Small Scale Hydrogeological Assessment
Residential Property Located at
14245 Highway 50, Caledon, Ontario

Report #6069A – Columbia Square Inc. Caledon
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EXECUTIVE SUMMARY

A & A Environmental Consultants Inc. (A&A) was retained by Columbia Square Inc. (the client), to evaluate the potential impact from the proposed multi-level, mixed-use development on local groundwater/surface water resources by conducting a small-scale hydrogeological study. The subject site is located at 14245 Highway 50, Caledon, Ontario, (Figure 1). The Site is bound to the northwest by agricultural, by Highway 50 followed by institutional to the northwest, Columbia way to the southeast followed by residential, and by institutional to the northeast. The area of the Site is approximately 33,700 m^2 (8.33 acres). At the time of the investigation, the site was vacant agricultural land.

The topography in the vicinity of the subject site (a 100-meter radius) ranges from approximately 266 masl to the north to 262 masl to the south and was observed to be generally flat with a slight southeastern slope toward Columbia Way. The Humber River is located to the south of the subject site beyond Highway 50. The surface water is expected to infiltrate the permeable ground surface.

Geological Maps identified the site to be Halton till characterized by predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor. The physiographic landform of the site is identified as till plains (drumlinized). The surficial geology identified the site to be Clay to silt-textured till deposits derived from glaciolacustrine deposits or shale. Bedrock in the area of the site is part of the Georgian Bay Formation characterized as shale, limestone, dolostone and siltstone. These rocks were formed from weathering of the Precambrian surface (shales) and from the calcareous marine creature skeletons.

A search of the Ministry of Environment, Conservation, and Parks (MECP) well records show a total of eleven wells located within 500 meters of the surrounding area as follows: three domestic wells, one domestic irrigation well, two wells listed as other use, one monitoring well, one public use well, two domestic-livestock wells, and one well with no use listed.

It is clear from the MECP water well database and the information obtained during the field survey that the local residents obtain their water from a municipal water supply system. The subject site is also expected to utilize the municipal water system when redeveloped. The MECP well records show groundwater was found at 4.57 mbgs, for a well drilled in the unconfined aquifer to approximately 6.71 mbgs. The records also indicate groundwater levels at an average of 49.25 mbgs for wells drilled in the confined aquifer under a hard clay aquitard identified at approximately 29.26 mbgs. The drilling program completed at this site show the groundwater between 1.131– 2.945 mbgs for monitoring wells drilled between 6.493 – 8.957 mbgs.

The water table in the study area was defined by installing a total of four monitoring wells in the area of the proposed development and using an existing well on site. The selection of the monitoring wells was based on the predicted water flow direction, taking into consideration the site location and accessibility for the drill crew. The four monitoring wells installed by A&A were drilled to a maximum depth of 12.071 mbgs. There were seven groundwater monitoring events that took place (May 31, 2021, June 18, 2021, June 23, 2021, June 28, 2021, July 26, 2021, August 9, 2021, and August 26, 2021). All wells contained water in each of the seven monitoring events. It was concluded that groundwater was present on site at elevations between 260.766 – 262.863 masl.

A groundwater contour map was plotted using “Golden Software” (Surfer 8) and the measurements of groundwater levels taken on July 26, 2021 from five monitoring wells. This map shows well MW-1 being at the lowest water elevation compared with the other wells. The general direction of groundwater flow was found to be in a south- southeast direction.

The total precipitation (rainfall plus snowfall) in 2020 was 1064 mm, with the greatest amounts falling in January and November. July and August show the highest mean daily temperatures during the year and the lowest temperatures were recorded in February. The average annual precipitation from 1990-2020 was calculated using historical data collected at the meteorological station located at the “Bolton SPS” located in Caledon, Ontario. The average annual precipitation over the thirty-year period was 859 mm. For the same period, it was calculated that approximately 520 mm/year would be lost to evapotranspiration (Environment Canada, 2020);

leaving a total of approximately 337 mm/year available for groundwater recharge and surface runoff.

Based on the water balance assessment, moderate changes are anticipated in the infiltration and runoff due to the proposed development at the subject site. A storm water management plan, will be needed to manage the increased stormwater runoff on site.

The analysis results indicate that all health and non-health related parameters were below the standards as outlined in the Peel Region - Sanitary Sewer Discharge By-Law 53-2010.

RECOMMENDATION

Based on the obtained information from this study, A&A has the following recommendations:

1. Due to the high runoff rate on site with the development, a stormwater management plan is required. Proper planning as well as implementing LIDs will mitigate the stormwater that accumulates.
2. Due to the high-water levels above the foundation bottom, the excavation area with the underground parking garage will need to undergo in-construction dewatering. The groundwater discharge to allow the groundwater to remain one meter below the parking garage is estimated to be approximately at rate of 4.75 m^3/day for in-construction dewatering. The underground parking facility walls and floor are to be made watertight to eliminate seepage from the groundwater. This would eliminate the need for post-construction dewatering.

No adverse impact on the groundwater resources is expected to occur during the re-development of the subject site with the implementations of these recommended actions.

1.0 INTRODUCTION

A & A Environmental Consultants Inc. (A&A) was retained by Columbia Square Inc. (the client), to evaluate the potential impact from the proposed development of a multi-level, mixed-use development on local groundwater/surface water resources by conducting a small-scale hydrogeological study. The subject site is located at 14245 Highway 50, Caledon, Ontario, (Figure 1). The Site is bound to the northwest by agricultural, by Highway 50 followed by institutional to the northwest, Columbia way to the southeast followed by residential, and by institutional to the northeast. The area of the Site is approximately 33,700 m^2 (8.33 acres). At the time of the investigation, the site was vacant agricultural land.

This study describes a small-scale hydrogeological study to obtain a better understanding of the groundwater resources within the study area and includes the characterization of the site using all available geological and hydrogeological information; a discussion of the groundwater quality and a report for the site with conclusions and recommendations.

There is no relationship between the client and A&A other than third-party independent assessor.

1.1 Scope of Work

The scope of work included the following where applicable:

- Perform visual/olfactory examination of the site and a walk-through inspection of the property to look for signs of any environmental issues.
- Characterize the site's geological, topography, meteorology, hydrogeology, and groundwater conditions.
- Determination of current activities at the site.
- Obtain utility line locates for all public and private utility lines.
- Drill four boreholes to a maximum depth of 17.9 m in selected locations. The boreholes will be drilled with a hydraulic soil drill fitted with 4-inch augers. Monitoring wells were installed to a maximum depth of 8.957 m.

- Install four groundwater monitoring wells, to cover the entire site. The wells will be constructed of 51 mm (2") PVC risers with 3.05m long Schedule 40 PVC slotted well screen. Slip end caps will be installed at the end of the riser pipe with threaded drive-points at the bottom of the well. The borehole annuluses will be backfilled with silica sand to approximately 0.3 m above the well screen. A bentonite seal will be placed on the sand pack with a second seal at about 0.3 mbgs. The well will be fitted with a dedicated inertial sampler. The well will be installed by a licensed well technician, tagged in accordance with Regulation 903 and recorded on the Ministry of the Environment, Conservation and Park's (MECP) water well information system (WWIS).
- A level survey will be conducted at the site, which consists of measuring the elevation of the top of the well, relative to an arbitrary benchmark. This level survey will be conducted to provide the information used to calculate the groundwater table elevation.
- The groundwater will be sampled and analyzed for selected parameters of concerns.
- Groundwater samples will be evaluated using information obtained from the newly installed monitoring wells following MECP sampling protocol and procedures.
- Evaluate the potential impact of the proposed development on the ground water and surface water resources and their users.
- Provision of a reasonable conclusion regarding the environmental condition of the site.
- Development of recommendations for follow-up investigations if needed.

1.2 Changes to Scope of Work

An existing monitoring, EMW-1, was found within the subject site. This well was included in the monitoring program of all the groundwater monitoring wells on site.

2.0 DESCRIPTION OF THE SUBJECT SITE

The subject site is an irregular shaped lot with an area of 33,700 m^2. The site lies in the eastern area of Caledon, Ontario at 14245 Highway 50. The site is bound to the northwest by agricultural, by Highway 50 followed by institutional to the northwest, Columbia way to the southeast followed by residential, and by institutional to the northeast. The subject study area is located within the Humber River watershed which contains the Humber River.

The approximate UTM coordinates are Zone 17T; 600066 m Easting; 4860703 Northing. The site is zoned as being "C – General Commercial " as quoted from Town of Caledon Zoning By-law 2006-50, as amended and is located on the north side of the intersection of Highway 50 and Columbia Way. The site is currently vacant and used as agricultural land.

3.0 DEVELOPMENT PLAN

It is understood that the proposed residential development will consist of the following:

- Eleven 2-storey back-to-back townhouse buildings, each consisting of 10 or 12 townhouse units.
- One 9-storey apartment residence building consisting of 132 units.
- Two mixed-used 10-storey buildings with a podium consisting of 346 units, with 1,694 m^2 being used for proposed retail units.
- A total number of 1130 parking spaces including 993 underground parking spaces. There are two levels of underground parking with the first level of underground parking covering the entire building envelopes and the second underground parking level covering only the mixed-use building development.
- There will be two access points to this site, one off of Highway 50 and one off of Columbia Way.

The general arrangement of the proposed development is illustrated in Figure 6, Appendix A.

The total site area is 33,700 m^2 with a total of 26,960 m^2 being developed.

4.0 PHYSICAL SETTING

4.1 Topography

The regional topography, which is an area within a 5 km radius from the site, has one slope. The Town of Caledon would slope southeast towards the Humber River. The site sits in the Humber River Watershed that consists of the main channel, the Humber River, and then two smaller branches, the East Humber and the West Humber. All together the Humber River Watershed drains an area of 911 km^2 with 1,800km of waterways and 600 bodies of water (Toronto and Region Conservation Authority, 2019). The main branch has its source in the Niagara Escarpment and flows 126 km south to empty into Lake Ontario at Humber Bay east of Etobicoke and ranges from 320 masl to 80 masl (Toronto and Region Conservation Authority, 2021). The East Humber has its origins in the Kettle Lakes Region of the Richmond Hill and King Township while the West Humber has its origins in the King City region. The watershed has a mixed land use with 54% rural, 33% urban and 13% urbanizing (Toronto and Region Conservation Authority, 2019).

The topography in the vicinity of the subject site (a 100-meter radius) ranges from approximately 266 masl to the north to 262 masl to the south and was observed to be generally flat with a slight southeastern slope toward Columbia Way. The Humber River is located on south of the subject site beyond Highway 50. The surface water is expected to infiltrate the permeable ground surface.

4.2 Geology

The surface deposit in this region, like all of Ontario, was once covered by massive glaciers during the late Wisconsin glacial period. The grinding action of the moving ice masses produced a considerable amount of rock materials, ranging in size from boulders to rock flour which was distributed over the landscape.

Quaternary Geology: The sedimentary record of southern Ontario provides evidence for three distinct climatic stages during the Quaternary period: the Illinoisan glacial stage (130-180,000

years before present (y.b.p), Sangamonian interglacial stage (110-130,000 y.b.p.) and the Wisconsinan glacial stage (110-10,000 y.b.p; Johnson et al, 1997).

The Quaternary geology identified the site to be Halton till characterized by predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor. The physiographic landform of the site is identified as till plains (drumlinized) in the South Slope region. The surficial geology identified the site to be till, characterized by clay to silt-textured till derived from glaciolacustrine deposits or shale.

Paleozoic Geology: Bedrock in the area of the Site is part of the Georgian Bay Formation characterized as shale and limestone. These rocks were formed from weathering of the Precambrian surface (shales) and from the calcareous marine creature skeletons.

Physiography of Southern Ontario: The physiography of southern Ontario was altered considerably by the glacial and interglacial episodes that took place throughout the Quaternary period (2 million years to present). Southern Ontario's glacial history is very complex and has been interpreted and discussed by many (Barnett 1992; Karrow 1967; Chapman and Putnam 1984; Dreimanis and Goldthwait 1973; etc). The site to be on the till plains (drumlinized) landform in the South Slope region.

Surficial Geology: The site is identified as Clay to silt-textured till deposits derived from glaciolacustrine deposits or shale.

Bedrock Geology of Ontario: The site is part of the Georgian Bay Formation; Blue Mountain Formation; Billings Formation; Collingwood Member and Eastview Member, characterized by shale, limestone, dolostone and siltstone.

The drilling program conducted for this study indicates the overburden deposits are generally consistent across the property. The soil profile consists of silt and clay followed by clayey silt to depth. Bedrock was not encountered during the drilling program.

4.2.1 Overburden Detailed Summary

The drilling program conducted for this study indicates the overburden deposits are generally consistent across the property. All boreholes revealed underlain the surface to be characterized as follows:

- **Topsoil**

  All of the boreholes encountered a layer of topsoil at the ground surface. The thickness of the topsoil layer ranged from approximately 0 – 10 cm.

- **Silt and Clay**

  After the top soil, a layer of Silt and Clay with trace Gravel and/or Sand spreads across the site at an approximate depth of 0.1 mbgl to 13.5 mbgl. This deposit was medium brown to grey in colour in the shallower areas.

- **Clayey Silt**

  A Clayey Silt layer with some Sand trace Gravel was found at an approximate depth of 13.5 to 17.9 mbgl. Boreholes BH1 to BH4 were terminated within this deposit. This layer was medium grey in colour and had no odour.

5.0 HYDROGEOLOGICAL CONDITIONS

5.1 Hydrogeology

Groundwater and surface water are expected to flow towards the natural slope of the ground surface. Although the surface topography typically has great influence on the groundwater flow it has been observed in several areas that bedrock topography also has a significant influence on the flow, in some cases more so than surface topography. In the latter case, this is believed to be due to relatively impermeable bedrock underlying a much more permeable sand overburden. Based on the regional topography, groundwater flow is inferred to be in a south direction towards the Humber River. The groundwater flow direction may also be influenced by utility trenches and other subsurface structures and may migrate in the bedding stone of the subsurface utility trenches.

During the hydrogeological investigation on the site, four groundwater monitoring wells were installed within the annulus of boreholes BH-1, BH-4, BH-5, and BH-7 (Figure 4). The wells were constructed of 51 mm (2") PVC risers with a 3.05m long Schedule 40 PVC slotted well screen. A 'J-plug' secure end cap was installed at the top of the riser pipe with a threaded drive-point at the bottom of the well screen. The borehole annulus was backfilled with silica sand to approximately 0.3m above the well screen. A bentonite seal was placed on the sand pack to about 0.3mbgs. The wells were fitted with a dedicated inertial sampler and a protective, flush-mount steel well protector was installed around the risers. The wells were installed by A&A, licensed well technicians in accordance with Ontario Regulation 903. An additional existing well (EMW-1) was found on site in the west corner.

