample 4	2.5 m	SANDY SILT, some clay, trace gravel	10^{-9}
Borehole 18 Sample 5	3.3 m	CLAYEY SILT, some sand, trace gravel	10^{-9}
Borehole 20 Sample 4	2.5 m	SILTY SAND, trace gravel	10^{-5}
Borehole 21 Sample 4	2.5 m	CLAYEY SILT, some sand, trace gravel	10^{-9}

Based on the above, the hydraulic conductivity of the native overburden soils ranges from 10^{-5} to 10^{-9} m/s.

Single Well Response Tests (SWRT) were conducted on three (3) monitoring wells (MW 6, 9 & 10), and the resulting hydraulic conductivity (K) values, in comparison to the K values obtained from the grain size analysis and published data, are summarized below:

Table 2-6: Summary of Hydraulic Conductivities from Single Well Response Test/Grain Size Analysis/Published Data

Monitoring Well	Strata Screened	Hydraulic Conductivity (m/s)		
		Well Response Test	Grain Size Analysis	Published Data
MW 6	Sand	3.0×10^{-6}	10^{-5} to 10^{-9}	$10^{-4} – 10^{-6}$
MW 9	Sandy Silt to Silty Sand	4.8×10^{-7}	10^{-5} to 10^{-9}	10^{-4} to 10^{-7}
MW 10	Sand	5.6×10^{-6}	10^{-5} to 10^{-9}	$10^{-4} – 10^{-6}$

The hydraulic conductivity value based on the SWRTs is approximately on the order of 10^{-6} to 10^{-7} m/s. This is in lower spectrum of the published data, and is primarily due to the presence of large silt content within the soil matrix, which significantly reduces the permeability of the soil. Due to the significant silt content in the soil, the hydraulic conductivity values retrieved from the SWRT is inferred to be more accurate as compared to the grain size analysis. The hydraulic conductivity test results are provided in Appendix K.

2.13 Wellhead Protection Areas and Aquifer Vulnerability

The following maps by the York Region were reviewed (Appendix G, H and I): 11333 Dufferin St, Maple, ON L6A 1S2

- Map 6 – Wellhead Protection Areas and Intake Protection Zones
- Map 7 – Oak Ridges Moraine Aquifer Vulnerability Areas and Watershed Boundaries
- Map 14 – Highly Vulnerable Aquifers
- Oak Ridges Moraine Conservation Plan

Based on the Source Protection Information Atlas, the Site is located within a Wellhead Protection Area (WHPA) Q1 and Q2 for water quantity with moderate stress (Appendix G). As described in CTC Source Protection Plan, WHPA-Q1 refers to the area where activities that take water without returning it to the same source may be a threat and WHPA-Q2 refers to the area where activities that reduce recharge may be a threat. The proposed development on Site includes excavation for the culvert for the road crossing across the creek that will require dewatering to ensure the excavation area is dry. However, considering the size of the structure the dewatering will be insignificant and would unlikely pose any threat to the groundwater. The Site is located within an area of predominantly High Aquifer Vulnerability and Oak Ridges Moraine Conservation Area (Appendix H & I). During construction period, appropriate mitigation measures will be required to ensure protection of the aquifer underlying the Site (See Section 3.4).

2.14 Toronto Region Conservation Authority (TRCA)

The Toronto and Region Conservation Authority's (TRCA's) online interactive map was accessed to determine if the Site is located within a regulated area of the TRCA (Appendix J). A portion of the Site is located within the TRCA regulated area.

Additionally, the TRCA was contacted to inquire about the nature of how the Site is regulated. At the time of this report, a response from the TRCA was not received. Upon receiving a response from the TRCA, this report will be revised to include the nature of the regulation at the Site by the TRCA.

3.0 DISCUSSION AND ANALYSIS

3.1 Proposed Development Plan

The proposed development at the Site includes the extension of Kirby Road from Dufferin Street to Bathurst Street along five (5) proposed alignments (Alignments 4, 5, 5A, 6 and 6A). The proposed alignments are provided in Figures 2A and 2B. The proposed alignment 5A is selected as the final alignment for the project. The finding of the Hydrogeological Study is only assessed for Alignment 5A. The configuration of Alignment 5A is identified in Appendix M.

The Site statistics of the proposed road alignment 5A was provided by the client. The following summarizes the proposed land coverage areas for the development for alignment 5A:

Alignment 5A:

Area covered by hard surface paving…… 4.4 ha
Landscape areas for infiltration…… 2.9 ha
Total Area…… 7.3 ha

3.2 Principal Hydrogeologic Features and Functions

The hydrogeologic features and functions associated with the property were assessed based on the results of the subsurface investigation completed by Terraprobe and available geologic and hydrogeologic information. The results of our study indicate that the site hydrogeologic characteristics can be summarized as follows:

- The principal drainage feature located at the Site is the Tributary of the East Don River, which is located within the central portion of the Site.
- The Site is located within an area of predominantly high aquifer vulnerability. The site is not located within a Wellhead Protection Zone or an Intake Protection Zone.
- The Site is located within an area that is regulated by the Toronto and Region Conservation Authority.
- The Site is characterized by a surficial layer of asphalt pavement and/or topsoil underlain by sand and silt, gravelly sand and clayey silt earth fill which in turn is underlain by undisturbed native soil extending to the full depth of investigation. The native soils consisted of sand/sandy silt to silty sand, with inconsistent layers/lenses of silt or clayey silt at varying depths.
- The subsurface soils at the Site have hydraulic conductivities ranging between 10^{-6} to 10^{-7} m/s. The medium to high permeability of the subsurface soils at the Site will allow for infiltration, ground water recharge and base flow to the tributary of the East Don River at the Site. The recharge rate for this type of soil is typically on the order of 287 mm/year.
- The ground water level was found to be approximately 1.6 m to 17.9 m below the existing grade. The shallow ground water flow at the Site is expected to follow the local topography. During

precipitation events, water will tend to flow overland and drain along the ground surface following the Site topography.

- The Site is situated on the south slope of the Oak Ridges Moraine, approximately 2 km south of the height of land for the moraine. In this area, the moraine forms a zone of regional ground water recharge. Ground water recharge is particularly pronounced in the sandy moraine deposits. Ground water recharge in the glacial till materials is relatively limited.
- The regional hydrogeologic conditions of the Site comprise of three ground water flow systems: shallow, intermediate and deep aquifer systems. The shallow flow system occurs in the upper kame deposits, in an unconfined aquifer setting, and follows the local topography of the area and discharges into topographically lower areas, such as intermittent water courses and headwaters of the Don River, within approximately 1 km of the Site. The intermediate and deep ground water flow systems are found beneath confining layers of glacial till, and they follow the regional topography.
- Based on the private water well survey, the surrounding area within a 500 m radius (study area) of the subject site is predominantly on municipal water. There are four (4) private residences or wells situated in the immediate vicinity of the Site. There is no significant use of ground water in the area.

The above hydrogeologic features and functions were considered in assessing the potential impact of the proposed development. This information was used to assess the impact of proposed development, and provide mitigating measures to ensure that hydrogeologic function is not adversely affected.

3.3 Water Balance for Pre- and Post- Development Conditions

The area of the Site is considered a ground water recharge zone. The soil at the property are of medium permeability. The Site consists of hilly topography, as such there exists areas of enhanced or localized higher recharge (such as closed depression) across the property.

A water balance model was prepared for the property to assess the distribution of rainfall run-off and infiltration for existing (pre- and post- development) conditions (Appendix L). The model is based on Environment Canada's climate data presented in Section 2.6 of this report. The Thornthwaite method was used to evaluate the relative balance between rainfall, evaporation and evapotranspiration in the shallow soil zone as shown in Appended- Table 3. Based on this calculation, a water balance was developed.

In summary, the total ground water recharge component for the area is about 287 mm/a. This recharge rate was determined using the MOECC's Table 2 and Table 3 approach in the *Technical Information Requirements for Land Development Applications* (1995).

The detailed water balance calculations for each road alignment option are presented in Appendix L. The water balance for pre-development conditions is summarized in Table 3.1 below:

Table 3-1 Pre- Development Water Balance - Alignment 5A

	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Proposed Development	73,222	64,875	34,854	21,015	9,006

The water balance calculations for the post-development case are provided in the Appendix L. The results of the analysis are summarized in Table 3.5 below:

Table 3-5 Post- Development Water Balance without LID Measures – Alignment 5A

	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Proposed Development	73,222	64,875	13,738	8,283	42,854

Post-development infiltration will occur in open/grassed areas. In the post-development case, there is a decrease in the amount of infiltration and therefore an increase in the available surface water run-off. The post-construction infiltration deficit for alignment 5A is summarized below:

Alignment 5A:

In the post-construction period, there will be a potential infiltration deficit of approximately 12,732 m^3 compared to the pre-construction period. In the post-construction period, there is approximately 39,304 m^3 of surface water runoff is available to supplement the infiltration deficit. Approximately 32% of the surface water runoff is required to match the pre-construction infiltration rates.

3.4 Mitigating Measures to Maintain Hydrogeologic Functions and Ground Water Quality and Quantity

3.4.1 Maintenance of Ground Water Quality

The Site is located within an area of predominantly high aquifer vulnerability. During the construction period, appropriate mitigation measures will be required to ensure protection of the aquifer underlying the Site. Mitigation measures during the construction period may include the following:

- **Road Salting –** There may be a requirement for the application of road salt in the proposed Kirby Road Extension for road de-icing purposes during the winter months.
    - The Transportation Association of Canada (TAC) has produced a document titled Syntheses of Best Practices – Road Salt Management (2013). These should be generally flowed at the Site unless prohibited. In addition, best management practices for contractors, residents, and the community are provided by the not-for-profit organization Smart About Salt Council and their recommendations may be of benefit in reducing salt loads

  - The salt management plan should strive to minimize the amount of road salt entering the environment.
  - Alternative method for road de-icing should be considered (e.g., use of sand)
- **Temporary Storage of Fuels and Chemicals during Construction –** During construction of the proposed Kirby Road Extension, it may be necessary to temporarily store fuels and/or chemicals at the Site. This represents a potential threat to ground water quality, as spills of significant size may potentially impact the underlying aquifer.
  - To prevent and mitigate any spills at the Site, it is recommended to place temporary fuel and chemical storage containers of significant size into secondary containment such that a leak can be contained.
  - Appropriate spill kits should be maintained at various locations throughout the site and an emergency response plan should be developed to outline actions to be taken in case of a spill or leak.
  - It is recommended that temporary fuel and chemical storage locations be inspected on a regular basis to ensure integrity of storage containers.
  - Any spills or leaks related to the temporary storage of fuels and chemicals located on the property will be reported to the Spills Action Centre.
  - Contact information for the Spills Actions Centre, as well as information detailing the requirement for reporting any spills will occur, will be available at the Site.

3.4.2 Maintenance of Ground Water Recharge

The existing ground water recharge rate at the Site is approximately 287 mm/a. This recharge occurs in a broad diffuse manner over the entire Site. Mitigation measures are available to maintain recharge rates. There is a Provincially Significant Wetland (PSW) intersecting the western portion of the Site. The Tributary of the East Don River traverses the central portion of the Site in a northwest-southeast direction. The ground water at the Site may provide base flow to the PSW and Tributary of the East Don River.

Appropriate low-impact development (LID) techniques which can be applied include maintenance of overall ground water recharge across the Site area. In order to maintain ground water recharge for the Site, LID measures should be implemented. There is a surplus of water available following development to maintain ground water recharge and function. Based on the property conditions, the following typical LID measures may be suitable for the proposed development:

- Directing and controlling runoff water towards the road-side swales along the boulevard/easement area of the proposed Kirby Road development through gradual outward sloping of the road from its center.

The storm water management measures must specifically address the maintenance of ground water recharge of the proposed development in order to preserve the tributary of East Don River located in the central portion of the Site.

3.4.3 Maintenance of Ground Water Transmission Pathways

As previously indicated the soils present on the property are of medium permeability, which would provide potential pathways for ground water discharge towards the Tributary of the East Don River. The

proposed development will include the construction of the Kirby Road Extension from Dufferin Street and Bathurst Street. The road construction would involve cut and fill. Based on the observed ground water elevation, the excavation would unlikely extend below the water table. However, installation of any services (sewer or watermain) may disrupt the ground water flow, and its continuity should be maintained where practical. Generally, the ground water transmission pathways can be maintained through the following means:

- Bedding material beneath underground services may serve as a subdrain to collect and convey ground water. To prevent drainage of ground water along bedding material, clay trench plugs should be provided at all manhole locations in order to cut-off the granular beddings.
- The excavation of any underground services or utilities across the site must be backfilled using material of similar permeabilities to minimize disruption to the ground water regime. It is recommended that backfilling of the trenches/excavations, where required, be done using the native excavated soils.

4.0 REQUIREMENTS FOR CONSTRUCTION DEWATERING

The native soil encountered at the Site predominantly consists of sand/sandy silt to silty sand. The excavation for the culvert for the proposed road crossing across the creek will require dewatering to ensure the excavation area is dry. However, considering the size of the structure the dewatering will be insignificant and would unlikely pose any threat to the groundwater.

At the time of this report, detailed information on the size and depth of the culvert was not provided; as such anticipated ground water seepage volumes into excavation and requirements for dewatering could not be assessed. Once the detailed information of the proposed culvert is available, Terraprobe will conduct ground water seepage assessments to determine the volume of water that will be encountered in the culvert excavation during the construction period.

5.0 SUMMARY AND CONCLUSIONS

The results of the hydrogeologic study indicate the following:

(i) The Site is located within the Don River Watershed

(ii) The Site is located within an area of predominantly high aquifer vulnerability. The Site is not located within a Wellhead Protection Zone or an Intake Protection Zone.

(iii) The Site is located within an area that is regulated by the Toronto and Region Conservation Authority.

(iv) The Site is characterized by a surficial layer of asphalt pavement and/or topsoil underlain by sand and silt, gravelly sand and clayey silt earth fill which in turn is underlain by undisturbed native soil extending to the full depth of investigation. The native soils consisted of sand/sandy silt to silty sand with inconsistent layers/lenses of silt or clayey silt.

(v) During precipitation events, water will tend to flow overland and drain along the ground surface following the Site topography. The ground water level at the Site was found to be approximately 1.6 m to 17.9 mbgs. The shallow ground water flow at the Site is expected to follow the local topography. Long term ground water monitoring of the wells would be required to determine the changes in the ground water levels as a result of seasonal fluctuations.

(vi) The subsurface soils at the Site have hydraulic conductivities ranging between 10^{-6} to 10^{-7} m/s. The medium to high permeability of the subsurface soils at the Site will allow for infiltration, ground water recharge and base flow to the Tributary of the East Don River at the Site. The recharge rate for this type of soil is typically on the order of 287 mm/year.

(vii) The Site is situated on the south slope of the Oak Ridges Moraine, approximately 2 km south of the height of land for the moraine. In this area, the moraine forms a zone of regional ground water recharge. Ground water recharge is particularly pronounced in the sandy moraine deposits. Ground water recharge in the glacial till materials is relatively limited.

(viii) The regional hydrogeological conditions of the Site comprise of three ground water flow systems: shallow intermediate and deep aquifer system. The shallow flow system occurs in the upper kame deposits, in an unconfined aquifer setting and follows the local topography of the area and discharges into topographically lower areas, such as short intermittent water courses and headwaters of the Don River, within approximately 1 km of the Site. The intermediate and deep ground water flow systems are found beneath confining layers of glacial till, and they follow the regional topography.

(ix) The principal drainage feature located at the Site is the Tributary of the East Don River, which is located in its central portion. It is likely that ground water will contribute base flow to the Tributary of the East Don River.

(x) Based on the private water well survey, the surrounding area within a 500 m radius (study area) of the subject site is predominantly on municipal water. There are four (4) private residences or wells situated in the immediate vicinity of the Site. There is no significant use of ground water in the area.

(xi) The Site is located within an area of predominantly high aquifer vulnerability. During the construction period, appropriate mitigation measures will be required to ensure protection of the aquifer underlying the Site.

(xii) Conventional low impact development storm water management measures should be applied to maintain water balance in the post-development conditions. Final design of the above measures should be reviewed in conjunction with the storm water management plan for the Site.

(xiii) The development of the Site will result in an overall reduction of ground water recharge and a significant increase in surface water runoff unless appropriate mitigation measures are provided at the design stage. The following mitigation measures can be implemented for the Site.

a. Directing and controlling runoff water towards the road-side swales along the boulevard/easement area of the proposed Kirby Road development through gradual outward sloping of the road from its centre.

(xiv) Based on the measured ground water elevation across the Site, the excavation for the road construction is not likely to extend below the water table, however, perched ground water may be excavated into the excavation. Perched ground water entering the excavation can be controlled by pumping from filtered sumps at the base of the excavation.

(xv) The proposed alignments will cross the tributary of the East Don River. The details of the proposed structures/culverts is not available yet, as such estimation of ground water seepage volumes and requirements for dewatering cannot be assessed at this time. Ground water seepage rates must be estimated at the detailed design stage.

6.0 REFERENCES

1. Russel, H.A.J., Moore, A., Logan, C., Kenny, F., Brennand, T.A., Sharpe, D.R., and Barnett, P.J. 1998: Sediment Thickness of the Greater Toronto and Oak Ridges Moraine Areas, Southern Ontario; Geological Survey of Canada, Open File 2892, Scale 1:200,000.

2. Surficial Geology of the Greater Toronto and Oak Ridges Moraine Area, Southern Ontario. Ministry of Northern Development and Mines, Ontario, 1997.

3. Barnett, P.J., Cowan, W.R. and Henry, A.P. 1991: Quaternary Geology of Ontario, Southern Sheet; Ontario Geological Survey Map 2544, scale 1:1,000,000.

4. Ontario Geological Survey 1991: Bedrock Geology of Southern Ontario, Southern Sheet; Ontario Geological Survey Map 2556, scale 1:1,000,000.

5. Structural Model of the Greater Toronto and Oak Ridges Moraine Areas, Southern Ontario: Oak Ridges Moraine Sediment, scale 1:250,000.

6. Approved Source Protection Plan: CTC Source Protection Region, July 28, 2015.

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We trust that the above-noted information is suitable for your review. If you have any questions regarding this information, please do not hesitate to contact the undersigned.

Yours truly,

Terraprobe Inc.

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Principal

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Muhammad Shahid, M.Sc., P.Geo.,
Senior Project Manager

DRAFT
Ahmad Sarwar, B.Sc., G.I.T.
Project Manager

FIGURES

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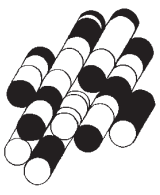

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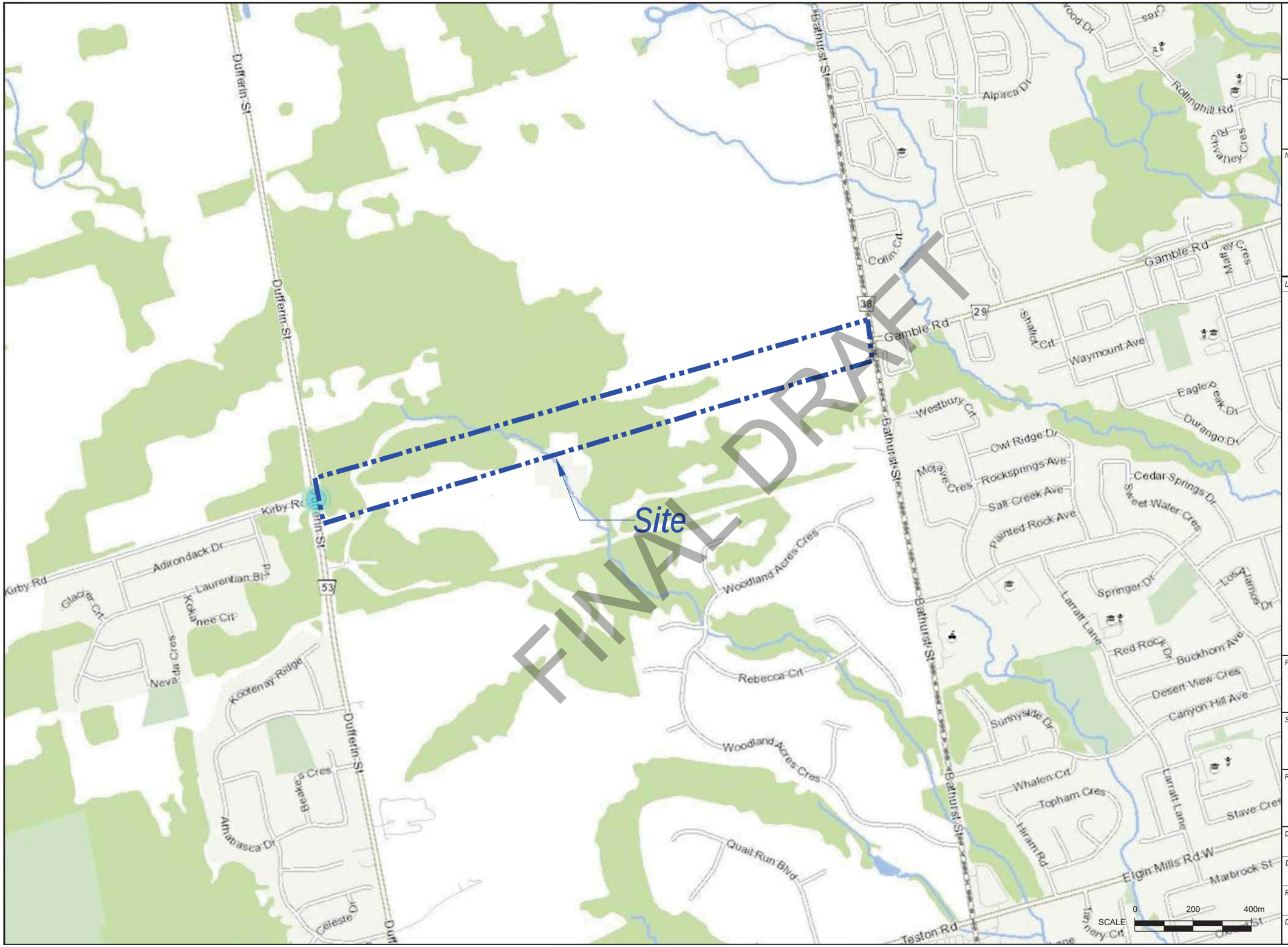

T:\1-Project Files\2015\1-15-0700 - Kirby Road Extension, Vaughan\46-Hydro-GIA Dwgs, Logs\AutoCAD\1-15-0700 FIGURES - updated (2018-01-30).dwg, Smriti

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Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650

Reference:
York Interactive Maps

Notes:

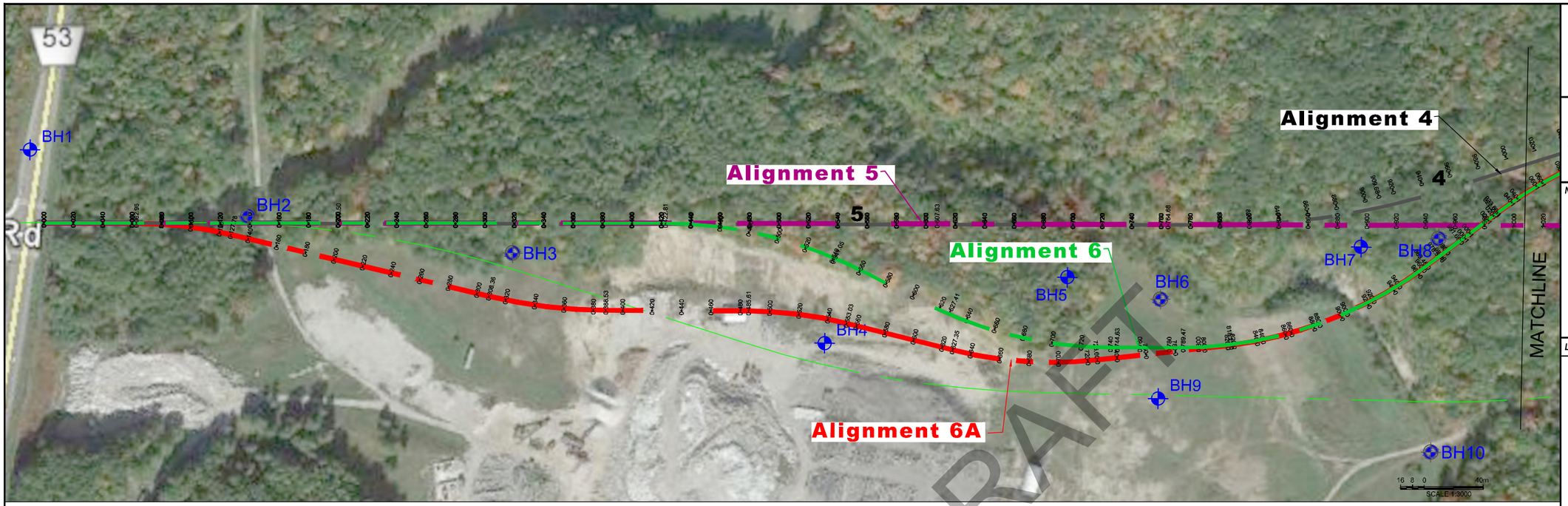
Legend:
Site Boundary

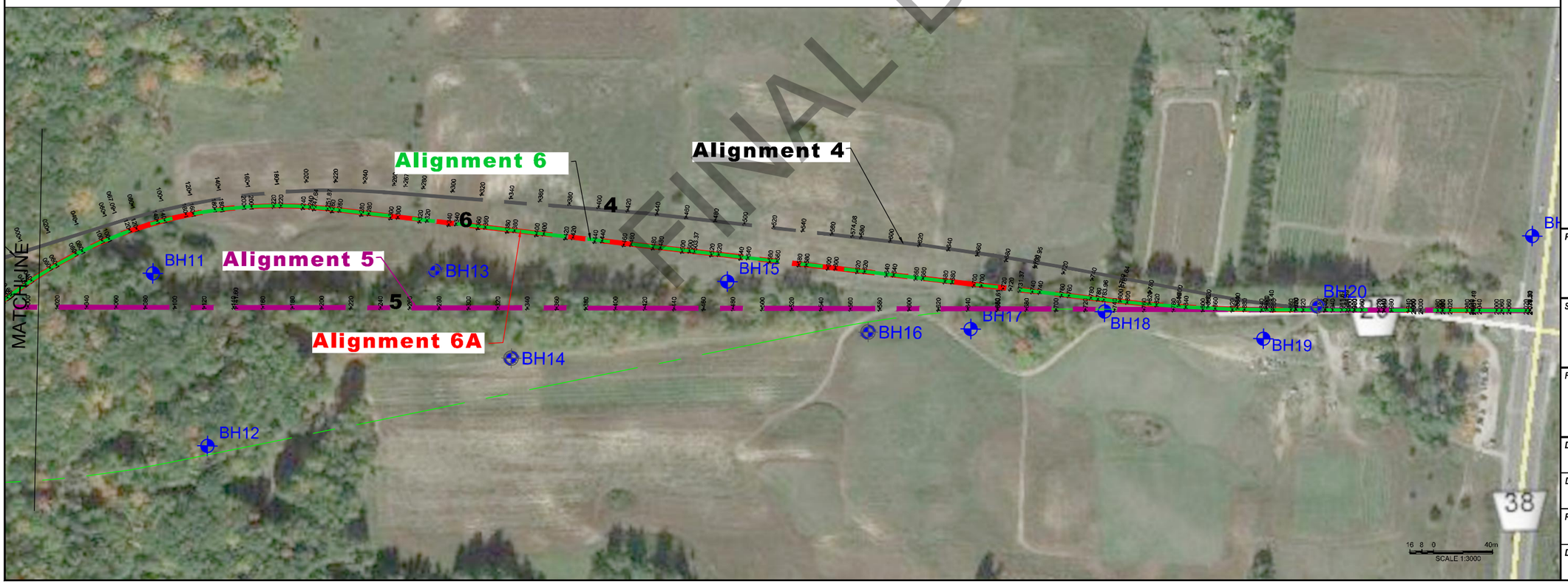
Project Title:
Hydrogeologic Study

Site Location:
Kirby Road Extension, Vaughn, Ontario

Figure Title:
SITE LOCATION PLAN

Designed By: AS	*File No.:* 1-15-0700-54
Drawn By: SSK	*Scale:* As Shown
Reviewed By: MS	*Figure No.:* 1
Date: February 2018	





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Reference:
Cad Drawings provided by Schaeffer & Associates Ltd. via email.

