Appendix M.1 – Geotechnical Hydrogeological Desktop Study

Kennedy Road Environmental Assessment between Steeles Avenue and Major Mackenzie Drive

REPORT

February 1, 2018

GEOTECHNICAL AND HYDROGEOLOGICAL DESKTOP STUDY REPORT

Kennedy Road Environmental Assessment from Steeles Avenue to Major Mackenzie Drive

Submitted to:
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Report Number: 1664178

Distribution:

1 E-Copy - HDR Inc.
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Golder Associates

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by HDR Inc. (HDR) to carry out a desktop study of existing information from a geotechnical, hydrogeological, and pavement discipline perspective. This desktop study has been carried out in the area of Kennedy Road, from Steeles Avenue to Major Mackenzie Drive in the City of Markham. This desktop study is part of the overall Municipal Class Environmental Assessment Study (Class EA) for improvements to Kennedy Road. Kennedy Road is a major north-south corridor in the Regional Municipality of York (Region) and the need for capacity improvements has been identified in the York Region Transportation Master Plan (2016) in order to accommodate growth and improve overall network connectivity.

The purpose of this report is to present the results of the desktop study. This report was prepared for the exclusive use of HDR and is intended to be used in planning of further investigations only. Any use that a third party makes of this report is based solely on the review of historical information and data obtained by Golder and/or provided by HDR as described in this report. Additional explorations of subsurface conditions will need to be carried out as part of this Class EA and preliminary design assignment to better define the local geologic stratigraphy, groundwater levels and the engineering properties of the subsurface materials for further design activities.

The factual data contained in this report pertain to a specific project as described in the report and are not applicable to any other project of site location. In addition, this report should be read in conjunction with the "Important Information and Limitations of This Report" contained in Appendix A of this report. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2.0 SITE AND PROJECT DESCRIPTION

The study area for the Class EA is located along Kennedy Road between Steeles Avenue and Major Mackenzie Drive in the City of Markham, York Region and is approximately nine kilometres in length (Figure 1). Within the study limits, Kennedy Road is a four lane undivided north-south urban arterial road that intersects a number of local roads, watercourses, environmentally sensitive areas, railway lines, and crosses over Highway 407. Improvements along Kennedy Road (including possible widening) are required in order to increase system capacity, accommodate growth and advance network connectivity.

Within the overall project limits, Kennedy Road crosses the main branch of the Rouge River. Notably, the confluence of Bruce Creek with the Rouge River is located 150 metres west of Kennedy Road and the Unionville Marsh Wetland Complex, a Provincially Significant Wetland (PSW), is located 500 metres west of Kennedy Road (Figure 2). It is understood that the proposed Kennedy Road improvements will modify the existing roadway to meet the planning requirements for the City of Markham as set out in Places to Grow, the Big Move, Regional policy documents (such as Vision 2051) and the Regional Official Plan. The following structures identified within the study area include:

- Stouffville GO At-Grade Crossing north of Clayton Drive (potential overpass/underpass structure);
- CN Rail structure (north of 14th Avenue);
- Highway 407 Overpass Structure;
- Kennedy Road crossing over Rouge River (north of Highway 7); and
- Stouffville GO At-Grade Crossing north of Austin Drive (potential overpass/underpass structure).

3.0 EXISTING CONDITIONS

Relevant borehole information for this project was collected from information provided by York Region to HDR and from MTO's GEOCRES database. Additionally, previous projects on Kennedy Road between Steeles Avenue and Major Mackenzie Drive have contributed to the current understanding of the conditions on the site. The relevant reports used in this desktop study are listed below:

- Beatty and Associates Ltd., report titled "Groundwater and Engineering in the Town of Markham", dated December 2001.
- Coffey, report titled "Hydrogeological Assessment Report for Application to Renew Permit to Take Water 1500-mm Diameter Kennedy Road Watermain". Reference No. ENVSETOB10389AA, dated March 25, 2014.
- Geo-Canada Ltd., report titled "Report on subsurface investigation for Kennedy Road and Birchview Lane Intersection Improvements Regional Municipality of York", Report No. G-06.0406, dated June 2006.
- Golder Associates Ltd., report titled "Preliminary Geotechnical Investigation Proposed Residential Development, 4134 16th Ave Markham, Ontario", Report No. 1413472, dated September 29, 2016.
- MacViro Consultants Inc., report titled "Fill, Construction, Alteration to Waterways Application 16th Avenue Trunk Sewer Phase II York Durham Sewage System", dated June 2003.
- Ministry of Transportation, Ontario, Engineering Material Office, Soil Mechanics Section, report titled "Foundation Investigation Report for Feasibility Study for Proposed Hwy 407 from East of Woodbine Avenue to East of Regional Road 69, W.P. 90-78-00, District 6, Toronto", GEOCRES Report No. 30M14-163, dated May 18, 1979.
- North-South Environmental Inc., report titled "Natural Heritage and Hydrologic Study – Millken Secondary Plan Area", dated December 12, 2016.
- R. J. Burnside and Associates Ltd., report titled "Hydrogeological Assessment and Water Balance of 4134 16th Ave Markham, Ontario", Report No. 300038247.0000, dated September 2016.
- Trow Associates Ltd., report titled "Foundation Conditions, Proposed Bridge Replacement, Kennedy Road over Beaver Creek, South of Unionville". GEOCRES Report No. 30M14-049, dated April 16, 1968.
- Trow Associates Inc., report titled "Geotechnical Investigation Proposed Road Widening Kennedy and Birchview Lane Markham, Ontario", Report No. BRGE00283621A, dated June 5, 2007.
- URS Corp., report titled "Environmental Study Report – Miller Avenue Extension and Improvements from Woodbine Avenue to Kennedy Road", dated September 2013.
- York Region Rapid Transit Plan, report titled "Highway 7 Corridor & Vaughan North-South Link Public Transit Improvements – Environmental Assessment Report", Report No. PM1435, dated August 2005.

3.1 Topography and Drainage

The ground surface topography and drainage of this section of Kennedy Road are shown in Figure 2. The ground surface slopes downward to the south and west between Major Mackenzie Drive (~205 masl (metres above sea level)) and the Rouge River (~170 masl), toward Bruce Creek and the Rouge River. Between the Rouge River and 14th Avenue (~205 masl) the ground surface slopes downward to the north toward the Rouge River. The final leg included in this study between 14th Avenue and Steeles Avenue (195 masl) slopes gently downward to the south.

Drainage throughout the study area is affected by the extensive urbanization including the impervious surfaces, stormwater drainage, and stormwater management systems. The dominant drainage features in the study area include the main branch of the Rouge River, Bruce Creek (a tributary of the Rouge River), the Unionville Marsh Wetland Complex, small wetland features, stormwater ponds, and minor tributaries of the Rouge River. The Rouge River is defined as a cold water stream (MNRF LIO, 2017) where it crosses Kennedy Road. The Unionville Marsh Wetland Complex is a Provincially Significant Wetland located 500 metres west of Kennedy Road.

3.2 Regional Geology

This section of Kennedy Road, from Steeles Avenue to Major Mackenzie Drive is primarily within the Peel Plain physiographic regions and the southern portion of the site is within the Southern Ontario physiographic regions[1].

The Peel Plain physiographic region covers portions of the Regional Municipalities of York, Peel, and Halton. The Peel Plain comprises a surficial till sheet, which generally follows the surface topography and is present through much of this area. The till is typically comprised of silt to silty clay, with occasional sand and silt zones; it is mapped in this area as the Halton Till. Although the topography is relatively flat, it leads to some local ponding; however, infiltration is still quite low due to the presence of the lacustrine clay over the till deposit. The area is underlain by Ordovician shales of the Georgian Bay Formation.

The South Slope physiographic region covers portions of the Regional Municipalities of Peel, York and Durham. A surficial till sheet, which generally follows the surface topography, is generally present throughout much of this area. The till is typically comprised of clayey silt to silty clay, with occasional silt to sand zones and is mapped in this area as the Halton Till. Shallow, localized deposits of loose silt and sand and/or soft clay can overlie this uppermost till sheet, and these represent relatively recent deposits, formed in small glacial melt water ponds scattered throughout the Peel Plain and concentrated near river valleys. The recent sand, silt and clay and uppermost till deposits in this area overlie and are interbedded with stratified deposits of sand, silt and clay. The area is underlain by the grey shale of the Georgian Bay Formation.

3.3 Overview of Subsurface Conditions

The surficial geology of the area is summarized in Figure 3. The surficial geology of the study area includes carbonate-derived silty to sandy till, massive well-laminated deposits, foreshore-basinal deposits, and modern alluvial sediments. Between Steeles Avenue and Highway 407, silty to sandy till is consistently observed. Between Highway 407 and Major Mackenzie Drive, massive well-laminated deposits, foreshore-basinal deposits, and silty to sandy till are found in sections. Immediately around the Rouge River and Bruce Creek, modern alluvial deposits are observed.

[1] Chapman, L.J., and Putnam, D.F. 1972. *Map 2226 – Physiography of the south central portion of Southern Ontario* in *The physiography of Southern Ontario*. 2nd ed. Toronto: Ontario Dept. of Mines and Northern Affairs.

Sixty-five borehole records, six borehole plans, and stratigraphic profiles are found in previous studies and are included in Appendix C. Boreholes ranged in depth from 1 m to 35 m and generally showed agreement with the surficial soils mapping in Figure 3 and the overburden soils encountered in previous investigations is consistent with the expected regional geology. The subsurface conditions generally consist of surficial topsoil and /or pavement structure and fill materials underlain by alternating deposits of silty clay to clayey silt, silty sand to sand, silt to sandy silt and glacial till.

The cohesive tills encountered generally consist of very stiff to hard silty clay to clayey silt with varying quantities of sand and gravel. The non-cohesive tills encountered consist of a combination of silt and sand of loose to very dense compactness and contain varying quantities of fines and gravel. Cobbles and boulders were noted throughout the previous boreholes advanced and should be expected to be present within the till deposits in this area. Non-cohesive deposits consisting of dense to very dense sand and gravel was encountered within and below the till deposits in the boreholes advanced. Contacts between sand till, silt till, clay till, and sand units are often irregular and many units are discontinuous.

An alluvium deposit was encountered at the Rouge River crossing east of Kennedy Road. The deposit consists primarily of very loose to loose silty sand to sand to some coarser gravelly soils and was encountered at elevations ranging from 163 m to 168 m. The alluvium deposit was generally underlain by dense to very dense silty sand and gravel.

3.3.1 Bedrock Conditions

Underlying the overburden, shale bedrock was encountered at boreholes advanced at the Rouge River bridge. Bedrock consists of weak to medium shale of the Georgian Bay Formation. Bedrock was encountered at a depth of approximately 21 m below the existing ground surface of Kennedy Road (between Elevations 149 m to 151 m). The Total Core Recovery (TCR) ranged from 95 percent to 100 percent and the Rock Quality Designation (RQD) ranged from 0 percent to 77 percent.

3.4 Regional Hydrogeology

Generally, hydrostratigraphic units influencing groundwater flow in the study area include a shallow groundwater system (i.e., Halton Till and Oak Ridges Complex Aquifer) and a deeper groundwater system (i.e., Newmarket Till, Thorncliffe Aquifer, Sunnybrook Aquitard, Scarborough Aquifer and Weathered Bedrock) (TRCA, 2008). The characteristics of these hydrostratigraphic units that influence groundwater flow include the presence and configuration of bedrock valleys and tunnel channels, the thickness and lateral extent of the Newmarket Till, which separates the shallow and deep groundwater systems, and the thickness and lateral extent and nature of the sediments in the aquifer complexes (TRCA, 2008). Along, Kennedy Road there may be additional discontinuous layers and variation of the hydrostratigraphic units.

The shallow aquifer in the study area has been observed in hydrogeological and geotechnical studies. Depth to the water table varies throughout the study area, ranging from 31 metres below ground level (mbgl) to 3.5 mbgl (Coffey, 2014). Some artesian conditions have been observed in shallow groundwater in the topographic lows and near the Rouge River. Observed groundwater levels in the shallow aquifer mimicked the topography (Beatty and Associates Ltd, 2001) from high elevations in the northern end of the study area to the low point in the study area, the Rouge River (Coffey, 2014). Additional hydrogeological information obtained from the anticipated geotechnical investigation in 2018 will be provided, when available. Shallow groundwater levels are influenced by infiltration at the ground surface contributing to recharge. Based on the annual precipitation, topography, and surficial soils, 100

millimetres per year (mm/yr) of recharge is estimated in the study area (North-South Environmental, 2016). Seasonality and recharge events also have an influence on the water level distribution in the shallow aquifer. Due to the heterogeneity of the shallow soils, perched water table conditions were observed near the intersection of Kennedy Road and Steeles Avenue.

The lower aquifer is found at the contact between the Scarborough Sands and the weathered shale Georgian Bay Formation bedrock. In the study area, a buried bedrock valley affects the groundwater flow (Beatty and Associates Ltd., 2001). A pumping test conducted using seven wells on 16th Avenue and Markham Road (4 km east of the study area) made observations of the baseline head distributions and estimated the hydraulic parameters (MacViro, 2003). The test showed that in the lower aquifers the typical direction of groundwater flow is from the Oak Ridges Moraine toward Lake Ontario, south-southeast.

3.5 Groundwater Use

Based on a review of the Ontario Ministry of the Environment and Climate Change's (MOECC) Water Well Information System (WWIS) database, there are 412 water well records and seven Permits to Take Water (PTTW) within a 500 m radius of the study area. Figures 4 and 5 indicate the locations of these water well records and PTTW, respectively. Table B1 summarizes the well information and Table B2 summarizes the PTTW information (Appendix B).

The listed wells were drilled between 1950 and 2016 to depths of 1.8 to 100.6 mbgl. Some (97) of the water wells listed have been abandoned. A total of 160 water supply well records are listed and are primarily for domestic, livestock, and 145 for irrigation use and 99 monitoring/test holes/observation wells. Two municipal and two public wells were identified, completed in 1964 and 1967, and 1967 and 1994, respectively. The majority of the area is now municipally serviced; most of these water supply wells are assumed to be no longer active and may have been decommissioned.

Part of our standard hydrogeological review is to check for nearby permitted water takings to assess the potential for well interference impacts. Of the seven PTTW listed in Table B2, six are held by the Region, ranging from 135,000 L/day to 200,000 L/day. All six permits are used for construction dewatering. Five of the construction dewatering permits are near the Kennedy Road bridge over the Rouge River and the sixth is located on Kennedy Road north of Highway 407. The Region's permits will expire in 2018. The other permit is held by the Angus Glen Golf Club, active until 2022, and is used for irrigation (392,775 L/day). The permitted well for the Angus Glen Golf Club is located at the northwestern extent of the study area. The need of a PTTW for the Kennedy Road Improvement will be further assessed during the geotechnical/hydrogeological investigation which is anticipated to be carried out in 2018.

3.6 Pavement Design Considerations

3.6.1 Visual Condition Survey

In July 2017, Golder carried out a visual pavement condition inspection of Kennedy Road between Steeles Avenue and Major Mackenzie Drive.

The pavement on Kennedy Road between Steeles Avenue and Major Mackenzie Drive is generally in fair condition, with localized areas of severe distresses. There are urban cross-sections with curbs, gutters and catch basins for drainage. The following types, severities, and densities of surface distresses were documented:

- Intermittent, slight to moderate transverse cracking;

- Intermittent, slight to moderate longitudinal cracking;
- Frequent, slight to moderate longitudinal and transverse construction joints; and
- Localized, moderate to severe alligator cracking.

Occasional patching and repairs have been carried out within this section of Kennedy Road and are generally performing fairly. Based on the visual condition survey, Golder suggests localized removal and reconstruction at areas of severe alligator cracking.

Photographs of typical distresses in the existing pavement are attached to this report.

3.6.2 Summary of Existing Pavement Reports

3.6.2.1 Pavement Structure

Based on the information provided by HDR, Golder completed a review of previous geotechnical investigations at Kennedy Road and Birchview Lane conducted by Geo-Canada in May 2006, and by Trow in June 2007. A total of fifteen (15) boreholes were advanced along Kennedy Road in the northbound and southbound lanes and are summarized in Table 1 below.