These wells are used to determine the direction of groundwater flow and quality of the groundwater. A level survey was conducted at the site, which consisted of measuring the elevation of the top of the well casings, relative to a benchmark. This level survey was conducted to provide information used to calculate the groundwater table elevation, hydraulic gradient and flow direction. Groundwater levels were obtained from each monitoring well on May 31, 2021, June 18, 2021, June 23, 2021, June 28, 2021, July 26, 2021, August 9, 2021, and August 26, 2021.

They were recorded to the nearest 0.01 m accuracy, using an electronic water-table level tape. The total depth of each well was measured and recorded. The groundwater elevations are shown in the well logs (see Tables 1-2 below). These show the highest elevation at MW-7 near the north corner and the lowest at MW-4 near the east corner of the property.

Groundwater flow direction was determined using the groundwater elevation of the of the site on July 26, 2021 groundwater monitoring event.

Table 1 – Monitoring Well Details July 26, 2021

Project #6069 – Columbia Square Inc. Caledon 14245 Highway 50, Caledon, Ontario					
Date Logged: July 26, 2021			**Logged by: J. Osborne**		
Monitoring Well #	**EMW-1**	**MW-1**	**MW-4**	**MW-5**	**MW-7**
Location	West Corner of Subject Site	Southwest Corner Area of Subject Site	East Corner of Subject Site	Northwest Area of Subject Site Near Property Line	North Corner Area of Subject Site
Pipe Size (mm)	51	51	51	51	51
UTM Zone	17T	17T	17T	17T	17T
Easting	599953	600005	600156	600004	600058
Northing	4860716	4860639	4860747	4860748	4860815
Top of Pipe (masl)	263.06	262.619	263.711	263.545	264.547
Water Level (m)	1.269	1.537	2.945	1.131	1.684
Water Level (masl)	261.791	261.082	260.766	262.414	262.863
Total Depth (m)	6.493	6.504	8.957	7.656	7.19
BM = 263.60 masl Manhole Cover, Near East Corner of Subject Site					

Table 2 – Groundwater Monitoring Program Levels

Monitoring Well	**Elevation (masl)**	**Groundwater Elevations (masl)**						
		31-May-21	**18-Jun-21**	**23-Jun-21**	**28-Jun-21**	**26-Jul-21**	**09-Aug-21**	**26-Aug-21**
EMW-1	263.06	261.887	261.798	261.729	261.722	261.791	261.723	261.512
MW-1	262.619	260.899	260.99	260.919	260.872	261.082	260.882	260.644
MW-4	263.711	256.336	259.589	260.11	260.393	260.766	260.725	260.576
MW-5	263.545	256.926	262.408	262.308	262.297	262.414	262.195	261.981
MW-7	264.547	262.837	262.626	262.637	262.624	262.863	262.55	262.157

The seasonal change in groundwater hydraulic gradient due to rainfall and spring runoff have a significant influence on the groundwater flow velocities. The groundwater flow velocities were calculated using a hydraulic gradient of 0.0178 m/m (MW-7 to MW-1), using July 2021 groundwater elevation and the hydraulic conductivity of 1 x 10^{-4} cm/s for silt clay and clayey silt materials, with an estimated porosity of 35% (Fetter 2001). The average linear velocity can thus be calculated using the following equation:

$$v = \frac{ki}{n}$$

Where "k" is the hydraulic conductivity, "i" is the hydraulic gradient, and "n "the porosity. By using the above information, the average linear velocities for the silt clay and clayey silt materials are estimated to be 1.604 m/year.

A groundwater contour map, shown below in Figure 5, Appendix A, was plotted using Golden Surfer™ (Surfer 8) and the measurements of groundwater levels taken on July 26, 2021 from five monitoring wells installed in the unconfined aquifer. This map shows well MW-1 being at the lowest water elevation compared with the other wells used. The general direction of groundwater flow was found to be in a south- southeast direction.

5.2 Meteorological Conditions

Meteorological conditions, such as precipitation (rainfall and snowfall) and temperature are of particular interest for understanding the existing surface water regime; the amount of water available for groundwater recharge; and for developing a surface water management system at the subject site. Data for 2020 describing the climatic variables was obtained from the Environment Canada meteorological station at "Bolton SPS" meteorological station, located in Caledon, Ontario (Table 3). However, climate varies across large area both spatially and temporally with local variation created by such factors as topography and prevailing winds. Human activities can also affect local climate. Deforestation may increase stream and peak flood flows while decreasing evapotranspiration. Urbanization can increase cloudiness, precipitation and extreme winter temperatures while decreasing relative humidity, incident radiation and wind speed (Phillips and McCulloch, 1972).

The total precipitation (rainfall plus snowfall) in 2020 was 1064 mm, with the greatest amounts falling in January and November. July and August show the highest mean daily temperatures during the year and the lowest temperatures were recorded in February.

Table 3 – 2020 Meteorological Data (Caledon, ON)

MONTH	TOTAL PRECIPITATION (mm)	MEAN TEMPERATURE (°C)
JANUARY	**138.4**	**-4.9**
FEBRUARY	**76.7**	**-9.8**
MARCH	**43.4**	**0.6**
APRIL	**93.0**	**2.1**
MAY	**67.8**	**11.7**
JUNE	**54.8**	**18.5**
JULY	**109.2**	**20.0**
AUGUST	**82.3**	**20.2**
SEPTEMBER	**35.6**	**12.8**
OCTOBER	**127.3**	**9.4**
NOVEMBER	**175.6**	**-1.9**
DECEMBER	**60.0**	**-8.0**
SUM	**1064**	
AVERAGE		**5.9**

*Denotes incomplete data

Climate is usually defined as normals (or averages) of weather variable over a 30-year period as defined by the World Meteorological Organization (WMO). These "climate normals" refer to arithmetic calculations based on observed climate values for a given location over a specified time period. Climate normals are often used to classify a region's climate and for research in many environmental fields. There are many ways to calculate "climate normals" and the most useful ones adhere to accepted standards. The WMO considers thirty years long enough to eliminate year-to-year variations. Thus, the WMO climatological standard period for normal's calculations are computer over a 30-year period of consecutive records, starting January 1st and ending December 31st. In addition, the WMO established that normal's should be arithmetic

means calculated for each month of the year form daily data with a limited number of allowable missing values.

The average annual precipitation from 1990-2020 was calculated using historical data collected at the meteorological station located at the "Bolton SPS" meteorological station, located in Caledon, Ontario and with the use of the Toronto Regional Conservation Authority (TRCA) water balance tool. The average annual precipitation was used to estimate the total amount of water available for surface water and groundwater resources. The average annual precipitation over the thirty-year period was 859 mm. For the same period, it was calculated that approximately 520 mm/year would be lost to evapotranspiration (TRSPA Water Balance Tool, 2021); leaving a total of approximately 339 mm/year available for groundwater recharge and surface runoff.

The natural freeze-thaw cycle, which occurs each year in southern Ontario, significantly impacts the rate and timing of surface water runoff and groundwater recharge. Typically, watercourses in the Toronto area are frozen over by late January and clear by late March to mid April. There is usually snow on the ground by the end of December, with the greatest accumulations in January and February. By late March, warmer spring temperatures melt the snow pack and normally there is little or no snow cover remaining by the end of April. From January to early March surficial soils are normally frozen and relatively impervious to infiltration. Most of the spring melt waters end up as surface runoff, contributing to high flows in the water bodies near the site.

Climate change has had a significant impact on this region and other regions of Canada. In recent years, it has been noted that snow does not accumulate on the ground until January, rather than in late December. In a warming climate, more precipitation will fall in the form of rain rather than snow, filling reservoirs to capacity earlier than normal. Additionally, a warming climate will result in snow melting earlier in the year than in previous decades, disrupting the traditional timing of melt water runoff. Together, these changes mean less snow accumulation in the winter and earlier snow-derived water runoff in the spring, challenging the capacities of existing water reservoirs.

5.3 Groundwater Recharge

Recharge or infiltration to the groundwater system occurs by the migration of precipitation through the surficial soil. The amount of recharge or infiltration at a specific site depends on the amount of precipitation evaporated back into the atmosphere, the amount of water transpired from natural vegetation to the air, site topography, type of vegetation and surficial soil type. Surficial geology influences recharge rates. Areas of hummocky topography exhibit higher recharge rates since soil run-off collects in depressions where it can then infiltrate through the surficial soils. Reduction in recharge within urban settings occur due to paved driveways/roads or impermeable rooftop surfaces.

5.4 Hydraulic Properties

The amount and rate of groundwater flow through porous media is determined by the hydraulic properties of the unit, particularly hydraulic conductivity (K), the hydraulic gradient and porosity. The response of a flow system to various stresses is largely determined by the previously mentioned parameters along with storage. Hydraulic conductivity is a key hydraulic parameter that can be estimated by numerous field and laboratory methods including slug tests and pumping tests.

5.5 Site-Level Water Balance

The basic water balance for a particular area can be expressed as:

$P = ET + R + I + \Delta S$

(Thornthwaite and Mather, 1957)

Where:

P = Precipitation (mm/year)

ET = Evapotranspiration (mm/year)

R = Runoff (mm/year)

I = Infiltration (mm/year)

ΔS = Change in groundwater storage (taken as zero under steady state conditions) (mm/year)

Based on the Thornthwaite and Mather methodology, the water balance is accounting water in the hydrologic cycle. Precipitation (P) falls as rain and snow. It can run off towards lakes and streams (R), infiltrate to the groundwater table (I), or evaporate from surface water and vegetation (ET). When long-term average values of P, R, I, and ET are used there is minimal or no net change to groundwater storage (ΔS).

5.5.1 Precipitation and Evapotranspiration

Based on the Canada Climate Normals data from Environment Canada for "Bolton SPS" station for the years 1990 to 2020. The average annual precipitation over the thirty-year period was 859 mm. For the same period, it was calculated that approximately 520 mm/year would be lost to evapotranspiration (TRSPA Water Balance Tool, 2021); leaving a total of approximately 339 mm/year available for groundwater recharge and surface runoff.

5.5.2 Infiltration and Runoff

As indicated, there is a water surplus of 339 mm/year at the Site, which becomes the infiltration and runoff components of the water balance. The rate of infiltration at a site is expected to vary, based on a number of factors to be considered in any infiltration model. To partition the available water surpluses into infiltration and surface runoff, the MECP infiltration factor was used. The MECP Stormwater Management (SWM) Planning and Design Manual (2003) methodology for calculating total infiltration based on topography, soil type and land cover was used and a corresponding runoff component was calculated for the soil moisture storage conditions. The calculated volumes of infiltration and runoff in the stage of pre-development and post-development are presented in Appendix F and are discussed as follows.

5.5.2.1 Pre-development

Considering the fact that the site is fairly level with a slight slope to the southeast, medium combination of silt and clay, and is currently vacant; the site may have an infiltration factor of 0.5, i.e., 50% of water surplus (169.5 mm/year). In the meantime, a total of 212 mm/year will become the runoff. Based on the Site's area of 33,700 m^2, a total of 5,712.2 m^3 per year will infiltrate, while a total volume of 5,712.2 m^3 per year will become runoff.

5.5.2.2 Post-development

Based on the information provided by the site plan, it is anticipated that after development, approximately 80% of the site area will be the impervious and hard surface area occupied by the buildings and parking area and 20% will be the pervious area, unpaved areas represent landscaped and green area.

Assuming that 20% of the precipitation will become the evaporation in the non-permeable surface areas, the infiltration volume was calculated to be 1142.4 m^3 per year, which is a deficit of 4569.7 m^3 per year after the development, while the runoff volume was calculated to be 19669.3 m^3 per year, which is a surplus of 13957.2 m^3 per year after the development.

Based on the water balance assessment, changes are anticipated in the infiltration and runoff due to the proposed development at the subject site. There will be an increase in surface runoff due to the re-development on-site. A storm water management plan, will be needed to manage the stormwater runoff on site.

5.5.2.3 Low Impact Developments (LIDs)

Low impact development (LID) practices have been used to reduce peak storm flows, provide water retention and water quality treatment. From a SWM plan, an LID can be used to alter the post development water balance. This will reduce the post-development impact by increasing the infiltration and reducing the runoff. With the implementation of LIDs, the LID infiltration rate will need to be 13957.1 m^3 per year or more. This will increase the total post-development infiltration to 15099.6 m^3 per year and reduce the runoff to 5712.2 m^3 per year, providing the site with infiltration rates and runoff rates that are equivalent or better than the pre-development conditions.

5.6 Groundwater Discharge

As part of the water cycle, groundwater is a major contributor to flow in many streams and rivers and strongly influences river and wetland habitats for plants and animals. Groundwater enters the ground in recharge areas and leaves the ground at discharge points. Discharge is continuous as long as sufficient water is available above the discharge point. The most visible evidence of

groundwater discharge occurs as seepage or springs along watercourse banks and is also noted within stream beds as upwellings and boiling creek bed sediments. Based on the groundwater elevation encounter during this investigation groundwater discharge will be required during the site construction at this site.

5.6.1 Construction Dewatering Requirements

Construction dewatering is intended to lower the groundwater levels in the excavation areas in order to provide a "dry" working condition for excavations and construction of foundations and/or associated sewer systems.

The construction dewatering generally depends on the design specifications of the foundation and footings, and the proposed sewer system (invert elevation, length and size of underground utility pipes), and the site hydrogeological conditions such as existing ground water levels and flow regime. Drawdown levels are not required and dewatering discharge rates are not needed to achieve the required drawdown levels for maintaining a dry working condition and stable excavation bottom and slopes for the subject site.

5.6.2 Pre-construction Dewatering

Based on the propose design plan, the new development consists of construction of several buildings. There will be two levels of underground parking with footings being put no deeper than 6 mbgs (20 fbgl). The developed area at the Site is approximately 33,700 m^2. The ground surface is estimated to be at 263 masl.

