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HYDROGEOLOGICAL IMPACT ASSESSMENT REPORT

Nobleton Wells 2 & 5 Upgrades, The Regional Municipality of York, ON

Project #: 23-0358
Prepared for: ETO Engineering
Date: May 23, 2025

Report Version: 03

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Attention: Johnny Pang, P.Eng., PMP

SUBJECT: HYDROGEOLOGICAL IMPACT ASSESSMENT REPORT, NOBLETON WELLS 2 & 5 UPGRADES, THE REGIONAL MUNICIPALITY OF YORK, ON

EnVision Consultants Ltd. is pleased to present the enclosed Hydrogeological Impact Assessment Report report for the above-noted property. The report describes the interpreted hydrogeological conditions based on our assessment and provides conclusions for your consideration. This version of the report has updated to the most current design, and has been expanded to include both the Well 5 Site, and the Well 2 Site. The previous version should be deleted and replaced with this version.

We thank you for utilizing EnVision for this assignment. If there are any questions regarding the enclosed report, please do not hesitate to contact us.

Yours sincerely,

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QUALITY MANAGEMENT

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SIGNATURE	DRAFT	DRAFT	DRAFT
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DATE	December 13, 2023	October 11, 2024	May 23, 2025

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1. INTRODUCTION

EnVision Consultants Ltd. (EnVision) was retained by ETO Engineering (the 'Client') to conduct a hydrogeological impact assessment in support of proposed facility upgrades at the Nobleton Well 2 and Well 5 locations. The Well 2 facility location is identified by the municipal address 22 Faris Avenue, Township of King, ON. The Well 5 facility location is identified by the municipal address 12860 Highway 27, Nobleton, ON. It is our understanding that this assessment has been requested to support the proposed capacity and treatment upgrades for the two facilities.

The scope of work for the geo-environmental engineering services provided herein is outlined in ETO Engineering's request for The Regional Municipality of York's quotation entitled "Preliminary Design, Detailed Design, Contract Administration and Site Inspection Services for The Nobleton Wells 2 and 5 Upgrades", Reference No. RFPC-738-22. The scope of field investigations was further amended in collaboration with the Client as documented in email communications between September 15th and October 13th, 2023.

Geo-environmental soil characterization studies and geotechnical studies were also performed for this project, and those findings are provided in separate reports.

Review of the design drawings provided by the Client indicates that the proposed upgrades at the two sites consist of the following:

- Nobleton Well 2 - Construction of a generator pad, removal of a chlorine contact tank and associated linear utilities, and valve chamber installation.
- Nobleton Well 5 - Construction of a treatment plant building and a generator pad, as well as watermain and sanitary sewer installations.

The location of the two facilities, together with a 500-m buffer around the properties, representing the 'Study Area' are presented on the attached Figure 1.

1.1. OBJECTIVES AND SCOPE OF WORK

The objective of this hydrogeological investigation is to characterize the geological and hydrogeological conditions at the Site and Study Area to:

- Review soil and groundwater data to understand any constraints to the project goals;
- Estimate the need for groundwater control during construction;
- Assess potential dewatering rates to determine the required permitting associated with water takings as per Ontario Water Resources Act;
- Assess any short- or long-term impacts on groundwater resources from the construction activities;
- Review mitigation measures to protect groundwater resources during the construction work; and,
- Determine management options for the handling of any groundwater collected and discharged during construction.

1.2. SITE DESCRIPTION

1.2.1. Well 2 Location

The site is located on the north side of Faris Avenue, approximately 50 m west of the intersection of Wellington Street and Faris Avenue in a mixed residential and commercial area in the Community of Nobleton, Township of King. The site is rectangular in shape with approximately 15 m of frontage along Faris Avenue, occupying an area of approximately 0.14 ha (0.35 acres). The site is currently comprised of manicured grass, trees, and a single-story well facility with an associated driveway. Additional information on the property is presented in *Table 1-1* below.

Table 1-1: Well 2 Project Area Information

CRITERION	PHASE ONE PROPERTY INFORMATION
MUNICIPAL ADDRESS(S)	22 Faris Avenue, Nobleton, Ontario
PROPERTY IDENTIFICATION NUMBER(S) (PIN)	03352-0130
PROPERTY OWNER(S)	The Regional Municipality of York 17250 Yonge Street, Newmarket, ON L3Y 6Z1
GEOGRAPHICAL COORDINATES	608,018 m E 4,861,718 m N
QUATERNARY WATERSHED BOUNDARY	Humber River

1.2.2. Well 5 Location

The Well 5 Site is currently comprised of manicured grass, trees, and a single-story well facility and associated driveway. It is located on the west side of Highway 27, approximately 415 m south of the intersection of Highway 27 and King Road. The Site is located in a mixed commercial, community, agricultural, and residential area in the Community of Nobleton, Township of King. The Site is irregular in shape with approximately 110 m of frontage along Highway 27, occupying an area of approximately 1.12 ha (2.76 acres). Additional information on the property is presented in *Table 1-2* below.

Table 1-2: Project Area Information

CRITERION	PROJECT AREA INFORMATION
MUNICIPAL ADDRESS(S)	12860 Highway 27, Nobleton, Ontario
PROPERTY IDENTIFICATION NUMBER(S) (PIN)	03351-0054 (LT)
PROPERTY OWNER(S)	The Regional Municipality of York 17250 Yonge Street, Newmarket, ON L3Y 6Z1

CRITERION	PROJECT AREA INFORMATION
GEOGRAPHICAL COORDINATES	608,115 m E 4,861,432 m N
QUATERNARY WATERSHED BOUNDARY	Humber Watershed

1.3. POLICY AND REGULATORY OVERVIEW

The Study Area falls within the Toronto Regional Conservation Authority Regulated Area (Toronto and Region Conservation Authority, 2022) and a review of the Source Water Protection Policy areas indicates the Sites both are situated within the Toronto Source Protection Area, Wellhead Protection Area (WHPA) A with a score of 10, as highlighted on Figure 2. The facility does not fall within any intake protection zones and is not considered a significant groundwater recharge area (Ministry of the Environment, Conservation and Parks, 2021). Areas within the Study Area do intersect a highly vulnerable aquifer mapped area. *Table 1-3* summarizes the relevant source water and regulated area mapping for the Site's and Study Area.

Table 1-3: Summary of Source Water Protection Area and Regulation Area Mapping

SITE LOCATION	WELLHEAD PROTECTION AREA	HIGHLY VULNERABLE AQUIFER	SIGNIFICANT GROUNDWATER RECHARGE AREA	TRCA REGULATION MAPPING AREA
WELL 2	A – Score – 10	Site – No Study Area - Yes	No	Site- Yes Study Area - Yes
WELL 5	A – Score – 10	Site – No Study Area - Yes	No	Site – No Study Area – Yes

2. REGIONAL SETTING

2.1. GEOLOGY

The Study Area is situated within the physiographic region identified as the South Slope, which is an area of land that represents the southern flank of the Oak Ridges Moraine landform. In the area of the Site, the South Slope is comprised of successive layers of glacial material deposited during ice advance and retreat cycles.

2.1.1. Overburden Geology

A review of the public geological mapping of the Study Area indicated that the surficial material consists of glaciolacustrine deposits of clay to silt-textured till (Ministry of Northern Development, Mines and Forestry, 2013). Figure 3 highlights the surficial geology of the Study Area.

2.1.2. Bedrock Geology

Bedrock mapping of the Study Area identifies the bedrock as the Georgian Bay formation; a mix of shale, siltstone, dolostone and limestone (Sharpe, 1980). The depth to bedrock is expected at more than 30 meters below the ground surface (m BGS) and is not considered hydrogeologically significant to the Site.

2.2. HYDROGEOLOGICAL SETTING

2.2.1. Study Area Review of MECP Well Records

EnVision reviewed the online Ministry of the Environment, Conservation and Parks (MECP) Water Well Record WWR information system (Ministry of Environment, Conservation and Parks, 2018) to determine the number and reported use of water wells present within the Study Area.

The MECP WWR database indicated that there are one hundred and sixteen (116) water wells in the Study Area. Of the well records returned in the search, forty-five (45) were classified as abandoned/unknown, forty-six (46) were classified as observation/monitoring/test holes and twenty five (25) were classified as water supply wells.

Of the water supply wells pulled from the database, four (4) wells were classified as commercial, three (3) wells were listed as municipal, one (1) was listed as public, and seventeen (17) were listed for domestic use.

The depth of the wells ranged from 1.68 to 116.13 m BGS. Of the wells classified as being used for water supply, the depths ranged from 2.74 to 111.86 m BGS. The results of this search have been plotted in Figure 4 and a summary of the well records has been tabulated in Appendix A.

2.2.2. Hydrostratigraphy

Based on a review of the public records, including a 2018 background hydrogeological assessment of the study area performed by Palmer Environmental Consulting Group, the stratigraphic sequence below the Project Area is anticipated to consist of the following general sequence:

- Fill materials of various consistency and thickness;
- Halton Till;
- Oak Ridges Aquifer Complex (ORAC);
- Newmarket Till;
- Thorncliffe Formation;
- Sunnybrook Drift;
- Scarborough Formation; and,
- Bedrock – Georgian Bay Formation.

The primary water bearing formation across the Study Area is expected to be the Oak Ridges Aquifer Complex (ORAC), Thorncliffe Formation, and Scarborough Formation. In these formations, continuous layers of fine to medium sand are encountered. The onsite and nearby municipal wells supply water to area residents that is extracted from the lower lying Scarborough Formation.

Groundwater flow in these units is influenced by topography and travels horizontally toward Lake Ontario. In addition, groundwater is also known to be encountered within the fractured till material that is found near the surface across the Study Area. Within the Halton Till, groundwater flow in the horizontal direction is constricted due to low permeability, however within weathered or highly fractured till, significant flow within discontinuous sand or silt lenses is possible, however this would be on a local scale.

2.2.3. Permit to Take Water and Construction Dewatering EASR Search

The MECP maintains an online database and GIS mapping service that contains all registered Permit to Take Water and Construction Dewatering EASR filings (Ministry of the Environment, 2018). A review of this service indicates that the following activities are currently reported for the Study Area.

- Water Taking – PTTW – Issued - for municipal water supply, 14 Royal Ave Lot 6 Concession 8, 22 Faris Ave Lot 5, 12860 Hwy 27 Lot 4, King, Onratio (total permitted volume of 4,460,000 L/day)
- Water Taking – PTTW – Expired - for a dugout pond at lot 3, 4, Concession 8, King, Ontario (total permitted volume of 3,273,000 L/day)
- Water Taking PTTW – Expired – for pumping station sump, STP sump, wetland well points, sewer line sumps lot 5,6,2, Concession 8,10,11, King, Ontario (total permitted volume of 1,584,000 L/day)

Based on this review, the surrounding areas, have required temporary water taking permits for construction dewatering activities.

2.2.4. ERIS Summary (Well 2)

The ERIS report for the Well 2 Site showed 151 records within the 250m search area. Twelve (12) of the records were identified within the site area.

Table 2-1: Summary of ERIS Report for Well 2 Site and Study Area

CRITERION	SUMMARY OF RECORDS REVIEW RESULTS
RECORDS OF ENVIRONMENTAL INCIDENTS, ORDERS, OFFENCES, SPILLS, DISCHARGES OF CONTAMINANTS, OR INSPECTIONS	The ERIS report did not identify any records of incidents or spills for the Phase One Property. Forty-five (45) records pertaining to incidents and/or releases at properties within the Study Area were identified, including: • Various spills associated with vehicles at the intersection of King Street and Highway 27; and, • In January 2012 and March 2017, gasoline spills were identified at United Petroleum Transport, located approximately 165 m northeast of the Site at 12990 Highway 27. In 2012, the spill was identified as a leak and no volume was included in the record. In 2017, the spill was identified to have occurred due to overflow by human error and 10 L of gasoline was spilled. The remainder of the incident and spill records pertained to pipeline strikes resulting in the release of natural gas to air, which were not anticipated to have impacted the environmental quality of the Phase One Property and are therefore not listed herein.
WASTE MANAGEMENT RECORDS, INCLUDING CURRENT AND HISTORICAL WASTE STORAGE LOCATIONS, O. REG. 347 WASTE GENERATOR / RECEIVER SUMMARY RECORDS, AND MECP WASTE DISPOSAL INVENTORY	The ERIS Report did not identify Waste Receiver Records for the Phase One Property or properties within the Study Area. One (1) O. Reg. 347 Waste Generator Summary Records was identified for the Phase One Property, as summarized below: • CH2M Hill Ltd., an engineering company, was registered at 22 Faris Avenue for the generation of other specified inorganics as of July 2022. The ERIS report identified eleven (11) O. Reg. 347 Waste Generator Summary Records pertaining to two (2) properties located within the Study Area, including: • Suncor Energy Products, located at 12990 Hwy 27, approximately 190 m northeast of the Site, was registered for the generation, use, and/or storage of light fuels and oil skimmings and sludges in 2014 and 2021. Due to distance from the Phase One Property, location relative to the inferred groundwater flow direction, and the nature of waste products identified, the remaining property identified in the Waste Generator database was not anticipated to have impacted the environmental quality of the Phase One Property and is therefore not listed herein. The ERIS report did not identify records pertaining to the Phase One Property and Study Area with regards to large or small scale, active or closed landfill sites.
RECORDS OF FUEL STORAGE MAINTAINED BY TECHNICAL STANDARDS AND SAFETY AUTHORITY (TSSA)	The ERIS report did not identify records of fuel storage for the Phase One Property. Thirty-two (32) records pertaining to six (6) properties within the Study Area were identified; however, due to distance from the Phase One Property, location relative to the inferred groundwater flow direction, and/or the nature of products identified, the records identified in these databases were not anticipated to have impacted the environmental quality of the Site and are therefore not listed herein.
OTHER COMMERCIAL AND INDUSTRIAL RECORDS	No additional commercial and/or industrial records were identified in the ERIS report for the Phase One Property. Two (2) records pertaining to one (1) property within the Study Area were identified in the Pesticide Register, as summarized below:

CRITERION	SUMMARY OF RECORDS REVIEW RESULTS
	• Nobleton True Value Hardware, located approximately 70 m northeast of the Site at 6045 King Road, was licensed as a 'Limited Vendor'

2.2.5. ERIS Summary (Well 5)

The ERIS report for the Well 5 Site showed seventy-four (74) records within the 250m search area. Five (5) of those records is within the site area. *Table 2-1* presents a summary of the potential environmental risks associated with the site. The full ERIS report as well as more information on environmental risks associated with the site can be found in the EnVision Phase One report presented under a separate cover.

Table 2-2: ERIS Summary of Potential Risks

CRITERION	SUMMARY OF RECORDS REVIEW RESULTS
RECORDS OF ENVIRONMENTAL INCIDENTS, ORDERS, OFFENCES, SPILLS, DISCHARGES OF CONTAMINANTS, OR INSPECTIONS	The ERIS report did not identify any records of incidents or spills for the Site. Nineteen (19) records pertaining to incidents and/or releases at properties within the Study Area were identified; however, due to the nature of the products released, the incidents/releases identified in these databases were not anticipated to have impacted the environmental quality of the Site and are therefore not listed herein. An FOI request was submitted to the MECP, requesting information pertaining to environmental incidents, orders, offences, spills, discharges of contaminants, or inspections for the Site. A confirmation of receipt and response has not yet been received from the MECP regarding the FOI request. Notification will be provided if any records are identified by the MECP file search that may impact or change the findings of this report.
WASTE MANAGEMENT RECORDS, INCLUDING CURRENT AND HISTORICAL WASTE STORAGE LOCATIONS, O. REG. 347 WASTE GENERATOR / RECEIVER SUMMARY RECORDS, AND MECP WASTE DISPOSAL INVENTORY	The ERIS Report did not identify Waste Receiver Records or O. Reg. 347 Waste Generator Summary Records for the Site. The ERIS report identified nine (9) O. Reg. 347 Waste Generator Summary Records pertaining to one (1) property located within the Study Area; however, the records pertained to a medical clinic and are not anticipated to have impacted the environmental quality of the Site and are therefore not listed herein. Waste Receiver records were not identified for properties within the Study Area. Additionally, the ERIS report did not identify records pertaining to the Site or Study Area with regards to large or small scale, active or closed landfill sites.
RECORDS OF FUEL STORAGE MAINTAINED BY TECHNICAL STANDARDS AND	The ERIS report did not identify records of fuel storage for the Phase One Property or the surrounding Study Area. An information request was submitted to the TSSA pertaining to underground and aboveground fuel storage for the Phase One Property and adjacent properties. The TSSA response was received on April 11, 2023 and indicated that no records were identified pursuant to this request.

CRITERION	SUMMARY OF RECORDS REVIEW RESULTS
SAFETY AUTHORITY (TSSA)	
OTHER COMMERCIAL AND INDUSTRIAL RECORDS	No additional commercial and/or industrial records were identified in the ERIS report for the Phase One Property. Three (3) records pertaining to one (1) property within the Study Area were identified in the Pesticide Register, as summarized below: • Boynton Weed Spraying Limited, located at 12805 Highway 27, approximately 200 m southeast of the Phase One Property was licenced as an operator.

3. SITE SETTING

3.1. TOPOGRAPHY AND DRAINAGE

Based on the reviewed topographical details, the Well 2 Site Area features a minor gradient dipping towards the west and southwest. The Site reached its lowest elevation at approximately 263m ASL along the southwest corner of the site along the existing creek channel and its highest elevation point at about 266m ASL at the northeast corner of the site.

The Site grounds are covered by a mix of permeable and impermeable surfaces with surface water anticipated to be collected and conveyed through a swale to the western boundary where it is released to the existing creek.

Based on topographical survey, the Well 5 Site Area features a minor gradient dipping towards the south along Highway 27. The Site reached its lowest elevation at approximately 258m ASL on the south side of the property and its highest elevation point at about 263m ASL at the north side of the site.

The Site grounds are covered by mostly vegetation. The Site Area features asphalt driveway and a pumping facility which directs excess runoff to the south toward a large, vegetated area where it can infiltrate into the ground. There are also drainage culverts which collect run off along the eastern boundary of the Site Area along Highway 27.

3.2. SURFACE WATER FEATURES

Along the western boundary of the Well 2 property a small creek meanders from the north towards the south, entering a culvert below Faris Avenue where it enters a stormwater culvert for eventual discharge to the Humber River tributary southeast of Highway 27 and Parkview Dr. Based on the topographical details provided on the design drawing set, the creek is situated at approximately 263.0 to 263.5m ASL where it enters the property.

The south side of the Well 5 property features a small tributary of the Humber River flowing from west to east across the Site. The small creek crosses Highway 27 where it joins with the East Humber River near King Road and Concession Road 8 approximately 2.1km east of the Site. The East Humber River connects with the main Humber River just north of Highway 7 between Pine Valley Drive and Highway 27. The Humber River flows into Lake Ontario approximately 33km south of the Site.

3.3. NOBLETON GROUNDWATER SUPPLY WELL SUMMARY

The Village of Nobleton is provided drinking water from five (5) groundwater production wells, PW-2, PW-3, PW-5, and PW-7, with PW-6 serving as a backup. The wells are registered under MOECC PTTW# 6548-D55LZH issued October 13, 2022 and are managed by York Region (Ministry of the Environment, 2018). The PTTW is summarized in *Table 3-1* below.

Table 3-1: Active PTTW Summary

SOURCE NAME	SOURCE TYPE	CATEGORY	MAX TAKEN PER MIN (L)	MAX TAKEN PER DAY (L)	ZONE/ EASTING/ NORTHING
PW-2	WELL DRILLED	MUNICIPAL SUPPLY	1,364	1,964,000	17 608009 E 4861746 N
PW-3	WELL DRILLED	MUNICIPAL SUPPLY	1,734	2,496,000	17 608342 E 4862013 N
PW-5	WELL DRILLED	MUNICIPAL SUPPLY	1,734	2,496,000	17 608241 E 4861438 N
PW-6	WELL DRILLED	MUNICIPAL SUPPLY	1,734	2,496,000	17 608152 E 4861416 N
PW-7	WELL DRILLED	MUNICIPAL SUPPLY	1,734	2,496,000	17 608346 E 4861996 N

Envision has reviewed the 2018 background hydrogeological assessment completed by Palmer Environmental Consulting Group INC. (Katanchi & Cole, 2018) to better understand the site setting.

Production Well PW-2 was completed in 1961 and is constructed as a 0.32 m diameter well, screened from elevation 155.5 to 161.5 m ASL. Production Well PW-5 was completed in 2012 and then was commissioned in 2015. The well is 0.32m in diameter and is drilled to approximately 100m below ground. Both wells are screened in a sand and gravel unit within the Scarborough Formation. The aquifer is locally confined by the Sunnybrook Drift and can be up to 60m thick within the bedrock valley located to the south-southwest and east of Nobleton running west to southeast and north to south.

3.4. MONITORING WELL NETWORK

The Region maintains a network of variable depth (shallow, and deep) groundwater monitoring wells across the Study Area, which target the ORAC, Thorncliffe Aquifer, and deeper lying Scarborough Aquifer formations. The purpose of the monitoring network is to conduct continuous monitoring of the shallow and deep groundwater elevations across the network, both within pumping wells and at nearby monitoring well locations.

Based on review of the Nobleton Well 5 site monitoring wells and water level records, Well No. 4S, screened 18.6m to 21.0m bgl appears to be shallowest and may be most representative of the Region's wells in determining the piezometric head that will act at the base of the proposed wet well excavation.

The water level records for Well 4S between Years 2022 and 2024 reveal piezometric total head almost identical to those measured by EnVision in our monitoring wells 5-1, 5-2 and 5-4 during our observation period, indicating that the silt unit into which the EnVision wells are screened communicates with the deeper medium grained sand and gravel formation into which Well 4S is screened. Based on the 4-year record of water level readings provided by the Region, it appears that a maximum piezometric level of about 255.0m was the highest recorded. Seasonal fluctuations across the period indicate water levels are highest in the spring months, and lowest during the early winter (November to December). The amplitude of several seasonal fluctuations are summarized below in *Table 3-2*:

Table 3-2: Summary of Well 4s Seasonal Fluctuations at Well 5 Facility

YEAR	HIGH CONDITION (mm/elev.)	LOW CONDITION (mm/elev.)	FLUCTUATION (m)
2020	May – 255.3	Dec – 254.1	1.2
2021	May - 254.6	Sep – 253.7	0.9
2022	April - 254.9	Nov - 253.6	1.3
2023	Inconclusive	Dec – 254.0	NA
2024	May - 255.4	Jan - 254.1	1.3

Review of the water level data from the other Region wells indicates that the hydraulic gradient at this site is downward.

4. FIELD INVESTIGATION

4.1. BOREHOLE DRILLING

The field investigation at the Well 2 site was carried out on December 6, 2023, which consisted of drilling three (3) boreholes (designated as BH2-1 to BH2-3) to depths ranging from 5.2m to 6.1m below the existing ground surface. Three (3) boreholes were completed as monitoring wells.

The field investigation at the Well 5 site was carried out between October 19 and October 20, 2023, which consisted of drilling six (6) boreholes (designated as BH5-1 to BH5-6) to depths ranging from 1.5m to 9.7m below the existing ground surface. Three (3) boreholes were completed as monitoring wells.

Borehole log sheets and details are attached in Appendix B. The approximate location of boreholes and monitoring wells are highlighted in Figure 5, and Figure 6.

4.2. SOIL DESCRIPTIONS – NOBLETON WELL 2

In summary, the subsurface conditions encountered in the boreholes consisted of topsoil or flexible pavement structure underlain by fill material, generally consisting of loose to compact sand and gravel to gravelly sand, and firm to very stiff silty clay to clayey silt. Native overburden deposits consist of very stiff to hard silty clay to clayey silt till and compact to dense silty sand. A lithological profile interpretation based on the borehole information has been prepared and presented in Figure 7.

4.2.1. Topsoil

A 205 mm thick layer of topsoil was encountered at borehole BH2-2. Topsoil thickness will vary between and beyond the borehole locations.

4.2.2. Flexible Pavement

Boreholes BH2-1 and BH2-3 were advanced through the pavement structure of the driveway to the property located at 22 Faris Avenue. Two asphalt cores were also collected from the driveway pavement. A pavement structure consisting of 105mm to 130mm asphaltic concrete, underlain by 350mm to 355mm of sand and gravel to gravelly sand fill was encountered at the test hole locations.

4.2.3. Fill – Silty Clay to Clayey Silt

Fill material, consisting of silty clay to clayey silt was encountered in all the boreholes at depths ranging from 0.2m to 0.5m below the ground surface which extended to depths ranging about from 0.6m to 1.2m below the existing ground surface.

4.2.4. Silty Clay Till to Clayey Silt Till

Cohesive glacial till deposits ranging in texture from silty clay to clayey silt were encountered in all of the boreholes, at depths ranging from 0.6m to 1.2m below ground surface, which extended to borehole termination depths ranging from 5.2m to 6.1m below ground surface.

Glacial till deposits can be expected to contain cobbles and boulders. The slow rate of drilling experienced within these deposits can be attributed to the presence of cobbles and/or boulders.

4.2.5. Silty Sand

Embedded within the cohesive glacial till, a 0.2m to 0.4m thick layer of wet silty sand was encountered in all of the boreholes, at depths ranging from 2.1m to 3.0m below ground surface, which extended to depths ranging from 2.5m to 3.3 m below the ground surface. The natural water content of samples of the silty sand deposit ranged from 16% to 19% by weight.

4.3. SUBSURFACE CONDITIONS - NOBLETON WELL 5

In summary, the subsurface conditions encountered in the boreholes consisted of topsoil or a flexible pavement structure underlain by fill material, generally consisting of firm to very stiff silty clay to clayey silt, loose to compact silty sand to sand and silt and, loose sand and gravel. Native overburden deposits consist of very dense cohesionless deposits ranging in composition from silt to sand and silt, stiff to hard silty clay to clayey silt and very dense silty sand till to sandy silt till. A lithological profile interpretation based on the borehole information has been prepared and presented in Figure 8.

4.3.1. Topsoil

A layer of topsoil, ranging in thickness from 80 mm to 130 mm was encountered at the ground surface at the borehole locations. Topsoil thickness will vary between and beyond the borehole locations.

4.3.2. Flexible Pavement

Borehole BH5-3 was advanced through the pavement structure of the driveway to the property located at 12860 ON-12. A pavement structure consisting of 80mm asphaltic concrete, underlain by sand and gravel fill was encountered.

4.3.3. Fill – Silty Clay to Clayey Silt

Fill material, consisting of silty clay to clayey silt was encountered at boreholes, BH5-1 to BH5-4 and BH5-6 at depths ranging from 0.1m to 0.7m below the ground surface which extended to depths ranging from 0.7m to 2.2m below the existing ground surface.

4.3.4. Fill – Silty Sand to Sandy Silt

Silty sand to sandy silt fill material was encountered in boreholes, BH5-4 and BH5-5 at depths of 0.1m and 0.7m below ground surface which extended to depths of 1.5m and 1.8m below ground surface.

4.3.5. Silt

Silt deposits (non-plastic) were encountered in the boreholes, BH5-1, BH5-2, BH5-4 and BH5-6. The silt deposits were encountered at depths ranging from 2.2m to 4.8m below ground surface which extended to borehole termination depths ranging from 6.5m to 9.7m below ground surface.

4.3.6. Silty Clay to Clayey Silt

Cohesive deposits of silty clay to clayey silt were encountered in boreholes, BH5-4 and BH5-6. The silty clay to clayey silt deposits were encountered at depths of 0.7m and 1.8m below ground surface which extended to depths of 2.2m and 4.8m below ground surface.

4.3.7. Sandy Silt And Sand and Silt

Cohesionless deposits of sandy silt and sand and silt were encountered in boreholes BH5-2 and BH5-3 at depths of 2.2m and 4.5m below ground surface which extended to depths of 3.5m and 5.6m below ground surface.

4.3.8. Silty Sand Till to Sandy Silt Till

A cohesionless glacial till deposit of silty sand to sandy silt texture was encountered in borehole BH5-6 at a depth of 2.2m below ground surface, which extended to a depth of 3.0m below ground surface.

A Standard Penetration test carried out in silty sand till to sandy silt till deposit measured a SPT N-value of 74 blows per 0.3 penetration indicating a very dense relative density. The natural water content of a sample of silty sand till to sandy silt till was 10% by weight.

Glacial till deposits can be expected to contain cobbles and boulders. The slow rate of drilling experienced within these deposits can be attributed to the presence of cobbles and/or boulders.

4.4. MONITORING WELL INSTALLATION

Monitoring wells were installed in six (6) boreholes; three at the Well 2 Site (BH2-1 BH2-2, BH2-3), and three at the Well 5 Site (BH5-1, BH5-2, BH5-4). Upon completion of borehole drilling activities, a 51mm monitoring well was installed by inserting the screen and casing assembly into the borehole to the designed depth and then packing a silica sand pack filter around the screen interval. Above the sand pack, a bentonite hole plug was installed to eliminate contamination from surface along the annulus space. All installed monitoring wells were finished with an above ground protective casing. Ground levels at each of the monitoring well locations were surveyed to an elevation datum and reported on the borehole logs. Well installation details are also included on the logs in Appendix B.

4.5. GROUNDWATER LEVEL MONITORING

Upon completion of well drilling activities, the groundwater monitoring wells were purged and developed to remove fine sediments adjacent to the screen interval. The wells were purged of a minimum of three (3) well volumes. Water levels were then monitored at the Site on December 8, 2023, September 11, 2024, and May 22, 2025 at the Well 2 location, and on October 25, December 12, 2023, August 16, September 11, 2024, and May 22, 2025 at the Well 5 location. A summary of the water level observations to date, including well construction details, and other information is included in Table C-1, and Table C-2, Appendix C.

At the Well 2 Site, the monitoring wells were screened within the upper 6m of overburden, and water levels ranged from dry conditions at BH2-2 (in December 2023), to 1.9m BGS at BH2-2 (in May 2025).

Groundwater levels at BH2-1 ranged from 1.6 to 2.6m, and at BH2-3 the levels ranged from 1.3m to 2.2m below existing ground across the monitoring site visits. The groundwater elevations over the monitoring period recorded on May 22, 2025 ranged from 263.2 to 264.0m ASL, as highlighted on Figure 9, and represented the highest levels observed over the program.

At the Well 5 Site, the monitoring wells were screened within the upper 9.2m of overburden, and water levels ranged from 6.9 to 5.7 at BH5-1, 6.4 to 5.1 at BH5-2, and dry to 5.5m at BH5-4. The groundwater elevations over the monitoring period recorded on May 22, 2025 ranged from 254.9 to 255.7m ASL, as highlighted on Figure 10.