Table 1: Summary of Previous Borehole Review

Direction	No. of Boreholes	
	Lane	Shoulder/Ditch
Northbound	4	3
Southbound	4	4

Based on the record of boreholes documented in the 2006 and 2007 geotechnical investigations, the thicknesses (range and average) of the existing asphalt and granular materials are summarized in Table 2.

Table 2: Summary of Existing Pavement Structure - Kennedy Road

Direction	Layer Thicknesses (mm)			
	Asphalt	Granular Base	Granular Subbase	Total
Northbound	130 - 140 (140)	170 - 240 (200)	290 - 580 (450)	590 - 960 (790)
Southbound	95 - 125 (115)	180 - 380 (280)	330 - 510 (450)	605 - 1015 (845)

Grain size distribution tests were carried out on two (2) samples of the granular base material, and two (2) samples of the granular subbase material obtained from the lanes and shoulder/ditches along Kennedy Road. The results indicate that one (1) out of the two (2) samples tested did not satisfy the current OPSS.PROV. 1010 gradation requirements for Granular A due to the material being too coarse on most sieves; the other granular base sample marginally failed the OPSS gradation requirements with a slight tolerance violation on the 0.075 mm sieve (10% with an acceptable range of 2-8%). The results for the granular subbase material along Kennedy road indicate that both samples tested generally satisfied the current OPSS.PROV 1010 gradation requirements for Granular B, Type I.

The results of the gradation tests carried out on the granular base and subbase samples are shown in Appendix B of Geo-Canada's report (Ref. No. G-06.0406), dated June 2006.

3.6.2.2 Subgrade Soil Conditions and Topsoil Depth

The results of the previous borehole investigations at Kennedy Road and Birchview Lane indicate that the predominant subgrade soils surrounding the existing pavement generally consisted of stiff to very stiff clayey silt. Topsoil depths adjacent to the pavement structure ranged from 150 mm to 250 mm, with an average of 230 mm.

3.6.3 Pavement Design

3.6.3.1 Design Criteria and Traffic Data

Kennedy Road is assumed to be maintained as an Urban Principal Arterial (UPA) configuration with two to three lanes in each direction.

The traffic data for the pavement components within the project limits was provided by The Regional Municipality of York in the Class EA background documents in an email dated November 4, 2016. The traffic data is summarized in Table 3.

Table 3: Summary of Traffic Volumes

Kennedy Road Segment	2015		2031	
	Lane	AADT	Lane	AADT
Steeles Avenue E to Denison Road	4 GPL	34,840	4 GPL + 2 HOV	52,000
Denison Road to Highway 7	4 GPL	41,580	4 GPL + 2 HOV	52,000
Highway 7 to 16th Avenue	4 GPL	28,270	4 GPL + 2 HOV	52,000
16th Avenue to Major Mackenzie Drive E	4 GPL	22,420	4 GPL + 2 HOV	52,000

3.6.3.2 Pavement Design and Analysis

Based on the existing desktop information the estimated Equivalent Single Axle Loads (ESALs) is approximately 13 million over 20 years. This may be subject to change based on HDR's updated traffic analysis study.

Kennedy Road's pavement structural number was calculated using previously obtained borehole information and typical AASHTO 1993 design parameters. The calculated structural number was compared to the required structural number and was found to be deficient in both the northbound and southbound lanes. As such, at a minimum a mill and overlay design strategy may be required to rehabilitate the existing pavements on Kennedy Road.

Based on the existing information noted above, the following could be proposed for the **rehabilitation of the existing lanes**:

- Mill 50 mm of the existing asphalt;
- Pave with 150 mm of new Hot Mix Asphalt consisting of the following:

50 mm	Superpave 12.5 FC2	Surface Course
50 mm	Superpave 19	Upper Binder Course
50 mm	Superpave 19	Lower Binder Course

The above noted strategy will result in a grade raise of 100 mm throughout the entire Kennedy Road corridor.

For the purposes of design, it has been assumed that all asphalt materials and mixes will conform to the requirements of York Region Road Design Guidelines and OPSS.PROV 1151 (November 2016) – Material Specification for Superpave and Stone Mastic Asphalt Mixtures, and be designed to meet the requirements of MTO Traffic Category D.

Based on the existing information noted above, the following could be proposed for the **widening of Kennedy Road**:

- Excavate to a minimum depth of 850 mm below the proposed grade (the subgrade depth should match or exceed the depth of the adjacent granular subbase in the existing lane);
- Proof roll and inspect subgrade for soft or poor soils;
- Construct the widening with the following pavement structure below the finished grade:

50 mm	Superpave 12.5 FC2	Surface Course
50 mm	Superpave 19	Upper Binder Course
100 mm	Superpave 25	Lower Binder Course
150 mm	Granular A	Base
500 mm	Granular B, Type I	Subbase

It should be noted that subgrade material should be tested to determine the percentage of silt content beneath the proposed widening sections. If any material encountered consists of a high silt content with moderate to high susceptibility to frost heaving, removal of up to 1,200 mm (frost depth) may be required.

4.0 CLOSURE

This Report was authored under a Subconsultant Agreement between HDR and Golder for the Regional Municipality of York's ("Owner") projects. The Report is provided to HDR and Regional Municipality of York for their use, utilizing their judgment, in fulfilling a portion of HDR's particular scope of work. No other party may rely upon this report, or any portion thereof, without Golder's express written consent and any reliance of the reports by others will be at that user's sole risk and liability, notwithstanding that they may have received this Report through an appropriate user. In addition, Golder shall not be liable for any use of the Report for any purpose other than that for which the same was originally prepared or provided by Golder, or any improper use of this Report, or to any party other than HDR.

We trust that this geotechnical and hydrogeological desktop study provides information on the existing conditions along Kennedy Road from Steeles Avenue to Major Mackenzie Drive to assist with the initial stages of the development of the Class Environmental Assessment. Further work in the disciplines will continue and a report will be issued when the investigation and analysis work is completed.

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Senior Pavement and Materials Engineer, Associate

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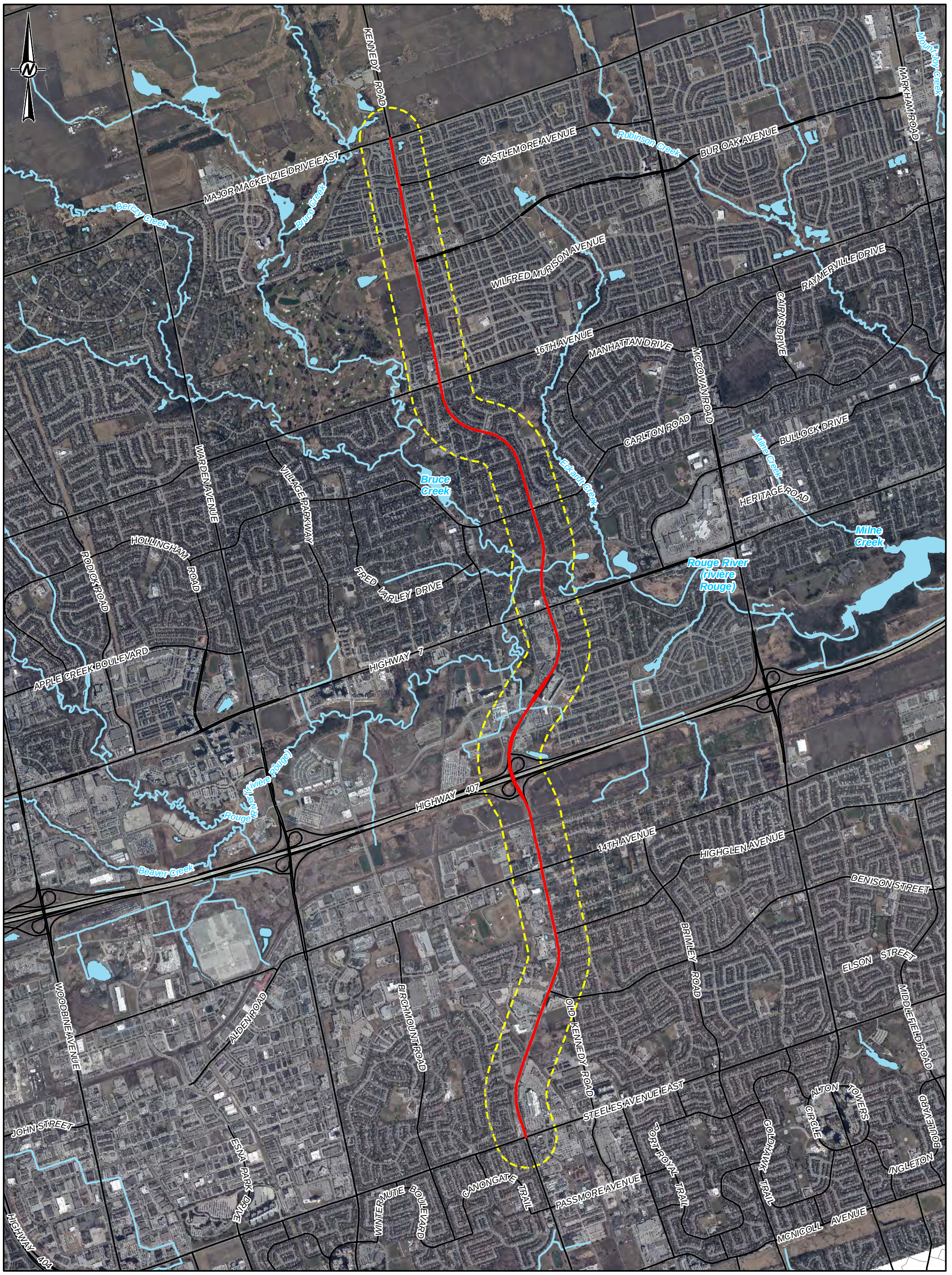

LEGEND

- STUDY CORRIDOR
- STUDY AREA

REFERENCE(S)

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3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

0 1,000 2,000

1:30,000 METRES

CLIENT
HDR CORPORATION

PROJECT
HYDROGEOLOGY DESKTOP STUDY
KENNEDY ROAD, STEELES AVENUE TO MAJOR MACKENZIE DRIVE
CITY OF MARKHAM, REGIONAL MUNICIPALITY OF YORK

TITLE
STUDY SITE

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-17
DESIGNED	JT
PREPARED	PR/JT
REVIEWED	AM
APPROVED	SYJ

PROJECT NO.	CONTROL	REV.	FIGURE
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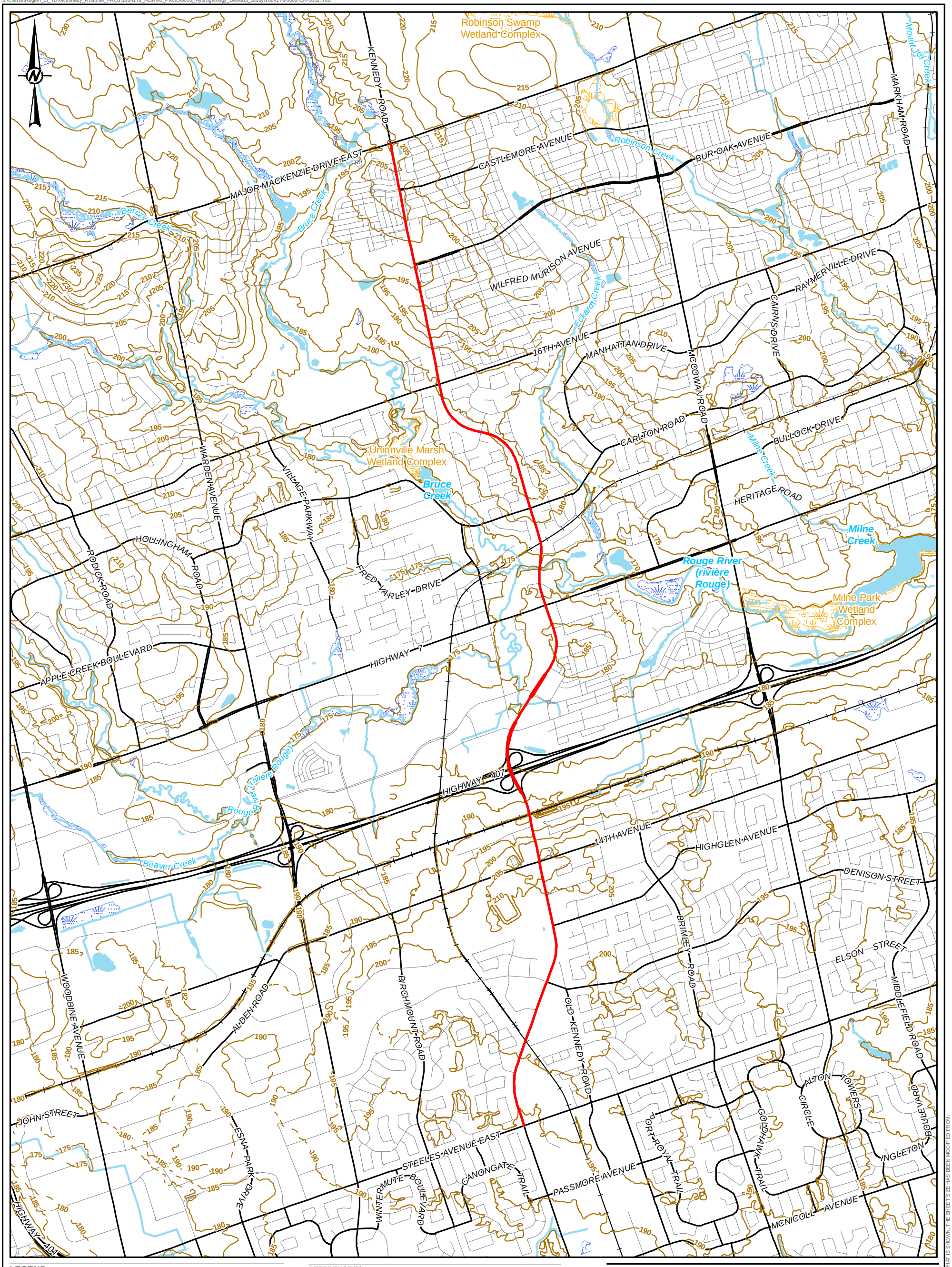

LEGEND

- STUDY CORRIDOR
- CONTOUR (5 M)
- RAILWAY
- ROAD
- WATERCOURSE
- WATERBODY
- NOT EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND

REFERENCE(S)

1. BASE DATA: MNRF LIO, OBTAINED 2016
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

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CLIENT
HDR CORPORATION

PROJECT
HYDROGEOLOGY DESKTOP STUDY
KENNEDY ROAD, STEELES AVENUE TO MAJOR MACKENZIE DRIVE
CITY OF MARKHAM, REGIONAL MUNICIPALITY OF YORK