5.6.3 In-Construction Dewatering

Based on the proposed development, the excavation for construction of the building footings will mainly take place in the loam deposits. The loam deposit as described before is characterized by predominantly silty sand matrix, high in matrix carbonate content and clast poor. The highest water level measured within the footprint of the proposed building was 262.863 masl at monitoring well MW-7, which is above the proposed designed footing and the target water level for construction. Given the hydraulic conductivity of the overburden deposits, a positive dewatering may not be feasible. Instead, sump pumping at the bottom of excavation may be

applied accordingly if needed. During the construction, groundwater control would be considered for the water coming from surface water runoff. To estimate the potential construction dewatering, the following assumptions would be made:

Based on the obtained information we can calculate the discharge by considering a rectangular block of aquifer below the water table at the subject site. The block has horizontal width *w,* vertical thickness *h* and horizontal (or near horizontal) length *L.* Suppose that water is moving through the soil in the direction parallel to the edges of length Land perpendicular to the cross section with edge lengths w and *h.* Since the water can move only through the connected pores, the discharge *Q* of the water through the cross section can calculate using the following equation:

$$Q = A_{pores} v$$

Where A_{pores} is the total cross-sectional area of all the connected pores in the aquifer cross section, and *v* is the speed of the water in the pores as the water passes the cross section. The cross section of the aquifer, for the total area of the buildings of 1075 m^2 with vertical thickness below water surface of approximately 6 m, by using the above information, the groundwater seepage to the building excavation is estimated to be approximately at rate of 4.72 m^3/day (4720 L/day). The proposed development is going to excavate below the groundwater table on site.

5.6.4 Post-Construction Dewatering

A perimeter weeping tile system and/or an under-slab drainage with a sump-pumping system is usually required for the constructed building to lower the groundwater level and avoid wet conditions in the bottom level. The permanent drainage system will collect the passive groundwater seepage flow from the surrounding soils as well as the stormwater accumulation.

Based on the groundwater conditions observed at the Site, the groundwater level in the native soils surrounding the basement level would be anticipated to be above the weeping tile system or sub-drainage system, and any water entering the water collection system would be limited to the water coming from the fill materials above the native soils. Therefore, the water in the fill materials would be the main concern in groundwater control after construction. The underground parking facility walls and floor are to be made watertight to eliminate seepage from

the groundwater. A sump pump will be installed to pump stormwater and minimal seepage groundwater from the underground parking area. The sump pump will be connected to a pumping system that will be connected to an infiltration trench on the surface. This will eliminate the need for post construction dewatering. The stormwater management plan will detail this infiltration trench location and details.

5.7 Permit-To-Take-Water/EASR Posting

Any construction dewatering or water takings in Ontario is governed by Ontario Regulation 387/04 – the Water Taking and Transfer, an Ontario Regulation made under the Ontario Water Resources Act (OWRA), and/or Ontario Regulation 63/16 – Registrations under Part II.2 of the Act – Water Taking, made under Environmental Protection Act.

According to O. Reg. 387/04, any water taking over 50,000 litres per day should not take place without a valid permit, which shall be applied in accordance with the MECP's Permit-to-Take-Water (PTTW) Manual, dated April 2005. According to O. Reg. 63/16, the construction site dewatering between 50,000 L/day and 400,000 L/day shall be registered through Environmental Activity and Sector Registry (EASR).

Based on the site condition, positive dewatering will not be workable at the Site for the building footings construction. The construction dewatering (likely by sump pumping) and post construction drainage were evaluated to be in a mount below 50,000 L/day. Therefore, a PTTW or EASR posting will not be required.

6.0 POTENTIAL CONSTRUCTION DEWATERING IMPACTS

6.1 Local Water Use

A search of the MECP well records show a total of eleven (11) wells located within 500 meters of the surrounding area as follows: three domestic wells, one domestic irrigation well, two wells listed as other use, one monitoring well, one public use well, two domestic-livestock wells, and one well with no use listed.

It is clear from the MECP water well database and the information obtained during the field survey that the local residents obtain their water from a municipal water supply system. The subject site is also expected to utilize the municipal water system when developed. Table 4 presents the summary of the wells from the well records, showing the UTM coordinate, drilling date, total depth and water found elevation. The MECP well records show groundwater was found at 4.57 mbgs, for a well drilled in the unconfined aquifer to approximately 6.71 mbgs. The records also indicate groundwater levels at an average of 49.25 mbgs for wells drilled in the confined aquifer under a hard clay aquitard identified at approximately 29.26 mbgs. It should be noted that the water levels provided in these tables do not represent current water level depths because those wells more likely measured at the time of drilling. However, the drilling program completed at this site show the groundwater was found between 1.131– 2.945 mbgs for monitoring wells drilled between 6.493 – 8.957 mbgs.

The Site and the surrounding properties are expected to be serviced by the municipal water system. Therefore, there should be no impact on the domestic water wells.

Table 4 – Water Wells on and within 0.5 km of the Proposed Development

Well No.	UTM Coordinate Zone 17T		Date Drilled	Total Depth	Water Level	Water Use
	Easting	Northing		(mbgs)	(mbgs)	
4900324	599960	4860448	1967	Unknown	54.56	No Use Listed
4905679	599915	4860773	1978	45.11	42.67	Domestic
4903224	599715	4860723	1969	46.03	45.72	Domestic
4900323	600040	4860503	1961	53.34	53.04	Domestic

Well No.	UTM Coordinate Zone 17T		Date Drilled	Total Depth	Water Level	Water Use
	Easting	Northing		(mbgs)	(mbgs)	
4906317	600144	4860343	1985	49.07	45.72	Domestic Irrigation
7164920	600043	4860573	2011	6.71	4.57	Monitoring
7169000	600014	4861031	2011	Unknown	Unknown	Other
7168998	599976	4861004	2011	Unknown	Unknown	Other
4900325	599934	4860568	1967	79.86	78.33	Public
4900386	600316	4860511	1967	57.00	54.86	Livestock Domestic
4900385	600256	4860508	1963	49.38	48.16	Livestock Domestic

6.2 Wellhead Protection Sensitivity Area

The Site and the neighboring properties are not located within a wellhead protection area. Therefore, there should be no impact on the public wells due to the construction dewatering.

6.3 Surface Water

During the site visits, no standing water was visible. After development of this site, a slight increase to the amount of runoff water will be created. This should be considered during the creation of a SWM plan.

6.4 Potential Sources of Contamination

No sources of apparent environmental concern were noted on the site.

6.5 Ground Subsidence in Adjacent Structures

Under certain conditions, dewatering activities can cause ground settlement which results from the increase in effective stresses caused by the lowering of groundwater level and subsequent decrease in pore pressure. Based on obtained groundwater levels during this investigation, no influence is anticipated due to the new reconstruction.

7.0 GROUNDWATER QUALITY

7.1 Groundwater Sampling Protocol

Groundwater samples were collected from the monitoring wells using dedicated inertial samplers. Clean nitrile gloves were used to minimize the potential for secondary contamination of the samples. Sampling of the monitoring wells was conducted July 9, 2021. The groundwater sampling was compared to the Toronto Municipal Code Chapter 681, Sewers for discharge to the sanitary sewer.

Specific Quality Assurance/Quality Control (QA/QC) measures were undertaken to ensure that the groundwater samples collected and the subsequent chemical analysis of the samples provided representative results. Upon arrival at each well site, the well was inspected for signs of damage or interference, the well cap removed and the top-of-pipe depth to the water table and to the bottom of the well measured using a Solinst electric depth meter. The top-of-pipe to ground level was also measured. This data was recorded on the field monitoring log sheets and any abnormalities were noted. The volume of the water in the well was calculated and three times this volume was purged from the well using the pre-installed Waterra inertial pumps. All samples were collected into the appropriate bottles, each supplied by the laboratory. Groundwater samples were kept on ice in coolers until delivered to AGAT Laboratories Ltd. (AGAT), of Mississauga, Ontario. AGAT is accredited by the Standards Council of Canada (SCC) and Canadian Association of Laboratory Accreditation (CALA) and is licensed for these tests by the MECP. All samples submitted to the laboratory were identified by a unique sample number. In addition, the laboratory carried out its own internal QA/QC procedures. The results of the chemical analyses are shown in the Certificates of Analysis in Appendix C**.**

7.2 Assessment of Water Quality

The following observations were made after careful review of the results of analysis. The health-related parameters tested were Arsenic; Cadmium; Chromium; Lead; and Fluoride. The non-health related parameters tested were pH; Total Suspended Solids; Aluminum; Copper; Manganese; Titanium and Zinc.

7.2.1 Health Related Parameters

- **Total Arsenic:** Arsenic is a semi-metal, a member of the nitrogen family occurring naturally in the environment. It is odorless and tasteless. Consumption in food and water are the major sources of arsenic exposure for the majority of North American citizens. People may also be exposed from industrial sources, as arsenic is used in semiconductor manufacturing, petroleum refining, wood preservatives, animal feed additives, and herbicides. Arsenic can combine with other elements to form inorganic and organic arsenicals. In general, inorganic derivatives are regarded as more toxic than the organic forms and it is primarily the inorganic forms which are present in water. Exposure to arsenic at high levels poses serious health effects as it is a known human carcinogen. In addition, it has been reported to affect the vascular system in humans and has been associated with the development of diabetes. In the monitoring wells, indication of levels of arsenic fell well below the allowable limit for Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Total Cadmium:** Cadmium is a rare element that is extremely unlikely to be present as a significant natural contaminant in drinking water. Cadmium compounds used in electroplated materials and electroplating wastes may be a significant source of drinking water contamination. Other than occupational exposure and inhalation from cigarette smoke, food is the main source of cadmium intake. In the monitoring wells, indication levels of cadmium fell far below the allowable limit of 0.7 mg/L for Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Total Chromium:** If Chromium is present in raw water, it may be oxidized to a more harmful hexavalent form during chlorination. Chromium in the more highly oxidized form may be present in older yellow paints and in residues from plating operations and around old re-circulating water cooling systems. In the monitoring wells, indication levels of total chromium fell far below the allowable limit of 2 mg/L for Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Lead:** Lead is typically only present as a result of corrosion of lead solder, lead containing brass fittings or lead pipes which are found close to or in domestic plumbing and the

service connection to buildings. Lead ingestion should be avoided particularly by pregnant women and young children, who are the most susceptible. It is recommended that only the cold-water supply be used for drinking/consumption and only after five minutes of flushing to rid the system of standing water. Corrosion inhibitor addition or other water chemistry adjustments may be made at the treatment plant to reduce lead corrosion rates where necessary. In the monitoring wells, levels of lead fell far below the allowable limit of 1 mg/L for Peel Region - Sanitary Sewer Discharge By-Law 53-2010.

- **Fluoride:** When fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L, the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of the Health and Long-Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources. In the monitoring wells, indication levels of Fluoride fell far below the allowable limit of 10 mg/L for Peel Region - Sanitary Sewer Discharge By-Law 53-2010.

7.2.2 Non-health Related Parameters

- **pH:** pH is a parameter that indicates the acidity of a water sample. The principal objective in controlling pH is to produce a water that is neither corrosive nor produces incrustation. In the monitoring well tested, indication of pH levels fell within the appropriate range set out by Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Total Suspended Solids (TSS):** TSS are particles that are larger than 2 microns found in the water column. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration. Pollutants such as dissolved metals and pathogens can attach to suspended particles and enter the water. TSS was found to be below the standard of 350 mg/L set out by Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Total Aluminum:** Aluminum in untreated water is present in the form of fine particles of alumino-silicate clay. These clay particles are effectively removed in coagulation/filtration. Aluminum found in coagulant treated water is due to the presence

of aluminum left over from use of the coagulant. High aluminum can cause coating of the pipes resulting in increased energy requirements for pumping, interference with certain industrial processes and flocculation. Medical studies have not provided clear evidence that residual aluminum has any effect on health. The total aluminum found in the monitoring wells sampled, does not exceeded Peel Region - Sanitary Sewer Discharge By-Law 53-2010.

- **Total Copper:** Copper occurs naturally in the environmental but is rarely present in raw water. Copper is used extensively in domestic plumbing in tubing and fittings and is an essential trace component in food. Although the intake of large doses of copper has resulted in adverse health effects such as stomach upsets, the levels at which this occurs are much higher than regulated limits. In the monitoring wells, copper was below the standard set by Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Total Manganese:** Manganese is objectionable in water supplies because it stains black and produces an undesirable taste. Manganese is present in some groundwater because of chemically reducing underground conditions coupled with presence of manganese mineral deposits. Manganese is also occasionally present, seasonally, in surface waters when anaerobic decay processes in sediments occurring. Total Manganese in the samples collected from the monitoring well fell below the standards set out by Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Total Titanium:** Titanium is an element found naturally in many igneous and sedimentary rocks. Titanium compounds are stable in soil, so only small amounts of titanium end up in water from the weathering of rocks. Titanium may also be present in groundwater due to manufacturing effluent. Titanium is relatively non-toxic. It does not accumulate in the human body. Total Titanium in the samples collected from the monitoring well fell below the limits set out by Peel Region - Sanitary Sewer Discharge By-Law 53-2010.
- **Total Zinc:** Zinc occurs in small amounts in almost all igneous rocks. The natural zinc content in soil is estimated to be 1-300 mg/kg. Zinc can impart an undesirable taste to drinking water. In natural surface water the concentration of zinc is usually below 10µg/L and in groundwater is between 10-40 µg/L. Acute toxicity can occur in humans if excessive

amounts of zinc are ingested. Total Zinc in the groundwater samples analyzed fell below the guidelines set out by Peel Region - Sanitary Sewer Discharge By-Law 53-2010.

Results of analysis were compared to Peel Region - Sanitary Sewer Discharge By-Law 53-2010. The results can be found below in Table 5.

