November 21, 2024

Engtec Consulting Inc.
2447 Anson Drive
Mississauga, ON
L5S 1G1

Attn: Annie Shah

Re: Construction Dewatering Assessment
Temporary Construction Dewatering
York Region North Roads Operations Centre
3525 Baseline Road
Sutton, Ontario
Project 10347

Hydrogeology Consulting Services Inc. (HCS) was retained by Engtec Consulting Inc. to prepare construction dewatering calculations for the above-referenced project. The construction dewatering calculations below contemplate servicing trenches for the proposed expansion of the Operations Centre facility, and a second stormwater management (SWM) pond proposed for the property.

Previous investigation of the site includes a Hydrogeological Assessment Report (Harden Environmental Services Limited, September 2022), with three monitoring wells (installed previously as part of a geotechnical investigation (Sola Engineering Inc., August 2021)) developed, slug tested, and chemistry sampled to assess groundwater conditions. Copies of the borehole logs are attached.

It is important to consider the 2022 hydrogeological assessment report (the Harden Report) provides details regarding regional and on-site stratigraphic and groundwater conditions, and this construction dewatering assessment report is not intended to represent a comprehensive hydrogeological investigation. This report relies on the hydrogeological and other site-level information included in the Harden Report for the construction dewatering calculations provided below.

The Harden Report also provides construction dewatering calculations for expansion of the existing McMinnows pond on the subject property – these calculations have not been modified.

1. PROPOSED WATER TAKING

As part of the proposed construction shown on the attached Figures 1 and 2 (Drawings C-03 and C-08, GEC Architecture, September 2024), temporary dewatering will be required for excavations to support the enlargement of McMinnows pond (as contemplated in the Harden Report); construction of a new SWM pond at Baseline Road; construction of building foundations; and construction of servicing trenches, oil-grit separators (OGS), catchbasins, storm sewers, sanitary sewers, and watermains. During construction the dewatering system will be operating 24 hours per day to maintain a dry working area.

2. MEASURED GROUNDWATER LEVELS

Per the Harden Report, on August 19, 2021 and July 19, 2022, the groundwater level observations listed in Table 1 below were reported. Subsequently a groundwater measurement was obtained from monitoring well BH 3 on September 13, 2024 during installation of an electronic pressure transducer (datalogger):

Table 1: Observed Groundwater Levels:

Location	Observed Depth to Groundwater (mBGS)			Groundwater Elevation (mASL)		
	19-Aug-2021	19-Jul-2022	13-Sept-2024	19-Aug-2021	19-Jul-2022	13-Sept-2024
BH 1	1.43	1.06	--	249.07	249.44	--
BH 2	0.95	0.80	--	251.55	251.70	--
BH 3	1.12	0.93	1.25	252.28	252.48	252.15

mBGS – metres below ground surface
mASL – metres above sea level

3. SOIL HYDRAULIC CONDUCTIVITY

3.1 Slug Test Results

As described in the Harden Report, hydraulic conductivity estimates for the overburden soils were determined using single response hydraulic (slug) tests of the saturated soils screened by monitoring wells BH 1 and BH 3.

Graphical analyses of the slug tests are attached, and the hydraulic conductivity estimates are listed in Table 2 below:

Table 2: Estimated Soil Hydraulic Conductivity – Slug Tests

Borehole Name	Screened Interval (mBGS)	Hydraulic Conductivity (m/sec)
BH 1	2.3-3.8	4.1×10^{-7}
BH 3	2.3-3.8	2.2×10^{-6}

The hydraulic conductivity values of 4.1×10^{-7} to 2.2×10^{-6} m/sec indicate a low to moderately low hydraulic conductivity for the screened clayey silt till and sandy silt till overburden deposits.

3.2 Grain Size Analysis Results

As described in the Sola Engineering Inc. 2021 Geotechnical Investigation Report (the Sola Report), samples of subsurface soil collected from boreholes BH 1 and BH 3 were submitted to the Sola Engineering Inc. laboratory facilities for analysis of particle size distribution (grain size). The attached grain size analysis results were used to estimate soil hydraulic conductivity (K) values by applying the Kaubisch, Breyer, Hazen, and Kozeny-Carman formulae where appropriate based on the limitations of each formula. Where a D10 value was not available due to the high percentage of fine-grained material in the sample, the hydraulic conductivity has been estimated.

The hydraulic conductivity estimates are summarized in Table 3 below.

Table 3: Estimated Soil Hydraulic Conductivity – Grain Size Analysis

Name	Soil Sample Depth or Screened Interval (mBGS)	Soil Type	Analysis Method	Hydraulic Conductivity (m/sec)
BH 1	2.3-3.8	Clayey Silt Till, trace gravel	Kaubisch	1.5×10^{-8}
BH 3	2.3-3.8	Sandy Silt Till, trace gravel, trace clay	Kaubisch	$<1 \times 10^{-8}$

mBGS - metres Below Ground Surface
m/sec - metres per second

Hydraulic conductivity estimates for the clayey-sandy silt till overburden deposits varied from <1 x 10^{-8} – 1.5 x 10^{-8} m/sec, indicating a low permeability. Results from the grain size analysis correlate relatively well with the hydraulic conductivities estimated from the slug tests, with both indicating a relatively low permeability for the till overburden.

The hydraulic conductivity estimates from both slug tests and grain size analyses generally correlate reasonably well with published ranges for major soil types (Freeze and Cherry, 1979).

4. GROUNDWATER CHEMISTRY ANALYSIS RESULTS

Per the Harden Report, on July 19, 2022 water chemistry samples were obtained from monitoring well BH 1. The samples were collected in the appropriate containers, stored in a cooler, and delivered to AGAT Laboratories in Mississauga, Ontario for analysis of York Region Storm Sewer By-Law parameters.

4.1 York Region Storm Sewer Use By-Law

As shown on the attached COA, the samples exhibited exceedances of the York Region Storm Sewer Use By-Law criteria limits for the following parameters:

- Total Suspended Solids (TSS)
- Total Manganese
- Phenols

It is important to consider the water chemistry sample was were obtained using inertial valves (Waterra) and tubing. The method of water collection inherently results in the inclusion of sediments into the water sample, thereby increasing concentrations of parameters such as colour, turbidity, total suspended solids, total dissolved solids, and total metals where metals are adsorbed onto soil particles. Water chemistry samples analyzed for Total Metals were not filtered during or after collection.

Additionally, it is important to consider that the 4AAP laboratory analysis for Phenols detects a wide variety of naturally occurring organic substances, along with the chemical Phenol (C_6H_5OH). Measured exceedances of “Phenols” may not be indicative of a contamination issue, but rather groundwater that is influenced by natural environmental factors

4.1.1 Discharge to Municipal Storm Sewers

Based on the analysis results, discharge to municipal storm sewers may require treatment such as settling tanks with flocculation and/or mechanical filtration (e.g. using filter bags) to reduce TSS and metals concentrations to acceptable concentrations. Resolution of Phenol exceedances if they persist will require more specialized treatment.

4.2 Provincial Water Quality Objectives

For the parameters analyzed in the attached COA, the samples exhibited exceedances of the Provincial Water Quality Objectives (PWQO) for the following parameters:

- Phenols

As noted above, it is important to consider that the 4AAP laboratory analysis for Phenols detects a wide variety of naturally occurring organic substances, along with the chemical Phenol (C_6H_5OH). Measured exceedances of "Phenols" may not be indicative of a contamination issue, but rather groundwater that is influenced by natural environmental factors

4.2.1 Discharge to Ground Surface or the Natural Environment

Based on the analysis results, discharge to the ground surface or the natural environment (such as the drainage ditch along Baseline Road) may require treatment such as settling tanks with flocculation and/or mechanical filtration (e.g. using filter bags) to reduce Turbidity to acceptable concentrations. Resolution of Phenol exceedances if they persist will require more specialized treatment.

5. CONSTRUCTION DEWATERING CALCULATIONS

Based on excavation locations, dimensions, and depths provided for this report, construction of the Baseline Road SWM pond, building foundations, and the servicing trenches within the study area shown on the attached Figures 1 and 2 will require construction dewatering to lower the groundwater table within the excavations to maintain a dry excavation base and sidewalls.

Temporary dewatering requirements are dependent on factors such as excavation parameters (excavation dimensions, infrastructure invert elevations, the number of concurrent excavations, etc.), hydrogeological conditions at the site (groundwater levels, soil/bedrock hydrogeological parameters, etc.), construction and dewatering methodologies (open cuts, dewatering pits, sumps, wellpoints, etc.), and the amount of groundwater drawdown required to achieve and maintain dry working conditions and stable excavations.

Additionally, factors such as the use of shoring would be expected to influence the rate of groundwater inflow into the excavation. The calculations provided below assume open excavations as a conservative factor of safety.

It is important to note that the dewatering contractor retained to perform construction dewatering is solely responsible for achieving and maintaining dry working conditions at the site at all times. The calculations and dewatering rates/volumes provided below are not directives for a dewatering contractor, and the dewatering contractor must review the information, calculations, and recommendations provided as part of their own assessment of dewatering requirements to determine appropriate methodologies and designs for their construction dewatering project.

5.1 Excavation Requirements and Temporary Construction Dewatering Assumptions

During the construction project dewatering operations are expected to take place twenty-four hours per day to maintain a dry excavation. Dewatering calculations include a number of variables such as the static groundwater level, soil hydraulic conductivity, aquifer thickness, confined aquifer conditions, etc. that can be adjusted to provide conservative buffers to account for conditions beyond those encountered in the available monitoring wells.

Based on the proposed excavation depth elevations provided by GEC Architecture on the appended Figures 1 and 2, Table 4 below summarizes the preliminary excavation requirements for the Baseline Road SWM pond, building foundations, and for the servicing trenches.

It is understood all electrical conduits will be installed within the servicing trenches at elevations above the servicing trench invert elevations.

PLEASE NOTE: It is important to consider the dewatering calculations below assume the total lengths of stormwater servicing (approximately 270 m) and sanitary servicing (approximately 188 m) will not be excavated concurrently. The calculations below have assumed typical servicing trench excavation will comprise a 20 m segment of open trench being actively dewatered, a 20 m segment of trench "in front" of the open trench being pre-dewatered prior to excavation, and a 10 m segment "behind" the open trench maintained in a dewatered state to facilitate connection to the installed servicing. The total servicing trench dewatering length of 50 m is a critical component of the dewatering calculations, and if alternate dewatering strategies are proposed revision of the dewatering calculations will be necessary. For the purposes of the construction dewatering assessment a 50 m section of trench at the deepest invert elevation has been assumed.

Additionally, Table 4 includes the following buffers as factors of safety:

- A buffer of 2 m (assumed, although the exact buffer shall be determined during the construction design phases with the shoring engineer, and accounting for property limits) for all excavation widths and lengths to account for an excavation large enough to accommodate working around the perimeter;

- A buffer of 1 m for the excavation invert depth to ensure groundwater is drawn down 1 m below the base of the excavation to maintain a dry work surface.

- "Squared off" excavation shapes to account for excavation dimension adjustments during the construction process.

- A buffer of 0.5 m for the depth to groundwater (the highest measured groundwater elevation from the monitoring wells on site, increased by 0.5 m) to account for seasonal fluctuations.

Table 4: Preliminary Excavation Requirements

Excavation	Excavation Length (m) (+2 m)	Excavation Width (m) (+2 m)	Excavation Depth (mBGS) (-1 m)	GW Depth (mBGS) (+0.5 m)
Baseline SWM Pond	75	55.7	2.4	0.3
Building Foundations	63.7	43.9	2.2	0.3
Servicing Trenches (50 m total dewatering length)	52	4	2.6	0.3

It is important to note the dewatering calculations included in this report are based on the information provided to HCS as outlined above. In the event design parameters (e.g. excavation footprint, excavation depth, servicing trench depths, etc.) are modified the dewatering calculations provided will also need to be updated.

5.1.1 Concurrent Dewatering Tasks

The following concurrent tasks are contemplated for construction dewatering:

- Excavation of the entire Baseline SWM pond footprint;
- Excavation of the entire McMinnows Pond expansion footprint (as calculated by Harden Environmental);
- Excavation of the building foundations; and,
- Dewatering of a 50 m length of servicing trench.