TITLE
ELEVATION AND DRAINAGE

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-17
DESIGNED	JT
PREPARED	PR/JT
REVIEWED	AM
APPROVED	SYJ

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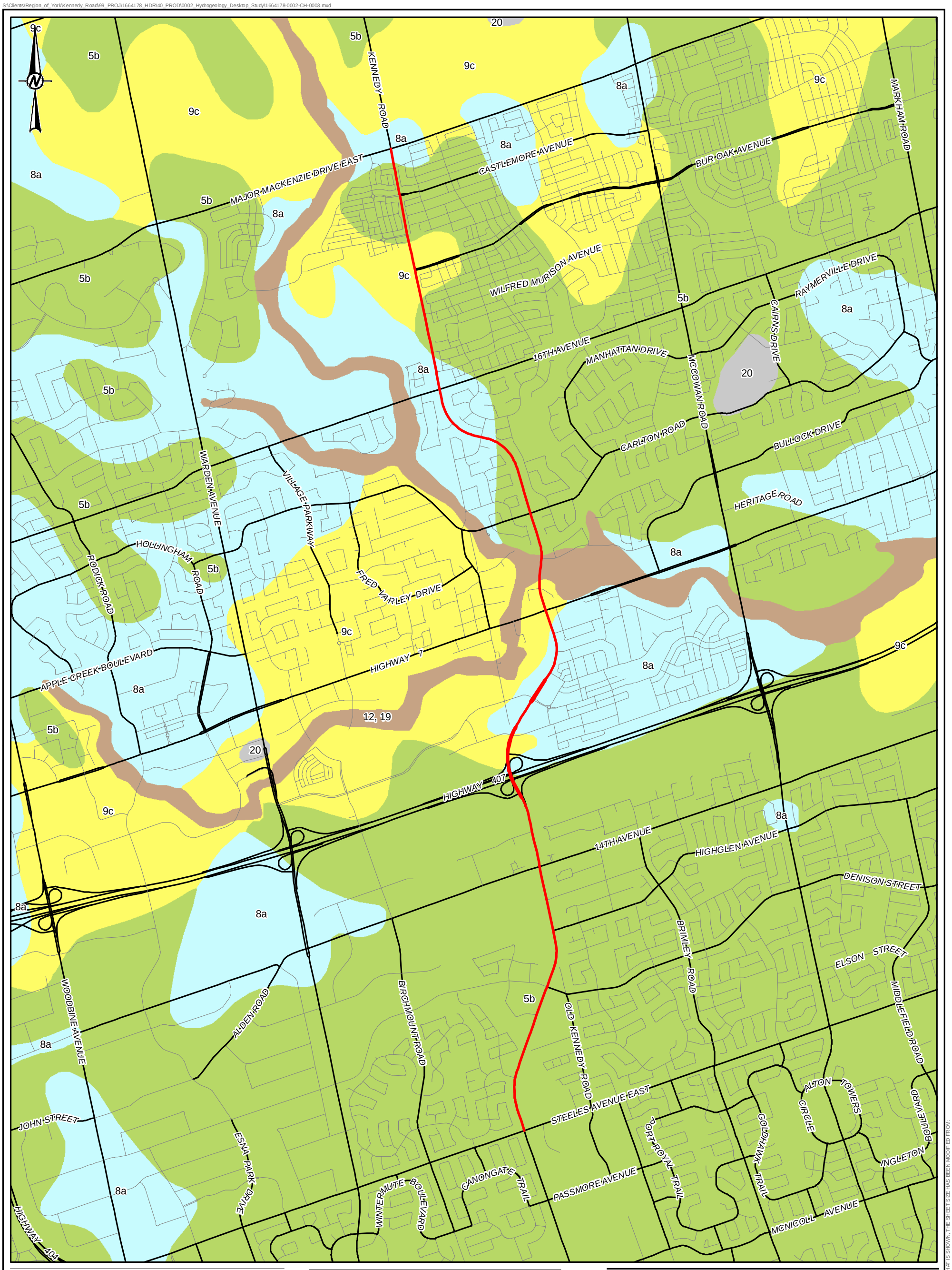

LEGEND

- STUDY CORRIDOR
- 5B: STONE-POOR, CARBONATE-DERIVED SILTY TO SANDY TILL
- 8A: MASSIVE WELL-LAMINATED
- 9C: FORESHORE-BASINAL DEPOSITS
- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

REFERENCE(S)

1. BASE DATA: MNRF LIO, OBTAINED 2016
2. SURFICIAL GEOLOGY: ONTARIO GEOLOGICAL SURV EY 2010. SURFICIAL GEOLOGY OF SOUTHERN ONTARIO; ONTARIO GEOLOGICAL SURV EY, MISCELLANEOUS RELEASE--DATA 128.
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

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CLIENT
HDR CORPORATION

PROJECT
HYDROGEOLOGY DESKTOP STUDY
KENNEDY ROAD, STEELES AVENUE TO MAJOR MACKENZIE DRIVE
CITY OF MARKHAM, REGIONAL MUNICIPALITY OF YORK

TITLE
SURFICIAL GEOLOGY

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-17
DESIGNED	JT
PREPARED	PR/JT
REVIEWED	AM
APPROVED	SYJ

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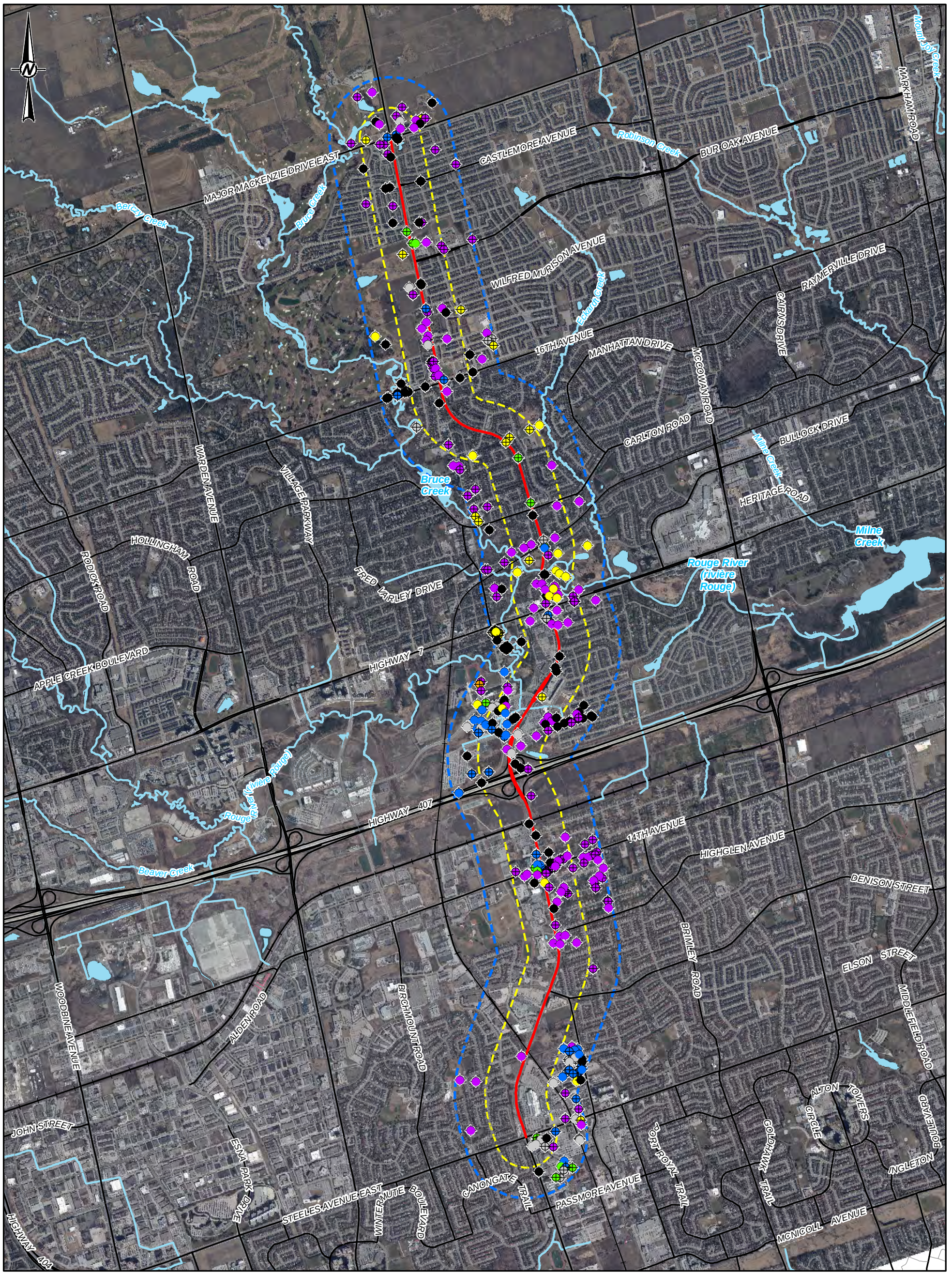

LEGEND

MOECC WATER WELL USE

- ABANDONED
- DEWATERING
- MONITORING AND TEST HOLE
- NOT IDENTIFIED
- OBSERVATION WELLS
- TEST HOLE
- WATER SUPPLY

- STUDY CORRIDOR
- RAILWAY
- WATERCOURSE
- WATERBODY
- BUFFER (500 M)

REFERENCE(S)

1. BASE DATA: MNRF LIO, OBTAINED 2016
2. MOECC WATER WELLS: WWIS MOECC, 2017
3. IMAGERY: REGION OF YORK WMS, 2016
4. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

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1:30,000 METRES

CLIENT
HDR CORPORATION

PROJECT
HYDROGEOLOGY DESKTOP STUDY
KENNEDY ROAD, STEELES AVENUE TO MAJOR MACKENZIE DRIVE
CITY OF MARKHAM, REGIONAL MUNICIPALITY OF YORK

TITLE
MOECC WATER WELLS

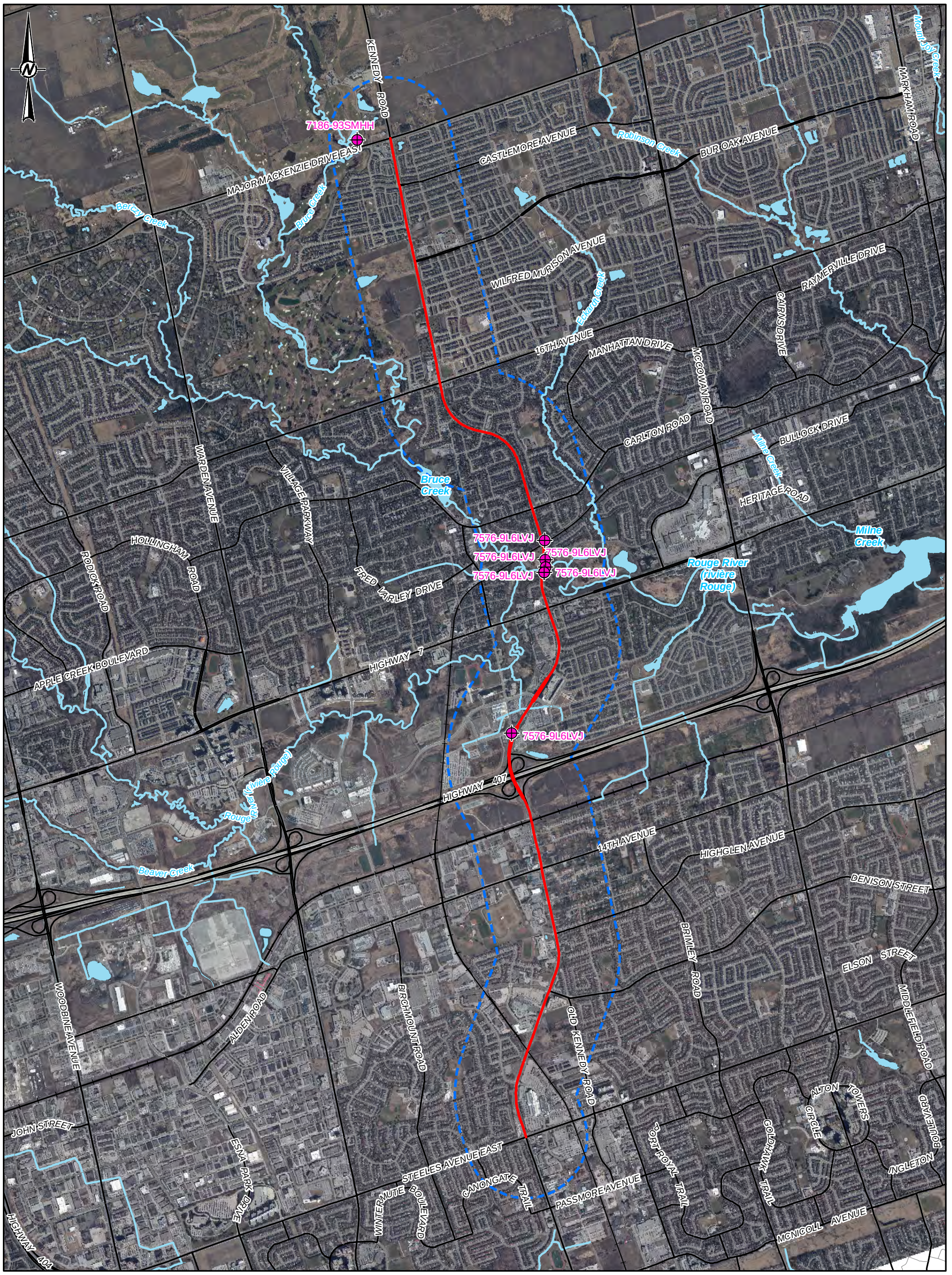
CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-17
DESIGNED	JT
PREPARED	PR/JT
REVIEWED	AM
APPROVED	SYJ

PROJECT NO.	CONTROL	REV.	FIGURE
1664178	0002	1	4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

S:\Clients\Region_of_York\Kennedy_Road\99_PROJ\1664178_HDR\40_PROD\0002_Hydrogeology_Desktop_Study\1664178-0002-CH-0005.mxd



LEGEND

- PERMIT TO TAKE WATER
- STUDY CORRIDOR
- RAILWAY
- WATERCOURSE
- WATERBODY
- BUFFER (500 M)

REFERENCE(S)

1. BASE DATA: MNRF LIO, OBTAINED 2016
2. MOECC PERMIT TO TAKE WATER LOCATIONS, MOECC 2017
3. IMAGERY: REGION OF YORK WMS, 2016
4. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

0 1,000 2,000

1:30,000 METRES

CLIENT
HDR CORPORATION

PROJECT
HYDROGEOLOGY DESKTOP STUDY
KENNEDY ROAD, STEELES AVENUE TO MAJOR MACKENZIE DRIVE
CITY OF MARKHAM, REGIONAL MUNICIPALITY OF YORK

TITLE
MOECC PERMITS TO TAKE WATER (PTTW)

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-17
DESIGNED	JT
PREPARED	PR/JT
REVIEWED	AM
APPROVED	SYJ

PROJECT NO.	CONTROL	REV.	FIGURE
1664178	0002	1	5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 0 25mm