Table 5 – Summary of Groundwater Samples

Sample Description	**2718967**			
Date Sampled	**07/09/2021**			
Parameter	**Unit**	**G / S**	**RDL**	**MW-5**
CBOD5				
Biochemical Oxygen Demand, Carbonaceous	mg/L		2.00	<2.00
Peel Region Sanitary - Organics				
Oil and Grease (animal/vegetable) in water	mg/L	150	0.5	<0.5
Oil and Grease (mineral) in water	mg/L	15	0.5	<0.5
Methylene Chloride	µg/L	2000	0.3	<0.0003
trans-1,3-Dichloropropene	µg/L	140	0.30	<0.0009
Methyl Ethyl Ketone	µg/L	8000	0.9	<0.0002
cis- 1,2-Dichloroethylene	µg/L	4000	0.2	<0.0002
Chloroform	µg/L	40	0.2	<0.0002
Benzene	µg/L	10	0.2	<0.0002
Trichloroethylene	µg/L	400	0.2	<0.0002
Toluene	µg/L	270	0.2	<0.0002
Tetrachloroethene	µg/L	1000	0.1	<0.0003
Ethylbenzene	µg/L	160	0.1	<0.0001
1,1,2,2-Tetrachloroethane	µg/L	1400	0.1	<0.0001
Styrene	µg/L	200	0.1	<0.0001
1,2-Dichlorobenzene	µg/L	50	0.1	<0.0001
1,4-Dichlorobenzene	µg/L	80	0.1	<0.0001
m & p-Xylene	µg/L		0.2	<0.0002
o-Xylene	µg/L		0.1	<0.0001
Xylenes (Total)	µg/L	1400	0.2	<0.0001
Toluene-d8	% Recovery		1	99
4-Bromofluorobenzene	% Recovery		1	108
PCBs	µg/L	1	0.2	<0.0002
Decachlorobiphenyl	%		1	74
Di-n-butyl phthalate	µg/L	80	0.5	<0.0005
Bis(2-Ethylhexyl)phthalate	µg/L	12	0.5	<0.0005
2,4,6-Tribromophenol	%		1	88
2-Fluorophenol	%		1	105
Chrysene-d12	%		1	96
phenol-d6 surrogate	%		1	94
Nonylphenol and Nonylphenol Ethoxylates (Ontario, mg/L)				

Sample Description	2718967			
Date Sampled	07/09/2021			
Parameter	**Unit**	**G / S**	**RDL**	**MW-5**
Total Nonylphenol	mg/L	0.001	0.001	<0.001
NP1EO	mg/L		0.001	<0.001
NP2EO	mg/L		0.0003	<0.0003
Total Nonylphenol Ethoxylates	mg/L	0.01	0.001	<0.001
York Region Sanitary Sewer Use By-Law - Inorganics				
pH	pH Units	6.0-10.5	NA	8.04
Total Suspended Solids	mg/L	350	10	<10
Fluoride	mg/L	10	0.05	<0.05
Sulphate	mg/L	1500	0.50	133
Total Cyanide	mg/L	2	0.002	<0.002
Phenols	mg/L	1	0.001	<0.002
Total Kjeldahl Nitrogen	mg/L	100	0.10	<0.02
Total Aluminum	mg/L	50	0.010	0.32
Total Antimony	mg/L	5	0.020	0.124
Total Arsenic	mg/L	1	0.015	<0.020
Total Cadmium	mg/L	0.7	0.005	<0.015
Total Chromium	mg/L	2	0.020	<0.010
Total Cobalt	mg/L	5	0.020	<0.015
Total Copper	mg/L	3	0.015	<0.020
Total Lead	mg/L	1	0.020	<0.010
Total Manganese	mg/L	5	0.020	<0.020
Total Mercury	mg/L	0.01	0.0002	0.056
Total Molybdenum	mg/L	5	0.020	<0.0002
Total Nickel	mg/L	2	0.015	<0.020
Total Phosphorus	mg/L	10	0.02	<0.015
Total Selenium	mg/L	1	0.002	<0.002
Total Silver	mg/L	5	0.020	<0.010
Total Tin	mg/L	5	0.025	<0.025
Total Titanium	mg/L	5	0.020	<0.020
Total Zinc	mg/L	2	0.020	<0.020

Comments: RDL - Reported Detection Limit;

G / S - Guideline / Standard: Refers to Peel Region - Sanitary Sewer Discharge By-Law 53-2010

NOTE: Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

8.0 CONCLUSIONS AND RECOMMENDATION

The assessment of the available data indicates that:

- A&A was retained by the client, to evaluate the potential impact from the proposed multi-level mixed-use development on local groundwater/surface water resources by conducting a small-scale hydrogeological study. The subject site is located at 14245 Highway 50, Caledon, Ontario. The area of the Site is approximately 33,700 m^2 (8.33 acres). At the time of the investigation, the site was vacant and used for agricultural purposes.
- The topography in the vicinity of the subject site (a 100-meter radius) ranges from approximately 266 masl to the north to 262 masl to the south and was observed to be generally flat with a slight southeastern slope toward Columbia Way. The Humber River is located south of the subject site beyond Highway 50. The surface water is expected to infiltrate the permeable ground surface.
- The MECP well records show groundwater was found at 4.57 mbgs, for a well drilled in the unconfined aquifer to approximately 6.71 mbgs. The records also indicate groundwater levels at an average of 49.25 mbgs for wells drilled in the confined aquifer under a hard clay aquitard identified at approximately 29.26 mbgs. The drilling program completed at this site show the groundwater between 1.131– 2.945 mbgs for monitoring wells drilled in the unconfined aquifer between 6.493 – 8.957 mbgs.
- The water table in the study area was defined by installing a total of four monitoring wells in the area of the proposed development and an existing monitoring well that was found on site. The four monitoring wells installed by A&A were drilled to a maximum depth of 8.957 mbgs. There were seven groundwater monitoring events that took place. All wells contained water in each of the seven monitoring events. It was concluded that groundwater was present on site at elevations between 260.766 – 262.863 masl.
- A groundwater contour map was plotted using “Golden Software” (Surfer 8) and the measurements of groundwater levels taken on July 26, 2021 from five monitoring wells. This map shows well MW-1 being at the lowest water elevation compared with the other

wells. The general direction of groundwater flow was found to be in a south-southeast direction.

- The total precipitation (rainfall plus snowfall) in 2020 was 1064 mm. The average annual precipitation over the thirty-year period was 859 mm. For the same period, it was calculated that approximately 520 mm/year would be lost to evapotranspiration (TRSPA Water Balance Tool, 2021); leaving a total of approximately 337 mm/year available for groundwater recharge and surface runoff.
- Based on the water balance assessment, moderate changes are anticipated in the infiltration and runoff due to the proposed development at the subject site. A storm water management plan, will be needed to manage the increased stormwater runoff on site.
- The analysis results indicate that all health and non-health related parameters were below Peel Region - Sanitary Sewer Discharge By-Law 53-2010.

Based on the obtained information from this study, A&A has the following recommendations:

- Due to the high runoff rate on site with the development, a SWM plan is required. Proper planning as well as implementing LIDs will mitigate the stormwater that accumulates.
- Due to the high-water levels above the foundation bottom, the excavation area with the underground parking garage will need to undergo in-construction dewatering. The groundwater discharge to allow the groundwater to remain one meter below the parking garage is estimated to be approximately at rate of 4.75 m^3/day for in-construction dewatering. The underground parking facility walls and floor are to be made watertight to eliminate seepage from the groundwater. This would eliminate the need for post-construction dewatering.

No adverse impact on the groundwater resources is expected to occur during the developments of the subject site with the implementations of these recommended actions.

SIGNED:

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SIGNED:

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Accessed on: October 15, 2021

10.0 QUALIFICATIONS OF THE ASSESSORS

A & A Environmental Consultants Inc. is a multi-disciplinary environmental consulting firm offering consulting services in the fields of site assessments (Phase I-II), cleanups, water resource studies, aggregate permitting, landfill design and monitoring, geotechnical studies, air quality studies, designated substances surveys and environmental impact studies. A&A has more than 20 years of experience in environmental consulting in the province of Ontario, Alberta, Saskatchewan, British Columbia and have preformed thousands of projects from small scale Phase I ESAs to large scale landfill design, hydro-geological studies and groundwater management plans. We have a number of senior, experienced staff who consult in a variety of disciplines and offer our clients expert knowledge in both the technical aspects of a project and the environmental regulations applicable.

Dr. Ali A. Rasoul, Ph.D., EP, P. Geo., QP

Principal Consultant

The report was reviewed by Dr. Ali A. Rasoul, a Principal Consultant with A&A. He has over 20 years experience in his field. He has completed hundreds of environmental projects including Phase I/II/III ESAs, mould assessments, hydrogeological investigations, designated substances surveys and water management plans. He is a licensed Professional Geoscientist with the Association of Professional Geoscientists of Ontario and a licensed Well Technician in the Province of Ontario (Ministry of the Environment, Conservation and Parks). He is also a licensed Professional Geoscientist in Alberta, Saskatchewan and British Columbia. Dr. Rasoul is registered as a “Qualified Person” for conducting ESAs as defined under Ontario Regulation 153/04 and 511/09.

11.0 LIMITATIONS

The report was prepared for the exclusive use of the client. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. Should additional parties require reliance on this report, written authorization from A&A will be required. With respect to third parties, A&A has no liability or responsibility for losses of any kind whatsoever including direct or consequential financial effects on transactions or property values, or requirement for follow-up actions and costs.

The investigation undertaken by A&A with respect to this report and any conclusions or recommendations made in this report reflect A&A's judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observations of the site as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, or portions of the site, which were unavailable for direct investigation. A&A has used professional judgment in analysing this information and formulating these conclusions.