4.6. HYDRAULIC CONDUCTIVITY ASSESSMENT

4.6.1. Grain Size Distribution

EnVision has reviewed grain size distribution plots from the geotechnical field investigation and has tabulated estimated hydraulic conductivity (K) using a variety of empirical relationships. Details are included on the calculation sheets in Appendix D. *Table 4-1* presents a summary of the estimated K value for each of the soil samples. The provided value is the geometric average value from selected empirical relations, as outlined in Appendix D.

Table 4-1: Summary of Estimated K (Grain Size Relationships)

BH ID	SAMPLE ID	DEPTH		SOIL UNIT	HYDRAULIC CONDUCTIVITY
		From (m)	To (m)		(m/sec)
BH2-1	SS6	3.8	4.2	SILTY CLAY TILL TO CLAYEY SILT TILL	$6.5X10^{-9}$
BH2-2	SS2	0.6	1.1	SILTY CLAY TILL TO CLAYEY SILT TILL	$2.5X10^{-9}$
BH2-3	SS2	0.6	1.1	FILL	$8.6X10^{-9}$
BH5-1	SS2	0.7	1.2	FILL	$2.0X10^{-9}$
BH5-1	SS7	4.5	5.0	SILT	$3.4X10^{-8}$
BH5-2	SS7	4.5	5.0	SILT AND SAND	$1.8X10^{-8}$
BH5-3	SS4	2.3	2.8	SILT AND SAND	$7.4X10^{-7}$
BH5-4	SS5	3.1	3.6	SILTY CLAY TO CLAYEY SILT	$4.7X10^{-9}$

The K values have been summarized to provide a range based on the soil unit description in *Table 4-2.*

Table 4-2: Summary of K Value Ranges by Soil Unit

SOIL UNIT	LOW K (m/sec)	HIGH K (m/sec)	AVERAGE K (m/sec)
FILL	$2.0X10^{-9}$	$8.6X10^{-9}$	$2.00X10^{-9}$
SILT	$3.4X10^{-8}$	$3.4X10^{-8}$	$3.4X10^{-8}$
SILT AND SAND	$1.8X10^{-8}$	$7.4X10^{-7}$	$3.8X10^{-7}$
SILTY CLAY TO CLAYEY SILT	$4.7X10^{-9}$	$4.7X10^{-9}$	$4.7X10^{-9}$
SILTY CLAY TILL TO CLAYEY SILT TILL	$2.5X10^{-9}$	$6.5X10^{-9}$	$4.5X10^{-9}$

4.6.2. In-Situ Single Well Response Testing (SWRT)

EnVision conducted confirmatory SWRTs at all monitoring wells on Site, apart from BH5-4 which was measured to be dry at the time of testing. In advance of performing SWRTs, the monitoring wells were developed to remove the potential presence of fine sediments. The development process involved purging of the monitoring wells to induce the flow of fresh formation water through the screen. The monitoring well water levels were permitted to fully recover prior to performing SWRTs.

During the SWRT, a slug of water was near-instantaneously removed from the well and the response in water level was recorded. The K values for each of the tested wells were calculated from the SWRT data using Aqtesolv Software and the Bouwer-Rice solutions for unconfined conditions. The semi-log plots for normalized drawdown versus time are included in Appendix E. *Table 4-3* presents a summary of the in-situ rising head test results.

Table 4-3: Summary of in-Situ Single Well Response Testing

BH ID	SCREEN DEPTH From (m)	SCREEN DEPTH To (m)	SOIL UNIT	HYDRAULIC CONDUCTIVITY (m/sec)	HYDRAULIC CONDUCTIVITY (m/day)
BH2-1	2.1	5.1	SILTY SAND TO SILTY CLAY TILL	$8.5x10^{-8}$	$7.3x10^{-3}$
BH2-2	3.0	6.0	SILTY SAND TO SILTY CLAY TILL	$3.9x10^{-9}$	$3.4x10^{-4}$
BH2-3	2.2	5.2	SILTY SAND TO SILTY CLAY TILL	$1.3x10^{-7}$	$1.1x10^{-2}$
BH5-1	6.1	9.1	SILT	$6.8x10^{-7}$	$5.9x10^{-2}$
BH5-2	6.1	9.1	SILT	$9.1x10^{-8}$	$7.9x10^{-3}$

4.7. GROUNDWATER QUALITY ASSESSMENT

To assess the suitability for discharge of pumped groundwater to the York Region sanitary sewer during dewatering activities, one (1) groundwater sample was collected from each of BH2-1, and BH5-2. Prior to collection of the sample, approximately three (3) well volumes of standing groundwater were purged from the well. The sampling date for BH2-1 was September 11, 2024, and the sampling date for BH5-2 was October 25, 2023.

The suites were collected unfiltered and placed into pre-cleaned laboratory-supplied vials and/or bottles provided with analytical test group specific preservatives, as required. Dedicated nitrile gloves were used during sample handling. The groundwater sample was submitted to an independent laboratory, Bureau Veritas Laboratories (BV), in Mississauga, Ontario, for analysis of parameters of the York Region Sewer Use By-Law. BV is a certified laboratory by the Canadian Association for Laboratory Accreditation Inc.

For the assessment purposes, the analytical results were compared to the Regional Municipality of York By-Law No. 2021-102, Limits for Sanitary Sewer Discharge, and Limits for Storm Sewer/Land Drainage Discharge.

A summary of the analytical results and the laboratory Certificate of Analysis (CofA) are enclosed in Appendix F. A summary of the noted exceedances is included in *Table 4-4* below.

Table 4-4: Summary of Groundwater Exceedances Against York Region Storm/Sanitary Sewer Discharge

PARAMETER	UNITS	LIMITS FOR STORM DISCHARGE	LIMITS FOR SANITARY DISCHARGE	RESULTS BH5-2 (10-25-24)	RESULTS BH2-1 (09-11-24)
TOTAL SUSPENDED SOLIDS (TSS)	mg/L	15	350	**370**	**95**
TOTAL MANGANESE (MN)	ug/L	150	5000	**180**	69

NOTES:

UNDERLINED BOLD = EXCEEDS BOTH LIMITS

BOLD = EXCEEDS THE STORM SEWER RELEASE LIMITS ONLY

Results from the Well 2 Site monitoring well, BH2-1 indicate one (1) exceedance when compared to the parameters under York Region storm sewer release limit. The lone exceedance was reported for total suspended solids. The results from the well sampling had no reported exceedances against the sanitary sewer release limits.

Results from the monitoring well, BH5-2 indicate one (1) exceedance when compared to the parameters under York Region sanitary sewer release limit. The exceedance includes total suspended solids. The results also indicate two (2) exceedances when compared to the parameters under York Region storm sewer release limit. The exceedances include total suspended solids and total manganese.

5. CONSTRUCTION DEWATERING ASSESSMENT

Water takings within the Province of Ontario are governed by the Ontario Water Resources Act (OWRA), and the Water Taking and Transfer Regulation (O.Reg. 387/04). In addition, O.Reg. 63/16 regulates water takings for temporary activities, such as construction and road work dewatering. In Ontario, construction dewatering that exceeds 50,000 L/day requires either a Category 3 PTTW, or registration with the MECP EASR. The proposed work may fall within the following possible categories:

- Surface water diversions without pumping (i.e. non-earth cofferdam, sheet piles, sandbags designed to provide a dry work area) are exempt and do not require permitting.
- Surface water diversions with pumping out of an excavation designed to provide a dry working area is exempt from permitting, except that best management practices listed in the regulation must be followed.
- Pumping of groundwater (construction dewatering) to maintain a dry work area, which falls under one of three scenarios:
    - Volumes of a combination of groundwater and surface water (precipitation) that is below 50,000 L/day are exempt from permitting
    - Volumes of a combination of groundwater and surface water (precipitation) that is above 50,000 L/day but below 400,000 L/day require registration as an EASR
    - Volumes of groundwater that is above 400,000 L/day will require a Category 3 PTTW.

In practice, the timelines associated with the permitting required for construction dewatering range from one or two weeks, to upwards of 90 days. The EASR process is self-registered and only requires that documents be prepared and attested to on the online portal. A review period is not associated with this process. Category 3 PTTW's require a review by the MECP, with a turnaround time of 90 days. Both the PTTW and EASR processes have monitoring, discharge quality controls, and groundwater management requirements. Typically, the permit holder has to ensure that the conditions outlined are met. In addition, any permit holder is required to report water takings using the online Water Taking and Reporting System (WTRS).

For purposes of providing an estimation of future water taking rates and potential zone of influence from active groundwater control measures, the following assumptions have been included in the analysis.

- Surface water will be directed away from open excavation areas to limit inputs;
- Groundwater control methods will be utilized that are designed to prevent loss of ground;
- The selection of a dewatering system shall be left to the contractor, with recommendations that the dewatering plan be reviewed by a qualified dewatering specialist.

5.1. PROJECT OVERVIEW

The following overview is based on the 90% design drawing set provided by ETO Engineering, dated September of 2024.

5.1.1. Well 2 Upgrades

During the facility upgrades, several excavations are planned including the removal of the chlorine contact tank, and associated piping. Shoring support is anticipated for the chlorine tank removal, and construction of the valve chamber and 150mm sewer lines. Shoring design had not been provided, however assumptions with respect to the placement and construction method have been incorporated into the dewatering analysis where appropriate.

Several excavations will be extending below the water table, including;

- Removal of a chlorine contact tank, and associated piping/features.
- Removal of existing 200mm watermain, 150mm sanitary and storm sewer lines.
- Installation of a valve chamber, maintenance hole, and associated piping infrastructure.

Based on the 90% design detail, the chlorine contact tank founded at a depth of 3.6m BGS, and measures approximately 13m by 2m. It is expected that the excavation to remove will by much larger than this, and can be estimated as a rectangular area 18m by 7m in area. The base of the structure is estimated at elevation 258.9m ASL, with groundwater levels at the nearby BH2-2 and BH2-3 reading 263.2 to 264.0m ASL. Shoring around this structure is anticipated and it is recommended that it be toed into competent clay till below the silty sand material. The toe in elevation is recommended below about 262 m ASL, as shown in Figure 7.

The existing 200mm watermain that extend from the Well No. 2 building across to the tank is estimated with a length of 30m and a depth between 1.8 and 2.7m BGS. Open cut trenching is anticipated along this section to facilitate the removal, with backfilling once completed.

The existing 150mm sanitary pipe is approximately 20m in length, and assumed to reach up to 3m in depth. Approximately 4m of 150mm storm pipe will also require excavation, and is also assumed to reach up to 3m in depth. Open cut trenching is ancipated along these two sections to facilitate the removal, with backfilling once completed.

Based on the information from drawing C110, the valve chamber will be installed to below about elevation 261.6m ASL (approximately 3.2m BGS). The structure is rectangular in shape; approximately 3m by 3m in area, and will be supported by future shoring system in this area.

Up to 45m of 250mm PVC pipe is to extend from the Well 2 building to the valve chamber, and beyond terminating along Faris Ave. The piping will be at invert elevation 263.9 to 261.9m ASL. It is anticipated that the piping will be installed using open cut excavation. A 1200mm maintenance hole is to be installed with the lowest invert elevation of 261.7m ASL.

Approximately 60m of trenching will be required for the installation of a new 150 to 200mm sanitary sewer extending from the building, through the maintenance hole and out to Faris Avenue. The invert elevations for this new sewer will range from 263.90 to 260.08m ASL. It is anticpated that this will be completed using open cut methods.

5.1.2. Well 5 Upgrades

The upgrades for the Well 5 facility include several excavations, including for:

- Construction of a water treatment plant comprising of multiple underground compartment tanks and a single-story above ground structure,

- Watermain and sanitary sewer installations.

Based on the reviewed drawing set, the proposed treatment plant is rectangular in shape with approximate dimensions of 24m by 20m. The structure will include below grade structure for housing of water cells, pumps and other infrastructure. The treatment plant is to be founded between elevations 253.0 and 253.5m. Locally, the two high lift pump wells will extend deeper to elevation between 252.0 and 252.5m. A rigid contiguous shoring system is to be installed to support the excavation and construction of the underground facility. A raft slab is anticipated below the structure, and will require active dewatering to a minimum of 1.0m below the excavation base level to facilitate installation. The underground level is recommended to be constructed watertight and will therefore not include any underdrainage layer.

It is anticipated that the proposed new watermains and sanitary sewers at Nobleton Well 5 will be installed in supported open cut excavations. Based on the expected excavation depths of about 3.0 m to 3.5 m for the open cut installations, trenches will primarily be through pavement structure, fill material of variable texture, and into the underlying native deposits of sand and silt to silt, and silty clay to clayey silt.

5.2. DEWATERING ANALYSIS

5.2.1. Well 2 Excavations

A conceptual hydrogeological model of the Site is presented graphically on Figure 7. The model has been generated from the geotechnical data and interpolated between the borehole to provide an interpretation of the subsurface conditions. As non-continuous sampling was completed during the initial field investigation, the inferred conditions may vary between the borehole conditions. Groundwater elevations prior to any dewatering activity have been assigned a fluctuation allowance that increases the high May 2025 measured levels by 0.3 m to account for seasonal influence. The target groundwater elevation has been assigned as 1m below the anticipated lowest excavation level.

Table 5-1: Summary of Well 2 Facility Excavations

EXCAVATION	LENGTH (m)	WIDTH (m)	GROUNDWATER ELEVATION (m ASL)*	U/S EXCAVATION (m ASL)	TARGET GROUNDWATER ELEVATION (m ASL)	MAX. TOTAL DRAWDOWN (m)
CHLORINE TANK REMOVAL	18	7	264.3	258.9	257.9	6.4
200mm WATERMAIN REMOVAL	30	3	264.3	264.0 to 262.5	263.0 to 261.5	2.8
150mm SANITARY	24	3	264.3	262.6	262.1	2.2

EXCAVATION	LENGTH (m)	WIDTH (m)	GROUNDWATER ELEVATION (m ASL)*	U/S EXCAVATION (m ASL)	TARGET GROUNDWATER ELEVATION (m ASL)	MAX. TOTAL DRAWDOWN (m)
AND STORM REMOVAL						
VALVE CHAMBER	3	3	264.3	261.5	261.0	3.3
250mm PVC PIPE	45	3	264.3	263.9 to 261.9	263.4 to 261.4	0.9 to 2.9
150mm SANITARY SEWER AND MAH	60	3	264.3	263.90 to 260.08	263.4 to 259.5	0.9 to 4.8

NOTES:

Shoring influence during dewatering for the chlorine tank removal is simulated, using a 1/10 multiplier to the estimated hydraulic conductivity to represent attenuation via a permeable boundary.

In all calculations, the worst case for each excavation has been selected. This translates to selecting the highest expected groundwater elevation (May 2025 water levels have been used, with a modest 0.5 m increase to account for seasonal variability), and the lowest underside of excavation for each component assessed, as shown above in *Table 5-1.*

5.2.2. Well 5 Excavations

A conceptual hydrogeological model of the Site is presented graphically on Figure 8. The model has been generated from the geotechnical data and interpolated between the borehole to provide an interpretation of the subsurface conditions. As non-continuous sampling was completed during the initial field investigation, the inferred conditions may vary between the borehole conditions. Groundwater elevations prior to any dewatering activity have been assigned a fluctuation allowance that increases the high spring 2025 measured levels by 0.3 m to account for seasonal influence. The target groundwater elevation has been assigned as 1m below the anticipated lowest excavation level. The construction for the WTP will be supported by a groundwater cutoff shoring system, which has been incorporated into the dewatering analysis.

Table 5-2: Summary of Well 5 Facility Excavations

EXCAVATION	LENGTH (m)	WIDTH (m)	GROUNDWATER ELEVATION (m ASL)*	U/S EXCAVATION (m ASL)	TARGET GROUNDWATER ELEVATION (m ASL)	TOTAL DRAWDOWN (m)
WTP	24	20	256.1	252.0	251.0	5.1
WATERMAINS \SANITARY SEWERS	60	5	255.1	258.0 to 257.0	NA	NA

NOTES:

*Groundwater elevations include a 0.3m fluctuation allowance added to the measured spring time 2025 groundwater levels to account for seasonal variability.

In all calculations, the worst case for each excavation has been selected. This translates to selecting the highest likely groundwater elevation and the lowest underside of excavation for each component assessed, as shown above in *Table 5-2.*

5.3. CONSTRUCTION DEWATERING RATES

To estimate the amount of dewatering needed to drain the area for proposed construction along open-cut sections, the Powers expression (long narrow system equation) for unconfined and confined aquifer steady-state conditions, was used:

$$Q = \frac{\pi K(H^2 - h^2)}{\ln {}^{R_0}/_{r_e}} + \frac{2(xK(H^2 - h^2))}{2L}$$

Where:

Q = Groundwater discharge (m^3/day)

H = Initial depth of water (static head) prior to dewatering (m)

h = Elevation of water beneath excavation while pumping (m)

K = Hydraulic Conductivity (m/day)

r_e = effective radius of excavation (m)

R_0 =2 L = estimated radius of influence (m)

During the early stages of dewatering, higher pumping rates are typically required to remove the water that is stored within the overburden materials. The storage volume will drain from the porous media as the water table is lowered. This drainage will be controlled by physical processes and limited by the soil conditions within the excavated area. The volume of storage (V_s) can be estimated with the following approximation;

$$V_s = sS_y[lw + \left(\frac{1}{3\pi {R_0}^2}\right) + lR_0]$$

Where:

L = excavation length (m)

w = excavation width (m)

s = total drawdown (m)

S_y = specific yield (0.05 for clay)

R_0 = estimated radius of influence (m)

Based on the volume of storage calculation, the approximate pumping rates can be assessed over a selected period, typically 7 to 14 days. In addition to the steady-state groundwater flow, and the removal of water from storage, stormwater inflows from direct rainfall/precipitation events are considered in the predicted rates. The assessment includes capacity for typical rainfall events of up to 29mm in 24 hours.

Typical stormwater runoff management will be required during precipitation events and best management practices should be employed to protect open excavations from runoff accumulation. In addition, perched groundwater trapped within granular bedding planes may be encountered at select locations and would need to be managed using typical sump pumping methods, if significant volumes are present. Shallow perched groundwater can be significant when it is encountered along bedding planes associated with existing underground infrastructure, however it will drain under sump pumping and be manageable without a water taking permit. The treatment of such water is typically addressed by way of settling tank with discharge conveyed to ground or storm sewer.

Based on the site conditions, and project objectives, the following summary of total construction dewatering rates for the Well 2 Facility upgrades are provided, in Table *5-3*. The individual source calculations are provided in Table G-1, and Table G-2 in Appendix G.

Table 5-3: Summary of Well 2 Facility Total Dewatering Rates

EXCAVATION	STEADY STATE GROUNDWATER FLOW (L/DAY)	7-DAY STORAGE REMOVAL (L/DAY)	PRECIPITATION (L/DAY)	TOTAL DEWATERING RATE (L/DAY)
CHLORINE TANK REMOVAL	4,000	15,700	3,650	23,350
200mm WATERMAIN REMOVAL	13,600	10,000	2,600	16,210

EXCAVATION	STEADY STATE GROUNDWATER FLOW (L/DAY)	7-DAY STORAGE REMOVAL (L/DAY)	PRECIPITATION (L/DAY)	TOTAL DEWATERING RATE (L/DAY)
150mm SANITARY AND STORM REMOVAL	10,400	2,900	2,100	12,490
VALVE CHAMBER	1,800	700	260	2,760
250mm PVC PIPE	15,900	20,000	3,900	39,820
150mm SANITARY SEWER AND MAH	17,600	48,600	5,200	71,420

Based on the site conditions, and project objectives, the following summary of total construction dewatering rates for the Well 5 Facility upgrades are provided, in *Table 5-4*. The individual source calculations are provided in Table G-3 in Appendix G. Note that the Total Dewatering Rate is assuming a 7-day dewatering period to remove the initial storage water plus any groundwater seepage.

Table 5-4: Summary of Well 5 Facility Total Dewatering Rates

EXCAVATION	STEADY STATE GROUNDWATER FLOW (L/DAY)	7-DAY STORAGE REMOVAL (L/DAY)	PRECIPITATION (L/DAY)	TOTAL DEWATERING RATE (L/DAY)
WTP	5,700	60,000	28,700	94,410
WATERMAINS AND SANITARY SEWERS	0	0	3,900	3,920

5.4. GROUNDWATER CONTROL

5.4.1. Well 2 Facility Groundwater Control

Where excavations are made through cohesive silty clay to clayey silt material, it is expected that much of the water seepage should be controllable by use of conventional pumping from filtered collection sumps for trenches. However, contractors should provide provisional bid pricing to employ more elaborate, advanced dewatering procedures such as well points if the flow from fill material or any native cohesionless deposit that may be encountered is not controlled by conventional methods. The groundwater table must be lowered to at least 1.0m below the deepest excavation base.

5.4.2. Well 5 Facility Groundwater Control (WTP)

Surface water and groundwater control will be necessary to enable construction below the groundwater table. Where cohesionless deposits are encountered below the groundwater table, flowing soil conditions (with associated ground loss, base instability and surface settlement) will occur unless suitable groundwater control and active dewatering measures are implemented.

While design, installation, operation, and maintenance of the dewatering system is the Contractor's responsibility, provided herein are general approaches to control the groundwater into excavations during construction.

Excavations into and through the cohesionless water bearing deposits will require active dewatering measures such as closely spaced vacuum well point systems to depress the piezometric level at least 1.0m below the excavation base. Depending on the base depth of the excavation, it may be necessary to use closely spaced eductors instead of well points. Groundwater seepage can also be controlled with cut-off walls designed with sufficient embedment depth to limit the influence of groundwater on construction as well as the effects of groundwater lowering on existing structures and settlement sensitive utilities, if present. Cut-off walls should also be designed with sufficient embedment depth below the excavation base to satisfy stability requirements and to mitigate the risk of basal instability/boiling.

To verify the functionality of the dewatering system, groundwater monitoring wells/piezometers will be required to monitor the groundwater level before, during and after construction. The excavation shall not be extended below groundwater level unless the groundwater monitoring data indicates that the piezometric level has been depressed at least 1.0 m below the targeted excavation base.

Around the perimeter of the excavation an interceptor trench should be installed to prevent water from storm events from entering the excavation. The dewatering system must also include appropriate filtration mechanisms to prevent the pumping of fines and loss of ground during the dewatering activities.

5.5. DEWATERING INDUCED ZONE OF INFLUENCE

The zone of influence (ZOI) is calculated using the empirical Sichardt equation (Kyrieleis & Sichardt, 1930), which can be stated as:

$$R_0 = C(H - h)\sqrt{K}$$

Where:

C = Coefficient constant, assumed 3000 for a line source;

Based on site conditions and total expected drawdowns outlined above the estimated zone of influence for each of the dewatering sources have been summarized in *Table 5-5* below. Figure G-1 and Figure G-2, Appendix G, highlight the maximum expected ZOI for each potential source, based on the analysis.

Table 5-5: Summary of Dewatering Induced Zone of Influence

SOURCE	RADIUS OF INFLUENCE (M)
CHLORINE TANK	18.5
200mm WATERMAIN	19.8
150mm SANITARY AND STORM	13.6
VALVE CHAMBER	8.9
250mm PVC PIPE	24.1
150mm SANITARY SEWER AND MAH	32.9
WTP	27.2
WATERMAINS AND SANITARY SEWERS	0

5.6. MECP WATER TAKING PERMIT (EASR/PTTW)

Based on the predicted daily water taking rates, the future construction dewatering should be managed through an Environmental Activity and Sector Registry (EASR) for short-term construction dewatering activities (O. Reg. 63/16). The EASR is to be registered by the project owner using the on-line MECP Environmental Permissions portal. The EASR process includes several conditions and technical requirements, including the following:

1) A Qualified Person must complete a "Water Taking and Discharge Plan" to guide the dewatering activity and to ensure that no unacceptable impacts to the natural environment, private property owners, or groundwater users will occur due to the activity.
2) A discharge plan must be prepared to direct the safe discharge of dewatering effluent during construction.
3) A mitigation strategy must be developed to direct response to any negative impacts to the environment, or stakeholders.

5.7. DISCHARGE PERMITTING AND TREATMENT

Under the EASR registration, the options available for discharge of dewatering effluent are one of the following:

1) To land surface 30m setback from mapped watercourse;
2) Municipal sanitary or storm sewer, in accordance with any municipal requirements; or,

3) Sewage works operating under Environmental Compliance Approval.

Typical measures for groundwater discharge during construction is to pump it to a municipal sewer, collect and haul offsite for disposal, or to treat and release to land surface. In either case, the discharge activity may be regulated by a municipal by-law, or provincial regulation.

Due to Site constraints at the Well 2 location, there is no realistic staging area to allow for discharge to the land surface. All potential locations for discharge overland fall within the minimal setback of 30m from the nearby watercourse. Discharge to the municipal sewer will be required at this location, or through offsite haulage.

At the Well 5 location, a discharge area can be identified more than 30m setback from the watercourse. Discharge through an erosion and sediment control plan with treatment is preferable. Additional information is provided below.

The following information provides a summary of the two recommended options for groundwater discharge management during construction dewatering.

5.7.1. Discharge Management Options for Well 2 Facility

There are two possible options for the management of construction dewatering effluent at the Well 2 location. The contractor will be responsible for implementing the preferred method.

Option One – discharge is to be collected and containerized on site in a series of environmental tanks, sized to provide appropriate capacity, as outlined in Section 5.3. The effluent will require offsite disposal by a licenced liquid waste haulage contractor. Treatment will be directed by the receiving facility, however it is anticipated that only containment and settlement will be required. This should be confirmed by the contractor and receiving facility.

Option Two – discharge to the municipal storm sewer (ditch) system under an approved sewer use agreement. This will require coordination with the owning agency, and will be dependent on available capacity in the receiving sewer, and other logistical issues. Treatment of the effluent for total suspended solids and total manganese will be required. The treatment system must be designed by a qualified contractor. The discharge agreement may include additional constraints.

5.7.2. Discharge Management Options for Well 5 Facility

Option One – discharge is to be collected and containerized on site in a series of environmental tanks, sized to provide appropriate capacity, as outlined in Section 5.3. The effluent will require offsite disposal by a licenced liquid waste haulage contractor. Treatment will be directed by the receiving facility, however it is anticipated that only containment and settlement will be required. This should be confirmed by the contractor and receiving facility.

Option Two – Discharge to the land surface with a minimal setback of 30m from the edge of the watercourse. The dewatering effluent should be directed to an appropriately sized weir tank for temporary retention and settlement prior to release as overland runoff. A filter bag is recommended at the discharge location to retain any disturbed sediment. The discharge must be sampled prior to release to confirm that the following parameters: pH, boron, total boron, cobalt, total cobalt, copper, total

copper, iron, total iron, molybdenum, total molybdenum, tungsten, total tungsten, uranium, total uranium, vanadium, total vanadium, zinc, and total zinc meet the Provincial Water Quality Objectives (PWQO). Once confirmed the effluent passes the PWQO parameters, the effluent can be released to the land surface at a minimum setback of 30m from any surface water feature. This should be done to minimize land scouring and erosion.

Option Three – discharge to the municipal storm sewer system under an approved sewer use agreement. This will require coordination with the owning agency, and will be dependent on available capacity in the receiving sewer, and other logistical issues. Treatment of the effluent for total suspended solids and total manganese will be required. The treatment system must be designed by a qualified contractor. The discharge agreement may include additional constraints.

6. IMPACT ASSESSMENT FOR DEWATERING APPLICATIONS

As there are some groundwater control activities expected at the Well 2 and Well 5 Sites, the following impact assessment has been completed for the purpose of providing a mitigation and monitoring plan. It is important to note that the effects of local dewatering cannot be completely mitigated as the objective is to remove groundwater from the work area to provide stable working conditions. Therefore, the impact assessment should consider the condition that dewatered working areas are to occur, however the duration is to be limited to the time required to complete Site works. Groundwater control should be localized to the excavation locations only, and excessive drawdown below the target pumping levels be avoided. The residual influence of groundwater control is typically short-lived, and the conditions should quickly re-equilibrate to normal conditions once dewatering activities are stopped.

The following sections outline the potential impacts for the Sites.

6.1. SOURCE WATER PROTECTION AREAS

A drinking water threat is any activity or condition that would adversely affect the quality or quantity of any water that is used as a source of drinking water (Ontario Regulation 287/07). The threats associated with construction dewatering could potentially include any, or all of the following:

- Activity that removes water from an aquifer or a surface water body without returning it to the same source.
- An activity that reduces the recharge of an aquifer.
- Storage, use of chemicals (fuel, hydraulic fluids) in operation of dewatering equipment.

As outlined in Section 1.3, the Sites are located within a WHPA-A, with scores of 10. The Sites are not located wtihin an area designated as Highly Vulnerable Aquifer, or Significant Groundwater Recharge Areas.

With respect to protection of drinking water quality, the construction dewatering works are not anticipated to introduce unnecessary risk as the works are focused on a shallow depth, with ample thickness of overburden present beneath the excavations. Both Sites collect drinking water from the Scarborough Formation, which is estimated at more than 100m below ground surface. Fueling and use of chemicals (including any gasoline, hydraulic fluids), have restrictions based on the WHPA-A designation. DNAPLs are restricted and prohibitied from the Site, and refueling must be done under supervision from start to finish at an area offsite (preferable), or on hard ashpalt surface, and not within excavation or landscaped areas. York Region spill procedures are to be followed directly, and any incidents involving fuels should include direct reporting to the RMO as part of any call out procedures.

Drinking water quantitiy risks are considered low, due to the Site conditions and temporary nature of the works. As the Sites are not mapped as SGRA or HVA, the risk of reducing or eliminating recharge to the underlying source aquifer is considered negligible. Dewatering effluent is being circulated back to the natural system, and the shallow nature of the excavations and low volumes of expected groundwater extraction further reduce any risk to the drinking water quality obtained from the onsite supply wells.

6.2. SURFACE WATER IMPACTS

Please note that an enhanced surface water study has been initiated for the Site and Study Areas and is to be completed in Summer 2025. The objectives of the study is to provide baseline information on the surface water features adjacent to the Sites. The following sections assume that the surface water study will be completed prior to the construction period and that the following prescribed monitoring plans will be implemented based on the assessment.

6.2.1. Well 2 Facility Surface Water Impact Assessment

According to the dewatering calculations presented in Section 5, the estimated ZOI have been plotted on Figure G-1. Several dewatering sources ZOI extend below the nearby watercourse, however the feature is not considered to be a cold-water system which would be fed by groundwater discharge.

Temporary groundwater control activities will not adversely affect the natural operation of the waterway as the expected water takings are of limited duration and volumes. The dewatering effluent will be recirculated to this feature as a discharge management strategy. A monitoring plan has been developed to mitigate any negative impacts.