Image ©2018 Google

Notes:

Legend:

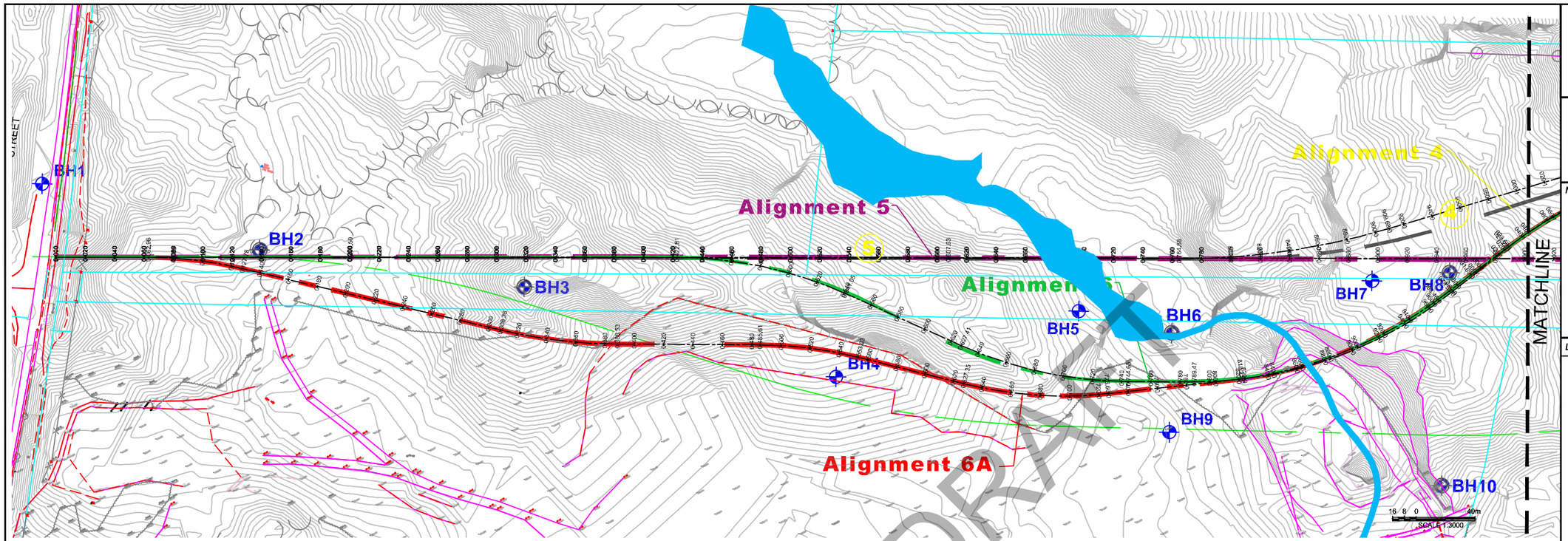
- Approximate Borehole Location
- Approximate Monitoring Well Location

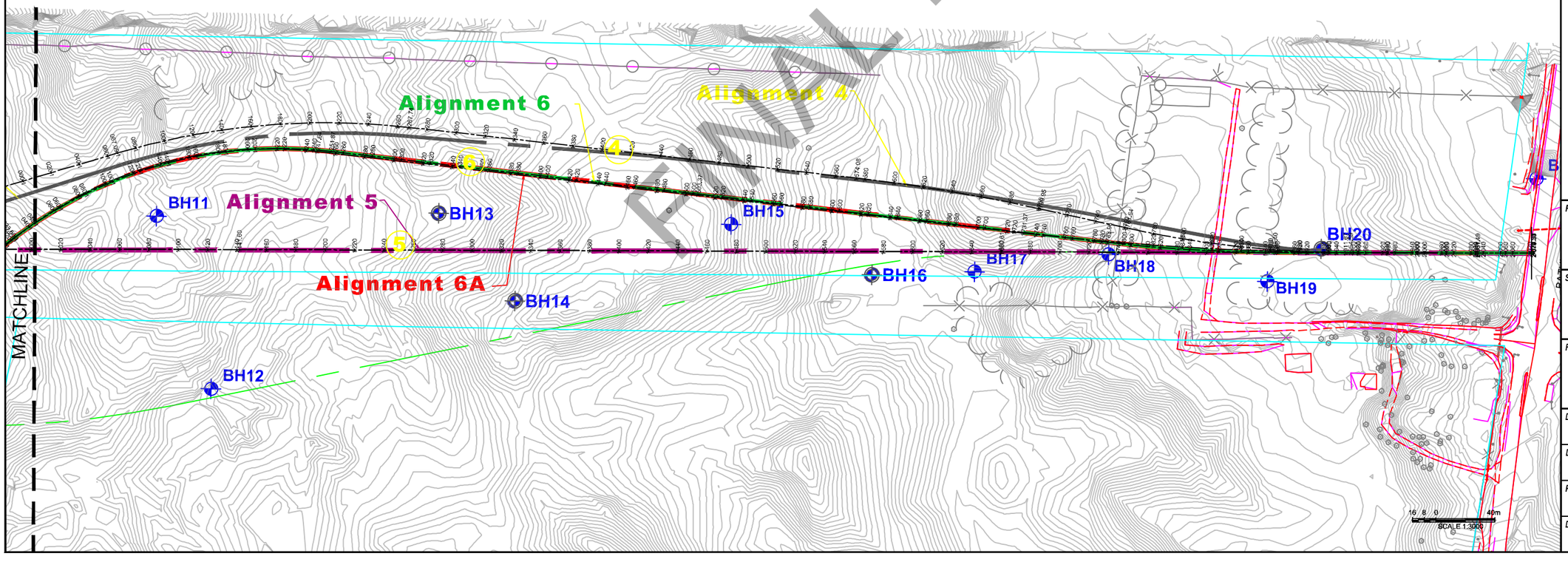
Project Title:
Hydrogeologic Study

Site Location:
Kirby Road Extension, Vaughn, Ontario

Figure Title:
BOREHOLE/ MONITORING WELL LOCATIONS- GOOGLE EARTH

Designed By: AS	*File No.:* 1-15-0700-54
Drawn By: SSK	*Scale:* As Shown
Reviewed By: MS	*Figure No.:* 2A
Date: February 2018	





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Reference:
Cad Drawings provided by Schaeffer & Associates Ltd. via email.

Notes:

Legend:

Approximate Borehole Location

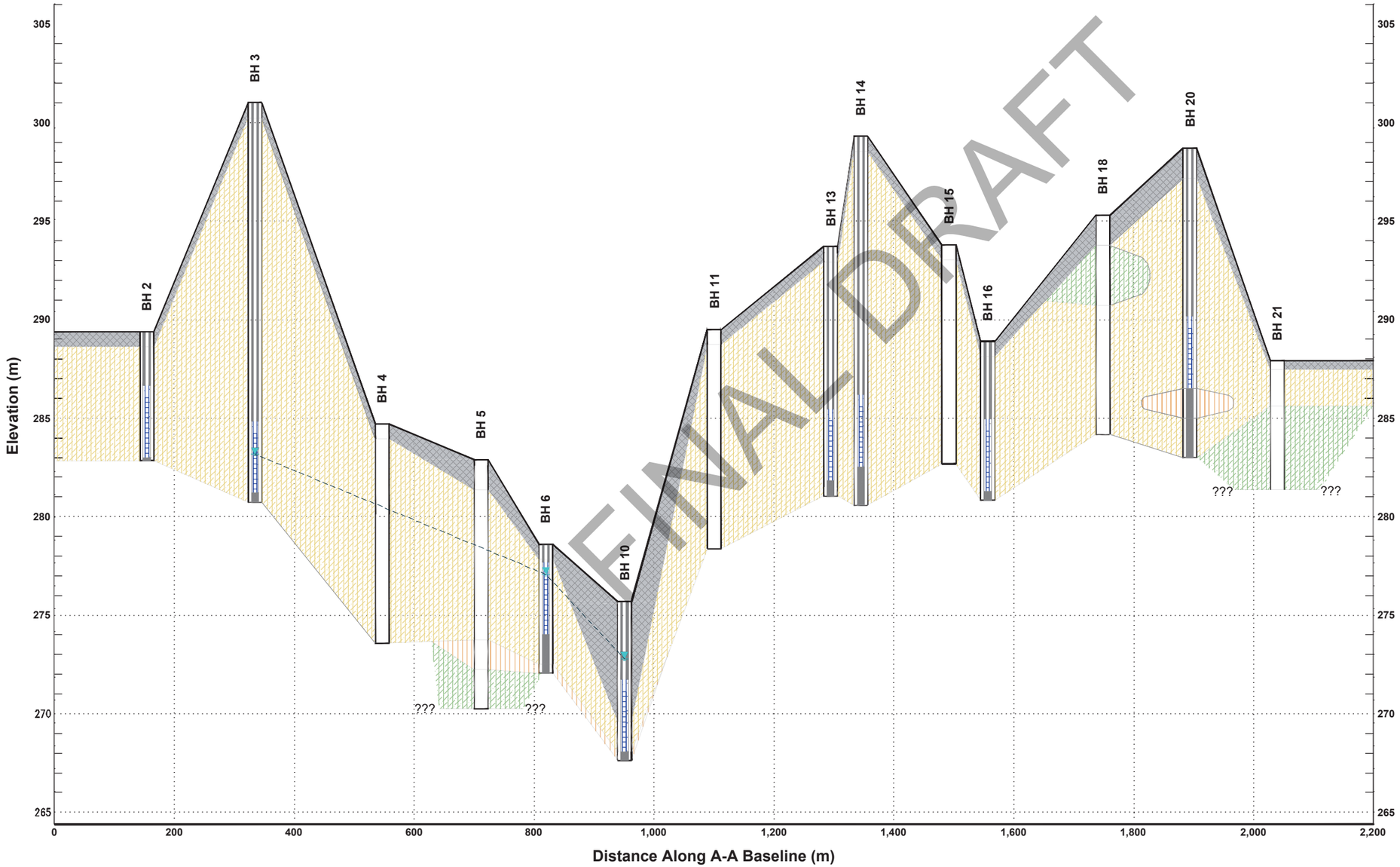
Approximate Monitoring Well Location

Project Title:
Hydrogeologic Study

Site Location:
Kirby Road Extension, Vaughn, Ontario

Figure Title:
BOREHOLE/ MONITORING WELL LOCATIONS- TOPOGRAPHY MAP

Designed By: AS	***File No.:*** 1-15-0700-54
Drawn By: SSK	***Scale:*** As Shown
Reviewed By: MS	***Figure No.:*** 2B
Date: February 2018	



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Reference:

Notes:

Legend:

- Fill
- Sand/ Sandy Silt to Silty Sand
- Clayey Silt
- Silt
- Monitoring Well Screen
- Approximate Elevation of Ground Water Table (masl), Jan. 25, 2018

Project Title:
Hydrogeologic Investigation

Site Location:
Kirby Road Extension, Vaughn, Ontario

Figure Title:
CROSS SECTION A-A'

Designed By: AS	*File No.:* 1-15-0700-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: MS	*Figure No.:* 3
Date: February 2018	

T:\1-Project Files\2015\1-15-0700 - Kirby Road Extension, Vaughan\46-Hydro-GIA. Dwgs, Logs\AutoCAD\1-15-0700 FIGURES - updated (2018-01-30) FOR CROSS SECTION.dwg, Smrtl

APPENDICES

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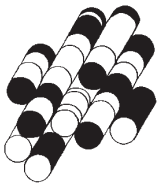

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APPENDIX A

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TABLE A-1

File No. 96127

WATER WELL DATA SYSTEM 25 OCT 86

GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
1	YS W	1 55	69-6152	623706 4862213	945	05/55	1622	6	FR	100	70	92	7	12/00	DO	BIRDSEYE D TPSL 0001 CLAY 0054 CSND 0092 FSND 0100 (S 0096 04)
2A	YS W	1 55	69-6153	623661 4862207	950	05/55	1622	4	FR	118	86	110	8	4/00	DO	WILLIAMS R TPSL 0001 CLAY 0018 GRVL 0032 FSND 0076 CSND 0118 (S 0114 04)
2B	YS W	1 55	69-6156	623541 4862193	972	05/56	4527	2	FR FR	140 156			4	6/00	DO	MCFEE M BRWN CLAY 0008 BRWN MSND 0120 BLUE CLAY MSND 0140 GRVL MSND 0148 BLUE CLAY 0156 MSND 0184 (S 0179 05)
	YS W	1 55	69-6157	624214 4862411	900	06/57	2105	2	FR	123	95		2	4/00	DO	GREIG A BRWN CLAY MSND 0092 FSND 0123 MSND 0128 (S 0123 05)
3	YS W	1 55	69-6158	622753 4861747	960	09/57	2105	2		DRY						GOLDING G FSND 0090 BLUE CLAY 0170
	YS W	1 55	69-6159	624672 4862333	890	03/58	2314	4	FR	300	28	250	18	16/00	CO	CAPPY JOE FSND 0150 BLUE CLAY 0270 MSND CLAY 0300 CSND 0310 (S 0306 04)
4	YS W	1 55	69-6160	622839 4861735	940	04/58	4501	2	FR	150	113		5	1/00	DO	GOULDING GEORGE FSND 0080 BLUE CLAY 0120 FSND 0150 MSND 0163 (S 0158 05)
5	YS W	1 55	69-6161	623615 4862220	960	07/59	4508	2	FR	183	20		6	5/00	DO	CHALLONER CATHERINE TPSL 0001 BRWN CLAY 0017 BRWN MSND STNS 0070 BRWN MSND 0187 (S 0182 05)
6	YS W	1 55	69-6162	623390 4862122	965	03/60	1515	2	FR	179	99		3	72/00	DO	GIBBINS J J BRWN MSND 0140 GREY MSND 0179 FSND 0185 (S 0179 06)
	YS W	1 55	69-6163	624261 4862425	906	06/60	1515	2	FR	96	26		6	5/00	DO	JONES GORDON FSND GRVL 0060 GRVL MSND 0101 (S 0095 06)
7	YS W	1 55	69-6164	623029 4862032	930	10/60	1515	4	FR	120	36	156	2	72/00	DO	DIAMOND D BRWN MSND 0060 CSND 0065 BRWN MSND 0085 CSND 0090 BLUE CLAY 0110 QSND 0155 FSND 0160 (S 0156 04)
	YS W	1 55	69-6165	624468 4862483	908	09/61	4102	30	FR	50	50		3		DO	CAPPY J BLUE CLAY 0050 GRVL 0060
8	YS W	1 55	69-6166	623410 4862132	965	04/62	1622	4	FR	170	110	170	4	18/00	DO	HUGHES M TPSL 0001 CLAY STNS 0007 FSND 0184 (S 0180 04)
9	YS W	1 55	69-6167	623568 4862089	940	04/62	1622	4	FR	170	114	134	6	10/00	DO	GADSBY GEO TPSL 0001 CLAY STNS 0007 FSND STNS 0170 FSND 0184 (S 0179 04)
10	YS W	1 55	69-6168	623322 4861927	965	05/62	1622	4	FR	184	135	160	6	24/00	DO	ABRAM G S FSND CLAY 0010 FSND GRVL 0176 BLUE CLAY GRVL 0184 FSND 0219 (S 0215 04)

WATER WELL DATA SYSTEM 25 OCT 86 GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
11	YS W	1 55	69- 6169	623126 4861955	930	06/62	3108	4	FR	174	55	163	10	5/00	DO	WORKMAN A BRWN MSND 0015 BRWN CLAY 0025 BRWN MSND 0060 BRWN CLAY 0067 BRWN MSND 0075 BLUE CLAY 0098 BLUE MSND 0130 BLUE CLAY 0153 MSND 0168 GREY CLAY 0174 BLUE FSND 0183 (S 0180 03)
12	YS W	1 55	69- 6170	622865 4861971	930	08/62	3108	4	FR	145	40	100	4	2/00	DO	BOXER S TPSL 0002 YLLW MSND 0010 YLLW CLAY MSND 0018 YLLW FSND 0078 BLUE CLAY 0098 BLUE CLAY MSND 0105 BLUE CLAY 0145 BLUE FSND 0160 (S 0157 03)
13	YS W	1 55	69- 10673	623660 4862188	954	08/71	5459	30	FR	22	14				DO	KUGLER A TPSL 0001 BRWN CLAY 0012 BLUE CLAY MSND 0018 GREY MSND CLAY 0030
14	YS W	1 55	69- 11567	623990 4862300	930	05/73	3108	6		107	78	130	7	3/00	DO	KOTWICHA J BLCK TPSL 0003 BRWN CLAY GRVL 0058 YLLW CLAY SAND 0104 BLUE CLAY GRVL 0139 BLUE CLAY SAND 0167 BLUE FSND 0170 (S 0167 03)
15	YS W	1 55	69- 12146	623817 4862040	920	05/74	1350	6	FR	159	97	150	6	50/00	DO	EUGENE MORETTI BRWN SAND 0057 GREY CLAY 0070 GREY SILT 0092 GREY CLAY SILT 0159 (S 0157 06) BRWN SAND 0168
16	YS W	1 55	69- 13364	623440 4862040	968	07/76	4241	6	FR	141	42		4	3/30	DO	CARMEN-ANTONIO RISI BRWN SAND CLAY TILL 0014 GREY CLAY 0049 BRWN FSND 0053 GREY CLAY FSND 0065 BRWN SAND SLTY WBRG 0130 GREY SAND SLTY CLAY 0138 GREY FSND FGVL 0143 (S 0139 04)
17	YS W	1 55	69- 13820	623060 4861940	920	10/76	1663	6	FR	170	105	160	7	2/00	DO	HUGHES JOHN TPSL 0001 YLLW CLAY SNDY 0005 BRWN FSND 0058 YLLW CLAY SAND 0088 BRWN SAND GRVL 0108 BLUE CLAY GRVL 0139 GREY FSND CLAY 0155 GREY FSND 0202 (S 0180 03)
18	YS W	1 55	69- 15691	623240 4862020	980	02/80	2407	6	FR	212	105	200	5	4/30	DO	ABRAM G BRWN CLAY SAND 0032 BLUE CLAY 0200 BLUE FSND 0217 (S 0212 05)
19	YS W	1 55	69- 15780	624140 4862200	950	11/80	1663	5	FR	110	58	110	5	1/15	DO	DAWSON D BRWN TPSL 0001 BRWN CLAY GRVL 0016 BLUE CLAY GRVL 0029 YLLW CLAY GRVL 0035 BLUE CLAY 0053 GREY FSND SILT 0106 BRWN FSND 0123 (S 0115 03) BRWN FSND SILT 0142
20	YS W	1 55	69- 15902	623540 4862180	970	06/81	3108	6		230	96	230	60	1/00	DO	MARSH F BRWN SAND 0061 BRWN CLAY 0068 BLUE CLAY 0102 BLUE CLAY GVLY SNDY 0200 BLUE FSND VERY 0230 BLUE SAND 0242 (S 0239 03)
21	YS W	1 55	69- 16148	624020 4862340	940	01/82	3108	6		130	65	123	10	2/00	DO	GREIG R TPSL 0002 BRWN CLAY 0030 BLUE CLAY HARD 0087 BLUE CLAY SNDY HARD 0108 BRWN FSND 0134 BRWN SAND 0138 (S 0135 03)

WATER WELL DATA SYSTEM 25 OCT 86

GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
22	YS W	1 56	69-6177	623688 4862295	955	10/61	4102	30	FR	43	43		3		D0	MCDOWELL D MSND 0050
23	YS W	1 56	69-6178	623760 4862344	949	07/62	3108	4	FR	150	90	110	4	2/30	D0	DOCKMAN WM PRDG 0008 BRWN MSND 0045 BRWN CLAY 0060 BRWN MSND 0139 FSND 0160 (S 0153 07)
24	YS W	1 59	69-6189	623708 4863961	1000	05/54	1622	4	FR	146	96	112	5	4/00	D0	HENDERSON D TPSL 0001 YLLW CLAY 0030 YLLW CLAY MSND 0110 FSND 0138 BLCK FSND 0146 (S 0141 05)
25	YS W	1 59	69-10405	623850 4863805	1000	07/71	3903	5		120	90	120	5	3/00	D0	MANCINI A BRWN CLAY MSND 0060 BRWN MSND CLAY 0120 GREY MSND STNS 0132 (S 0126 04)
26	YS W	1 59	69-11000	623566 4863773	1005	01/72	3108	5		136	96	119	7	3/00	D0	KURT NIELSEN BLCK TPSL 0003 BRWN SAND 0039 BRWN CLAY SAND 0129 BRWN FSND 0136 BRWN MSND 0141 (S 0138 03)
27	YS W	1 59	69-11140	623450 4863858	1015	08/72	3108	5		139	112	145	5	2/00	D0	VITELLI R TPSL 0002 BRWN SAND 0019 BRWN CLAY SAND 0043 BRWN CLAY GRVL 0059 BRWN CLAY SAND 0073 SAND GRVL 0079 FSND 0139 BLUE MSND 0151 (S 0148 03)
28	YS W	1 59	69-11326	623740 4863560	990	01/73	4743	6	FR	130	80	125	8	3/00	D0	HARRIS RAY BRWN CLAY SAND 0022 BRWN SAND 0095 YLLW SAND 0125 GREY SILT 0130 BRWN SAND 0145 (S 0137 08)
29	YS W	1 59	69-11800	623680 4863540	990	10/73	2310	4	FR	110	90	100	5	1/00	D0	PRICE H GREY CLAY SAND 0110 FSND 0119 (S 0112 04)
30	YS W	1 59	69-12177	623632 4863816	1000	04/74	2407	5	FR	155	125	148	6	1/30	D0	WEIDNER H TPSL 0001 BRWN SAND CLAY 0023 BRWN FSND 0140 BRWN CSND 0158 (S 0155 03)
31	YS W	1 59	69-12180	623627 4863907	1005	07/74	2407	5	FR	154	137	154	4	6/10	D0	DUNNFELT TPSL 0001 BRWN CLAY 0024 BRWN FSND 0154 BRWN CSND 0159 (S 0154 05)
32	YS W	1 59	69-12313	623856 4863711	994	08/74	5459	6	FR	100	95	127	7	2/00	D0	BELPARK CONSTR UNKN SAND 0007 UNKN SAND CLAY 0035 UNKN SAND CLAY 0100 UNKN FSND 0132 (S 0128 04)
33	YS W	1 59	69-12314	623885 4863719	990	07/74	5459	6	FR	100	95	127	5	2/00	D0	BELPARK CONST BRWN CLAY 0020 BRWN CLAY SAND 0070 UNKN FSND 0100 UNKN FSND 0132 (S 0128 04)
34	YS W	1 59	69-12315	623811 4863548	985	07/74	5459	6	FR	100	95	125	5	2/00	D0	BELPARK CONST BRWN CLAY 0020 BRWN CLAY SAND 0070 UNKN FSND 0100 UNKN FSND 0134 (S 0130 04)
35	YS W	1 59	69-12316	623843 4863560	985	06/74	5459	6	FR	100	100	120	5	1/00	D0	BELPARK CONST BRWN CLAY 0020 BLUE CLAY SAND 0040 BRWN FSND 0100 UNKN FSND 0132

WATER WELL DATA SYSTEM 25 OCT 86

GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
36	YS W	1 59	69-12938	623960 4863740	968	10/75	2310	4	FR	125	80	115	5	1/00	DO	PRICE H GREY CLAY STNS 0012 GREY CLAY 0043 GREY CLAY SAND 0109 BLUE CLAY SAND 0125 FSND 0141 (S 0133 05)
37	YS W	1 59	69-13081	623524 4863733	1004	09/75	2407	6	FR	132	107	146	5	2/00	DO	APFEL H PEAT 0005 BRWN CLAY SAND 0032 BRWN SAND 0144 BRWN CSND 0147 (S 0144 03)
38	YS W	1 59	69-13804	624040 4863740	978	10/76	4102	6	FR	156	82	130	4	1/45	DO	POLSONI W TPSL 0002 BRWN CLAY DNSE 0090 GREY CLAY 0130 GREY SILT CLAY 0155 GREY FSND 0164 (S 0160 04)
39	YS W	1 59	69-14821	623880 4863800	990	10/78	1350	6	FR	105	83	105	6	1/20	DO	PIAZZA M BRWN CLAY SNDY 0012 BRWN SAND 0025 GREY CLAY 0032 BRWN SAND DRY 0105 BRWN SAND 0113 (S 0107 06)
40	YS W	1 59	69-14859	623860 4863840	995	02/78	2407	6	FR	136	98	140	6	2/00	DO	LAURSEN T BRWN TPSL 0001 BRWN CLAY 0066 BRWN SAND 0140 (S 0135 04)
41	YS W	1 59	69-14860	623940 4863840	1000	03/78	2407	6	FR	144	101	145	9	3/00	DO	ARTINGER J BRWN TPSL 0001 BRWN CLAY HARD 0066 BRWN FSND 0144 (S 0141 05) BRWN SAND 0149
42	YS W	1 59	69-15898	623540 4863740	1000	08/81	5206	6	FR	153	60	140	20	2/00	DO	WOOD R BRWN TPSL CLAY 0001 BRWN CLAY SAND GRVL 0115 BRWN FSND DRTY 0130 GREY FSND GVLY 0155 (S 0152 03)
43	YS W	1 59	69-16025	623700 4863800	990	09/81	5459	6	FR	120	95	120	8		DO	BATEMAN R BRWN CLAY SAND 0029 BRWN CLAY SOFT 0034 BLUE CLAY SOFT 0078 BRWN SAND CLAY 0089 BLUE CLAY 0120 BLUE SAND 0131 (S 0125 06)
44	YS W	1 60	69-6201	623628 4864275	1020	09/50	2210	2	FR	95	50		2		DO	WEEKS JEAN ETHEL PRDG 0030 MSND 0140 (S 0136 04)
45	YS W	1 60	69-6202	623273 4863928	1010	12/50	1439	2	FR	132	94	94	4	8/00	DO	JOHNSTON FRANK CLAY 0100 MSND 0137 (S 0132 05)

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WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
46	CON	2 1	69-1598	620722 4863695	1020	08/60	3108	4	FR	190	145	210	8	4/00	ST DO	BURNS C F W PRDG 0005 BRWN CLAY 0020 BLUE CLAY 0130 BLUE FSND 0160 BLUE CLAY 0190 BLUE FSND 0200 BLUE CLAY MSND 0216 (S 0209 07)
47	CON	2 1	69-1599	621541 4864190	1032	01/62	2407	6	FR	204	120	180	12	6/00	ST DO	BURNS C F W TPSL 0002 BLUE CLAY 0100 BLUE CLAY STNS 0200 BLUE CLAY MSND 0204 FSND 0206 CSND 0210 (S 0206 04)
48	CON	2 1	69-1600	620749 4863628	1025	06/55	3903	30	FR	4	3		2		DO	MCGILLIVARY G A BRWN CLAY 0003 CSND 0012
49	CON	2 1	69-12555	621249 4863974	1030	09/74	2407	7	FR	180	86	176	9	6/00	ST	BURNS M BRWN TPSL 0001 BRWN CLAY SAND 0043 BLUE CLAY 0180 BLUE CSND 0185 (S 0180 05)
50	CON	3 1	69-12145	620131 4863533	1010	03/74	3108	7		215	119	215	8	3/00	ST DO	CROSSLEY ALLAN BLCK TPSL 0003 BRWN CLAY SAND 0043 YLLW CLAY SAND 0049 GREY CLAY GRVL 0063 GREY CLAY SAND 0071 BLUE CLAY SAND 0123 BLUE CLAY 0196 BLUE CLAY SAND 0215 BLUE FSND 0219 (S 0216 03)
51	CON	3 30	69-6498	620328 4860796	945	09/57	2314	6								MINGHELLA A MSND 0010 CLAY 0030 MSND CLAY 0140 GRVL 0142 QSND 0280
52	CON	3 30	69-6499	620463 4860855	960	10/57	2314	6								MINGHELLA A TPSL 0005 MSND CLAY 0030 GRVL 0070 BLUE CLAY 0100 MSND CLAY 0168 STNS 0169
53	CON	2 30	69-6320	622641 4861937	950	06/57	1622	4	FR	160	115	130	6	16/00	DO	ROSS JAS TPSL 0001 BRWN MSND 0060 BLUE CLAY 0115 FSND 0160 (S 0156 04)
54	CON	2 30	69-6321	622706 4861616	950	06/58	4501	2	FR	192	132		5	1/00	DO	GILES S A FSND 0160 MSND 0192 (S 0187 05)
55	CON	2 30	69-6322	622700 4861769	970	04/63	3108	2	FR	173	100		3	4/00	DO	WALEN C PRDG 0005 BLUE CLAY MSND 0055 MSND 0070 BLUE CLAY MSND 0140 FSND CLAY 0150 FSND 0165 CLAY 0173 FSND 0220 (S 0210 10)
56	CON	2 30	69-8707	622700 4861760	970	08/68	2407	5	FR	171	99	182	3	2/00	DO	WEST B TPSL 0002 BRWN MSND 0021 BLUE CLAY 0104 QSND 0171 FSND 0182 (S 0178 04)
57	CON	2 31	69-6324	622620 4862290	983	09/60	1622	4	FR	149	83	153	4	8/00	DO	MASHINTER FRANK TPSL 0001 GRVL 0017 BRWN MSND 0044 FSND CLAY 0090 BLUE CLAY 0110 BLUE CLAY FSND 0136 FSND 0153 (S 0149 04)
58	CON	2 31	69-6325	622421 4862082	985	02/63	3108	4	FR	150	100	140	3	2/00	DO ST	MASHINTER C PRDG 0005 BRWN FSND 0058 MSND CLAY 0075 BLUE CLAY STNS 0105 BLUE CLAY 0140 BLUE CLAY MSND 0150 FSND 0158 (S 0150 03)
59	CON	2 31	69-6326	622593 4862309	985	06/66	3108	4	FR	222	107	220	2	3/00	DO	MASHINTER F PRDG 0005 BLUE CLAY 0028 YLLW CLAY MSND 0112 BLUE CLAY 0165 BLUE CLAY MSND 0222 BLUE FSND 0237 (S 0233 04)