A&A makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

APPENDIX A – Site Maps

Figure 1 – Map Showing the Site Location

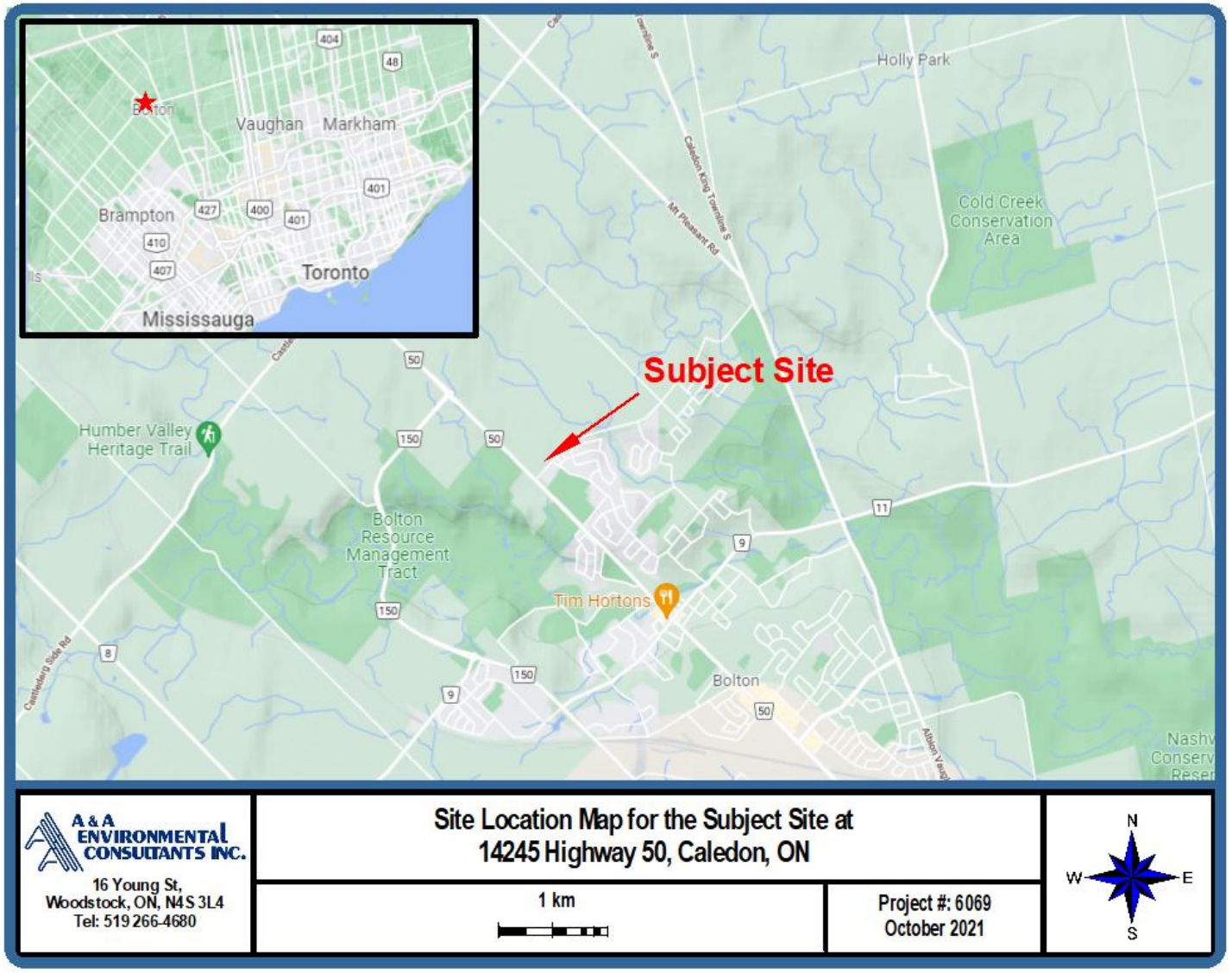


Figure 2 – Satellite Map of Site and Subject Study Area

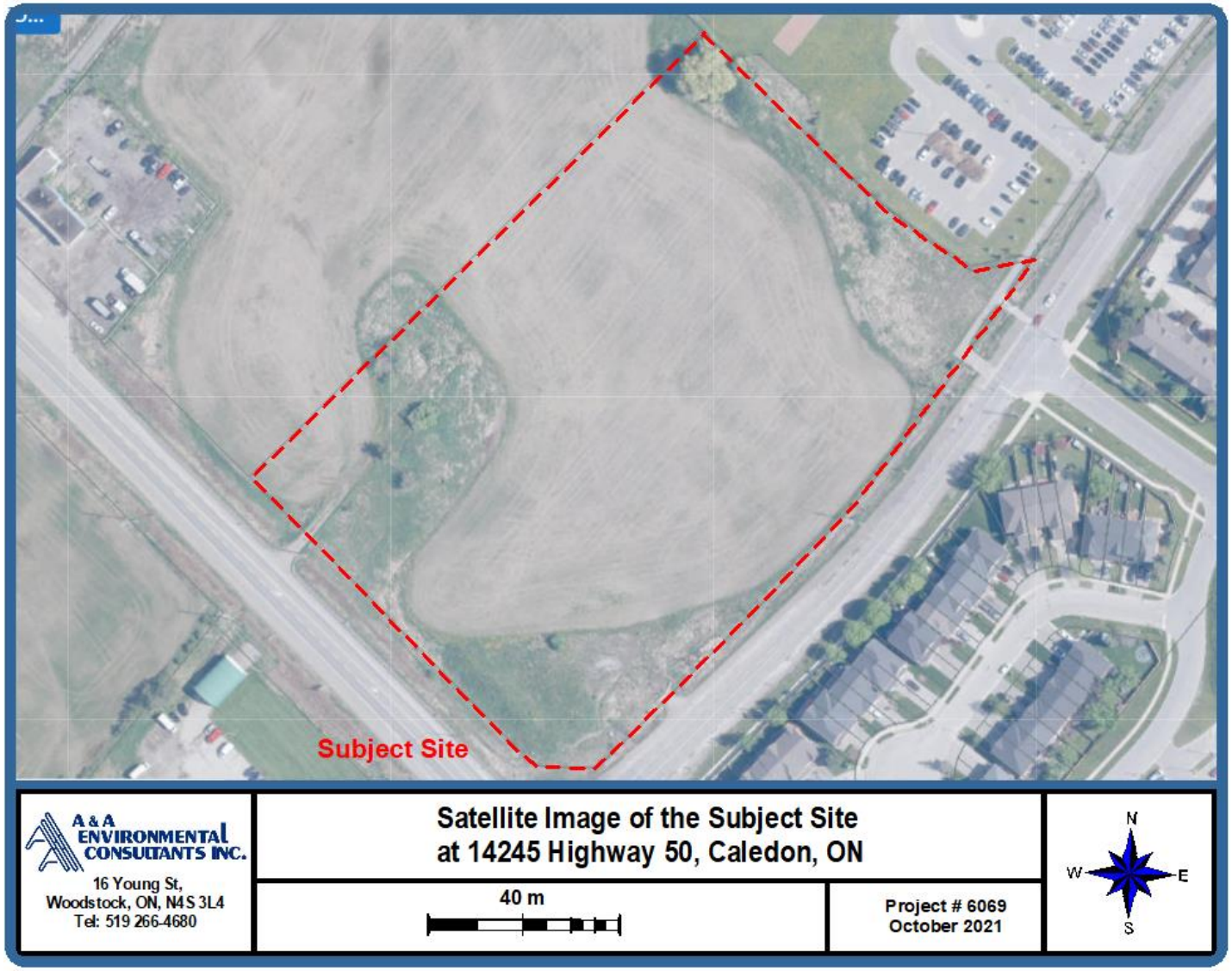


Figure 3 – Topographic Map

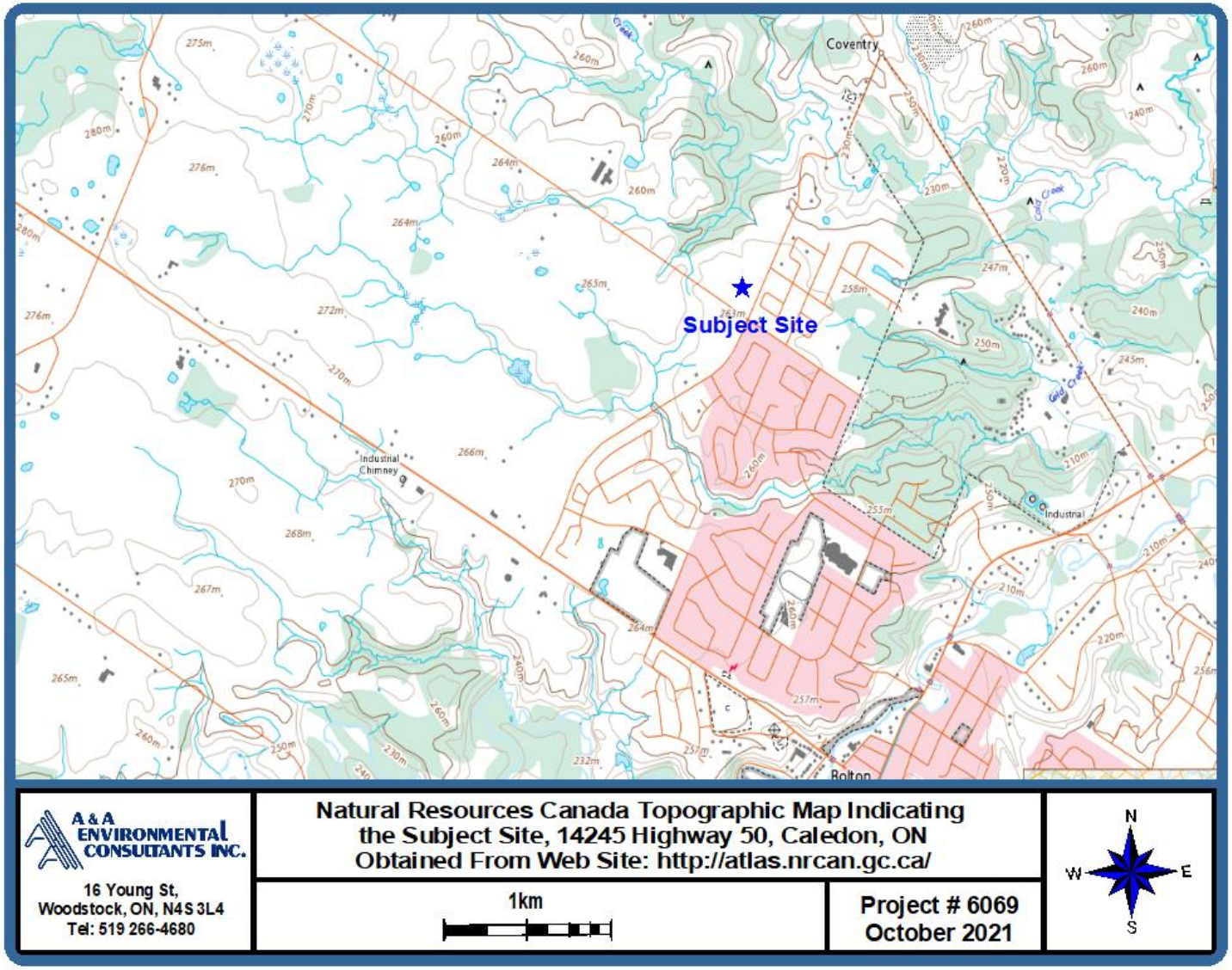


Figure 4 – Monitoring Wells Location Map – Satellite Image

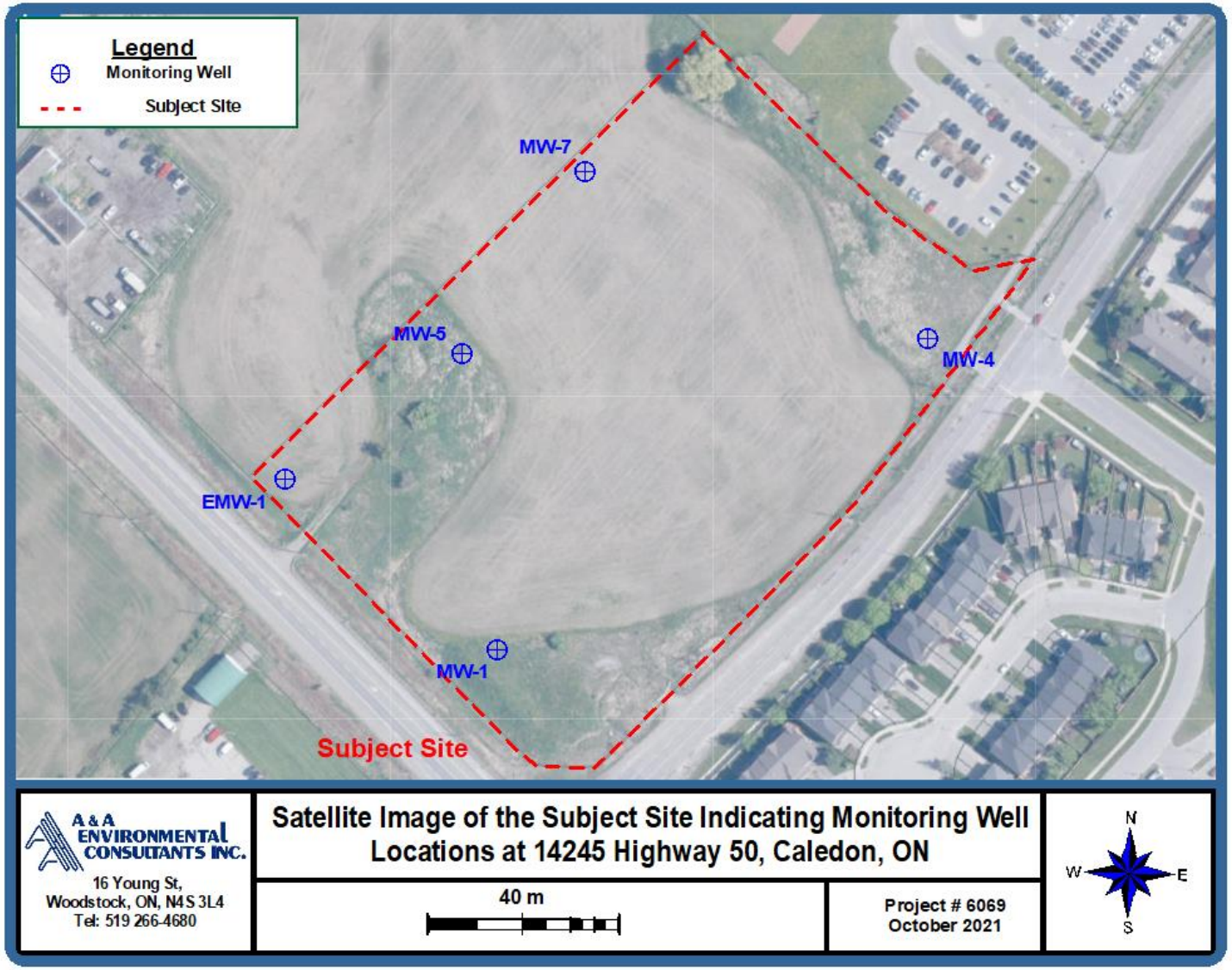


Figure 5 – Groundwater Contour Map

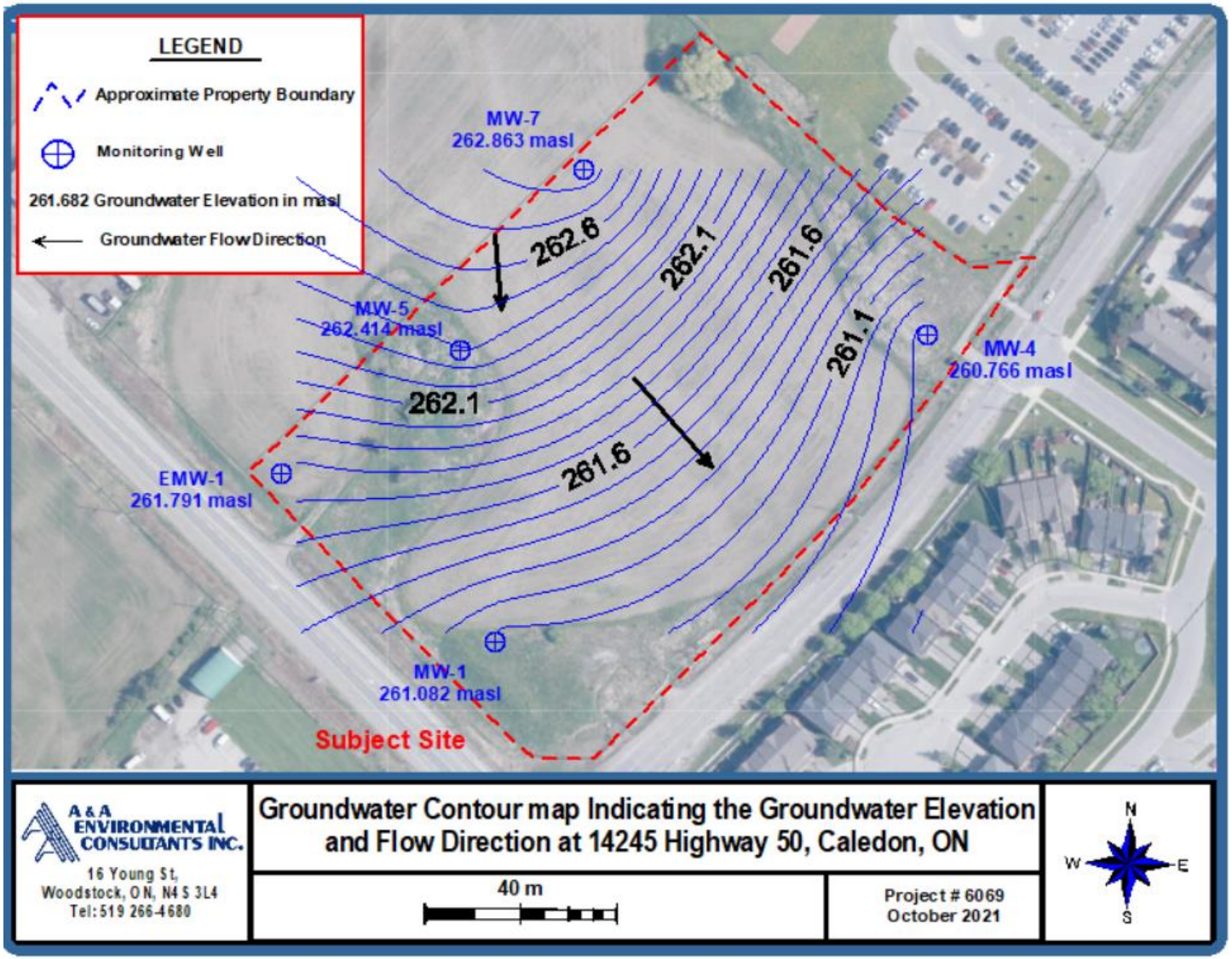
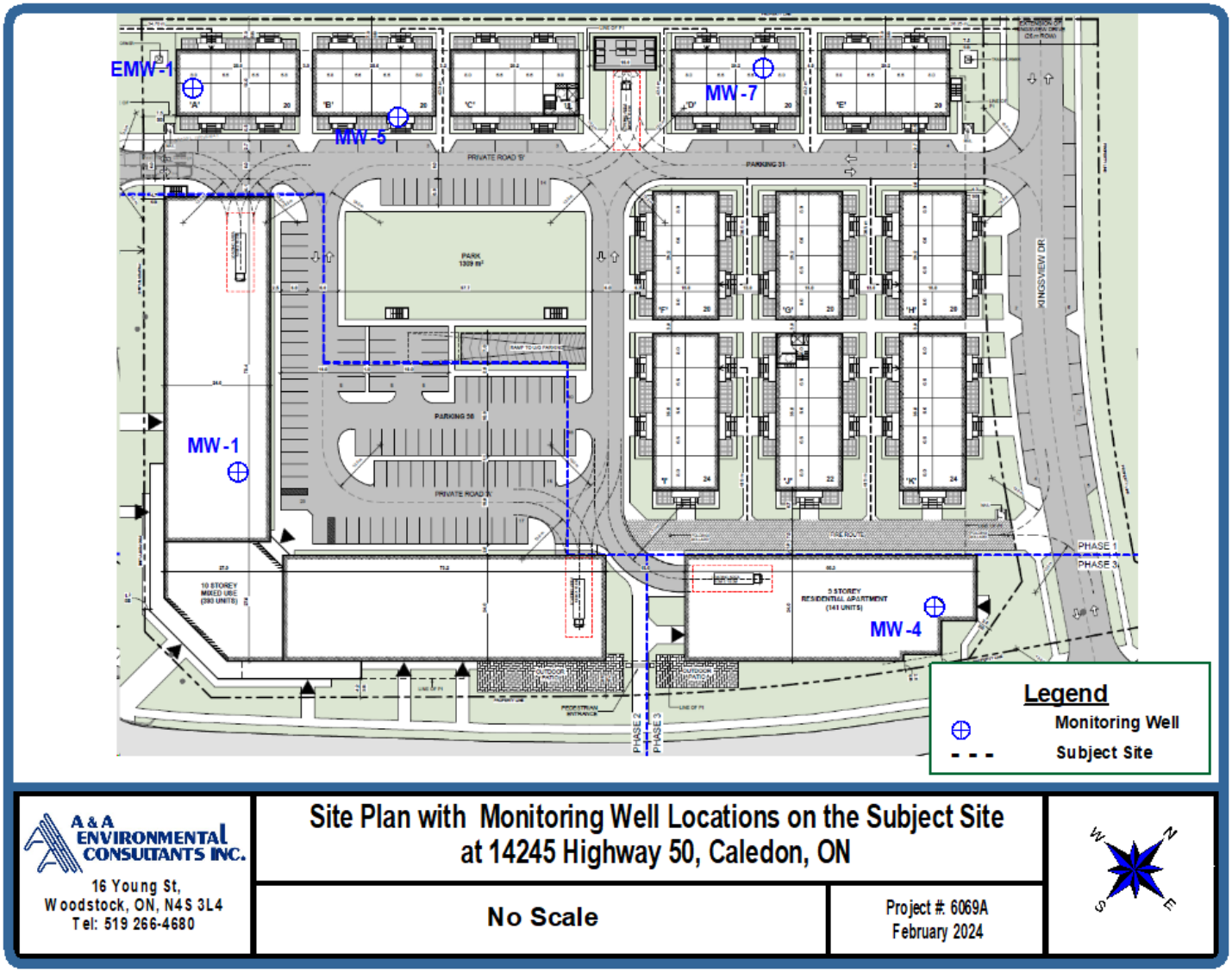