APPENDIX A

Important Information and Limitations of This Report

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

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

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

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

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

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

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface

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

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

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

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

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

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

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

APPENDIX B

Summary of Water Well Records and Permits to Take Water in Study Area

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
6903407	5	1	7-Jun-1958	635676.7	4853737.0	192.7	21.336	FRESH	2	21.3	11.6	Jetting	Water Supply	Commerical	23.8
6903409	5	1	4-May-1962	636555.8	4854198.0	201.9	47.8536	FRESH	5	45.4	31.7	Cable Tool	Water Supply	Domestic	47.9
6903410	5	1	8-Aug-1965	636563.8	4853913.0	198.3	7.62	FRESH	30		4.6	Boring	Water Supply	Domestic	9.1
6903412	5	2	12-Jun-1957	636508.8	4854422.0	200.9	10.668	FRESH	36		4.6	Boring	Water Supply	Commerical	14.3
6903413	5	2	8-Sep-1960	635720.7	4854138.0	197.4	7.3152	FRESH	34		6.1	Boring	Water Supply	Livestock	12.2
6903422	5	5	2-Nov-1956	636139.7	4855839.0	203.2	10.0584	FRESH	24		0	Boring	Water Supply	Domestic	10.4
6903423	5	5	5-Nov-1956	636119.7	4855820.9	203.5	12.4968	FRESH	36		4.6	Boring	Water Supply	Domestic	13.1
6903424	5	5	4-Jun-1962	636200.7	4855768.1	204.5			30		0	Boring	Abandoned-Supply		22.9
6903425	5	5	30-Jun-1962	636224.7	4855833.0	203.6	48.1584	FRESH	5	48.2	32.9	Cable Tool	Water Supply	Domestic	51.8
6903433	5	9	3-Nov-1964	635761.8	4857341.0	175.0	13.716	FRESH	30		2.4	Boring	Water Supply	Livestock	14
6903448	5	10	2-Aug-1966	635763.8	4857417.0	174.1	3.6576	FRESH	34		1.5	Boring	Water Supply	Commerical	6.4
6903511	5	14	28-Aug-1961	635497.8	4859362.0	180.6	9.144	FRESH	34		4.3	Boring	Water Supply	Domestic	10.7
6903516	5	14	18-Aug-1964	635535.8	4859189.0	178.9	10.3632	FRESH	34		4.9	Boring	Water Supply	Domestic	12.2
6903523	5	16	2-Feb-1955	635328.8	4860256.0	194.7	5.1816	FRESH	6		0	Cable Tool	Water Supply	Domestic	5.2
6903525	5	16	30-Oct-1954	635390.8	4859987.0	186.0	11.2776	FRESH	4		0	Cable Tool	Water Supply	Domestic	11.3
6903528	5	17	6-Sep-1961	635313.8	4860366.0	200.7	5.7912	FRESH	34		1.2	Boring	Water Supply	Domestic	6.4
6903541	5	19	22-Dec-1959	634817.7	4861336.0	202.3	4.2672	FRESH	30		3	Boring	Water Supply	Livestock	8.2
6903546	5	19	23-Dec-1963	635037.7	4861317.0	205.3	4.2672	FRESH	34		4.3	Boring	Water Supply	Domestic	11
6903637	6	4	3-Mar-1960	636547.8	4855279.1	202.1	14.6304	FRESH	30		14	Boring	Water Supply	Industrial	18.3
6903638	6	4	5-Sep-1960	636407.7	4855329.0	202.0	12.8016	FRESH	34		6.1	Boring	Water Supply	Domestic	15.8
6903639	6	4	18-Jan-1967	636453.8	4855339.0	202.4	48.768	FRESH	6	49.4	32	Cable Tool	Water Supply	Domestic	50.9
6903640	6	4	24-Jan-1967	636681.8	4855064.0	200.0	53.6448	FRESH	5	53.6	33.5	Cable Tool	Water Supply	Domestic	54.9
6903641	6	4	5-Jan-1967	636807.8	4855561.0	204.0	6.096	FRESH	30		6.1	Boring	Water Supply	Domestic	14.3
6903642	6	5	13-May-1956	636296.7	4855849.0	204.3	19.5072	FRESH	6		7.3	Cable Tool	Water Supply	Commerical	19.5
6903643	6	5	21-Oct-1956	636316.7	4855880.0	204.3	53.9496	FRESH	4	53.9	27.4	Cable Tool	Water Supply	Domestic	54.9
6903646	6	5	28-Sep-1959	636731.8	4855825.0	204.6	7.9248	FRESH	30		5.5	Boring	Water Supply	Domestic	9.1
6903647	6	5	12-Oct-1959	636694.8	4855763.0	204.8	13.716	FRESH	30		13.7	Boring	Water Supply	Domestic	15.5
6903648	6	5	24-Oct-1959	636294.7	4855848.0	204.3	18.288	FRESH	30		7.9	Boring	Water Supply	Domestic	20.1
6903649	6	5	24-Jun-1960	636323.7	4855734.0	204.9	40.5384	FRESH	6	39.3	31.7	Cable Tool	Water Supply	Commerical	40.5
6903650	6	5	8-Jul-1960	636702.8	4855730.0	204.3	7.62	FRESH	34		4.6	Boring	Water Supply	Domestic	11.3
6903651	6	5	15-Jul-1960	636685.8	4855787.0	204.8	9.7536	FRESH	34		9.8	Boring	Water Supply	Domestic	12.2
6903653	6	5	29-Jun-1961	636699.8	4856001.0	204.9	19.5072	FRESH	34		15.2	Boring	Water Supply	Domestic	21.3
6903657	6	5	12-Jun-1963	636372.8	4855909.0	204.8	11.5824	FRESH	34		5.5	Boring	Water Supply	Domestic	13.1
6903658	6	5	23-Jun-1963	636371.8	4855908.0	204.8	12.192	FRESH	34		2.4	Boring	Water Supply	Domestic	13.1
6903659	6	5	6-Jul-1963	636349.8	4855889.0	204.5	7.62	FRESH	34		3.7	Boring	Water Supply	Domestic	11.3
6903660	6	5	15-Aug-1963	636702.8	4855728.0	204.3	49.6824	FRESH	4	50.0	37.5	Cable Tool	Water Supply	Domestic	51.2
6903661	6	5	13-May-1964	636645.8	4855981.0	205.0	4.572	FRESH	34		4.6	Boring	Water Supply	Domestic	13.7
6903662	6	5	16-May-1964	636719.8	4855956.0	204.1	10.668	FRESH	34		4.9	Boring	Water Supply	Domestic	12.8
6903663	6	5	11-Sep-1964	636756.8	4855807.0	204.6	10.668	FRESH	30		6.1	Boring	Water Supply	Domestic	12.2
6903664	6	5	21-May-1965	636600.8	4855979.0	205.7	12.192	FRESH	34		6.1	Boring	Water Supply	Domestic	14.3
6903665	6	5	27-Jun-1965	636711.8	4856021.0	205.2	14.3256	FRESH	34		0	Boring	Water Supply	Domestic	14.3
6903666	6	5	27-Jul-1965	636438.8	4855733.0	205.8	10.668	FRESH	34		4.6	Boring	Water Supply	Domestic	13.7
6903668	6	5	27-May-1966	636803.8	4855618.0	204.5	9.144	FRESH	30		3.7	Boring	Water Supply	Domestic	10.7
6903670	6	5	28-May-1966	636453.8	4855693.0	205.5	11.5824	FRESH	34		2.4	Boring	Water Supply	Domestic	13.7
6903675	6	5	5-Aug-1966	636765.8	4855887.0	203.9	10.668	FRESH	30		3.7	Boring	Water Supply	Domestic	13.7

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
6903676	6	5	19-Aug-1966	636802.8	4855621.0	204.6	6.096	FRESH	34		3	Boring	Water Supply	Domestic	14.3
6903677	6	5	27-Sep-1966	636420.7	4855693.0	205.5	9.144	FRESH	34		4.3	Boring	Water Supply	Domestic	14
6903680	6	5	18-May-1967	636675.8	4855998.0	205.0	9.144	SULPHUR	34		3.7	Boring	Water Supply	Domestic	13.4
6903684	6	6	14-Jul-1960	636678.8	4856120.0	205.1	12.8016	FRESH	34		11	Boring	Water Supply	Domestic	15.2
6903687	6	6	20-Apr-1962	636613.8	4856083.0	205.2	6.4008	FRESH	30		3.7	Boring	Water Supply	Domestic	13.7
6903690	6	6	22-Aug-1964	636329.8	4855935.0	204.6			34		0	Boring	Abandoned-Supply		13.7
6903691	6	6	4-Sep-1964	636471.8	4855991.0	205.6	59.436	FRESH	5	59.7	35.7	Cable Tool	Water Supply	Domestic	61
6903699	6	8	6-Aug-1957	636344.8	4857098.0	176.4	17.0688	FRESH	2	16.8	8.5	Jetting	Water Supply	Domestic	18.3
6903700	6	8	12-Apr-1958	636315.8	4857020.0	176.9	29.5656	FRESH	2	29.3	19.5	Jetting	Water Supply	Domestic	30.8
6903701	6	8	15-Sep-1960	636088.8	4856892.0	176.8	6.096	FRESH	34		5.5	Boring	Water Supply	Industrial	7.3
6903703	6	8	4-Nov-1960	636545.8	4857150.1	176.9	7.9248	FRESH	34		3	Boring	Water Supply	Domestic	8.5
6903704	6	8	25-Feb-1961	636146.8	4856704.0	178.5	16.4592	FRESH	5		4.9	Cable Tool	Water Supply	Irrigation	16.5
6903706	6	8	24-Sep-1963	636280.8	4857084.9	176.5	4.2672	FRESH	34		4.3	Boring	Water Supply	Domestic	8.2
6903708	6	8	11-Jul-1964	636315.8	4857129.0	176.2	7.3152	FRESH	34		3.7	Boring	Water Supply	Domestic	7.6
6903709	6	8	17-Nov-1964	636315.8	4857129.0	176.2	4.8768	FRESH	30		4.9	Boring	Water Supply	Irrigation	9.1
6903710	6	9	1-May-1957	635977.8	4857376.0	175.2	10.0584	FRESH	2	9.8	4.3	Jetting	Water Supply	Domestic	11.3
6903711	6	9	23-Oct-1958	635981.8	4857345.0	175.5	13.1064	FRESH	2	13.1	2.1	Jetting	Water Supply	Domestic	14.6
6903718	6	10	6-Jun-1959	636344.8	4857892.9	178.9	10.668	FRESH	30		3.7	Boring	Water Supply	Domestic	10.7
6903722	6	10	7-Jul-1960	636703.8	4858086.0	174.3	6.4008	FRESH	30		4.3	Boring	Water Supply	Domestic	7
6903734	6	10	21-Aug-1963	636531.8	4858077.0	174.5			5		0	Cable Tool	Abandoned-Supply		28
6903735	6	10	28-Aug-1963	636530.8	4858076.0	174.5	6.096	FRESH	34		5.5	Boring	Water Supply	Domestic	9.1
6903737	6	10	19-Nov-1963	636526.8	4858076.0	174.6	7.3152	FRESH	34		2.4	Boring	Water Supply	Domestic	8.2
6903747	6	10	8-Oct-1966	636383.8	4858002.0	176.0	20.4216	FRESH	5	20.4	3.4	Cable Tool	Water Supply	Commerical	22.9
6903749	6	10	17-Aug-1967	636165.8	4857912.1	175.6	4.572	FRESH	30		1.5	Boring	Water Supply	Commerical	9.8
6903752	6	11	19-Feb-1965	636516.8	4858115.0	171.2	18.8976	FRESH	5		5.5	Cable Tool	Water Supply	Domestic	21.3
6903753	6	11	20-Apr-1957	635888.8	4858112.0	175.5	7.62	FRESH	36		2.1	Boring	Water Supply	Domestic	7.6
6903754	6	11	16-May-1961	636322.8	4858123.1	174.8	6.7056	FRESH	30		5.5	Boring	Water Supply	Domestic	8.5
6903755	6	11	6-Jun-1962	636293.8	4858058.0	175.5	12.8016	FRESH	2		0	Jetting	Water Supply	Domestic	21.3
6903756	6	11	18-Oct-1962	635873.8	4858186.0	175.8	12.192	FRESH	2	11.9	3	Jetting	Water Supply	Domestic	13.4
6903757	6	11	14-Nov-1962	635931.8	4858177.0	175.2			2		0	Jetting	Abandoned-Supply		21.3
6903758	6	11	4-May-1963	636289.8	4858173.0	174.3	17.3736	FRESH	2	17.4	5.5	Jetting	Water Supply	Domestic	18.9
6903759	6	11	5-Nov-1963	636345.8	4858130.0	175.0	24.0792	FRESH	2	23.8	8.2	Boring	Water Supply	Domestic	25.3
6903761	6	11	8-Apr-1964	636456.8	4858280.0	170.1	22.5552	FRESH	2	22.6	-0.6	Cable Tool	Test Hole	Not Used	35.1
6903762	6	11	16-Apr-1964	636408.8	4858301.0	170.9	22.2504	FRESH	2	22.3	-6.7	Cable Tool	Test Hole	Irrigation	35.1
6903763	6	11	1-May-1964	636376.8	4858326.9	170.5	12.192	FRESH	2	22.3	-6.7	Cable Tool	Test Hole	Not Used	33.2
6903764	6	11	12-May-1964	636323.8	4858123.0	174.9	9.144	FRESH	5	15.8	-0.6	Cable Tool	Test Hole	Not Used	27.4
6903765	6	11	18-May-1964	636384.8	4858119.0	174.0			7		0	Cable Tool	Test Hole		27.4
6903766	6	11	27-May-1964	636357.8	4858181.0	173.8	9.7536	FRESH	2	9.8	-1.8	Cable Tool	Test Hole		27.4
6903768	6	11	15-Feb-1967	636362.8	4858201.0	172.6	9.7536	FRESH	10	9.8	-0.6	Cable Tool	Water Supply	Municipal	16.2
6903769	6	11	7-Mar-1967	636373.8	4858177.0	173.1	13.1064	FRESH	5		4.3	Cable Tool	Water Supply	Domestic	13.1
6903770	6	12	3-Apr-1950	636567.8	4858896.0	179.3		FRESH	2		0	Jetting	Water Supply	Domestic	26.8
6903771	6	12	15-Jun-1953	635816.8	4858337.0	173.4	9.144	FRESH	4		1.2	Cable Tool	Water Supply	Domestic	12.8
6903772	6	12	3-Nov-1954	636011.8	4858480.0	172.6	12.192	FRESH	6		0	Cable Tool	Water Supply	Domestic	12.2
6903773	6	12	20-Sep-1955	636059.8	4858315.0	170.9			6		0	Rotary (Convent.)	Test Hole		22.9
6903774	6	12	26-Apr-1962	636158.8	4858414.0	172.1	22.5552	FRESH	2	20.1	0	Cable Tool	Test Hole	Not Used	34.1