6.2.2. Well 5 Facility Surface Water Impact Assessment

According to the dewatering calculations presented in Section 5, the estimated ZOI from dewatering associated with the Well 5 Facility upgrades have been plotted on Figure G-2. The ZOI extends below the nearby watercourse, and enhanced monitoring will be required.

Although some groundwater control activities of limited duration will reduce potential baseflow to this feature, it is expected that the discharge management strategy will include provisions to return the dewatering effluent back to the natural system, through a treatment and monitoring plan. Any adverse impacts will be observable within the monitoring plan, with contingency planning to mitigate any long-term or permanent harm to the system.

6.3. INFRASTRUCTURE IMPACTS

There is always a possibility of inducing settlement to neighboring buildings, utilities, and underground structures/infrastructure when lowering water levels or depressurizing an aquifer. It is considered a best practice to initiate a proactive monitoring program to identify any potential areas of concern and the need and type of monitoring required. Utilities, and transit owners may have stringent monitoring requirements, which will have to be adhered to.

It is understood that a geotechnical settlement analysis has been provided within the separate Geotechnical Investigation Report, prepared by EnVision, dated March 12, 2025. Results from the settlement analysis indicate predicted settlement ranging from 5 to 15mm are possible, which are considered “low” and within accepted values and that a pre- to post-construction condition survey is recommended for the project. Additional information is included in the geotechnical report, including a monitoring plan to mitigate the risk associated with dewatering induced settlement.

6.4. WATER SUPPLY WELL IMPACTS

Any negative impacts to groundwater users within the Study Area are considered negligible based on the following:

1) Shallow earth works are anticipated, and the well database indicates that the municipal supply wells at the Sites are found below about 100m depth, on average;
2) Temporary groundwater control measures are anticipated of a short term duration;
3) Zone influence (<35m from open cut excavation) due to dewatering has been estimated;
4) Relatively minor water takings have been estimated for the project, further lessening any risk to the groundwater quantity and quality for nearby groundwater users.

During construction activities, installation of any dewatering wells must be closely monitored and should be reviewed by the Qualified Person to confirm that the existing water supply and deep monitoring wells are not encroached upon. Dewatering wells should be carefully installed, where required, to protect against pressure grout migration within the shallow subsurface that could potentially migrate into the onsite well screens. The dewatering plans and drawings need to be reviewed by the QP prior to any subsurface work.

6.5. CONTAMINANT MIGRATION DURING DEWATERING

Changes to the hydraulic gradient could potentially influence the migration of contaminants from off-site properties. During dewatering activity, it is possible to alter the natural groundwater hydraulic gradient and cause dissolved contaminants to migrate onto nearby properties. It is recommended that a contaminant monitoring program be implemented during any active dewatering. The existing monitoring well network can be utilized for this program. Based on historic use across the Study Area, the risk of encountering contaminated groundwater is considered low.

6.6. LONG-TERM DRAINAGE

Typically, the installation of water mains and sanitary sewers will not require a permanent drainage system. The WTP building is understood to be designed as a watertight structure, and therefore long-term groundwater discharge will not be required for this project.

6.7. WELL DECOMMISSIONING (ONTARIO REGULATION 903)

In accordance with Ontario Regulation 903, all monitoring wells must be abandoned if they are no longer in use. This work must be completed by a licensed well-drilling contractor and abandonment records need to be filed with the Ministry of the Environment.

7. MONITORING AND MITIGATION

7.1. CONSTRUCTION DEWATERING MONITORING

The active construction dewatering stage will require monitoring designed to assess the potential for impacts to water levels in aquifers, water quality, and ground settlement. The monitoring program should include the following components:

- Discharge volume reporting
- Groundwater (piezometric) level monitoring
- Discharge water quality monitoring
- Surface Water monitoring
- Ground settlement monitoring

7.1.1. Discharge Volume Reporting

During active dewatering, the contractor will be required to document discharge pumping rates as a required condition of the EASR, with regular reporting of water taking volumes via the MECP Water Taking Reporting System. A flow meter should be supplied, and all discharged ground and storm water should be discharged through the properly field calibrated device. A non-resettable flow meter that records discharge in both instantaneous and cumulative modes is recommended. Daily recording of the discharge volumes will be required for regular reporting. The total combined daily discharge must never exceed the limits as outlined in the EASR. Additional storage measures (such as Extra tank storage or temporary settling ponds) can be used to control large rain events and reduce the instantaneous discharge/pumping rates. Further restrictions or conditions may be imposed through the enforced discharge agreement issued by the conservation authority.

7.1.2. Groundwater Level Monitoring

Where advanced dewatering systems are required (i.e. for the construction of the Well 5 Treatment Plant) a groundwater level monitoring program will be required. To verify the functionality of the dewatering system, groundwater monitoring wells/piezometers will be required to monitor the groundwater levels before, during and after construction. The excavation shall not be extended below the groundwater level until the piezometric pressure is depressed at least 1.0m below the targeted excavation base. This can be confirmed by measuring pressure levels in nearby piezometers installed by the dewatering contractor in areas within the expected zone of influence. Daily water levels should be measured and recorded in a log onsite to confirm that the target water levels are maintained throughout construction.

Excessive pumping is to be discouraged, and at no time should the drawdown extend beyond 1m. The discharge rates should be controlled to prevent over pumping of the groundwater.

7.1.3. Discharge Water Quality Monitoring

A monitoring program should be implemented that is based on the selected discharge option. Water pumped from the work area should be treated for suspended solids as necessary, prior to release. The dewatering discharge will be directed through a filter bag, splash pad, or settling tank prior to discharge to the natural environment. The monitoring program should consist of daily visual examination of the construction effluent for the presence of any sheen, foam, or odour. Water clarity and sediment level should also be monitored to ensure that the quality is not degrading during construction. Filters should be examined on a regular basis, and any failures to equipment should be repaired immediately.

Impacts on water quality can be controlled using safe construction practices that eliminate the potential for waste spills and other contamination events. Refuelling should be performed in designated areas away from open excavations, and on asphalt surfaces, supervised from start to finish. In the event of a spill, remedial action must be undertaken immediately by the contractor, following all MECP, Region of York, and provincial spill guidelines. The RMO for the Region of York should be contacted during any spill event.

Discharge Quality Monitoring for Sewer Release

For discharge to the sewer system (where available, and permitted), the discharge water will require pre-treatment measures to keep sediment levels low, which would include use of filter cloth/gravel pack sumps, settlement tanks, and discharge through a filter bag. Regular monitoring will be required based on the following schedule:

1) Prior to discharge to sewer, a Regional Storm/Sanitary Sewer Use groundwater suite shall be collected and analyzed by a certified laboratory to confirm that the discharge quality meets the limits as outlined in the relevant sewer use table (storm/sanitary).
2) Periodic confirmation on a weekly basis while active dewatering / discharge is ongoing to confirm that the quality is maintained by way of lab testing for the relevant sewer use parameters.
3) Daily visual examination to identify and degradation to the water quality (i.e. sheen, foam, turbidity increases, etc.).

Discharge Quality Monitoring for Land Release (30m setback from Watercourse)

Discharge to the land surface will require a monitoring program to mitigate any impacts to the natural environment. A discharge area should be selected that is setback a minimum of 30m from any defined watercourse, and the area should be protected from land erosion/scouring with the use of stone/gravel/geomembrane. The discharge should be directed away from working areas and from entering private properties, and designed to eliminate risk of flooding/pooling by utilizing the natural gradients. Flow should be laminar and directed to a large area where infiltration can occur. The discharge water will require pre-treatment measures to keep sediment levels low, which would include use of filter cloth/gravel pack sumps, settlement tanks, and discharge through a filter bag. Regular monitoring will be required based on the following schedule:

1) Turbidity should be measured at the point of discharge to confirm that the levels are maintained below a target of 25 NTU's.

2) Prior to release, a water quality sample for general parameters including metals, total suspended solids, turbidity, inorganics and nutrients should be collected and analyzed by a certified laboratory and reviewed by a qualified person to confirm discharge quality is acceptable for release to land surface.

3) Daily visual examination to identify and degradation to the water quality (i.e. sheen, foam, turbidity increases, etc.).

Discharge Quality Monitoring for Land Release within 30m of a watercourse

At the Well 2 Site it is not possible to discharge to land surface with a suitable setback distance, and therefore enhanced monitoring requirements will be required to protect the watercourse. In addition to the monitoring requirements for discharge to land surface, the following enhanced measures will be required.

1) Prior to discharge and then periodically throughout the discharge activity, water sampling for general water chemistry (metals, anions, inorganics, nutrients, total suspended solids) shall be completed at the discharge point and upstream at the receiving watercourse.

2) The water quality will be compared to the Provincial Water Quality Objectives. Sampling shall be completed daily for the first 3 days of discharge.

3) Daily temperature and turbidity measurements shall be taken at the discharge location and in the upgradient water course.

4) Total suspended solids shall be compared to the turbidity measurements to calibrate a curve between the analyzed TSS and field measured turbidity to establish suitable correlation. Further sampling will not be required once the initial system is proven operational and that the pre-treatment is suitable to meet the PWQO's. Daily turbidity measurements will be suitable to confirm operational status of the system after the initial 3-day period has expired.

5) If PWQOs can not be met, the pumping will be stopped, and treatment enhancement may be required. Any cessation due to a failing sample will restart the 3-day period and require reconfirmation of the suitability of treatment.

6) The discharge within 30m of the watercourse will require consultation with the MECP and TRCA prior to initiating.

7.1.4. Surface Water Monitoring

Based on the sensitivity and proximity of surface water features adjacent to Well 5, it is necessary to carry out some construction monitoring at these locations using the planned surface water stations that are to be installed as part of the ongoing Surface Water Study by EnVision. The monitoring should consist of level, turbidity, and temperature on a weekly basis during active construction work. The results shall be compared to readings obtained from an upstream location which will serve as the background station. The collected data must be reviewed by a Qualified Person (QP) to determine if any negative impacts are occurring upstream, near-site, and downstream across the construction period. The existing baselines show high variability, and therefore establishing quality triggers is difficult, however the QP shall be responsible for assessing the field data on a weekly basis to identify deterioration across the network of instruments. Turbidity triggers shall be established to ensure that

the surface water quality is not being impacted by construction activities. The trigger shall be established at the upstream location as 25 NTU above the background reading from the STN5-1. Exceedances to this trigger will result in a temporary stoppage of discharge so that the source of the degradation to the effluent can be investigated, with additional treatment implemented to bring the discharge water quality below the trigger threshold.

The Well 5 surface water feature will require monitoring of water levels during construction. At STN5-1, the water level information and drivepoint data must be monitored by way of programmable data logger to ensure that the existing natural hydraulic gradients remain unchanged during active dewatering. The QP shall review the data on a biweekly basis at these stations to ensure that there is no apparent reversal of the natural hydraulic gradients, as outlined in the baseline information.

7.1.5. Ground Settlement Monitoring

As discussed previously, structures located within the ZOI may be susceptible to potential settlement or subsidence during any temporary dewatering. The following monitoring and mitigation measures are recommended:

- Consider a pre-construction condition survey for the structures located within the ZOI;
- Install monitoring devices on nearby buildings and structures, and maintain scheduled monitoring during active dewatering;
- Prepare to reduce dewatering efforts if undesirable deformation conditions present.

It is understood that a geotechnical settlement analysis has been provided within the separate Geotechnical Investigation Report, prepared by EnVision, dated March 12, 2025. Results from the settlement analysis indicate predicted settlement ranging from 5 to 15mm are possible, which are considered "low" and within accepted values and that a pre- to post-construction condition survey is recommended for the project. Additional information is included in the geotechnical report, including a monitoring plan to mitigate the risk associated with dewatering induced settlement.

8. CLOSING

8.1. CONCLUSIONS

Based on the information obtained through the Hydrogeological Data Report, EnVision presents the following conclusions and recommendations:

- The Site is located entirely within the physiographic region in Southern Ontario known as the South Slope.
- The surficial material of glaciolacustrine deposits of clay to silt-textured till.
- The local bedrock within the Study Area is identified as the Georgian Bay formation; a mix of shale, siltstone, dolostone and limestone.
- The MECP WWR database indicated that there are one hundred and sixteen (116) water wells in the Study Area. Of the well records returned in the search, fourty-five (45) were classified as abandoned/unknown, forty-six (46) were classified as observation/monitoring/test holes and twenty five (25) were classified as water supply wells.
- The field investigation at the Well 2 site was carried out on December 6, 2023, which consisted of drilling three (3) boreholes (designated as BH2-1 to BH2-3) to depths ranging from 5.2m to 6.1m below the existing ground surface. Three (3) boreholes were completed as monitoring wells.
- The field investigation at the Well 5 site was carried out between October 19 and October 20, 2023, which consisted of drilling six (6) boreholes (designated as BH5-1 to BH5-6) to depths ranging from 1.5m to 9.7m below the existing ground surface. Three (3) boreholes were completed as monitoring wells.
- At the Well 2 Site, the monitoring wells were screened within the upper 6m of overburden, and water levels ranged from dry conditions at BH2-2 (in December 2023), to 1.9m BGS at BH2-2 (in May 2025). Groundwater levels at BH2-1 ranged from 1.6 to 2.6m, and at BH2-3 the levels ranged from 1.3m to 2.2m below existing ground across the monitoring site visits. The groundwater elevations over the monitoring period recorded on May 22, 2025 ranged from 263.2 to 264.0m ASL
- At the Well 5 Site, the monitoring wells were screened within the upper 9.2m of overburden, and water levels ranged from 6.9 to 5.7 at BH5-1, 6.4 to 5.1 at BH5-2, and dry to 5.5m at BH5-4. The groundwater elevations over the monitoring period recorded on May 22, 2025 ranged from 254.9 to 255.7m ASL
- Results from the Well 2 Site monitoring well, BH2-1 indicate one (1) exceedance when compared to the parameters under York Region storm sewer release limit. The lone exceedance was reported for total suspended solids. The results from the well sampling had no reported exceedances against the sanitary sewer release limits.
- Results from the monitoring well, BH5-2 indicate one (1) exceedance when compared to the parameters under York Region sanitary sewer release limit. The exceedance includes total suspended solids. The results also indicate two (2) exceedances when compared to the parameters under York Region storm sewer release limit. The exceedances include total suspended solids and total manganese.

- Construction dewatering rate estimates for work at the Well 2 Facility range from 2,400 to 47,100 L/day.
- Construction dewatering rate estimates for work at the Well 5 Facility range from 3,920 to 94,410 L/day.
- Based on the predicted daily water taking rates, the future construction dewatering should be managed through an Environmental Activity and Sector Registry (EASR) for short-term construction dewatering activities (O. Reg. 63/16).
- Discharge may be managed through conveyance to land surface, provided the monitoring and mitigation plans are followed, and approval is granted by the regulatory agencies.
- Discharge may be managed through conveyance to the municipal sewer system, provided that agreement is obtained under the Sewer Use By-law.
- A construction dewatering monitoring and mitigation plan has been developed and must be adhered to, as per Ontario Regulation 63/16.

8.2. QUALIFICATION OF THE ASSESSORS

Robin Byers, P.Geo., B.Sc. is a Senior Hydrogeologist and is a practicing member of the Professional Geoscientists of Ontario with over 11 years of hydrogeological experience working in the Greater Toronto Area and Southern Ontario. He has experience in physical and chemical hydrogeology with foundational knowledge of well construction and design, groundwater modeling, pumping test analysis, and construction dewatering. Rob is also a qualified person as defined by O.Reg 63/16 for purposes of preparing water taking and discharge plans.

8.3. CERTIFICATION AND SIGNATURES

EnVision confirms the findings and conclusions of the Hydrogeological Investigation.

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8.4. QUALIFIER

EnVision prepared this report solely for the use of the intended recipient in accordance with the professional services agreement. In the event a contract has not been executed, the parties agree that

the EnVision General Terms and Conditions, which were provided prior to the preparation of this report, shall govern their business relationship.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment. The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the report are based on the observations and/or information available to EnVision at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by EnVision and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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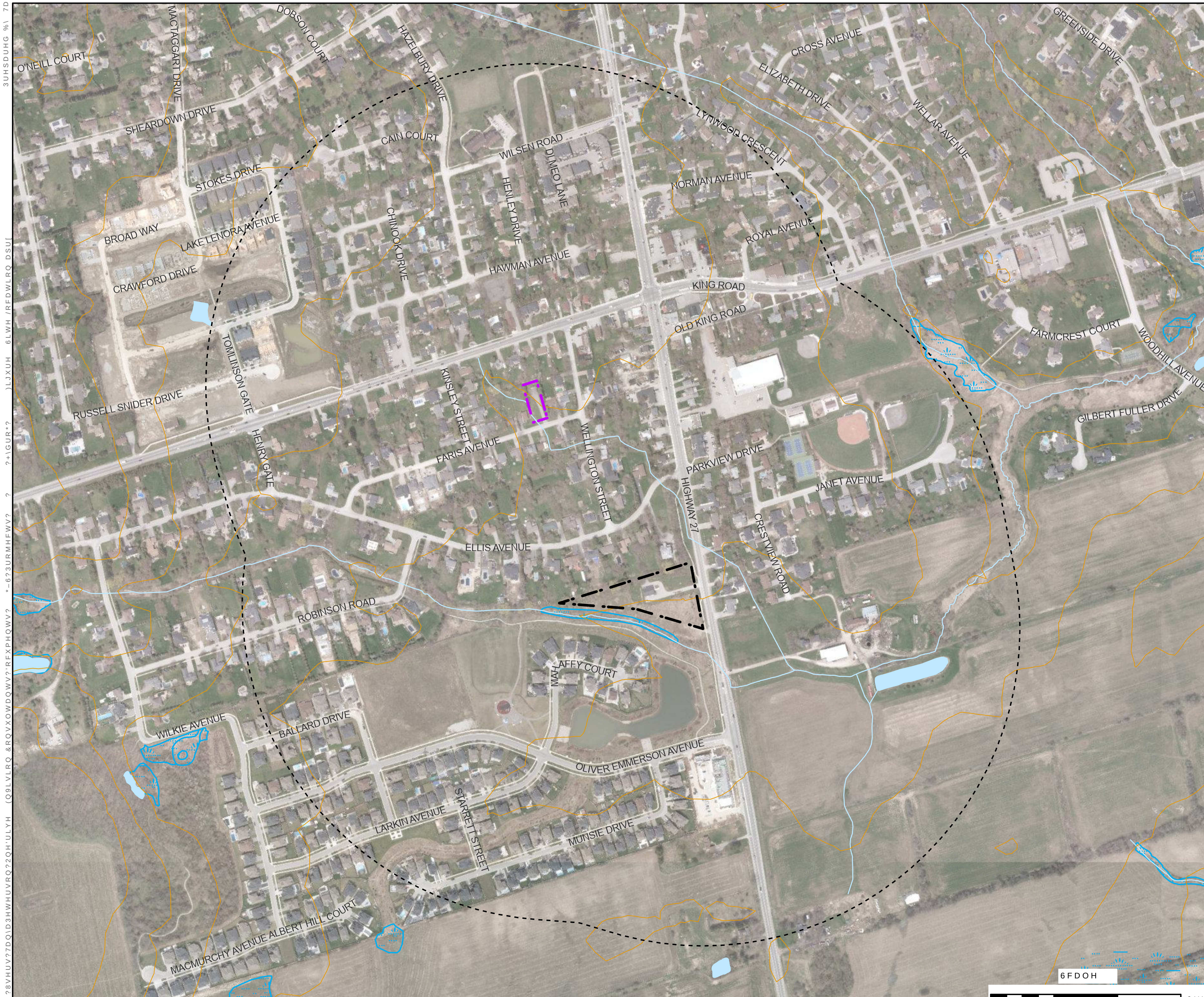
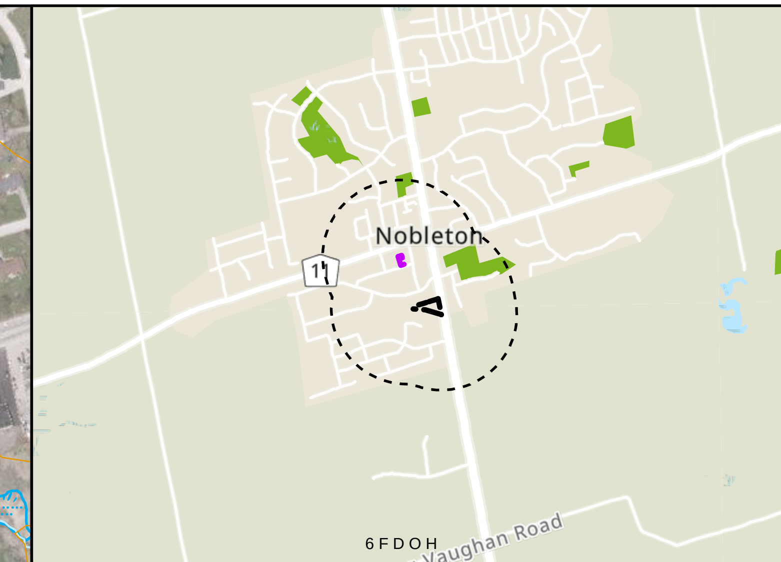
FIGURES





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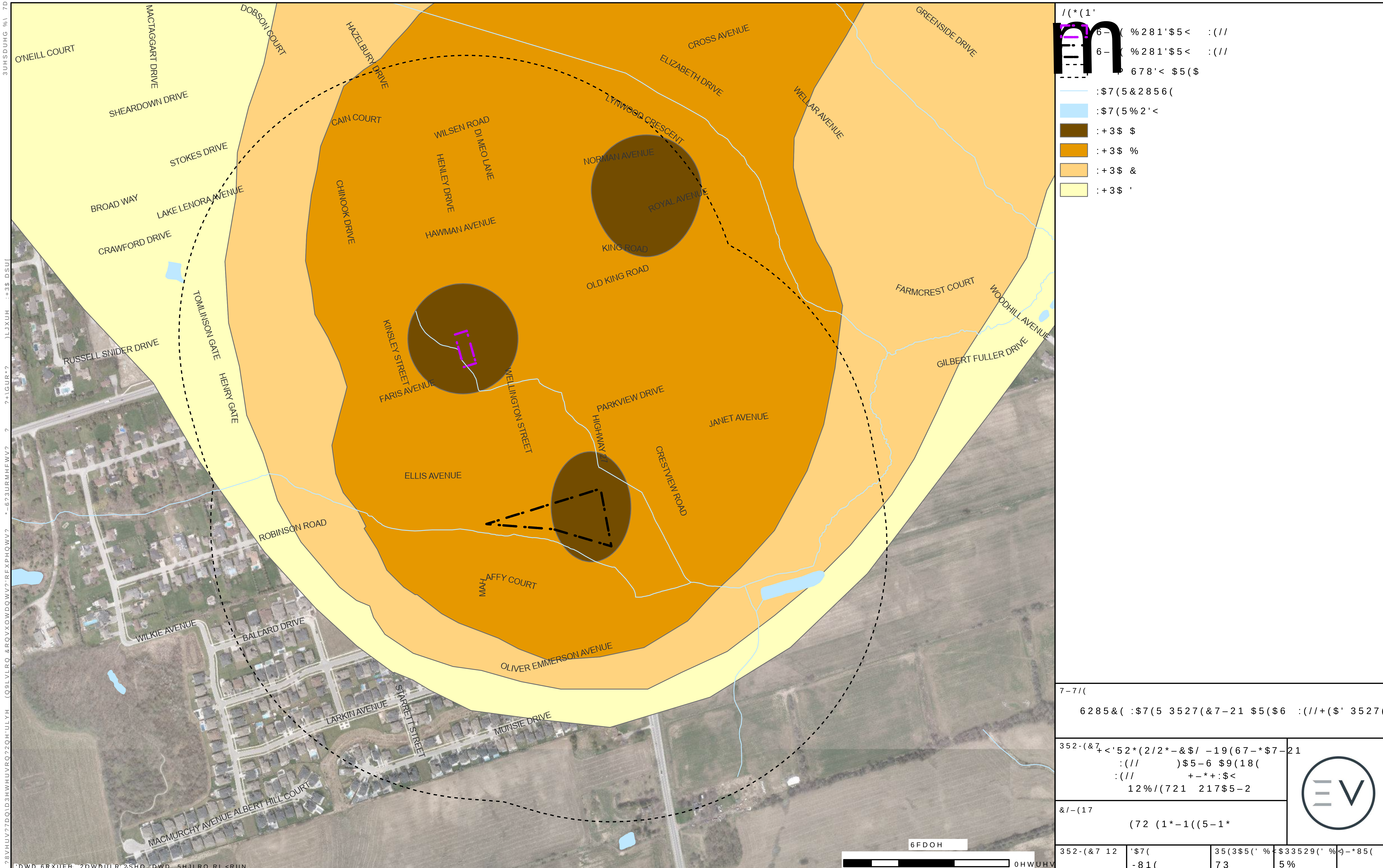
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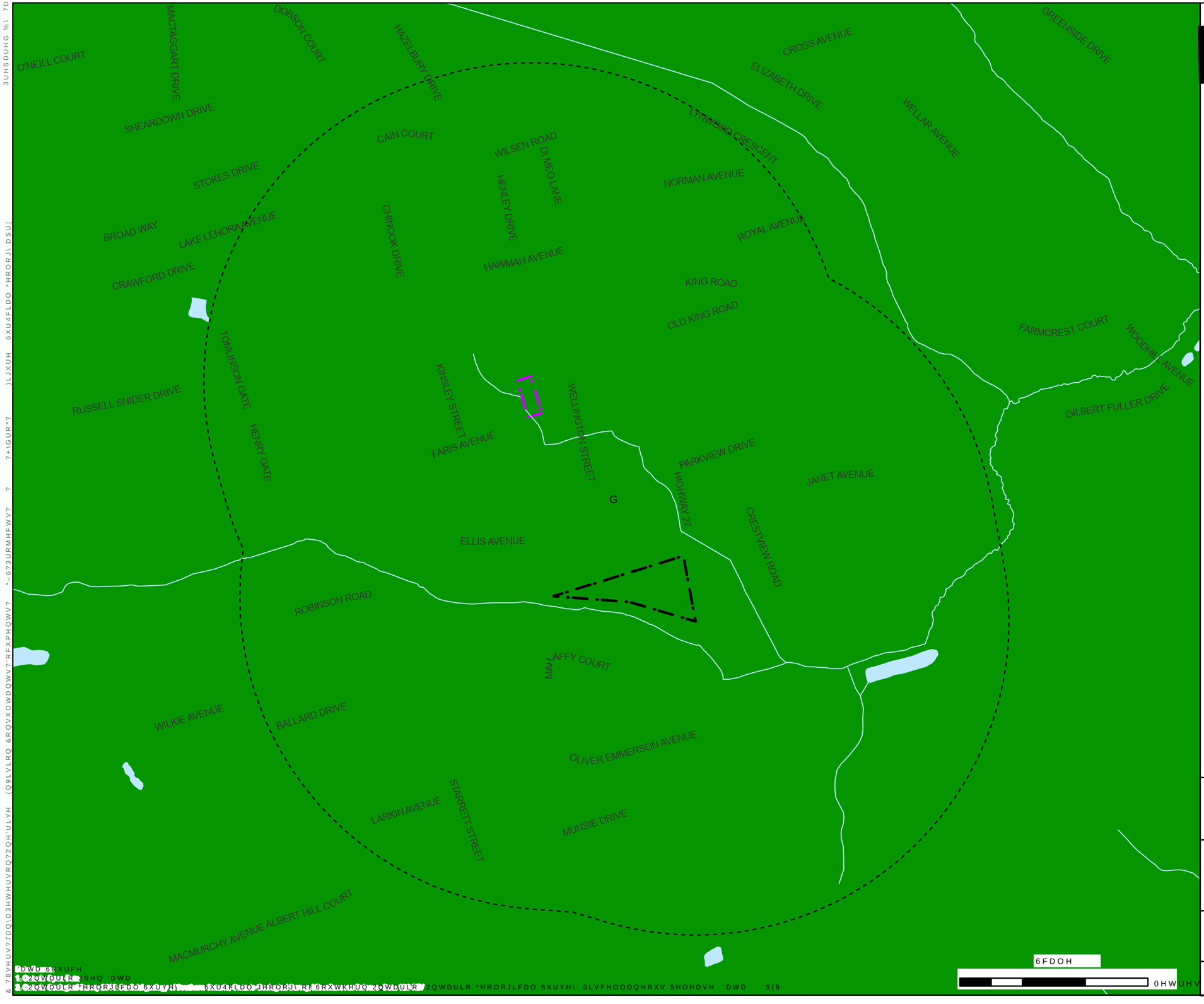

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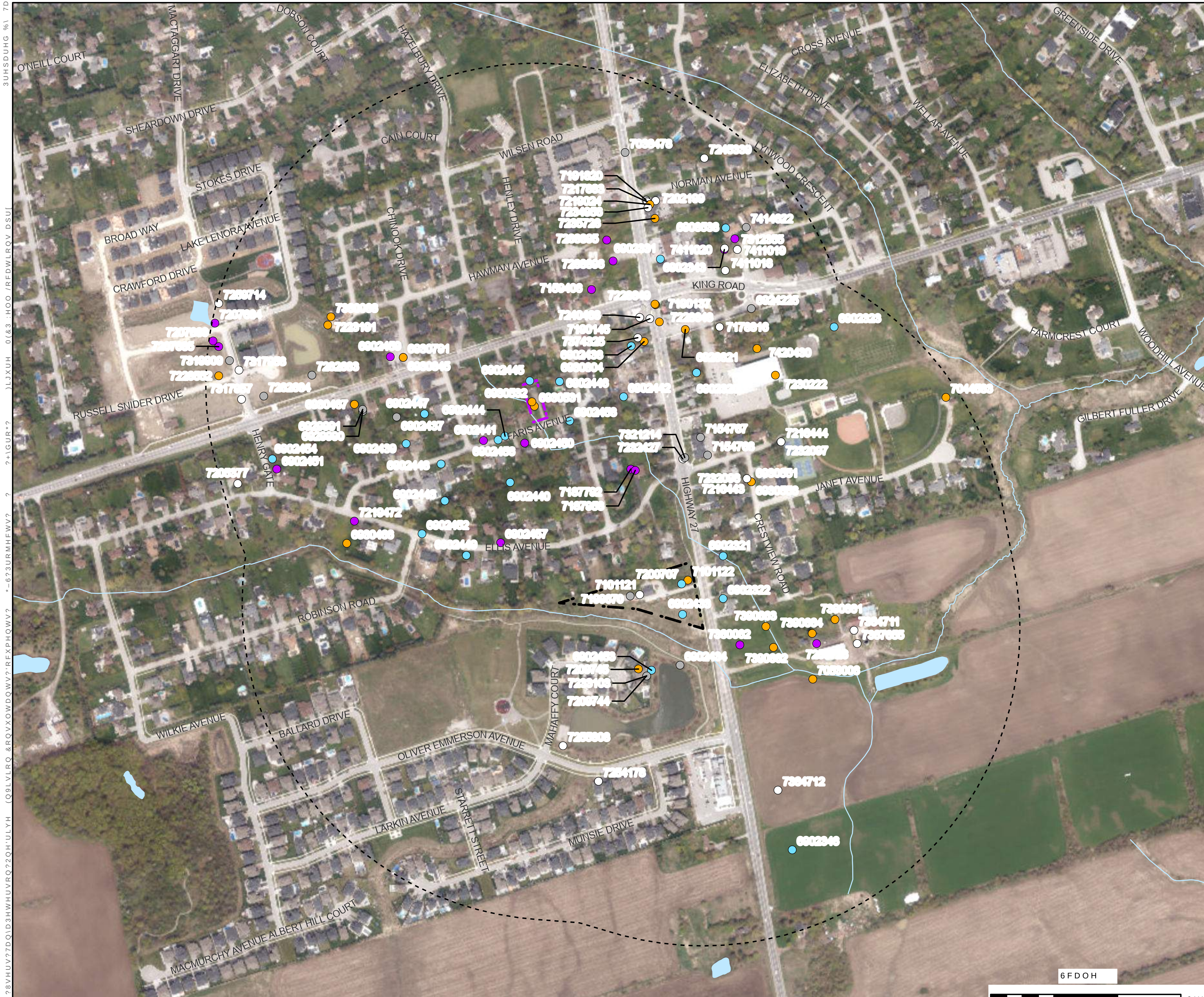