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WELL NUMBER	CONCESSION ETC	LOT	UTM WELL NO EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
60	CON	2 31	69- 620715 12202 4861749	990	07/74	1663	5	FR	95	90	115	15	2/00	DO	MILANI C D BRWN SAND CLAY 0060 BLUE CLAY GRVL 0095 GREY MSND CSND 0120 (S 0114 04) GREY SAND CLAY 0175 GREY SAND SILT 0232
61	CON	2 31	69- 622420 17083 4862120	980	11/83	1663	6	FR	201	94	193	3	2/00	ST	MASHINTER M BLCK TPSL 0001 YLLW CLAY GRVL 0017 BLUE CLAY 0021 BRWN CLAY SAND SILT 0086 BLUE CLAY GRVL 0149 GREY FSND SILT 0201 GREY FSND MGRD 0208 (S 0203 03) GREY FSND SILT 0262
62	CON	2 33	69- 622059 6327 4863027	1050	09/49	4623	4	FR	283	80	289	3		ST DO	RODEBURG J BRWN CLAY MSND 0080 BLUE CLAY MSND HPAN 0283 GREY CSND 0289 (S 0283 06)
63	CON	2 33	69- 620613 6328 4862479	1030	08/59	3108	4	FR	280	150	150	10	4/00	DO	HERD R G TPSL 0002 CLAY MSND 0050 FSND 0100 YLLW CLAY 0250 FSND 0305 (S 0299 06)
64	CON	2 34	69- 622355 8593 4863450	1055	07/68	3108	5	FR	265	160	185	6	3/00	ST DO	BEYNON B TPSL 0001 CLAY STNS 0020 BLUE CLAY 0075 CLAY MSND 0095 CLAY FSND 0110 CLAY MSND 0160 BLUE CLAY GRVL 0180 FSND SILT 0200 FSND 0265 MSND 0273 (S 0269 04)
65	CON	3 30	69- 620218 6502 4861101	920	08/59	2801	5								CARRIER SHOE CO CLAY MSND 0002 CLAY GRVL 0006 CLAY MSND BLDR 0016 BRWN CLAY GRVL 0043 MSND SILT 0046 CLAY GRVL 0053 MSND CLAY GRVL 0144 BLUE CLAY MSND 0264 MSND GRVL 0268 HPAN 0272 BLUE CLAY MSND GRVL 0316 BLUE CLAY GRVL BLDR 0330
66	CON	3 30	69- 620012 6503 4860823	925	08/59	2801	2	FR	257	43	51	12	5/00	CO	CARRIER SHOE CO MSND SILT 0014 BRWN CLAY MSND 0033 BLUE CLAY MSND 0257 MSND GRVL 0275 (S 0265 10)
67	CON	3 31	69- 620484 6506 4861314	945	08/59	2801	5								CARRIER SHOE CO TPSL 0001 CLAY MSND 0019 CLAY 0025 CLAY MSND SILT 0130 CLAY GRVL MSND 0158 CLAY SILT GRVL 0227 CLAY SILT BLDR 0240 HPAN 0243 BLUE CLAY GRVL 0275 BLUE CLAY 0287
68	CON	3 32	69- 620356 6510 4861972	1000	07/66	5203	7	FR	160	160	190	6	8/00	DO ST	RICE L BRWN MSND 0155 GRVL 0170 QSND 0196 (S 0195 04) FSND 0202 QSND 0220
69	CON	3 33	69- 620490 15090 4862450	1028	10/78	4006	5	FR FR FR	130 200 256	151		4	99/59	DO	GOLDIN R BRWN SAND TPSL 0004 BRWN FSND DRTY 0097 GREY CLAY STNS SAND 0129 GREY SAND SILT CLAY 0131 (S 0130 12) GREY CLAY STNS 0199 GREY SAND CLAY LYRD 0201 GREY CLAY STNS SILT 0254 GREY SAND SILT CLAY 0256 GREY CLAY SILT 0296 (S 0256 12)

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GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
70	CON	3 35	69-6512	620210 4863131	1022	04/58	2314	4	FR	220	150	210	8	12/00	D0 ST	LANNING ALFRED TPSL 0008 BRWN MSND 0065 BLUE CLAY 0220 FSND 0290 (S 0280 08)
71	CON	3 35	69-6513	620372 4863210	1022	03/63	2613	7	FR	430	133	330	6	15/00	D0 ST	BENORA FARM YLLW CLAY 0043 BRWN MSND 0078 BLUE CLAY STNS 0090 SILT CLAY 0403 BLUE CLAY STNS 0430 GRVL 0434 (S 0430 04)
72	CON	2 34	69-17308	622280 4863160	1040	11/84	3108	6	FR	262	140	155	12	2/00	D0	CAROLINE CONST BRWN CLAY 0013 BRWN SAND 0090 BLUE CLAY 0115 BLUE SAND 0141 BLUE CLAY 0144 BLUE FSND 0155 BLUE CLAY 0168 BLUE SAND 0180 BLUE CLAY 0208 BLUE SILT CLAY 0261 BRWN SAND 0272 (S 0266 06)
73	CON	2 35	69-6329	620624 4863198	1036	08/58	2314	4	FR	220	160	210	7	16/00	D0 ST	BURNS C F W TPSL 0005 BRWN MSND 0070 CLAY 0100 MSND CLAY 0200 HPAN 0220 FSND 0265 (S 0257 08)
74	CON	2 35	69-6330	620674 4863097	1036	07/65	2407	5	FR	337	170	290	6	12/00	D0 ST	BURNS C F W TPSL 0001 BLUE CLAY 0102 BLUE FSND 0290 BLUE CLAY 0330 BLUE MSND 0337 (S 0333 04)

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
																0144 GREY CLAY STNS 0173 GREY CLAY SNDY 0178 GREY CLAY SAND GRVL 0188 GREY CLAY SNDY 0194 GREY SAND CLAY LYRD 0224 GREY CLAY SAND LYRD 0229 GREY SAND CLAY LYRD 0262
75	CON	3	27 69- 14318	619580 4859240	930	06/77	2801	1			74				CO	DESPOSAL SERV LTD BRWN CLAY 0003 GREY CLAY SAND GRVL 0010 BRWN CLAY SAND LYRD 0013 GREY CLAY STNS HARD 0016 BRWN SAND CLAY LYRD 0018 BRWN FSND SLTY 0029 BRWN CLAY SAND STNS 0037 GREY CLAY STNS 0061 FSND 0063 BRWN CLAY SAND LYRD 0074 SAND LOOS 0081 GREY CLAY SAND 0083 GREY SAND CLAY LOOS 0098 GREY SAND 0101 GREY CLAY SAND 0103 GREY SAND PCKD 0148 GREY FSND LOOS 0153 GREY CLAY SAND FGVL 0162
76	CON	3	27 69- 15075	620920 4860080	940	09/78	5459	6	FR	122	63	122	8	3/00	DO	CARANCI T BRWN CLAY STNS 0026 BRWN FSND 0037 BLUE CLAY 0063 BLUE CLAY SILT STNS 0091 BLCK SAND DRTY 0108 BLUE CLAY STNS DRTY 0110 GREY SAND STNS CLN 0126 (S 0122 03) BLUE CLAY 0130
77	CON	3	27 69- 15398	620860 4859900	910	10/79	1663	5	FR	90	64	80	10	1/00	DO	WOLFF H BRWN SAND GRVL 0008 BLUE CLAY GRVL 0026 BRWN CLAY GRVL 0031 BLUE CLAY 0056 BRWN FSND SILT 0078 BLUE CLAY 0080 GREY SAND CLAY 0091 GREY CSND GRVL 0105 (S 0093 03) GREY FSND 0112
78	CON	3	27 69- 17030	620160 4859800	1020	02/83	5459	6	FR	115	70	100	15		DO	VACCA M BLCK TPSL 0002 BRWN SAND CLAY SOFT 0090 BRWN SAND SOFT 0095 BLUE CLAY SAND 0098 BLUE CLAY SOFT 0115 BLUE GRVL 0119 (S 0116 03)
79	CON	3	28 69- 6489	619041 4859549	943	01/55	4823	4	FR	124	100	108	4	48/00	DO	MARWOOD G TPSL 0002 YLLW CLAY STNS 0028 YLLW CLAY MSND 0035 YLLW CLAY STNS 0045 YLLW CLAY MSND 0085 BLUE CLAY MSND SILT 0124 MSND SILT 0129 CSND 0133 (S 0129 04)
80	CON	3	28 69- 6490	619205 4859786	973	09/59	2801	5								CONNAUGHT LABS LTD TPSL 0001 CLAY MSND GRVL 0043 MSND CLAY 0062 FSND CLAY 0162 MSND 0185 MSND SILT CLAY 0394 CLAY 0424
81	CON	3	28 69- 6491	619607 4859903	982	09/59	2801	5								CONNAUGHT LABS LTD TPSL 0001 CLAY MSND 0026 CLAY GRVL 0031 FSND CLAY GRVL 0056 MSND BLDR 0057 MSND SILT CLAY 0207 CLAY MSND 0302
82	CON	3	28 69- 6492	619380 4859798	970	02/61	1622	4	FR	125	90	130	2	8/00	DO	PAYNE NORM PRDG 0006 BRWN CLAY 0019 STNS GRVL 0030

- CONTINUED -

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
																BRWN MSND 0080 BLUE CLAY [illegible] MSND 0105 BRWN MSND 0118 FSND 0130 (S 0125 04)
83	CON	3 28	69-9496	618980 4859860	965	07/69	5203	5	FR	153	54	145	12	8/00	DO	VANDERMARK J BRWN CLAY 0039 BLUE SILT CLAY 0047 BLUE CLAY 0153 QSND 0160 MSND 0168 (S 0164 04)
84	CON	3 28	69-14315	619720 4860040	972	06/77	2801	1							CO	DESPOSAL SERV LTD TPSL 0004 BRWN CLAY STNS LYRD 0014 BRWN FSND 0021 BRWN CLAY GRVL SNDY 0039 GREY CLAY 0049 FSND SLTY LOOS 0052 BRWN SAND PCKD 0067 BRWN SAND FGVL 0073 BRWN FSND CLAY LYRD 0120 GREY CLAY 0129 GREY SAND CLAY 0133 GREY CLAY 0139 GRVL FSND 0140 GREY CLAY SLTY 0158 FGVL SAND 0182 FSND GRVL CLAY 0213 GREY CLAY SNDY 0217 FSND FGVL CLAY 0262
	CON	3 28	69-14316	619300 4859920	982	06/77	2801	1							CO	DESPOSAL SERV LTD BRWN CLAY 0007 BRWN FSND 0009 BRWN CLAY 0018 GREY CLAY STNS 0056 GRVL SAND 0063 BRWN FSND PCKD 0103 FSND SILT 0107 SAND FGVL 0112 FSND 0118 GREY CLAY FSND SLTY 0134 FSND SLTY LOOS 0137 GREY CLAY SAND FGVL 0141 GREY CLAY HARD 0153 SAND FGVL CLAY 0158 SAND FGVL CLAY 0173 FSND CLAY LYRD 0179 SAND FGVL 0184 FSND CLAY LYRD 0197 FSND FGVL CLAY 0262
85	CON	3 29	69-6493	619054 4860101	950	09/59	2801	5								CONNAUGHT LABS LTD TPSL 0001 CLAY MSND 0006 MSND GRVL 0013 CLAY MSND GRVL 0156 FSND CLAY 0177 MSND SILT CLAY 0210 CLAY MSND 0347
	CON	3 29	69-6494	620485 4860609	980	09/59	2801	4	FR	52	29	40	50	24/00	CO	CARRIER SHOE CO MSND SILT BLDR 0052 MSND GRVL SILT 0072 (S 0061 11) BLUE CLAY 0092
	CON	3 29	69-6495	620496 4860594	980	10/59	2801	2			28					CARRIER SHOE CO MSND SILT BLDR 0050 MSND GRVL SILT 0072 (S 0065 10) BLUE CLAY 0075
	CON	3 30	69-6496	618937 4860548	990	08/54	1622	4	FR	164	120	149	8	2/00	DO	CROOK W TPSL 0002 BLUE CLAY 0025 YLLW MSND 0027 BLUE CLAY MSND STNS 0067 BLUE CLAY STNS 0090 BLUE CLAY 0164 BLUE MSND 0176 (S 0172 04)
86	CON	3 30	69-6498	620328 4860796	945	09/57	2314	6								MINGHELLA A MSND 0010 CLAY 0030 MSND CLAY 0140 GRVL 0142 QSND 0280
	CON	3 30	69-6499	620463 4860855	960	10/57	2314	6								MINGHELLA A TPSL 0005 MSND CLAY 0030 GRVL 0070 BLUE CLAY 0100 MSND CLAY 0168 STNS 0169
87	CON	3 30	69-	620500	960	11/57	2314	6								MINGHELLA A

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WATER WELL DATA SYSTEM 25 OCT 86 GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	UTM WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
			6500	4860607												TPSL 0005 MSND CLAY 0030 GRVL 0070 BLUE CLAY 0100 MSND CLAY 0180 GRVL 0185 SILT 0240 QSND 0420
	CON	3 30	69-6502	620218 4861101	920	08/59	2801	5								CARRIER SHOE CO CLAY MSND 0002 CLAY GRVL 0006 CLAY MSND BLDR 0016 BRWN CLAY GRVL 0043 MSND SILT 0046 CLAY GRVL 0053 MSND CLAY GRVL 0144 BLUE CLAY MSND 0264 MSND GRVL 0268 HPAN 0272 BLUE CLAY MSND GRVL 0316 BLUE CLAY GRVL BLDR 0330
	CON	3 30	69-6503	620012 4860823	925	08/59	2801	2	FR	257	43	51	12	5/00	CO	CARRIER SHOE CO MSND SILT 0014 BRWN CLAY MSND 0033 BLUE CLAY MSND 0257 MSND GRVL 0275 (S 0265 10)
88	CON	3 30	69-6504	619985 4861059	920	09/59	2801	5								CARRIER SHOE CO MSND SILT 0014 BRWN CLAY MSND 0033 BLUE CLAY MSND 0227 MSND SILT CLAY 0257 SILT MSND GRVL 0280 BLUE CLAY 0281
	CON	3 30	69-6505	619956 4861018	920	09/59	2801	5								CARRIER SHOE CO MSND SILT 0012 CLAY MSND 0031 BLUE CLAY 0042 CLAY MSND 0053 MSND GRVL SILT 0058 BLUE CLAY 0069 CLAY MSND GRVL 0179 CLAY SILT MSND 0259 MSND GRVL 0262 BLUE CLAY 0267 BLUE CLAY GRVL BLDR 0279
89	CON	3 31	69-6506	620484 4861314	945	08/59	2801	5								CARRIER SHOE CO TPSL 0001 CLAY MSND 0019 CLAY 0025 CLAY MSND SILT 0130 CLAY GRVL MSND 0158 CLAY SILT GRVL 0227 CLAY SILT BLDR 0240 HPAN 0243 BLUE CLAY GRVL 0275 BLUE CLAY 0287
	CON	3 31	69-6507	618872 4861079	983	01/60	4102	30	FR	40	40		1		DO ST	HOPE A L BLUE CLAY MSND 0084
90	CON	3 31	69-6508	618861 4860903	980	09/61	2407	4	FR	150	120	130	5	24/00	DO ST	HOPE A L PRDG 0070 BLUE CLAY 0090 BLUE MSND CLAY 0140 FSND 0150 CSND 0156 (S 0153 03)
91	CON	3 32	69-6509	619278 4861709	1020	05/64	3108	4	FR	154	132	154	3	2/00	DO	FENSTON L TPSL 0001 CLAY STNS 0020 BRWN CLAY MSND 0050 BRWN FSND 0073 CSND 0085 MSND 0091 FSND 0152 MSND 0157 (S 0154 03)
92	CON	3 32	69-6510	620356 4861972	1000	07/66	5203	7	FR	160	160	190	6	8/00	DO ST	RICE L BRWN MSND 0155 GRVL 0170 QSND 0196 (S 0195 04) FSND 0202 QSND 0220
93	CON	3 33	69-6511	618983 4861932	1030	07/66	3519	4	FR	175	115	140	10	6/00	DO	CREVIER J TPSL 0002 GREY CLAY 0110 BRWN MSND 0140 GREY CLAY 0175 GREY CSND 0185 (S 0181 04)
	CON	3 33	69-15090	620490 4862450	1028	10/78	4006	5	FR FR FR	130 200 256	151		4	99/59	DO	GOLDIN R BRWN SAND TPSL 0004 BRWN FSND DRTY 0097 GREY CLAY STNS SAND 0129 GREY SAND SILT

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WATER WELL DATA SYSTEM 25 OCT 86

GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
																CLAY 0131 (S 0130 12) GREY CLAY STNS 0199 GREY SAND CLAY LYRD 0201 GREY CLAY STNS SILT 0254 GREY SAND SILT CLAY 0256 GREY CLAY SILT 0296 (S 0256 12)
94	CON	3 33	69-15656	618700 4861850	1000	11/80	3108	6		192	152	160	10	2/00	ST	KRIGSTIN M BRWN CLAY 0030 BRWN SAND 0112 BLUE CLAY SNDY 0168 GREY SAND 0182 SILT 0188 BLUE CLAY SLTY 0192 BLUE SAND 0200 (S 0197 03)
	CON	3 35	69-6512	620210 4863131	1022	04/58	2314	4	FR	220	150	210	8	12/00	D0 ST	LANNING ALFRED TPSL 0008 BRWN MSND 0065 BLUE CLAY 0220 FSND 0290 (S 0280 08)
95	CON	3 35	69-6513	620372 4863210	1022	03/63	2613	7	FR	430	133	330	6	15/00	D0 ST	BENORA FARM YLLW CLAY 0043 BRWN MSND 0078 BLUE CLAY STNS 0090 SILT CLAY 0403 BLUE CLAY STNS 0430 GRVL 0434 (S 0430 04)
96	CON	3 35	69-6514	618872 4862806	1032	11/67	3108	5	FR	105	81	105	4	2/00	D0	SENELLY J TPSL 0001 YLLW CLAY 0030 BLUE CLAY 0050 BLUE CLAY GRVL 0065 MSND 0078 FSND 0116 (S 0113 03)
	CON	3 35	69-10221	618850 4862800	1030	10/70	5206	5	FR	105	65	105	5	10/00	D0	SANELLI J BRWN CLAY 0056 SILT 0105 FSND 0117 (S 0113 04)
97	CON	3 35	69-11345	619240 4862720	1025	01/73	3108	5		97	76	102	5	3/00	D0	SANELLI J TPSL FILL 0002 BLCK TPSL 0004 BRWN CLAY SAND 0034 BLUE CLAY SAND 0097 BLUE MSND 0104 (S 0098 06)
98	CON	3 35	69-14397	619040 4862780	1030	10/77	1663	6	FR	100	54	103	3	1/30	D0	WEISS JOHN BRWN TPSL 0001 YLLW CLAY SNDY 0007 YLLW CLAY GRVL 0010 BRWN MSND CLAY 0029 BRWN CLAY GRVL SAND 0041 BLUE CLAY SAND GRVL 0053 BRWN MSND 0065 GREY FSND 0110 (S 0104 03) GREY SILT FSND 0127
	CON	3 35	69-15199	618650 4862750	1000	09/79	3108	6		100	66	105	7	1/00	D0	SANELLI J YLLW CLAY STNY 0048 YLLW SAND 0097 BLUE SAND 0110 (S 0107 03)
	CON	4 1	69-17433	618400 4863100	995	04/84	5459	6	FR	57	8	45	15		D0	DISANTO A BLCK TPSL 0002 BRWN CLAY STNS 0023 BLUE CLAY SOFT 0047 BLUE CLAY SAND 0057 BLUE SAND 0064 (S 0061 03)
	CON	4 2	69-6515	619182 4848532	630	10/63	1622	4	FR	170	100	187	5	8/00	D0 ST	TORONTO GEN CEMETERY PRDG 0017 BLUE CLAY 0170 CSND 0187 (S 0183 04)
	CON	4 2	69-13190	619164 4848457	640	11/75	1663	5	FR	162	101	165	10	2/00	D0	TOR BURIAL GROUND BLCK TPSL 0001 YLLW CLAY SAND 0006 YLLW CLAY GRVL 0016 BLUE CLAY GRVL 0033 BLUE CLAY 0128 GREY SAND SILT 0153 GREY MSND 0156 BLUE CLAY GRVL 0161 GREY MSND 0170 (S 0166 03) BLUE CLAY 0202

WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
			6289	4858192												CLAY BLDR 0030 BRWN FSND 0060 GREY FSND 0095 GREY CLAY 0173 BLCK GRVL 0182 GRVL CLAY 0184 GRVL 0200 CLAY GRVL 0210 GRVL CLAY 0220 FSND CLAY 0240
	CON	2 23	69-6290	622111 4858245	840	04/59	2402	5			40					LANDS AND FORESTS CLAY 0003 BRWN FSND 0070 MSND 0080 GREY MSND CLAY 0120 CSND CLAY 0130 GREY FSND 0140 MSND GRVL 0142 CLAY GRVL 0160 GRVL 0165 GREY FSND 0170 CLAY GRVL 0185 GRVL 0187 MSND CLAY 0190 CLAY 0235 GREY FSND 0245
	CON	2 23	69-6291	622239 4858020	820	05/59	2402	5			40					LANDS AND FORESTS BRWN FSND 0045 CLAY MSND 0070 GREY CLAY 0150 CLAY GRVL 0160 MSND GRVL 0165 BRWN MSND 0185 GREY CLAY 0188
	CON	2 23	69-6292	622240 4858137	800	06/59	2402	5			27					LANDS AND FORESTS BLCK TPSL 0002 CLAY GRVL 0070 BRWN FSND 0090 FSND CLAY 0200 GRVL MSND 0235 GREY FSND 0240 CLAY 0242
	CON	2 23	69-6293	622113 4858233	820	06/58	2402	10	FR FR	160 176		160	3	48/00	PS	LANDS AND FORESTS MSND STNS 0006 MSND CLAY 0040 CLAY MSND GRVL 0100 CLAY 0120 GRVL CLAY 0128 CLAY MSND 0140 GRVL CLAY 0156 GRVL MSND 0160 GRVL FSND 0176 (S 0162 12)
	CON	2 23	69-6294	623056 4859042	800	07/60	2527	2	FR	58	5	5	4	1/00	ST DO	RUMBLE DAVE YLLW CLAY STNS 0020 BLUE CLAY 0052 QSND 0058 (S 0057 05) GRVL 0062
	CON	2 23	69-6296	621590 4858420	810	10/59	2402	13	FR	200	22	102	640	48/00	PS	LANDS AND FORESTS MSND 0060 CLAY 0170 HPAN 0185 GRVL 0220 (S 0200 30) GRVL CSND 0230
	CON	2 23	69-6297	621590 4858420	810	10/64	2402	13	FR	210	18	120	700	48/00	PS	LANDS AND FORESTS TPSL 0001 MSND CLAY 0040 CLAY SILT QSND 0160 FSND 0175 HPAN 0187 FSND GRVL 0198 GRVL FSND 0235 (S 0210 25)
	CON	2 23	69-11043	623209 4858895	777	04/72	1663			DRY						SAVAGE M TPSL 0001 BRWN SAND CLAY 0008 BLUE CLAY GRVL 0022 BLUE CLAY SAND 0034 BLUE CLAY GRVL 0115 BLUE CLAY SAND 0129 GRVL SAND 0141 BLUE CLAY 0263
	CON	2 24	69-6295	622111 4858499	870	06/59	2402	5			50					LANDS AND FORESTS BRWN FSND 0080 CLAY MSND 0145 CLAY GRVL 0152 BRWN MSND 0158 CLAY HPAN 0250
	CON	2 25	69-6298	622199 4859534	865	03/66	2801	6								RICHMOND HILL P U C TPSL 0001 CLAY 0009 MSND SILT GRVL 0049 GRVL MSND CLAY 0078 CLAY SILT 0107 CLAY SILT GRVL 0157 CLAY GRVL 0229 CLAY SILT 0312 CLAY GRVL 0446 SHLE 0449
	CON	2 25	69-	623156	815	06/66	2801	2								RICHMOND HILL P U C

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WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
			6299	4859528												TPSL 0001 CLAY 0012 CLAY GRVL 0043 CLAY SILT 0060 CLAY 0067 SILT CLAY 0081 CLAY 0097 CLAY GRVL 0104 GRVL MSND SILT 0110 CLAY GRVL 0124 CLAY GRVL MSND 0138 HPAN 0140 CLAY GRVL CLAY 0201 CLAY 0281 CLAY GRVL 0317
100	CON	2 25	69-8706	622600 4859720	854	07/68	2407	7	FR	65	39	68	6	6/00	DO	KREINER JOSEPH
101	CON	2 25	69-12220	621639 4859370	900	03/74	1663	6	FR	140	54	145	8	2/00	DO	TPSL 0002 BRWN MSND CLAY 0023 BLUE CLAY 0065 CSND 0069 (S 0065 04) KLEES CARL BLCK TPSL 0001 YLLW CLAY SAND 0022 YLLW CLAY GRVL 0070 GREY SAND 0072 BLUE CLAY GRVL 0120 GREY SAND GRVL CLAY 0140 GREY SAND GRVL 0150 (S 0146 04) BLUE CLAY GRVL 0172
102	CON	2 26	69-6300	621121 4859761	892	12/55	1622	6	FR	145	120	135	3	12/00	DO	MAPLE DOWNS GOLF TPSL 0001 FSND 0085 BLUE CLAY 0090 FSND 0130 BLUE CLAY 0136 FSND 0145 (S 0139 06)
	CON	2 26	69-6301	622388 4859774	830	04/64	4201	30	FR	12	12		4		DO	ELDRIDGE G CSND 0025
103	CON	2 26	69-6302	622378 4859794	830	10/64	5420	5	FR	112	17	30	7	22/00	DO	ELDRIDGE GEORGE PRDG 0020 BRWN MSND 0046 MSND SILT GRVL 0050 BLUE CLAY MSND 0080 CLAY GRVL 0112 (S 0111 04) MSND 0115
104	CON	2 26	69-9529	622030 4859640	880	08/69	1622	5	FR	128	70	128	2	24/00	DO	OBEE H TPSL 0001 BRWN FSND 0085 CLAY MSND 0122
105	CON	2 27	69-6303	621463 4860108	910	05/58	2613	10	FR	30	36	67	433	8/00	IR	BLUE CLAY 0128 FSND 0132 (S 0128 04) MAPLE DOWNS GOLD
106	CON	2 27	69-6304	621055 4859995	910	08/64	1622	4	FR	96	68	98	5	4/00	DO	CLAY 0030 GRVL MSND 0088 (S 0074 14) GEORGE D PRDG 0005 BRWN MSND 0090 BLCK FSND 0098 (S 0094 04)
	CON	2 27	69-8702	622840 4860450	844	10/68	1622	5	FR	98	9	58	60	24/00	DO	MILLVIEW INVESTMENT BRWN MSND 0008 BLUE CLAY MSND 0097 GRVL CLAY 0099 CSND 0107 (S 0099 08)
	CON	2 27	69-10569	622500 4860430	850	02/71	1663	7	FR	89	10	71	90	23/40		MILLVIEW INVESTMENTS BRWN SAND 0008 BRWN SAND CLAY 0045 GREY SAND CLAY 0089 GREY SAND GRVL 0102 (S 0091 08) (S 0099 02)
107	CON	2 27	69-13884	621440 4860060	910	08/76	1663	5	FR	125	69	130	14	1/30	IR DO	HEBREW MEMORIAL PARK YLLW CLAY SNDY 0014 BRWN SAND 0024 BRWN CSND CGVL 0068 BLUE CLAY 0084 BRWN SAND GRVL 0107 BRWN FSND 0118 BLUE CLAY SAND 0120 GREY MSND 0132 (S 0127 04) GREY MSND FSND 0148 BLUE CLAY GRVL 0175 SAND SILT CLAY 0202
	CON	2 28	69-	622735	920	08/54	4527	4	FR	103	25	80	2	3/00	DO	MAYBEE AND FRIZLER