Figure 6 – Monitoring Wells Location Map – Site Plan Image



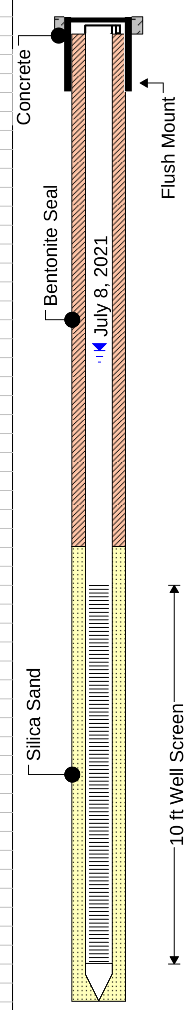
APPENDIX B – Borehole Logs

PROJECT: Wyndcliffe Caledon	**BH LOCATION:** Central West Boundary	**BOREHOLE NO: BH/MW-1**
PROJECT NO: 6069	**LOCATION:** 14245 Highway 50, Caledon ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

SAMPLE TYPE	SHELBY TUBE	CORE SAMPLE	SPT SAMPLE	GRAB SAMPLE	NO RECOVERY
BACKFILL TYPE	BENTONITE	PEA GRAVEL	SLOUGH	GROUT	DRILL CUTTINGS

DEPTH (ft)	DEPTH (m)	Soil Description	SAMPLE TYPE	SAMPLE NO	BLOWS / 150 mm	N Value
		Ground Surface				
0.0–2.5	0.0–0.76	Clay and organic matter Medium Brown, Dry	SPT		4,4,5,4	9
2.5–5.0		Silt and Clay Medium Brown, Dry	SPT		6,6,9,10	15
5.0–7.5			SPT		7,12,16,20	18
7.5–10.0			SPT		5,12,18,27	30
10.0–12.5		Silt and Clay Medium Brown, Dry	SPT		5,11,16,19	27
12.5–15.0		Silt and Clay Grey/Brown, Damp	SPT		5,7,12,15	19
15.0–17.5		Silt and Clay Grey, Damp	SPT		4,7,10,13	17
17.5–20.0			SPT		5,5,8,8	13
20.0–22.5		Silt and Clay Grey, Damp	SPT		3,3,7,9	10
22.5–25.0		Silt and Clay Grey, Moist	SPT		3,5,7,8	13
25.0–27.5		Silt and Clay Grey, Damp	SPT		4,4,6,10	10
27.5–30.0			SPT		4,5,8,9	13
30.0–			SPT		5,6,6,10	12

Monitoring Well



Notes

A & A ENVIRONMENTAL CONSULTANTS INC.
16 Young Street Woodstock, ON

LOGGED BY: J. Osborne	**COMPLETION DEPTH:** 60 Feet
REVIEWED BY: A. Rasoul	**DRILL METHOD:** SPT
DRILL DATE: May 25, 2021	**PAGE:** 1 of 2

PROJECT: Wyndcliffe Caledon	**BH LOCATION:** Central West Boundary	**BOREHOLE NO: BH/MW-1**
PROJECT NO: 6069	**LOCATION:** 14245 Highway 50, Caledon ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

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

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS

DEPTH (ft)	DEPTH (m)	Soil Description	SAMPLE NO	BLOWS / 150 mm	N Value / PPM	Monitoring Well	Notes
32.0					12		
33.0	10.0	Silt and Clay Grey, Moist		3,5,8,9	13		
34.0							
35.0							
36.0	11.0			2,4,5,6	9		
37.0							
38.0				5,5,6,9	11		
39.0	12.0						
40.0							
41.0				2,3,6,7	9		
42.0							
43.0	13.0			3,3,5,4	8		
44.0							
45.0							
46.0	14.0			0,2,4,3	6		
47.0							
48.0		Clayey Silt Grey, Damp		2,7,11,13	18		
49.0	15.0						
50.0		Clayey Silt Grey, Wet					
51.0				5,15,16,18	31		
52.0							
53.0	16.0	Clayey Silt Grey, Moist		6,10,14,21	24		
54.0		Clayey Silt Grey, Wet					
55.0							
56.0	17.0	Clayey Silt Grey, Moist		4,13,15,20	28		
57.0							
58.0		Clayey Silt Grey, Dry					
59.0	18.0			8,13,19,28	32		
60.0							
61.0		End of Log					
62.0	19.0	**Notes** Borehole completed at 60 Feet Monitoring well installed at 20.5					
63.0							

A&A ENVIRONMENTAL CONSULTANTS INC.
16 Young Street Woodstock, ON

LOGGED BY: J. Osborne	**COMPLETION DEPTH:** 60 Feet
REVIEWED BY: A. Rasoul	**DRILL METHOD:** SPT
DRILL DATE: May 25, 2021	**PAGE:** 1 of 2

PROJECT: Wyndcliffe Caledon	**BH LOCATION:** Northwest of sidewalk	**BOREHOLE NO: BH-4**
PROJECT NO: 6069	**LOCATION:** 14245 Highway 50, Caledon ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

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

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS

DEPTH (ft)	DEPTH (m)	Soil Description	SAMPLE TYPE	SAMPLE NO	BLOWS / 150 mm	N Value / PPM	Monitoring Well	Notes
0.0	0.0	Ground Surface						
0.0–1.0	0.0–0.3	Top Soil Damp			7,5,5,5	10	Concrete Flush Mount	
1.0–4.0	0.3–1.2	Silt and Clay Light Brown, Dry			5,5,7,10	13		
4.0–7.0	1.2–2.1				7,11,16,22	27		
7.0–10.0	2.1–3.0				6,11,18,21	21	Bentonite Seal	
10.0–13.0	3.0–4.0				4,10,17,23	27	July 8, 2021	
13.0–16.0	4.0–4.9	Silt and Clay Grey/Brown, Damp			4,9,10,13	19		
16.0–19.0	4.9–5.8				2,5,7,10	13		
19.0–22.0	5.8–6.7				5,20,22,24	42		
21.0–22.0	6.4–6.7				3,14,19,17	33		
22.0–23.0	6.7–7.0	Silt and Clay Grey, Moist			4,6,8,11	14	Silica Sand	
23.0–26.0	7.0–7.9				9,12,10,9	22	10 ft Well Screen	
27.0	8.0							

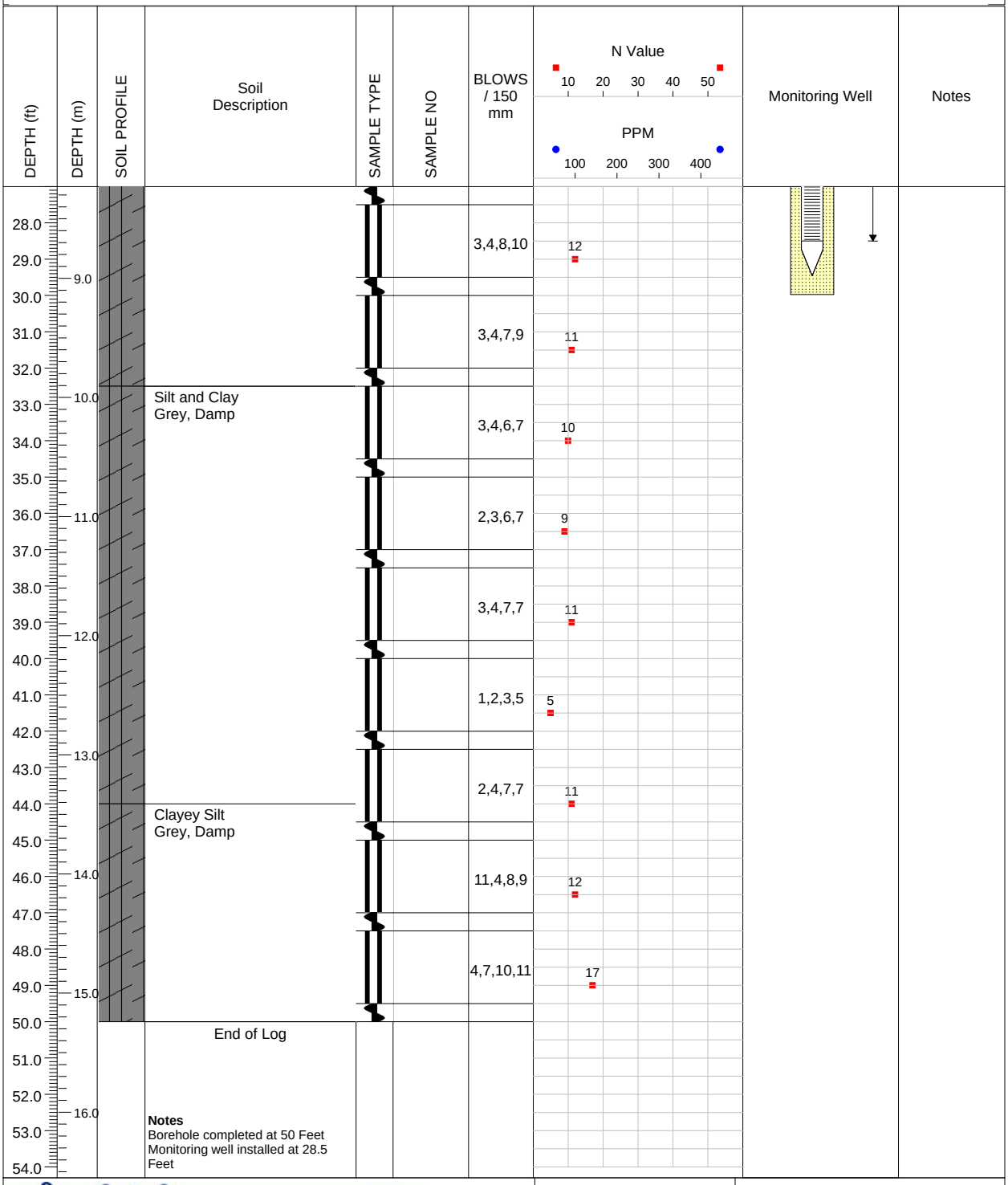
A&A ENVIRONMENTAL CONSULTANTS INC.
16 Young Street Woodstock, ON

LOGGED BY: J. Osborne	**COMPLETION DEPTH:** 50 Feet
REVIEWED BY: A. Rasoul	**DRILL METHOD:** SPT
DRILL DATE: May 27, 2021	**PAGE:** 1 of 2

PROJECT: Wyndcliffe Caledon	**BH LOCATION:** Northwest of sidewalk	**BOREHOLE NO: BH-4**
PROJECT NO: 6069	**LOCATION:** 14245 Highway 50, Caledon ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

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

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS



A&A ENVIRONMENTAL CONSULTANTS INC.
16 Young Street Woodstock, ON

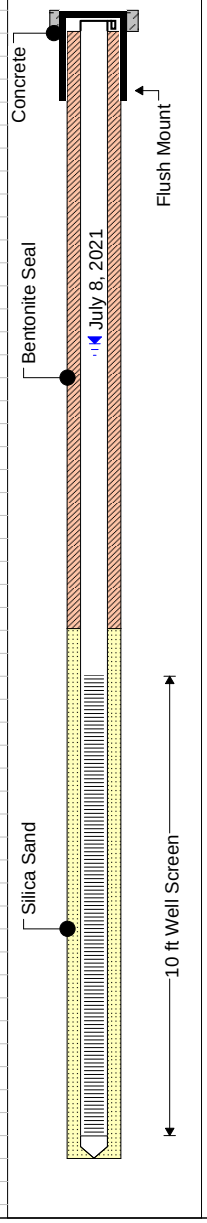
LOGGED BY: J. Osborne	**COMPLETION DEPTH:** 50 Feet
REVIEWED BY: A. Rasoul	**DRILL METHOD:** SPT
DRILL DATE: May 27, 2021	**PAGE:** 1 of 2

PROJECT: Wyndcliffe Caledon	**BH LOCATION:** Near northwest boundary of site	**BOREHOLE NO: BH/MW5**
PROJECT NO: 6069	**LOCATION:** 14245 Highway 50, Caledon ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

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

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS

DEPTH (ft)	DEPTH (m)	Soil Description	SAMPLE NO	BLOWS / 150 mm	N Value (10 20 30 40 50) / PPM (100 200 300 400)	Monitoring Well	Notes
0.0	0.0	Ground Surface					
0.0	0.0	Topsoil		3 2 2 4	4		
1.0		Silt and Clay Medium brown, some sand, damp.					
2.0							
3.0	1.0			2 3 5 9	8		
4.0							
5.0		Silt and Clay Medium brown, trace sand, damp.		3 7 11 17	18		
6.0	2.0						
7.0				4 9 13 18	22		
8.0							
9.0							
10.0	3.0	Silt and Clay Grey, wet.		5 9 14 12	23		
11.0							
12.0							
13.0	4.0			4 4 6 9	10		
14.0							
15.0				3 5 5 7	10		
16.0	5.0						
17.0							
18.0				2 3 4 6	7		
19.0							
20.0	6.0	Silt and Clay Grey, trace sand, wet.		3 4 5 8	9		
21.0							
22.0							
23.0	7.0			3 4 5 8	9		
24.0							
25.0		End of Log					
26.0							