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
6903775	6	12	1-May-1962	636312.8	4858457.0	176.4	24.9936	FRESH	2	25.0	0	Cable Tool	Water Supply	Irrigation	37.8
6903776	6	12	9-May-1962	636392.8	4858472.9	175.4	24.384	FRESH	3	23.2	4	Rotary (Convent.)	Test Hole	Not Used	30.5
6903777	6	12	15-May-1962	636634.8	4858536.0	174.5	28.0416	FRESH	2	28.7	-3.7	Rotary (Convent.)	Test Hole	Not Used	42.7
6903779	6	12	26-Sep-1963	635952.8	4858397.0	175.0	3.048	FRESH	34		4.9	Boring	Water Supply	Domestic	6.1
6903780	6	12	16-Dec-1962	635798.8	4858336.0	173.6	3.6576	FRESH	34		2.1	Boring	Water Supply	Domestic	4.3
6903781	6	12	28-Nov-1963	635874.8	4858185.0	175.8	14.9352	FRESH	2	14.6	2.1	Jetting	Water Supply	Domestic	16.2
6903782	6	12	20-Dec-1964	636366.8	4858598.0	176.7	23.4696	FRESH	10	22.6	0	Cable Tool	Water Supply	Municipal	30.5
6903783	6	12	22-Dec-1964	636383.8	4858863.0	181.7	15.5448	FRESH	34		3	Boring	Water Supply	Domestic	15.8
6903785	6	13	25-Apr-1961	635742.8	4858732.0	173.9	10.0584	FRESH	1	21.9	-1.2	Cable Tool	Test Hole	Not Used	26.5
6903786	6	13	25-Apr-1961	635717.8	4858771.0	174.1	10.0584	FRESH	1	10.1	-0.9	Rotary (Convent.)	Test Hole	Not Used	16.5
6903787	6	13	22-Jun-1962	635588.8	4859153.1	179.1	15.24	FRESH	2		0	Jetting	Water Supply	Domestic	15.8
6903788	6	13	18-Jul-1967	635701.8	4858834.0	175.0	8.5344	FRESH	30		0	Boring	Water Supply	Public	8.8
6903789	6	14	10-Jun-1960	636239.8	4859523.1	180.6	7.3152	FRESH	2	58.8	0	Rotary (Convent.)	Test Hole	Irrigation	67.1
6903790	6	14	25-Jun-1960	636159.8	4859483.0	182.2	0.9144	FRESH	5	15.8	-1.2	Cable Tool	Test Hole	Not Used	26.2
6903791	6	14	23-Jun-1960	635964.8	4859378.0	185.1	13.1064	FRESH	1	38.7	1.8	Rotary (Convent.)	Test Hole	Not Used	65.5
6903792	6	14	14-Jul-1960	635694.8	4859273.0	181.1	7.62	FRESH	6		0	Rotary (Convent.)	Test Hole	Not Used	61
6903793	6	14	22-Jul-1960	635994.8	4859423.0	185.0	14.3256	FRESH	4	33.8	1.8	Rotary (Convent.)	Test Hole	Not Used	62.5
6903796	6	14	23-Jul-1966	635581.8	4859182.0	179.5	6.4008	FRESH	30		0.6	Boring	Water Supply	Domestic	7.9
6903798	6	16	16-Aug-1963	635444.7	4860478.0	199.9	17.6784	FRESH	5	17.7	4.9	Cable Tool	Water Supply	Livestock and Domestic	18.9
6903810	6	18	21-Apr-1964	635689.7	4861041.1	204.2	12.4968	FRESH	6		0	Cable Tool	Water Supply	Domestic	12.8
6903811	6	18	26-Jun-1964	635457.7	4860962.0	196.9	13.716	FRESH	6	13.7	0	Cable Tool	Water Supply	Domestic	14.9
6903812	6	18	30-Jul-1965	635437.7	4860992.0	197.0	6.096	FRESH	34		0	Boring	Water Supply	Domestic	7.3
6903814	5	18	31-Aug-1965	635120.7	4860921.0	196.1			6		0	Rotary (Convent.)	Test Hole		46.3
6903815	6	20	6-Sep-1962	635384.7	4861780.0	211.2	6.096	FRESH	34		5.5	Boring	Water Supply	Livestock and Domestic	8.8
6903817	6	21	17-Nov-1961	635230.7	4862020.0	212.3	3.6576	FRESH	34		0.9	Boring	Water Supply	Domestic	4.9
6903818	6	21	18-Nov-1961	635307.7	4862039.1	215.4	6.096	FRESH	34		3	Boring	Water Supply	Domestic	6.4
6903819	6	21	16-Jun-1962	635115.7	4862128.0	209.9	3.048	FRESH	34		3	Boring	Water Supply	Livestock and Domestic	7.9
6903820	6	21	19-Jun-1963	635101.7	4861955.0	206.8	6.7056	FRESH	34		4.9	Boring	Water Supply	Domestic	10.1
6905426	5	27	12-Oct-1960	636585.8	4853783.0	196.8	47.8536	FRESH	5	45.4	26.5	Cable Tool	Water Supply	Industrial	47.9
6908650	5	28	22-Apr-1967	636354.7	4853602.9	194.3	7.62	FRESH	34		1.5	Boring	Water Supply	Industrial	11.3
6908788	6	5	10-Sep-1968	636604.8	4855933.0	205.1	45.1104	FRESH	5	46.3	35.1	Cable Tool	Water Supply	Domestic	48.8
6908792	5	16	30-Aug-1968	635104.8	4859863.0	177.9			6		0	Cable Tool	Abandoned-Supply		41.1
6908809	5	1	18-Oct-1968	636454.8	4853833.0	197.4	3.3528	FRESH	34		2.4	Boring	Water Supply	Domestic	11.3
6909161	6	11	24-May-1969	636564.8	4858173.0	168.9	17.6784	FRESH	6	16.8	5.5	Cable Tool	Water Supply	Commerical	17.7
6909444	5	17	7-Jun-1969	634894.8	4860253.1	183.7	15.8496	FRESH	7	17.1	3.7	Cable Tool	Test Hole	Not Used	22.3
6909455	6	10	28-Jul-1969	636474.8	4857902.9	178.6	18.288	FRESH	6	18.3	6.1	Cable Tool	Water Supply	Domestic	22.3
6909709	6	13	14-Jul-1969	635714.8	4858993.0	178.9	7.62	FRESH	34		0	Boring	Water Supply	Domestic	8.2
6909716	6	13	20-Feb-1969	635654.8	4858943.0	176.3	7.0104	FRESH	34		2.4	Boring	Water Supply	Domestic	7.6
6909719	6	5	20-Apr-1969	636474.8	4855683.0	205.3	4.572	FRESH	34		7.6	Boring	Water Supply	Domestic	13.7
6909949	6	11	17-Jun-1970	636394.8	4858133.0	173.1	13.4112	FRESH	5	13.4	9.1	Cable Tool	Water Supply	Domestic	14.6
6909954	6	11	15-Jun-1970	636344.8	4859193.0	182.2	15.24	FRESH	5	15.5	8.5	Cable Tool	Water Supply	Domestic	16.8
6909957	6	4	28-May-1970	636374.7	4855422.9	202.9	8.5344	FRESH	30		2.4	Boring	Water Supply	Domestic	10.7
6910161	5	4	23-Jul-1970	636354.7	4855273.0	201.7	47.244	FRESH	5	48.2	30.8	Cable Tool	Water Supply	Domestic	49.4
6910164	6	11	23-Nov-1970	636264.8	4858223.0	173.8	15.24	FRESH	6	15.2	1.2	Cable Tool	Water Supply	Domestic	17.7
6910166	6	11	10-Jul-1970	636194.8	4858023.0	175.5	23.4696	Not stated	5	23.5	5.2	Cable Tool	Water Supply	Domestic	25.9

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
6910172	5	16	22-Jun-1970	635324.8	4860223.0	192.1	5.4864	FRESH	34		0	Boring	Water Supply	Domestic	6.7
6910176	6	10	25-May-1970	636394.8	4857883.0	179.2	9.144	FRESH	34		3.7	Boring	Water Supply	Domestic	10.7
6910180	6	13	10-Sep-1970	635814.8	4858853.0	177.7	6.096	FRESH	34		0	Boring	Water Supply	Domestic	7.3
6910182	6	8	28-Oct-1970	636214.8	4856973.0	177.1	8.2296	FRESH	34		3.7	Boring	Water Supply	Domestic	10.4
6910186	5	1	19-Nov-1970	636454.8	4854043.0	200.8	1.524	FRESH	34		4.9	Boring	Water Supply	Domestic	13.7
6910291	6	12	16-Jul-1971	636114.8	4858513.0	173.7	18.288	FRESH	5	15.8	0	Cable Tool	Water Supply	Domestic	18.3
6910455	6	6	28-Jul-1971	636394.8	4855948.0	204.5	49.3776	FRESH	5	50.0	35.1	Cable Tool	Water Supply	Domestic	51.2
6910652	6	6	14-Apr-1971	636352.8	4855933.0	204.4	46.9392	FRESH	5	47.5	36.6	Cable Tool	Water Supply	Domestic	48.8
6910809	6	13	21-Dec-1971	636504.8	4857083.0	177.5	7.0104	FRESH	30		3.7	Boring	Water Supply	Domestic	9.1
6911176	6	12	5-Sep-1972	636174.8	4858543.0	176.1	27.432	FRESH	5	28.3	6.1	Cable Tool	Water Supply	Domestic	29.6
6911355	5	2	25-May-1972	636094.7	4854348.0	200.8	64.008	FRESH	5	64.0	15.8	Cable Tool	Water Supply	Domestic	64.9
6911393	6	4	5-May-1973	636409.7	4855268.0	201.4	53.34	FRESH	5	54.3	29	Cable Tool	Water Supply	Domestic	56.7
6911426	5	9	26-Mar-1973	635964.8	4857218.0	176.7	24.384	FRESH	6	25.6	3.7	Cable Tool	Water Supply	Domestic	26.8
6911430	6	6	19-Feb-1973	636434.8	4855963.0	205.3	51.2064	FRESH	6	53.9	33.5	Rotary (Convent.)	Water Supply	Domestic	53.9
6911439	5	16	10-May-1973	635414.8	4859933.0	185.3			30		3	Boring	Water Supply	Domestic	6.1
6911554	6	8	3-Jul-1973	636564.8	4857123.0	177.0	6.7056	FRESH	30		3	Boring	Water Supply	Domestic	7.9
6911861	5	16	15-Sep-1973	635374.8	4859983.0	185.9	21.336	FRESH	6	21.9	0	Cable Tool	Water Supply	Domestic	22.9
6911865	6	21	15-Aug-1973	635214.7	4861963.0	210.5	5.4864	FRESH	30		4.3	Boring	Water Supply	Domestic	7.9
6911866	6	6	12-Sep-1973	636414.8	4855963.0	205.1	5.4864	FRESH	30		2.4	Boring	Water Supply	Domestic	11
6912300	5	6	27-Jun-1974	636048.7	4855859.1	203.8	44.196	FRESH	6	45.1	32.9	Rotary (Convent.)	Water Supply	Domestic	46.3
6912367	6	5	28-Jan-1974	636516.8	4855888.0	205.1	45.4152	FRESH	6	45.7	9.1	Cable Tool	Water Supply	Domestic	46.6
6912445	6	5	10-Nov-1974	636386.7	4855614.0	204.4	46.3296	FRESH	6	47.9	32	Cable Tool	Water Supply	Commerical	48.8
6912452	5	16	23-Aug-1974	635315.8	4860217.0	191.4	21.0312	FRESH	6	21.6	3.7	Cable Tool	Water Supply	Domestic	22.9
6912497	5	15	20-Dec-1974	635418.8	4859701.0	183.4			6		0	Cable Tool	Abandoned-Supply		100.6
6912887	5	17	15-Aug-1975	635202.7	4860588.0	197.9	21.336	FRESH	6	21.3	8.5	Rotary (Convent.)	Water Supply	Domestic	24.4
6912949	6	21	27-Oct-1975	635068.7	4862056.0	208.2	4.2672	Not stated	6	7.9	4.3	Rotary (Convent.)	Water Supply	Domestic	9.1
6912958	6	21	8-Oct-1975	635359.7	4862164.0	215.5					0	Cable Tool	Abandoned-Supply		61
6913435	6	11	4-Jun-1976	636214.8	4858223.0	174.5	17.6784	FRESH	6	18.3	8.2	Cable Tool	Water Supply	Domestic	19.2
6914160	5	20	21-Jul-1977	634994.7	4861743.0	202.2	4.8768	FRESH	30		3.7	Boring	Water Supply	Domestic	11
6914887	6	10	10-Nov-1978	636094.8	4857743.0	172.4			5	17.4	0	Rotary (Convent.)	Abandoned-Quality		27.7
6914892	5	8	29-Nov-1978	635974.8	4856863.0	177.9	31.3944	FRESH	6	31.1	7	Rotary (Convent.)	Water Supply	Domestic	32
6915257	6	19	9-Nov-1979	635274.7	4861183.0	200.2	8.2296	FRESH	30		3.7	Boring	Water Supply	Domestic	9.1
6915314	5	20	1-Nov-1979	634934.7	4861823.0	199.9	19.812	FRESH	6		1.5	Cable Tool	Water Supply	Domestic	24.4
6915359	6	7	10-Apr-1979	636174.8	4856483.0	183.5	35.3568	FRESH	6		13.7	Cable Tool	Water Supply	Domestic	35.4
6915377	6	20	14-Dec-1979	635554.7	4861663.0	211.2	32.9184	Not stated	6	34.4	11.6	Rotary (Convent.)	Water Supply	Domestic	36.3
6915926	6	18	11-Jun-1981	635314.7	4861022.9	198.4	3.3528	FRESH	30		2.1	Boring	Water Supply	Domestic	8.2
6915952	6	6	16-Nov-1981	636454.8	4856143.0	198.7	48.1584	FRESH	6	50.0	32	Cable Tool	Water Supply	Domestic	50.9
6916014	5	16	13-Aug-1981	635374.8	4860043.0	187.1	11.5824	FRESH	6	13.4	0.3	Cable Tool	Water Supply	Domestic	14.3
6916404	5	16	3-Aug-1982	635354.8	4860023.0	186.4	15.24	FRESH	6	15.5	0.9	Cable Tool	Water Supply	Domestic	16.5
6918617	5	17	26-Jun-1986	635278.0	4860313.0	195.9	35.9664	FRESH	6	36.0	6.1	Rotary (Convent.)	Water Supply	Domestic	38.1
6919191	5	16	6-Aug-1987	635324.0	4860451.0	200.8	20.4216	FRESH	6	20.7	-1.2	Cable Tool	Water Supply	Domestic	21.6
6920043	5	2	3-Dec-1987	635589.7	4854151.0	195.6	46.6344	FRESH	5	46.3	32	Rotary (Convent.)	Water Supply	Domestic	51.8
6920991	6	16	23-Apr-1990	635808.0	4860277.0	204.6	22.86	FRESH	6	28.7	6.7	Rotary (Convent.)	Water Supply	Domestic	29.6
6921321	5	16	23-Nov-1990	635385.0	4859920.0	184.9	35.9664	FRESH	6	35.1	0	Rotary (Air)	Water Supply	Domestic	36.3
6922233	5	21	31-Mar-1993	634820.0	4861858.0	197.4	22.86	FRESH	8	23.5	0	Cable Tool	Test Hole	Irrigation	32

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
6922691	6	21	15-Jun-1994	634746.0	4862214.0	209.2	30.48	FRESH	8	32.0	1.8	Rotary (Convent.)	Water Supply	Public	38.7
6922816	5	21	11-Aug-1994	634929.0	4861986.0	203.2	24.0792	FRESH	6	24.1	1.8	Rotary (Convent.)	Water Supply	Domestic	71.6
6923248	6	15	11-May-1995	635482.0	4859797.0	185.6			4		1.2	Not Known	Water Supply	Domestic	10.4
6923480	5	21	7-Dec-1995	634901.0	4862010.0	202.9			24		0	Not Known	Abandoned-Other	Not Used	
6923625	5	21	20-Jun-1996	634870.0	4862249.0	210.1	33.528	FRESH	6	35.4	9.4	Rotary (Convent.)	Water Supply	Irrigation	40.2
6923713	5	19	26-Sep-1996	635015.0	4861470.0	206.8					0	Not Known	Abandoned-Other		
6923714	5	19	26-Sep-1996	635038.0	4861179.0	202.4					0	Not Known	Abandoned-Other		3
6923715	5	19	26-Sep-1996	634979.0	4861462.0	206.4					0	Not Known	Abandoned-Other		
6923811	6	12	13-Nov-1996	635833.0	4858663.0	175.8			30		0	Other Method	Abandoned-Other	Not Used	6.1
6924236	6	18	11-Nov-1997	635267.0	4861523.0	206.0					0	Not Known	Abandoned-Other		
6924243	6	18	11-Nov-1997	635267.0	4861523.0	206.0					0	Not Known	Abandoned-Other		
6924244	6	18	11-Nov-1997	635268.0	4861523.0	206.0					0	Not Known	Abandoned-Other		
6924245	6	18	11-Nov-1997	635268.0	4861523.0	206.0					0	Not Known	Abandoned-Other		
6924816	5	20	15-Feb-1999	634965.0	4861823.0	201.1	44.5008	FRESH	6		3.7	Cable Tool	Water Supply	Domestic	53.3
6925247	6	21	15-Dec-1999	635262.0	4861993.0	213.3					0	Other Method	Abandoned-Other	Not Used	
6925330	5	20	23-Nov-1999	635069.0	4861879.0	205.1					0	Not Known	Abandoned-Other		
6925331	5	20	23-Nov-1999	635069.0	4861879.0	205.1					0	Not Known	Abandoned-Other		
6925395	6	8	16-May-2000	636317.0	4856016.0	204.2					0	Not Known	Abandoned-Other		
6927782	6	16	2-Mar-2004	634978.3	4860184.0	183.2					0	Rotary (Air)	Abandoned-Supply	Not Used	
6927837	7		27-May-2004	636607.0	4857221.0	177.2					0	Digging	Abandoned-Other	Not Used	
6927838	7		27-May-2004	636665.0	4857138.9	177.1					0	Digging	Abandoned-Other	Not Used	
6928277	6	11	17-Sep-2004	636596.0	4857119.0	173.6			5	0.9	0	Boring	Test Hole	Not Used	6.1
6928356	6	16	7-Sep-2004	636680.0	4857132.0	192.1	60	FRESH	15.87		22	Rotary (Air)	Water Supply	Domestic and Livestock	60.4
6928357	6	16	8-Sep-2004	636387.0	4858104.0	192.8	60	FRESH	15.87		26	Rotary (Air)	Water Supply	Domestic and Livestock	60.4
6928386	5	7	14-Sep-2004	635485.0	4860229.0	179.8	5.5		15.24		5		Abandoned-Other		14.2
6928565			16-Jun-2004	635773.0	4860064.0	193.6			2	4.6	0	Other Method	Observation Wells		7.6
6928148	6	8	13-Aug-2004	635769.0	4856589.0	177.2			36		4	Digging	Abandoned-Other	Not Used	
6928150	6	8	13-Aug-2004	636457.0	4853437.0	177.1			32		2	Digging	Abandoned-Other	Not Used	
6928827			19-Feb-2005	636548.0	4854144.0	200.8			5	1.0	0	Boring	Test Hole	Not Used	4.7
6928956	6	9	28-Feb-2005	636566.0	4857167.0	177.0					3.9		Abandoned-Other		
6929259			29-Jul-2005	636301.0	4853673.0	194.5	2		5	1.4	0	Boring	Abandoned-Other	Not Used	
6929482			29-Aug-2005	635867.0	4857838.0	175.3					0	Boring	Abandoned-Other		
6929526		132	24-Aug-2005	636380.0	4857123.0	176.8			30		4.6	Digging	Abandoned-Other	Not Used	9.1
6929527		123	24-Aug-2005	636391.0	4857050.0	177.0			30		0	Digging	Abandoned-Other	Not Used	2.4
6929846	6	8	9-Jan-2006	636447.0	4857081.0	177.2			30		1.8	Digging	Abandoned-Supply		7.8
6929847	6	8	9-Jan-2006	636487.0	4857091.0	177.3			30		1.5	Digging	Abandoned-Other	Not Used	8.8
6929945			2-Mar-2006	635883.0	4857834.0	174.8	5.2	FRESH	5.1	1.2	0	Boring	Observation Wells		6.8
6930243			12-May-2006	636443.0	4853487.0	193.9			2	4.6	0	Other Method	Observation Wells		
6930443			10-May-2006	636581.0	4854152.0	200.9			36		0	Digging	Abandoned-Other	Not Used	6.4
6930501			18-May-2006	636371.0	4853729.9	195.7			1.25	3.0	0	Other Method	Observation Wells		
6930839			19-May-2006	635064.0	4861902.0	205.1			5	0.9	0	Boring	Observation Wells	Not Used	6.1
7034852			18-Aug-2006	636595.0	4854302.0	201.8			3.17	1.1	0	Other Method	Abandoned-Other		6.7
7034885			18-Aug-2006	636591.0	4854326.0	201.8			5.08	0.7	0	Other Method	Abandoned-Other		5.5
7038496			5-Oct-2006	636282.0	4855769.1	176.5			5.08	0.9	0	Other Method	Abandoned-Other		4.9
7038497			4-Oct-2006	635953.0	4857270.0	176.6			5.08	0.7	0	Other Method	Abandoned-Other		5.5