5.1.2 Dewatering Assumptions

Dewatering calculations have been prepared based on the following assumptions to account for variability in soil, bedrock, and groundwater conditions:

- A soil hydraulic conductivity of 2.2 x 10^{-6} m/sec for the underground excavations (the highest hydraulic conductivity measured in the on-site well slug tests and grain size samples).
- An initial saturated aquifer thickness of 10 m, based on Ministry of the Environment, Conservation, and Parks (MECP) Well Records in the vicinity of the study area;
- An initial groundwater elevation corresponding to the highest measured/observed groundwater elevation from monitoring wells/boreholes along each section, increased by 0.5 m to account for seasonal variation.

5.2 Dewatering Calculations

5.2.1 Stormwater Pond Dewatering Calculations

To estimate the steady-state dewatering flow rate needed to maintain dry conditions in the excavation for the SWM pond, the following equation (for radial flow to an unconfined aquifer) from Powers (2007)[1] was used:

$$Q = \frac{\pi K\left(H^2 - {h_w}^2\right)}{\ln\left(\frac{R_o}{r_e}\right)}$$

Where:

Q = Flow Rate (m^3/sec)

H = Initial Saturated Thickness (Piezometric Head) of Aquifer (m)

h_w = Dewatered Saturated Thickness (Piezometric Head) of Aquifer (m)

K = Soil Hydraulic Conductivity (m/sec)

r_e = Effective radius, $r_e = \sqrt{(excavation\ area/\pi)}$ (m)

R_o = Radius of influence, $R_o = 3000*(H-h_w)*\sqrt{K}$ (m)

Where R_o is very close to r_e or less than r_e, to avoid $\ln\left(\frac{R_o}{r_e}\right)$ resulting in a very small or negative number R_o is replaced with ($R_o + r_e$) in the formula above, which gives a reasonable estimate of the dewatering requirements.

Using the assumptions listed in Section 4.1 and its subsections, the steady-state inflow rate and radius of influence listed in Table 5 below were estimated.

Table 5: SWM Pond Steady-State Dewatering Requirements

Excavation	Daily Dewatering Rate (L/day)	Radius of Influence (m)
Baseline SWM Pond	98,400	9.3

[1] Powers, P.J. et al. 2007. Construction Dewatering and Groundwater Control: New Methods and Applications. Wiley.

5.2.2 Building Foundation Dewatering Calculations

To estimate the steady-state dewatering flow rate needed to maintain dry conditions in the excavation for the building foundations, the following equation (for radial flow to an unconfined aquifer) from Powers (2007)[2] was used:

$$Q = \frac{\pi K\left(H^2 - {h_w}^2\right)}{\ln\left(\frac{R_o}{r_e}\right)}$$

Where:

Q = Flow Rate (m^3/sec)

H = Initial Saturated Thickness (Piezometric Head) of Aquifer (m)

h_w = Dewatered Saturated Thickness (Piezometric Head) of Aquifer (m)

K = Soil Hydraulic Conductivity (m/sec)

r_e = Effective radius, $r_e = \sqrt{(excavation\ area/\pi)}$ (m)

R_o = Radius of influence, $R_o = 3000*(H-h_w)*\sqrt{K}$ (m)

Where R_o is very close to r_e or less than r_e, to avoid $\ln\left(\frac{R_o}{r_e}\right)$ resulting in a very small or negative number R_o is replaced with ($R_o + r_e$) in the formula above, which gives a reasonable estimate of the dewatering requirements.

Using the assumptions listed in Section 4.1 and its subsections, the steady-state inflow rate and radius of influence listed in Table 5 below were estimated.

Table 5: SWM Pond Steady-State Dewatering Requirements

Excavation	Daily Dewatering Rate (L/day)	Radius of Influence (m)
Building Foundations	82,300	8.5

[2] **Powers, P.J. et al. 2007. Construction Dewatering and Groundwater Control: New Methods and Applications. Wiley.**

5.2.3 Servicing Trench Dewatering Calculations

To estimate the steady-state dewatering flow rate needed to maintain dry conditions within a 50 m length of servicing trench excavation, the following equation (for unconfined aquifer flow from a line source to a trench, plus the ends of the trench) from Powers (2007)[3] was used:

$$Q = \frac{\pi K\left(H^2 - {h_w}^2\right)}{\ln\left(\frac{R_o}{r_e}\right)} + 2\left[\frac{xK\left(H^2 - {h_w}^2\right)}{2L}\right]$$

Where:

Q = Flow Rate (m^3/sec)

H = Initial Saturated Thickness (Piezometric Head) of Aquifer (m)

h_w = Dewatered Saturated Thickness (Piezometric Head) of Aquifer (m)

K = Soil Hydraulic Conductivity (m/sec)

r_e = Effective radius, $r_e = \sqrt{(excavation\ area/\pi)}$ (m)

R_o = Radius of influence, $R_o = 3000*(H-h_w)*\sqrt{K}$ (m)

x = Trench Length (m)

2L = R_o (per Powers et al, a line source can be described as having a similar effect on dewatering volume as a circular source at twice the distance (L) from the centre of pumping)

Where R_o is very close to r_e or less than r_e, to avoid $\ln\left(\frac{R_o}{r_e}\right)$ resulting in a very small or negative number R_o is replaced with (R_o + r_e) in the formula above, which gives a reasonable estimate of the dewatering requirements.

Using the assumptions listed in Section 4.1 and its subsections, the steady-state inflow rate and radius of influence listed in Table 6 below were estimated.

Table 6: Servicing Trench Steady-State Dewatering Requirements

Excavation	Daily Dewatering Rate (L/day)	Radius of Influence (m)
Servicing Trenches (50 m total dewatering length)	184,635	10.2

[3] **Powers, P.J. et al. 2007. Construction Dewatering and Groundwater Control: New Methods and Applications. Wiley.**

5.2.4 Calculated Dewatering Rates, With Factors of Safety

It is important to consider that dewatering requirements will be highest at the start of the dewatering process when the volume of water stored within the pore spaces of the soil and/or within the bedrock fracture matrix must be extracted. This storage must be accounted for to allow for rapid achievement of drawdown targets.

Initial drawdown of the overburden soils within a short period of time would be expected to require additional pumping capacity. An initial drawdown requirement has been calculated assuming a surcharge of 100% of the estimated steady state dewatering rate.

Additionally, where a PTTW is required dewatering of precipitation inflow must also be accounted for. For the purposes of this assessment a precipitation event of 100 mm pumped out within 24 hours has been assumed.

While it is important to consider that during and after precipitation events significantly higher dewatering flow rates may be required to account for direct precipitation and surficial runoff falling into an excavation; recent changes to Ontario Regulation 63/16 mandate that stormwater does not need to be counted as part of the daily dewatering limit

Table 7 below provides a summary of the calculated dewatering rates and factors of safety for the excavation.

Table 7 – Calculated Maximum Total Dewatering Rate including Factors of Safety

	Steady State Dewatering (L/day)	**Initial Drawdown Surcharge (L/day)**	**Potential Maximum Total Dewatering Requirement (L/day)**	**Precipitation Surcharge (L/day)**
Baseline SWM Pond	98,400	98,400	196,800	417,750
Building Foundations	82,300	82,300	164,600	279,640
Servicing Trenches (50 m total dewatering length)	184,635	184,635	390,070	20,800
McMinnows SWM Pond Expansion (*from Harden Environmental*)	92,600	185,200	322,800	45,000

COMBINED POTENTIAL MAXIMUM TOTAL DEWATERING REQUIREMENT:	**1,074,270 L/day + 763,190 L/day precipitation = 1,837,460 L/day**

The totals shown in Table 7 indicate a potential maximum dewatering requirement of up to:

- 196,800 L/day for dewatering of the Baseline Pond excavation footprint;
- 164,600 L/day for dewatering of the building foundations;
- 390,070 L/day for dewatering of 50 m (total) trench excavation;
- 322,800 L/day for dewatering of the McMinnows Pond excavation.
- Plus precipitation dewatering totaling 763,190 L/day for the various excavations.

It is important to note several individual dewatering tasks have an individual total maximum dewatering rate (groundwater plus precipitation) above 400,000 L/day; therefore, a PTTW will be required.

Additionally, monitoring to ensure discharge meets PWQO parameters prior to being routed to the nearby drainage ditch will be required.

While the conservative assumptions and factors of safety discussed in the preceding sections combine to create very conservative dewatering calculations, it is important to consider the variable nature of the overburden aquifer.

The potential maximum dewatering requirements outlined above are reasonable based on the information available; however, less-conservative assumptions of total dewatering requirements (e.g. lower average soil hydraulic conductivity value, smaller saturated aquifer thickness, etc.) would be expected to decrease the estimated total dewatering requirement. The client, the construction contractor, and the dewatering contractor shall review the dewatering calculations provided above and make their own determinations regarding the potential maximum daily dewatering requirements for the project, and regarding potential sequencing of the construction excavations to manage total dewatering requirements.

6. PERMIT REQUIREMENTS AND DEWATERING DISCHARGE

Ontario Regulation 387/04 requires authorization from the Ministry of the Environment, Conservation, and Parks (MECP) for all water takings over 50,000 L/day. Ontario Regulation 63/16 specifies that for temporary construction dewatering at rates between 50,000 and 400,000 L/day an Environmental Activity and Sector Registry (EASR) may be obtained in lieu of a Permit to Take Water (PTTW). Dewatering at rates of more than 400,000 L/day require a PTTW to authorize groundwater withdrawal.

As shown in Section 4.2.1, combined construction dewatering requirements for groundwater and precipitation would be expected to require a maximum daily dewatering rate exceeding 400,000 L/day. As a result, a PTTW will be required to support construction dewatering tasks.

6.1 Dewatering Discharge

It is expected that dewatering discharge will be directed to the drainage ditch along the northern property boundary.

As discussed in Section 2.1, groundwater chemistry samples exhibited exceedances of the PWQO criteria limit for “Phenols”; however, follow-up testing will be necessary to confirm whether the Phenols are naturally occurring background parameters or a contaminant. Discharge treatment and mitigation measures will need to be developed and potentially implemented to permit discharging to the drainage ditch.

Section 7 below discusses mitigation measures that will need to be implemented to permit discharging to drainage ditches.

It is noted based on the calculated steady-state dewatering rates collection of discharge for disposal by a licensed hauler would likely not be a possibility for the project; however, the client and their dewatering contractor could evaluate the potential benefits of haulage vs. discharge to drainage ditches as part of the overall construction dewatering strategy.

7. POTENTIAL IMPACTS OF CONSTRUCTION DEWATERING

7.1 Municipal Supply Wells and Surface Water Intakes

Ontario Source Protection Information Atlas (OSPIA) mapping shows the study area does not lie within a municipal Wellhead Protection Area (WHPA) or municipal surface water Intake Protection Zone (IPZ). As a result, no impacts to municipal water supplies from the proposed construction dewatering are anticipated.

7.2 Sensitive Features

OSPIA mapping shows the study area does not lie within a Significant Groundwater Recharge Area (SGRA) or within a Highly Vulnerable Aquifer (HVA) area. As all construction dewatering discharge would be required to meet the appropriate PWQO criteria limits prior to discharge, and dewatering of the shallow subsurface soils will only occur during the construction period, it is anticipated that routing dewatering discharge to the drainage ditch would not result in negative impacts to surface water quality.

7.3 Private Supply Wells

Well Records from the MECP WWR Database were reviewed to determine the number of supply wells present. According to the MECP WWR database, twelve wells are located within an approximate radius of 500 m from the subject property. A copy of the MECP water well records is appended.

Of the twelve wells, one is an abandonment record, and three are monitoring wells. These records have been excluded from further consideration.

Three of the wells are completed in bedrock at depths of 74.1 to 79.6 mBGS. Five of the wells are completed in overburden deposits at depths of 11 to 27.4 mBGS; however, four of the overburden wells are completed at depths greater than 24.7 m.

The four deep overburden wells and the three bedrock wells are completed in aquifer formations that are isolated from the near surface soils by vertically extensive aquitard deposits and would not be expected to be impacted by temporary construction dewatering.