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WATER WELL DATA SYSTEM 25 OCT 86 GROUND WATER BULLETIN REPORT

WELL NUMBER	CONCESSION ETC	LOT	UTM WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
			6305	4861088												BRWN MSND CLAY 0035 BLUE CLAY 0075 MSND GRVL 0088 BRWN MSND 0103 (S 0097 06)
108	CON	2 28	69-6306	621058 4860351	930	04/56	2801	6								MAPLE DOWNS GOLF MSND CLAY 0005 BRWN CLAY MSND 0013 BRWN MSND CLAY 0070 MSND GRVL 0071 GREY CLAY 0076 GREY CLAY MSND 0093 BRWN CLAY MSND CLAY 0128 MSND GRVL 0136 MSND GRVL CLAY 0147 MSND CLAY MSND 0154 GREY CLAY MSND CLAY 0168 GREY CLAY MSND 0180 MSND GRVL CLAY 0199 GREY CLAY MSND GRVL 0253 GREY CLAY MSND 0297 GRVL CLAY 0298 GRVL SHLE 0299
109	CON	2 28	69-6307	621286 4860435	920	05/56	2801	6								MAPLE DOWNS GOLF TPSL MSND 0001 BRWN MSND GRVL CLAY 0014 BRWN MSND GRVL 0020 BRWN CLAY MSND 0058 MSND GRVL 0060 MSND GRVL CLAY 0093 GRVL FSND 0098 HPAN 0111 GRVL CLAY 0115 GRVL MSND 0120 GRVL CLAY 0126 GRVL MSND 0132 BLUE CLAY MSND GRVL 0145 GREY CLAY MSND GRVL 0173 MSND GRVL CLAY 0176 GREY CLAY MSND GRVL 0194 MSND CLAY 0220
110	CON	2 28	69-6308	620986 4860422	940	05/56	2801	6								MAPLE DOWNS GOLF TPSL MSND GRVL 0004 BRWN CLAY MSND GRVL 0102 GRVL MSND FSND 0113 GRVL CLAY 0126 BLUE CLAY MSND GRVL 0252
111	CON	2 28	69-6309	621202 4860307	940	05/56	2801	6								MAPLE DOWNS GOLF TPSL 0001 BRWN MSND 0026 BRWN CLAY MSND GRVL 0048 BLUE CLAY MSND GRVL 0061 BRWN MSND GRVL CLAY 0098 GRVL MSND 0123 GREY CLAY GRVL 0136 BLUE CLAY MSND GRVL 0156
112	CON	2 28	69-6310	621585 4860427	890	06/56	2801	6								MAPLE DOWNS GOLF PRDR 0139 CLAY SILT 0199 BLUE CLAY 0205 CLAY SILT MSND 0215 CLAY SILT BLDR 0225 CSND FSND SILT 0232 MSND SILT 0320 BLUE CLAY 0326 MSND SILT 0365 BLUE CLAY GRVL 0367
113	CON	2 28	69-6311	621446 4860566	900	06/56	2801	6								MAPLE DOWNS GOLF TPSL 0001 CLAY MSND 0003 CLAY SILT GRVL 0020 MSND GRVL BLDR 0046 BLUE CLAY 0047 MSND GRVL 0069 BLUE CLAY GRVL 0084 CLAY 0091 MSND CLAY BLDR 0162 BLUE CLAY GRVL BLDR 0240 BLUE CLAY 0241 CLAY MSND GRVL 0252
	CON	2 28	69-6312	621573 4860379	910	06/56	2801	6								MAPLE DOWNS GOLF MSND SILT 0001 CLAY MSND 0013 MSND GRVL BLDR 0068 CLAY MSND GRVL 0119 MSND GRVL 0129 SILT MSND GRVL 0140 MSND GRVL CLAY 0214 HPAN 0215 SILT BLDR MSND 0218 HPAN

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WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
																0219 SILT MSND 0238 BLUE MSND CLAY SILT 0304
	CON	2 28	69- 6313	621625 4860421	910	07/56	2801	2	FR	74	40	41	12	8/00	CO IR	MAPLE DOWNS GOLF TPSL 0001 BRWN CLAY MSND BLDR 0025 BRWN CLAY GRVL BLDR 0074 GRVL MSND 0088 (S 0078 10) MSND 0090 CLAY MSND GRVL 0112 MSND SILT CLAY 0131 BLUE CLAY GRVL MSND 0137 MSND SILT 0143 BLUE CLAY GRVL MSND 0191
114	CON	2 28	69- 6314	622722 4860920	860	09/63	1622	4	FR	97	50	105	4	8/00	DO	EATON E A TPSL 0001 BRWN CLAY MSND 0097 FSND 0105 (S 0097 08)
	CON	2 28	69- 10088	622370 4860690	890	11/70	2801			DRY						MAPLE DOWNS GOLF CL BRWN MSND CLAY 0011 BRWN CLAY MSND 0031 BRWN MSND GRVL CLAY 0035 GREY CLAY 0071 GREY CLAY SILT GRVL 0079 GREY CLAY SILT 0091 BRWN MSND GRVL 0097 GREY CLAY SILT 0106
	CON	2 29	69- 6315	621406 4861515	940	11/54	2636	6		DRY						MAPLE DOWNS GOLF BRWN CLAY 0035 BLUE CLAY 0090 SILT 0310
	CON	2 29	69- 6316	621114 4861189	980	12/54	2636	6	FR	89	45	75	300	48/00	IR	MAPLE DOWNS GOLF BRWN CLAY 0018 BRWN MSND 0030 BLUE CLAY 0089 GRVL 0099 (S 0089 10)
115	CON	2 29	69- 6317	622697 4861495	950	06/56	4508	2	FR	128	30		2	3/00	DO	ALPINE NURSERIES BRWN CLAY MSND 0026 BRWN FSND 0125 BRWN MSND 0131 (S 0126 05)
116	CON	2 29	69- 6318	621623 4860972	940	06/56	2801	6								MAPLE DOWNS GOLF TPSL 0001 MSND SILT 0012 MSND CLAY BLDR 0028 SILT MSND CLAY 0040 BLUE CLAY SILT MSND 0045 SILT MSND 0047 SILT MSND CLAY 0101 SILT MSND BLDR 0158 GRVL MSND SILT 0180 BLDR 0181
117	CON	2 29	69- 6319	622786 4861335	950	01/57	4527	2	FR	170	42	42	3	2/00	DO	FULLMAN J BRWN CLAY 0012 BRWN FSND 0108 BLUE CLAY 0170 GREY MSND 0175 (S 0170 05)
118	CON	2 29	69- 10089	621040 4860880	980	11/70	2801			DRY						MAPLE DOWNS GOLF CL BRWN CLAY MSND 0014 GREY CLAY SILT 0041 GREY CLAY SILT GRVL 0046 GREY CLAY SILT 0162 GREY CLAY SILT GRVL 0285 GREY CLAY GRVL 0386
	CON	2 29	69- 10090	620970 4860600	960	11/70	2801			DRY						MAPLE DOWNS GOLF CL BRWN CLAY GRVL 0020 BRWN MSND GRVL 0024 BRWN MSND GRVL CLAY 0046 BRWN SILT CLAY 0054 GREY CLAY SILT 0096 GREY SILT MSND 0102 GREY SILT CLAY 0118 BRWN MSND GRVL 0122 GREY SILT CLAY 0191 GREY SILT CLAY GRVL 0194 GREY SILT CLAY 0249
	CON	2 29	69-	622533	965	09/74	1663	6	FR	195	95	200	4	4/00	DO	MILANI I

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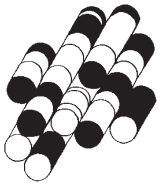
WELL NUMBER	CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
																0160 BLUE CLAY GRVL 0180 FSND SILT 0200 FSND 0265 MSND 0273 (S 0269 04)
	CON	2 34	69-17308	622280 4863160	1040	11/84	3108	6	FR	262	140	155	12	2/00	DO	CAROLINE CONST BRWN CLAY 0013 BRWN SAND 0090 BLUE CLAY 0115 BLUE SAND 0141 BLUE CLAY 0144 BLUE FSND 0155 BLUE CLAY 0168 BLUE SAND 0180 BLUE CLAY 0208 BLUE SILT CLAY 0261 BRWN SAND 0272 (S 0266 06)
	CON	2 35	69-6329	620624 4863198	1036	08/58	2314	4	FR	220	160	210	7	16/00	DO ST	BURNS C F W TPSL 0005 BRWN MSND 0070 CLAY 0100 MSND CLAY 0200 HPAN 0220 FSND 0265 (S 0257 08)
	CON	2 35	69-6330	620674 4863097	1036	07/65	2407	5	FR	337	170	290	6	12/00	DO ST	BURNS C F W TPSL 0001 BLUE CLAY 0102 BLUE FSND 0290 BLUE CLAY 0330 BLUE MSND 0337 (S 0333 04)
	CON	3 1	69-6332	623643 4849317	623	05/55	2909	6	FR	160	54	64	40	6/00	CO	CANADIAN PETROFINA FILL 0001 BRWN CLAY 0012 BRWN CLAY MSND 0016 BRWN CLAY 0042 GREY CLAY 0109 QSND 0134 SILT MSND 0142 MSND GRVL 0160 GREY SHLE 0166 (S 0160 04)
	CON	3 1	69-6333	623565 4849346	627	09/55	2801	6								FRASER J TPSL 0002 BRWN CLAY BLDR 0008 MSND CLAY 0020 MSND CLAY GRVL 0029 GREY CLAY GRVL 0057 CLAY GRVL 0142 FSND GRVL CLAY 0159 GRVL MSND SILT 0162 MSND CLAY 0166 CLAY GRVL 0188
	CON	3 1	69-6334	623625 4849438	623	09/55	2801	6								FRASER J TPSL 0002 BRWN CLAY BLDR 0015 BRWN CLAY 0028 GREY CLAY FSND GRVL 0068 GREY CLAY GRVL 0125 CLAY MSND GRVL 0153 MSND SILT CLAY 0158 GRVL CLAY 0167 CLAY BLDR 0168 BLUE CLAY GRVL 0174
	CON	3 1	69-6335	623455 4849240	636	09/55	2801	4	FR	37	12	32	6	2/00		FRASER J TPSL 0002 BRWN CLAY GRVL 0017 MSND CLAY 0030 MSND GRVL CLAY 0183 (S 0037 10)
	CON	3 1	69-6336	622794 4849043	640	12/55	2801	6								FRASER J TPSL 0002 BRWN CLAY MSND 0024 CLAY MSND GRVL 0037 CLAY GRVL 0379 SHLE 0380
	CON	3 1	69-9533	622140 4849060	650	07/69	2610	5	FR	175	95	209	8	4/00	CO	TEPERMANS LTD BRWN CLAY 0040 GREY CLAY STNS 0160 MSND 0175 CSND 0209 (S 0205 04)
	CON	3 2	69-6331	622032 4849349	662	08/47	4841	6	FR	170	100				DO ST	FRASER J FILL TPSL 0008 BLUE CLAY 0120 BLUE CLAY MSND 0173
	CON	3 2	69-6337	623363 4849679	623	09/55	2801	6								FRASER J TPSL 0002 BRWN CLAY GRVL BLDR 0030 GREY CLAY GRVL 0049 CLAY GRVL 0154 SILT GRVL

- CONTINUED -

APPENDIX B

TERRAPROBE INC.



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for 2-sided printing purposes

LEGEND

- WELL NUMBER
- WELL LOCATION
- HYDROGEOLOGIC CROSS SECTIONS
- WATERSHED DIVIDE

Scale 1:10 000

500 Metres 0 500 1000 Metres

1000 Feet 0 1000 2000 3000 4000 5000 Feet

Contour Interval 5 Metres

PROJECT:

PRELIMINARY AGGREGATE RESOURCE STUDY

SHEET TITLE:

WELL LOCATION PLAN

PROJECT No.	DATE:
96250	DECEMBER 1997

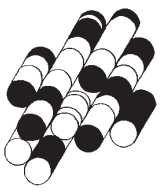
TERRAPROBE

FIGURE No. 2

9625-2

APPENDIX C

TERRAPROBE INC.



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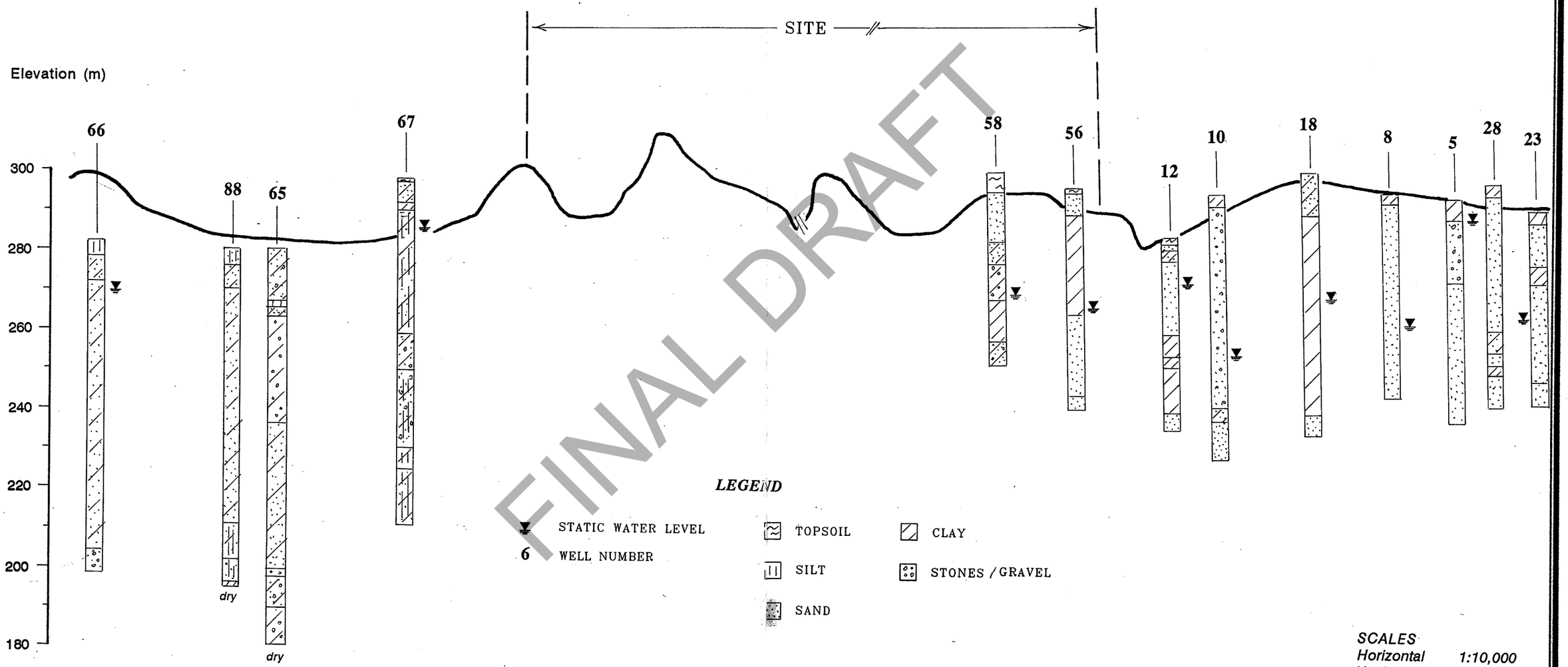
for 2-sided printing purposes

SECTION A-A'

WEST

EAST



HYDROGEOLOGIC CROSS SECTION

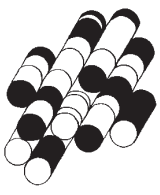
TERRAPROBE

File No. 96250

FIGURE 4

APPENDIX D

TERRAPROBE INC.



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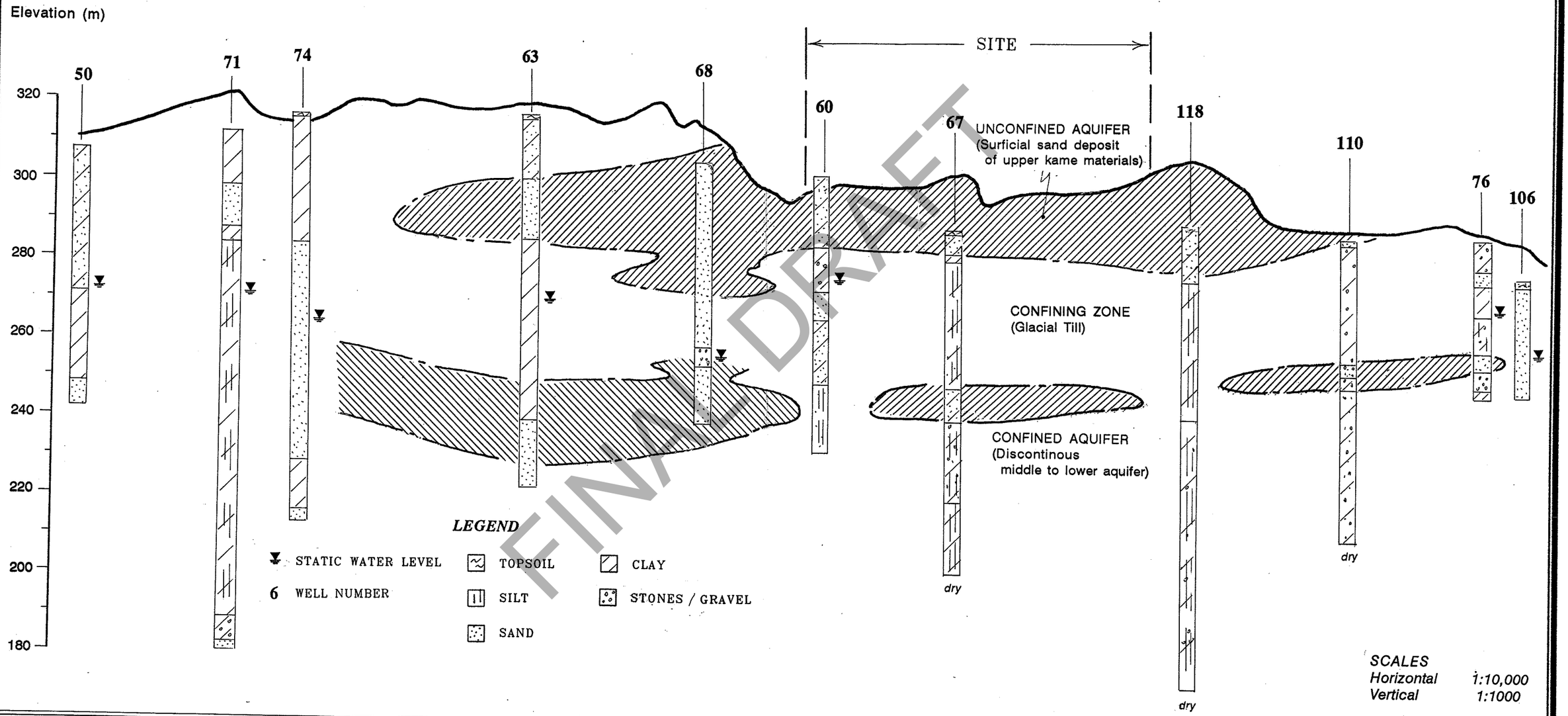
for 2-sided printing purposes

SECTION B-B'

NORTH

SOUTH



SCALES
Horizontal 1:10,000
Vertical 1:1000

HYDROGEOLOGIC CROSS SECTION

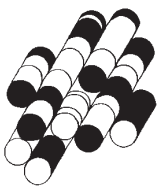
TERRAPROBE

File No. 96250

FIGURE 5

APPENDIX E

TERRAPROBE INC.



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LOG OF BOREHOLE 1

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : TG
Date started : December 7, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 620760, N: 4861627 (UTM 17T) Elevation Datum : Geodetic

Rig type : CME 55, truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
	299.1	**GROUND SURFACE**											
0	298.9	160mm **ASPHALTIC CONCRETE**					299						
	0.2	640mm **AGGREGATE**		1	SS	66							
	298.3												
1	0.8	**SAND**, some silt to silty, trace clay, compact to dense, brown, moist		2	SS	42	298						
				3	SS	22							
2				4	SS	18	297						
3				5	SS	19	296						0 69 29 2
4				6	SS	29	295						
5							294						
6				7	SS	40	293						
	292.5												
	6.6	**END OF BOREHOLE**											

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit — PL MC LL 10 20 30

Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 2

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : October 31, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 620915, N: 4861628 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity (PL, MC, LL)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments (GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL)
0	289.4	**GROUND SURFACE**					289						
	289.2 / 0.2	150mm **TOPSOIL**											
		FILL, sandy silt, trace clay, trace gravel, trace organics, trace rootlets, loose, brown, moist		1	SS	6							
	288.6 / 0.8	**SANDY SILT to SILTY SAND**, trace clay, trace gravel, loose to compact, brown, moist		2	SS	8							
1				3	SS	4	288						
2				4	SS	17	287						1 22 70 7
3				5	SS	24	286						
4		...wet below		6	SS	23	285						
5							284						
6				7	SS	22	283						
	282.8 / 6.6												

END OF BOREHOLE

Borehole was dry and encased during drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	6.3	283.1
Jan 25, 2018	dry	n/a

LOG OF BOREHOLE 3

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : October 31, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621095, N: 4861658 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
0	301.0	**GROUND SURFACE**					
	300.7	300mm **TOPSOIL**		1	SS	3	
	0.3	**FILL**, sandy silt, trace clay, trace gravel, trace organics, very loose, brown, moist					
	300.2						
	0.8	**SAND**, some silt to silty, trace clay, loose to compact, brown, damp to moist		2	SS	8	300
1				3	SS	8	
2				4	SS	18	299
3				5	SS	14	298
4				6	SS	28	297
5							296
6		...trace silt, dense to very dense below		7	SS	31	295
7				8	SS	38	294
8							293
9				9	SS	55	292
10							291
11				10	SS	78	290

Penetration Test Values (Blows / 0.3m)
Dynamic Cone 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined, Pocket Penetrometer, Field Vane, Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit, Natural Water Content, Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL
0 94 4 2

October 31, 2017
November 1, 2017

(continued next page)

LOG OF BOREHOLE 3

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : October 31, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 2 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621095, N: 4861658 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
12		*(continued)*					289
		SAND, some silt to silty, trace clay, loose to compact, brown, damp to moist *(continued)*		11	SS	57	
13							288
				12	SS	71	
14							287
15				13	SS	47	286
16							285
		... wet below		14	SS	54	284
17							
18				15	SS	32	283
19							282
20	280.7 / 20.3			16	SS	31	281

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL) Natural Water Content (MC) Liquid Limit (LL) 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

spoon wet 0 76 21 3

END OF BOREHOLE

Unstabilized water level measured at 16.8 m below ground surface; borehole was encased during drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	17.9	283.1
Jan 25, 2018	17.9	283.1

LOG OF BOREHOLE 4

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : October 31, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621315, N: 4861662 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Lab Data and Comments
0	284.7	**GROUND SURFACE**										
		FILL, sand, trace gravel, trace silt, construction debris, compact, brown, moist		1	SS	15						
	283.9						284					
1	0.8	**SAND**, trace to some silt, trace gravel, compact to dense, brown, moist		2	SS	37						
		...wet below		3	SS	14	283					spoon wet
2				4	SS	21	282					
3				5	SS	20	281					
4	280.1											
	4.6	**SANDY SILT to SILTY SAND**, trace clay, compact to dense, brown, wet		6	SS	38	280					
5												
6				7	SS	27	279					
7		...grey below					278					
8				8	SS	30	277					
9				9	SS	29	276					
10							275					

Penetration Test Values (Blows / 0.3m): Dynamic Cone (10, 20, 30, 40)

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane (40, 80, 120, 160)

Moisture / Plasticity: Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL) (10, 20, 30)

Unstabilized Water Level

Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

(continued next page)

LOG OF BOREHOLE 4

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : October 31, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 2 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621315, N: 4861662 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity (PL, MC, LL)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments (GR SA SI CL)
11	273.6 / 11.1	**SANDY SILT to SILTY SAND**, trace clay, compact to dense, brown, wet *(continued)* ...very dense		10	SS	53	274						

END OF BOREHOLE

Unstabilized water level measured at 2.3 m below ground surface; borehole was encased during drilling.

LOG OF BOREHOLE 5

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 1, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621460, N: 4861754 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments / GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
0	282.9 **GROUND SURFACE**												
	282.6 / 0.3	300mm **TOPSOIL**											
1		**FILL**, sand, trace silt, trace gravel, loose, brown, moist		1	SS	4							
				2	SS	4	282						
	281.4 / 1.5	**SANDY SILT to SILTY SAND**, trace gravel, loose to compact, brown, moist to wet		3	SS	10	281						
2				4	SS	6							spoon wet
3				5	SS	14	280						
4				6	SS	24	279						
5				7	SS	20	278						
6				8	SS	22	277						
7							276						
8				9	SS	32	275						0 1 84 15
9	273.8 / 9.1	**SILT**, trace to some clay, trace sand, dense, grey, wet					274						
10							273						

Penetration Test Values (Blows / 0.3m): Dynamic Cone; 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

(continued next page)

Terraprobe

LOG OF BOREHOLE 5

Project No. : 1-15-0700-01 | Client : Rizmi Holdings Limited | Originated by : SM

Date started : November 1, 2017 | Project : Kirby Road Extension | Compiled by : NNA

Sheet No. : 2 of 2 | Location : Vaughan, Ontario | Checked by : SZ

Position : E: 621460, N: 4861754 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Track-mounted | Drilling Method : Hollow stem augers

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
		SILT, trace to some clay, trace sand, dense, grey, wet *(continued)*					
	272.2 / 10.7	**CLAYEY SILT**, trace sand, trace gravel, very stiff to hard, grey, wet to wet		10	SS	29	272
11							
12				11	SS	59	271
	270.3 / 12.6	**END OF BOREHOLE**					

Drilling mud was used during drilling. The borehole was encased during drilling.