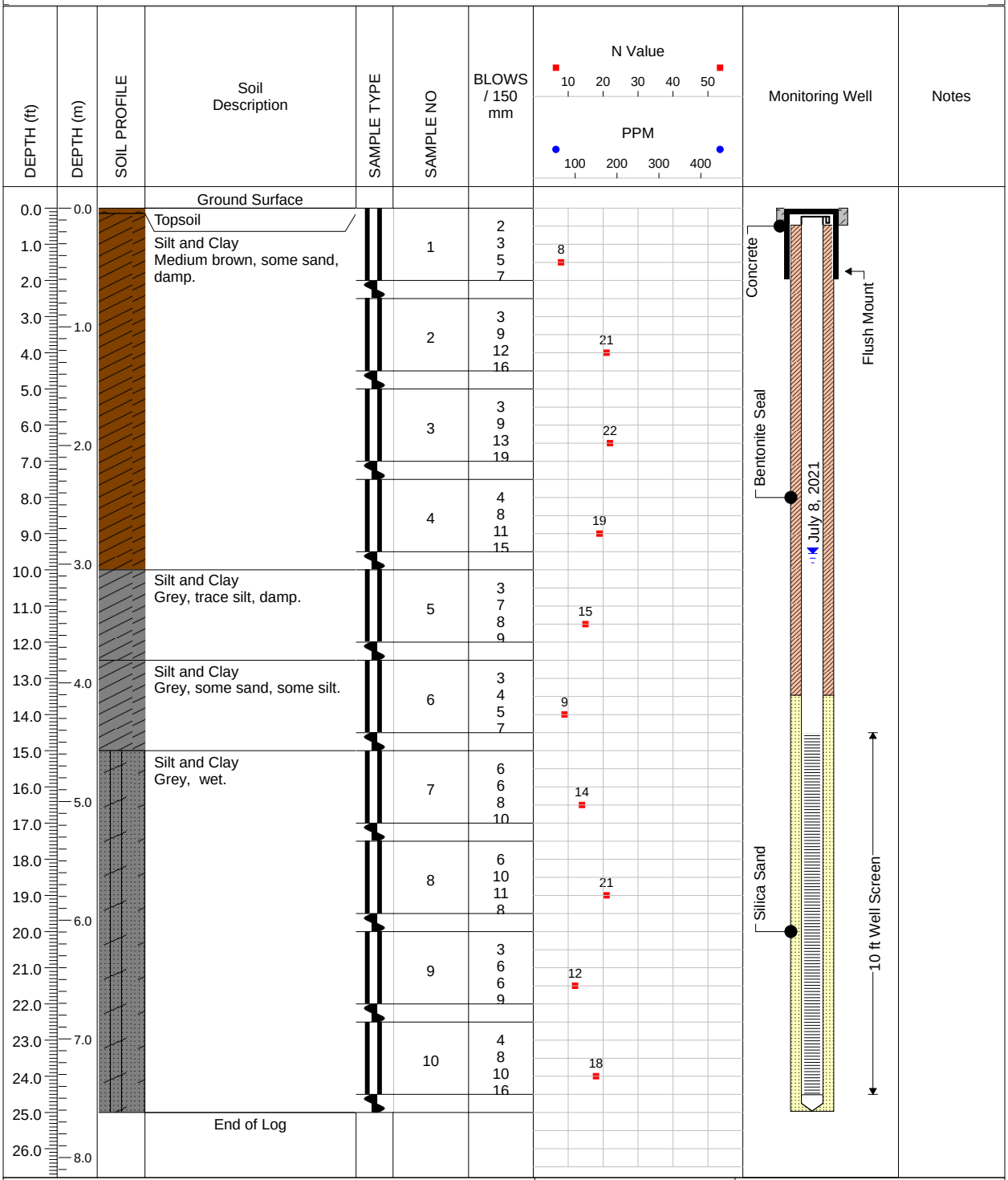
A&A ENVIRONMENTAL CONSULTANTS INC.
16 Young Street Woodstock, ON

LOGGED BY: J. Osborne	**COMPLETION DEPTH:** 25 Feet
REVIEWED BY: A. Rasoul	**DRILL METHOD:** SPT
DRILL DATE: May 31, 2021	**PAGE:** 1 of 1

PROJECT: Wyndcliffe Caledon	**BH LOCATION:** Northeast of HWY 50 entrance	**BOREHOLE NO: BH/MW7**
PROJECT NO: 6069	**LOCATION:** 14245 Highway 50, Caledon ON	
PROJECT MANAGER: T. Demers	**COMPANY NAME:** A&A Environmental Consultants Inc.	

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

BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS



A&A ENVIRONMENTAL CONSULTANTS INC.
16 Young Street Woodstock, ON

LOGGED BY: J. Osborne	**COMPLETION DEPTH:** 25 Feet
REVIEWED BY: A. Rasoul	**DRILL METHOD:** SPT
DRILL DATE: June 7, 2021	**PAGE:** 1 of 1

APPENDIX C – Certificate of Chemical Analysis

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC
16 Young Street
WOODSTOCK, ON N4S3L4
(519) 266-4680
ATTENTION TO: Ali Rasoul
PROJECT: 6069- Wyndcliffe Caledon
AGAT WORK ORDER: 21T772514
TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist
ULTRA TRACE REVIEWED BY: Marc Paquet, Director of Ultra-Trace and Toxicology
WATER ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
DATE REPORTED: Jul 29, 2021
PAGES (INCLUDING COVER): 14
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This report shall not be reproduced or distributed, in whole or in part, without the prior written consent of AGAT Laboratories.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the information contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

AGAT Laboratories

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CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

Peel Region Sanitary - Organics

DATE RECEIVED: 2021-07-09

DATE REPORTED: 2021-07-29

				Region of Peel Use Bylaw for
			SAMPLE DESCRIPTION:	Sanitary Sewers
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2021-07-09 08:30
Parameter	**Unit**	**G / S**	**RDL**	**2718967**
Oil and Grease (animal/vegetable) in water	mg/L	150	0.5	<0.5
Oil and Grease (mineral) in water	mg/L	15	0.5	<0.5
Methylene Chloride	mg/L	2	0.0003	<0.0003
Methyl Ethyl Ketone	mg/L	8.0	0.0009	<0.0009
cis-1,2-Dichloroethylene	mg/L	4	0.0002	<0.0002
Chloroform	mg/L	0.04	0.0002	<0.0002
Benzene	mg/L	0.01	0.0002	<0.0002
Trichloroethylene	mg/L	0.4	0.0002	<0.0002
Toluene	mg/L	0.27	0.0002	<0.0002
Tetrachloroethene	mg/L	1	0.0002	<0.0002
trans-1,3-Dichloropropene	mg/L	0.14	0.0003	<0.0003
Ethylbenzene	mg/L	0.16	0.0001	<0.0001
1,1,2,2-Tetrachloroethane	mg/L	1.4	0.0001	<0.0001
Styrene	mg/L	0.2	0.0001	<0.0001
1,2-Dichlorobenzene	mg/L	0.05	0.0001	<0.0001
1,4-Dichlorobenzene	mg/L	0.08	0.0001	<0.0001
m & p-Xylene	mg/L		0.0002	<0.0002
o-Xylene	mg/L		0.0001	<0.0001
Xylenes (Total)	mg/L	1.4	0.0001	<0.0001
PCBs	mg/L	0.001	0.0002	<0.0002
Di-n-butyl phthalate	mg/L	0.08	0.0005	<0.0005
Bis(2-Ethylhexyl)phthalate	mg/L	0.012	0.0005	<0.0005

Certified By: N Popnikolof

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
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Certificate of Analysis

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

Peel Region Sanitary - Organics

DATE RECEIVED: 2021-07-09

DATE REPORTED: 2021-07-29

			Region of Peel Use Bylaw for Sanitary Sewers	
		SAMPLE DESCRIPTION:		
		SAMPLE TYPE:	Water	
		DATE SAMPLED:	2021-07-09 08:30	
Surrogate	**Unit**	**Acceptable Limits**	**2718967**	
Toluene-d8	% Recovery	50-140	99	
4-Bromofluorobenzene	% Recovery	50-140	108	
Decachlorobiphenyl	%	50-140	74	
2,4,6-Tribromophenol	%	50-140	88	
2-Fluorophenol	%	50-140	105	
Chrysene-d12	%	50-140	96	
phenol-d6 surrogate	%	50-140	94	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Peel Sanitary By-Law 53-2010
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2718967 Oil and Grease animal/vegetable is a calculated parameter. The calculated value is the difference between Total O&G and Mineral O&G.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popnikolof

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
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Certificate of Analysis

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

Nonylphenol and Nonylphenol Ethoxylates (Ontario, mg/L)

DATE RECEIVED: 2021-07-09

DATE REPORTED: 2021-07-29

				Region of Peel Use Bylaw for Sanitary Sewers
SAMPLE DESCRIPTION:				
SAMPLE TYPE:				Water
DATE SAMPLED:				2021-07-09 08:30
Parameter	**Unit**	**G / S**	**RDL**	**2718967**
Total Nonylphenol	mg/L	0.001	0.001	<0.001
NP1EO	mg/L		0.001	<0.001
NP2EO	mg/L		0.0003	<0.0003
Total Nonylphenol Ethoxylates	mg/L	0.01	0.001	<0.001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CIty of Toronto Storm Sewer Discharge
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Montreal (unless marked by *)

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

CBOD5

DATE RECEIVED: 2021-07-09

DATE REPORTED: 2021-07-29

				Region of Peel Use Bylaw for Sanitary Sewers	
			SAMPLE DESCRIPTION:		
			SAMPLE TYPE:	Water	
			DATE SAMPLED:	2021-07-09 08:30	
Parameter	**Unit**	**G / S**	**RDL**	**2718967**	
Biochemical Oxygen Demand, Carbonaceous	mg/L		2.00	<2.00	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
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Certificate of Analysis

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

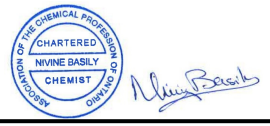
Peel Sanitary Sewer Use By-Law - Inorganics

DATE RECEIVED: 2021-07-09

DATE REPORTED: 2021-07-29

				Region of Peel Use Bylaw for Sanitary Sewers
SAMPLE DESCRIPTION:				
SAMPLE TYPE:				Water
DATE SAMPLED:				2021-07-09 08:30
Parameter	**Unit**	**G / S**	**RDL**	**2718967**
pH	pH Units	5.5-10	NA	8.04
Total Suspended Solids	mg/L	350	10	<10
Fluoride	mg/L	10	0.05	<0.05
Sulphate	mg/L	1500	0.10	133
Total Cyanide	mg/L	2	0.002	<0.002
Phenols	mg/L	1.0	0.002	<0.002
Total Phosphorus	mg/L	10	0.02	<0.02
Total Kjeldahl Nitrogen	mg/L	100	0.10	0.32
Total Aluminum	mg/L	50	0.010	0.124
Total Antimony	mg/L	5	0.020	<0.020
Total Arsenic	mg/L	1	0.015	<0.015
Total Cadmium	mg/L	0.7	0.010	<0.010
Total Chromium	mg/L	5	0.015	<0.015
Total Cobalt	mg/L	5	0.020	<0.020
Total Copper	mg/L	3	0.010	<0.010
Total Lead	mg/L	3	0.020	<0.020
Total Manganese	mg/L	5	0.020	0.056
Total Mercury	mg/L	0.01	0.0002	<0.0002
Total Molybdenum	mg/L	5	0.020	<0.020
Total Nickel	mg/L	3	0.015	<0.015
Total Selenium	mg/L	1	0.002	<0.002
Total Silver	mg/L	5	0.010	<0.010
Total Tin	mg/L	5	0.025	<0.025
Total Titanium	mg/L	5	0.020	<0.020
Total Zinc	mg/L	3	0.020	<0.020

Certified By:



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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

Peel Sanitary Sewer Use By-Law - Inorganics

DATE RECEIVED: 2021-07-09

DATE REPORTED: 2021-07-29

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Peel Sanitary By-Law 53-2010
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Quality Assurance

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

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SAMPLED BY:

Trace Organics Analysis

RPT Date: Jul 29, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Peel Region Sanitary - Organics															
Oil and Grease (animal/vegetable) in water	2710223		< 0.5	< 0.5	NA	< 0.5	92%	70%	130%	105%	70%	130%	106%	70%	130%
Oil and Grease (mineral) in water	2710223		< 0.5	< 0.5	NA	< 0.5	78%	70%	130%	83%	70%	130%	81%	70%	130%
Methylene Chloride	2709846		<0.0003	<0.0003	NA	< 0.0003	101%	50%	140%	95%	60%	130%	98%	50%	140%
Methyl Ethyl Ketone	2709846		<0.0009	<0.0009	NA	< 0.0009	111%	50%	140%	86%	50%	140%	90%	50%	140%
cis-1,2-Dichloroethylene	2709846		<0.0002	<0.0002	NA	< 0.0002	103%	50%	140%	101%	60%	130%	99%	50%	140%
Chloroform	2709846		<0.0002	<0.0002	NA	< 0.0002	111%	50%	140%	109%	60%	130%	116%	50%	140%
Benzene	2709846		<0.0002	<0.0002	NA	< 0.0002	89%	50%	140%	93%	60%	130%	104%	50%	140%
Trichloroethylene	2709846		<0.0002	<0.0002	NA	< 0.0002	111%	50%	140%	101%	60%	130%	100%	50%	140%
Toluene	2709846		<0.0002	<0.0002	NA	< 0.0002	117%	50%	140%	89%	60%	130%	99%	50%	140%
Tetrachloroethene	2709846		<0.0002	<0.0002	NA	< 0.0002	111%	50%	140%	86%	60%	130%	82%	50%	140%
trans-1,3-Dichloropropene	2709846		<0.0003	<0.0003	NA	< 0.0003	108%	50%	140%	97%	60%	130%	77%	50%	140%
Ethylbenzene	2709846		<0.0001	<0.0001	NA	< 0.0001	87%	50%	140%	87%	60%	130%	86%	50%	140%
1,1,2,2-Tetrachloroethane	2709846		<0.0001	<0.0001	NA	< 0.0001	99%	50%	140%	99%	60%	130%	91%	50%	140%
Styrene	2709846		<0.0001	<0.0001	NA	< 0.0001	90%	50%	140%	85%	60%	130%	100%	50%	140%
1,2-Dichlorobenzene	2709846		<0.0001	<0.0001	NA	< 0.0001	104%	50%	140%	113%	60%	130%	102%	50%	140%
1,4-Dichlorobenzene	2709846		<0.0001	<0.0001	NA	< 0.0001	94%	50%	140%	104%	60%	130%	84%	50%	140%
m & p-Xylene	2709846		<0.0002	<0.0002	NA	< 0.0002	102%	50%	140%	92%	60%	130%	95%	50%	140%
o-Xylene	2709846		<0.0001	<0.0001	NA	< 0.0001	103%	50%	140%	97%	60%	130%	83%	50%	140%
PCBs	2694858		< 0.0002	< 0.0002	NA	< 0.0002	98%	50%	140%	99%	50%	140%	100%	50%	140%
Di-n-butyl phthalate	2682230		< 0.0005	< 0.0005	NA	< 0.0005	96%	50%	140%	94%	50%	140%	73%	50%	140%
Bis(2-Ethylhexyl)phthalate	2682230		< 0.0005	< 0.0005	NA	< 0.0005	101%	50%	140%	96%	50%	140%	96%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