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:(//)$5-6 9(18(
:(// +-*+:$<
12%/(721 217$5-2

&/-(17

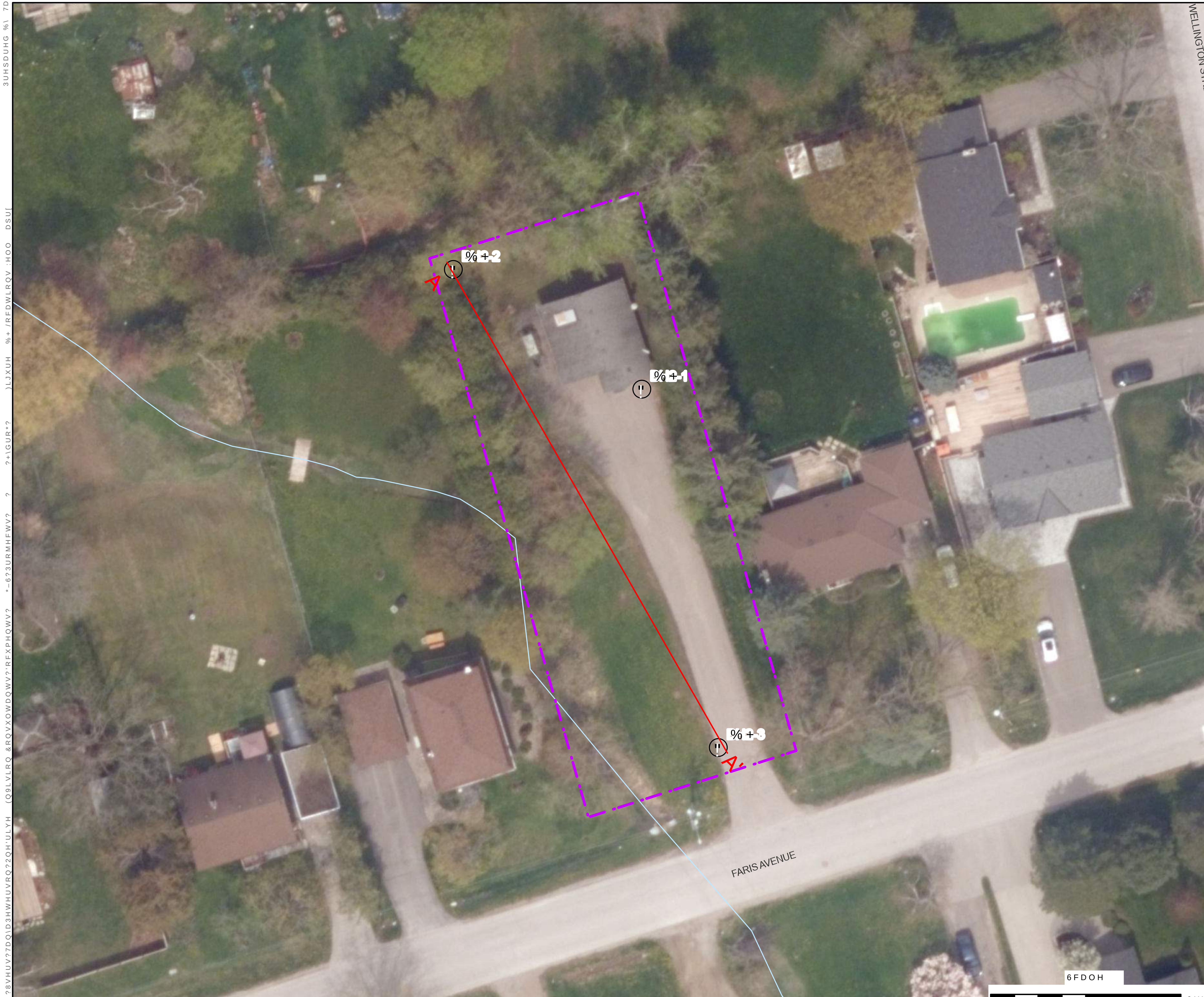
(72 (1*-1((5-1*

352-(&7 12 | '$7(-81(| 35(3$5(' %< 73 | $33529(' %< 5% |)-*85(

6FDOH

0HWUHV

'DWD 6RXUFH 2SHQ 'DWD 2QWDULR 5HJLRQ RI <RUN



/(*(1'

%281'$5< :(//

:$7(5&2856(

021,725,1* :(//

7,7/(

%25(+2/(/2&$7,21 3/$1 :(//

352-(&7

+<'52*(2/2*,&$/ ,19(67,*$7,21 :(//)$5,6 $9(18(:(// +,*+:$< 12%/(721 217$5,2

&/,(17

(72 (1*,1((5,1*

352-(&7 12	'$7(	35(3$5(' %<	$33529(' %<	),*85(
	-81(	73	5%	

/(*(1'

%281'$5<   :(//

:$7 5&2856(

%25(+2/(/2&$7−21

021−725−1* :(//

7−7/(

%25(+2/(/2&$7−21 3/$1   :(//

352-(&7

+<'52*(2/2*−&$/ −19(67−*$7−21
:(//   )$5−6 $9(18(
:(//   +−*+:$<
12%/(721 217$5−2

&/−(17

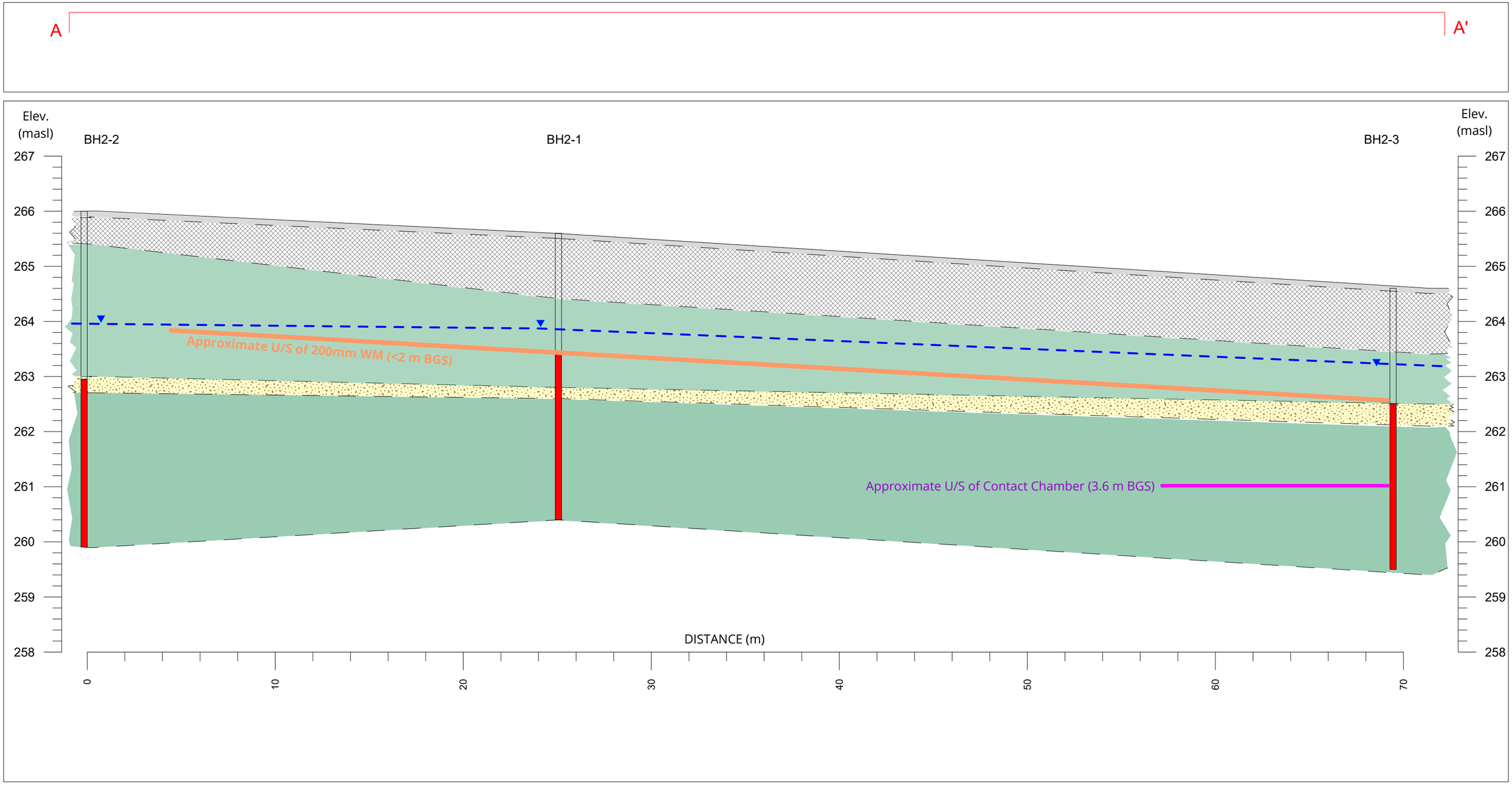
(72 (1*−1((5−1*

352-(&7 12	'$7(	35(3$5(' %	$33529(' %	)−*85(
	-81(	73	5%	

6FDOH

0HWUHV

'DWD 6RXUFH 2SHQ 'DWD 2QWDULR 5HJLRQ RI <RUN



Legend Title

- Asphalt
- Fill Group
- Silty clay till
- Silty sand
- Casing
- Screen

Water Levels May 2025)

22-May-25

Note:
The actual soil stratification has been verified from data obtained at borehole locations only. The inferred contacts are interpretive only, based on geological evidence and may vary from location to location between boreholes.

CLIENT: ETO ENGINEERING

PROJECT: HYDROGEOLOGICAL IMPACT ASSESSMENT REPORT
NOBLETON WELLS 2 & 5 UPGRADES
REGION OF YORK, ON

TITLE: CROSS SECTION A-A'

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0358	May 2025	SH	RB	7

B

B'

Elev. (masl)

BH5-6

BH5-1 (o/s 14m)

MW4s Max. Water Elev. 255.0 mASL

BH5-2

BH5-4

262
260
258
256
254
252
250
248
246
244
242
240
238
236
234

Silty clay (Aquitard)

Fill

U/S of WM/SAN (<3 m BGS)

Interpreted May 2025 Water Level

Silty clay (Aquitard)

Approximate U/S of WTP

Approximate U/S of Pumps

Target Dewatering Level for WTP (251 mASL)

Silty fine sand to silt (Aquifer)

Fine to Coarse Sand (Aquifer)

Sand and Gravel (Aquifer)

DISTANCE (m)

0 10 20 30 40 50 60 70 80 90 100

Lithological Interpretation

- Topsoil
- Asphalt
- Silty clay
- Silty fine sand to silt
- Fine to coarse sand
- Sand and gravel

Groundwater level

Casing

Screen

Note:
The actual soil stratification has been verified from data obtained at borehole locations only. The inferred contacts are interpretive only, based on geological evidence and may vary from location to location between boreholes.

CLIENT

ETO ENGINEERING

PROJECT

HYDROGEOLOGICAL IMPACT ASSESSMENT REPORT
NOBLETON WELLS 2 & 5 UPGRADES
REGION OF YORK, ON

TITLE

CROSS SECTION B-B'

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0358	May 23, 2025	SH	RB	8

263.99 mASL
(1.96 mBGS)
May 22, 2025
GW Measurement

BH2-2

263.94 mASL
(1.64 mBGS)
May 22, 2025
GW Measurement

BH2-1

263.22 mASL
(1.35 mBGS)
May 22, 2025
GW Measurement

BH2-3

FARIS AVENUE

6FDOH

0HWUHV

'DWD 6RXUFH 2SHQ 'DWD 2QWDULR 5HJLRQ RI <RUN

/(*(1'

%281'$5< :(//

:$7(5&2856(

021,725,1* :(//

7,7/(

*5281':$7(5 (/(9$7,216 :(//

352-(&7

+<'52*(2/2*,&$/ ,19(67,*$7,21
:(//)$5,6 $9(18(
:(// +,*+:$<
12%/(721 217$5,2

&/,(17

(72 (1*,1((5,1*

352-(&7 12	'$7(	35(3$5(' %<	5%
0HWUHV	0$<	73	

ELLIS AVENUE

HIGHWAY 27

BH5-1/1A

255.52 mASL
(5.68 mBGS)
May 22, 2025
GW Measurement

BH5-2

255.68 mASL
(5.06 mBGS)
May 22, 2025
GW Measurement

BH5-3

BH5-4

254.81 mASL
(5.54 mBGS)
May 22, 2025
GW Measurement

BH5-5

BH5-6

261 261.5 260.5 260 259.5 259 258.5 258

6FDOH

0HWUHV

/(*(1'

%281'$5<

:$7(5&2856(

7231*5$3+,& &2172856 P$6/

%25(+2/(/2&$7,21

021,725,1* :(//

*5281':$7(5 (/(9$7,216 :(//

+<'52*(2/2*,&$/ ,19(67,*$7,21
:(//)$5,6 $9(18(
:(// +,*+:$<
12%/(721 217$5,2

(72 (1*,1((5,1*

0$<	73	5%		

APPENDIX A:

MECP Well Records

Well ID	Final Status	Water Use	Easting	Northing	Depth (m)
6902446	Water Supply	Commerical	608052.6	4861756	23.47
6902438	Water Supply	Commerical	608165.6	4861812	24.38
6902331	Water Supply	Commerical	608211.6	4861949	83.82
6902320	Water Supply	Commerical	608268.6	4861770	22.25
6902453	Water Supply	Domestic	608197.6	4861301	13.72
6902452	Water Supply	Domestic	607835.6	4861516	24.69
6902449	Water Supply	Domestic	607905.6	4861482	29.26
6902448	Water Supply	Domestic	607865.6	4861626	35.36
6902447	Water Supply	Domestic	607839.6	4861705	31.39
6902445	Water Supply	Domestic	608005.6	4861757	32.61
6902444	Water Supply	Domestic	607966.6	4861670	14.94
6902443	Water Supply	Domestic	607871.6	4861568	27.43
6902442	Water Supply	Domestic	608153.6	4861732	12.80
6902441	Water Supply	Domestic	607955.6	4861664	9.75
6902440	Water Supply	Domestic	607974.6	4861597	12.80
6902439	Water Supply	Domestic	607810.6	4861658	33.53
6902433	Water Supply	Domestic	608246.6	4861389	12.19
6902346	Water Supply	Domestic	608419.6	4861018	78.33
6902323	Water Supply	Domestic	608485.6	4861842	12.19
6902322	Water Supply	Domestic	608310.6	4861414	2.74
6902321	Water Supply	Domestic	608310.6	4861481	9.75
7200707	Water Supply	Municipal	608245	4861437	
6908538	Water Supply	Municipal	608314.6	4861998	93.88
6902458	Water Supply	Municipal	608068.6	4861694	111.86
6902454	Water Supply	Public	607599.6	4861634	40.23
7411020	Unknown		608313	4861966	
7411019	Unknown		608333	4861964	
7411018	Unknown		608314	4861931	
7374325	Unknown		608176	4861825	
7367655	Unknown		608522	4861343	
7364712	Unknown		608397	4861112	
7364711	Unknown		608517	4861364	
7317958	Unknown		607547	4861774	
7317957	Unknown		607551	4861728	
7259714	Unknown		607515	4861879	
7255808	Unknown		608058	4861182	
7254178	Unknown		608114	4861126	
7245339	Unknown		608281	4862108	
7240468	Unknown		608179	4861857	
7234956	Unknown		608192	4862030	
7232427	Unknown		608247	4861634	
7232097	Unknown		608402	4861661	
7232096	Unknown		608348	4861603	
7217883	Unknown		608191	4862039	
7216444	Unknown		608402	4861661	
7216443	Unknown		608348	4861603	
7205377	Unknown		607545	4861595	
7202199	Unknown		608204	4862041	
7190145	Unknown		608195	4861855	
7178816	Unknown		608305	4861842	
7101121	Unknown		608179	4861420	41.14
7101121	Unknown		608179	4861420	41.14
6930551	Unknown		608355	4861598	102.41
7187958	Test Hole	Monitoring and Test Hole	608172	4861616	3.96
7187792	Test Hole	Monitoring and Test Hole	608165	4861618	4.57
7159406	Test Hole	Monitoring and Test Hole	608103	4861901	5.49
6902459	Test Hole	Not Used	607785.6	4861795	48.77
6902457	Test Hole	Not Used	607959.6	4861502	116.13
6902456	Test Hole	Not Used	607932.6	4861663	111.86
6902451	Test Hole	Not Used	607606.6	4861618	38.71
6902450	Test Hole	Not Used	607997.6	4861659	46.63
6902343	Test Hole	Not Used	608312.6	4861964	92.96

APPENDIX B:

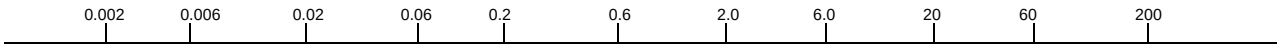
Borehole Logs

Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by SPL also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

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Explanation of Terms Used in the Record of Borehole

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

WH – Samples sinks under "weight of hammer"

Dynamic Cone Penetration Resistance, N_d:
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Textural Classification of Soils (ASTM D2487-10)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm - 4.75 mm
Silt	0.002 mm - 0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion (*)
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

(*) Canadian Foundation Engineering Manual (4th Edition)

Soil Description

a) Cohesive Soils(*)

Consistency	Undrained Shear Strength (kPa)	SPT "N" Value
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction
1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils

Density Index (Relative Density)	SPT "N" Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_P	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

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LOG OF BOREHOLE BH2-1

PROJECT: Nobleton Well 2 Upgrades
REF. NO.: 23-0358
CLIENT: ETO Engineering
Method: Solid Stem Auger
ENCL NO.:
PROJECT LOCATION: 22 Faris Avenue, Nobleton
Diameter: 150mm
ORIGINATED BY GR
DATUM: Geodetic
Date: Dec-06-2023 to Dec-06-2023
COMPILED BY CS
BH LOCATION: N 4861733.5 E 608018.3
Equipment: Drill Tech M5T Trackmounted Rig
CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm) 10 20 30 40	CGD (ppm) 10 20 30 40	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
265.6	Ground Surface												
265.5	**ASPHALT:** 125mm					Flushmount cover							
0.1													
265.1	355mm **FILL**, sand and gravel, trace to some silt, trace to some clay, brown, moist, loose		1A	SS	6								
0.5			1B				265						
1	**FILL:** silty clay to clayey silt, some sand to sandy, trace gravel, brown, wet, firm to very stiff		2	SS	16		Bentonite						
264.4													
1.2	**SILTY CLAY TILL TO CLAYEY SILT TILL:** some sand, trace gravel, brown, moist, very stiff to hard		3	SS	28		264				>250		
2							Sand						
262.8			4A	SS	32		W. L. 263.2 m Dec 08, 2023				125		
2.8			4B										
262.6	**SILTY SAND:** some clay, trace gravel, brown, wet, inferred dense												
3.0	**SILTY CLAY TILL TO CLAYEY SILT TILL:** some sand, trace gravel, grey, moist, very stiff to hard		5	SS	33						>250		
4							Screen						
			6	SS	55						>250		1 17 64 18
							261						
5			7	SS	24						>250		
260.4													
5.2	**END OF BOREHOLE:**												

Notes:
1) Borehole was open and unstabilized water measured at 4.0m below ground surface upon completion of drilling.
2) Borehole was straight augered from 4.6m to 5.2m for a monitoring well installation
3) Monitoring well was installed upon completion of drilling, screened from 2.1m to 5.2m.

Water Level Readings:

Date	W.L. Depth (m)
Dec 08, 2023	2.41

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^{3}$, $\times^{3}$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

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LOG OF BOREHOLE BH2-2

PROJECT: Nobleton Well 2 Upgrades | REF. NO.: 23-0358
CLIENT: ETO Engineering | Method: Solid Stem Auger | ENCL NO.:
PROJECT LOCATION: 22 Faris Avenue, Nobleton | Diameter: 150mm | ORIGINATED BY GR
DATUM: Geodetic | Date: Dec-06-2023 to Dec-06-2023 | COMPILED BY CS
BH LOCATION: N 4861751 E 608012.9 | Equipment: Drill Tech M5T Trackmounted Rig | CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm)	CGD (ppm)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
266.0	Ground Surface												
266.0	**TOPSOIL:** 205mm						Flushmount cover						
0.2	**FILL:** silty clay to clayey silt, some sand to sandy, trace gravel, trace rootlets, brown, moist, firm		1	SS	6								
265.3													
0.6	**SILTY CLAY TILL TO CLAYEY SILT TILL:** some sand, trace gravel, brown, moist, very stiff to hard		2	SS	25		265						2 13 60 25
							Bentonite						
			3	SS	24						>250		
							264						
			4	SS	35						>250		
263.0							Sand						
3.0	**SILTY SAND:** some clay, trace gravel, brown, wet, inferred compact		5A	SS	22		263						
262.7													
3.3	**SILTY CLAY TILL TO CLAYEY SILT TILL:** some sand, trace gravel, brown, moist to wet, very stiff to hard		5B								188		
	grey		6	SS	69		262				>250		
							Screen						
			7	SS	26		261				>250		
			8	SS	27						>250		
259.9							260						
6.1	**END OF BOREHOLE:**												

Notes:
1) Borehole was open and unstabilized water measured at 5.8m below ground surface upon completion of drilling.
2) Borehole was straight augered from 5.3m to 6.1m for a monitoring well installation
3) Monitoring well was installed upon completion of drilling, screened from 3.1m to 6.1m.

Water Level Readings:

Date	W.L. Depth (m)
Dec 08, 2023	Dry

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^{3}$, $\times^{3}$: Numbers refer to Sensitivity; ○ ^{6}=3% Strain at Failure

ENVISION
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LOG OF BOREHOLE BH2-3

PROJECT: Nobleton Well 2 Upgrades
REF. NO.: 23-0358
CLIENT: ETO Engineering
Method: Solid Stem Auger
ENCL NO.:
PROJECT LOCATION: 22 Faris Avenue, Nobleton
Diameter: 150mm
ORIGINATED BY GR
DATUM: Geodetic
Date: Dec-06-2023 to Dec-06-2023
COMPILED BY CS
BH LOCATION: N 4861701 E 608028.4
Equipment: Drill Tech M5T Trackmounted Rig
CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS / 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm)	Soil Head Space Vapors CGD (ppm)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L — WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
264.6	Ground Surface							10 20 30 40	10 20 30 40	10 20 30			
264.4	**ASPHALT:** 130mm						Flushmount cover						
0.1	350mm **FILL**, gravelly sand, some silt, trace clay, brown, moist, compact		1A	SS	12								26 52 (22)
264.1			1B				264						
0.5	**FILL:** silty clay to clayey silt, some sand to sandy, trace gravel, brown, wet, stiff to very stiff		2	SS	18		Bentonite						4 25 52 19
1													
263.4													
1.2	**SILTY CLAY TILL TO CLAYEY SILT TILL:** some sand, trace gravel, brown, moist, very stiff		3	SS	22		263				>250		
2							W. L. 262.8 m Dec 08, 2023						
262.5													
2.1	**SILTY SAND:** some clay, trace gravel, brown, wet, inferred compact		4A										
262.0			4B	SS	25		262				125		
2.5	**SILTY CLAY TILL TO CLAYEY SILT TILL:** some sand, trace gravel, brown, moist to wet, very stiff to hard		5	SS	35						>225		
3							Screen						
4	grey		6	SS	48						175		
							260						
5			7	SS	25						225		
259.4													
5.2	**END OF BOREHOLE:**												

Notes:
1) Borehole was open and unstabilized water measured at 3.0m below ground surface upon completion of drilling.
2) Borehole was straight augered from 4.6m to 5.2m for a monitoring well installation
3) Monitoring well was installed upon completion of drilling, screened from 2.1m to 5.2m.

Water Level Readings:

Date	W.L. Depth (m)
Dec 08, 2023	1.80

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^{3}$, $\times^{3}$: Numbers refer to Sensitivity; $\circ^{6}$ 6=3% Strain at Failure

ENVISION CONSULTANTS LTD

LOG OF BOREHOLE BH5-1

PROJECT: Nobleton Well 5 Upgrades | REF. NO.: 23-0358
CLIENT: ETO Engineering | Method: Solid Stem Auger | ENCL NO.:
PROJECT LOCATION: 12860 York Regional Road 27, Nobleton | Diameter: 150 mm | ORIGINATED BY NL
DATUM: Geodetic | Date: Oct-19-2023 to Oct-19-2023 | COMPILED BY CS
BH LOCATION: N 4861432.5 E 608166.9 | Equipment: Drill Tech M5T Trackmounted Rig | CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors: PID (ppm)	Soil Head Space Vapors: CGD (ppm)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L (WATER CONTENT (%))	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
261.2	Ground Surface												
260.9	**TOPSOIL:** 130 mm												
0.1	**FILL:** silty clay to clayey silt, some sand to sandy, trace gravel, trace rootlets, trace organics, brown, moist, stiff to very stiff		1	SS	10		261						
			2	SS	10		260						4 16 51 29
			3	SS	26								
259.0							259						
2.2	**SILT:** trace clay, trace to some sand, trace gravel, brown, moist to wet, very dense		4	SS	53								
							Bentonite						
			5	SS	52		258						
			6	SS	71		257						
			7	SS	80								2 7 84 7
							256						
							Sand						
			8	SS	67		255						
						▽	W. L. 254.3 m Oct 25, 2023						
							Screen						
			9	SS	59		253						
	containing silty clay layers		10	SS	87		252						
251.7							Bentonite						
9.6	**END OF BOREHOLE:**												

Notes:
1) Borehole was open and unstabilized water measured at 7.6m below ground surface upon completion of drilling.
2) Monitoring well was installed upon completion of drilling, screened from 6.1m to 9.1m.

Water Level Readings:

Date	W.L. Depth (m)
Oct 25, 2023	6.94
Dec 12, 2023	7.11

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH5-2

PROJECT: Nobleton Well 5 Upgrades
REF. NO.: 23-0358
CLIENT: ETO Engineering
Method: Solid Stem Auger
ENCL NO.:
PROJECT LOCATION: 12860 York Regional Road 27, Nobleton
Diameter: 150 mm
ORIGINATED BY NL
DATUM: Geodetic
Date: Oct-19-2023 to Oct-19-2023
COMPILED BY CS
BH LOCATION: N 4861419.8 E 608183.3
Equipment: Drill Tech M5T Trackmounted Rig
CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm)	Soil Head Space Vapors CGD (ppm)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
260.7	Ground Surface												
260.6 / 0.1	**TOPSOIL:** 130 mm												
	FILL: silty clay to clayey silt, some sand to sandy, trace gravel, trace rootlets, trace organics, brown, moist, stiff to very stiff		1	SS	19		260						
			2	SS	10								
			3	SS	26		259						
258.5 / 2.2	**SILT:** some sand to sandy, trace to some clay, brown, moist to wet, very dense		4	SS	40		258						
			5	SS	70			65	200				
			6	SS	59		257						
256.2 / 4.5	**SANDY SILT:** trace clay, brown, wet, very dense		7	SS	73		256						0 27 69 4
255.1 / 5.6	**SILT:** some clay, some sand, trace gravel, brown, wet, very dense						255						
			8	SS	76								
			9	SS	80		253						
							252						
251.0 / 9.7	**END OF BOREHOLE:**		10	SS	76								

Sand
Bentonite
W. L. 254.3 m
Oct 25, 2023
Screen
Bentonite

Notes:
1) Borehole was open and unstabilized water measured at 7.9m below ground surface upon completion of drilling.
2) Monitoring well was installed upon completion of drilling, screened from 6.1m to 9.1m.