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL) 10, Natural Water Content (MC) 20, Liquid Limit (LL) 30

Headspace Vapour (ppm) | Instrument Details | Unstabilized Water Level | Lab Data and Comments | GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

LOG OF BOREHOLE 6

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 2, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621525, N: 4861759 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	278.6	**GROUND SURFACE**				
	278.4	150mm **TOPSOIL**				
	0.2	**FILL**, silty sand, trace organics, loose, brown, moist		1	SS	5
	277.8					
1	0.8	**SAND**, trace to some silt, compact, brown, wet		2	SS	16
				3	SS	10
2				4	SS	12
3				5	SS	19
4	274.0					
	4.6	**SILTY SAND**, trace clay, compact, brown, wet		6	SS	21
5						
6	272.5					
	6.1	**SILT**, trace sand, trace clay, compact, grey, wet		7	SS	18
	272.0					
	6.6					

Elevation Scale (m): 278, 277, 276, 275, 274, 273

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL) Natural Water Content (MC) Liquid Limit (LL) 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Drilling mud was used during drilling. The borehole was encased during drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	1.8	276.8
Jan 25, 2018	1.6	277.0

file: 1-15-0700-01_borehole_logs_coord updated 2018-01-30.gpj

LOG OF BOREHOLE 7

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 10, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621644, N: 4861833 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
0	288.9	**GROUND SURFACE**					
	288.6	250mm **TOPSOIL**					
	0.3	**FILL**, sand, some silt, very loose, brown, moist		1	SS	4	
	288.1						
	0.8	**SAND**, trace to some silt, trace gravel, loose to compact, brown, damp to moist		2	SS	5	288
1				3	SS	9	287
2				4	SS	17	
3		...trace rootlets		5	SS	18	286
4							285
5				6	SS	17	284
6		...dense to very dense below		7	SS	45	283
7							282
8		...occasional silt partings		8	SS	56	281
9				9	SS	86	280
10							279

Penetration Test Values (Blows / 0.3m)
Dynamic Cone 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined Field Vane
Pocket Penetrometer Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

(continued next page)

Terraprobe

LOG OF BOREHOLE 7

Project No. : 1-15-0700-01 | Client : Rizmi Holdings Limited | Originated by : SM

Date started : November 10, 2017 | Project : Kirby Road Extension | Compiled by : NNA

Sheet No. : 2 of 2 | Location : Vaughan, Ontario | Checked by : SZ

Position : E: 621644, N: 4861833 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Track-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	SOIL PROFILE: Description (continued)	Graphic Log	SAMPLES: Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
11	277.8 / 11.1	**SAND**, trace to some silt, trace gravel, loose to compact, brown, damp to moist *(continued)*		10	SS	80	278						

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 8

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 10, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621693, N: 4861854 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
		SOIL PROFILE		SAMPLES				Dynamic Cone 10 20 30 40; Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160	Plastic Limit, Natural Water Content, Liquid Limit PL MC LL 10 20 30				GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
0	289.2	**GROUND SURFACE**					289						
	288.9	250mm **TOPSOIL**											
	0.3	**FILL**, sand, trace silt, loose, brown, damp to moist		1	SS	5							
	288.4												
1	0.8	**SAND**, trace to some silt, trace clay, loose to dense, brown, damp to moist		2	SS	7	288						
				3	SS	16							
2				4	SS	14	287						0 92 6 2
3				5	SS	13	286						
4							285						
5				6	SS	13	284						
6				7	SS	29	283						
7		...very dense		8	SS	51	282						
8							281						
9				9	SS	22	280						
10													

(continued next page)

LOG OF BOREHOLE 8

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 10, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 2 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621693, N: 4861854 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
		(continued)				
		SAND, trace to some silt, trace clay, loose to dense, brown, damp to moist *(continued)*				
11				10	SS	36
12		...silty sand		11	SS	25
	276.6 / 12.6					

Elevation Scale (m): 279, 278, 277

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Borehole was dry and encased during drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 25, 2018	dry	n/a

LOG OF BOREHOLE 9

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 2, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621543, N: 4861694 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	281.1	**GROUND SURFACE**				
	280.9	150mm **TOPSOIL**				
	0.2	**FILL**, sandy silt, trace clay, trace organics, loose, brown, moist		1	SS	6
	280.3					
	0.8	**SANDY SILT to SILTY SAND**, compact to dense, brown, moist		2	SS	22
1				3	SS	25
2				4	SS	36
3				5	SS	38
4		...wet below		6	SS	20
5						
6				7	SS	24
7		...grey		8	SS	22
8	273.0					
	8.1	**END OF BOREHOLE**				

Elevation Scale (m): 281, 280, 279, 278, 277, 276, 275, 274

Penetration Test Values (Blows / 0.3m): Dynamic Cone (×) 10 20 30 40

Undrained Shear Strength (kPa): Unconfined (○) Pocket Penetrometer (●) Field Vane (+) Lab Vane (■) 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL) Natural Water Content (MC) Liquid Limit (LL) 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

Drilling mud was used during drilling. The borehole was encased during drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	5.4	275.7
Jan 25, 2018	5.2	275.9

file: 1-15-0700-01_borehole_logs_coord updated 2018-01-30.gpj

LOG OF BOREHOLE 10

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 3, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621731, N: 4861715 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	275.7	**GROUND SURFACE**				
	275.5 / 0.2	150mm **TOPSOIL**				
		FILL, sand, trace to some silt, trace gravel, trace rootlets, very loose to compact, brown, moist		1	SS	6
1				2	SS	14
2				3	SS	16
		...wet below		4	SS	1
3				5	SS	0
4						
		...presence of original topsoil layer		6	SS	26
5						
6	269.6 / 6.1					
		SAND, trace silt, trace gravel, dense, brown, wet		7	SS	30
7	268.1 / 7.6					
		SILT, trace clay, trace sand, dense, grey, moist		8	SS	50
8	267.6 / 8.1					

Elevation Scale (m): 275, 274, 273, 272, 271, 270, 269, 268

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)

GR SA SI CL

0 3 87 10

END OF BOREHOLE

Drilling mud was used during drilling. The borehole was encased during drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	3.1	272.6
Jan 25, 2018	3.0	272.7

LOG OF BOREHOLE 11

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 3, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621814, N: 4861925 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
0	289.5	**GROUND SURFACE**					289
	289.3	150mm **TOPSOIL**					
	0.2	**FILL**, sand, some silt to silty, loose, brown, moist		1	SS	7	
	288.7						
1	0.8	**SAND**, trace to some silt, loose to dense, brown, damp to moist		2	SS	5	288
				3	SS	12	
2				4	SS	23	287
3				5	SS	21	286
4				6	SS	20	285
5							
6		...silty sand		7	SS	36	284
7							283
8				9	SS	21	282
9							281
10				10	SS	26	280

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10, 20, 30, 40

Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40, 80, 120, 160

Moisture / Plasticity — Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL): 10, 20, 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

(continued next page)

LOG OF BOREHOLE 11

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 3, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 2 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621814, N: 4861925 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity (PL, MC, LL)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments (GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL)
11	278.4 11.1	**SAND**, trace to some silt, loose to dense, brown, damp to moist *(continued)*		11	SS	34	279						

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 12

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 3, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621884, N: 4861824 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	286.8	**GROUND SURFACE**				
	286.6 / 0.2	150mm **TOPSOIL**				
		FILL, sand, some silt, trace rootlets, loose, brown, moist		1	SS	6
	286.0 / 0.8	**SAND**, trace to some silt, loose to compact, brown, damp to moist		2	SS	8
1				3	SS	10
2				4	SS	15
3				5	SS	19
4				6	SS	26
5						
6		...dense		7	SS	36
	280.2 / 6.6	**END OF BOREHOLE**				

Elevation Scale (m): 286, 285, 284, 283, 282, 281

Penetration Test Values (Blows / 0.3m): Dynamic Cone (10, 20, 30, 40)

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane (40, 80, 120, 160)

Moisture / Plasticity: Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL) (10, 20, 30)

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 13

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 6, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621997, N: 4861984 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
0	293.7	**GROUND SURFACE**					
	293.4	300mm **TOPSOIL**					
	0.3	**FILL**, sand, some silt, trace gravel, trace rootlets, loose, brown, moist		1	SS	7	
	292.9						293
1	0.8	**SAND**, trace to some silt, trace gravel, trace clay, compact, brown, damp to moist		2	SS	14	
				3	SS	19	292
2				4	SS	17	
							291
3				5	SS	13	
							290
4							
				6	SS	19	289
5							
							288
6				7	SS	14	
							287
7							
				8	SS	22	286
8							
							285
9		...very dense		9	SS	56	
							284
10							

Penetration Test Values (Blows / 0.3m)
× Dynamic Cone
10 20 30 40
Undrained Shear Strength (kPa)
○ Unconfined + Field Vane
● Pocket Penetrometer ■ Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

0 93 5 2

November 6, 2017
November 7, 2017

(continued next page)

LOG OF BOREHOLE 13

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 6, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 2 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 621997, N: 4861984 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Hollow stem augers

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
11		**SAND**, trace to some silt, trace gravel, trace clay, compact, brown, damp to moist *(continued)*				
		...dense		10	SS	33
12	281.5					
	12.2	**SANDY SILT**, very dense, brown, moist		11	SS	60
	281.1					
	12.6	**END OF BOREHOLE**				

Drilling mud was used during drilling. The borehole was encased during drilling.

50 mm dia. monitoring well installed.

Elevation Scale (m): 283, 282

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	dry	n/a
Jan 25, 2018	dry	n/a

LOG OF BOREHOLE 14

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 6, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622064, N: 4861943 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
	299.3	**GROUND SURFACE**					
0	299.0	250mm **TOPSOIL**					299
	0.3	**FILL**, sandy silt, trace to some clay, trace rootlets, loose, brown, moist		1	SS	5	
	298.5						
1	0.8	**SANDY SILT to SILTY SAND**, trace to some clay, dense to very dense, brown, damp to moist		2	SS	36	298
				3	SS	34	
2							297
				4	SS	60	
3				5	SS	85	296
4							295
		...silt, some sand		6	SS	65	
5							294
6				7	SS	58	293
7							292
8				8	SS	67	291
9				9	SS	52	290
10							

Penetration Test Values (Blows / 0.3m)
Dynamic Cone 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined Field Vane Pocket Penetrometer Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit Natural Water Content Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

(continued next page)

LOG OF BOREHOLE 14

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 6, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 2 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622064, N: 4861943 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
		(continued)				
11		**SANDY SILT to SILTY SAND**, trace to some clay, dense to very dense, brown, damp to moist *(continued)*		10	SS	38
12				11	SS	36
13	285.6 13.7					
14		**SAND**, trace to some silt, compact to very dense, brown, moist		12	SS	13
15				13	SS	18
16						
17				14	SS	31
18	280.6 18.7			15	SS	93 / 275mm

Elevation Scale (m): 289, 288, 287, 286, 285, 284, 283, 282, 281

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10, 20, 30, 40

Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40, 80, 120, 160

Moisture / Plasticity — Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL): 10, 20, 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) — GR SA SI CL

END OF BOREHOLE

Drilling mud was used during drilling. The borehole was encased during drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	17.9	281.4
Jan 25, 2018	dry	n/a

file: 1-15-0700-01_borehole_logs_coord updated 2018-01-30.gpj

LOG OF BOREHOLE 15

Terraprobe

Project No. : 1-15-0700-01 | Client : Rizmi Holdings Limited | Originated by : SM

Date started : November 7, 2017 | Project : Kirby Road Extension | Compiled by : NNA

Sheet No. : 1 of 2 | Location : Vaughan, Ontario | Checked by : SZ

Position : E: 622189, N: 4862036 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Track-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
0	293.8	**GROUND SURFACE**											
	293.4	350mm **TOPSOIL**		1	SS	2							
	0.4	**FILL**, sandy silt, trace clay, very loose, brown, moist											
	293.0												
1	0.8	**SANDY SILT to SILTY SAND**, trace to some clay, trace gravel, loose to compact, brown, moist		2	SS	5	293						
2				3	SS	15	292						
				4	SS	30							5 22 54 19
3				5	SS	22	291						
4							290						
5		...dense to very dense below		6	SS	30	289						
6							288						
7				7	SS	35	287						
8				8	SS	53	286						
9				9	SS	42	285						
10							284						

Penetration Test Values (Blows / 0.3m): Dynamic Cone; 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

(continued next page)

LOG OF BOREHOLE 15

Project No. : 1-15-0700-01 | Client : Rizmi Holdings Limited | Originated by : SM

Date started : November 7, 2017 | Project : Kirby Road Extension | Compiled by : NNA

Sheet No. : 2 of 2 | Location : Vaughan, Ontario | Checked by : SZ

Position : E: 622189, N: 4862036 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Track-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description (continued)	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity (PL, MC, LL)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments (GR SA SI CL)
11	282.7 11.1	**SANDY SILT to SILTY SAND**, trace to some clay, trace gravel, loose to compact, brown, moist *(continued)*		10	SS	38	283						

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 16

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 7, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622300, N: 4862000 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	288.9	**GROUND SURFACE**				
		350mm **TOPSOIL**		1	SS	4
	288.5 / 0.4					
		FILL, sandy silt, trace clay, trace gravel, loose, brown, moist				
	288.1 / 0.8					
1		**SANDY SILT to SILTY SAND**, trace to some clay, trace gravel, compact to dense, brown, damp to moist		2	SS	13
				3	SS	16
2				4	SS	11
3		...clayey silt		5	SS	15
4				6	SS	22
5						
6				7	SS	32
7						
8	280.8 / 8.1			8	SS	36

Elevation Scale (m): 288, 287, 286, 285, 284, 283, 282, 281

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane — 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL) Natural Water Content (MC) Liquid Limit (LL) — 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Jan 8, 2018	dry	n/a
Jan 25, 2018	dry	n/a

file: 1-15-0700-01_borehole_logs_coord updated 2018-01-30.gpj

LOG OF BOREHOLE 17

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 10, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622357, N: 4862055 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	282.9	**GROUND SURFACE**				
0	282.6	300mm **TOPSOIL**				
	0.3	**FILL**, clayey silt, some sand, trace gravel, trace organics, firm to stiff, brown to dark brown, moist		1	SS	6
1				2	SS	7
2				3	SS	13
	280.6					
	2.3	**FILL**, sandy silt, trace clay, trace gravel, trace rootlets, loose, brown, moist		4	SS	8
3	279.9					
	3.0	**FILL**, gravelly sand, some silt, compact, brown, moist		5	SS	16
4	278.3					
	4.6	**SANDY SILT to SILTY SAND**, trace clay, trace gravel, compact to dense, brown, moist		6	SS	22
5						
6				7	SS	40
	276.3					
	6.6	**END OF BOREHOLE**				

Elevation Scale (m): 282, 281, 280, 279, 278, 277

Penetration Test Values (Blows / 0.3m)
Dynamic Cone: 10 20 30 40
Undrained Shear Strength (kPa)
Unconfined, Pocket Penetrometer, Field Vane, Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit, Natural Water Content, Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments
GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 18

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 8, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622440, N: 4862093 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity (PL MC LL)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments (GR SA SI CL)
0	**295.3**	**GROUND SURFACE**					295	Dynamic Cone 10 20 30 40; Unconfined / Pocket Penetrometer / Field Vane / Lab Vane 40 80 120 160	Plastic Limit / Natural Water Content / Liquid Limit PL MC LL 10 20 30				
	295.0	250mm **TOPSOIL**											
1	0.3	**FILL**, clayey silt, some sand, trace gravel, firm to stiff, brown, moist		1	SS	7							
				2	SS	15	294						
	293.8												
2	1.5	**CLAYEY SILT**, trace to some sand, trace gravel, very stiff to hard, brown, moist		3	SS	18							
				4	SS	34	293						
3				5	SS	48	292						1 17 48 34
4	290.7												
	4.6	**SANDY SILT to SILTY SAND**, trace to some clay, trace gravel, dense to very dense, brown, moist		6	SS	43	291						
5							290						
6				7	SS	42	289						
7		...clayey silt					288						
				8	SS	47							
8							287						
9				9	SS	85	286						
10													

(continued next page)

Terraprobe

LOG OF BOREHOLE 18

Project No. : 1-15-0700-01 | Client : Rizmi Holdings Limited | Originated by : SM

Date started : November 8, 2017 | Project : Kirby Road Extension | Compiled by : NNA

Sheet No. : 2 of 2 | Location : Vaughan, Ontario | Checked by : SZ

Position : E: 622440, N: 4862093 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Truck-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
11	284.2 / 11.1	**SANDY SILT to SILTY SAND**, trace to some clay, trace gravel, dense to very dense, brown, moist *(continued)*		10	SS	72	285						

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 19

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 8, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622549, N: 4862107 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
0	298.5	**GROUND SURFACE**					298
	298.3	150mm **TOPSOIL**					
	0.2	**FILL**, clayey silt, trace sand, trace gravel, trace organics, firm, brown, moist		1	SS	6	
1	297.7						297
	0.8	**SAND**, trace to some silt, trace to some gravel, compact to dense, brown, moist		2	SS	23	
2				3	SS	46	
				4	SS	34	296
3	295.5						
	3.0	**SANDY SILT to SILTY SAND**, trace to some clay, trace gravel, compact to dense, brown, moist		5	SS	22	295
4							
				6	SS	43	294
5							
							293
6				7	SS	37	
							292
7							
							291
8				8	SS	41	
							290
9		...very dense		9	SS	80	
							289
10							

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL) Natural Water Content (MC) Liquid Limit (LL) 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

(continued next page)

LOG OF BOREHOLE 19

Terraprobe

Project No. : 1-15-0700-01 | Client : Rizmi Holdings Limited | Originated by : SM

Date started : November 8, 2017 | Project : Kirby Road Extension | Compiled by : NNA

Sheet No. : 2 of 2 | Location : Vaughan, Ontario | Checked by : SZ

Position : E: 622549, N: 4862107 (UTM 17T) | Elevation Datum : Geodetic

Rig type : Truck-mounted | Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity (PL, MC, LL)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments / GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
	287.8	**SANDY SILT to SILTY SAND**, trace to some clay, trace gravel, compact to dense, brown, moist *(continued)*											
	10.7	**SILT**, trace clay, trace sand, very dense, brown, moist		10	SS	53							
11							288						
				11	SS	53							
12							287						
				12	SS	58							
13							286						
							285						
14	284.3												
	14.2	**END OF BOREHOLE**											

Borehole was dry and open upon completion of drilling.

LOG OF BOREHOLE 20

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 9, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622577, N: 4862140 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0	298.7 GROUND SURFACE	**FILL**, clayey silt, trace to some sand, trace gravel, firm to stiff, brown, moist		1	SS	10	298						
1				2	SS	6							
	297.2 / 1.5	**SANDY SILT to SILTY SAND**, trace to some clay, trace to some gravel, compact to very dense, brown, moist		3	SS	28	297						
2				4	SS	24							GR 10 SA 67 SI 20 CL 3
3				5	SS	36	296						
4							295						
5				6	SS	50	294						
6							293						
7				7	SS	55	292						
		...wet sand seams		8	SS	58	291						
8							290						
9				9	SS	45	289						
10													

Penetration Test Values (Blows / 0.3m): Dynamic Cone (10, 20, 30, 40)

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane (40, 80, 120, 160)

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit (PL, MC, LL; 10, 20, 30)

Lab Data and Comments: GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

(continued next page)

LOG OF BOREHOLE 20

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : SM
Date started : November 9, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 2 of 2	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622577, N: 4862140 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description (continued)	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
11		**SANDY SILT to SILTY SAND**, trace to some clay, trace to some gravel, compact to very dense, brown, moist *(continued)*		10	SS	88	288
12	286.5 / 12.2	**SILT**, some sand, trace clay, very dense, brown, wet		11	SS	81	287
13	285.0 / 13.7	**SANDY SILT to SILTY SAND**, trace to some clay, trace to some gravel, compact to very dense, brown, moist		12	SS	73	286
14							285
15	283.0 / 15.7			13	SS	50	284

Penetration Test Values (Blows / 0.3m): Dynamic Cone (10, 20, 30, 40)

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane (40, 80, 120, 160)

Moisture / Plasticity: Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL) (10, 20, 30)

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT): GR SA SI CL

END OF BOREHOLE

The monitoring well is buried. The water level measurement could not be done.

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

LOG OF BOREHOLE 21

Terraprobe

Project No. : 1-15-0700-01	Client : Rizmi Holdings Limited	Originated by : TG
Date started : December 7, 2017	Project : Kirby Road Extension	Compiled by : NNA
Sheet No. : 1 of 1	Location : Vaughan, Ontario	Checked by : SZ

Position : E: 622703, N: 4862229 (UTM 17T) Elevation Datum : Geodetic

Rig type : CME 55, truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	287.9	**GROUND SURFACE**				
	287.7	240mm **ASPHALTIC CONCRETE**				
	0.2 / 287.5	200mm **AGGREGATE**		1	SS	44
	0.4	**SAND**, some silt to silty, compact to dense, brown, moist		2	SS	36
1				3	SS	10
2	285.6					
	2.3	**CLAYEY SILT**, trace to some sand, trace gravel, very stiff to hard, brown, moist		4	SS	24
3				5	SS	27
4				6	SS	40
5						
6				7	SS	51
	281.3 / 6.6	**END OF BOREHOLE**				

Borehole was dry and open upon completion of drilling.

Elevation Scale (m): 287, 286, 285, 284, 283, 282

Penetration Test Values (Blows / 0.3m): Dynamic Cone 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160

Moisture / Plasticity: Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL) 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

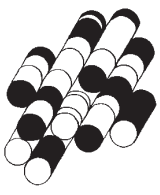
GRAIN SIZE DISTRIBUTION (%) (MIT)

GR SA SI CL

0 12 63 25

APPENDIX F

TERRAPROBE INC.



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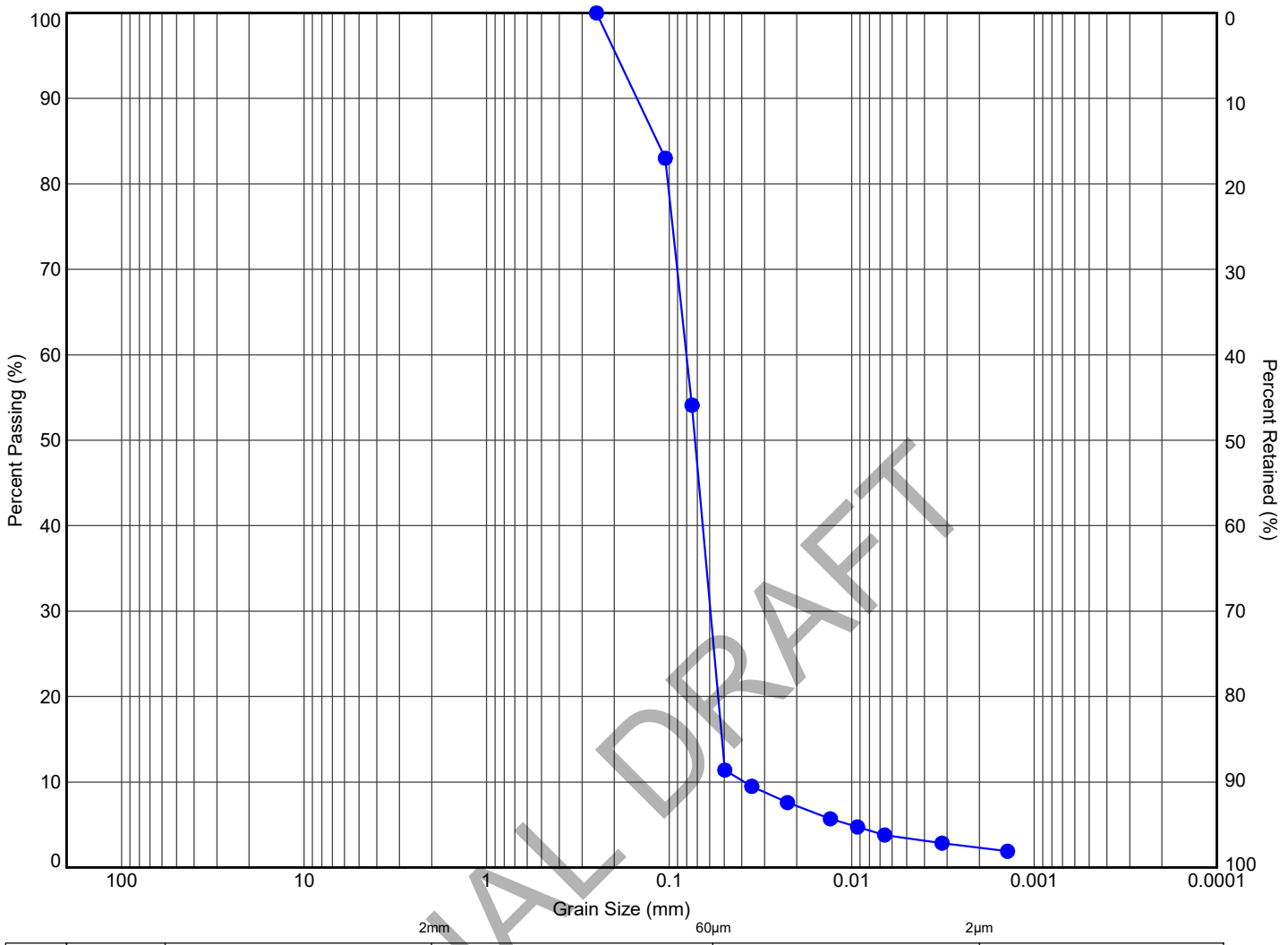


MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

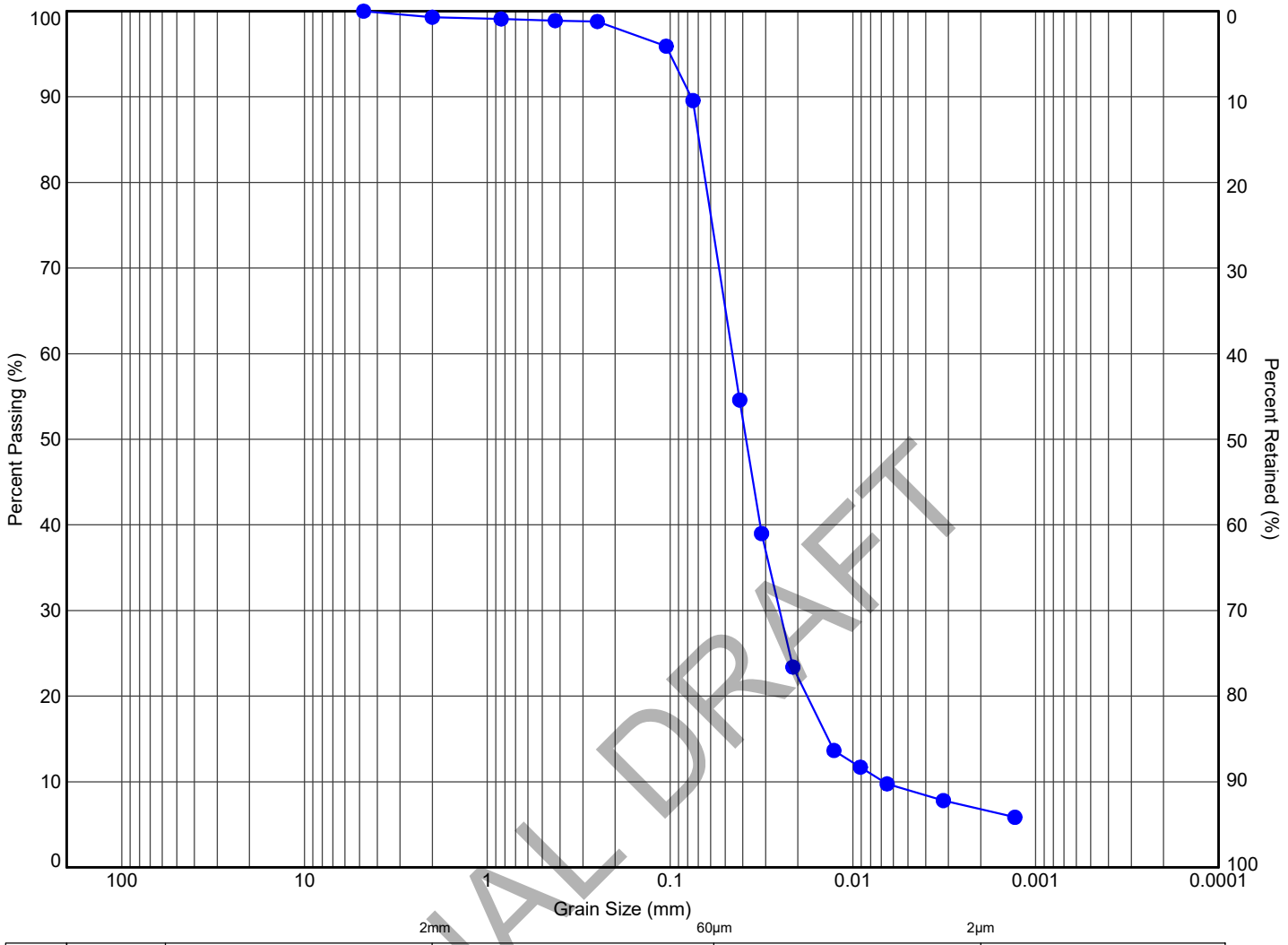
MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**1**	SS5	3.3	295.8	0	69	29	2	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title: **GRAIN SIZE DISTRIBUTION**
SILTY SAND, TRACE CLAY