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Quality Assurance

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

Ultra Trace Analysis

RPT Date: Jul 29, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Nonylphenol and Nonylphenol Ethoxylates (Ontario, mg/L)															
Total Nonylphenol	1	2716907	< 0.001	< 0.001	NA	< 0.001	NA	60%	140%	88%	60%	140%	NA	60%	140%
NP1EO	1	2716907	< 0.001	< 0.001	NA	< 0.001	NA	60%	140%	75%	60%	140%	NA	60%	140%
NP2EO	1	2716907	< 0.0003	< 0.0003	NA	< 0.0003	NA	60%	140%	87%	60%	140%	NA	60%	140%

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SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Jul 29, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Peel Sanitary Sewer Use By-Law - Inorganics															
pH	2716433		8.39	8.36	0.4%	NA	102%	90%	110%						
Total Suspended Solids	2719995		<10	<10	NA	< 10	100%	80%	120%						
Fluoride	2710840		<0.05	<0.05	NA	< 0.05	106%	70%	130%	104%	80%	120%	108%	70%	130%
Sulphate	2710840		33.5	33.8	0.9%	< 0.10	103%	70%	130%	103%	80%	120%	103%	70%	130%
Total Cyanide	2718967	2718967	<0.002	<0.002	NA	< 0.002	99%	70%	130%	99%	80%	120%	102%	70%	130%
Phenols	2714468		<0.002	<0.002	NA	< 0.002	97%	90%	110%	110%	90%	110%	99%	80%	120%
Total Phosphorus	2718967	2718967	<0.02	<0.02	NA	< 0.02	100%	70%	130%	91%	80%	120%	96%	70%	130%
Total Kjeldahl Nitrogen	2710086		14.5	15.0	3.4%	< 0.10	100%	70%	130%	102%	80%	120%	NA	70%	130%
Total Aluminum	2713323		<0.010	<0.010	NA	< 0.010	97%	70%	130%	102%	80%	120%	99%	70%	130%
Total Antimony	2713323		<0.020	<0.020	NA	< 0.020	93%	70%	130%	97%	80%	120%	90%	70%	130%
Total Arsenic	2713323		<0.015	<0.015	NA	< 0.015	94%	70%	130%	101%	80%	120%	103%	70%	130%
Total Cadmium	2713323		<0.010	<0.010	NA	< 0.010	101%	70%	130%	105%	80%	120%	101%	70%	130%
Total Chromium	2713323		<0.015	<0.015	NA	< 0.015	101%	70%	130%	102%	80%	120%	98%	70%	130%
Total Cobalt	2713323		<0.020	<0.020	NA	< 0.020	96%	70%	130%	102%	80%	120%	96%	70%	130%
Total Copper	2713323		0.387	0.394	1.8%	< 0.010	98%	70%	130%	101%	80%	120%	100%	70%	130%
Total Lead	2713323		<0.020	<0.020	NA	< 0.020	101%	70%	130%	102%	80%	120%	98%	70%	130%
Total Manganese	2713323		<0.020	<0.020	NA	< 0.020	100%	70%	130%	106%	80%	120%	98%	70%	130%
Total Mercury	2716573		<0.0002	<0.0002	NA	< 0.0002	104%	70%	130%	100%	80%	120%	96%	70%	130%
Total Molybdenum	2713323		<0.020	<0.020	NA	< 0.020	107%	70%	130%	110%	80%	120%	105%	70%	130%
Total Nickel	2713323		<0.015	<0.015	NA	< 0.015	98%	70%	130%	102%	80%	120%	95%	70%	130%
Total Selenium	2713323		0.003	0.002	NA	< 0.002	99%	70%	130%	107%	80%	120%	104%	70%	130%
Total Silver	2713323		<0.010	<0.010	NA	< 0.010	95%	70%	130%	99%	80%	120%	93%	70%	130%
Total Tin	2713323		<0.025	<0.025	NA	< 0.025	98%	70%	130%	101%	80%	120%	100%	70%	130%
Total Titanium	2713323		<0.020	<0.020	NA	< 0.020	94%	70%	130%	96%	80%	120%	98%	70%	130%
Total Zinc	2713323		<0.020	0.021	NA	< 0.020	98%	70%	130%	109%	80%	120%	97%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

CBOD5

Biochemical Oxygen Demand, Carbonaceous	2727035		33	31	6.3%	< 2	87%	70%	130%						

Certified By:

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Method Summary

CLIENT NAME: A & A ENVIRONMENTAL CONSULTANTS INC

AGAT WORK ORDER: 21T772514

PROJECT: 6069- Wyndcliffe Caledon

ATTENTION TO: Ali Rasoul

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Oil and Grease (animal/vegetable) in water	VOL-91-5011	EPA SW-846 3510C & SM5520	BALANCE
Oil and Grease (mineral) in water	VOL-91-5011	EPA SW-846 3510C & SM 5520	BALANCE
Methylene Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis-1,2-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Tetrachloroethene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	CALCULATION
Toluene-d8	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
PCBs	ORG-91-5112	modified from EPA SW-846 3510C & 8082A	GC/ECD
Decachlorobiphenyl	ORG-91-5112	modified from EPA SW846 3510C & 8082A	GC/ECD
Di-n-butyl phthalate	ORG-91-5114	modified from EPA SW-846 3510C & 8270E	GC/MS
Bis(2-Ethylhexyl)phthalate	ORG-91-5114	modified from EPA SW-846 3510C & 8270E	GC/MS
2,4,6-Tribromophenol	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
2-Fluorophenol	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Chrysene-d12	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS

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SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
phenol-d6 surrogate	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Ultra Trace Analysis			
Total Nonylphenol	TOX-151-19003F	ASTM D7065-6	LCMSMS
NP1EO	TOX-151-19003F	ASTM D7065-6	LCMSMS
NP2EO	TOX-151-19003F	ASTM D7065-6	LCMSMS
Total Nonylphenol Ethoxylates	TOX-19003F	ASTM D7065-6	LCMSMS

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Biochemical Oxygen Demand, Carbonaceous	INOR-121-6023	SM 5210 B	INCUBATOR
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Total Suspended Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Total Cyanide	INOR-93-6051	modified from MOECC E3015; SM 4500-CN- A, B, & C	TECHNICON AUTO ANALYZER
Phenols	INOR-93-6072	modified from SM 5530 D	LACHAT FIA
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Total Aluminum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

AGAT Laboratories

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Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only
Work Order #: 21T772514
Cooler Quantity:
Arrival Temperatures: 7.1 7.0 8.3 / 5.3 5.1 5.0
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes: ice

Report Information:
Company: A & A Environmental Consultants Inc.
Contact: Dr. Ali Rasoul
Address: 16 Young St, Woodstock, ON
Phone: 519-266-4680 Fax: 519-266-3666
Reports to be sent to:
1. Email: arasoul@aaenvironmental.ca, vsowden@aaenvironmental.ca
2. Email: sscott@aaenvironmental.ca, tdemers@aaenvironmental.ca

Regulatory Requirements: ☐ No Regulatory Requirement
(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One): ☐Ind/Com ☐Res/Park ☐Agriculture
Soil Texture (Check One): ☐Coarse ☐Fine

☒ Sewer Use
☒ Sanitary ☐ Storm
Region: Peel (Indicate One)
☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☒ No

Report Guideline on *Certificate of Analysis* ☒ Yes ☐ No

Turnaround Time (TAT) Required:
Regular TAT ☒ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*
For 'Same Day' analysis, please contact your AGAT CPM

Project Information:
Project: 6069 - Wyndcliffe Caledon
Site Location: 14245 Hwy 50, Caledon
Sampled By: J. Osborne
AGAT Quote #: 368057 PO: 6069
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:
Bill To Same: Yes ☑ No ☐
Company:
Contact:
Address:
Email:

Sample Matrix Legend
B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N
Region of Peel Use By-law for Sanitary Sewers	7/9/21	8:30	22	GW		Y

O. Reg 153: Metals and Inorganics (☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (incl. Hydrides)); ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr^{6+} ☑ EC ☐ FOC ☐ Hg ☑ pH ☐ SAR; Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2; Volatiles: ☐ VOC ☐ BTEX ☐ THM

Field Filtered - Metals, Hg, CrVI	Full Metals Scan	Regulation/Custom Metals	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use	Metals Soil 93-101	Metals Water 93-196	CCME F1-F4/VOCs Soil 91-248	CCME F1-F4/VOCs Water 91-249	CCME F1-F4/ BTEX Water 91-205	Sieve & texture (75 Micron)
									X						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
J. Osborne	7/9/21	11:00	Brendan G	July 9/21	1225
Brendan G	July 9/21	345			

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N°:

Document ID: DIV-78-1511.015

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Date Issued: March 16, 2018

APPENDIX D – MECP Well Records

Water Well Records - Report #6069

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
CALEDON TOWN (ALBION CON 06 011	17 599960 4860448 W	1967-01 4305	6	FR 0179				4900324 () A	LOAM 0002 BRWN CLAY 0012 GREY CLAY 0131 GREY CLAY STNS 0179 GREY SILT 0188 GREY CLAY 0240
									1
CALEDON TOWN (ALBION CON 07 012	17 599915 4860773 W	1978-10 3108	6	UK 0140	69/130/20/3:0	DO	0145 3	4905679 ()	BRWN CLAY 0014 BLUE GRVL CLAY HARD 0082 BLUE CLAY 0137 BRWN SAND 0148
CALEDON TOWN (ALBION CON 06 012	17 599715 4860723 W	1969-04 1413	5	FR 0150	45/140/6/2:0	DO	0146 4	4903224 ()	BRWN CLAY 0025 BLUE CLAY 0105 BLUE CLAY SILT 0143 RED MSND GRVL 0150
CALEDON TOWN (ALBION CON 06 011	17 600040 4860503 W	1961-02 1413	5	FR 0174	78/160/3/2:0	DO	0170 4	4900323 ()	BLUE CLAY 0120 CLAY SILT 0165 FSND 0169 CSND GRVL 0174
									DO 3
CALEDON TOWN (ALBION CON 06 011	17 600144 4860343 W	1985-05 3108	6	FR 0150	85/145/30/3:0	DO IR	0151 10	4906317 ()	BRWN CLAY DNSE 0014 BLUE CLAY 0065 BLUE CLAY SNDY DNSE 0102 BLUE CLAY 0137 STNS GRVL CLAY 0147 SAND 0158 CGVL SAND 0161
									DO IR 1
CALEDON TOWN (ALBION	17 600043 4860573 W	2011-05 7295	1.79	UT 0015		MO	0012 10	7164920 (Z128945) A113824	YLLW SAND 0005 GREN CLAY 0015 GREN SILT 0020 GREN SILT WBRG 0022
									MO 1
CALEDON TOWN (ALBION CON 07 012	17 600014 4861031 W	2011-09 4011	49.2		6///:	OT		7169000 (Z134783) A	
CALEDON TOWN (ALBION CON 07 013	17 599976 4861004 W	2011-08 4011			4///:	OT		7168998 (Z134782) A	
									OT 2

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
CALEDON TOWN (ALBION CON 06 011	17 599934 4860568 W	1967-08 4305	5	FR 0257	91/98/15/2:0	PS	0257 5	4900325 ()	LOAM 0002 BRWN CLAY 0012 GREY CLAY STNS 0251 CSND CLAY 0262
									PS 1
CALEDON TOWN (ALBION CON 07 011	17 600316 4860511 W	1967-01 1622	4	FR 0180	113/153/8/8:0	ST DO	0183 4	4900386 ()	BRWN CLAY MSND 0060 BLUE CLAY 0110 HPAN GRVL 0160 BLUE CLAY 0180 MSND 0187
CALEDON TOWN (ALBION CON 07 011	17 600256 4860508 W	1963-11 1622	4	FR 0158	120/160/5/8:0	ST DO	0158 4	4900385 ()	YLLW CLAY 0007 BLUE CLAY 0108 FSND 0158 CSND 0162
									ST DO 2

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION

Total Wells: 11

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		

APPENDIX E – Water Balance Calculation

	Area (m^2)	Infiltration Factors				Precipitation Data		Calculated	
		Topography	Soil	Cover	Accumulative Infiltration Factors	P	E	I	R
						(mm/y)	(mm/y)	(mm/y)	(mm/y)
						(m^3/y)	(m^3/y)	(m^3/y)	(m^3/y)
Pre-development									
Impervious Area	0					859	172	0	687
						0.0	0.0	0.0	0.0
Pervious Area	33700	0.2	0.2	0.1	0.5	859	520	169.5	169.5
		(Flat)	(Sandy Silt)			28948.3	17524.0	5712.2	5712.2

Inputs	m^3/year	Outputs	m^3/year
Total Precipitation	28948.3	Total Evapotranspiration	17524.0
		Total Infiltration	5712.2
		Total Runoff	5712.2
Total	28948.3	Total	28948.3
Difference (Inputs-Outputs)		0	

Post Development									
Impervious Area	26960					859	172	0	687
						23158.6	4631.7	0.0	18526.9
Pervious Area	6740	0.2	0.2	0.1	0.5	859	520	169.5	169.5
		(Flat)	(Sandy Silt)			5789.7	3504.8	1142.4	1142.4

Inputs	m^3/year	Outputs	m^3/year
Total Precipitation	28948.3	Total Evapotranspiration	8136.5
		Total Infiltration	1142.4
		Total Runoff	19669.3
Total	28948.3	Total	28948.3
Difference (Inputs-Outputs)		0	

Developmental Impacts	Infiltration	Runoff
Sub-Total Post-Development (m^3/year)	1142.4	19669.3
Impacts from Pre to Post Development (m^3/year)	-4569.7	13957.2
Low-Impact Development (LID) - Design	13957.1	
Impacts from Pre to Post Development with LID (m^3/year)	15099.6	5712.2