Water Level Readings:

Date	W.L. Depth (m)
Oct 25, 2023	6.42
Dec 12, 2023	6.57

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^{3}$, $\times^{3}$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH5-3

PROJECT: Nobleton Well 5 Upgrades
REF. NO.: 23-0358
CLIENT: ETO Engineering
Method: Solid Stem Auger
ENCL NO.:
PROJECT LOCATION: 12860 York Regional Road 27, Nobleton
Diameter: 150 mm
ORIGINATED BY NL
DATUM: Geodetic
Date: Oct-19-2023 to Oct-19-2023
COMPILED BY CS
BH LOCATION: N 4861412.2 E 608192.4
Equipment: Drill Tech M5T Trackmounted Rig
CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm)	Soil Head Space Vapors CGD (ppm)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
260.6	Ground Surface												
260.5	**ASPHALT:** 80 mm												
0.1	**FILL:** sand and gravel, trace silt, brown, moist, loose		1	SS	9								
259.9													
0.7	**FILL:** silty clay to clayey silt, some sand to sandy, trace gravel, trace rootlets, trace organics, brown, moist, firm to stiff		2	SS	7		260						
			3	SS	8		259	65		230			
258.4													
2.2	**SAND AND SILT:** trace clay, trace gravel, brown, moist, very dense		4	SS	74		258	58		170			1 55 39 5
257.2			5	SS	80			64		200			
3.5	**END OF BOREHOLE**												

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH5-4

PROJECT: Nobleton Well 5 Upgrades | REF. NO.: 23-0358
CLIENT: ETO Engineering | Method: Solid Stem Auger | ENCL NO.:
PROJECT LOCATION: 12860 York Regional Road 27, Nobleton | Diameter: 150 mm | ORIGINATED BY NL
DATUM: Geodetic | Date: Oct-20-2023 to Oct-20-2023 | COMPILED BY CS
BH LOCATION: N 4861454.7 E 608228.7 | Equipment: Drill Tech M5T Trackmounted Rig | CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm)	Soil Head Space Vapors CGD (ppm)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L (WATER CONTENT (%))	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
260.4	Ground Surface												
260.3	**TOPSOIL:** 80 mm												
0.1	**FILL:** silty clay to clayey silt, some sand to sandy, trace gravel, trace rootlets, trace organics, brown, moist, firm to stiff		1	SS	8		260			115			
259.7													
0.7	**FILL:** silty sand, trace gravel, trace clay, brown, moist, loose to compact		2	SS	10		259						
258.5			3	SS	23								
1.8	**SILTY CLAY TO CLAYEY SILT:** some sand to sandy, trace gravel, brown, moist, very stiff to hard						Bentonite						
			4	SS	26		258			105	250		
	containing silty sand seams		5	SS	43		257			90	250		3 17 60 20
			6	SS	41			64		190	250		
255.6							Sand						
4.8	**SILT:** trace clay, some sand to sandy, trace gravel, brown, moist, very dense		7	SS	95					430	188		
							Screen						
253.8			8	SS	100		Bentonite			300			Split spoon sampler wet.
6.5	**END OF BOREHOLE:**												

Notes:
1) Borehole was open and unstabilized water measured at 5.8m below ground surface upon completion of drilling.
2) Monitoring well was installed upon completion of drilling, screened from 4.6m to 6.1m.

Water Level Readings:

Date	W.L. Depth (m)
Oct 25, 2023	Dry
Dec 12, 2023	Dry

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

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LOG OF BOREHOLE BH5-5

PROJECT: Nobleton Well 5 Upgrades
REF. NO.: 23-0358
CLIENT: ETO Engineering
Method: Hand Auger
ENCL NO.:
PROJECT LOCATION: 12860 York Regional Road 27, Nobleton
Diameter: 75 mm
ORIGINATED BY KS
DATUM: Geodetic
Date: Oct-19-2023 to Oct-19-2023
COMPILED BY CS
BH LOCATION: N 4861453.4 E 608254.3
CHECKED BY SD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"			PID (ppm)	CGD (ppm)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%)				GR SA SI CL
260.4	Ground Surface							10 20 30 40	10 20 30 40	10 20 30				
260.0	**TOPSOIL:** 115 mm													
0.1	**FILL:** silty sand to sandy silt, trace to some clay, trace gravel, trace organics, brown, moist		1	GS			260							
			2	GS										
1			3	GS			259							
258.9														
1.5	**END OF BOREHOLE**													

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 3=3% Strain at Failure

ENVISION CONSULTANTS LTD

LOG OF BOREHOLE BH5-6

PROJECT: Nobleton Well 5 Upgrades | REF. NO.: 23-0358
CLIENT: ETO Engineering | Method: Solid Stem Auger | ENCL NO.:
PROJECT LOCATION: 12860 York Regional Road 27, Nobleton | Diameter: 150 mm | ORIGINATED BY NL
DATUM: Geodetic | Date: Oct-20-2023 to Oct-20-2023 | COMPILED BY CS
BH LOCATION: N 4861412.1 E 608158.5 | Equipment: Drill Tech M5T Trackmounted Rig | CHECKED BY SD

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors: PID (ppm)	Soil Head Space Vapors: CGD (ppm)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L (WATER CONTENT (%))	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
260.2	Ground Surface							10 20 30 40	10 20 30 40	10 20 30			
260.0 0.1	**TOPSOIL:** 90 mm												
259.5 0.7	**FILL:** silty clay to clayey silt, some sand to sandy, trace gravel, trace organics, trace rootlets, brown, moist, stiff		1	SS	12		260		65				
1	**SILTY CLAY TO CLAYEY SILT:** some sand, trace gravel, brown, moist to wet, hard		2	SS	37		259				250		
			3	SS	46						250		
2 258.0							258						
2.2 257.2	**SILTY SAND TILL TO SANDY SILT TILL:** some clay, trace gravel, brown, moist, very dense		4	SS	74								
3.0	**SILT:** some sand to sandy, trace clay, trace gravel, brown, moist to wet, very dense		5	SS	78		257		125				
4			6	SS	75		256		65				
5			7	SS	81		255						1 18 76 5
6													
253.7			8	SS	85		254		55				
6.5	**END OF BOREHOLE**												

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

APPENDIX C:

Groundwater Level Monitoring

Table C - 1: Groundwater Level Monitoring at Well 2 Facility

Monitoring Well ID			BH2-1	BH2-2	BH2-3
Installed By			EnVision	EnVision	EnVision
Installation Date			6-Dec-23	6-Dec-23	6-Dec-23
Well Status			Active	Active	Active
Well Inner Diameter		(mm)	50.8	50.8	50.8
Casing Type			Flushmount	Flushmount	Flushmount
Ground Surface Elevation		(masl)	265.58	265.95	264.57
Screened Soil Unit			Silty Sand/ Silty Clay Till to Clayey Silt Till	Silty Sand/ Silty Clay Till to Clayey Silt Till	Silty Sand/ Silty Clay Till to Clayey Silt Till
Top of Well Screen		(mbgs)	2.10	3.10	2.10
		(masl)	263.48	262.85	262.47
Screen Length		(m)	3.05	3.05	3.05
Bottom of Screen		(mbgs)	5.20	6.10	5.20
		(masl)	260.38	259.85	259.37
8-Dec-23	Depth of GW				
		(mbgs)	2.41	Dry	1.80
	GW Elevation	(masl)	263.17	Dry	262.77
11-Sep-24	Depth of GW				
		(mbgs)	2.56	3.22	1.90
	GW Elevation	(masl)	263.02	262.73	262.67
13-Nov-24	Depth of GW				
		(mbgs)	2.73	3.78	2.17
	GW Elevation	(masl)	262.85	262.17	262.40
16-Dec-24	Depth of GW				
		(mbgs)	-	-	-
	GW Elevation	(masl)	-	-	-
28-Mar-25	Depth of GW				
		(mbgs)	-	-	-
	GW Elevation	(masl)	-	-	-
22-May-25	Depth of GW				
		(mbgs)	1.64	1.96	1.35
	GW Elevation	(masl)	263.94	263.99	263.22

Table C - 2: Groundwater Level Monitoring at Well 5 Facility

Monitoring Well ID			BH5-1	BH5-2	BH5-4
Installed By			EnVision	EnVision	EnVision
Installation Date			19-Oct-23	19-Oct-23	5-Oct-23
Well Status			Active	Active	Active
Well Inner Diameter		(mm)	50.8	50.8	50.8
Casing Type			Monument	Monument	Monument
Top of Pipe Elevation		(masl)	267.93	266.92	266.37
Ground Surface Elevation		(masl)	261.20	260.74	260.35
Screened Soil Unit			Silt	Silt	Silty Clay to Clayey Silt/ Silt
Top of Well Screen		(mbgs)	6.10	6.10	4.57
		(masl)	255.11	254.64	255.78
Screen Length		(m)	3.05	3.05	1.52
Bottom of Screen		(mbgs)	9.14	9.14	6.10
		(masl)	252.06	251.60	254.25
25-Oct-23	Depth of GW	(mbtoc)	7.90	7.25	Dry
		(mbgs)	6.94	6.42	Dry
	GW Elevation	(masl)	254.26	254.32	Dry
12-Dec-23	Depth of GW	(mbtoc)	8.07	7.40	Dry
		(mbgs)	7.11	6.44	Dry
	GW Elevation	(masl)	254.09	254.30	Dry
16-Aug-24	Depth of GW	(mbtoc)	6.94	6.23	6.49
		(mbgs)	5.94	5.40	5.59
	GW Elevation	(masl)	255.26	255.34	254.76
11-Sep-24	Depth of GW	(mbtoc)	7.21	6.44	6.64
		(mbgs)	6.21	5.61	5.74
	GW Elevation	(masl)	254.99	255.13	254.61
13-Nov-24	Depth of GW	(mbtoc)	7.73	7.01	6.92
		(mbgs)	6.73	6.18	6.02
	GW Elevation	(masl)	254.47	254.56	254.33
16-Dec-24	Depth of GW	(mbtoc)	-	-	-
		(mbgs)	-	-	-
	GW Elevation	(masl)	-	-	-
28-Mar-25	Depth of GW	(mbtoc)	-	-	-
		(mbgs)	-	-	-
	GW Elevation	(masl)	-	-	-
22-May-25	Depth of GW	(mbtoc)	6.68	5.89	6.44
		(mbgs)	5.68	5.06	5.54
	GW Elevation	(masl)	255.52	255.68	254.81

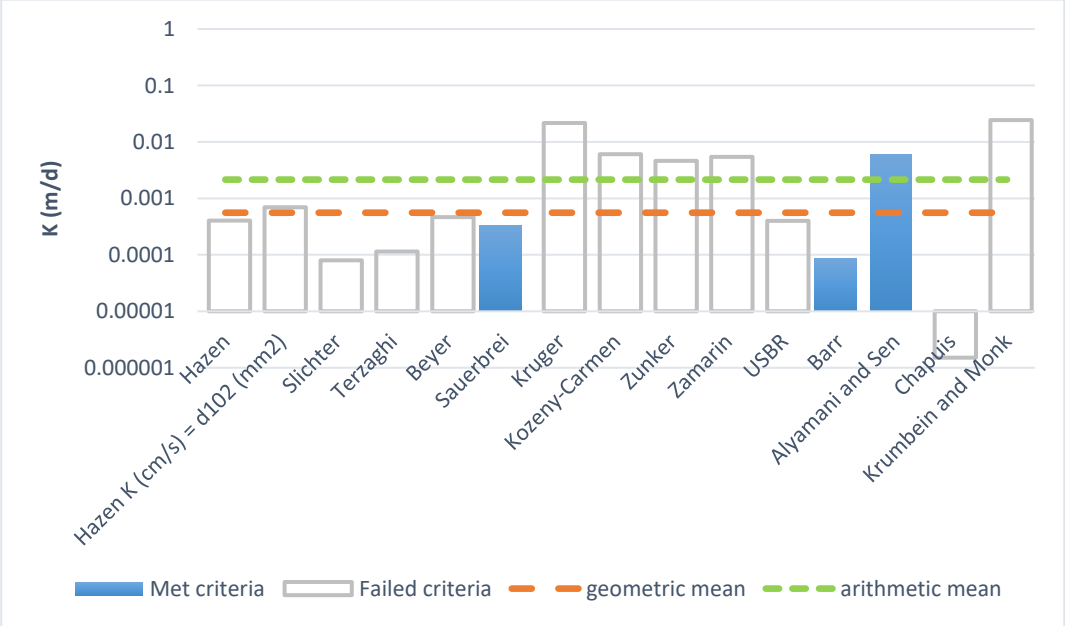
APPENDIX D: *Grain Size Analysis*

K from Grain Size Analysis Report Date: 2024-09-24

Sample Name: BH2-1 SS6 Depth - 3.8m

Mass Sample (g): 100 T (oC) 20

Poorly sorted clay with fines



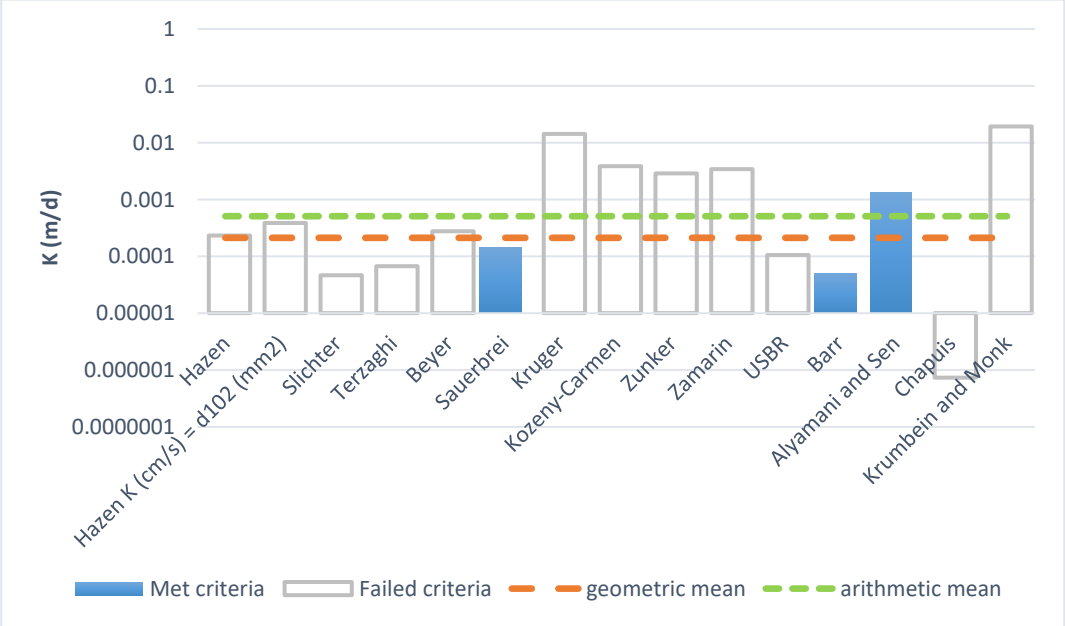
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	4.68E-07	4.68E-09	4.04E-04	
Hazen K (cm/s) = d_{10} (mm)	8.09E-07	8.09E-09	6.99E-04	
Slichter	9.24E-08	9.24E-10	7.98E-05	
Terzaghi	1.33E-07	1.33E-09	1.15E-04	
Beyer	5.37E-07	5.37E-09	4.64E-04	
Sauerbrei	3.88E-07	3.88E-09	3.35E-04	
Kruger	2.51E-05	2.51E-07	2.17E-02	
Kozeny-Carmen	7.04E-06	7.04E-08	6.09E-03	
Zunker	5.33E-06	5.33E-08	4.60E-03	
Zamarin	6.30E-06	6.30E-08	5.44E-03	
USBR	4.64E-07	4.64E-09	4.01E-04	
Barr	9.94E-08	9.94E-10	8.59E-05	
Alyamani and Sen	6.98E-06	6.98E-08	6.03E-03	
Chapuis	1.75E-09	1.75E-11	1.51E-06	
Krumbein and Monk	2.81E-05	2.81E-07	2.43E-02	
geometric mean	6.46E-07	6.46E-09	5.58E-04	
arithmetic mean	2.49E-06	2.49E-08	2.15E-03	

K from Grain Size Analysis Report Date: 2024-09-24

Sample Name: BH2-2 SS2 Depth - 0.6m

Mass Sample (g): 100 T (oC) 20

Poorly sorted clay with fines



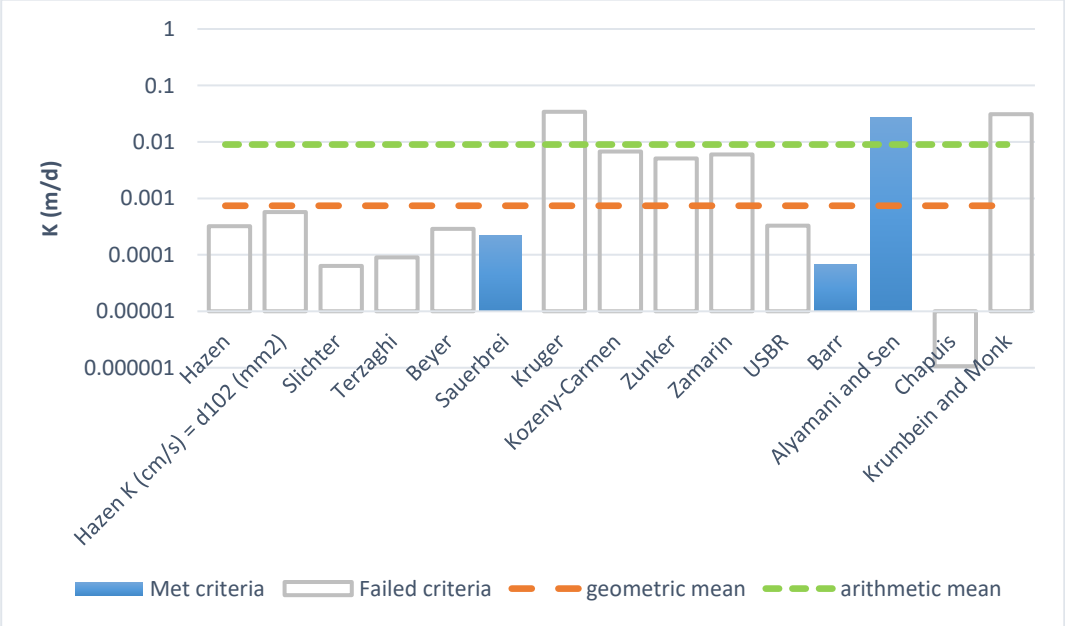
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.69E-07	2.69E-09	2.33E-04	
Hazen K (cm/s) = d_{10} (mm)	4.49E-07	4.49E-09	3.88E-04	
Slichter	5.36E-08	5.36E-10	4.63E-05	
Terzaghi	7.81E-08	7.81E-10	6.75E-05	
Beyer	3.22E-07	3.22E-09	2.78E-04	
Sauerbrei	1.65E-07	1.65E-09	1.42E-04	
Kruger	1.66E-05	1.66E-07	1.43E-02	
Kozeny-Carmen	4.48E-06	4.48E-08	3.87E-03	
Zunker	3.34E-06	3.34E-08	2.89E-03	
Zamarin	3.96E-06	3.96E-08	3.43E-03	
USBR	1.23E-07	1.23E-09	1.06E-04	
Barr	5.80E-08	5.80E-10	5.01E-05	
Alyamani and Sen	1.54E-06	1.54E-08	1.33E-03	
Chapuis	8.51E-10	8.51E-12	7.35E-07	
Krumbein and Monk	2.24E-05	2.24E-07	1.93E-02	
geometric mean	2.45E-07	2.45E-09	2.12E-04	
arithmetic mean	5.89E-07	5.89E-09	5.09E-04	

K from Grain Size Analysis Report Date: 2024-09-24

Sample Name: BH2-3 SS2 Depth - 0.6m

Mass Sample (g): 100 T (oC) 20

Poorly sorted sandy silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.74E-07	3.74E-09	3.23E-04	
Hazen K (cm/s) = d_{10} (mm)	6.60E-07	6.60E-09	5.70E-04	
Slichter	7.34E-08	7.34E-10	6.35E-05	
Terzaghi	1.05E-07	1.05E-09	9.05E-05	
Beyer	3.34E-07	3.34E-09	2.88E-04	
Sauerbrei	2.59E-07	2.59E-09	2.24E-04	
Kruger	3.97E-05	3.97E-07	3.43E-02	
Kozeny-Carmen	7.78E-06	7.78E-08	6.72E-03	
Zunker	5.90E-06	5.90E-08	5.10E-03	
Zamarin	6.93E-06	6.93E-08	5.99E-03	
USBR	3.80E-07	3.80E-09	3.29E-04	
Barr	7.87E-08	7.87E-10	6.80E-05	
Alyamani and Sen	3.09E-05	3.09E-07	2.67E-02	
Chapuis	1.23E-09	1.23E-11	1.07E-06	
Krumbein and Monk	3.59E-05	3.59E-07	3.10E-02	
geometric mean	8.57E-07	8.57E-09	7.41E-04	
arithmetic mean	1.04E-05	1.04E-07	8.98E-03	

K from Grain Size Analysis Report Date: 2023-11-28

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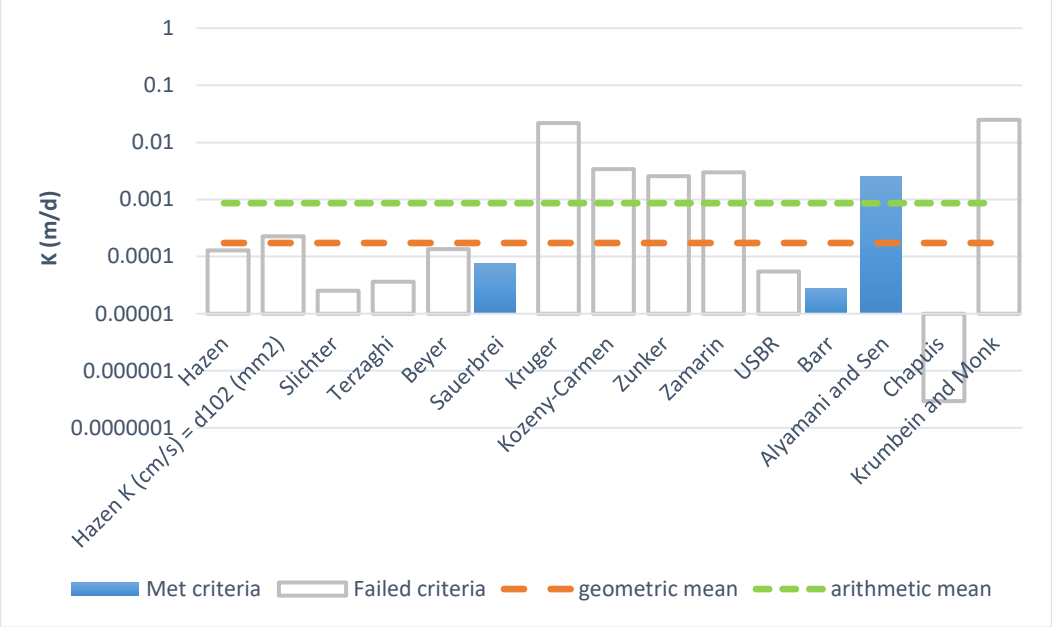
Sample Name: BH5-1 SS2

Mass Sample (g): 100 T (oC) 20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.49E-07	1.49E-09	1.28E-04	
Hazen K (cm/s) = d_{10} (mm)	2.61E-07	2.61E-09	2.26E-04	
Slichter	2.92E-08	2.92E-10	2.53E-05	
Terzaghi	4.18E-08	4.18E-10	3.61E-05	
Beyer	1.57E-07	1.57E-09	1.36E-04	
Sauerbrei	8.91E-08	8.91E-10	7.70E-05	
Kruger	2.53E-05	2.53E-07	2.18E-02	
Kozeny-Carmen	3.93E-06	3.93E-08	3.40E-03	
Zunker	2.97E-06	2.97E-08	2.57E-03	
Zamarin	3.49E-06	3.49E-08	3.01E-03	
USBR	6.32E-08	6.32E-10	5.46E-05	
Barr	3.14E-08	3.14E-10	2.71E-05	
Alyamani and Sen	2.87E-06	2.87E-08	2.48E-03	
Chapuis	3.39E-10	3.39E-12	2.93E-07	
Krumbein and Monk	2.87E-05	2.87E-07	2.48E-02	
geometric mean	2.00E-07	2.00E-09	1.73E-04	
arithmetic mean	9.98E-07	9.98E-09	8.62E-04	

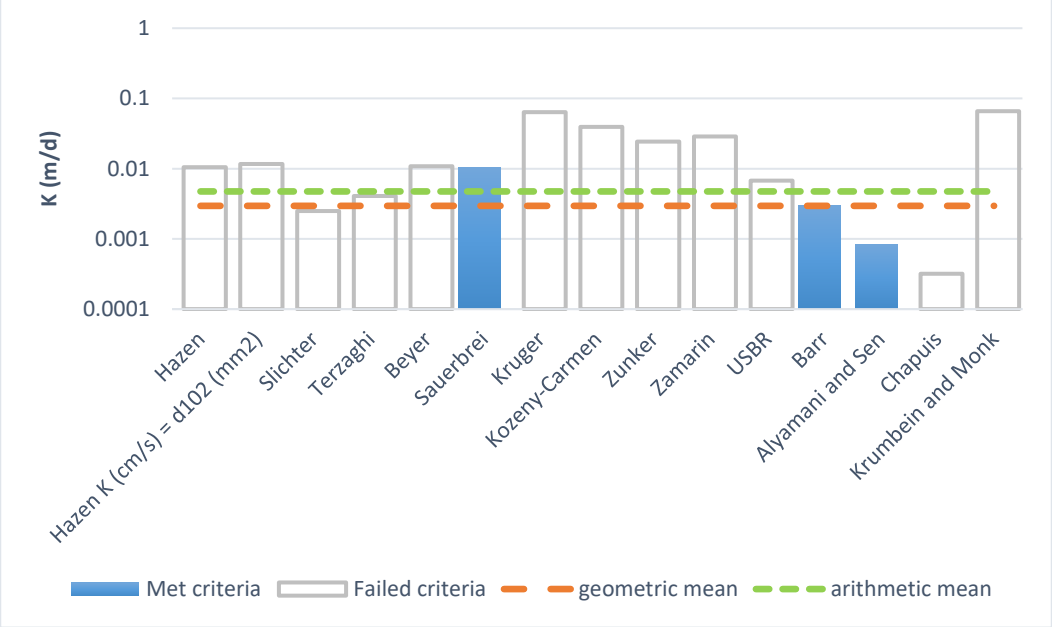
K from Grain Size Analysis Report Date: 2023-11-28

ENVISION CONSULTANTS LTD

Sample Name: BH5-1 SS7

Mass Sample (g): 100 T (oC) 20

Poorly sorted silt low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	1.22E-05	1.22E-07	1.05E-02	
Hazen K (cm/s) = d_{10} (mm)	1.35E-05	1.35E-07	1.17E-02	
Slichter	2.89E-06	2.89E-08	2.50E-03	
Terzaghi	4.74E-06	4.74E-08	4.09E-03	
Beyer	1.25E-05	1.25E-07	1.08E-02	
Sauerbrei	1.21E-05	1.21E-07	1.04E-02	
Kruger	7.38E-05	7.38E-07	6.38E-02	
Kozeny-Carmen	4.54E-05	4.54E-07	3.92E-02	
Zunker	2.82E-05	2.82E-07	2.44E-02	
Zamarin	3.32E-05	3.32E-07	2.87E-02	
USBR	7.78E-06	7.78E-08	6.72E-03	
Barr	3.42E-06	3.42E-08	2.96E-03	
Alyamani and Sen	9.67E-07	9.67E-09	8.35E-04	
Chapuis	3.69E-07	3.69E-09	3.19E-04	
Krumbein and Monk	7.60E-05	7.60E-07	6.57E-02	
geometric mean	3.42E-06	3.42E-08	2.95E-03	
arithmetic mean	5.48E-06	5.48E-08	4.74E-03	

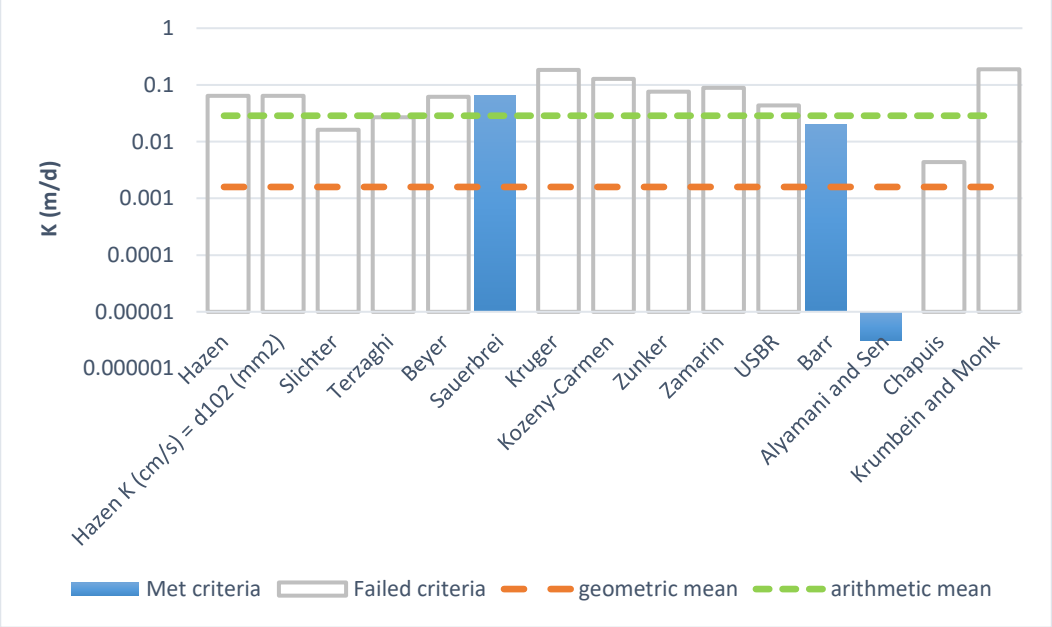
K from Grain Size Analysis Report Date: 2023-11-28

ENVISION CONSULTANTS LTD

Sample Name: BH5-2 SS7

Mass Sample (g): 100 T (oC) 20

Poorly sorted sandy silt low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	7.41E-05	7.41E-07	6.40E-02	
Hazen K (cm/s) = d_{10} (mm)	7.47E-05	7.47E-07	6.45E-02	
Slichter	1.87E-05	1.87E-07	1.62E-02	
Terzaghi	3.13E-05	3.13E-07	2.70E-02	
Beyer	7.19E-05	7.19E-07	6.21E-02	
Sauerbrei	7.66E-05	7.66E-07	6.62E-02	
Kruger	2.13E-04	2.13E-06	1.84E-01	
Kozeny-Carmen	1.49E-04	1.49E-06	1.28E-01	
Zunker	8.81E-05	8.81E-07	7.61E-02	
Zamarin	1.03E-04	1.03E-06	8.87E-02	
USBR	5.06E-05	5.06E-07	4.37E-02	
Barr	2.29E-05	2.29E-07	1.97E-02	
Alyamani and Sen	3.55E-09	3.55E-11	3.06E-06	
Chapuis	5.03E-06	5.03E-08	4.35E-03	
Krumbein and Monk	2.17E-04	2.17E-06	1.88E-01	
geometric mean	1.84E-06	1.84E-08	1.59E-03	
arithmetic mean	3.31E-05	3.31E-07	2.86E-02	