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

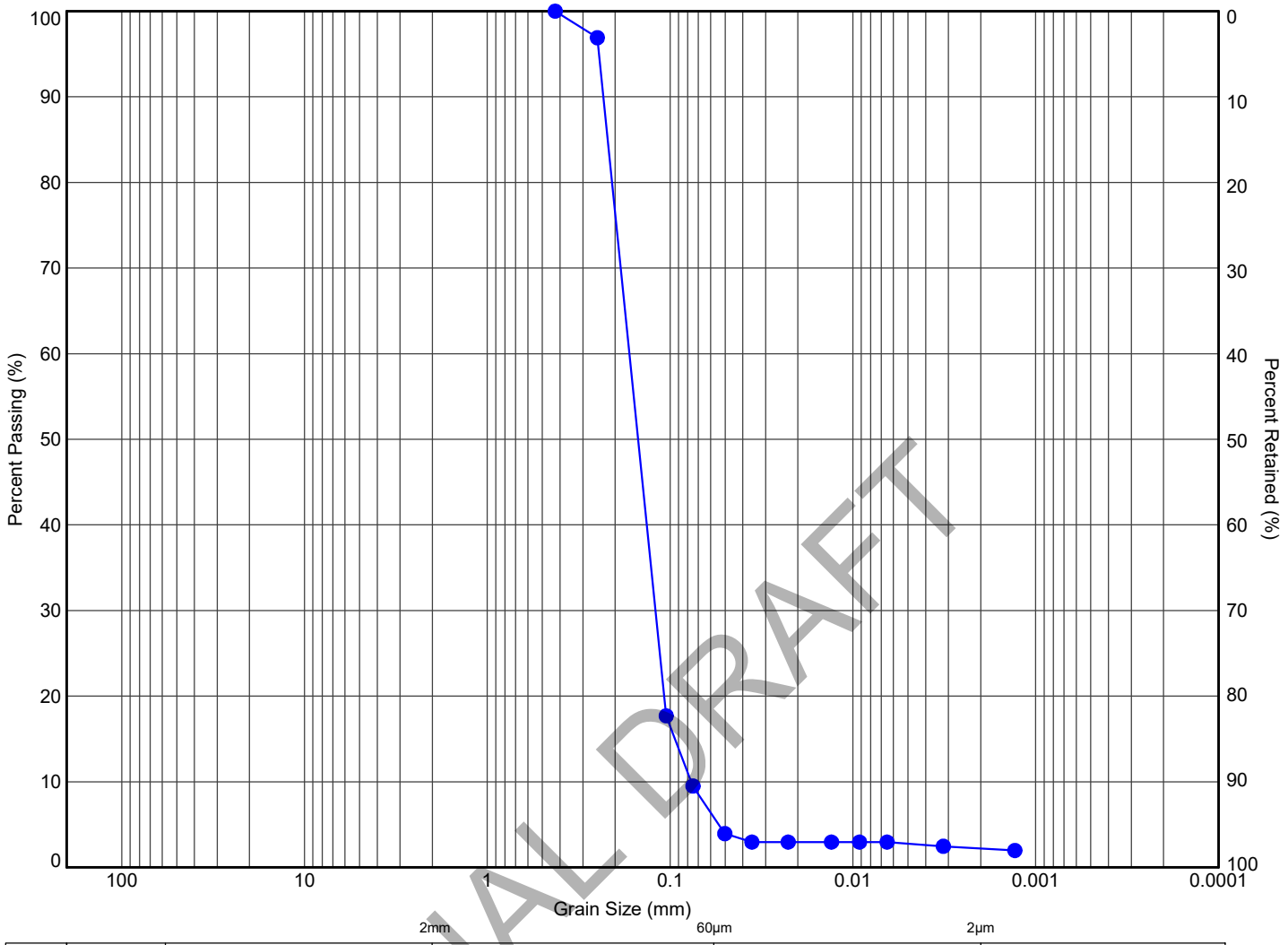
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**2**	SS4	2.5	286.9	1	22	70	7	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SANDY SILT, TRACE CLAY, TRACE GRAVEL

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

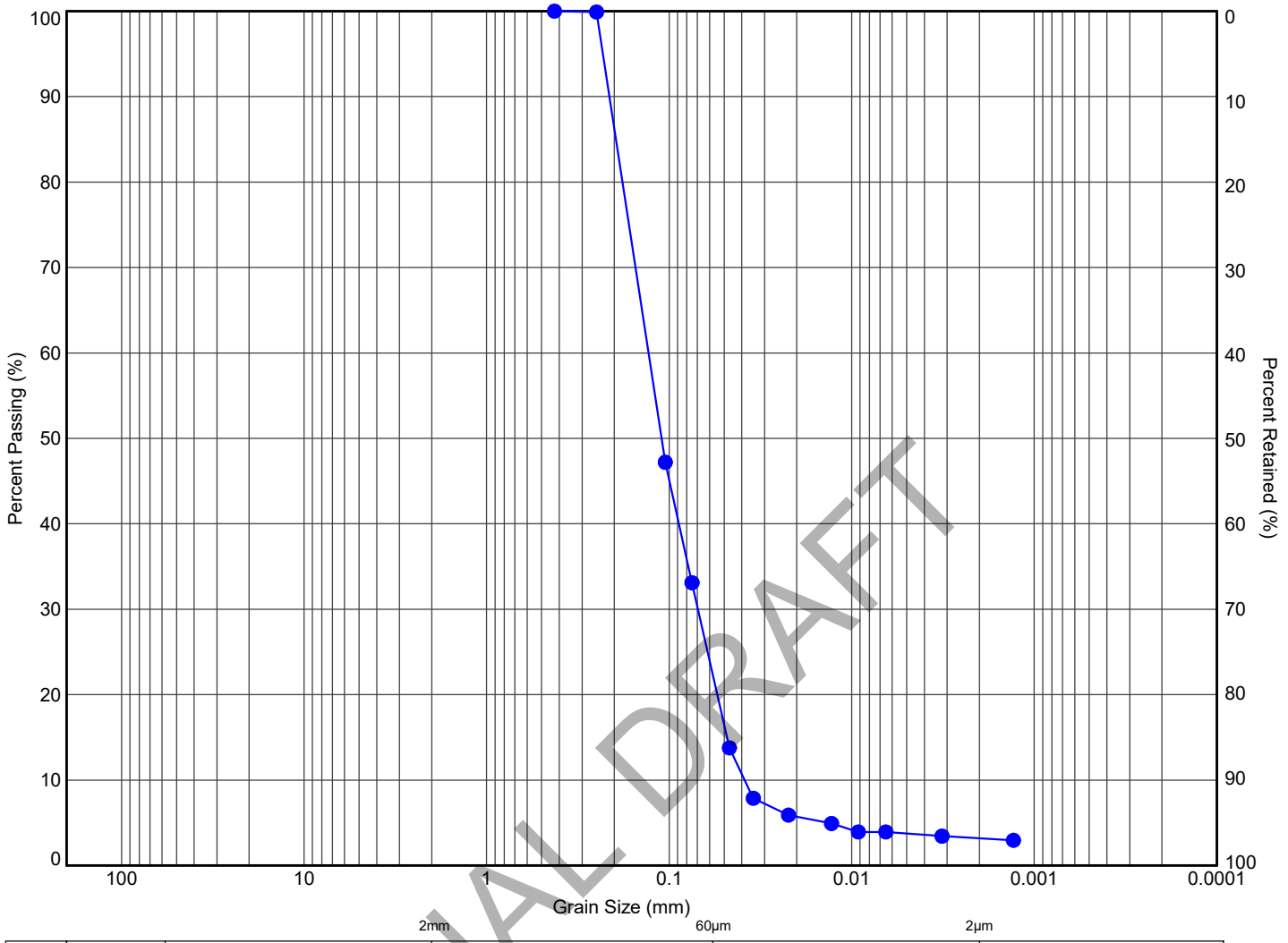
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**3**	SS7	6.3	294.7	0	94	4	2	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SAND, TRACE SILT, TRACE CLAY

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

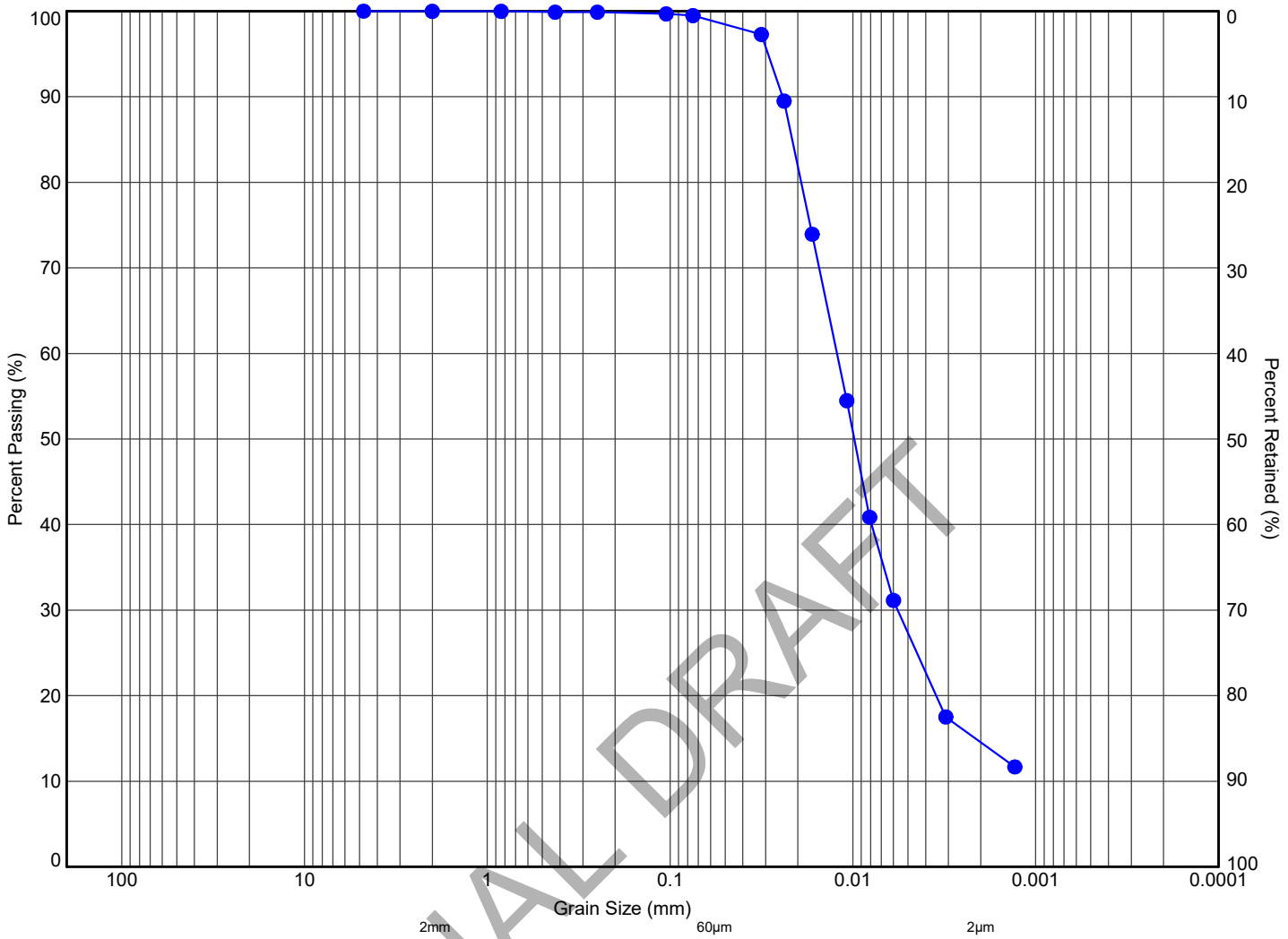
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**3**	SS14	17.0	284.0	0	76	21	3	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SILTY SAND, TRACE CLAY

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

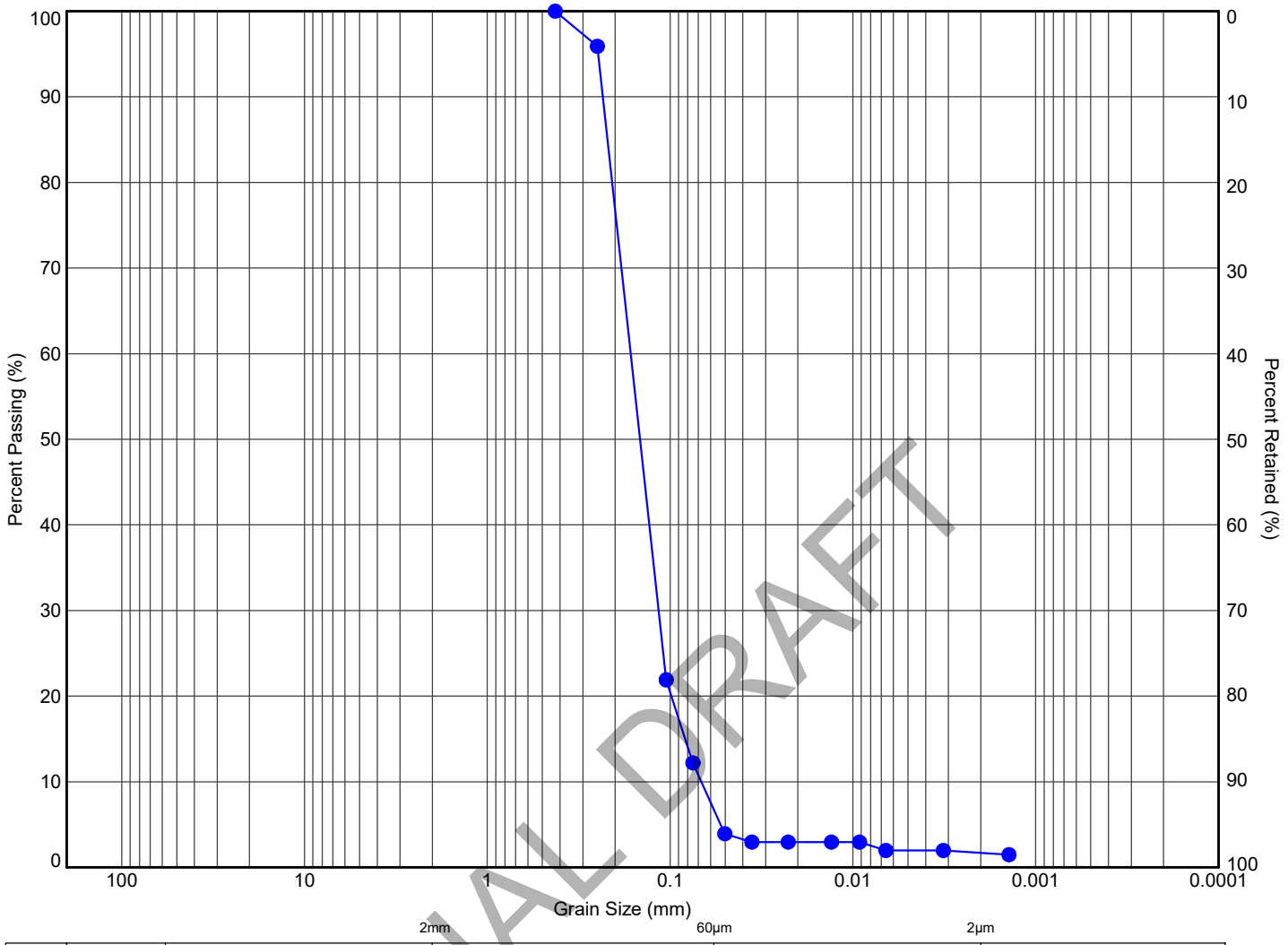
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**5**	SS9	9.4	273.5	0	1	84	15	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SILT, SOME CLAY, TRACE SAND

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

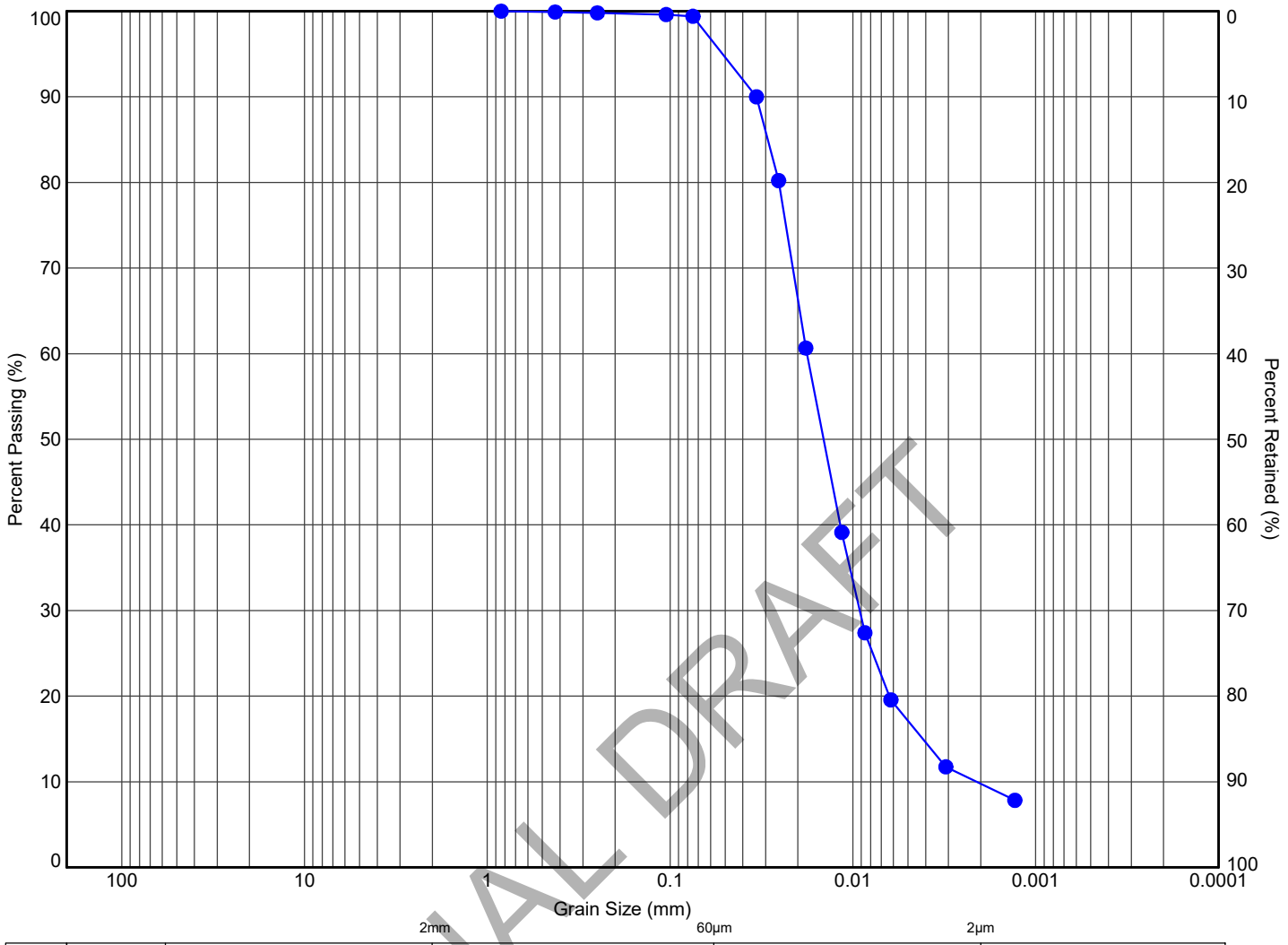
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**8**	SS4	2.5	286.7	0	92	6	2	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SAND, TRACE SILT, TRACE CLAY

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

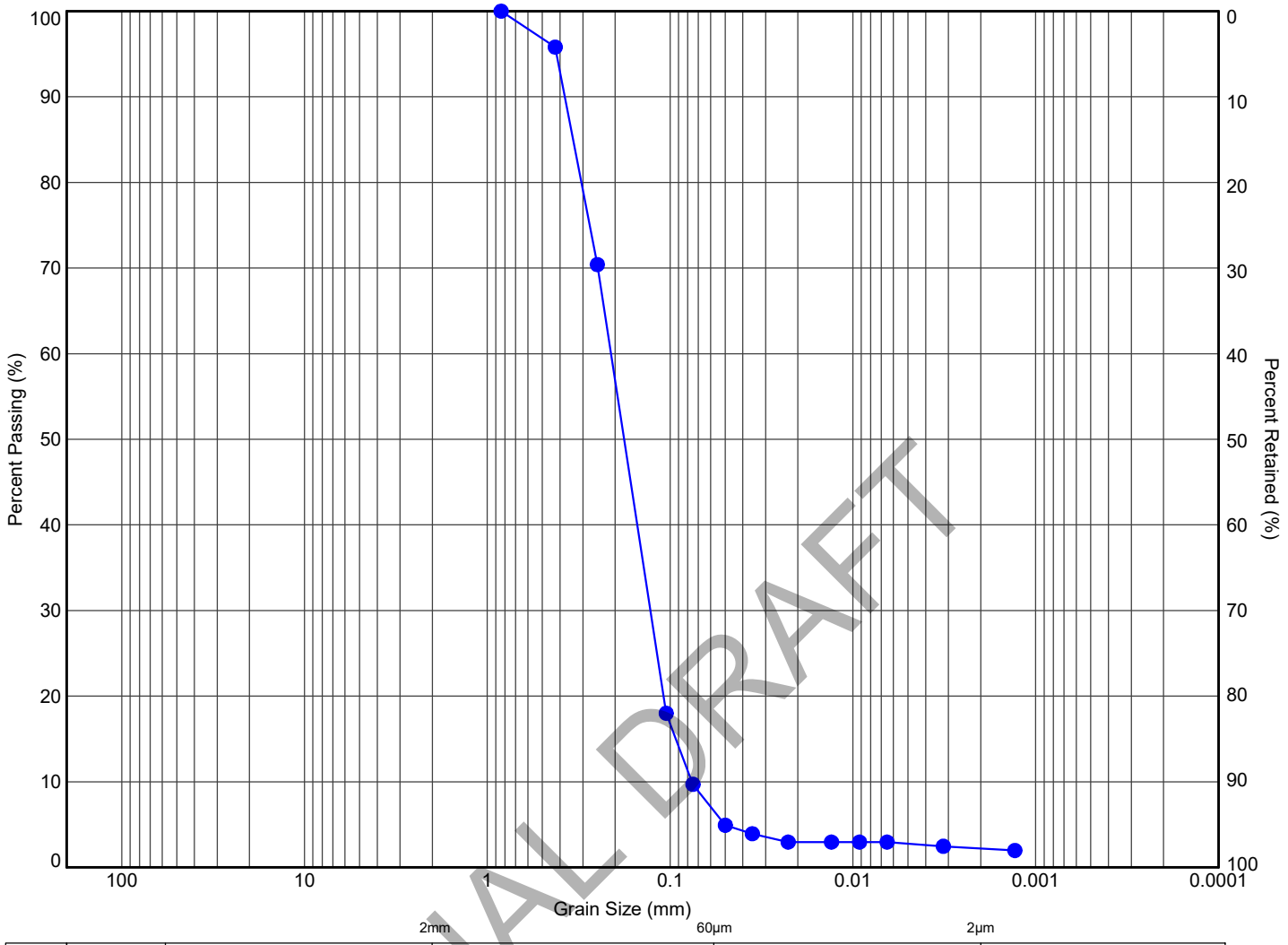
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**10**	SS8	7.8	267.9	0	3	87	10	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SILT, SOME CLAY, TRACE SAND

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

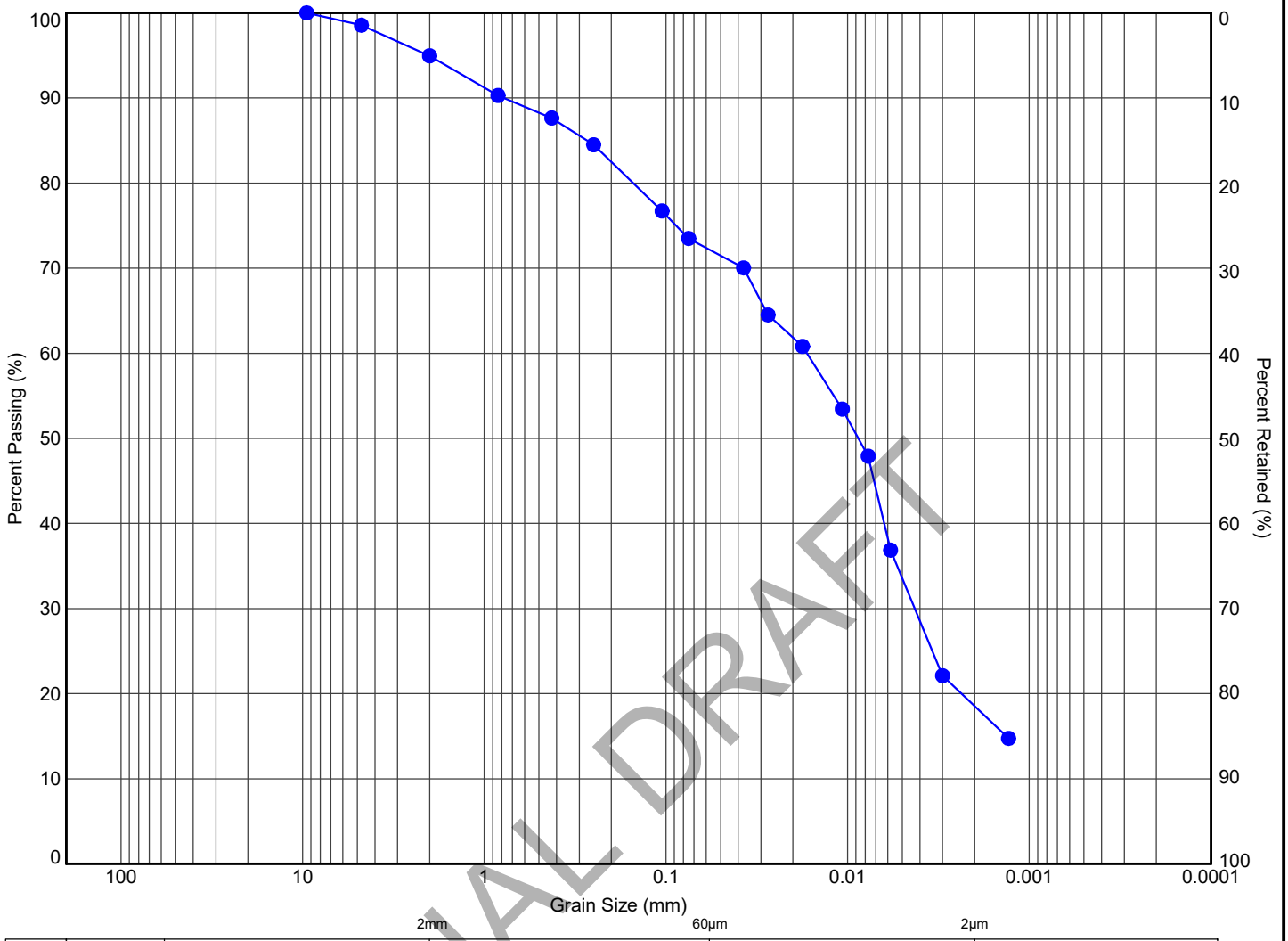
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**13**	SS6	4.8	288.9	0	93	5	2	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SAND, TRACE SILT, TRACE CLAY