The well record (#6904898) for the one shallow dug well is plotted approximately 387 m west of the subject property, well beyond the calculated radius of influence of construction dewatering. Additionally, the hand-written sketch on the well record shows the well located on Highway 12 west of 6th Line, and not on Baseline Road (Highway 8A) west of Kennedy Road (3rd Line). Based on this information, it is concluded the shallow dug well would not be impacted by temporary construction dewatering.

7.4 Surface Water Features

There are no surface water features on the subject property. The closest surface water features identified by OSPIA and Lake Simcoe Region Conservation Authority (LSRCA) mapping are wetlands on the north side of Baseline Road beyond the northern property boundary. However, it is important to consider the wetlands on the north side of Baseline Road are partially mapped overtop of a constructed SWM pond. The closest natural wetland feature is located approximately 44 m northeast of the proposed limits of construction.

Wetlands and a surface drainage feature along the eastern property boundary are more than 240 m from any proposed construction dewatering activities. Wetlands west of the western property boundary are more than 75 m from any proposed construction dewatering activities.

Based on the calculated maximum radius of influence of 9.2 m, no impacts to wetlands or surface water features from temporary construction dewatering would be expected.

7.5 Groundwater Resources

As construction dewatering will temporarily withdraw water from the shallow overburden soils which are not expected to be utilized by private water supply wells within the estimated radius of influence of construction dewatering, and are not supporting surface water features, no material impacts to shallow groundwater resources are anticipated.

7.6 Confined Groundwater Conditions and Excavation Bottom Heave

While confined aquifer conditions were not identified in the boreholes drilled on the subject property by Sola Engineering Inc., bottom heave occurring in excavations due to unweighting of the soils as a result of excavations removing soil/bedrock weight overlying pressurized aquifer conditions should still be considered a (relatively remote) possibility. As discussed in Section 7.4 below, diligent observation of conditions in the excavations is recommended to monitor for potential bottom heaving. In the unlikely event bottom heaving or other issues due to pressurized aquifer conditions occur, the construction and dewatering strategies for the project would need to be revised.

7.7 Geotechnical Issues and Settlement

The calculated radius of influence of construction dewatering is up to 10.2 m. Some buildings, roadways, and services lie within the radius of influence; therefore, a geotechnical engineer should be consulted to determine whether geotechnical issues or impacts due to settlement resulting from construction dewatering could be anticipated. A geotechnical engineer should provide any applicable monitoring and/or mitigation recommendations to address any potential geotechnical issues or impacts.

8. MONITORING AND MITIGATION

The following monitoring and mitigation recommendations are provided to ensure construction dewatering does not impact surface water features or groundwater resources used by private or municipal water supply wells, and to ensure any impacts from construction dewatering are promptly and effectively resolved. These monitoring and mitigation recommendations shall be implemented during construction dewatering, along with any monitoring and mitigation recommendations that may be provided by a geotechnical engineer.

8.1 Discharge Volumes

During all construction dewatering operations, total pumping rates and discharge volumes from all excavations shall be measured using calibrated flow measurement devices (such as flow meters), with daily summation of total pumping rates and volumes and comparison to the permitted rates and volumes to ensure no exceedances occur.

In the event daily water taking rates or volumes exceed permitted values, the construction methodology or dewatering methodology shall be modified immediately to bring the daily water taking back into compliance with the permitted values.

The dewatering contractor shall maintain records of all daily water taking rates and volumes, including dates and locations of all water takings. The recorded data shall be retained for a period of five years per MECP requirements, and uploaded to the MECP's Water Taking Reporting System (WTRS) by March 31 of the year following the water taking.

8.2 Discharge Water Chemistry and Treatment

As discussed in Section 2, the groundwater chemistry samples exhibited exceedances of York Region Storm Sewer Use By-Law criteria limits for Total Suspended Solids, Total Manganese, and Phenols. The groundwater chemistry samples exhibited exceedances of PWQO criteria limits for Phenols. Mitigation measures that will need to be implemented to permit discharging to adjacent drainage ditches are described below.

The dewatering contractor must implement appropriate treatment methodologies for these exceedances as well as any exceedances that may occur during the construction dewatering program, and all required treatment equipment shall be set up on site prior to any construction dewatering.

FOLLOW-UP CHEMISTRY SAMPLING AND ANALYSIS

In order to determine whether the previously measured "Phenols" exceedance represents natural occurring compounds or the contaminant "Phenol" or "Monohydroxybenzene", follow-up chemistry sampling and analysis of BH 1 and BH 3 should be performed for the parameters "Phenols" and "Monohydroxybenzene". In the event the measured concentration of Monohydroxybenzene is below the PWQO criteria limit, design and implementation of a treatment system prior to commencement of construction dewatering would not be necessary.

DISCHARGE TO DRAINAGE DITCH

Although field testing will be required to ensure PWQO criteria are being met, a suggested initial treatment system could consist of the following (for each dewatering system):

- A Settling Tank sufficiently sized for the expected dewatering flow rate;
- Two filter vessels (appropriately sized for the dewatering flow rate) equipped with disposable 25-micron filter bags;
- Specialized treatment equipment to address Monohydroxybenzene in the event follow-up chemistry sampling determines it exceeds the PWQO criteria limit.

Once the treatment system(s) are set up, short-term trial dewatering should take place to allow representative water samples to be collected upstream (pre-treatment) and downstream (post-treatment) of the system(s), with sampling for general chemistry parameters plus Phenols and Monohydroxybenzene with comparison to PWQO criteria limits. In the event post-treatment samples exhibit exceedances of any parameters, the treatment system(s) will need to be modified and chemistry re-testing completed until the post-treatment samples show no exceedances.

During all construction dewatering operations, samples from each dewatering system should be collected on a weekly basis and analyzed for the same general chemistry suite of parameters. If water chemistry testing shows an exceedance of applicable criteria limits, the dewatering contractor or a water treatment specialist shall be consulted immediately to determine the most effective method of mitigating the exceedance. Treatment should be implemented with follow-up water chemistry sampling to confirm that no further exceedances are measured.

Weekly water chemistry sampling can also include upstream (pre-treatment) sampling to assess whether continued use of treatment systems is required. If upstream sampling results demonstrate that the pumped water meets the appropriate criteria, the treatment system(s) can be taken offline. In the event exceedances are measured in future weekly samples, the treatment system(s) would need to be brought back online immediately.

8.3 Dewatering Discharge Location

It is expected dewatering discharge will be routed to the drainage ditch along the northern property boundary. As noted above, water chemistry samples shall be collected weekly from the discharge location(s) and analyzed for general chemistry parameters with comparison to PWQO criteria limits. If any exceedances are measured, water treatment and mitigation measures will need to be implemented immediately and the water shall be re-tested with a maximum 24-hour turnaround time to confirm compliance with the appropriate criteria limits prior to continued discharge.

Appropriate dispersion and diffusion measures (e.g. hay bales, rip rap, etc.) shall be implemented to reduce the potential for erosion at the discharge point(s). Discharge point(s) shall be monitored on a daily basis and if evidence of erosion is observed appropriate mitigation measures shall be implemented to resolve the erosion issue.

8.4 Excavation Bottom Heave

All excavations shall be monitored daily for signs of bottom heave. In the unlikely event heaving is observed, all excavation work in the immediate area shall cease and soils shall be replaced in the excavation to restore overburden weight. If bottom heave occurs, alternate construction and/or dewatering methodologies will be required to address the issue, and coordination between the construction contractor, the dewatering contractor, and engineering consultants will be required to ensure the situation is effectively mitigated. This scope of this report does not include detailed analysis of the potential for excavation bottom heave, and it will be the responsibility of the construction contractor and dewatering contractor to identify and mitigate bottom heave in the unlikely event it occurs.

8.5 Geotechnical Issues for Adjacent Infrastructure

A geotechnical consulting engineer should be retained to evaluate all infrastructure, (utility poles, light poles, above ground and underground services, building foundations, roadways, etc.) within the calculated radius of influence of dewatering at all dewatering locations. Infrastructure such as utility poles, light poles, underground services, etc. within the radius of influence of construction dewatering may need to be braced and supported, based on the geotechnical engineer's recommendations. Supported infrastructure shall be monitored regularly during construction dewatering activities to ensure no settlement or impacts are occurring. Any settlement or impacts that are noted by the geotechnical consulting engineer shall be assessed and mitigated promptly and effectively using appropriate methodology.

For building foundations and other structures that may be identified within the calculated radius of influence, a geotechnical consulting engineer should perform a foundation assessment, install crack monitors as required, and monitor the foundations on a weekly basis for signs of settlement or other impact.

In the event settlement or other impact to foundations occurs, construction dewatering and/or excavation methodologies may need to be revised, dewatering may need to cease temporarily, and the geotechnical consulting engineer shall take all required steps to halt resolve the impact.

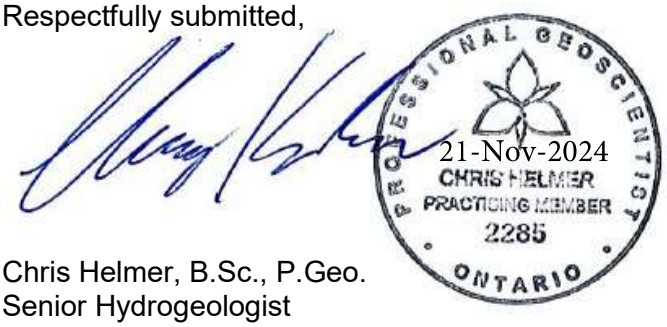
9. REPORTING

Daily water taking volumes shall be summarized and submitted to the MECP at the end of each calendar year, by March 31 of the following year, using the Water Taking Reporting System (WTRS), or the Regulatory Self-Reporting System (RSRS) through the Public Secure Client Access Management System (CAMS). All monitoring data will be retained for five years.

10. QUALIFICATIONS

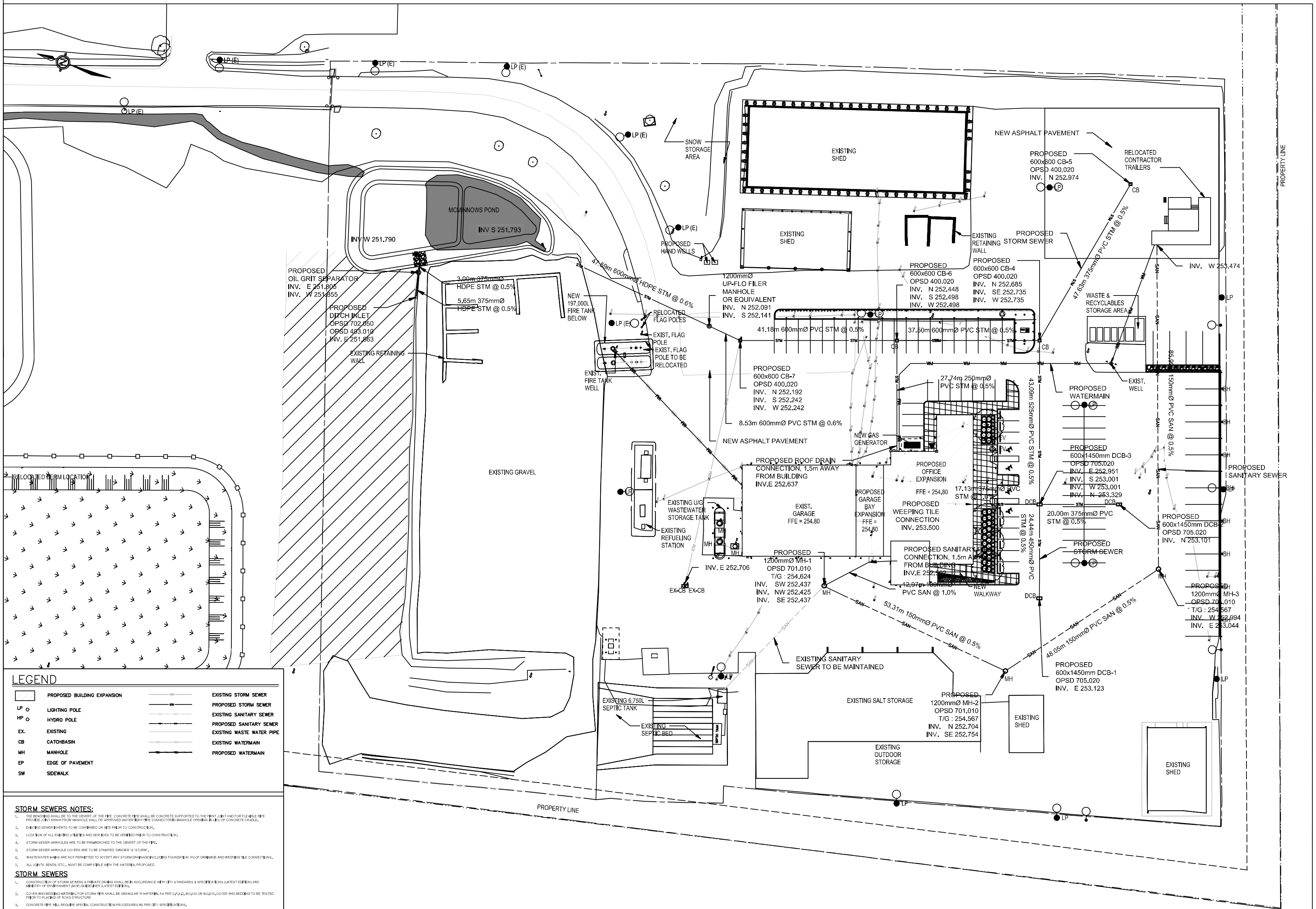
Chris Helmer is a licensed Professional Geoscientist, registered with the Association of Professional Geoscientists of Ontario since 2013. Mr. Helmer has been employed in the field of hydrogeology for more than twenty years, and has worked on construction dewatering projects and Permit to Take Water applications for more than fifteen years.