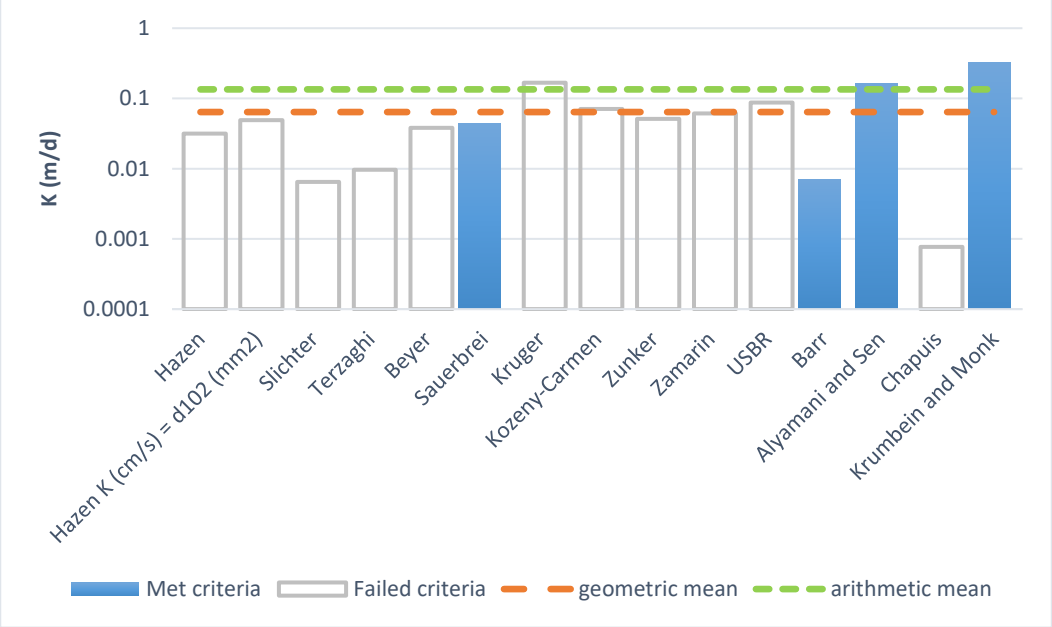
K from Grain Size Analysis Report Date: 2023-11-28

ENVISION CONSULTANTS LTD

Sample Name: BH5-3 SS4

Mass Sample (g): 100 T (oC) 20

Poorly sorted sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.67E-05	3.67E-07	3.17E-02	
Hazen K (cm/s) = d_{10} (mm)	5.66E-05	5.66E-07	4.89E-02	
Slichter	7.49E-06	7.49E-08	6.47E-03	
Terzaghi	1.12E-05	1.12E-07	9.68E-03	
Beyer	4.40E-05	4.40E-07	3.80E-02	
Sauerbrei	5.15E-05	5.15E-07	4.45E-02	
Kruger	1.93E-04	1.93E-06	1.67E-01	
Kozeny-Carmen	8.17E-05	8.17E-07	7.06E-02	
Zunker	5.93E-05	5.93E-07	5.12E-02	
Zamarin	7.05E-05	7.05E-07	6.09E-02	
USBR	1.01E-04	1.01E-06	8.72E-02	
Barr	8.21E-06	8.21E-08	7.09E-03	
Alyamani and Sen	1.92E-04	1.92E-06	1.66E-01	
Chapuis	8.89E-07	8.89E-09	7.68E-04	
Krumbein and Monk	3.71E-04	3.71E-06	3.21E-01	
geometric mean	7.41E-05	7.41E-07	6.40E-02	
arithmetic mean	1.56E-04	1.56E-06	1.35E-01	

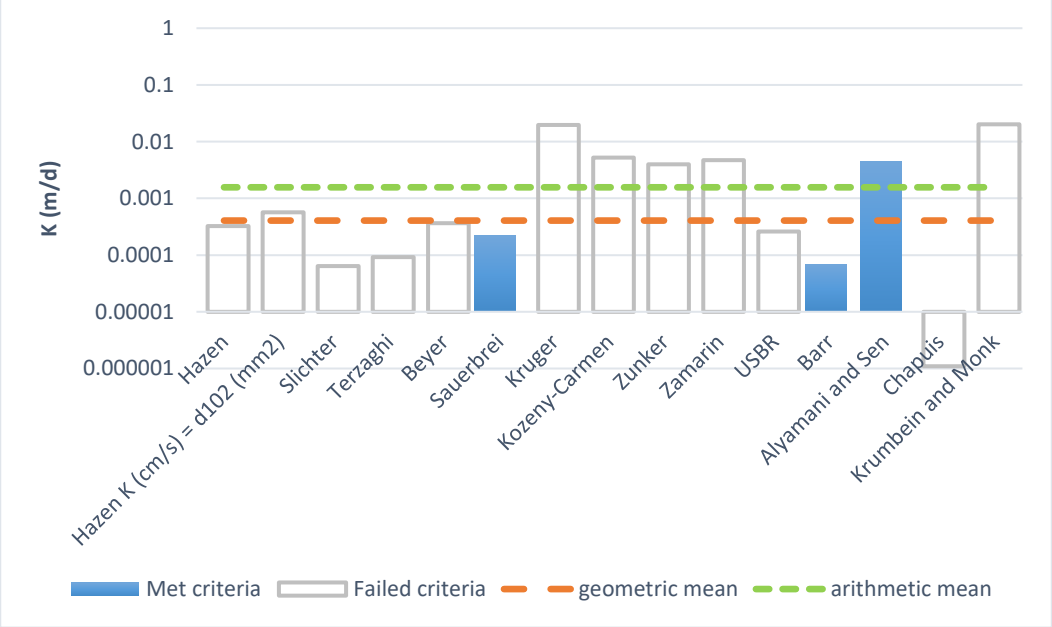
K from Grain Size Analysis Report Date: 2023-11-28

ENVISION CONSULTANTS LTD

Sample Name: BH5-4 SS5

Mass Sample (g): 100 T (oC) 20

Poorly sorted clay with fines

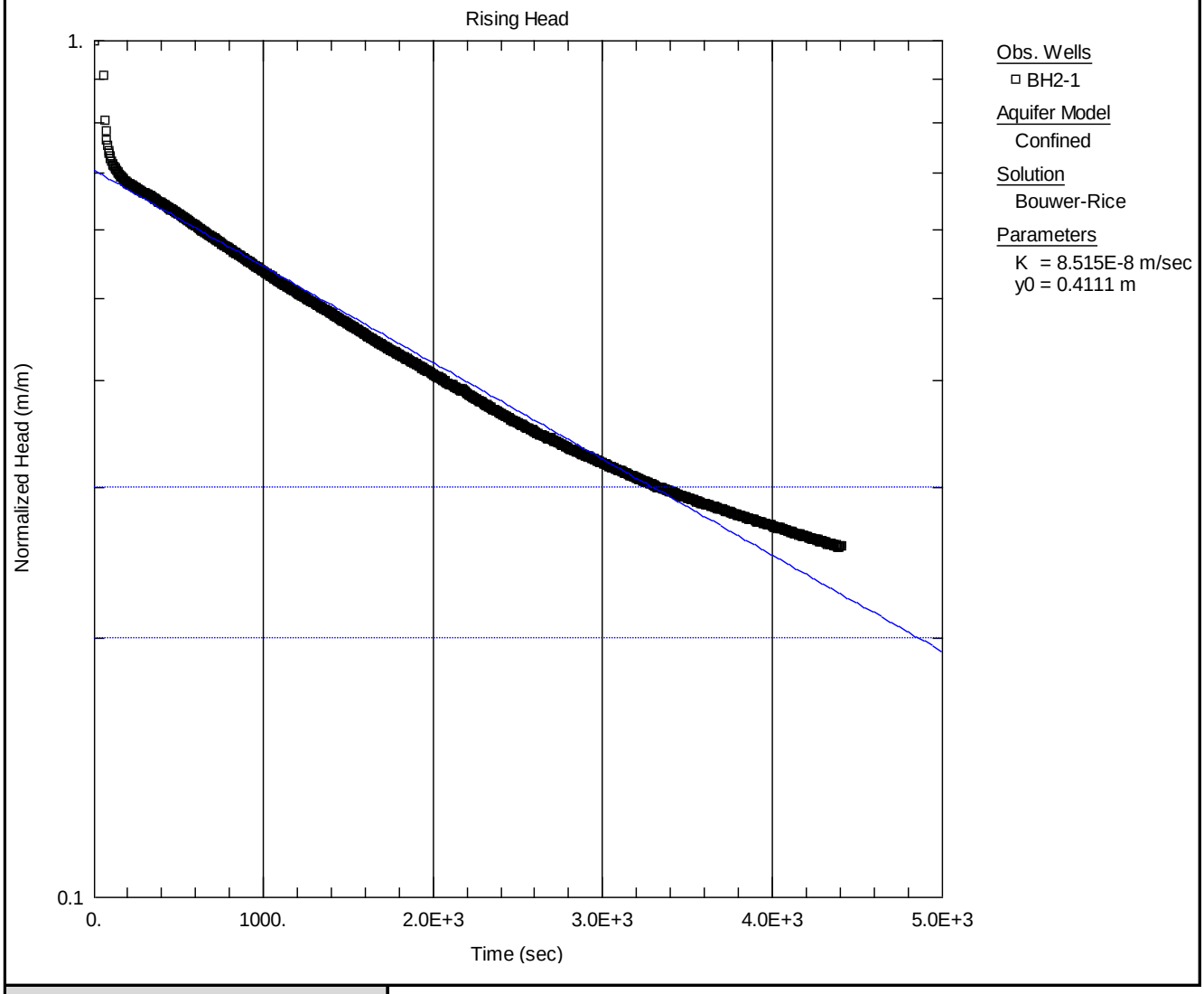


Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	3.77E-07	3.77E-09	3.25E-04	
Hazen K (cm/s) = d_{10} (mm)	6.56E-07	6.56E-09	5.66E-04	
Slichter	7.43E-08	7.43E-10	6.42E-05	
Terzaghi	1.06E-07	1.06E-09	9.20E-05	
Beyer	4.24E-07	4.24E-09	3.66E-04	
Sauerbrei	2.53E-07	2.53E-09	2.19E-04	
Kruger	2.27E-05	2.27E-07	1.96E-02	
Kozeny-Carmen	6.07E-06	6.07E-08	5.24E-03	
Zunker	4.61E-06	4.61E-08	3.98E-03	
Zamarin	5.45E-06	5.45E-08	4.71E-03	
USBR	3.00E-07	3.00E-09	2.59E-04	
Barr	7.98E-08	7.98E-10	6.89E-05	
Alyamani and Sen	5.10E-06	5.10E-08	4.41E-03	
Chapuis	1.27E-09	1.27E-11	1.10E-06	
Krumbein and Monk	2.35E-05	2.35E-07	2.03E-02	
geometric mean	4.69E-07	4.69E-09	4.05E-04	
arithmetic mean	1.81E-06	1.81E-08	1.57E-03	

APPENDIX E: *In-Situ Single Well Response Tests*

ENVISION CONSULTANTS LTD

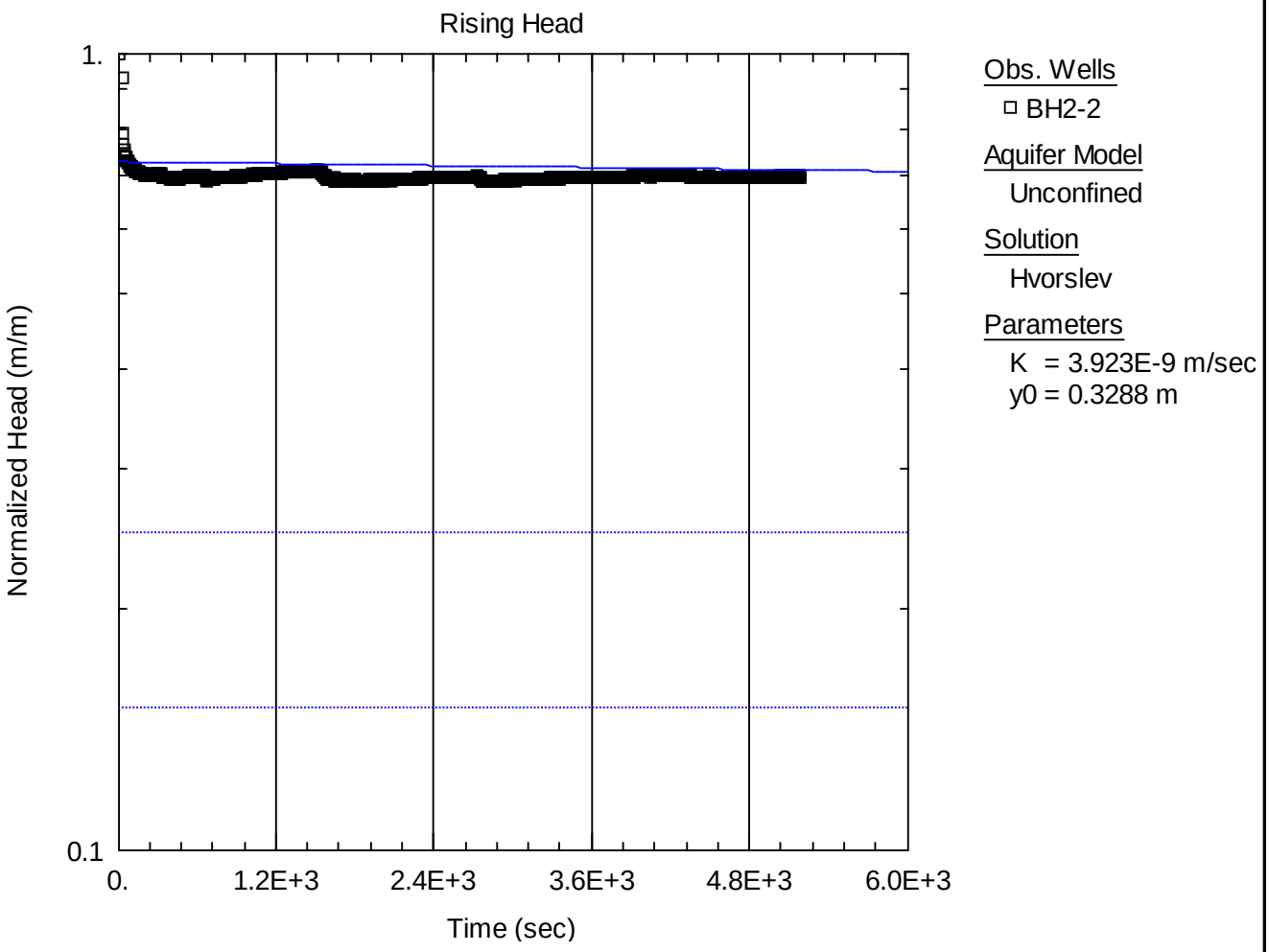
Single Well Response Test Analysis Report	
Project #:	23-0358
Project Location:	12860 Highway 27, Nobleton, ON
Analysis Date:	20-Sep-24



Testing Details	
Well ID:	BH2-1
Field Technician:	SH
Analysis By:	RB
Date of Analysis:	11-Sep-24

Well Details		
Top of Screen	2.1	m
Bottom of Screen	5.1	m
Diam. of well	51	mm
Static Water Level	2.56	m bgs
Formation Screened	Silty sand to silty clay till	

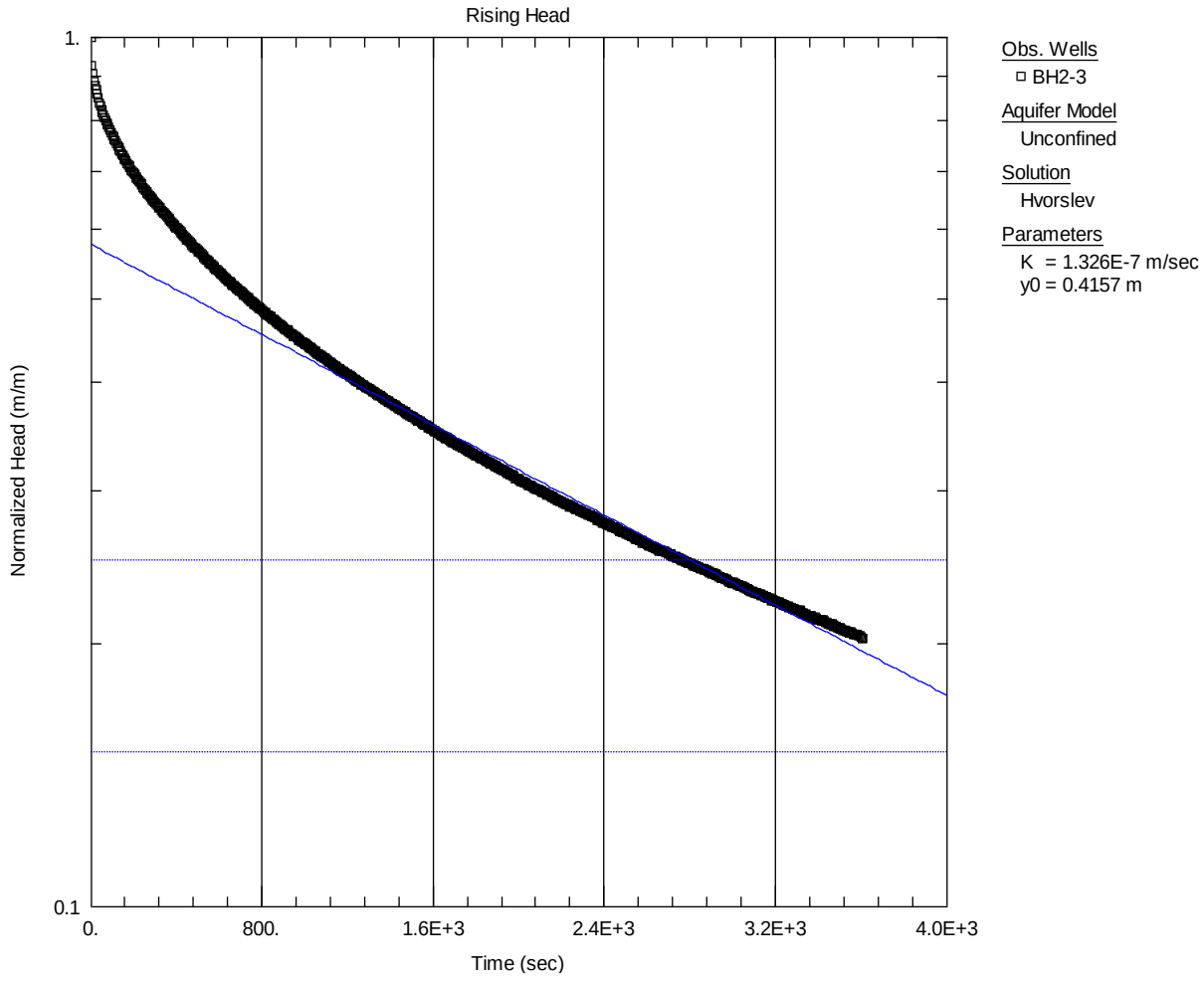
Single Well Response Test Analysis Report	
Project #:	23-0358
Project Location:	12860 Highway 27, Nobleton, ON
Analysis Date:	20-Sep-24



Testing Details	
Well ID:	BH2-2
Field Technician:	SH
Analysis By:	RB
Date of Analysis:	11-Sep-24

Well Details		
Top of Screen	3.0	m
Bottom of Screen	6.0	m
Diam. of well	51	mm
Static Water Level	3.22	m bgs
Formation Screened	Silty sand to silty clay till	

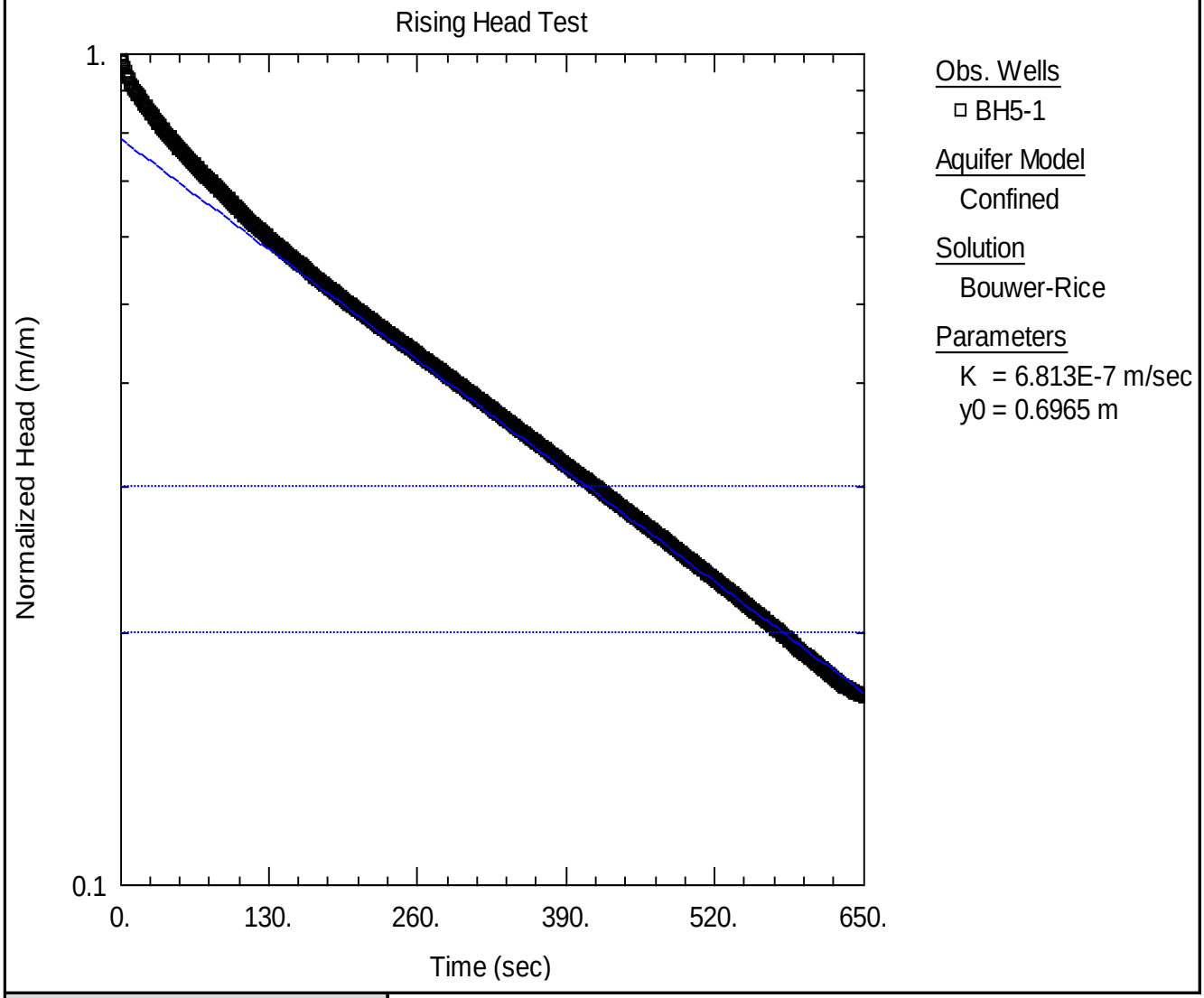
Single Well Response Test Analysis Report	
Project #:	23-0358
Project Location:	12860 Highway 27, Nobleton, ON
Analysis Date:	20-Sep-24



Testing Details	
Well ID:	BH2-3
Field Technician:	SH
Analysis By:	RB
Date of Analysis:	11-Sep-24

Well Details		
Top of Screen	2.2	m
Bottom of Screen	5.2	m
Diam. of well	51	mm
Static Water Level	1.9	m bgs
Formation Screened	Silty sand to silty clay till	

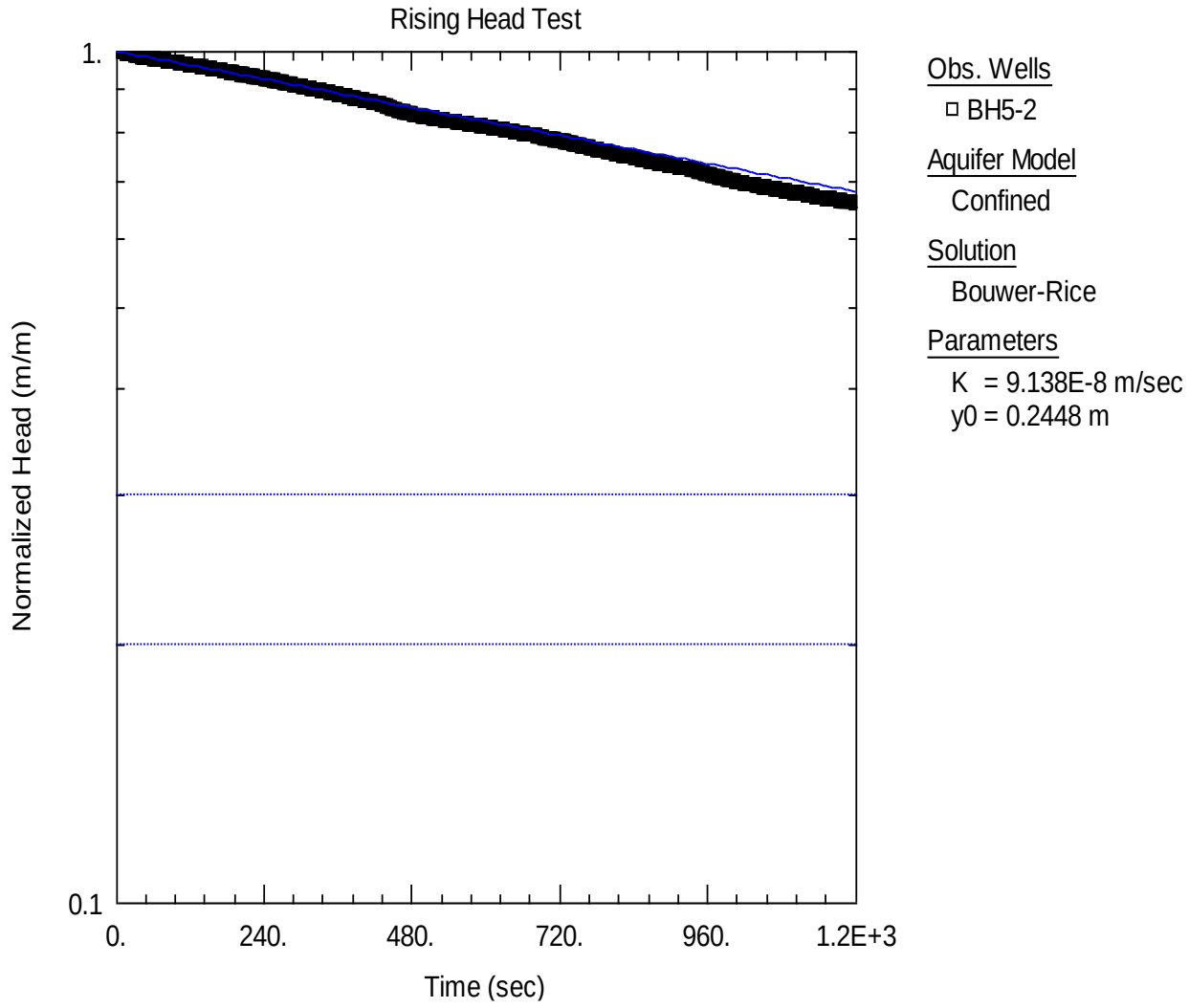
Single Well Response Test Analysis Report	
Project #:	23-0358
Project Location:	12860 Highway 27, Nobleton, ON
Analysis Date:	15-Nov-23



Testing Details	
Well ID:	BH5-1
Field Technician:	SH
Analysis By:	RB
Date of Analysis:	15-Nov-23

Well Details		
Top of Screen	6.1	m
Bottom of Screen	9.1	m
Diam. of well	51	mm
Static Water Level	6.94	m bgs
Formation Screened	Silt	

Single Well Response Test Analysis Report	
Project #:	23-0358
Project Location:	12860 Highway 27, Nobleton, ON
Analysis Date:	15-Nov-23



Testing Details	
Well ID:	BH5-2
Field Technician:	SH
Analysis By:	RB
Date of Analysis:	15-Nov-23

Well Details		
Top of Screen	6.1	m
Bottom of Screen	9.1	m
Diam. of well	51	mm
Static Water Level	6.42	m bgs
Formation Screened	Silt	

APPENDIX F: *Laboratory Certificate of Analysis*

Your Project #: 23-0358
Your C.O.C. #: C#1011742-01-01

Attention: Rob Byers

EnVision Consultants Ltd.
40-6415 Northwest Drive
Mississauga, ON
CANADA L4V 1X1

Report Date: 2024/09/24
Report #: R8333589
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4S5121
Received: 2024/09/12, 09:03

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
ABN Compounds in Water by GC/MS	1	2024/09/15	2024/09/16	CAM SOP-00301	EPA 8270 m
Carbonaceous BOD	1	2024/09/14	2024/09/19	CAM SOP-00427	SM 24 5210B m
Total Cyanide	1	2024/09/14	2024/09/14	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2024/09/13	2024/09/13	CAM SOP-00449	SM 24 4500-F C m
Mercury in Water by CVAA	1	2024/09/17	2024/09/17	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	2024/09/18	2024/09/19	CAM SOP-00447	EPA 6020B m
Total Nonylphenol in Liquids by HPLC	1	2024/09/16	2024/09/16	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2024/09/16	2024/09/16	CAM SOP-00313	Bureau Veritas
Animal and Vegetable Oil and Grease	1	N/A	2024/09/16	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2024/09/16	2024/09/16	CAM SOP-00326	EPA1664B m,SM5520B m
Polychlorinated Biphenyl in Water	1	2024/09/17	2024/09/18	CAM SOP-00309	EPA 8082A m
Phenols (4AAP)	1	N/A	2024/09/17	CAM SOP-00444	OMOE E3179 m
pH	1	2024/09/13	2024/09/13	CAM SOP-00413	SM 24th-4500H+ B
Sulphate by Automated Turbidimetry	1	N/A	2024/09/16	CAM SOP-00464	SM 24 4500-SO42- E m
Total Kjeldahl Nitrogen in Water	1	2024/09/16	2024/09/17	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (1)	1	2024/09/16	2024/09/16	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2024/09/14	2024/09/16	CAM SOP-00428	SM 24 2540D m
Volatile Organic Compounds in Water	1	N/A	2024/09/15	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless

Your Project #: 23-0358
Your C.O.C. #: C#1011742-01-01

Attention: Rob Byers

EnVision Consultants Ltd.
40-6415 Northwest Drive
Mississauga, ON
CANADA L4V 1X1

Report Date: 2024/09/24
Report #: R8333589
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4S5121
Received: 2024/09/12, 09:03

otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ashton Gibson, Project Manager
Email: ashton.gibson@bureauveritas.com
Phone# (905)817-5765
==========
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas Job #: C4S5121
Report Date: 2024/09/24