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
7038468			24-Nov-2006	635948.0	4857252.0	204.7			3.8	0.5	0	Other Method	Test Hole		4.6
7044487			21-May-2007	636314.0	4857966.0	174.6	1.5	FRESH	4.31	1.1	0	Jetting	Dewatering		7
7044421			2-Apr-2007	635750.0	4857396.0	176.7			5.1	0.5	0	Boring	Observation Wells		4.5
7045299			3-Aug-2006	636239.0	4853398.0	191.7			4.06		0	Other Method	Abandoned-Other		3.7
7048167			31-Jul-2007	635954.0	4857499.0	172.7	2	FRESH	4.31		0	Driving	Observation Wells	Not Used	3
7051124			5-Sep-2007	635750.0	4857396.0	174.6					0				
7100452			15-Nov-2007	636536.0	4854337.0	202.0	3.8	FRESH			0				
7100522			15-Nov-2007	636478.0	4854316.0	202.0					0				
7100538			10-Dec-2007	636486.0	4854301.0	203.1			3.5		0	Rotary (Convent.)	Observation Wells	Monitoring	6.2
7100930	6	9	31-Oct-2007	636540.0	4854319.0	177.1			76.2		5		Abandoned-Other	Not Used	
7103270			14-Jan-2008	636217.0	4856004.9	203.1					0		Abandoned-Other		
7103271			13-Feb-2008	636561.0	4857111.0	204.9					0		Abandoned-Other		
7106045			22-Apr-2008	635020.0	4861722.0	177.5					0				
7112253	5	15	21-Aug-2008	634799.0	4861625.0	179.5					0	Rotary (Air)	Abandoned-Other	Not Used	
7112254	5	15	25-Aug-2008	636302.0	4857930.0	182.7					0	Rotary (Air)	Abandoned-Other	Not Used	
7112255	5	15	13-Aug-2008	636315.0	4857927.0	176.5			6		0	Rotary (Air)	Abandoned-Other	Monitoring	14.3
7112540			19-Aug-2008	636302.0	4857934.0	175.0	2.5	FRESH	5.9	0.3	3	Boring	Test Hole	Other	7.5
7114520	5	9	10-Oct-2008	635166.0	4859795.0	177.7					0		Abandoned-Other		29
7116876			5-Dec-2008	635304.0	4859837.0	193.0	0.6858	Other	5.2	0.9	0	Boring		Monitoring	1.8
7124142		6	12-May-2009	635091.0	4859773.0	193.6	3.28	Other	5.2	2.2	0	Boring		Monitoring	10.6
7126706	6	8	29-Jun-2009	635906.0	4857815.0	176.5					0	Other Method	Abandoned-Other	Not Used	
7100452			15-Nov-2007	635872.0	4857822.0	202.1	3.8	FRESH			0				
7100452			15-Nov-2007	635911.0	4857821.1	202.1	3.8	FRESH			0				
7112540			18-Aug-2008	635877.0	4857841.0	173.2	2.5	FRESH	5.9	0.3	0.9		Test Hole	Other	
7112540			18-Aug-2008	635904.0	4857794.0	173.6	2.5	FRESH	5.9	0.3	0.9		Test Hole	Other	
7112540			18-Aug-2008	635877.0	4857841.0	173.5	2.5	FRESH	5.9	0.3	1.1		Test Hole	Other	
7112540			19-Aug-2008	635885.0	4857827.0	174.9	2.5	FRESH	5.9	0.3	3		Test Hole	Other	
7112540			19-Aug-2008	635647.0	4856806.0	175.0	2.5	FRESH	5.9	0.3	4		Test Hole	Other	
7112540			19-Aug-2008	636184.0	4853611.0	175.3	2.5	FRESH	5.9	0.3	2.8		Test Hole	Other	
7106045			22-Apr-2008	636440.0	4853411.0	177.4					0				
7106045			22-Apr-2008	635983.0	4857691.0	177.7					0				
7129168	5	1	21-Aug-2009	635983.0	4857693.0	197.4	0.5	Other	5.2	0.9	0			Monitoring	7.5
7130127			25-Aug-2009	635982.0	4857688.9	193.9					0				
7130128			25-Aug-2009	635963.0	4857687.0	193.6			4.03	0.4	0	Direct Push	Monitoring and Test Hole	Monitoring and Test Hole	5.8
7130129			25-Aug-2009	635982.0	4857699.9	193.6			4.03	0.5	0	Direct Push	Monitoring and Test Hole	Monitoring and Test Hole	7.6
7134274	6	10	9-Nov-2009	635968.0	4857688.0				5.6	2.3	0	Auger	Abandoned-Other	Dewatering	9
7135758	5	16	26-Oct-2009	635970.0	4857686.0	187.0			15.24		1.5		Abandoned-Other	Not Used	
7135759	5	16	26-Oct-2009	635976.0	4857690.0	187.0			15.24		1.5		Abandoned-Other	Not Used	
7136093	6	9	16-Nov-2009	635980.0	4857688.0	175.9	7.3152	Not stated			0		Abandoned-Other		
7136094	6	9	16-Nov-2009	635981.0	4857692.0	175.3	7.3152	FRESH			0		Abandoned-Other		
7136851	6	18	30-Nov-2009	636294.0	4857071.0	195.0			2		0		Abandoned-Other		
7136856	6	20	28-Nov-2009	636538.0	4853833.0	205.1			2		0		Abandoned-Other		
7136857	7	20	28-Nov-2009	636253.0	4853664.0	195.0			2		0		Abandoned-Other		
7139476	6	9	11-Sep-2009	636219.0	4853679.1		3		5.1		3	Boring	Test Hole	Monitoring	4.5
7139580			15-Jan-2010	636220.0	4853659.0	200.5					0	Boring	Observation Wells	Monitoring	12.2

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
7139584			8-Jan-2010	635978.0	4857705.0	203.8	7		2.5		0	Boring	Monitoring and Test Hole	Monitoring and Test Hole	33.1
7140188			4-Aug-2009	635950.0	4857694.0	175.7		FRESH	5.6		0	Auger	Dewatering	Dewatering	9
7140352			2-Dec-2009	635965.0	4857699.0	175.7					0				
7141955	Jan-00	21	24-Feb-2010	635979.0	4857703.0	204.9			2	11.3	0	Rotary (Convent.)	Observation Wells	Monitoring	12.8
7141956	5	8	19-Feb-2010	635968.0	4857701.0	176.6		Untested	2	14.6	0	Rotary (Convent.)	Observation Wells	Monitoring	17.4
7141957	6	12	24-Feb-2010	635953.0	4857694.0			Untested	5	18.9	3.7	Rotary (Convent.)	Monitoring and Test Hole	Monitoring and Test Hole	23.8
7141958	6	12	23-Feb-2010	635958.0	4857696.0	176.8		Untested	2	17.4	0	Rotary (Convent.)	Observation Wells	Monitoring	23.8
7141959	6	8	17-Feb-2010	635968.0	4857685.0	176.8		Untested	2	14.3	0	Rotary (Convent.)		Monitoring	16.5
7141960	5	8	18-Feb-2010	635978.0	4857702.0	176.6		Untested	2	13.1	0	Rotary (Convent.)	Observation Wells	Monitoring	17.1
7142235			16-Feb-2010	635976.0	4857704.0	184.1			2	3.4	0	Direct Push	Monitoring and Test Hole	Monitoring and Test Hole	5.8
7142236			16-Feb-2010	635962.0	4857698.0	185.9			2	4.9	0	Direct Push	Monitoring and Test Hole	Monitoring and Test Hole	6.4
7144057	6	18	19-Mar-2010	635358.0	4860045.0				5.2	2.0	0	Rotary (Convent.)	Monitoring and Test Hole	Monitoring and Test Hole	7.9
7144058			19-Mar-2010	635364.0	4860040.0	198.9			5.2	1.6	0	Rotary (Convent.)	Monitoring and Test Hole		6.7
7126599			24-Jun-2009	636024.0	4857107.0	172.4			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	636045.0	4857124.0	172.2			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	635269.0	4860684.0	172.2			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	635079.0	4861866.1	171.9			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	635271.0	4860671.0	171.8			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	636262.0	4857289.0	171.8			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	635312.0	4860476.0	171.8			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	636226.0	4855866.0	171.7			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	635855.0	4857822.0	171.7			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	636226.0	4855866.0	171.7			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	635855.0	4857822.0	171.7			5.6	2.3	0		Dewatering	Dewatering	
7126599			24-Jun-2009	635855.0	4857822.0	171.6			5.6	2.3	0		Dewatering	Dewatering	
7134274	6	10	7-Nov-2009	634992.0	4861883.0	171.6			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	635967.0	4856983.0	171.6			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	636286.0	4858529.0	171.7			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	636286.0	4858513.0	171.7			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	636065.0	4856990.0	172.0			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	635952.0	4856966.0	172.1			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	636169.0	4858883.0	172.2			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	636067.0	4859249.9	172.4			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	635201.0	4861012.0	172.6			5.6	2.3	0		Abandoned-Other	Dewatering	
7134274	6	10	7-Nov-2009	635224.0	4861012.0	172.7			5.6	2.3	0		Abandoned-Other	Dewatering	
7149975	5	16	28-Jul-2010	635135.0	4859790.0	178.3					0		Abandoned-Quality		4.9
7151763	5	6	5-Sep-2010	636226.0	4855918.0	205.0		Untested	2	26.5	0	Rotary (Convent.)	Observation Wells	Monitoring	30.5
7151764	5	6	4-Aug-2010	636244.0	4855913.1	204.6		Untested	2	17.7	0	Rotary (Convent.)	Observation Wells	Monitoring	20.7
7152936			20-Sep-2010	636512.0	4854338.0	202.1					0				
7153148			23-Jul-2010	635142.0	4859804.0	179.2					0				
7157521	5	9	6-Jan-2010	635760.0	4857043.0						0				
7158698			11-Jan-2011	635935.0	4857204.0				2	4.0	0	Rotary (Convent.)	Test Hole	Test Hole	4
7159642			29-Dec-2010	635867.0	4860175.0						0	Driving	Test Hole	Not Used	1.9
7161897			24-Feb-2011	635596.0	4860469.0				2	3.0	0	Rotary (Convent.)	Test Hole	Test Hole	6.1
7162878	6	16	9-Feb-2010	635458.0	4859892.0		7.62	Untested	2	7.6	0	Boring	Observation Wells	Monitoring	9.1
7166795			30-Jun-2011	636580.0	4853823.0				1.75	3.7	0	Direct Push	Test Hole	Monitoring and Test Hole	6.7
7168492			29-Aug-2011	636290.0	4855875.0				2	3.0	0	Rotary (Convent.)	Observation Wells	Test Hole	6.1

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
7170244			2-Sep-2011	635233.0	4859502.0						0				
7171226			8-Sep-2011	635856.0	4857212.0						0				
7171354	Jan-00	16	6-Sep-2011	635144.0	4859800.0				2	6.1	0		Abandoned-Other	Monitoring	
7171356	5	16	6-Sep-2011	635074.0	4859776.0				2	7.6	0		Abandoned-Other	Monitoring	
7171357	5	16	6-Sep-2011	635002.0	4859749.0				2	9.1	0		Abandoned-Other	Monitoring	
7172338			19-Sep-2011	635078.0	4859765.0				2	9.1	0	Auger	Observation Wells	Monitoring and Test Hole	12.2
7172356			7-Oct-2011	635076.0	4859782.9				2	5.8	0	Auger	Observation Wells	Monitoring and Test Hole	8.8
7172489	6	10	3-Nov-2011	635894.0	4857758.0						0		Abandoned-Other		6.1
7172573			21-Oct-2011	636297.0	4855862.0						0		Abandoned-Other		
7172684	5	8	28-Jun-2011	635975.0	4857069.0						0	Boring	Observation Wells	Monitoring	6.6
7175422	6	5	18-Nov-2011	636359.0	4855558.0						0		Abandoned-Other		
7182482			30-Apr-2012	635733.0	4857233.0		6.096		2	11.9	0	Rotary (Convent.)	Test Hole	Test Hole	13.4
7186060			9-May-2012	635963.0	4857159.0						0		Abandoned-Other	Not Used	
7186067			7-Feb-2012	635852.0	4857026.1						0		Abandoned-Other	Not Used	
7185927			6-Jul-2012	635855.0	4857079.0		6		5.2	2.8	0	Boring	Observation Wells	Monitoring	10.7
7185936			6-Jul-2012	635909.0	4857003.0		6		5.2	2.8	0	Boring	Observation Wells	Monitoring	10.7
7188482	5	9	17-Sep-2012	635890.0	4857218.1						0				
7190309	5	16	9-Aug-2012	636365.0	4855891.0						0		Abandoned-Other	Not Used	
7190310	5	16	17-Aug-2012	636304.0	4855851.9						0		Abandoned-Other	Not Used	
7190498			24-Apr-2012	634990.0	4859743.0						0				
7190514			15-Dec-2011	635152.0	4859797.1				6		8.2		Abandoned-Other	Not Used	
7190526			24-Apr-2012	635817.0	4860215.0				36		0				
7188948			6-Jun-2012	635476.0	4860446.0						0				
7188981			12-Jul-2012	635851.0	4860231.0						0				
7196212	5	9	10-Jan-2013	635902.0	4857176.0				5		0		Abandoned-Other		
7200787			25-Mar-2013	635889.0	4857820.0				2	4.6	0	Rotary (Convent.)	Test Hole	Test Hole	
7200789			25-Mar-2013	635889.0	4857820.0						0		Abandoned-Other	Test Hole	
7204160				636013.0	4856832.0						0				
7204438			7-Jun-2013	636405.0	4857624.0				0.25		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7204439			7-Jun-2013	636296.0	4858119.9				1		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7204440			7-Jun-2013	636280.0	4858296.0				1		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7204501			7-Jun-2013	636155.0	4856254.0				1		0		Abandoned-Other		
7204502			7-Jun-2013	636375.0	4857533.0				1		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7204503			7-Jun-2013	636091.0	4856707.0				1		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7204504			7-Jun-2013	636043.0	4856746.0				1		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7204505			7-Jun-2013	636210.0	4856155.0				1		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7204506			7-Jun-2013	636380.0	4857503.0				1		0	Other Method	Abandoned-Other	Monitoring and Test Hole	
7206232	6	15	15-Jul-2013	635694.0	4859953.0						0		Abandoned-Other	Not Used	
7206235	6	20	16-Jul-2013	635080.0	4861866.0						0		Abandoned-Other	Not Used	
7206240	6	15	15-Jul-2013	635591.0	4859907.0						0		Abandoned-Other	Not Used	
7206242			12-Jul-2013	635672.0	4860098.0						0		Abandoned-Other	Not Used	
7206245	6	15	22-Jul-2013	635672.0	4860098.0						0		Abandoned-Other	Not Used	
7207259			14-Aug-2013	635686.0	4856661.0		7.62	Untested	2	4.6	0	Boring	Observation Wells	Monitoring	7.6
7207260			14-Aug-2013	635827.0	4856676.0		4.572	Untested	2	4.6	0	Boring	Observation Wells	Monitoring	7.6
7207952			25-Jun-2013	636288.0	4858296.0						0		Abandoned-Other	Not Used	