Respectfully submitted,



Chris Helmer, B.Sc., P.Geo.
Senior Hydrogeologist
MECP Licensed Well Contractor and Class 5 Well Technician
www.hydrog.ca

encl: Figure 1 – Drawing C-03 (GEC Architecture, September 2024)
encl. Figure 2 – Drawing C-08 (GEC Architecture, September 2024)
encl: Borehole Logs
encl: Slug Test Analyses
encl: Grain Size Analysis Graphs
encl: Laboratory Certificate of Analysis
encl: MECP Well Records



EXISTING SHED
NEW ASPHALT PAVEMENT
PROPOSED 600x600 CB-5 OPSD 400.020 INV. N 252.974
RELOCATED CONTRACTOR TRAILERS
PROPERTY LINE
SNOW STORAGE AREA
MCMINNOWS POND
INV S 251.793
INV W 251.790
PROPOSED HAND WELLS
EXISTING RETAINING WALL
PROPOSED STORM SEWER
47.63m 375mmØ PVC STM @ 0.5%
INV. W 253.474
PROPOSED OIL GRIT SEPARATOR INV. E 251.805 INV. W 251.855
3.00m 375mmØ HDPE STM @ 0.5%
5.65m 375mmØ HDPE STM @ 0.5%
47.69m 600mmØ HDPE STM @ 0.6%
NEW 197,000L FIRE TANK BELOW
1200mmØ UP-FLO FILER MANHOLE OR EQUIVALENT INV. N 252.091 INV. S 252.141
PROPOSED 600x600 CB-6 OPSD 400.020 INV. N 252.448 INV. S 252.498 INV. W 252.498
PROPOSED 600x600 CB-4 OPSD 400.020 INV. N 252.685 INV. SE 252.735 INV. W 252.735
WASTE & RECYCLABLES STORAGE AREA
PROPOSED DITCH INLET OPSD 702.050 OPSD 403.010 INV. E 251.863
RELOCATED FLAG POLES
EXIST. FLAG POLE
EXIST. FLAG POLE TO BE RELOCATED
41.18m 600mmØ PVC STM @ 0.5%
37.50m 600mmØ PVC STM @ 0.5%
EXISTING RETAINING WALL
EXIST. FIRE TANK WELL
PROPOSED 600x600 CB-7 OPSD 400.020 INV. N 252.192 INV. S 252.242 INV. W 252.242
8.53m 600mmØ PVC STM @ 0.6%
27.74m 250mmØ PVC STM @ 0.5%
43.09m 525mmØ PVC STM @ 0.5%
PROPOSED WATERMAIN
EXIST. WELL
85.99m 150mmØ PVC SAN @ 0.5%
NEW ASPHALT PAVEMENT
NEW GAS GENERATOR
EXISTING GRAVEL
RELOCATED BERM LOCATION
PROPOSED ROOF DRAIN CONNECTION, 1.5m AWAY FROM BUILDING INV.E 252.637
PROPOSED OFFICE EXPANSION
FFE = 254.80
17.13m 375mmØ PVC STM @ 0.5%
PROPOSED 600x1450mm DCB-3 OPSD 705.020 INV. E 252.951 INV. S 253.001 INV. W 253.001 INV. N 253.329
PROPOSED SANITARY SEWER
EXISTING U/G WASTEWATER STORAGE TANK
EXISTING REFUELING STATION
EXIST. GARAGE FFE = 254.80
PROPOSED GARAGE BAY EXPANSION FFE = 254.80
PROPOSED WEEPING TILE CONNECTION INV. 253.500
24.44m 450mmØ PVC STM @ 0.5%
20.00m 375mmØ PVC STM @ 0.5%
PROPOSED 600x1450mm DCB-2 OPSD 705.020 INV. N 253.101
PROPOSED STORM SEWER
PROPOSED 1200mmØ MH-1 OPSD 701.010 T/G : 254.624 INV. SW 252.437 INV. NW 252.425 INV. SE 252.437
INV. E 252.706
EX-CB EX-CB
PROPOSED SANITARY CONNECTION, 1.5m AWAY FROM BUILDING INV.E 252.
12.97m 150mmØ PVC SAN @ 1.0%
NEW WALKWAY
PROPOSED 1200mmØ MH-3 OPSD 701.010 T/G : 254.567 INV. W 252.994 INV. E 253.044
53.31m 150mmØ PVC SAN @ 0.5%
48.05m 150mmØ PVC SAN @ 0.5%
EXISTING SANITARY SEWER TO BE MAINTAINED
PROPOSED 600x1450mm DCB-1 OPSD 705.020 INV. E 253.123
EXISTING 6,750L SEPTIC TANK
EXISTING SEPTIC BED
EXISTING SALT STORAGE
PROPOSED 1200mmØ MH-2 OPSD 701.010 T/G : 254.567 INV. N 252.704 INV. SE 252.754
EXISTING SHED
EXISTING OUTDOOR STORAGE
EXISTING SHED

LEGEND

[box]	PROPOSED BUILDING EXPANSION		EXISTING STORM SEWER
LP	LIGHTING POLE		PROPOSED STORM SEWER
HP	HYDRO POLE		EXISTING SANITARY SEWER
EX.	EXISTING		PROPOSED SANITARY SEWER
CB	CATCHBASIN		EXISTING WASTE WATER PIPE
MH	MANHOLE		EXISTING WATERMAIN
EP	EDGE OF PAVEMENT		PROPOSED WATERMAIN
SW	SIDEWALK		

STORM SEWERS NOTES:

1. THE BENCHING SHALL BE TO THE OBVERT OF THE PIPE, CONCRETE PIPE SHALL BE CONCRETE SUPPORTED TO THE FIRST JOINT AND FOR FLEXIBLE PIPE PROVIDE JOINT 600mm FROM MANHOLE WALL OR APPROVED WATERTIGHT PIPE CONNECTOR IN MANHOLE OPENING. IN LIEU OF CONCRETE CRADLE.
2. EXISTING SEWER INVERTS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
3. LOCATION OF ALL EXISTING UTILITIES AND SERVICES TO BE VERIFIED PRIOR TO CONSTRUCTION.
4. STORM SEWER MANHOLES ARE TO BE PRE-BENCHED TO THE OBVERT OF THE PIPE.
5. STORM SEWER MANHOLE COVERS ARE TO BE STAMPED "DANGER" & "STORM".
6. WASTEWATER MAINS ARE NOT PERMITTED TO ACCEPT ANY STORM DRAINAGE INCLUDING FOUNDATION, ROOF DRAINAGE AND WEEPING TILE CONNECTIONS.
7. ALL JOINTS, BENDS, ETC... MUST BE COMPATIBLE WITH THE MATERIAL PROPOSED

STORM SEWERS

1. CONSTRUCTION OF STORM SEWERS & PRIVATE DRAINS SHALL BE IN ACCORDANCE WITH CITY STANDARDS & SPECIFICATIONS (LATEST EDITION) AND MINISTRY OF ENVIRONMENT (MOE) GUIDELINES (LATEST EDITION).
2. COVER AND BEDDING MATERIAL FOR STORM PIPE SHALL BE GRANULAR 'A' MATERIAL AS PER O.P.S.D. 802.010 OR 802.013. COVER AND BEDDING TO BE TESTED PRIOR TO PLACING OF ROAD STRUCTURE
3. CONCRETE PIPE WILL REQUIRE SPECIAL CONSTRUCTION PROCEDURES AS PER CITY SPECIFICATIONS.
4. STORM SEWER PIPE TO BE PROVIDED INSULATION WHERE DEPTH IS LESS THAN 1.4 m REFER TO OPSD 1109.030.
5. ALL SEWERS TO BE FLUSHED PRIOR TO VIDEO INSPECTION.
6. MANHOLE FRAMES AND COVERS SHALL BE AS PER O.P.S.D. 401.010 (STORM-OPEN, SANITARY-CLOSED).
7. ALL STORM SEWERS AND APPURTENANCES TO COMPLY WITH REGION OF YORK STANDARDS AND ONTARIO PLUMBING CODE.
9. ALL TRENCHES TO BE BACKFILLED IN 300mm LAYERS AND COMPACTED TO 95% SPD.
9. ANY CONFLICTS WITH EXISTING SERVICES SHALL BE RECTIFIED AT THE OWNER'S EXPENSE.
10. A MINIMUM VERTICAL SEPARATION OF 0.5m SHALL BE MAINTAINED BETWEEN THE INVERT OF A SEWER AND THE CROWN OF A WATERMAIN OR VICE VERSA AT ALL CROSSINGS.
11. ALL SEWER STRUCTURES TO BE REPAIRED WITH TYPE 50 SULPHATE-RESISTANT PORTLAND CEMENT.
12. ALTERNATE MATERIALS MAY BE ACCEPTABLE PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE CITY/ENGINEER.
13. MAINTENANCE HOLES 1200mm DIAMETER TO BE AS PER OPSD 701.010 (WITH NO SUMPS); MAINTENANCE HOLES 1500mm TO BE AS PER OPSD 701.011 (WITH NO SUMPS); MAINTENANCE HOLES 1800mm DIAMETER TO BE AS PER OPSD 701.012 (WITH NO SUMPS); MAINTENANCE HOLES 2400mm DIAMETER TO BE A PER OPSD 701.013 (WITH NO SLUMPS)

1 C-03 CONSTRUCTION PLAN

SCALE: 1:400

POINT NAME	EASTING	NORTHING	ELEVATION	DESCRIPTION
100 CC	628181.6120	4905083.7629	254.675	
101 CC	628083.2890	4904998.6158	268.388	
102 CC	628071.2807	4905137.0880	254.606	
103 CC	628159.7904	4905258.0516	252.348	
368 NL	628223.6844	4905040.2867	253.767	

NOTE:
SURVEY COMPLETED BY PLANMAC ENGINEERING INC. ON ON NOV 14, 2023.
VERTICAL AND HORIZONTAL CONTROL ESTABLISHED USING LEICA SMARTNET RTK.
COORDINATE SYSTEM: UTM 17 NAD 83, CGVD 1928.

gec architecture

Project Team:
Prime Consultant: GEC ARCHITECTURE
Structural Consultant: ENTUITIVE
Mechanical Consultant: MCW CONSULTANTS LTD
Electrical Consultant: MCW CONSULTANTS LTD
Civil Consultant: PLANMAC ENGINEERING
Passive House Consultant: PEEL PASSIVE HOUSE
LEED Consultant: MCW CONSULTANTS LTD