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

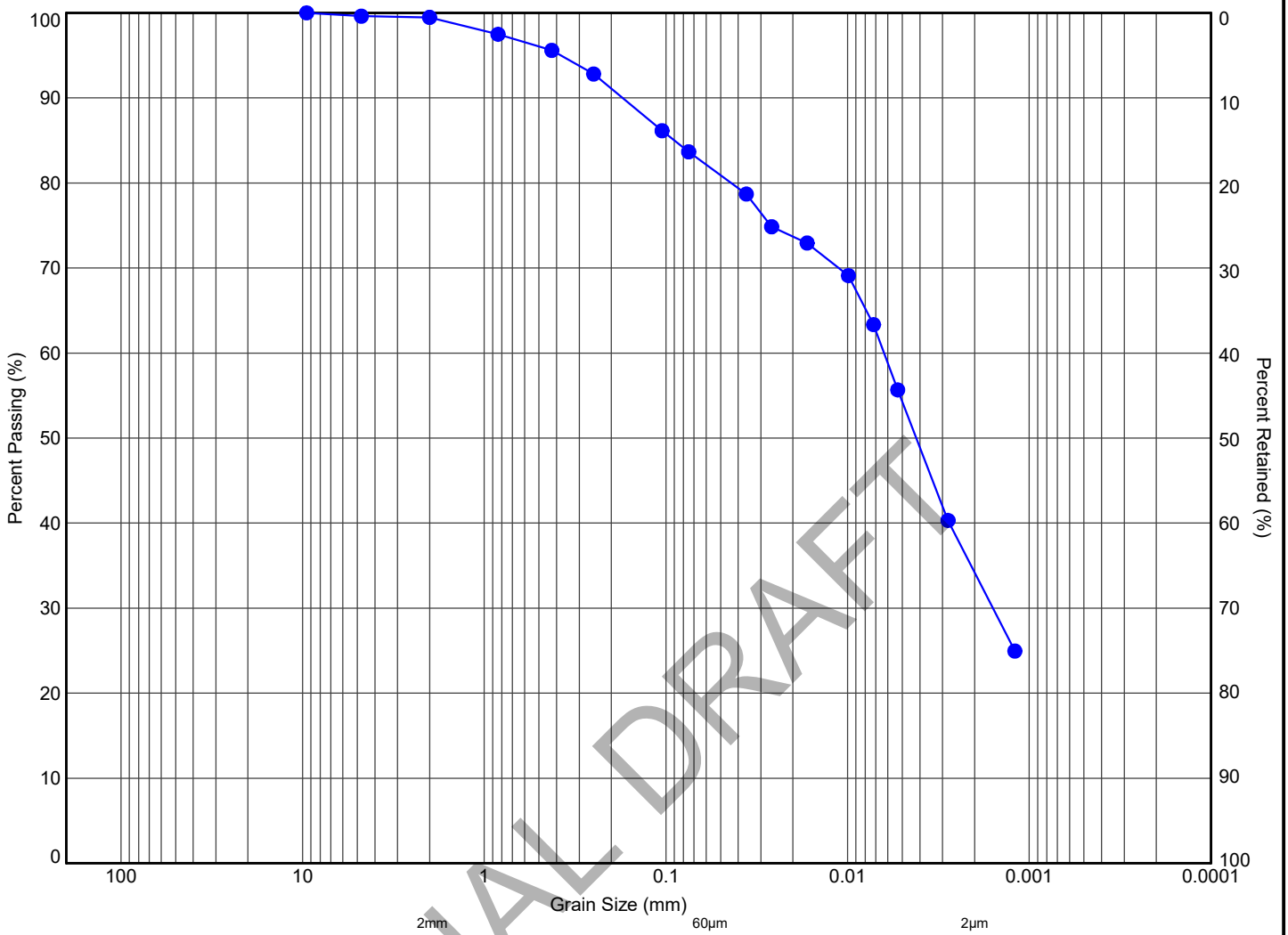
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**15**	SS4	2.5	291.3	5	22	54	19	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SANDY SILT, SOME CLAY, TRACE GRAVEL

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

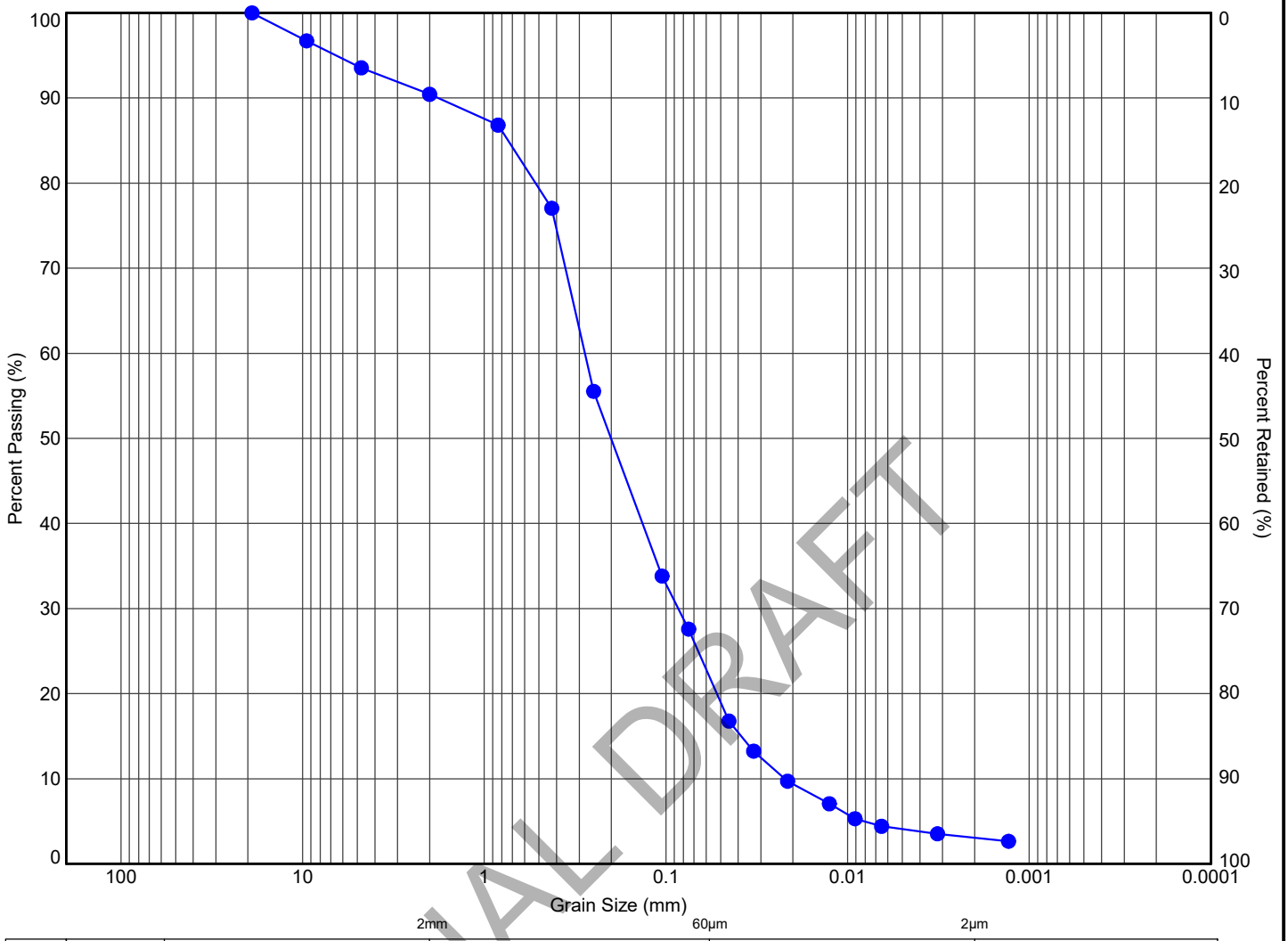
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**18**	SS5	3.3	292.0	1	17	48	34	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
CLAYEY SILT, SOME SAND, TRACE GRAVEL

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

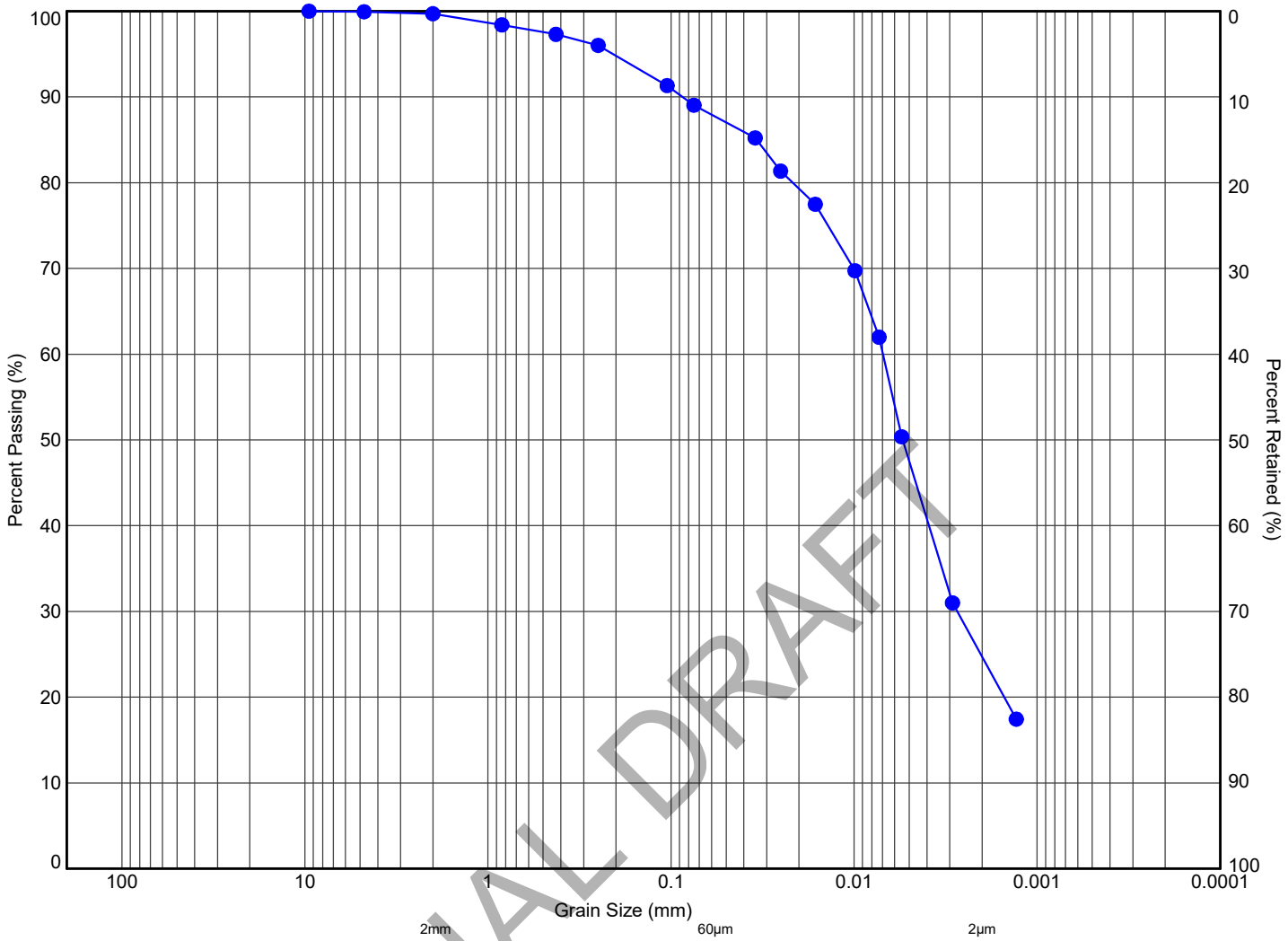
	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**20**	SS4	2.5	296.2	10	67	20	3	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

GRAIN SIZE DISTRIBUTION
SILTY SAND, TRACE GRAVEL, TRACE CLAY

File No.: **1-15-0700-01**



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**21**	SS4	2.5	285.4	0	12	63	25	

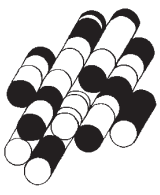
Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title: **GRAIN SIZE DISTRIBUTION**
CLAYEY SILT, SOME SAND

File No.: **1-15-0700-01**

APPENDIX G

TERRAPROBE INC.



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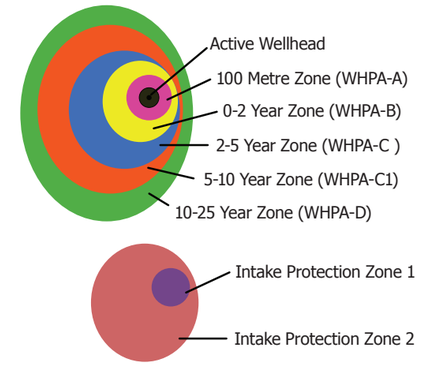
MAP 6

WELLHEAD PROTECTION AREAS and INTAKE PROTECTION ZONES



Urban Area

Towns and Villages

Hamlet

Municipal Boundary

Oak Ridges Moraine Conservation Plan

Oak Ridges Moraine Boundary

Oak Ridges Moraine Plan Area

Greenbelt Plan

Greenbelt Plan Area Boundary

Greenbelt Protected Countryside/Hamlet

Area Subject to the Lake Simcoe Protection Plan

Provincial Highways

Existing

Controlled Access Highway

Under Construction

5 2.5 0 5 Km

York Region yorkmaps

Produced by: Geographic Information Services Branch
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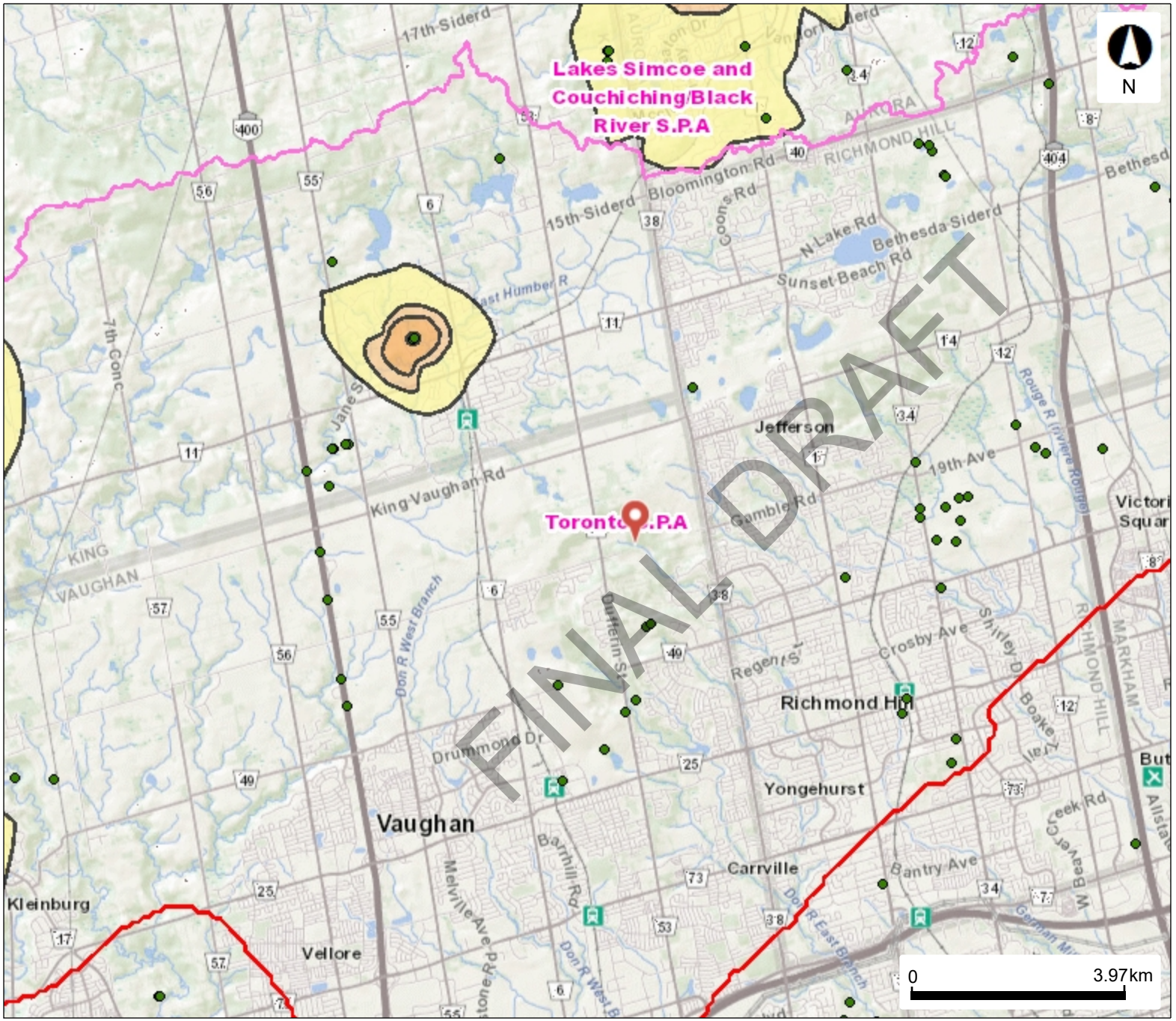
Source Protection Information Atlas



Legend

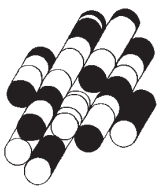
- Source Protection Areas
- Permits To Take Water: Active Watershed
- Intake Protection Zone Q
- Wellhead Protection Area Q1
- Issue Contributing Areas
- WHPA Groundwater Under Direct Influence (WHPA-E)
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- Intake Protection Zone 1
- Event Based Areas
- Intake Protection Zone 2

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Map Created: 5/8/2019
Map Center: 43.90506 N, -79.4995 W

APPENDIX H

TERRAPROBE INC.



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MAP 7

OAK RIDGES MORAINE AQUIFER VULNERABILITY AREAS and WATERSHED BOUNDARIES

Lake Simcoe
Georgina Island I.R.
Georgina Island I.R.
Cook's Bay
Georgina Creeks Watershed
Woodbine Avenue
Town of Georgina
Pollock Road
Maskinonge River Watershed
McCowan Road
48
Old Homestead Road
Park Road
Pefferlaw Brook Watershed
Weir's Sideroad
Old Shiloh Road
Ravenshoe Road
Uxbridge Brook Watershed
Lake Simcoe Watershed
Leslie Street
Boag Road
Warden Avenue
Kennedy Road
Black River Watershed
Town of East Gwillimbury
Queensville Sideroad
Yonge Street
Doane Road
East Townline
Mount Albert Road
East Holland Watershed
Green Lane
Herald Road
Davis Drive
McCowan Road
COUNTY OF SIMCOE
9
Davis Drive West
19th Sideroad
West Holland Watershed
Dufferin Street
Bathurst Street
Town of Newmarket
Mulock Drive
Vivian Road
St John's Sideroad
Pefferlaw Brook Watershed
18th Sideroad
17th Sideroad
16th Sideroad
15th Sideroad
11th Concession
10th Concession
8th Concession
7th Concession
Keele Street
Township of King
Town of Aurora
Aurora Road
Vandorf Sideroad
Bloomington Road
Town of Whitchurch-Stouffville
Bethesda Sideroad
King Road
400
404
48
Stouffville Road
19th Line
Duffins Creek Watershed
Kirby Road
Highway 27
Kipling Avenue
Weston Road
Highway 400
Jane Street
Keele Street
Dufferin Street
Bayview Avenue
Leslie Street
Woodbine Avenue
Warden Avenue
Kennedy Road
Reesor Road
19th Avenue
Elgin Mills Road East
Teston Road
Humber River Watershed
City of Vaughan
Major Mackenzie Drive West
Town of Richmond Hill
Major Mackenzie Drive East
City of Markham
York/Durham Line
Rutherford Road
16th Avenue
Highway 50
Pine Valley Drive
Don River Watershed
Langstaff Road
Bathurst Street
Highway 7
Rouge Watershed
407
14th Avenue
Highway 7
427
John Street
Yonge Street
Steeles Avenue West
Steeles Avenue East
Highland Creek Watershed
Petticoat Creek Watershed
THE REGIONAL MUNICIPALITY OF PEEL
THE REGIONAL MUNICIPALITY OF DURHAM
THE CITY OF TORONTO
Lake Ontario Watershed
DRAFT
5 2.5 0 5 Km

Document Path: N:\PL_LRSP\Policy\P00 - Policy General\Jeff_Hignett\ROP_Mapping\april2016\mxd\Map7_Aquifer.mxd

Oak Ridges Moraine Conservation Plan

- Area of High Aquifer Vulnerability
- Area of Low Aquifer Vulnerability
- Oak Ridges Moraine Boundary
- Watershed Boundaries
- Area Subject to the Lake Simcoe Protection Plan

Provincial Highways

- Existing

Controlled Access Highway

- Under Construction
- Municipal Boundary

York Region yorkmaps

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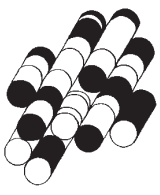
APPENDIX I

TERRAPROBE INC.



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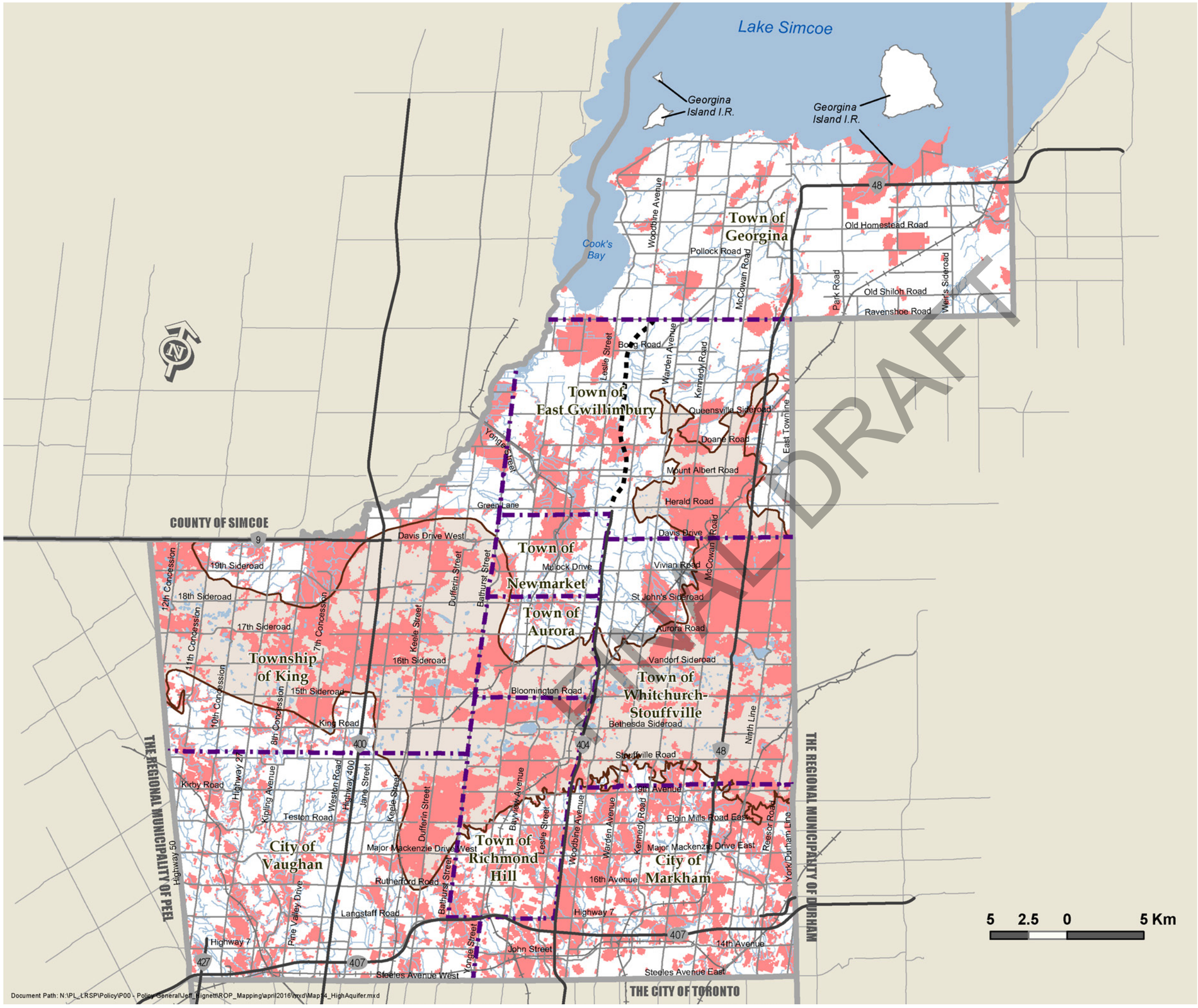
MAP 14

HIGHLY VULNERABLE AQUIFERS



Highly Vulnerable Aquifers

Oak Ridges Moraine Conservation Plan

- Oak Ridges Moraine Boundary
- Oak Ridges Moraine Plan Area

Provincial Highways

- Existing

Controlled Access Highway

- Under Construction

- Municipal Boundary

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APPENDIX J

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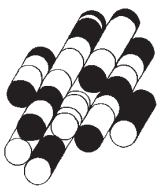

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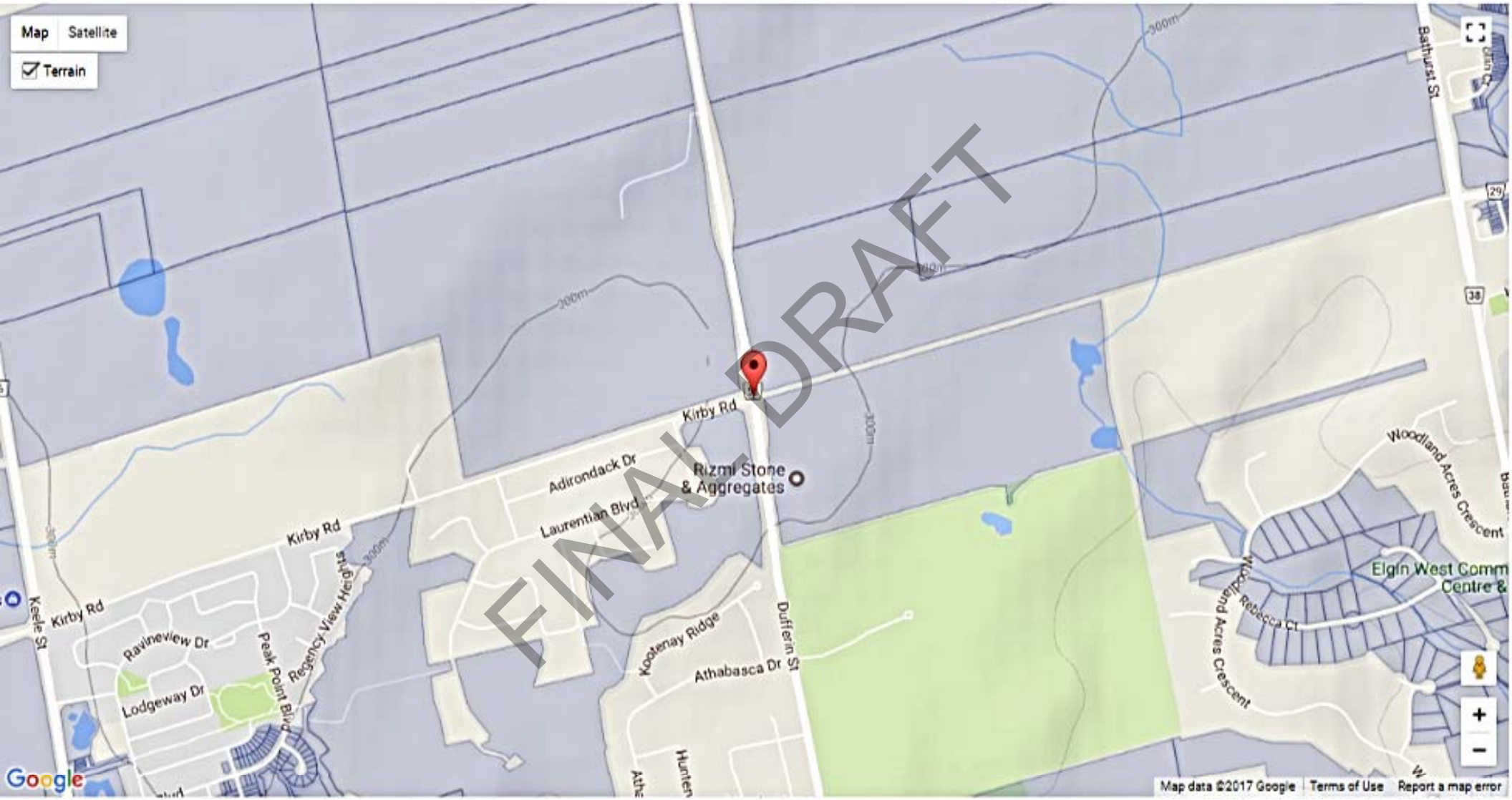
Map
Satellite
Terrain
Kirby Rd
Adirondack Dr
Laurentian Blvd
Rizmi Stone & Aggregates
Kirby Rd
Kirby Rd
Keele St
Ravineview Dr
Lodgeway Dr
Peak Point Blvd
Regency View Heights
Kootenay Ridge
Athabasca Dr
Dufferin St
Bathurst St
Woodland Acres Crescent
Rebecca Ct
Woodland Acres Crescent
Elgin West Comm
Centre &
300m
Google
Map data ©2017 Google
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APPENDIX K

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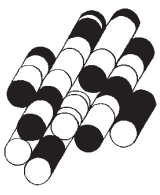

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Terraprobe Consulting Geotechnical & Environmental Engineering Construction Materials Engineering, Inspection & Testing	**Slug Test Analysis Report**
	Project: Kirby Road Extension
	Number: 1-15-0700-54
	Client: Rizmi Holdings Limited