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
7208233			29-Aug-2013	636188.0	4858782.0						0		Abandoned-Other	Not Used	
7209127			4-Feb-2013	635152.0	4861107.0		3.6576	Untested	2	3.0	0	Rotary (Convent.)	Monitoring and Test Hole	Monitoring and Test Hole	6.1
7210183	5	7	14-Aug-2013	635579.0	4856507.0				2	4.6	0	Boring	Observation Wells	Monitoring	7.6
7210716			1-Nov-2013	635579.0	4856507.0						0	Boring		Monitoring	
7211073			1-Nov-2013	635686.0	4856661.0						0	Boring		Monitoring	
7211076			1-Nov-2013	635827.0	4856676.0						0	Boring	Observation Wells	Monitoring	
7218632			5-Nov-2013	635099.0	4862019.0						0				
7225639			13-Mar-2014	636277.0	4858579.0						0			Not Used	
7229487	5	6	23-Jun-2014	636205.0	4855890.0				2	4.6	0	Rotary (Convent.)	Monitoring and Test Hole	Monitoring and Test Hole	7.6
7237164				636356.0	4854131.0						0				
7241057			29-Mar-2015	636420.0	4853443.9				2	6.1	0	Rotary (Convent.)	Monitoring and Test Hole	Test Hole and Monitoring	9.1
7248483			26-May-2015	636544.0	4853996.9				2	3.0	0	Boring	Observation Wells	Monitoring	6.1
7255004	6	19	3-Dec-2015	635255.0	4861182.0		4.3	FRESH	76		0		Abandoned-Other		
7255162			5-Oct-2015	635710.0	4857103.0				2	16.8	0	Rotary (Convent.)	Observation Wells	Monitoring	18.3
7255163			5-Oct-2015	635710.0	4857103.0				2	3.0	0	Boring	Observation Wells	Monitoring	6.1
7255164			5-Oct-2015	635770.0	4857188.0				2	3.0	0	Boring	Observation Wells	Monitoring	6.1
7255165			5-Oct-2015	635765.0	4857095.1				2	3.0	0	Boring	Observation Wells	Monitoring	6.1
7255166			15-Oct-2015	635803.0	4857068.1				2	3.0	0	Boring	Observation Wells	Monitoring	6.1
7255167			5-Oct-2015	635728.0	4857032.0				2	3.0	0	Boring	Observation Wells	Monitoring	6.1
7255188			5-Oct-2015	635744.0	4857000.0				2	3.0	0	Boring	Observation Wells	Monitoring	
7255189			5-Oct-2015	635744.0	4856999.0				2	22.9	0	Rotary (Convent.)	Observation Wells	Monitoring	24.4
7255190			5-Oct-2015	635770.0	4857187.0				2	22.9	0	Rotary (Convent.)	Observation Wells	Monitoring	24.4
7257742			15-Dec-2015	635650.0	4857051.0						0				
7258345			7-Oct-2015	636289.0	4853606.0						0				
7258375			8-Feb-2016	636488.0	4854234.0				2	30.5	0	Rotary (Convent.)	Observation Wells	Monitoring	33.5
7258376			9-Feb-2016	636586.0	4854262.0				2	30.5	0	Rotary (Convent.)	Observation Wells	Monitoring	33.5
7258377			10-Feb-2016	636560.0	4854211.9				2	30.5	0	Rotary (Convent.)	Observation Wells	Monitoring	33.5
7258378			12-Feb-2016	636432.0	4854180.0				2	30.5	0	Rotary (Convent.)	Observation Wells	Monitoring	33.5
7258379			17-Dec-2015	636515.0	4854202.0				2	1.2	0	Boring	Observation Wells	Monitoring	4.3
7258380			14-Dec-2015	636480.0	4854227.0				2	13.7	0	Boring	Observation Wells	Monitoring	16.8
7258381			14-Dec-2015	636589.0	4854239.0				2	15.2	0	Boring	Observation Wells	Monitoring	18.3
7258382			15-Dec-2015	636588.0	4854238.0				2	1.2	0	Boring	Observation Wells	Monitoring	4.3
7258383			15-Dec-2015	636561.0	4854217.0				2.2	15.2	0	Boring	Observation Wells	Monitoring	18.3
7258514			3-Feb-2016	636412.0	4853347.0				1.5	2.1	0	Direct Push		Monitoring	3.7
7258607			12-Feb-2016	636432.0	4854180.0				2	3.0	0	Boring	Observation Wells	Monitoring	4.6
7258698			3-Feb-2016	636511.0	4853432.0				1.5	0.6	0	Direct Push	Monitoring and Test Hole	Test Hole and Monitoring	2.1
7258700			3-Feb-2016	636379.0	4853354.0				2	2.4	0	Direct Push	Monitoring and Test Hole	Test Hole and Monitoring	5.5
7259448			23-Apr-2015	635802.0	4857243.0		2.1336	Untested	2	16.8	0	Rotary (Convent.)	Monitoring and Test Hole	Test Hole and Monitoring	19.8
7260140			15-May-2015	636211.0	4853626.0						0				
7260610			23-Jul-2015	636569.0	4853672.0						0				
7261032			28-May-2015	635278.0	4862040.0				2	3.0	0	Boring	Test Hole	Test Hole	
7262539			12-Apr-2016	636570.0	4853663.0						0				
7266025	5	21	14-Jun-2016	634697.0	4861832.0				8		0	Cable Tool	Water Supply	Irrigation	
7269535			8-Dec-2014	635175.0	4860650.0						0				
7269576			8-Jul-2016	636441.0	4854410.0				2	4.0	0	Boring	Observation Wells	Monitoring	7

WELL ID	CON #	LOT #	COMPLETED	EASTING	NORTHING	ELEVATION (masl)	WATER FOUND (m bgs)	WATER KIND	CASING DIAM.(cm)	SCRN TOP (mbgs)	STATIC LEVEL (mbgs)	METHOD	STATUS	USE	DEPTH (mbgs)
7269577			8-Jul-2016	636486.0	4854387.0				2	3.0	0	Boring	Observation Wells	Monitoring	6.1
7269578			8-Jul-2016	636528.0	4854400.0				2	3.0	0	Boring	Observation Wells	Monitoring	
7269579			8-Jul-2016	636568.0	4854359.0				2	7.6	0	Boring	Observation Wells	Monitoring	10.7
7269580			8-Jul-2016	636556.0	4854407.0				2	10.7	0	Boring	Observation Wells	Monitoring	13.7
7272278	5	16	18-Sep-2016	635319.0	4860216.0						0				
7272279	5	16	18-Sep-2016	635329.0	4860183.0						0				
7272280	5	16	18-Sep-2016	635327.0	4860184.0						0				

Table B2 - Summary of Permits to Take Water - Kennedy Road from Major Mackenzie Drive to Steeles Avenue

Permit Number	Permit Holder	Expiry	Issue	Easting	Northing	Max (L/day)
7576-9L6LVJ	The Regional Municipality of York	31-Dec-2018	26-Jun-2014	636010	4856980	200000
7576-9L6LVJ	The Regional Municipality of York	31-Dec-2018	26-Jun-2014	636283	4858295	135000
7576-9L6LVJ	The Regional Municipality of York	31-Dec-2018	26-Jun-2014	636283	4858310	200000
7576-9L6LVJ	The Regional Municipality of York	31-Dec-2018	26-Jun-2014	636288	4858355	135000
7576-9L6LVJ	The Regional Municipality of York	31-Dec-2018	26-Jun-2014	636290	4858420	200000
7576-9L6LVJ	The Regional Municipality of York	31-Dec-2018	26-Jun-2014	636283	4858580	170000
7186-93SMHH	Angus Glen Golf Club Ltd.	31-Dec-2022	15-Jan-2013	634748	4861850	392775

APPENDIX C

Record of Borehole Sheets, Borehole Location Plans, and Stratigraphic Profiles

LEGEND

- Approximate Alignment of 1500 mm Diameter Watermain
- Approximate Alignment of Tunnelled Section (STA. 0+400 To STA. 3+240)
- Approximate Alignment of Completed Tunnelled Section (Limit of Tunnelling - February 2014)
- Shaft Site Location
- Monitoring Well Location

Notes:
1. This figure should be read in conjunction with associated report.
2. Satellite image:©2011 Google and ©2012 Digital Globe.

0 100 200 300 400
METRES

drawn	MV
approved	WBB
date	MAR. 2014
scale	AS SHOWN
original size	Tabloid

coffey

client: MMM GROUP LIMITED

project: 1500 mm DIAMETER WATERMAIN - KENNEDY ROAD (STA. 0+400 TO STA. 3+240) CITY OF MARKHAM, YORK REGION

title: SITE PLAN

project no: ENVSETOB10389AA

figure no: 1

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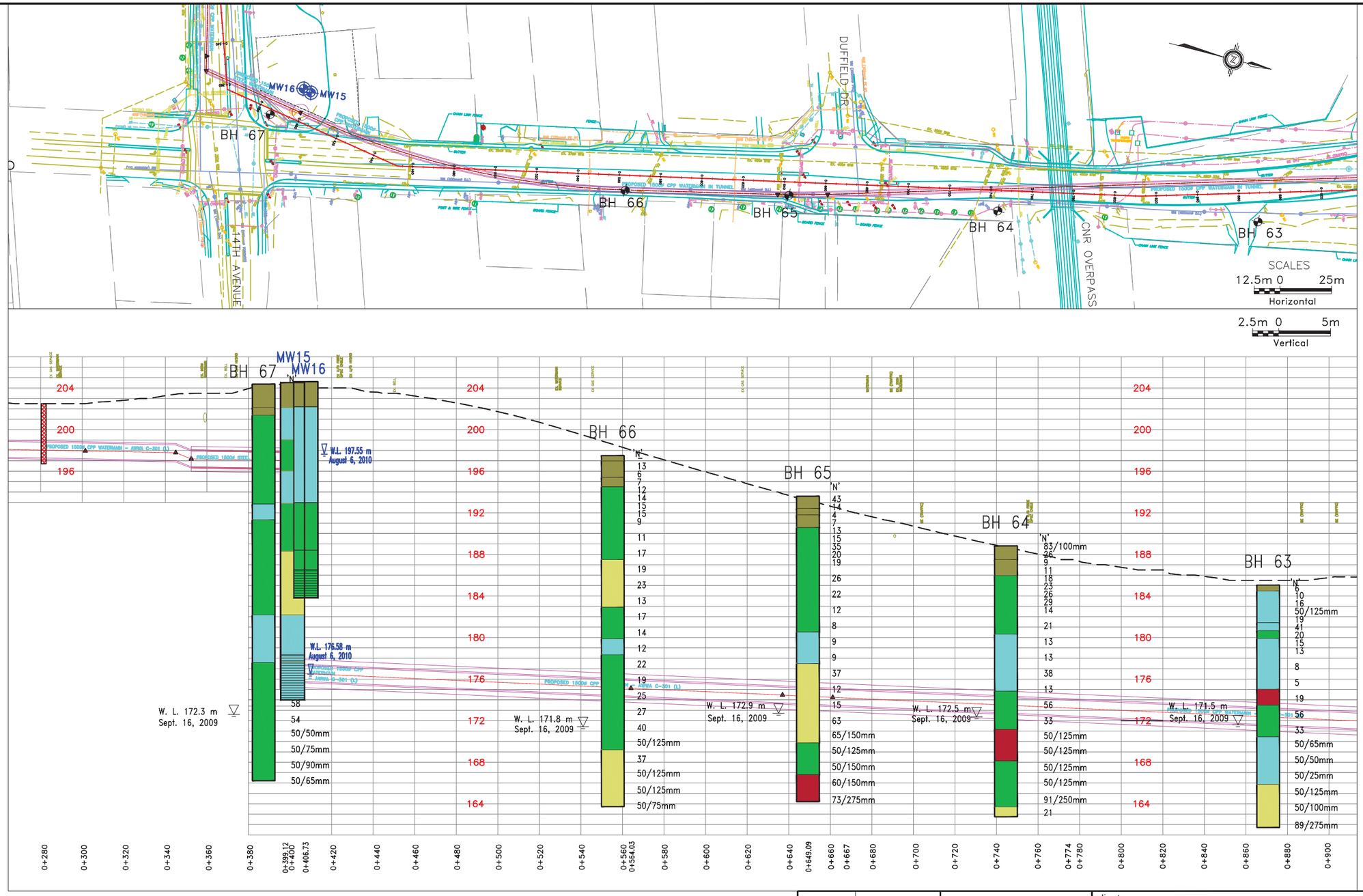

LEGEND

- MW11 – MONITORING WELL BY COFFEY (2010)
- PW2 – PUMPING WELL BY COFFEY (2010)
- BH 38 – INVESTIGATION BOREHOLE BY OTHERS (2009)
- SCREENED INTERVAL
- Water Level Elevation (Date)
- Topsoil
- Fill
- Silty Clay, Clayey Silt
- Sand, Silty Sand
- Silt, Sandy Silt Sand & Silt
- Weathered Shale
- Sand and Gravel Gravelly Sand

drawn	MV/VI/AQ
approved	HJ
date	FEBRUARY 2011
scale	AS SHOWN
original size	Tabloid