Client: York Region

Seal & Permit:
LICENSED PROFESSIONAL ENGINEER J. HUANG 100135761 PROVINCE OF ONTARIO

PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE
9.	ISSUED FOR SPA 1ST RESUBMISSION	2024-09-17
8.	ISSUED FOR 100% CD R3	2024-08-02
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-30
5.	ISSUED FOR 100% CD	2024-06-03
4.	ISSUED FOR 60% CD R1	2024-05-02
3.	ISSUED FOR 60% CD	2024-04-24
2.	ISSUED FOR SPA SUBMISSION	2024-04-12
1.	ISSUED FOR 100% DD	2024-03-19

Drawing History

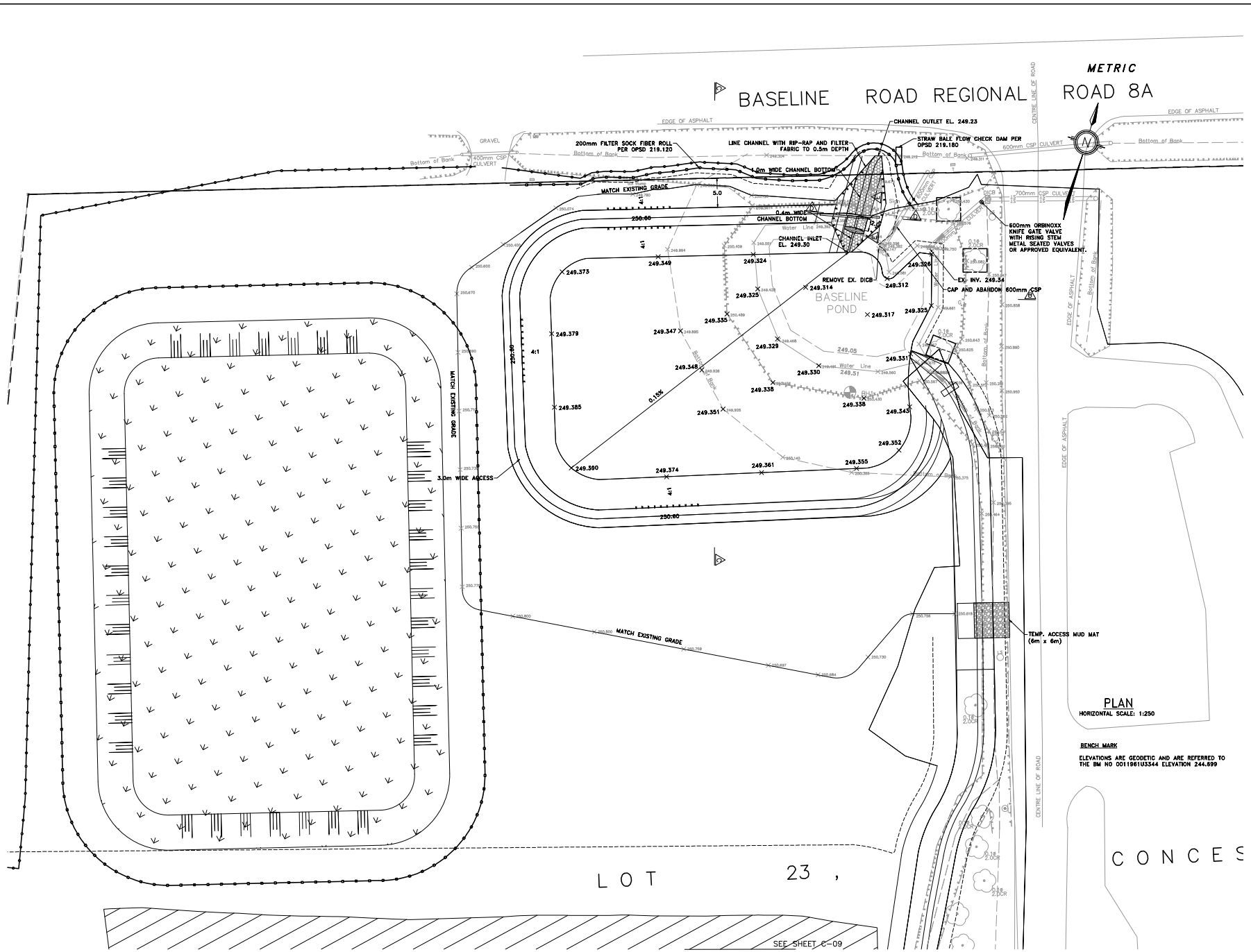
Scale: AS INDICATED
Checked By: J.H.

Region of York Project Number: 22046
Region of York Building Code: G013-B

Project: YORK REGION NORTH ROADS OPERATIONS CENTRE
3525 BASELINE RD, SUTTON WEST, ON, L0E 1R0

Drawing Title: SEVERING PLAN

Project Number: 6016
Drawing Number: C-03



PLAN
HORIZONTAL SCALE: 1:250

BENCH MARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE BM NO 0011961U3344 ELEVATION 244.699

NOTES:
THE LOCATIONS OF UTILITIES IS APPROXIMATE ONLY. CONSULT THE RESPECTIVE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES TO DETERMINE THE EXACT LOCATION OF THEIR UTILITIES. THE CONTRACTOR SHALL VERIFY THE LOCATION OF UTILITIES AND SHALL ADEQUATELY PROTECT AND SUPPORT THEM DURING CONSTRUCTION.

gec architecture

Project Team:
Prime Consultant: GEC ARCHITECTURE
Structural Consultant: ENTUITIVE
Mechanical Consultant: MCW CONSULTANTS LTD
Electrical Consultant: MCW CONSULTANTS LTD
Civil Consultant: PLANMAC ENGINEERING
Passive House Consultant: PEEL PASSIVE HOUSE
LEED Consultant: MCW CONSULTANTS LTD

Client: York Region

Seal & Permit:

PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE
9.	ISSUED FOR SPA 101 RESUBMISSION	2024-09-17
8.	ISSUED FOR 100% CD R3	2024-08-22
7.	ISSUED FOR 100% CD R2	2024-07-15
6.	ISSUED FOR 100% CD R1	2024-06-21
5.	ISSUED FOR 100% CD	2024-06-07
4.	ISSUED FOR 60% CD R1	2024-05-02
3.	ISSUED FOR 60% CD	2024-04-17
2.	ISSUED FOR SPA SUBMISSION	2024-04-17
1.	ISSUED FOR 100% CD	2024-03-15

Drawing History
Scale: AS INDICATED
Checked By: J.H.
Region of York Project Number: 22046
Region of York Drawing Code: G013-B

Project: YORK REGION NORTH ROADS OPERATIONS CENTRE
9525 BASELINE RD, SUTTON WEST, ON, L0E 1R0

Drawing Title: BASELINE POND MODIFICATIONS

Project Number: 6016
Drawing Number: C-08

SOLA ENGINEERING

ENCLOSURE No. 2

RECORD OF BOREHOLE No. BH1 1 OF 1 METRIC

PROJECT NUMBER 10868 LOCATION 3525 Baseline Road, Sutton, Ontario ORIGINATED BY JS

DIST ____ HWY ____ BOREHOLE TYPE Solid Stem Augers COMPILED BY CC

DATUM ____ DATE 2021.08.12 - 2021.08.12 LATITUDE ____ LONGITUDE ____ CHECKED BY JS

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
250.5	Topsoil										
250.4	TOPSOIL - 100 mm thick										
0.1	FILL - sandy silt, trace clay, trace gravel, trace rootlets, brown, moist		1	SS	7		250	○	○		
249.7											
0.8	FILL - clayey silt, trace gravel, trace rootlets, trace organic, dark brown, moist		2	SS	10			○	○		
248.9							249				
1.5	PROBABLE FILL - clayey silt, trace gravel, pockets of sand, brown, very moist		3	SS	9			○	○		
248.2											
2.3	CLAYEY SILT TILL - trace gravel, brown, very stiff, very moist		4	SS	17		248	○	○		
			5	SS	19			○	○		
246.6							247				
3.8	SANDY SILT TILL - trace gravel, brown, dense, moist		6	SS	32			○	○		
246.2											
4.3	End of Borehole at Targeted Depth; Borehole was Open and Water was at 3.7 m Below Existing Ground Surface upon Completion of Drilling.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 3

RECORD OF BOREHOLE No. BH2 1 OF 1 METRIC

PROJECT NUMBER 10868 LOCATION 3525 Baseline Road, Sutton, Ontario ORIGINATED BY JS

DIST ____ HWY ____ BOREHOLE TYPE Solid Stem Augers COMPILED BY CC

DATUM ____ DATE 2021.08.12 - 2021.08.12 LATITUDE ____ LONGITUDE ____ CHECKED BY JS

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
252.5	Topsoil									
252.4 / 0.0	TOPSOIL - 150 mm thick									
0.2	FILL - silty sand, trace gravel, brown, moist		1	SS	7		252	○	○	
251.7										
0.8	PROBABLE FILL - clayey silt, trace gravel, brown, moist		2	SS	18			○		
251.0							251			
1.5	CLAYEY SILT - trace gravel, trace sand, brown, very stiff, moist		3	SS	23			○		
250.2										
2.3	CLAYEY SILT TILL - trace gravel, grey, hard, moist		4	SS	46		250	○	○	
			5	SS	39			○		
248.7							249			
3.8	SANDY SILT TILL - trace gravel, trace clay, containing stone fragments, grey, very dense, moist		6	SS	58			○		
248.2										
4.3	End of Borehole at Targeted Depth; Borehole was Open and Dry upon Completion of Drilling.									

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 4

RECORD OF BOREHOLE No. BH3 1 OF 1 METRIC

PROJECT NUMBER 10868 LOCATION 3525 Baseline Road, Sutton, Ontario ORIGINATED BY JS

DIST ____ HWY ____ BOREHOLE TYPE Solid Stem Augers COMPILED BY CC

DATUM ____ DATE 2021.08.12 - 2021.08.12 LATITUDE ____ LONGITUDE ____ CHECKED BY JS

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" VALUES
253.4	Topsoil			
253.2 0.2	TOPSOIL - 150 mm thick			
	FILL - sandy silt, trace gravel, trace rootlets, trace organic, containing brick fragments, brown, moist	1	SS	5
		2	SS	8
252.3 1.1	CLAYEY SILT - trace gravel, trace sand, brown, firm to very stiff, moist	3	SS	19
251.1 2.3	SANDY SILT TILL - trace gravel, trace clay, brown, dense to very dense, moist	4	SS	50
		5	SS	54
249.5 3.8	SILT - trace clay, grey, very dense, moist	6	SS	74
249.1 4.3	End of Borehole at Targeted Depth; Borehole Caved at 3.9 m and Water was at 3.7 m Below Existing Ground Surface upon Completion of Drilling.			