Location: Vaughan	Scale 1:1000	Map Origin [m] X: 0 Y: 0

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

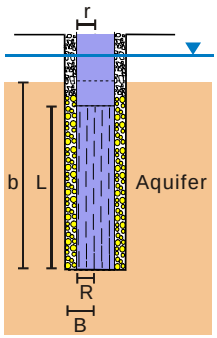
Wells

Project: Kirby Road Extension

Number: 1-15-0700-54

Client: Rizmi Holdings Limited

Location: Vaughan



	Name	X [m]	Y [m]	Elevation (amsl) [m]	Benchmark [m]	Penetration	L [m]	B [m]
1	MW 6					Partially	2.999999999999999	0.1016
2	MW 9					Partially	2.999999999999999	0.1016
3	MW 10					Fully	2.999999999999999	0.1016

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

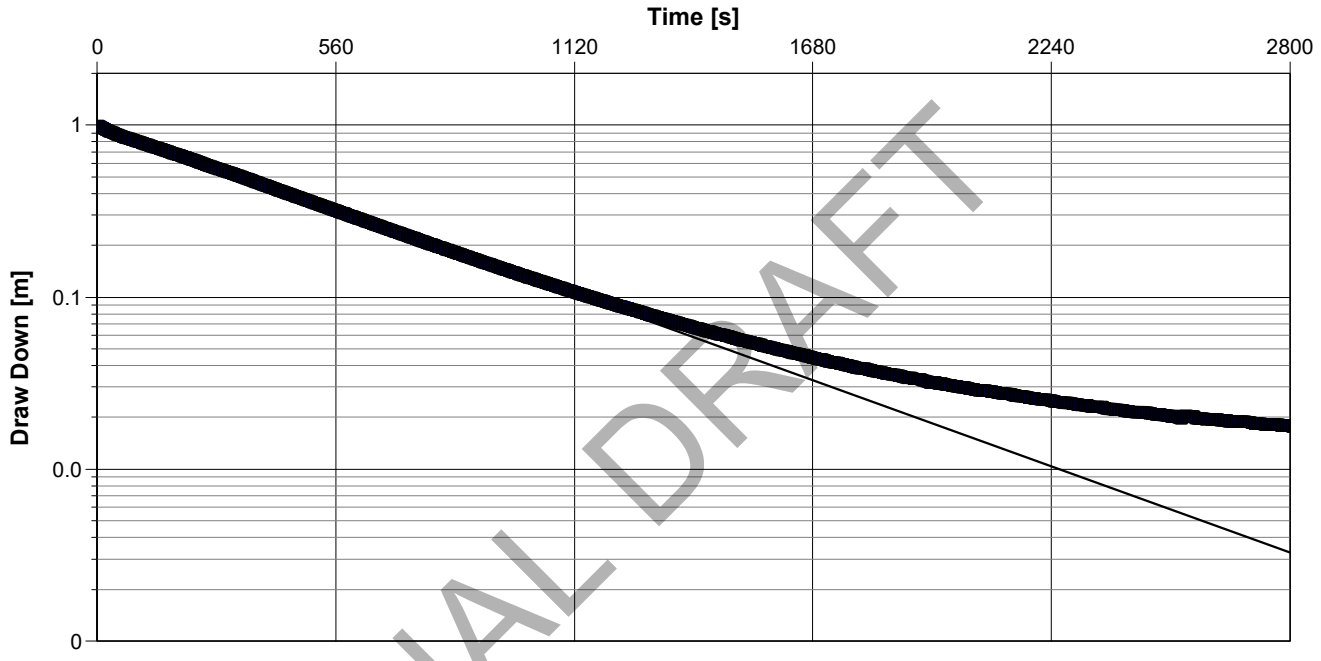
Slug Test Analysis Report

Project: Kirby Road Extension

Number: 1-15-0700-54

Client: Rizmi Holdings Limited

Location: Vaughan	Slug Test: MW 6	Test Well: MW 6
Test Conducted by: AJ & JR		Test Date: 1/8/2018
Analysis Performed by: JR	RHT MW 6	Analysis Date: 1/22/2018
Aquifer Thickness: 4.61 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
MW 6	3.00×10^{-6}

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

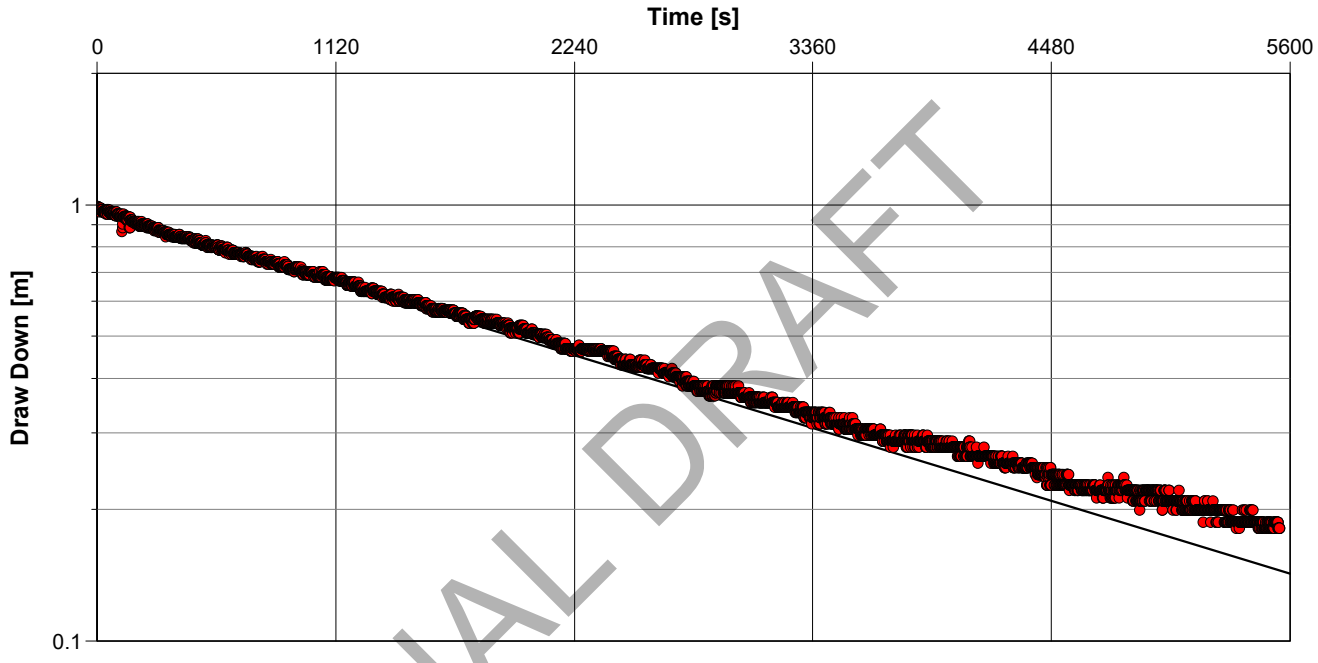
Slug Test Analysis Report

Project: Kirby Road Extension

Number: 1-15-0700-54

Client: Rizmi Holdings Limited

Location: Vaughan	Slug Test: MW 9	Test Well: MW 9
Test Conducted by: AJ & JR		Test Date: 1/8/2018
Analysis Performed by: JR	RHT MW 9	Analysis Date: 1/22/2018
Aquifer Thickness: 5.20 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
MW 9	4.77×10^{-7}

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

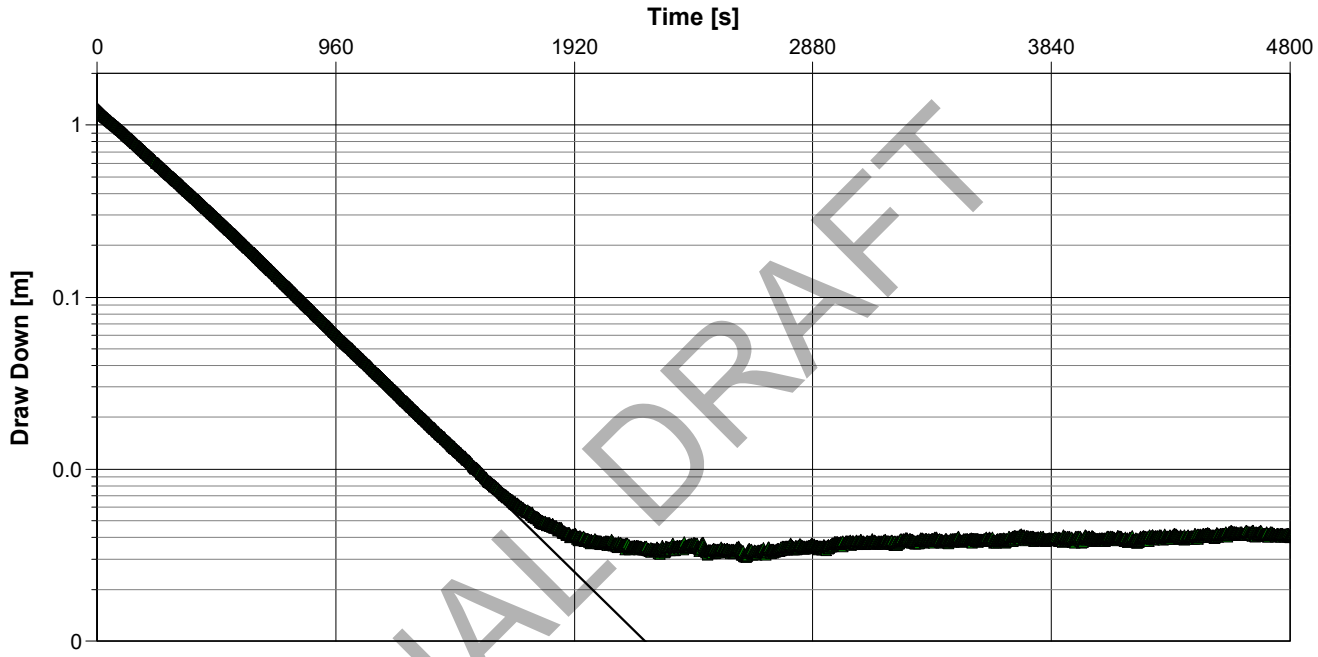
Slug Test Analysis Report

Project: Kirby Road Extension

Number: 1-15-0700-54

Client: Rizmi Holdings Limited

Location: Vaughan	Slug Test: MW 10	Test Well: MW 10
Test Conducted by: AJ & JR		Test Date: 1/8/2018
Analysis Performed by: JR	RHT MW 10	Analysis Date: 1/22/2018
Aquifer Thickness: 7.61 m		

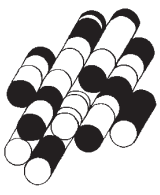


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]
MW 10	5.60×10^{-6}

APPENDIX L

TERRAPROBE INC.



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APPENDIX N - Water Balance - Kirby Road Extension, Vaughan (Alignment 4) **File No. 1-15-0700-54**

1. Climate Information

Precipitation	744	mm/a	0.74	m/a
Evapotranspiration	533	mm/a	0.53	m/a
Water Surplus	211	mm/a	0.21	m/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors

Hilly Land	0.1	
Open Sandy Loam	0.4	
Woodland	0.2	
TOTAL:	0.7	

Infiltration (0.7 x 211)	147.7	mm/a	0.1477	m/a
Run-off (211 - 147.7)	63.3	mm/a	0.0633	m/a

Table 3 Approach - Typical Recharge Rates

silty sand to sandy silt	150 - 200	mm/a
silt	125 - 150	mm/a
clayey silt	100 - 125	mm/a

The site development area is underlain by silty sand to sandy silt.

Based on the above, the recharge rate is	200	mm/a	0.125	m/a
with runoff of	11	mm/a	0.011	m/a

3. Property Statistics
Pre- Development Site Coverage

Area Covered by Existing Hard Surface Paving	0	m^2	0.0	ha
Area Covered by Existing Open/Grass Area	141,475	m^2	14.1	ha
TOTAL	141,475	m^2	14.1	ha

4. Post-Development Coverage

Area Covered by Hard Surface Paving	46,460	m^2	4.6	ha
Area Covered by Landscaped Area	95,015	m^2	9.5	ha
TOTAL:	141,475	m^2	14.1	ha

APPENDIX G - Water Balance - Kirby Road Extension, Vaughan (Alignment 4) **File No. 1-15-0700-54**
Vaughan

5. Annual Water Balance Before Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	0	0	nil	nil	nil	0
Open/Grass Area	141,475	105,257	75,406	nil	20,896	8,955
TOTAL	**141,475**	**105,257**	**75,406**	**0**	**20,896**	**8,955**

6. Annual Water Balance After Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	46,460	34,566	nil	nil	nil	34,566
Open/Grass/Landscaped Area	95,015	70,691	50,643	nil	14,034	6,014
TOTAL	**141,475**	**105,257**	**50,643**	**0**	**14,034**	**40,581**

7. Comparison of Pre-Development and Post-Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	105,257	75,406	nil	20,896	8,955
Post-Development	105,257	50,643	nil	14,034	40,581

8. Requirement for Infiltration of Runoff

Volume of surface runoff required to match pre-development infiltration rates	6,862 m^3
Percentage of surface runoff required to match pre-development infiltration	20%

APPENDIX N - Water Balance - Kirby Road Extension, Vaughan (Alignment 5) **File No. 1-15-0700-54**

1. Climate Information

Precipitation	744	mm/a	0.74	m/a
Evapotranspiration	533	mm/a	0.53	m/a
Water Surplus	211	mm/a	0.21	m/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors

Hilly Land	0.1
Open Sandy Loam	0.4
Woodland	0.2
TOTAL:	0.7

Infiltration (0.7 x 211)	147.7	mm/a	0.1477	m/a
Run-off (211 - 147.7)	63.3	mm/a	0.0633	m/a

Table 3 Approach - Typical Recharge Rates

silty sand to sandy silt	150 - 200	mm/a
silt	125 - 150	mm/a
clayey silt	100 - 125	mm/a

The site development area is underlain by silty sand to sandy silt.

Based on the above, the recharge rate is	200	mm/a	0.125	m/a
with runoff of	11	mm/a	0.011	m/a

3. Property Statistics
Pre- Development Site Coverage

Area Covered by Existing Hard Surface Paving	0	m^2	0.0	ha
Area Covered by Existing Open/Grass Area	146,238	m^2	14.6	ha
TOTAL	146,238	m^2	14.6	ha

4. Post-Development Coverage

Area Covered by Hard Surface Paving	46,000	m^2	4.6	ha
Area Covered by Landscaped Area	100,238	m^2	10.0	ha
TOTAL:	146,238	m^2	14.6	ha

APPENDIX G - Water Balance - Kirby Road Extension, Vaughan (Alignment 5) **File No. 1-15-0700-54**
Vaughan

5. Annual Water Balance Before Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	0	0	nil	nil	nil	0
Open/Grass Area	146,238	108,801	77,945	nil	21,599	9,257
TOTAL	**146,238**	**108,801**	**77,945**	**0**	**21,599**	**9,257**

6. Annual Water Balance After Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	46,000	34,224	nil	nil	nil	34,224
Open/Grass/Landscaped Area	100,238	74,577	53,427	nil	14,805	6,345
TOTAL	**146,238**	**108,801**	**53,427**	**0**	**14,805**	**40,569**

7. Comparison of Pre-Development and Post-Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	108,801	77,945	nil	21,599	9,257
Post-Development	108,801	53,427	nil	14,805	40,569

8. Requirement for Infiltration of Runoff

Volume of surface runoff required to match pre-development infiltration rates	6,794 m^3
Percentage of surface runoff required to match pre-development infiltration	20%

APPENDIX N - Water Balance - Kirby Road Extension, Vaughan (Alignment 6) **File No. 1-15-0700-54**

1. Climate Information

Precipitation	744	mm/a	0.74	m/a
Evapotranspiration	533	mm/a	0.53	m/a
Water Surplus	211	mm/a	0.21	m/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors

Hilly Land	0.1	
Open Sandy Loam	0.4	
Woodland	0.2	
TOTAL:	0.7	

Infiltration (0.7 x 211)	147.7	mm/a	0.1477	m/a
Run-off (211 - 147.7)	63.3	mm/a	0.0633	m/a

Table 3 Approach - Typical Recharge Rates

silty sand to sandy silt	150 - 200	mm/a
silt	125 - 150	mm/a
clayey silt	100 - 125	mm/a

The site development area is underlain by silty sand to sandy silt.

Based on the above, the recharge rate is	200	mm/a	0.125	m/a
with runoff of	11	mm/a	0.011	m/a

3. Property Statistics
Pre- Development Site Coverage (before building additions)

Area Covered by Existing Hard Surface Paving	13,400	m^2	1.3	ha
Area Covered by Existing Open/Grass Area	122,915	m^2	12.3	ha
TOTAL	136,315	m^2	13.6	ha

4. Post-Development Coverage

Area Covered by Hard Surface Paving	47,840	m^2	4.8	ha
Area Covered by Landscaped Area	88,475	m^2	8.8	ha
TOTAL:	136,315	m^2	13.6	ha

APPENDIX G - Water Balance - Kirby Road Extension, Vaughan (Alignment 6) **File No. 1-15-0700-54**
Vaughan

5. Annual Water Balance Before Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	13,400	9,970	nil	nil	nil	9,970
Open/Grass Area	122,915	91,449	65,514	nil	18,155	7,781
TOTAL	**136,315**	**101,418**	**65,514**	**0**	**18,155**	**17,750**

6. Annual Water Balance After Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	47,840	35,593	nil	nil	nil	35,593
Open/Grass/Landscaped Area	88,475	65,825	47,157	nil	13,068	5,600
TOTAL	**136,315**	**101,418**	**47,157**	**0**	**13,068**	**41,193**

7. Comparison of Pre-Development and Post-Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	101,418	65,514	nil	18,155	17,750
Post-Development	101,418	47,157	nil	13,068	41,193

8. Requirement for Infiltration of Runoff

Volume of surface runoff required to match pre-development infiltration rates	5,087 m^3
Percentage of surface runoff required to match pre-development infiltration	14%

APPENDIX N - Water Balance - Kirby Road Extension, Vaughan (Alignment 6A) **File No. 1-15-0700-54**

1. Climate Information

Precipitation	744	mm/a	0.74	m/a
Evapotranspiration	533	mm/a	0.53	m/a
Water Surplus	211	mm/a	0.21	m/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors

Hilly Land	0.1	
Open Sandy Loam	0.4	
Woodland	0.2	
TOTAL:	0.7	

Infiltration (0.7 x 211)	147.7	mm/a	0.1477	m/a
Run-off (211 - 147.7)	63.3	mm/a	0.0633	m/a

Table 3 Approach - Typical Recharge Rates

silty sand to sandy silt	150 - 200	mm/a
silt	125 - 150	mm/a
clayey silt	100 - 125	mm/a

The site development area is underlain by silty sand to sandy silt.

Based on the above, the recharge rate is	200	mm/a	0.125	m/a
with runoff of	11	mm/a	0.011	m/a

3. Property Statistics
Pre- Development Site Coverage (before building additions)

Area Covered by Existing Hard Surface Paving	32190	m^2	3.2 ha
Area Covered by Existing Open/Grass Area	107,058	m^2	10.7 ha
TOTAL	139,248	m^2	13.9 ha

4. Post-Development Coverage

Area Covered by Hard Surface Paving	48,185	m^2	4.8 ha
Area Covered by Landscaped Area	91,063	m^2	9.1 ha
TOTAL:	139,248	m^2	13.9 ha

APPENDIX G - Water Balance - Kirby Road Extension, Vaughan (Alignment 6A) File No. 1-15-0700-54
Vaughan

5. Annual Water Balance Before Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	32,190	23,949	nil	nil	nil	23,949
Open/Grass Area	107,058	79,651	57,062	nil	15,812	6,777
TOTAL	**139,248**	**103,601**	**57,062**	**0**	**15,812**	**30,726**

6. Annual Water Balance After Development

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Covered Area	0	0	nil	nil	nil	0
Hard Surface Area	48,185	35,850	nil	nil	nil	35,850
Open/Grass/Landscaped Area	91,063	67,751	48,537	nil	13,450	5,764
TOTAL	**139,248**	**103,601**	**48,537**	**0**	**13,450**	**41,614**

7. Comparison of Pre-Development and Post-Development

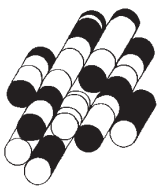
	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	103,601	57,062	nil	15,812	30,726
Post-Development	103,601	48,537	nil	13,450	41,614

8. Requirement for Infiltration of Runoff

Volume of surface runoff required to match pre-development infiltration rates	2,362 m^3
Percentage of surface runoff required to match pre-development infiltration	7%

APPENDIX M

TERRAPROBE INC.



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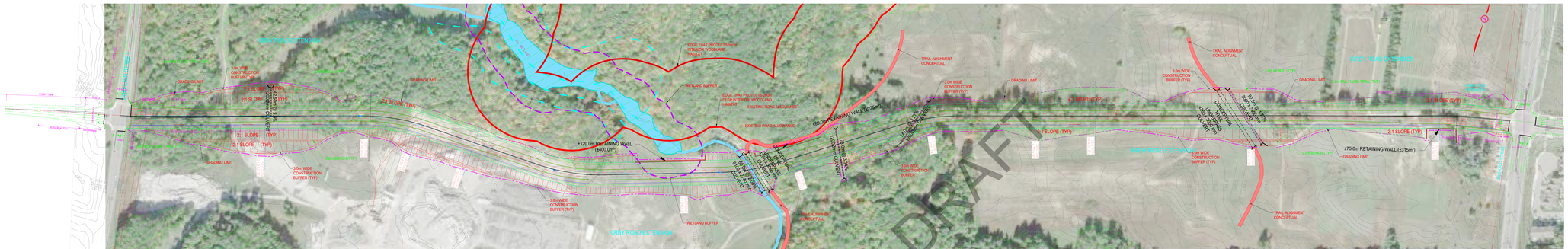
PRELIMINARY



PRELIMINARY

FINAL DRAFT

SCALE:
H 1:1500
V 1:300

LEGEND

- DENOTES WOODLAND SIGNIFICANCE
- DENOTES EXISTING WETLAND
- DENOTES EXISTING GROUND CONTOUR ELEVATION
- DENOTES SLOPES IN FILL
- DENOTES SLOPES IN CUT
- DENOTES CREEK

REVISIONS

No.	DESCRIPTION	By	Date

APPROVED AS TO FORM IN REGARDS TO THE PROFESSIONAL SEAL AND ABILITY OF SIGNATORIES CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATION.

SIGNATURE OF DEVELOPMENT ENGINEERING & INFRASTRUCTURE PLANNING DATE

KIRBY ROAD EXTENSION CLASS EA

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PROJECT No. 2018-4339 | DRAWING No.

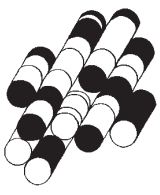
VAUGHAN

Kirby Road Extension Class EA
PLAN AND PROFILE ALIGNMENT 5A

DESIGNED BY: D.L.	DATE: DEC. 2018	CHECKED BY: N.L.
DRAWN BY: D.L.		APPROVED BY: P.S.
SCALE: 1:1500 AS SHOWN		DWG. No.: PP-5A

APPENDIX N

TERRAPROBE INC.



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for 2-sided printing purposes

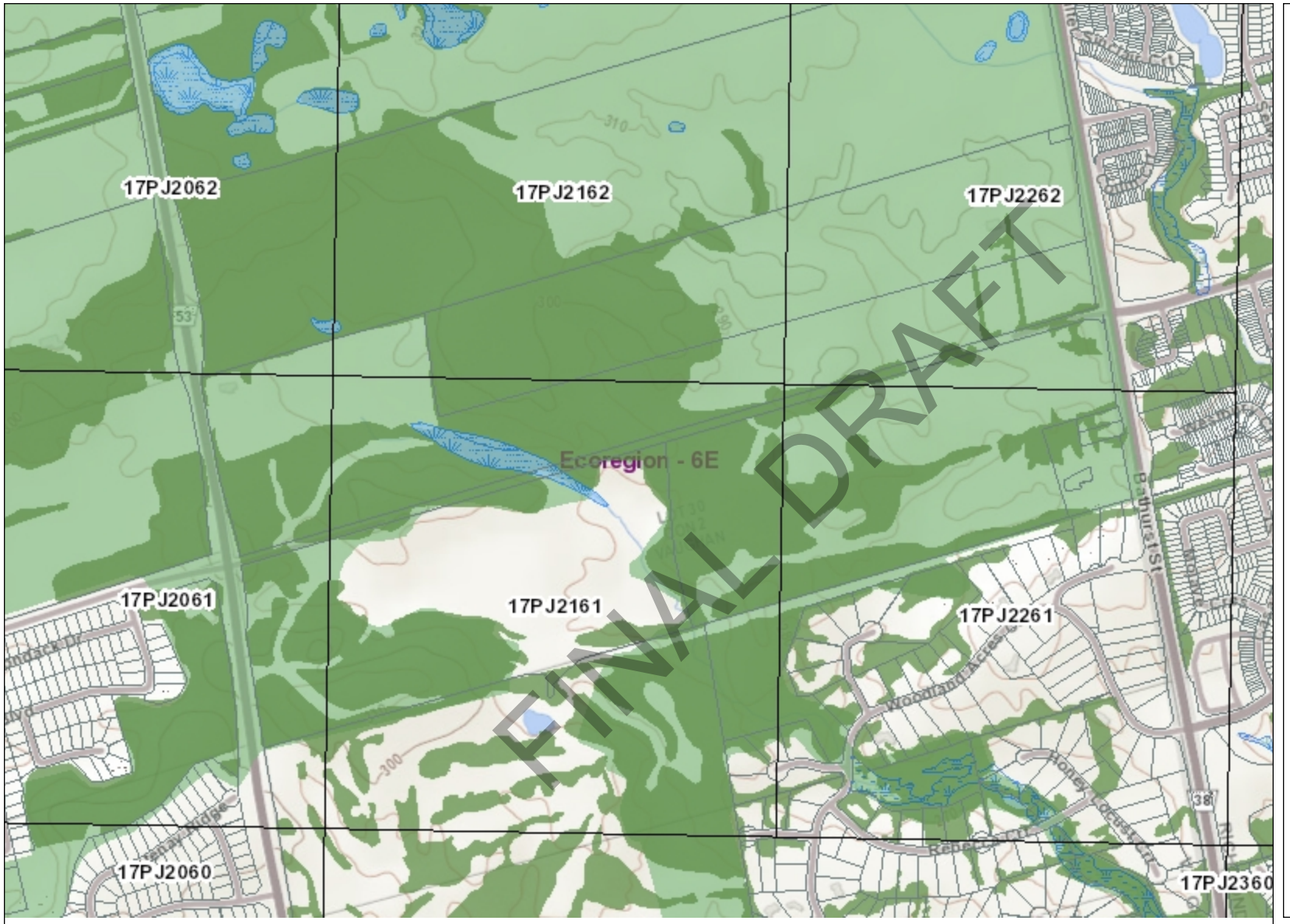
Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

Kirby Road Extension, Vaughan, ON

Notes: 1-15-0700-54



Legend

- Assessment Parcel
- Woodland
- Conservation Reserve
- Provincial Park
- Natural Heritage System
- Ecoregion

Wetland

- Provincially Significant Wetland Evaluated
- Non - Provincially Significant Wetland Evaluated
- Unevaluated Wetland

Area of Natural Heritage & Scientific Interest (ANSI)

- Provincially Significant Life Science ANSI
- Provincially Significant Earth Science ANSI

Greenbelt Plan

- Boundary
- River Valley Connections

Land Use Designations

- Protected Countryside
- Towns and Villages
- Hamlets
- Urban River Valley
- Specialty Crop Area

Niagara Escarpment Plan (NEP)

- Boundary
- Parks and Open Space System

Land Use Designations

- Escarpment Natural Area
- Escarpment Protection Area
- Escarpment Rural Area
- Mineral Resource Extraction Area
- Escarpment Recreation Area
- Urban Area
- Minor Urban Centre

Oak Ridges Moraine Conservation Plan (ORM)

- Boundary

Land Use Designations

- Natural Core Area
- Natural Linkage Area
- Countryside Area
- Rural Settlement
- Palgrave Estates Residential Community
- Settlement Area

0.7 0 0.33 0.7 Kilometers

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Natural Resources and Forestry(OMNRF) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.

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