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: MMM Group limited

project: HYDROGEOLOGICAL STUDY IN SUPPORT OF PTTW
1500mm DIAMETER WATERMAIN - KENNEDY ROAD
STA. 0+400 TO STA. 3+240)
MARKHAM, ONTARIO

title: PROFILE AND BOREHOLE LOCATION PLAN (BH63-67)

project no: ENVSETOB10389AA

drawing no: 4A

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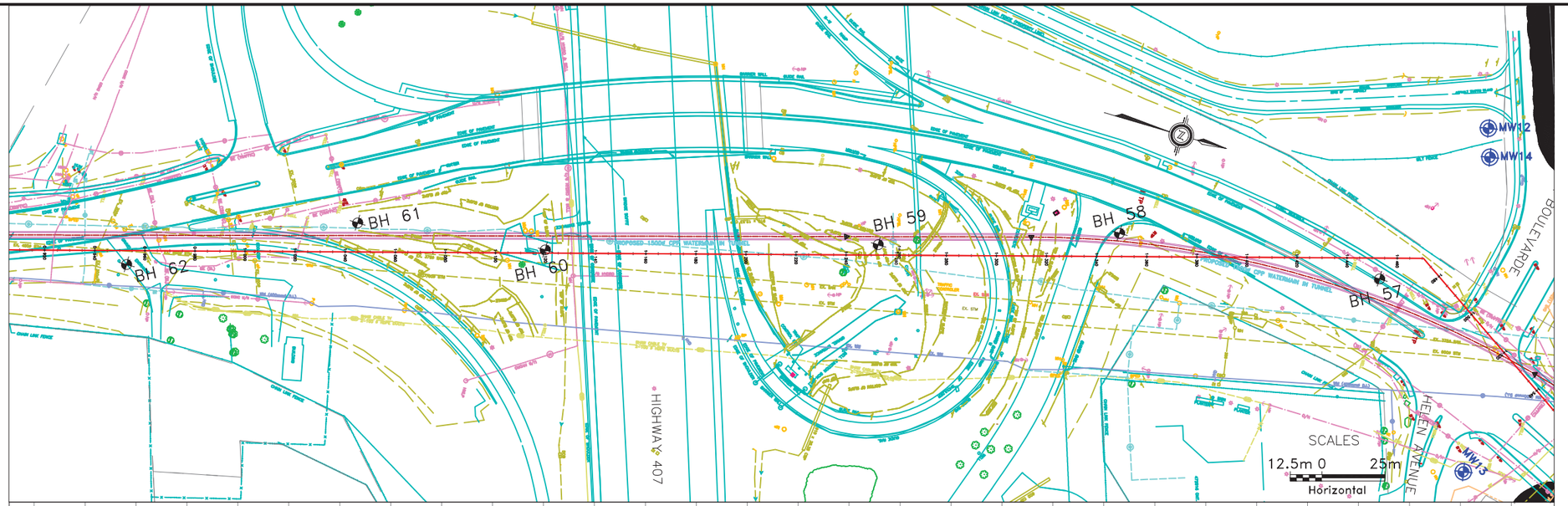

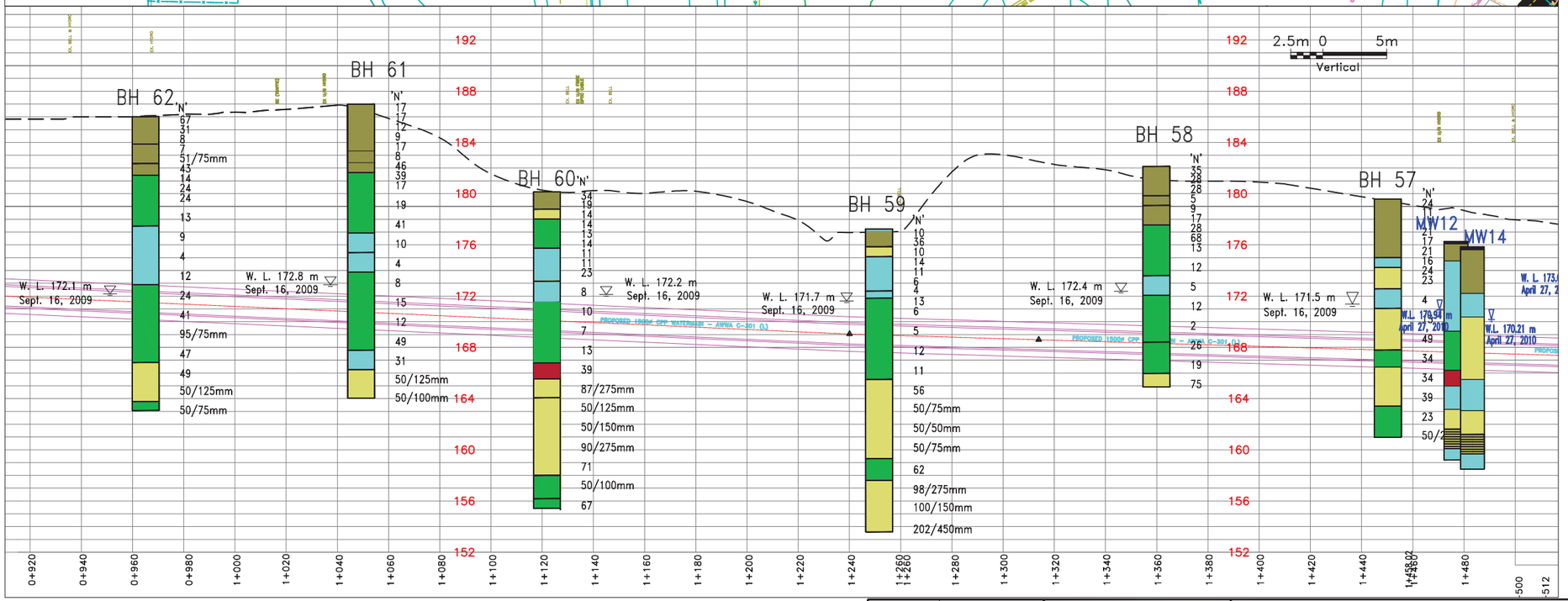

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drawn	MV/VI/AQ
approved	HJ
date	FEBRUARY 2011
scale	AS SHOWN
original size	Tabloid

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: MMM Group limited

project: HYDROGEOLOGICAL STUDY IN SUPPORT OF PTTW
1500mm DIAMETER WATERMAIN - KENNEDY ROAD
STA. 0+400 TO STA. 3+240)
MARKHAM, ONTARIO

title: PROFILE AND BOREHOLE LOCATION PLAN (BH57-62)

project no: ENVSETOB10389AA

drawing no: 4B

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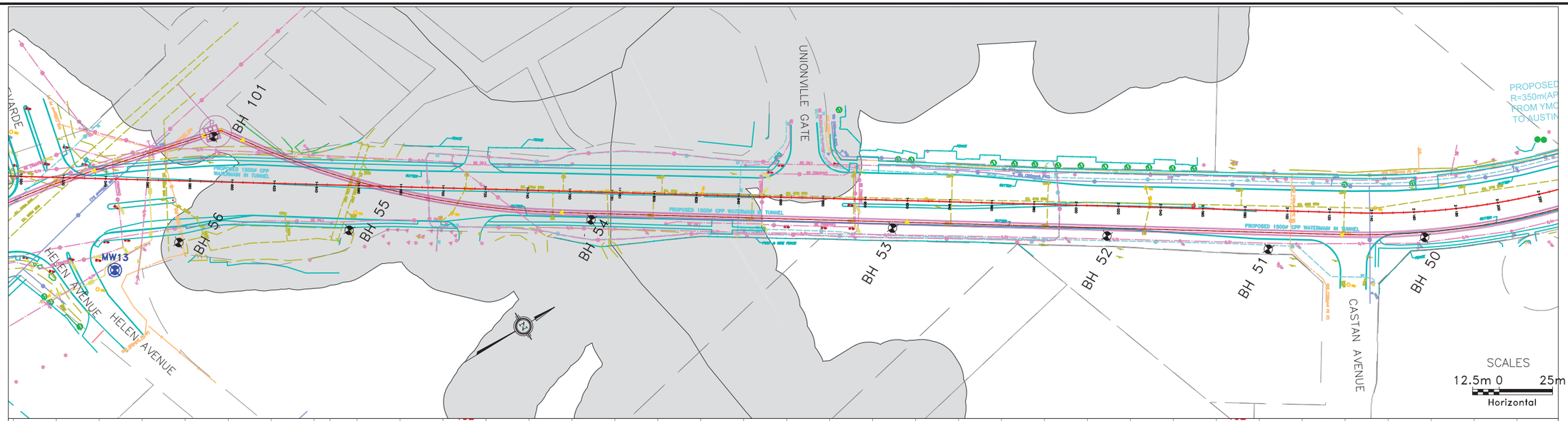

LEGEND

- MW11 – MONITORING WELL BY COFFEY (2010)
- PW2 – PUMPING WELL BY COFFEY (2010)
- BH 38 – INVESTIGATION BOREHOLE BY OTHERS (2009)
- SCREENED INTERVAL

Water Level Elevation (Date)

Topsoil

Fill

Silty Clay, Clayey Silt

Sand, Silty Sand

Silt, Sandy Silt
Sand & Silt

Weathered Shale

Sand and Gravel
Gravelly Sand

drawn	MV/VI/AQ
approved	HJ
date	FEBRUARY 2011
scale	AS SHOWN
original size	Tabloid

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: MMM Group Limited

project: HYDROGEOLOGICAL STUDY IN SUPPORT OF PTTW
1500mm DIAMETER WATERMAIN - KENNEDY ROAD
STA. 0+400 TO STA. 3+240)
MARKHAM, ONTARIO

title: PROFILE AND BOREHOLE LOCATION PLAN (BH50-56)

project no: ENVSETOB10389AA

figure no: 4C

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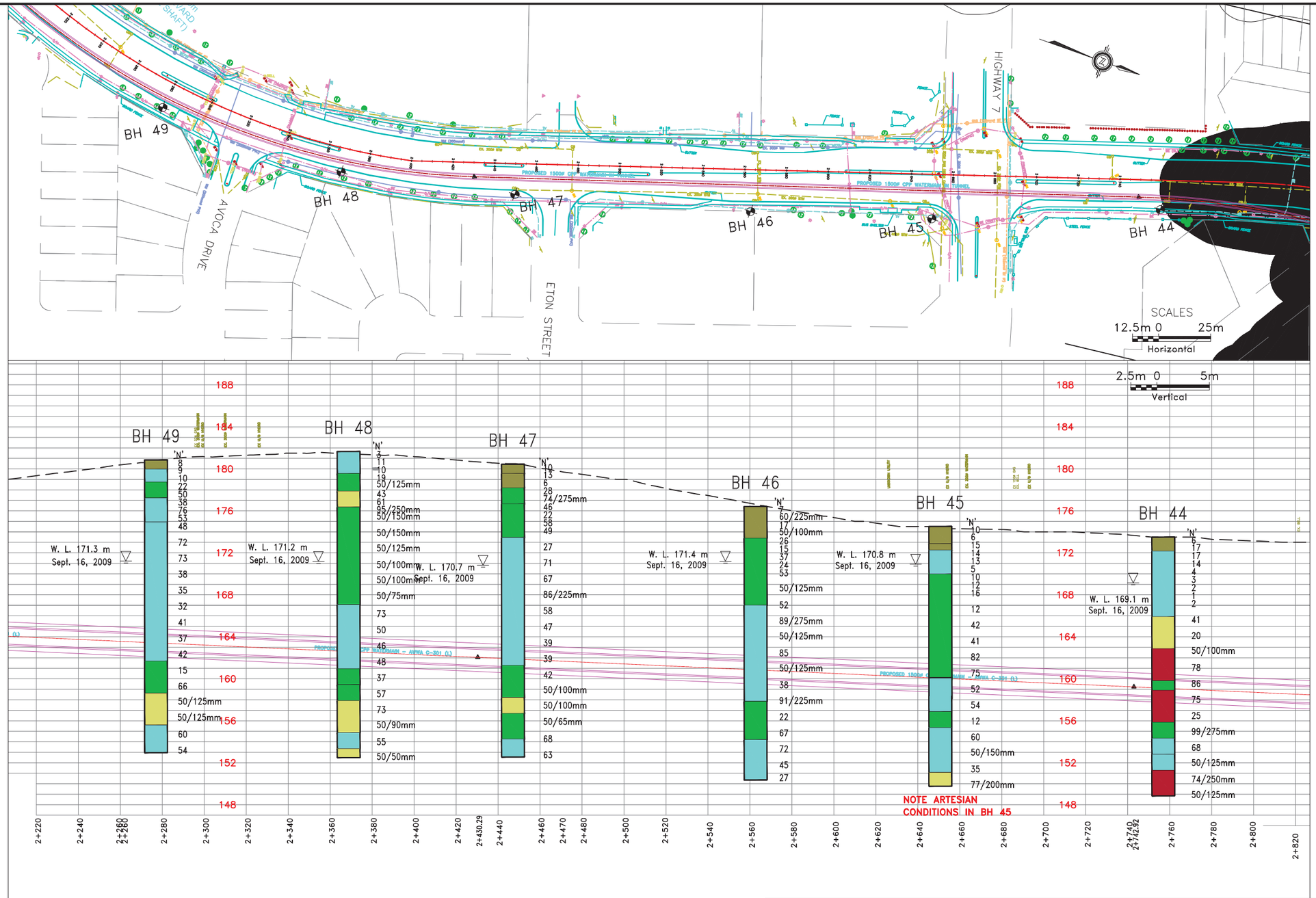

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drawn	MV/VI/AQ
approved	HJ
date	FEBRUARY 2011
scale	AS SHOWN
original size	Tabloid

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: MMM Group limited

project: HYDROGEOLOGICAL STUDY IN SUPPORT OF PTTW 1500mm DIAMETER WATERMAIN - KENNEDY ROAD STA. 0+400 TO STA. 3+240) MARKHAM, ONTARIO

title: PROFILE AND BOREHOLE LOCATION PLAN (BH44-49)

project no: ENVSETOB10389AA-1010

drawing no: 4D

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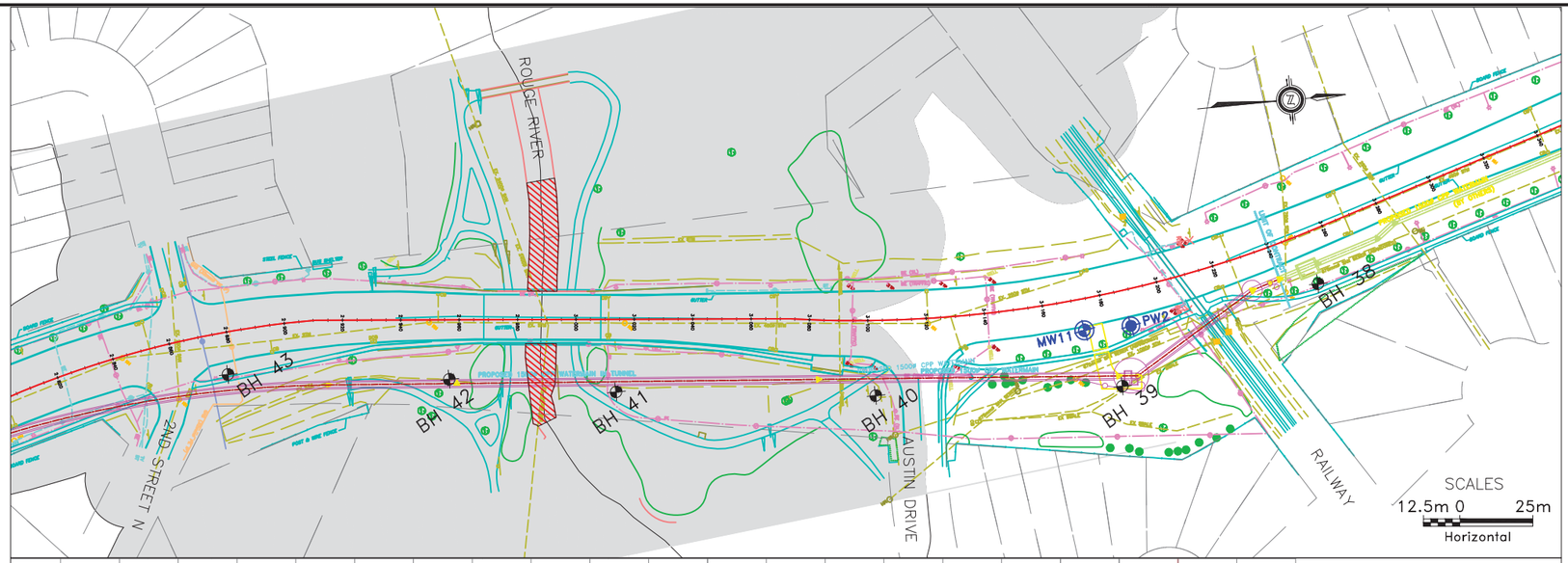

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drawn	MV/VI/AQ
approved	HJ
date	FEBRUARY 2011
scale	AS SHOWN
original size	Tabloid

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: MMM Group limited

project: HYDROGEOLOGICAL STUDY IN SUPPORT OF PTTW
1500mm DIAMETER WATERMAIN - KENNEDY ROAD
STA. 0+400 TO STA. 3+240)
MARKHAM, ONTARIO

title: PROFILE AND BOREHOLE LOCATION PLAN (BH38-43)

project no: ENVSETOB10389AA

drawing no: 4E

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