SOIL PROFILE; SAMPLES; STRAT PLOT; GROUND WATER CONDITIONS; ELEVATION SCALE

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
(20 40 60 80 100)

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

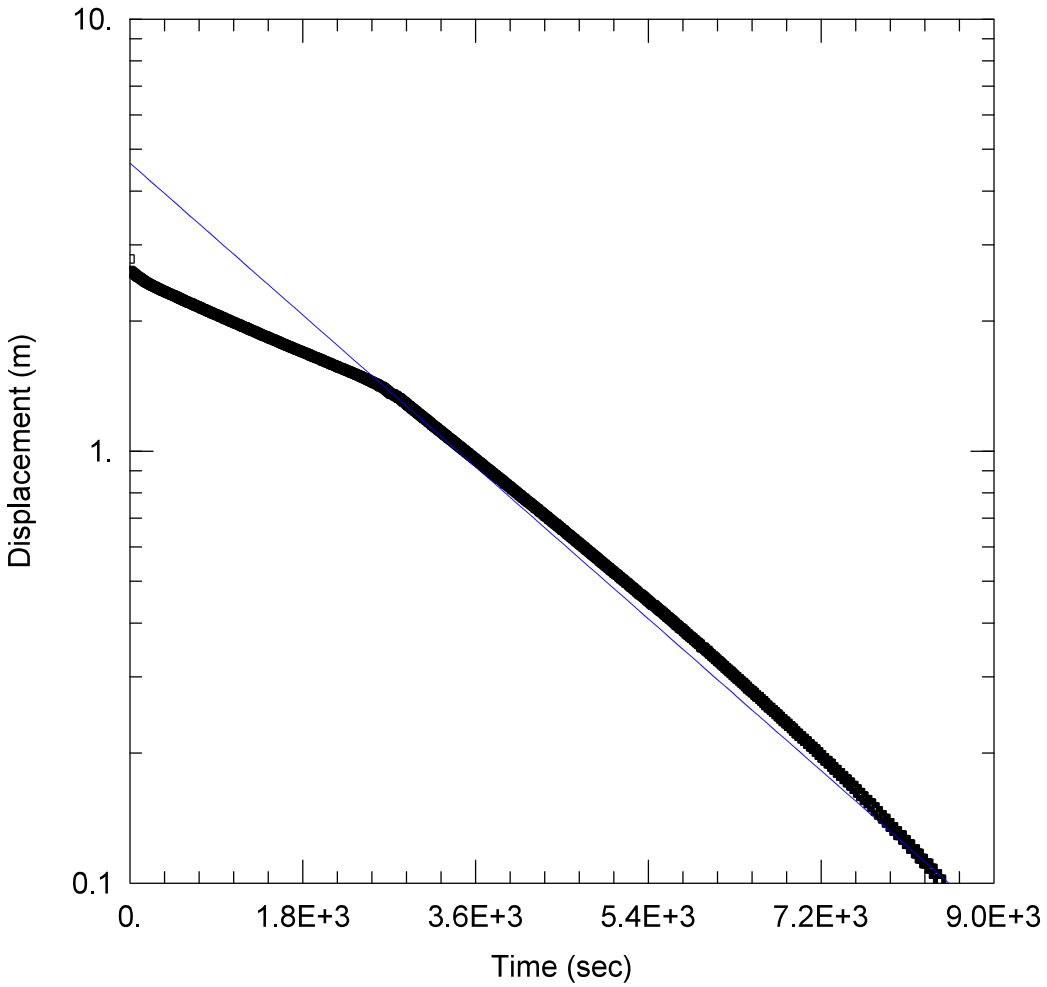
WATER CONTENT (%) (20 40 60)

UNIT WEIGHT γ kN/m³

REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE



NORTH PATROL YARD

Data Set: C:\Harden 2\Slug Test Results\northpatrolyard_BH1.aqt
Date: 07/27/22 Time: 12:47:50

PROJECT INFORMATION

Company: Harden Environmental
Client: York Region
Project: 2220
Location: 3525 Baseline Road
Test Well: BH1
Test Date: 07/19/22

AQUIFER DATA

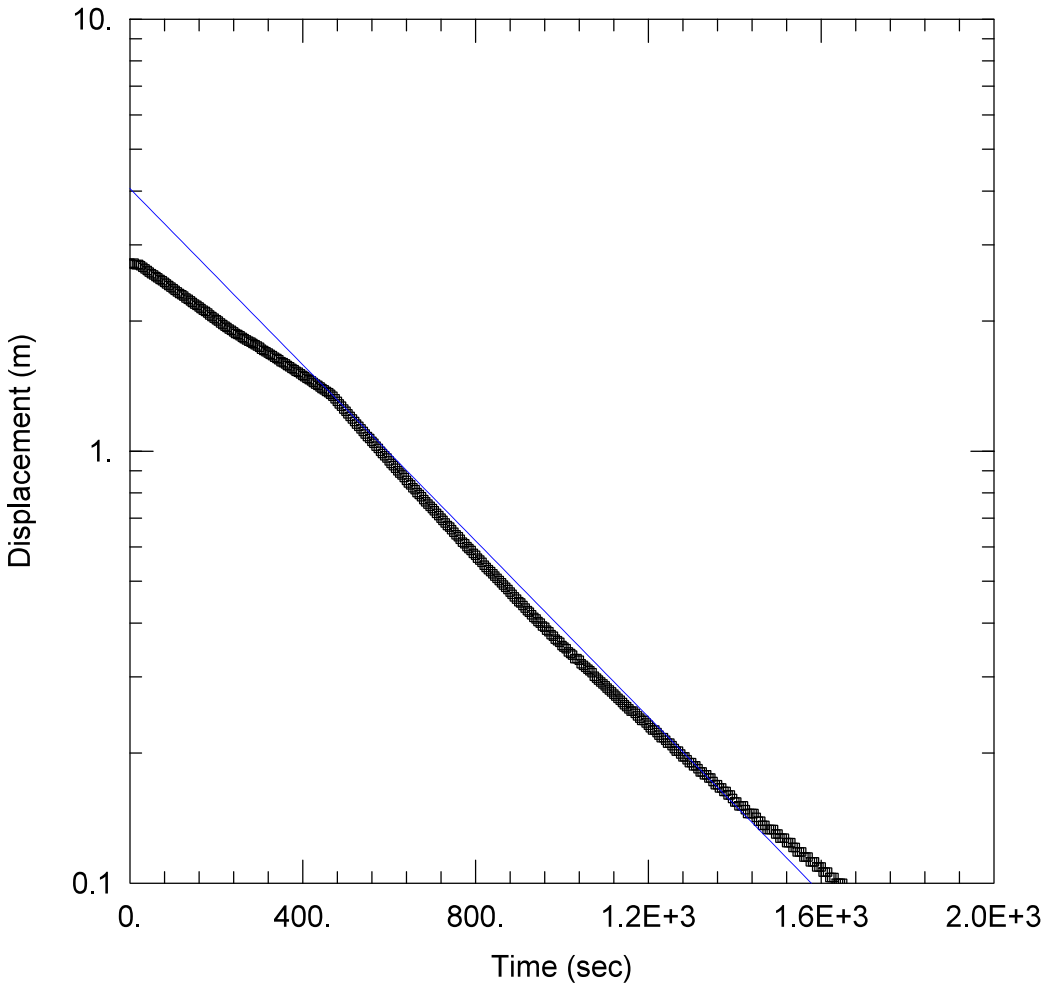
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH1)

Initial Displacement: 2.787 m
Total Well Penetration Depth: 4.3 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.24 m
Screen Length: 1.52 m
Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 4.131E-7 m/sec
y0 = 4.642 m



NORTH PATROL YARD

Data Set: C:\Harden 2\Slug Test Results\northpatrolyard_BH3.aqt
Date: 07/27/22 Time: 12:48:46

PROJECT INFORMATION

Company: Harden Environmental
Client: York Region
Project: 2220
Location: 3525 Baselline Road
Test Well: BH3
Test Date: 07/19/22

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.1

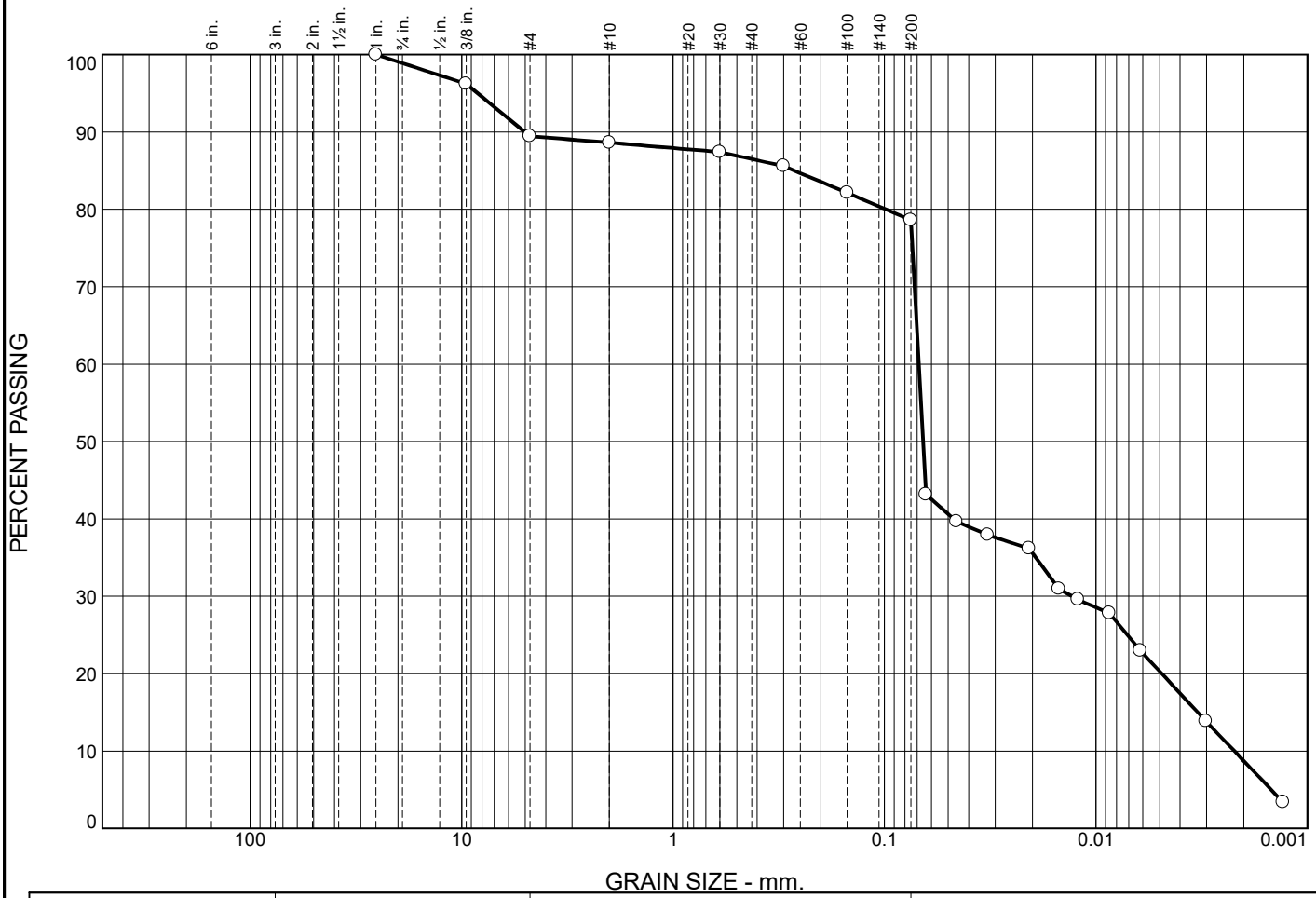
WELL DATA (BH3)

Initial Displacement: 2.719 m Static Water Column Height: 3.375 m
Total Well Penetration Depth: 4.3 m Screen Length: 1.52 m
Casing Radius: 0.0254 m Well Radius: 0.0635 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 2.155E-6 m/sec y0 = 4.051 m

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0	1	10	0	2	8	79

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.2661	0.0688	0.0656	0.0130	0.0033	0.0022	1.10	31.05

Material Description	USCS	AASHTO
○ BoreHole		

Project No. **Client:** Chisholm Fleming & Associates

Project: Pond

○ **Location:** BH1 **Depth:** 7.5'-9.5' **Sample Number:** 21-363

Date: ○

Remarks:

○Sampled By:Clement

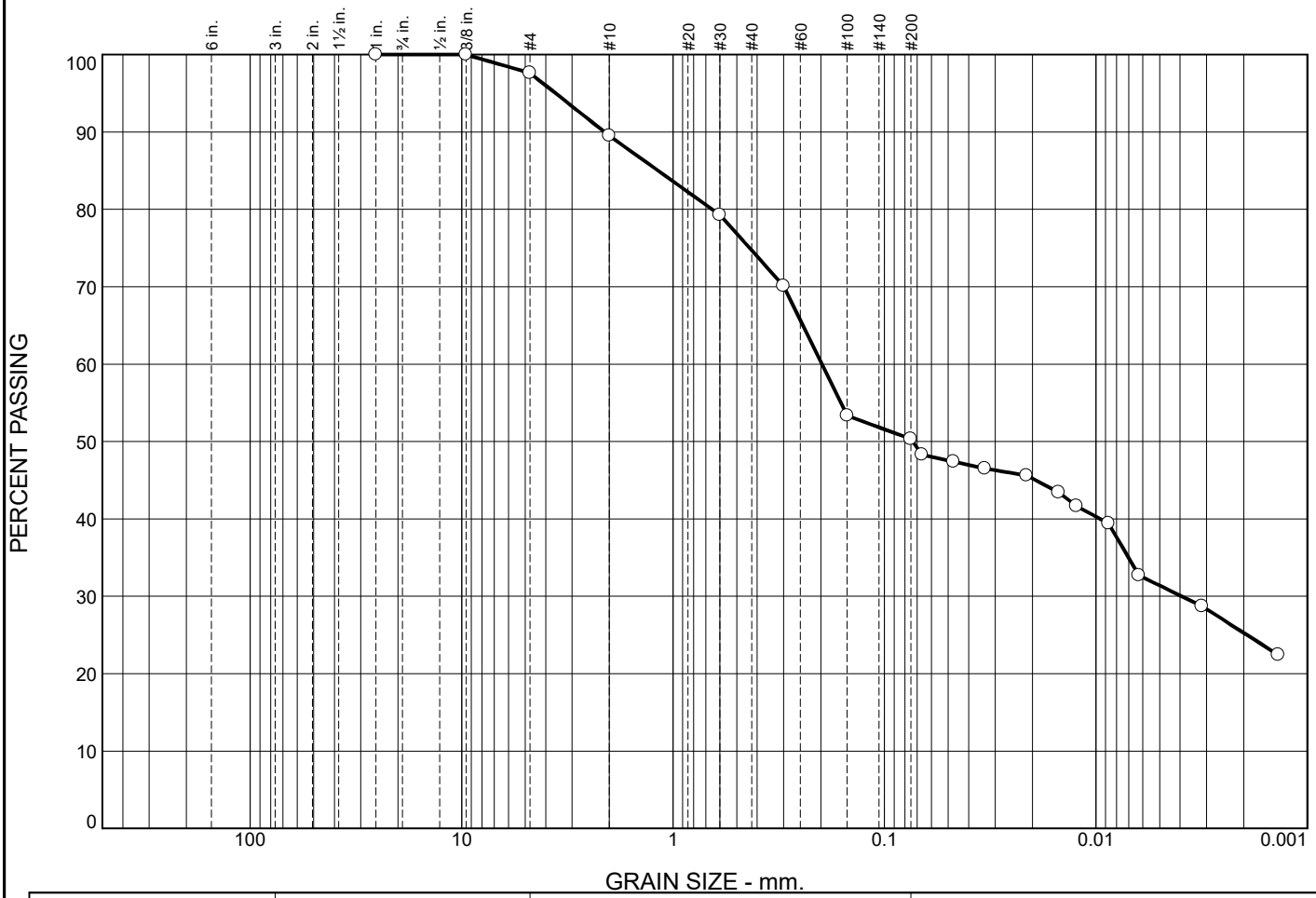
Date: August 12, 2021

Note: Additional information is available upon request

SOLA ENGINEERING INC.

Enclosure 7

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0	0	2	8	15	25	50

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				1.1751	0.1975	0.0735	0.0039				

	Material Description	USCS	AASHTO
○	BoreHole		

Project No. **Client:** Chisholm Fleming & Associates

Project: Pond

○ **Location:** BH3 **Depth:** 7.5'-9' **Sample Number:** 21-364

Date: ○

Remarks:

○Sampled By:Clement

Date: August 12, 2021

Note: Additional information is available upon request

SOLA ENGINEERING INC.

Enclosure 8

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

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.
4622 NASSAGAWEYA PUSLINCH TOWNLINE
MOFFAT, ON L0P 1J0
519-826-0099

ATTENTION TO: Allan Rodie

PROJECT: 2220-North Patrol Yard

AGAT WORK ORDER: 22T922462

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

WATER ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician

DATE REPORTED: Jul 28, 2022

PAGES (INCLUDING COVER): 11

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 after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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FAX (905)712-5122
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Certificate of Analysis

AGAT WORK ORDER: 22T922462

PROJECT: 2220-North Patrol Yard

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:AR

York Region Sanitary - Organics

DATE RECEIVED: 2022-07-19

DATE REPORTED: 2022-07-28

		SAMPLE DESCRIPTION:		POND		BH1
		SAMPLE TYPE:		Water		Water
		DATE SAMPLED:		2022-07-19		2022-07-19 14:40
Parameter	Unit	G / S	RDL	4110316	RDL	4110317
Oil and Grease (animal/vegetable) in water	mg/L		0.5	0.90	0.5	<0.5
Oil and Grease (mineral) in water	mg/L		0.5	<0.5	0.5	<0.5
Methylene Chloride	µg/L	5.2	0.6	<0.6	0.3	<0.3
trans-1,3-Dichloropropene	µg/L	5.6	0.60	<0.60	0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.8	<1.8	0.9	<0.9
cis- 1,2-Dichloroethylene	µg/L	5.6	0.4	<0.4	0.2	<0.2
Chloroform	µg/L	2.0	0.4	<0.4	0.2	<0.2
Benzene	µg/L	2.0	0.4	<0.4	0.2	<0.2
Trichloroethylene	µg/L	8.0	0.4	<0.4	0.2	<0.2
Toluene	µg/L	2.0	0.4	<0.4	0.2	<0.2
Tetrachloroethene	µg/L	4.4	0.2	<0.2	0.1	<0.1
Ethylbenzene	µg/L	2.0	0.2	<0.2	0.1	<0.1
1,1,2,2-Tetrachloroethane	µg/L	17.0	0.2	<0.2	0.1	<0.1
Styrene	µg/L		0.2	<0.2	0.1	<0.1
1,2-Dichlorobenzene	µg/L	5.6	0.2	<0.2	0.1	<0.1
1,4-Dichlorobenzene	µg/L	6.8	0.2	<0.2	0.1	<0.1
m & p-Xylene	µg/L		0.4	<0.4	0.2	<0.2
o-Xylene	µg/L		0.2	<0.2	0.1	<0.1
Xylenes (Total)	µg/L	4.4	0.2	<0.2	0.2	<0.2
PCBs	µg/L	0.4	0.2	<0.2	0.2	<0.2
Di-n-butyl phthalate	µg/L	15.0	0.5	<0.5	0.5	<0.5
Bis(2-Ethylhexyl)phthalate	µg/L	8.8	0.5	<0.5	0.5	<0.5

Certified By: N Popnikolof

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Certificate of Analysis

AGAT WORK ORDER: 22T922462

PROJECT: 2220-North Patrol Yard

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:AR

York Region Sanitary - Organics

DATE RECEIVED: 2022-07-19

DATE REPORTED: 2022-07-28

		SAMPLE DESCRIPTION:	POND		BH1
		SAMPLE TYPE:	Water		Water
		DATE SAMPLED:	2022-07-19		2022-07-19 14:40
Surrogate	Unit	Acceptable Limits	4110316		4110317
Toluene-d8	% Recovery	50-140	106	1	102
4-Bromofluorobenzene	% Recovery	50-140	102	1	100
Decachlorobiphenyl	%	50-140	107	1	90
2,4,6-Tribromophenol	%	50-140	97	1	96
2-Fluorophenol	%	50-140	77	1	88
Chrysene-d12	%	50-140	87	1	90
phenol-d6 surrogate	%	50-140	62	1	88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to The Regional Municipality of York - Limits for Storm Sewer Discharge [BY-LAW NO.2011-56]
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.

4110316 Dilution factor=2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.
Oil and Grease animal/vegetable is a calculated parameter. The calculated value is the difference between Total O&G and Mineral O&G.

4110317 Oil and Grease animal/vegetable is a calculated parameter. The calculated value is the difference between Total O&G and Mineral O&G.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopnikolof

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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AGAT WORK ORDER: 22T922462

PROJECT: 2220-North Patrol Yard

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:AR

CBOD5

DATE RECEIVED: 2022-07-19

DATE REPORTED: 2022-07-28

				SAMPLE DESCRIPTION:		POND
				SAMPLE TYPE:		Water
				DATE SAMPLED:		2022-07-19
Parameter	Unit	G / S	RDL	4110316	RDL	4110317
Biochemical Oxygen Demand, Carbonaceous	mg/L	15	2	6	6	<6

				BH1
				Water
				2022-07-19 14:40
Parameter	Unit	G / S	RDL	4110317
Biochemical Oxygen Demand, Carbonaceous	mg/L	15	2	<6

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to The Regional Municipality of York - Limits for Storm Sewer Discharge [BY-LAW NO.2011-56]
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.

4110317 RDL for BOD is raised due to insufficient DO depletion at selected dilution levels.

Analysis performed at AGAT Halifax (unless marked by *)

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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Certificate of Analysis

AGAT WORK ORDER: 22T922462

PROJECT: 2220-North Patrol Yard

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:AR

York Region Storm Sewer Use By-Law - Inorganics

DATE RECEIVED: 2022-07-19

DATE REPORTED: 2022-07-28

				SAMPLE DESCRIPTION:	POND	BH1
				SAMPLE TYPE:	Water	Water
				DATE SAMPLED:	2022-07-19	2022-07-19 14:40
Parameter	Unit	G / S	RDL		4110316	4110317
pH	pH Units	6.0-9.0	NA		7.64	7.43
Total Suspended Solids	mg/L	15	10		13	354
Total Kjeldahl Nitrogen	mg/L	1	0.10		0.75	0.26
Phenols	mg/L	0.008	0.004		0.008	0.009
Cyanide, SAD	mg/L	0.02	0.002		<0.002	0.003
Total Arsenic	mg/L	0.020	0.015		<0.015	<0.015
Total Cadmium	mg/L	0.008	0.005		<0.005	<0.005
Total Chromium	mg/L	0.080	0.020		<0.020	<0.020
Total Copper	mg/L	0.050	0.015		<0.015	<0.015
Total Lead	mg/L	0.120	0.020		<0.020	<0.020
Total Manganese	mg/L	0.150	0.020		0.064	0.188
Total Mercury	mg/L	0.0004	0.0002		<0.0002	<0.0002
Total Nickel	mg/L	0.080	0.015		<0.015	<0.015
Total Phosphorus	mg/L	0.400	0.02		0.07	0.13
Total Selenium	mg/L	0.020	0.002		<0.002	<0.002
Total Silver	mg/L	0.120	0.020		<0.020	<0.020
Total Zinc	mg/L	0.040	0.020		<0.020	<0.020

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to The Regional Municipality of York - Limits for Storm Sewer Discharge [BY-LAW NO.2011-56]
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.

4110316-4110317 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

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FAX (905)712-5122
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Exceedance Summary

AGAT WORK ORDER: 22T922462

PROJECT: 2220-North Patrol Yard

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

ATTENTION TO: Allan Rodie

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
4110317	BH1	ON York SM	York Region Storm Sewer Use By-Law - Inorganics	Phenols	mg/L	0.008	0.009
4110317	BH1	ON York SM	York Region Storm Sewer Use By-Law - Inorganics	Total Manganese	mg/L	0.150	0.188
4110317	BH1	ON York SM	York Region Storm Sewer Use By-Law - Inorganics	Total Suspended Solids	mg/L	15	354

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Quality Assurance

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.
AGAT WORK ORDER: 22T922462
PROJECT: 2220-North Patrol Yard
ATTENTION TO: Allan Rodie
SAMPLING SITE:
SAMPLED BY:AR