EnVision Consultants Ltd.
Client Project #: 23-0358
Sampler Initials: SH

YORK SANITARY & STORM SEWER (2021-102)

Bureau Veritas ID				ACQA44			ACQA44		
Sampling Date				2024/09/11 16:00			2024/09/11 16:00		
COC Number				C#1011742-01-01			C#1011742-01-01		
	UNITS	Criteria	Criteria-2	BH2-1	RDL	QC Batch	BH2-1 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Total Animal/Vegetable Oil and Grease	mg/L	150	-	<0.50	0.50	9634147			
Inorganics									
Total Carbonaceous BOD	mg/L	300	15	<2	2	9638698			
Fluoride (F-)	mg/L	10	-	0.11	0.10	9636669	<0.10	0.10	9636669
Total Kjeldahl Nitrogen (TKN)	mg/L	100	1	<0.50 (1)	0.50	9641791			
pH	pH	6.0:10.5	6.0:9.0	7.20		9636666	7.23		9636666
Phenols-4AAP	mg/L	1	0.008	<0.0010	0.0010	9642646			
Total Suspended Solids	mg/L	350	15	**95**	10	9635079			
Dissolved Sulphate (SO4)	mg/L	1500	-	74	1.0	9637560			
Total Cyanide (CN)	mg/L	2	0.020	<0.0050	0.0050	9638998			
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L	-	-	<0.50	0.50	9639829			
Total Oil & Grease Mineral/Synthetic	mg/L	15	-	<0.50	0.50	9639830			
Miscellaneous Parameters									
Nonylphenol Ethoxylate (Total)	mg/L	0.2	-	<0.025	0.025	9639842			
Nonylphenol (Total)	mg/L	0.02	-	<0.001	0.001	9639836			
Metals									
Mercury (Hg)	mg/L	0.01	0.0004	<0.00010	0.00010	9643298			
Total Aluminum (Al)	ug/L	50000	-	880	4.9	9645450			
Total Antimony (Sb)	ug/L	5000	-	<0.50	0.50	9645450			
Total Arsenic (As)	ug/L	1000	20	<1.0	1.0	9645450			
Total Cadmium (Cd)	ug/L	700	8	<0.090	0.090	9645450			
Total Chromium (Cr)	ug/L	2000	80	<5.0	5.0	9645450			
Total Cobalt (Co)	ug/L	5000	-	1.1	0.50	9645450			
Total Copper (Cu)	ug/L	3000	50	1.9	0.90	9645450			
Total Lead (Pb)	ug/L	1000	120	1.0	0.50	9645450			
Total Manganese (Mn)	ug/L	5000	150	69	2.0	9645450			
Total Molybdenum (Mo)	ug/L	5000	-	<0.50	0.50	9645450			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Regional Municipality of York By-Law No 2021-102, Limits for Sanitary Sewer Discharge
Criteria-2: Regional Municipality of York By-Law No 2021-102, Limits for Storm Sewer/Land Drainage Discharge
(1) Due to a high concentration of NOx, the sample required dilution. The detection limit was adjusted accordingly.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

YORK SANITARY & STORM SEWER (2021-102)

Bureau Veritas ID				ACQA44			ACQA44		
Sampling Date				2024/09/11 16:00			2024/09/11 16:00		
COC Number				C#1011742-01-01			C#1011742-01-01		
	UNITS	Criteria	Criteria-2	BH2-1	RDL	QC Batch	BH2-1 Lab-Dup	RDL	QC Batch
Total Nickel (Ni)	ug/L	2000	80	3.6	1.0	9645450			
Total Phosphorus (P)	ug/L	10000	400	<100	100	9645450			
Total Selenium (Se)	ug/L	1000	20	<2.0	2.0	9645450			
Total Silver (Ag)	ug/L	5000	120	<0.090	0.090	9645450			
Total Tin (Sn)	ug/L	5000	-	1.4	1.0	9645450			
Total Titanium (Ti)	ug/L	5000	-	20	5.0	9645450			
Total Zinc (Zn)	ug/L	2000	40	5.5	5.0	9645450			
Semivolatile Organics									
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	<8.0	8.0	9639590			
Di-N-butyl phthalate	ug/L	80	15.0	<8.0	8.0	9639590			
Volatile Organics									
Benzene	ug/L	10	2.0	<0.20	0.20	9638758	<0.20	0.20	9638758
Chloroform	ug/L	40	2.0	<0.20	0.20	9638758	<0.20	0.20	9638758
1,2-Dichlorobenzene	ug/L	50	5.6	<0.40	0.40	9638758	<0.40	0.40	9638758
1,4-Dichlorobenzene	ug/L	80	6.8	<0.40	0.40	9638758	<0.40	0.40	9638758
cis-1,2-Dichloroethylene	ug/L	4000	5.6	<0.50	0.50	9638758	<0.50	0.50	9638758
trans-1,3-Dichloropropene	ug/L	140	5.6	<0.40	0.40	9638758	<0.40	0.40	9638758
Ethylbenzene	ug/L	160	2.0	<0.20	0.20	9638758	<0.20	0.20	9638758
Methylene Chloride(Dichloromethane)	ug/L	2000	5.2	<2.0	2.0	9638758	<2.0	2.0	9638758
Methyl Ethyl Ketone (2-Butanone)	ug/L	8000	-	<10	10	9638758	<10	10	9638758
Styrene	ug/L	200	-	<0.40	0.40	9638758	<0.40	0.40	9638758
1,1,2,2-Tetrachloroethane	ug/L	1400	17.0	<0.40	0.40	9638758	<0.40	0.40	9638758
Tetrachloroethylene	ug/L	1000	4.4	<0.20	0.20	9638758	<0.20	0.20	9638758
Toluene	ug/L	270	2.0	<0.20	0.20	9638758	<0.20	0.20	9638758
Trichloroethylene	ug/L	400	8.0	<0.20	0.20	9638758	<0.20	0.20	9638758
p+m-Xylene	ug/L	-	-	<0.20	0.20	9638758	<0.20	0.20	9638758
o-Xylene	ug/L	-	-	<0.20	0.20	9638758	<0.20	0.20	9638758
Total Xylenes	ug/L	1400	4.4	<0.20	0.20	9638758	<0.20	0.20	9638758
PCBs									
Total PCB	ug/L	1	0.4	<0.05	0.05	9642291			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Regional Municipality of York By-Law No 2021-102, Limits for Sanitary Sewer Discharge
Criteria-2: Regional Municipality of York By-Law No 2021-102, Limits for Storm Sewer/Land Drainage Discharge

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YORK SANITARY & STORM SEWER (2021-102)

Bureau Veritas ID				ACQA44			ACQA44		
Sampling Date				2024/09/11 16:00			2024/09/11 16:00		
COC Number				C#1011742-01-01			C#1011742-01-01		
	UNITS	Criteria	Criteria-2	BH2-1	RDL	QC Batch	BH2-1 Lab-Dup	RDL	QC Batch
Surrogate Recovery (%)									
2,4,6-Tribromophenol	%	-	-	71		9639590			
2-Fluorobiphenyl	%	-	-	50		9639590			
2-Fluorophenol	%	-	-	35		9639590			
D14-Terphenyl	%	-	-	104		9639590			
D5-Nitrobenzene	%	-	-	80		9639590			
D5-Phenol	%	-	-	29		9639590			
Decachlorobiphenyl	%	-	-	81		9642291			
4-Bromofluorobenzene	%	-	-	100		9638758	102		9638758
D4-1,2-Dichloroethane	%	-	-	97		9638758	86		9638758
D8-Toluene	%	-	-	103		9638758	90		9638758

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Regional Municipality of York By-Law No 2021-102, Limits for Sanitary Sewer Discharge
Criteria-2: Regional Municipality of York By-Law No 2021-102, Limits for Storm Sewer/Land Drainage Discharge

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Bureau Veritas Job #: C4S5121
Report Date: 2024/09/24

EnVision Consultants Ltd.
Client Project #: 23-0358
Sampler Initials: SH

TEST SUMMARY

Bureau Veritas ID: ACQA44
Sample ID: BH2-1
Matrix: Water

Collected: 2024/09/11
Shipped:
Received: 2024/09/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in Water by GC/MS	GC/MS	9639590	2024/09/15	2024/09/16	Ahmed Ismail
Carbonaceous BOD	DO	9638698	2024/09/14	2024/09/19	Amrutha Anilkumar
Total Cyanide	SKAL/CN	9638998	2024/09/14	2024/09/14	Prgya Panchal
Fluoride	ISE	9636669	2024/09/13	2024/09/13	Nachiketa Gohil
Mercury in Water by CVAA	CV/AA	9643298	2024/09/17	2024/09/17	Maitri PATIL
Total Metals Analysis by ICPMS	ICP/MS	9645450	2024/09/18	2024/09/19	Prempal Bhatti
Total Nonylphenol in Liquids by HPLC	LC/FLU	9639836	2024/09/16	2024/09/16	Dennis Boodram
Nonylphenol Ethoxylates in Liquids: HPLC	LC/FLU	9639842	2024/09/16	2024/09/16	Dennis Boodram
Animal and Vegetable Oil and Grease	BAL	9634147	N/A	2024/09/16	Automated Statchk
Total Oil and Grease	BAL	9639829	2024/09/16	2024/09/16	Navneet Singh
Polychlorinated Biphenyl in Water	GC/ECD	9642291	2024/09/17	2024/09/18	Debashis Saha
Phenols (4AAP)	TECH/PHEN	9642646	N/A	2024/09/17	Sachi Patel
pH	AT	9636666	2024/09/13	2024/09/13	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9637560	N/A	2024/09/16	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	9641791	2024/09/16	2024/09/17	Rajni Tyagi
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	9639830	2024/09/16	2024/09/16	Navneet Singh
Total Suspended Solids	BAL	9635079	2024/09/14	2024/09/16	Razieh Tabesh
Volatile Organic Compounds in Water	GC/MS	9638758	N/A	2024/09/15	Narayan Ghimire

Bureau Veritas ID: ACQA44 Dup
Sample ID: BH2-1
Matrix: Water

Collected: 2024/09/11
Shipped:
Received: 2024/09/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Fluoride	ISE	9636669	2024/09/13	2024/09/13	Nachiketa Gohil
pH	AT	9636666	2024/09/13	2024/09/13	Nachiketa Gohil
Volatile Organic Compounds in Water	GC/MS	9638758	N/A	2024/09/15	Narayan Ghimire

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GENERAL COMMENTS

Sample ACQA44 [BH2-1] : ABN Analysis: Due to the sample matrix, a smaller amount was used for extraction. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9638758	4-Bromofluorobenzene	2024/09/15	105	70 - 130	101	70 - 130	103	%				
9638758	D4-1,2-Dichloroethane	2024/09/15	102	70 - 130	92	70 - 130	92	%				
9638758	D8-Toluene	2024/09/15	97	70 - 130	97	70 - 130	103	%				
9639590	2,4,6-Tribromophenol	2024/09/15	96	10 - 130	84	10 - 130	85	%				
9639590	2-Fluorobiphenyl	2024/09/15	69	30 - 130	61	30 - 130	67	%				
9639590	2-Fluorophenol	2024/09/15	48	10 - 130	47	10 - 130	43	%				
9639590	D14-Terphenyl	2024/09/15	94	30 - 130	99	30 - 130	99	%				
9639590	D5-Nitrobenzene	2024/09/15	86	30 - 130	79	30 - 130	82	%				
9639590	D5-Phenol	2024/09/15	34	10 - 130	29	10 - 130	29	%				
9642291	Decachlorobiphenyl	2024/09/18	81	60 - 130	80	60 - 130	75	%				
9635079	Total Suspended Solids	2024/09/16			95	80 - 120	<10	mg/L	8.3	20		
9636666	pH	2024/09/13			102	98 - 103			0.37	N/A		
9636669	Fluoride (F-)	2024/09/13	100	80 - 120	102	80 - 120	<0.10	mg/L	9.1	20		
9637560	Dissolved Sulphate (SO4)	2024/09/16	NC	75 - 125	98	80 - 120	<1.0	mg/L	1.0	20		
9638698	Total Carbonaceous BOD	2024/09/19					<2	mg/L	1.8	30	99	80 - 120
9638758	1,1,2,2-Tetrachloroethane	2024/09/15	102	70 - 130	91	70 - 130	<0.40	ug/L	NC	30		
9638758	1,2-Dichlorobenzene	2024/09/15	106	70 - 130	89	70 - 130	<0.40	ug/L	NC	30		
9638758	1,4-Dichlorobenzene	2024/09/15	105	70 - 130	100	70 - 130	<0.40	ug/L	NC	30		
9638758	Benzene	2024/09/15	111	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
9638758	Chloroform	2024/09/15	110	70 - 130	89	70 - 130	<0.20	ug/L	NC	30		
9638758	cis-1,2-Dichloroethylene	2024/09/15	117	70 - 130	94	70 - 130	<0.50	ug/L	NC	30		
9638758	Ethylbenzene	2024/09/15	101	70 - 130	92	70 - 130	<0.20	ug/L	NC	30		
9638758	Methyl Ethyl Ketone (2-Butanone)	2024/09/15	120	60 - 140	107	60 - 140	<10	ug/L	NC	30		
9638758	Methylene Chloride(Dichloromethane)	2024/09/15	97	70 - 130	89	70 - 130	<2.0	ug/L	NC	30		
9638758	o-Xylene	2024/09/15	111	70 - 130	95	70 - 130	<0.20	ug/L	NC	30		
9638758	p+m-Xylene	2024/09/15	104	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
9638758	Styrene	2024/09/15	108	70 - 130	96	70 - 130	<0.40	ug/L	NC	30		
9638758	Tetrachloroethylene	2024/09/15	101	70 - 130	90	70 - 130	<0.20	ug/L	NC	30		
9638758	Toluene	2024/09/15	103	70 - 130	90	70 - 130	<0.20	ug/L	NC	30		
9638758	Total Xylenes	2024/09/15					<0.20	ug/L	NC	30		
9638758	trans-1,3-Dichloropropene	2024/09/15	123	70 - 130	87	70 - 130	<0.40	ug/L	NC	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9638758	Trichloroethylene	2024/09/15	101	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
9638998	Total Cyanide (CN)	2024/09/14	97	80 - 120	100	80 - 120	<0.0050	mg/L	NC	20		
9639590	Bis(2-ethylhexyl)phthalate	2024/09/15	95	30 - 130	98	30 - 130	<2.0	ug/L	NC	40		
9639590	Di-N-butyl phthalate	2024/09/15	102	30 - 130	106	30 - 130	<2.0	ug/L	NC	40		
9639829	Total Oil & Grease	2024/09/16			99	80 - 110	<0.50	mg/L	0.25	25		
9639830	Total Oil & Grease Mineral/Synthetic	2024/09/16			97	65 - 130	<0.50	mg/L	0.52	25		
9639836	Nonylphenol (Total)	2024/09/16	81	50 - 130	97	50 - 130	<0.001	mg/L	NC	40		
9639842	Nonylphenol Ethoxylate (Total)	2024/09/16	89	50 - 130	96	50 - 130	<0.025	mg/L	NC	40		
9641791	Total Kjeldahl Nitrogen (TKN)	2024/09/17	100	80 - 120	100	80 - 120	<0.10	mg/L	NC	20	102	80 - 120
9642291	Total PCB	2024/09/18	94	60 - 130	84	60 - 130	<0.05	ug/L	NC	40		
9642646	Phenols-4AAP	2024/09/17	102	80 - 120	104	80 - 120	<0.0010	mg/L	13	20		
9643298	Mercury (Hg)	2024/09/17	97	75 - 125	98	80 - 120	<0.00010	mg/L	NC	20		
9645450	Total Aluminum (Al)	2024/09/19	99	80 - 120	99	80 - 120	<4.9	ug/L	1.4	20		
9645450	Total Antimony (Sb)	2024/09/19	106	80 - 120	103	80 - 120	<0.50	ug/L	14	20		
9645450	Total Arsenic (As)	2024/09/19	101	80 - 120	98	80 - 120	<1.0	ug/L	2.5	20		
9645450	Total Cadmium (Cd)	2024/09/19	99	80 - 120	97	80 - 120	<0.090	ug/L	NC	20		
9645450	Total Chromium (Cr)	2024/09/19	100	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
9645450	Total Cobalt (Co)	2024/09/19	98	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
9645450	Total Copper (Cu)	2024/09/19	103	80 - 120	98	80 - 120	<0.90	ug/L	NC	20		
9645450	Total Lead (Pb)	2024/09/19	96	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
9645450	Total Manganese (Mn)	2024/09/19	97	80 - 120	94	80 - 120	<2.0	ug/L	4.7	20		
9645450	Total Molybdenum (Mo)	2024/09/19	103	80 - 120	99	80 - 120	<0.50	ug/L	10	20		
9645450	Total Nickel (Ni)	2024/09/19	97	80 - 120	95	80 - 120	<1.0	ug/L	6.9	20		
9645450	Total Phosphorus (P)	2024/09/19	NC	80 - 120	93	80 - 120	<100	ug/L	2.6	20		
9645450	Total Selenium (Se)	2024/09/19	103	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
9645450	Total Silver (Ag)	2024/09/19	99	80 - 120	97	80 - 120	<0.090	ug/L	NC	20		
9645450	Total Tin (Sn)	2024/09/19	102	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
9645450	Total Titanium (Ti)	2024/09/19	95	80 - 120	96	80 - 120	<5.0	ug/L	5.2	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9645450	Total Zinc (Zn)	2024/09/19	100	80 - 120	100	80 - 120	<5.0	ug/L	9.1	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Louise Harding, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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C4S5121
2024/09/12 09:03

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BOD

Page of

NONT-2024-09-2223

Bottle Order #: 1011742

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#37360 EnVision Consultants Ltd.	Company Name:		Quotation #:	C35435
Attention:	Accounts Payable	Attention:	Rob Byers	P.O. #:	
Address:	40-6415 Northwest Drive	Address:		Project:	23-0358
	Mississauga ON L4V 1X1			Project Name:	
Tel:	(888) 597-6083 Fax:	Tel:	Fax:	Site #:	
Email:	payables@envisionconsultants.ca	Email:	rbyers@envisionconsultants.ca	Sampled By:	Sam Harding

COC #: C#1011742-01-01

Project Manager: Ashton Gibson

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☒ Sanitary Sewer Bylaw
- ☐ Reg 558. ☒ Storm Sewer Bylaw
- ☐ MISA Municipality York
- ☐ PWQO ☐ Reg 406 Table
- ☐ Other

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Field Filtered (please circle): Metals / Hg / Cr VI

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

York Sanitary & Storm Sewer (2021-102)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered	York Sanitary & Storm Sewer (2021-102)	# of Bottles	Comments
1		BH2-1	24/09/11	16:00	GW	No	X	16	
2									
3									
4									
5									
6									
7									
8									
9									
10									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Sam Harding	24/09/12	9:00		24/09/12	0903	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	7.1/9.8	Present		
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Exceedance Summary Table – York Sanitary SUB 2021

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Exceedance Summary Table – York Storm SUB 2021

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH2-1	ACQA44-06	Total Suspended Solids	15	95	10	mg/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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Your Project #: 23-0358
Your C.O.C. #: 960404-01-01

Attention: Sam Harding

EnVision Consultants Ltd.
40-6415 Northwest Drive
Mississauga, ON
CANADA L4V 1X1

Report Date: 2023/11/07
Report #: R7900783
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3X3848
Received: 2023/10/25, 20:20

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
ABN Compounds in Water by GC/MS	1	2023/10/30	2023/10/31	CAM SOP-00301	EPA 8270 m
Carbonaceous BOD	1	2023/10/26	2023/11/01	CAM SOP-00427	SM 23 5210B m
Total Cyanide	1	2023/10/26	2023/10/26	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2023/10/26	2023/10/27	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2023/11/01	2023/11/01	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	2023/10/31	2023/10/31	CAM SOP-00447	EPA 6020B m
Total Nonylphenol in Liquids by HPLC	1	2023/10/29	2023/10/31	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2023/10/29	2023/10/31	CAM SOP-00313	Bureau Veritas
Animal and Vegetable Oil and Grease	1	N/A	2023/11/03	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2023/11/02	2023/11/03	CAM SOP-00326	EPA1664B m,SM5520B m
Polychlorinated Biphenyl in Water	1	2023/10/27	2023/10/30	CAM SOP-00309	EPA 8082A m
pH	1	2023/10/26	2023/10/27	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2023/10/30	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Turbidimetry	1	N/A	2023/10/31	CAM SOP-00464	SM 23 4500-SO42- E m
Total Kjeldahl Nitrogen in Water	1	2023/10/27	2023/10/31	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (1)	1	2023/11/02	2023/11/03	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2023/11/01	2023/11/03	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2023/10/28	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless

Your Project #: 23-0358
Your C.O.C. #: 960404-01-01

Attention: Sam Harding

EnVision Consultants Ltd.
40-6415 Northwest Drive
Mississauga, ON
CANADA L4V 1X1

Report Date: 2023/11/07
Report #: R7900783
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3X3848
Received: 2023/10/25, 20:20

otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bureauveritas.com
Phone# (905)817-5765

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

YORK SANITARY & STORM SEWER (2021-102)

Bureau Veritas ID				XKF281			XKF281		
Sampling Date				2023/10/25 11:00			2023/10/25 11:00		
COC Number				960404-01-01			960404-01-01		
	UNITS	Criteria	Criteria-2	BHS-2	RDL	QC Batch	BHS-2 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Total Animal/Vegetable Oil and Grease	mg/L	-	150	<0.50	0.50	9007752			
Inorganics									
Total Carbonaceous BOD	mg/L	15	300	<2	2	9010272			
Fluoride (F-)	mg/L	-	10	0.11	0.10	9008737			
Total Kjeldahl Nitrogen (TKN)	mg/L	1	100	<0.10	0.10	9012498			
pH	pH	6.0:9.0	6.0:10.5	7.69		9008745			
Phenols-4AAP	mg/L	0.008	1	<0.0010	0.0010	9015629			
Total Suspended Solids	mg/L	15	350	**370**	10	9020722	**370**	10	9020722
Dissolved Sulphate (SO4)	mg/L	-	1500	22	1.0	9010008			
Total Cyanide (CN)	mg/L	0.020	2	<0.0050	0.0050	9004275			
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L	-	-	<0.50	0.50	9025175			
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	<0.50	0.50	9025179			
Miscellaneous Parameters									
Nonylphenol Ethoxylate (Total)	mg/L	-	0.2	<0.025	0.025	9014371			
Nonylphenol (Total)	mg/L	-	0.02	<0.001	0.001	9014369			
Metals									
Mercury (Hg)	mg/L	0.0004	0.01	<0.00010	0.00010	9020961			
Total Aluminum (Al)	ug/L	-	50000	3000	4.9	9017288	2900	4.9	9017288
Total Antimony (Sb)	ug/L	-	5000	<0.50	0.50	9017288	<0.50	0.50	9017288
Total Arsenic (As)	ug/L	20	1000	1.2	1.0	9017288	1.2	1.0	9017288
Total Cadmium (Cd)	ug/L	8	700	<0.090	0.090	9017288	<0.090	0.090	9017288
Total Chromium (Cr)	ug/L	80	2000	5.6	5.0	9017288	5.5	5.0	9017288
Total Cobalt (Co)	ug/L	-	5000	1.7	0.50	9017288	1.8	0.50	9017288
Total Copper (Cu)	ug/L	50	3000	7.0	0.90	9017288	6.7	0.90	9017288
Total Lead (Pb)	ug/L	120	1000	2.3	0.50	9017288	2.3	0.50	9017288
Total Manganese (Mn)	ug/L	150	5000	**180**	2.0	9017288	**180**	2.0	9017288
Total Molybdenum (Mo)	ug/L	-	5000	1.4	0.50	9017288	1.4	0.50	9017288
Total Nickel (Ni)	ug/L	80	2000	4.8	1.0	9017288	5.0	1.0	9017288

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Regional Municipality of York By-Law No 2021-102, Limits for Storm Sewer/Land Drainage Discharge
Criteria-2: Regional Municipality of York By-Law No 2021-102, Limits for Sanitary Sewer Discharge

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YORK SANITARY & STORM SEWER (2021-102)

Bureau Veritas ID				XKF281			XKF281		
Sampling Date				2023/10/25 11:00			2023/10/25 11:00		
COC Number				960404-01-01			960404-01-01		
	UNITS	Criteria	Criteria-2	BHS-2	RDL	QC Batch	BHS-2 Lab-Dup	RDL	QC Batch
Total Phosphorus (P)	ug/L	400	10000	240	100	9017288	230	100	9017288
Total Selenium (Se)	ug/L	20	1000	<2.0	2.0	9017288	<2.0	2.0	9017288
Total Silver (Ag)	ug/L	120	5000	<0.090	0.090	9017288	<0.090	0.090	9017288
Total Tin (Sn)	ug/L	-	5000	<1.0	1.0	9017288	<1.0	1.0	9017288
Total Titanium (Ti)	ug/L	-	5000	140	5.0	9017288	140	5.0	9017288
Total Zinc (Zn)	ug/L	40	2000	12	5.0	9017288	11	5.0	9017288
Semivolatile Organics									
Bis(2-ethylhexyl)phthalate	ug/L	8.8	12	<2.0	2.0	9014990	<2.0	2.0	9014990
Di-N-butyl phthalate	ug/L	15.0	80	<2.0	2.0	9014990	<2.0	2.0	9014990
Volatile Organics									
Benzene	ug/L	2.0	10	<0.20	0.20	9009703			
Chloroform	ug/L	2.0	40	<0.20	0.20	9009703			
1,2-Dichlorobenzene	ug/L	5.6	50	<0.40	0.40	9009703			
1,4-Dichlorobenzene	ug/L	6.8	80	<0.40	0.40	9009703			
cis-1,2-Dichloroethylene	ug/L	5.6	4000	<0.50	0.50	9009703			
trans-1,3-Dichloropropene	ug/L	5.6	140	<0.40	0.40	9009703			
Ethylbenzene	ug/L	2.0	160	<0.20	0.20	9009703			
Methylene Chloride(Dichloromethane)	ug/L	5.2	2000	<2.0	2.0	9009703			
Methyl Ethyl Ketone (2-Butanone)	ug/L	-	8000	<10	10	9009703			
Styrene	ug/L	-	200	<0.40	0.40	9009703			
1,1,2,2-Tetrachloroethane	ug/L	17.0	1400	<0.40	0.40	9009703			
Tetrachloroethylene	ug/L	4.4	1000	<0.20	0.20	9009703			
Toluene	ug/L	2.0	270	<0.20	0.20	9009703			
Trichloroethylene	ug/L	8.0	400	<0.20	0.20	9009703			
p+m-Xylene	ug/L	-	-	<0.20	0.20	9009703			
o-Xylene	ug/L	-	-	<0.20	0.20	9009703			
Total Xylenes	ug/L	4.4	1400	<0.20	0.20	9009703			
PCBs									
Total PCB	ug/L	0.4	1	<0.05	0.05	9013125			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

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YORK SANITARY & STORM SEWER (2021-102)

Bureau Veritas ID				XKF281			XKF281		
Sampling Date				2023/10/25 11:00			2023/10/25 11:00		
COC Number				960404-01-01			960404-01-01		
	UNITS	Criteria	Criteria-2	BHS-2	RDL	QC Batch	BHS-2 Lab-Dup	RDL	QC Batch
Surrogate Recovery (%)									
2,4,6-Tribromophenol	%	-	-	30		9014990	28		9014990
2-Fluorobiphenyl	%	-	-	59		9014990	58		9014990
2-Fluorophenol	%	-	-	18		9014990	17		9014990
D14-Terphenyl	%	-	-	94		9014990	99		9014990
D5-Nitrobenzene	%	-	-	56		9014990	55		9014990
D5-Phenol	%	-	-	15		9014990	14		9014990
Decachlorobiphenyl	%	-	-	92		9013125			
4-Bromofluorobenzene	%	-	-	104		9009703			
D4-1,2-Dichloroethane	%	-	-	108		9009703			
D8-Toluene	%	-	-	93		9009703			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Regional Municipality of York By-Law No 2021-102, Limits for Storm Sewer/Land Drainage Discharge
Criteria-2: Regional Municipality of York By-Law No 2021-102, Limits for Sanitary Sewer Discharge

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Bureau Veritas Job #: C3X3848
Report Date: 2023/11/07

EnVision Consultants Ltd.
Client Project #: 23-0358
Sampler Initials: SH

TEST SUMMARY

Bureau Veritas ID: XKF281
Sample ID: BHS-2
Matrix: Water

Collected: 2023/10/25
Shipped:
Received: 2023/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in Water by GC/MS	GC/MS	9014990	2023/10/30	2023/10/31	Kathy Horvat
Carbonaceous BOD	DO	9010272	2023/10/26	2023/11/01	Nusrat Naz
Total Cyanide	SKAL/CN	9004275	2023/10/26	2023/10/26	Prgya Panchal
Fluoride	ISE	9008737	2023/10/26	2023/10/27	Nachiketa Gohil
Mercury in Water by CVAA	CV/AA	9020961	2023/11/01	2023/11/01	Gagandeep Rai
Total Metals Analysis by ICPMS	ICP/MS	9017288	2023/10/31	2023/10/31	Azita Fazaeli
Total Nonylphenol in Liquids by HPLC	LC/FLU	9014369	2023/10/29	2023/10/31	Furneesh Kumar
Nonylphenol Ethoxylates in Liquids: HPLC	LC/FLU	9014371	2023/10/29	2023/10/31	Furneesh Kumar
Animal and Vegetable Oil and Grease	BAL	9007752	N/A	2023/11/03	Automated Statchk
Total Oil and Grease	BAL	9025175	2023/11/02	2023/11/03	Kishan Patel
Polychlorinated Biphenyl in Water	GC/ECD	9013125	2023/10/27	2023/10/30	Akruti Patel
pH	AT	9008745	2023/10/26	2023/10/27	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9015629	N/A	2023/10/30	Chloe Pollock
Sulphate by Automated Turbidimetry	KONE	9010008	N/A	2023/10/31	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9012498	2023/10/27	2023/10/31	Rajni Tyagi
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	9025179	2023/11/02	2023/11/03	Kishan Patel
Total Suspended Solids	BAL	9020722	2023/11/01	2023/11/03	Shaneil Hall
Volatile Organic Compounds in Water	GC/MS	9009703	N/A	2023/10/28	Hai Son Tran