Trace Organics Analysis

RPT Date: Jul 28, 2022			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
York Region Sanitary - Organics															
Oil and Grease (animal/vegetable) in water	4111931		< 0.5	< 0.5	NA	< 0.5	101%	70%	130%	108%	70%	130%	107%	70%	130%
Oil and Grease (mineral) in water	4111931		< 0.5	< 0.5	NA	< 0.5	81%	70%	130%	81%	70%	130%	83%	70%	130%
Methylene Chloride	4110588		<0.3	<0.3	NA	< 0.3	71%	50%	140%	88%	60%	130%	115%	50%	140%
trans-1,3-Dichloropropene	4110588		<0.30	<0.30	NA	< 0.30	79%	50%	140%	119%	60%	130%	92%	50%	140%
Methyl Ethyl Ketone	4110588		<0.9	<0.9	NA	< 0.9	97%	50%	140%	111%	50%	140%	99%	50%	140%
cis- 1,2-Dichloroethylene	4110588		<0.2	<0.2	NA	< 0.2	72%	50%	140%	93%	60%	130%	92%	50%	140%
Chloroform	4110588		<0.2	<0.2	NA	< 0.2	78%	50%	140%	92%	60%	130%	104%	50%	140%
Benzene	4110588		<0.2	<0.2	NA	< 0.2	101%	50%	140%	85%	60%	130%	94%	50%	140%
Trichloroethylene	4110588		<0.2	<0.2	NA	< 0.2	80%	50%	140%	100%	60%	130%	98%	50%	140%
Toluene	4110588		<0.2	<0.2	NA	< 0.2	85%	50%	140%	111%	60%	130%	99%	50%	140%
Tetrachloroethene	4110588		<0.1	<0.1	NA	< 0.1	85%	50%	140%	113%	60%	130%	98%	50%	140%
Ethylbenzene	4110588		<0.1	<0.1	NA	< 0.1	87%	50%	140%	116%	60%	130%	103%	50%	140%
1,1,2,2-Tetrachloroethane	4110588		<0.1	<0.1	NA	< 0.1	118%	50%	140%	118%	60%	130%	101%	50%	140%
Styrene	4110588		<0.1	<0.1	NA	< 0.1	89%	50%	140%	115%	60%	130%	104%	50%	140%
1,2-Dichlorobenzene	4110588		<0.1	<0.1	NA	< 0.1	99%	50%	140%	99%	60%	130%	115%	50%	140%
1,4-Dichlorobenzene	4110588		<0.1	<0.1	NA	< 0.1	95%	50%	140%	92%	60%	130%	113%	50%	140%
m & p-Xylene	4110588		<0.2	<0.2	NA	< 0.2	84%	50%	140%	111%	60%	130%	100%	50%	140%
o-Xylene	4110588		<0.1	<0.1	NA	< 0.1	87%	50%	140%	113%	60%	130%	102%	50%	140%
PCBs	4110275		< 0.1	< 0.1	NA	< 0.2	101%	50%	140%	100%	50%	140%	82%	50%	140%
Di-n-butyl phthalate	4113885		<0.5	<0.5	NA	< 0.5	94%	50%	140%	101%	50%	140%	76%	50%	140%
Bis(2-Ethylhexyl)phthalate	4113885		<0.5	<0.5	NA	< 0.5	114%	50%	140%	100%	50%	140%	106%	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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5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
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Quality Assurance

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.
AGAT WORK ORDER: 22T922462
PROJECT: 2220-North Patrol Yard
ATTENTION TO: Allan Rodie
SAMPLING SITE:
SAMPLED BY:AR

Water Analysis

RPT Date: Jul 28, 2022			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
York Region Storm Sewer Use By-Law - Inorganics															
pH	4110250		7.30	7.52	3.0%	NA	102%	90%	110%						
Total Suspended Solids	4109212		37	37	NA	< 10	96%	80%	120%						
Total Kjeldahl Nitrogen	4100106		0.40	0.41	NA	< 0.10	100%	70%	130%	100%	80%	120%	99%	70%	130%
Phenols	4102637		<0.001	<0.001	NA	< 0.001	106%	90%	110%	103%	90%	110%	91%	80%	120%
Cyanide, SAD	4082679		<0.002	<0.002	NA	< 0.002	96%	70%	130%	86%	80%	120%	101%	70%	130%
Total Arsenic	4110321		<0.015	<0.015	NA	< 0.015	95%	70%	130%	91%	80%	120%	90%	70%	130%
Total Cadmium	4110321		<0.005	<0.005	NA	< 0.005	99%	70%	130%	103%	80%	120%	92%	70%	130%
Total Chromium	4110321		<0.020	<0.020	NA	< 0.020	100%	70%	130%	97%	80%	120%	93%	70%	130%
Total Copper	4110321		<0.015	<0.015	NA	< 0.015	101%	70%	130%	104%	80%	120%	90%	70%	130%
Total Lead	4110321		<0.020	<0.020	NA	< 0.020	99%	70%	130%	92%	80%	120%	89%	70%	130%
Total Manganese	4110321		0.138	0.133	3.7%	< 0.020	104%	70%	130%	100%	80%	120%	97%	70%	130%
Total Mercury	4110316	4110316	<0.0002	<0.0002	NA	< 0.0002	102%	70%	130%	104%	80%	120%	100%	70%	130%
Total Nickel	4110321		<0.015	<0.015	NA	< 0.015	102%	70%	130%	95%	80%	120%	91%	70%	130%
Total Phosphorus	4119536		0.20	0.21	4.9%	< 0.02	99%	70%	130%	98%	80%	120%	NA	70%	130%
Total Selenium	4110321		<0.002	<0.002	NA	< 0.002	107%	70%	130%	93%	80%	120%	92%	70%	130%
Total Silver	4110321		<0.020	<0.020	NA	< 0.020	100%	70%	130%	93%	80%	120%	91%	70%	130%
Total Zinc	4110321		<0.020	<0.020	NA	< 0.020	99%	70%	130%	105%	80%	120%	93%	70%	130%
CBOD5															
Biochemical Oxygen Demand, Carbonaceous	4111032		203	198	2.5%	< 2	94%	70%	130%						

Comments: NA Signifies Not Applicable.
Duplicate NA: results are less than 5X the RDL and RPD will not be calculated.
Matrix spike: Spike level < native concentration. Matrix spike acceptance limits do not apply.

Certified By:

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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Method Summary

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 22T922462

PROJECT: 2220-North Patrol Yard

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:AR

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 & SM 5520	GRAVIMETRIC
Oil and Grease (mineral) in water	VOL-91-5011	EPA SW-846 3510C & SM 5520	GRAVIMETRIC
Methylene Chloride	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
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
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	EPA SW-846 5230B & 8260	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 3510 & 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 3510C and EPA 8270E	GC/MS
Bis(2-Ethylhexyl)phthalate	ORG-91-5114	modified from EPA 3510C and EPA 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
phenol-d6 surrogate	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS

AGAT Laboratories

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Method Summary

CLIENT NAME: HARDEN ENVIRONMENTAL SERVICES LTD.

AGAT WORK ORDER: 22T922462

PROJECT: 2220-North Patrol Yard

ATTENTION TO: Allan Rodie

SAMPLING SITE:

SAMPLED BY:AR

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
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Phenols	INOR-93-6072	modified from SM 5530 D	LACHAT FIA
Cyanide, SAD	INOR-93-6051	modified from MOECC E3015; SM 4500-CN- A, B, & C	TECHNICON AUTO ANALYZER
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 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 Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
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 Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

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 #: 22T922462

Cooler Quantity: 1 blue large

Arrival Temperatures: 5.9 | 6.2 | 6.8

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: Bagged ice

Report Information:

Company: HARDEN ENVIRONMENTAL SERVICES LTD.

Contact: Allan Rodie 519-400-7113

Address:

Phone: 519-826-0099 Fax:

Reports to be sent to:

1. Email: arodie@hardenv.com
2. Email: sdenhoed@hardenv.com

Regulatory Requirements:

(Please check all applicable boxes)

- ☐ Regulation 153/04 — Table ___ (Indicate One): ☐ Ind/Com ☐ Res/Park ☐ Agriculture; Soil Texture (Check One): ☐ Coarse ☐ Fine
- ☐ Excess Soils R406 — Table ___ (Indicate One)
- ☐ Regulation 558
- ☐ CCME
- ☑ Sewer Use: ☐ Sanitary ☑ Storm — YORK (Region)
- ☐ Prov. Water Quality Objectives (PWQO)
- ☐ Other ___ (Indicate One)

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: 2220 - NORTH PATROL YARD

Site Location:

Sampled By: AR

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

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

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

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

Analysis columns: Field Filtered - Metals, Hg, CrVI, DOC (Y/N); O. Reg 153: Metals & Inorganics; Metals - ☐ CrVI, ☐ Hg, ☐ HWSB; BTEX, F1-F4 PHCs; PAHs; PCBs; VOC; Aroclors; O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs; O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs; Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4; Corrosivity: Include Moisture ☐ Sulphide ☐; YORK REGION-STORM; Potentially Hazardous or High Concentration (Y/N)

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered (Y/N)	YORK REGION-STORM
POND	7/19/22	1230 PM		SW		NO	✓
BH1	7/19/22	240 PM		GW		NO	✓

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Allan Rodie [signature]	7/19/22	4:18pm	Amber D. [signature]		

'22 JUL 19 4:22

Page 1 of 1

Nº: T - 134394

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

Water Well Records

September 16, 2024

1:02:42 PM

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
GEORGINA TOWNSHIP (N CON 05 022	17 626185 4905373 W	1998-09 1413	6 6	FR 0228 FR 0257	75/226/10/1:0	CO		6924628 (188863)	BRWN LOAM SOFT 0001 BRWN CLAY STNS SOFT 0018 GREY SAND CLAY GRVL 0076 GREY CLAY DNSE 0228 GREY SHLE SOFT 0256 GREY LMSN ROCK 0261
GEORGINA TOWNSHIP (N CON 05 023	17 626151 4905224 W	2021-08 7732	1.97		///:	MO	0008 5	7394936 (WZR7HDZT) A326580	BRWN CLAY SAND 0012
GEORGINA TOWNSHIP (N CON 05 023	17 626097 4905332 W	2021-08 7732	1.97		///:	MO	0008 5	7394935 (T4B784JB) A326579	BRWN CLAY SAND 0012
GEORGINA TOWNSHIP (N CON 05 023	17 626137 4905175 W	2021-08 7732	1.97		///:	MO	0008 5	7394934 (VIFHVK86) A326578	BRWN CLAY SAND 0012
GEORGINA TOWNSHIP (N CON 05 023	17 625944 4905313 W	1991-06 5019	5	FR 0257	/90/14/2:20	DO		6921554 (68836)	BRWN CLAY BLDR HARD 0021 BLUE CLAY BLDR HARD 0036 BRWN SAND LOOS 0037 BLUE CLAY BLDR HARD 0177 GREY SILT STNS CMTD 0191 GREY CLAY BLDR HARD 0260 GREY LMSN PORS 0260
GEORGINA TOWNSHIP (N CON 09 008	17 625919 4905363 W	1992-09 5019				NU		6922157 (110705) A	PRDG
GEORGINA TOWNSHIP (N CON 09 008	17 625914 4905383 W	1992-09 5019	5	FR 0226	60/135/10/3:0	DO		6922155 (110706)	BRWN LOAM SOFT 0002 BRWN CLAY SOFT 0016 BRWN CLAY GRVL LOOS 0020 BLUE CLAY STNS DNSE 0150 GREY CLAY BLDR HARD 0220 GREY CLAY SHLE LYRD 0226 GREY LMSN SOFT 0243
GEORGINA TOWNSHIP (N CON 09 008	17 625746 4905327 W	1959-08 4102	36	FR 0036	28/32/1/1:0	DO		6904898 ()	GREY CLAY STNS 0035 STNS 0036
GEORGINA TOWNSHIP (N CON 09 009	17 625914 4905341 W	1991-11 5019	6	FR 0078	29/32/15/2:20	DO	0080 4	6921834 (44352)	BRWN CLAY BLDR HARD 0018 BLUE CLAY BLDR HARD 0038 GREY CLAY DNSE 0062 GREY CLAY SAND STNS 0078 RED SAND LOOS 0084
GEORGINA TOWNSHIP (N CON 09 009	17 625964 4905423 W	1976-05 1413	6	FR 0089	10/21/5/4:0	ST DO	0086 4	6913322 ()	BLCK LOAM SOFT 0001 BRWN SAND CLAY DNSE 0003 BRWN CLAY DNSE 0016 GREY CLAY STNS HARD 0062 BLUE CLAY DNSE 0086 BRWN SAND GRVL PORS 0089 BRWN CLAY STNS CMTD 0090
GEORGINA TOWNSHIP (N CON 09 010	17 626517 4905633 W	2019-08 1413	6.25	FR 0081	25/45/15/1:	DO	0078 3	7343019 (Z314390) A271447	BRWN CLAY STNS HARD 0018 GREY CLAY HARD 0070 GREY CLAY SAND LYRD 0072 BRWN SAND GRVL ---- 0081
GEORGINA TOWNSHIP (N CON 09 010	17 626514 4905633 W	1989-03 5019	5	FR 0072	26/70/8/3:0	DO	0079 4	6920360 (44511)	BRWN CLAY BLDR HARD 0009 BLUE CLAY BLDR HARD 0028 GREY CLAY SAND HARD 0072 GREY GRVL SILT CMTD 0082 GREY CLAY SOFT 0083

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

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		