Bureau Veritas ID: XKF281 Dup
Sample ID: BHS-2
Matrix: Water

Collected: 2023/10/25
Shipped:
Received: 2023/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in Water by GC/MS	GC/MS	9014990	2023/10/30	2023/10/31	Kathy Horvat
Total Metals Analysis by ICPMS	ICP/MS	9017288	2023/10/31	2023/10/31	Azita Fazaeli
Total Suspended Solids	BAL	9020722	2023/11/01	2023/11/03	Shaneil Hall

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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9009703	4-Bromofluorobenzene	2023/10/28	104	70 - 130	104	70 - 130	105	%				
9009703	D4-1,2-Dichloroethane	2023/10/28	109	70 - 130	104	70 - 130	105	%				
9009703	D8-Toluene	2023/10/28	98	70 - 130	99	70 - 130	95	%				
9013125	Decachlorobiphenyl	2023/10/30	79	60 - 130	80	60 - 130	81	%				
9014990	2,4,6-Tribromophenol	2023/10/30	79	10 - 130	78	10 - 130	54	%				
9014990	2-Fluorobiphenyl	2023/10/30	74	30 - 130	72	30 - 130	73	%				
9014990	2-Fluorophenol	2023/10/30	41	10 - 130	44	10 - 130	36	%				
9014990	D14-Terphenyl	2023/10/30	88	30 - 130	95	30 - 130	89	%				
9014990	D5-Nitrobenzene	2023/10/30	80	30 - 130	90	30 - 130	80	%				
9014990	D5-Phenol	2023/10/30	26	10 - 130	29	10 - 130	25	%				
9004275	Total Cyanide (CN)	2023/10/26	109	80 - 120	102	80 - 120	<0.0050	mg/L	NC	20		
9008737	Fluoride (F-)	2023/10/27	104	80 - 120	95	80 - 120	<0.10	mg/L	9.8	20		
9008745	pH	2023/10/27			102	98 - 103			0.86	N/A		
9009703	1,1,2,2-Tetrachloroethane	2023/10/28	126	70 - 130	106	70 - 130	<0.40	ug/L	NC	30		
9009703	1,2-Dichlorobenzene	2023/10/28	104	70 - 130	96	70 - 130	<0.40	ug/L	NC	30		
9009703	1,4-Dichlorobenzene	2023/10/28	110	70 - 130	106	70 - 130	<0.40	ug/L	NC	30		
9009703	Benzene	2023/10/28	98	70 - 130	89	70 - 130	<0.20	ug/L	NC	30		
9009703	Chloroform	2023/10/28	114	70 - 130	102	70 - 130	<0.20	ug/L	4.0	30		
9009703	cis-1,2-Dichloroethylene	2023/10/28	107	70 - 130	95	70 - 130	<0.50	ug/L	NC	30		
9009703	Ethylbenzene	2023/10/28	95	70 - 130	89	70 - 130	<0.20	ug/L	NC	30		
9009703	Methyl Ethyl Ketone (2-Butanone)	2023/10/28	122	60 - 140	100	60 - 140	<10	ug/L				
9009703	Methylene Chloride(Dichloromethane)	2023/10/28	116	70 - 130	102	70 - 130	<2.0	ug/L	NC	30		
9009703	o-Xylene	2023/10/28	87	70 - 130	83	70 - 130	<0.20	ug/L	NC	30		
9009703	p+m-Xylene	2023/10/28	100	70 - 130	95	70 - 130	<0.20	ug/L	NC	30		
9009703	Styrene	2023/10/28	111	70 - 130	104	70 - 130	<0.40	ug/L				
9009703	Tetrachloroethylene	2023/10/28	100	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
9009703	Toluene	2023/10/28	96	70 - 130	88	70 - 130	<0.20	ug/L	NC	30		
9009703	Total Xylenes	2023/10/28					<0.20	ug/L	NC	30		
9009703	trans-1,3-Dichloropropene	2023/10/28	104	70 - 130	88	70 - 130	<0.40	ug/L	NC	30		
9009703	Trichloroethylene	2023/10/28	104	70 - 130	97	70 - 130	<0.20	ug/L	NC	30		
9010008	Dissolved Sulphate (SO4)	2023/10/31	NC	75 - 125	99	80 - 120	<1.0	mg/L	0.50	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9010272	Total Carbonaceous BOD	2023/11/01					<2	mg/L	NC	30	93	85 - 115
9012498	Total Kjeldahl Nitrogen (TKN)	2023/11/01	NC	80 - 120	98	80 - 120	<0.10	mg/L	2.6	20	102	80 - 120
9013125	Total PCB	2023/10/30	89	60 - 130	95	60 - 130	<0.05	ug/L	NC	40		
9014369	Nonylphenol (Total)	2023/10/31	111	50 - 130	111	50 - 130	<0.001	mg/L	NC	40		
9014371	Nonylphenol Ethoxylate (Total)	2023/10/31	98	50 - 130	94	50 - 130	<0.025	mg/L	NC	40		
9014990	Bis(2-ethylhexyl)phthalate	2023/10/31	76	30 - 130	75	30 - 130	<2.0	ug/L	NC	40		
9014990	Di-N-butyl phthalate	2023/10/31	78	30 - 130	84	30 - 130	<2.0	ug/L	NC	40		
9015629	Phenols-4AAP	2023/10/30	104	80 - 120	101	80 - 120	<0.0010	mg/L	0	20		
9017288	Total Aluminum (Al)	2023/10/31	NC	80 - 120	98	80 - 120	<4.9	ug/L	2.4	20		
9017288	Total Antimony (Sb)	2023/10/31	102	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
9017288	Total Arsenic (As)	2023/10/31	95	80 - 120	96	80 - 120	<1.0	ug/L	3.2	20		
9017288	Total Cadmium (Cd)	2023/10/31	95	80 - 120	95	80 - 120	<0.090	ug/L	NC	20		
9017288	Total Chromium (Cr)	2023/10/31	93	80 - 120	95	80 - 120	<5.0	ug/L	2.5	20		
9017288	Total Cobalt (Co)	2023/10/31	93	80 - 120	96	80 - 120	<0.50	ug/L	5.5	20		
9017288	Total Copper (Cu)	2023/10/31	93	80 - 120	96	80 - 120	<0.90	ug/L	3.9	20		
9017288	Total Lead (Pb)	2023/10/31	90	80 - 120	94	80 - 120	<0.50	ug/L	0.86	20		
9017288	Total Manganese (Mn)	2023/10/31	92	80 - 120	96	80 - 120	<2.0	ug/L	0.27	20		
9017288	Total Molybdenum (Mo)	2023/10/31	100	80 - 120	99	80 - 120	<0.50	ug/L	2.0	20		
9017288	Total Nickel (Ni)	2023/10/31	92	80 - 120	96	80 - 120	<1.0	ug/L	4.9	20		
9017288	Total Phosphorus (P)	2023/10/31	95	80 - 120	93	80 - 120	<100	ug/L	2.9	20		
9017288	Total Selenium (Se)	2023/10/31	99	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
9017288	Total Silver (Ag)	2023/10/31	93	80 - 120	94	80 - 120	<0.090	ug/L	NC	20		
9017288	Total Tin (Sn)	2023/10/31	98	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
9017288	Total Titanium (Ti)	2023/10/31	127 (1)	80 - 120	99	80 - 120	<5.0	ug/L	0.85	20		
9017288	Total Zinc (Zn)	2023/10/31	92	80 - 120	97	80 - 120	<5.0	ug/L	5.6	20		
9020722	Total Suspended Solids	2023/11/03			95	85 - 115	<10	mg/L	0.27	20		
9020961	Mercury (Hg)	2023/11/01	100	75 - 125	109	80 - 120	<0.00010	mg/L	NC	20		
9025175	Total Oil & Grease	2023/11/03			98	85 - 115	<0.50	mg/L	0.25	25		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9025179	Total Oil & Grease Mineral/Synthetic	2023/11/03			96	85 - 115	<0.50	mg/L	0.52	25		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Matrix Spike exceeds acceptance limits, probable matrix interference

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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25-Oct-23 20:20
Ashton Gibson
C3X3848

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:			
Company Name:	#37360 EnVision Consultants Ltd.	Company Name:	EnVision	Quotation #:	C25646	Bottle Order #:	960404
Attention:	Accounts Payable	Attention:		P.O. #:			
Address:	40-6415 Northwest Drive Mississauga ON L4V 1X1	Address:		Project:	23-0358	COC #:	C#960404-01-01
Tel:	(888) 597-6083 Fax:	Tel:	Fax:	Project Name:		Project Manager:	Ashton Gibson
Email:	payables@envisionconsultants.ca	Email:	sharding@envisionconsultants.ca	Site #:			
				Sampled By:	Sam Harding		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☒ Sanitary Sewer Bylaw
- ☐ Reg 558. ☒ Storm Sewer Bylaw
- ☐ MISA Municipality York
- ☐ PWQO ☐ Reg 406 Table
- ☐ Other

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	RCAp - Comprehensive + TSS	York Sanitary & Storm Sewer (2021-102)	Barrie Sanitary	Barrie Storm	# of Bottles	Comments
1		BHS-2	23/10/25	11:00am	GW			X			16	
2												
3												
4												
5												
6												
7												
8												
9												
10												

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Tehnny Lu	2023/10/25	5:00 PM				

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	15/15/15	Present	✓	
		Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Exceedance Summary Table – York Storm SUB 2021

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BHS-2	XKF281-09-Lab Dup	Total Manganese (Mn)	150	180	2.0	ug/L
BHS-2	XKF281-09	Total Manganese (Mn)	150	180	2.0	ug/L
BHS-2	XKF281-06	Total Suspended Solids	15	370	10	mg/L
BHS-2	XKF281-06-Lab Dup	Total Suspended Solids	15	370	10	mg/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Exceedance Summary Table – York Sanitary SUB 2021

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BHS-2	XKF281-06	Total Suspended Solids	350	370	10	mg/L
BHS-2	XKF281-06-Lab Dup	Total Suspended Solids	350	370	10	mg/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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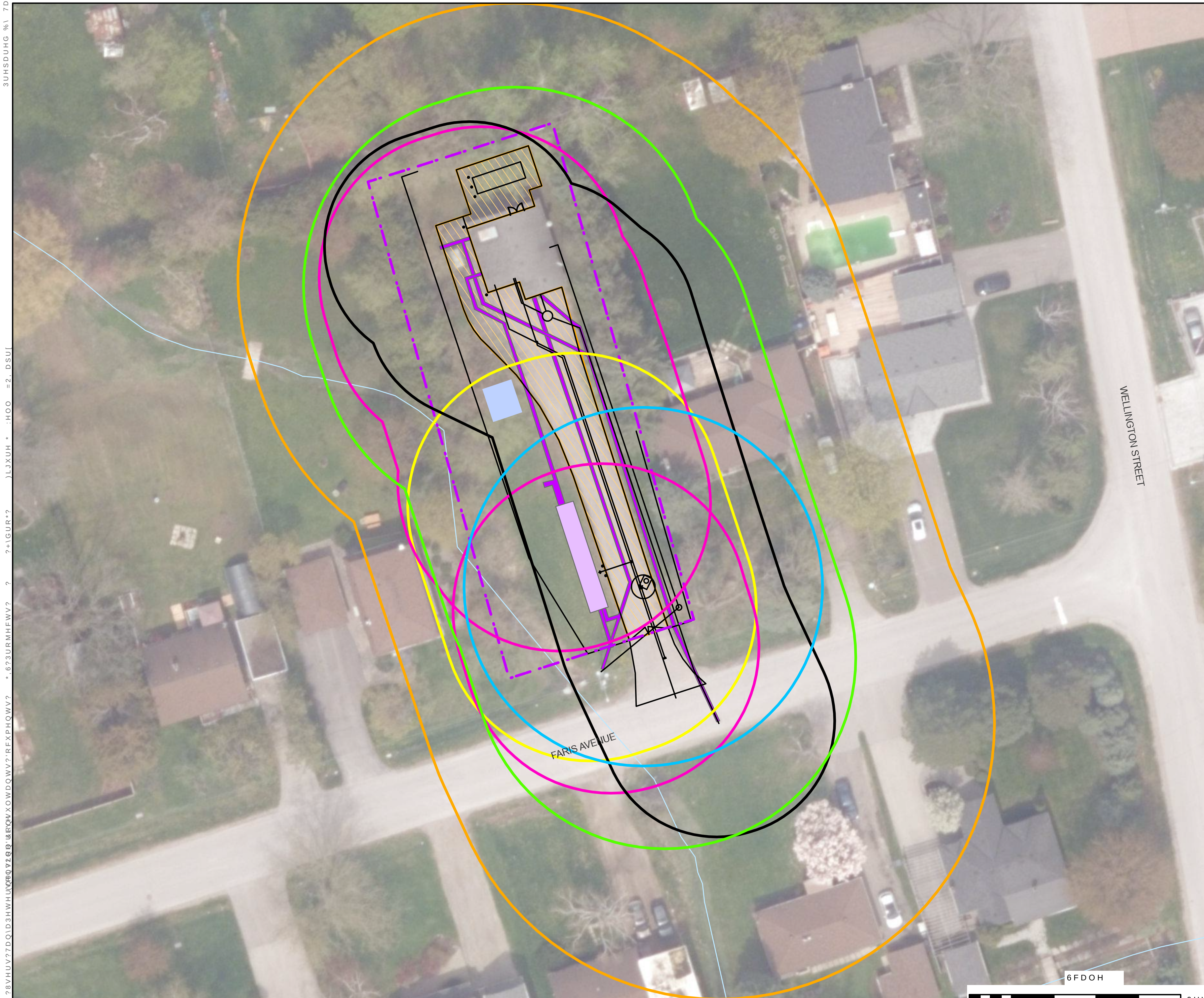
APPENDIX G:

Construction Dewatering Analysis



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6FDOH

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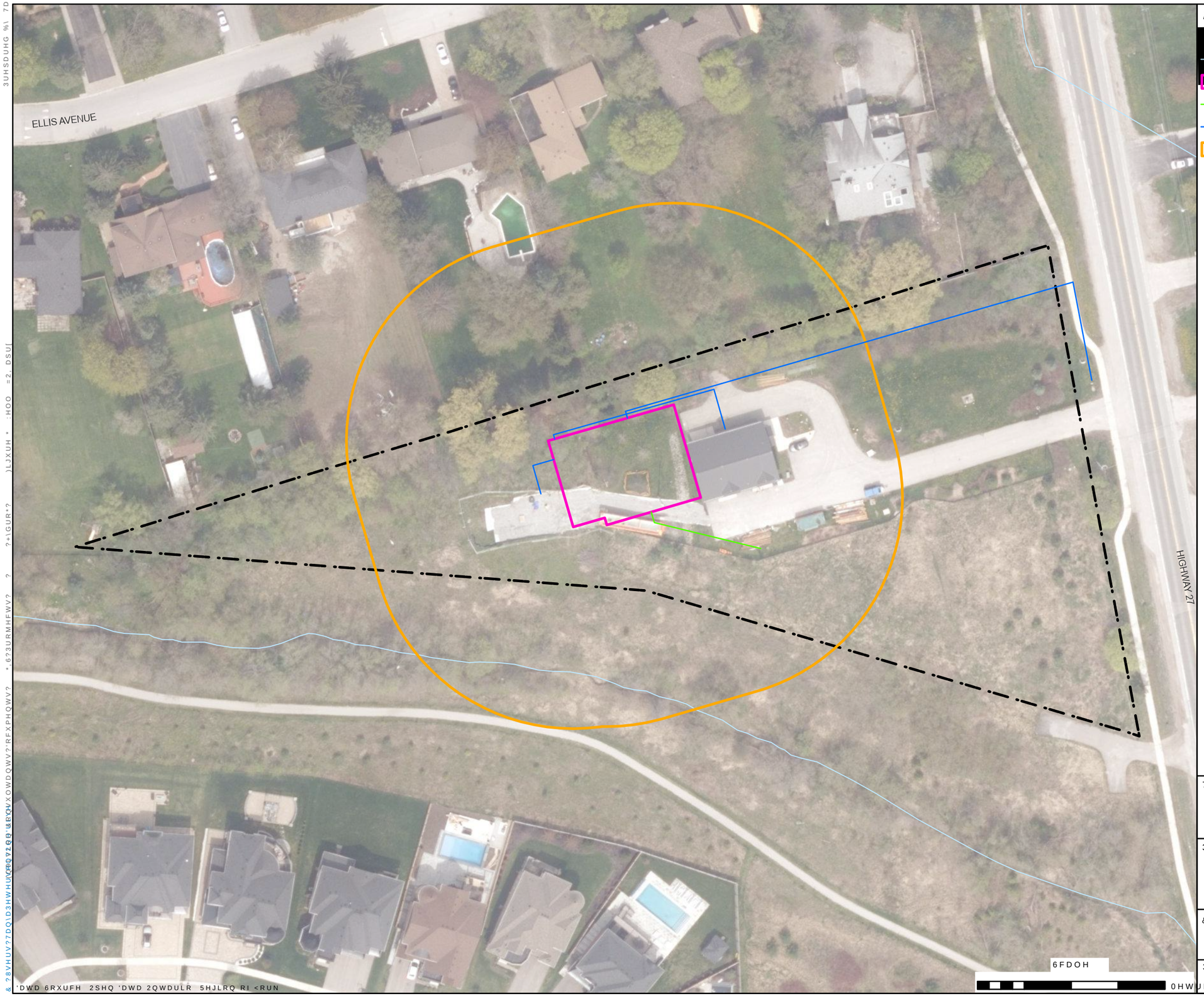

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Table G-1: Short-Term Dewatering at Well 2 Facility (Demolition Ex. Services)

ENVISION
CONSULTANTS LTD

Dewatering Source Information								Source Outputs		
Source #	Description	UTM 17N Coordinates			Dimensions (m)			Surface Area (m^2)	Volume (m^3)	R_{eff} (m)
		Northing	Easting	Elevation	Width	Length	Depth			
1	Chlorine Tank	4861699	608023	264.60	7.00	18.00	3.80	126	478.8	6.3
2	200mm WM	4861699	608023	265.00	3.00	30.00	2.50	90	225.0	5.4
3	150mm Sani/Storm	4861699	608023	265.00	3.00	24.00	1.90	72	136.8	4.8
								-		

Hydraulic Parameters								
Description	Source							
	1		2		3			
Max. Water Table Elevation (m)	264.3	masl	264.3	masl	263.8	masl		masl
Aquifer Saturated Thickness (H)	9.3	m	9.3	m	8.8	m		m
Target Dewatered Elev. (m)	257.90	masl	261.5	masl	262.1	masl		masl
Dewatered Aquifer Saturated Thickness (h)	2.90	m	6.5	m	7.1	m		m
Hydraulic Conductivity (K)	1.00E-07	m/sec	7.40E-07	m/sec	7.40E-07	m/sec		m/sec
Base of Aquifer (m)	255.00	masl	255.00	masl	255.00	masl		masl
Ground Elevation (m)	265.1	masl	266	masl	265.3	masl		masl

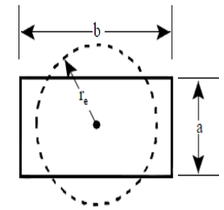
Dewatering Assessment										
Source #	H	h	K	r_{eff}	R_{scih}	R_0	R_0_ass	Q	S. Factor	Q
	(m)	*(m)*	*(m/sec)*	*(m)*	*(m)*	*(m)*	*(m)*	*(m3/day)*		*(L/day)*
1	9.3	2.9	1.00E-07	6.3	6.1	12.4	18.5	2.0	2	4,000
2	9.3	6.5	7.40E-07	5.4	7.2	12.6	19.8	6.8	2	13,600
3	8.8	7.1	7.40E-07	4.8	4.4	9.2	13.6	5.2	2	10,400

Stormwater Contribution			Storage Calculation			Pumping Time		Dewatering Discharge Rates (Maximum Expected with Stormwater)		
Source	Precipitation	Volume	s	Sy	V_S	7	14	Source	Q (7 Days Pumping)	Q (14 Days Pumping)
	(mm/day)	*(m^3/day)*	(m)	Unitless	(m3)	(L/day)	(L/day)		*(L/day)*	*(L/day)*
1	29	3.65	6	0.05	110	15,700	7,857	1	23,350	15,500
2	29	2.61	3	0.05	70	10,000	5,000	2	16,210	21,200
3	29	2.09	2	0.05	20	2,900	1,429	3	12,490	13,900

Effective Radius Approximation

$$R_{eff} = \sqrt{\frac{ab}{\pi}}$$

Where;
R_{eff} = Effective radius of the excavation (m)
a = width of excavation (m)
b = length of excavation (m)



Conversion Factors Used (Typical)		
1 m	=	3.28 ft
1 cu. m.	=	1000 L
1 day	=	1440 min
1 day	=	86,400 sec.

Sichardt Approximation for Radius of Influence

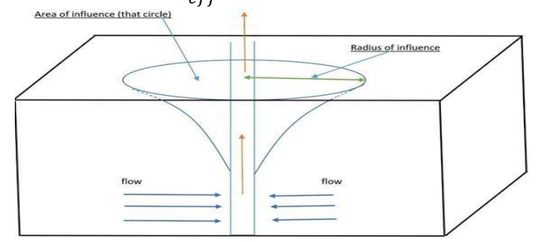
$$R_0 = 3000 * (H - h)\sqrt{K}$$

Where;
R_0 = Radius of influence(m)
(H-h) = change in aquifer saturated thickness (m)
K =hydraulic conductivity(m/sec)

Radial Flow to Source (Unconfined)

$$Q = \frac{\pi K (H^2 - h^2)}{\ln {R_0}/{r_{eff}}}$$

Where;
Q = discharge volume (m^3/day)
K = hydraulic conductivity (m/day)
H = saturated aquifer thickness (m)
h = dewatered aquifer thickness (m)
R_0 = Radius of influence (m)
R_{eff} = Effective radius of the excavation (m)



Sources:
Construction dewatering and groundwater control, Powers, J.P., 2007
Kyrieleis, W., Sichardt, W. – Grundwasserabsenkung bei Fundierungsarbeiten, Springer, Berlin, 1930

Table G-2: Short-Term Dewatering at Well 2 Facility (Construction New Services)

ENVISION CONSULTANTS LTD

Dewatering Source Information								Source Outputs		
Source #	Description	UTM 17N Coordinates			Dimensions (m)			Surface Area (m^2)	Volume (m^3)	R_{eff} (m)
		Northing	Easting	Elevation	Width	Length	Depth			
1	Valve Chamber	4861699	608023	265.00	3.00	3.00	7.00	9.0	63.0	1.7
2	250mm PVC Pipe	4861699	608023	265.00	3.00	45.00	3.00	135.0	405.0	6.6
3	150/200mm San Sewer	4861699	608023	265.00	3.00	60.00	3.00	180.0	540.0	7.6
								-		

Hydraulic Parameters								
Description	Source							
	1		2		3			
Max. Water Table Elevation (m)	264.3	masl	264.3	masl	264	masl		masl
Aquifer Saturated Thickness (H)	9.3	m	9.3	m	9	m		m
Target Dewatered Elev. (m)	260.50	masl	260.9	masl	259.1	masl		masl
Dewatered Aquifer Saturated Thickness (h)	5.50	m	5.9	m	4.1	m		m
Hydraulic Conductivity (K)	1.00E-07	m/sec	7.40E-07	m/sec	7.40E-07	m/sec		m/sec
Base of Aquifer (m)	255.00	masl	255.00	masl	255.00	masl		masl
Ground Elevation (m)	265.1	masl	266	masl	265	masl		masl

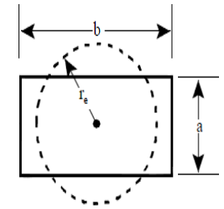
Dewatering Assessment									
Source #	H	h	K	r_{eff}	R_{scih}	R_0	R_{0}_ass	Q	S. Factor	Q
	(m)	*(m)*	*(m/sec)*	*(m)*	*(m)*	*(m)*	*(m)*	*(m3/day)*		*(L/day)*
1	9.3	5.5	1.00E-07	1.7	3.6	5.3	8.9	0.9	2	1,800
2	9.3	5.9	7.40E-07	6.6	8.8	15.3	24.1	8.0	2	15,900
3	9	4.1	7.40E-07	7.6	12.6	20.2	32.9	8.8	2	17,600

Stormwater Contribution			Storage Calculation			Pumping Time		Dewatering Discharge Rates (Maximum Expected with Stormwater)		
Source	Precipitation	Volume	s	Sy	V_S	7	14	Source	Q (7 Days Pumping)	Q (14 Days Pumping)
	(mm/day)	*(m^3/day)*	(m)	Unitless	(m3)	(L/day)	(L/day)		*(L/day)*	*(L/day)*
1	29	0.26	3.8	0.05	5	700	357	1	2,760	2,400
2	29	3.92	3.4	0.05	140	20,000	10,000	2	39,820	29,800
3	29	5.22	5	0.05	340	48,600	24,286	3	71,420	47,100

Effective Radius Approximation

$$R_{eff} = \sqrt{\frac{ab}{\pi}}$$

Where;
R_{eff} = Effective radius of the excavation (m)
a = width of excavation (m)
b = length of excavation (m)



Conversion Factors Used (Typical)		
1 m	=	3.28 ft
1 cu. m.	=	1000 L
1 day	=	1440 min
1 day	=	86,400 sec.

Sichardt Approximation for Radius of Influence

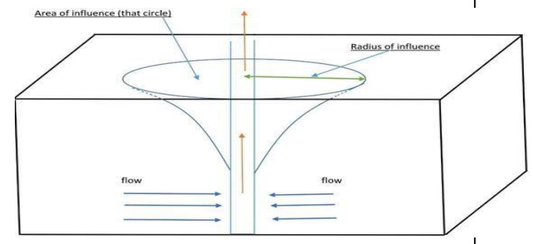
$$R_0 = 3000 * (H - h)\sqrt{K}$$

Where;
R_0 = Radius of influence(m)
(H-h) = change in aquifer saturated thickness (m)
K =hydraulic conductivity(m/sec)

Radial Flow to Source (Unconfined)

$$Q = \frac{\pi K(H^2 - h^2)}{\ln {}^{R_0}/_{r_{eff}}}$$

Where;
Q = discharge volume (m^3/day)
K = hydraulic conductivity (m/day)
H = saturated aquifer thickness (m)
h = dewatered aquifer thickness (m)
R_0 = Radius of influence (m)
R_{eff} = Effective radius of the excavation (m)



<u>Sources:</u>
Construction dewatering and groundwater control, Powers, J.P., 2007
Kyrieleis, W., Sichardt, W. – Grundwasserabsenkung bei Fundierungsarbeiten, Springer, Berlin, 1930

Table G-3: Short-Term Dewatering at Well 5 Facility (Construction of New Facilities)

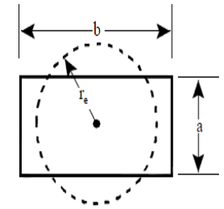
ENVISION CONSULTANTS LTD

Dewatering Source Information								Source Outputs		
Source #	Description	UTM 17N Coordinates			Dimensions (m)			Surface Area (m^2)	Volume (m^3)	R_{eff} (m)
		Northing	Easting	Elevation	Width	Length	Depth			
1	WTP	4861699	608023	265.00	33.00	30.00	13.00	990.0	12870.0	17.8
2	Watermains/Sewers	4861699	608023	265.00	3.00	45.00	3.00	135.0	405.0	6.6
								-		

Effective Radius Approximation

$$R_{eff} = \sqrt{\frac{ab}{\pi}}$$

Where;
R_{eff} = Effective radius of the excavation (m)
a = width of excavation (m)
b = length of excavation (m)



Conversion Factors Used (Typical)		
1 m	=	3.28 ft
1 cu. m.	=	1000 L
1 day	=	1440 min
1 day	=	86,400 sec.

Sichardt Approximation for Radius of Influence

$$R_0 = 3000 * (H - h)\sqrt{K}$$

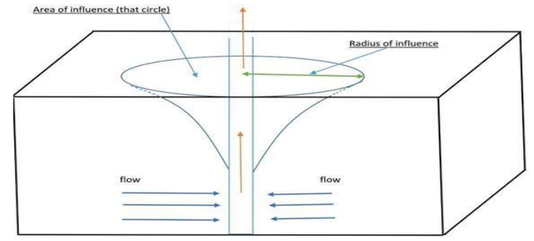
Where;
R_0 = Radius of influence(m)
(H-h) = change in aquifer saturated thickness (m)
K =hydraulic conductivity(m/sec)

Hydraulic Parameters								
Description	Source							
	1		2					
Max. Water Table Elevation (m)	256.0	masl	256.1	masl		masl		masl
Aquifer Saturated Thickness (H)	7	m	6.1	m		m		m
Target Dewatered Elev. (m)	251.00	masl	256	masl		masl		masl
Dewatered Aquifer Saturated Thickness (h)	2.00	m	6	m		m		m
Hydraulic Conductivity (K)	1.00E-07	m/sec	6.80E-07	m/sec		m/sec		m/sec
Base of Aquifer (m)	249.00	masl	250.00	masl		masl		masl
Ground Elevation (m)	261	masl	261	masl		masl		masl

Radial Flow to Source (Unconfined)

$$Q = \frac{\pi K(H^2 - h^2)}{\ln {R_0}/{r_{eff}}}$$

Where;
Q = discharge volume (m^3/day)
K = hydraulic conductivity (m/day)
H = saturated aquifer thickness (m)
h = dewatered aquifer thickness (m)
R_0 = Radius of influence (m)
R_{eff} = Effective radius of the excavation (m)



<u>Sources:</u>
Construction dewatering and groundwater control, Powers, J.P., 2007
Kyrieleis, W., Sichardt, W. – Grundwasserabsenkung bei Fundierungsarbeiten, Springer, Berlin, 1930

Dewatering Assessment										
Source #	H	h	K	r_{eff}	R_{scih}	R_0	R_0_ass	Q	S. Factor	Q
	(m)	(m)	(m/sec)	(m)	(m)	(m)	(m)	(m3/day)		(L/day)
1	7	2	1.00E-07	17.8	4.7	22.5	27.2	2.9	2	5,700
2	6.1	6	6.80E-07	6.6	0.2	6.8	7.1	0.0	2	-

Stormwater Contribution			Storage Calculation			Pumping Time		Dewatering Discharge Rates (Maximum Expected with Stormwater)		
Source	Precipitation	Volume	s	Sy	V_S	7	14	Source	Q (7 Days Pumping)	Q (14 Days Pumping)
	(mm/day)	(m^3/day)	(m)	Unitless	(m3)	(L/day)	(L/day)		(L/day)	(L/day)
1	29	28.71	5.0	0.05	420	60,000	30,000	1	94,410	64,400
2	29	3.92	0.1	0.05	-	-	-	2	3,920	3,900