Elora Sands/Keating Lands

Functional Servicing Report

Project Location:
Township of Centre Wellington, Ontario

Prepared for:
Elora Sands Development Inc.
c/o Cachet Developments
2555 Meadowpine Boulevard, Unit 3
Mississauga, ON L5N 6C3

Prepared by:
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520 Bingemans Centre Drive
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Issued: February 2025
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MTE File No.: 49878-100

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1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Cachet Developments (Elora) Inc. (Cachet) to prepare the following Functional Servicing Report (FSR) in support of a privately initiated settlement boundary expansion Official Plan Amendment (OPA) application.

The lands that comprise the OPA application are known as the Elora Sands (formerly Gibson Farm) and the Keating Lands (owned by James Keating Construction). The Elora Sands are located at 7581 Sideroad 15, legally described as Lot 16 of Concession 12, Nichol Township, County of Wellington, and are approximately 40.0ha. The Keating Lands are located at 6583 Irvine Street, legally described as Lot 17 of Concession 12, Nichol Township, County of Wellington, and are approximately 36.8ha. These lands, herein referred to as the 'subject lands', are in the geographic community of Salem and both immediately adjacent to the current settlement boundary for Elora. The subject lands comprise a total area of approximately 76.8ha. Refer to **Figure 1.1** which illustrates the location of the subject lands.

The subject lands are generally bounded by Sideroad 15 to the north, Gerrie Road to the east, existing residential and future development (Ainley Farm Subdivision 23T-18002, owned by Keating) to the south, and Irvine Street to the west. The Nichol Municipal Drain No. 1 (ND) bisects the subject lands. Further west of Irvine Street is the Clayton Subdivision (23T-22005, owned by Cachet Development).

The Ainley Farm Subdivision is within the current settlement boundary and has recently received draft plan approval (November 14, 2023) and is proceeding to final design. The Clayton Subdivision is within the current settlement boundary and for which a Zoning By-law Amendment and Draft Plan of Subdivision applications were submitted and is currently under appeal and going through Ontario Land Tribunal mediation.

Concept Plans for the proposed development were prepared by Malone Given Parsons Ltd. (MGP) for the subject lands and form the basis for this FSR. Refer to the Concept Plans, dated February 28, 2025, in **Appendix B**.

The purpose of this FSR is to present a servicing strategy for the Concept Plan to support the privately initiated settlement boundary expansion. A high-level serviceability assessment of the lands on full municipal services is presented herein for the purpose of a settlement boundary expansion OPA application. The report will document wastewater treatment capacity, sanitary outfalls, internal sanitary sewage collection, water supply/transmission and domestic distribution, storm drainage, Stormwater Management Facilities (SWMFs) and utilities.

This report should be read in conjunction with the *Elora Sands/Keating Lands – Preliminary Stormwater Management Strategy Report*, prepared by MTE (March 2025).

SETTLEMENT BOUNDARY

IRVINE STREET

WOOLWICH STREET EAST

SIDEROAD 15

GERRIE ROAD

SIDEROAD 15

CLAYTON SUBDIVISION

ELORA SANDS

NICHOL DRAIN NO.1

GERRIE ROAD

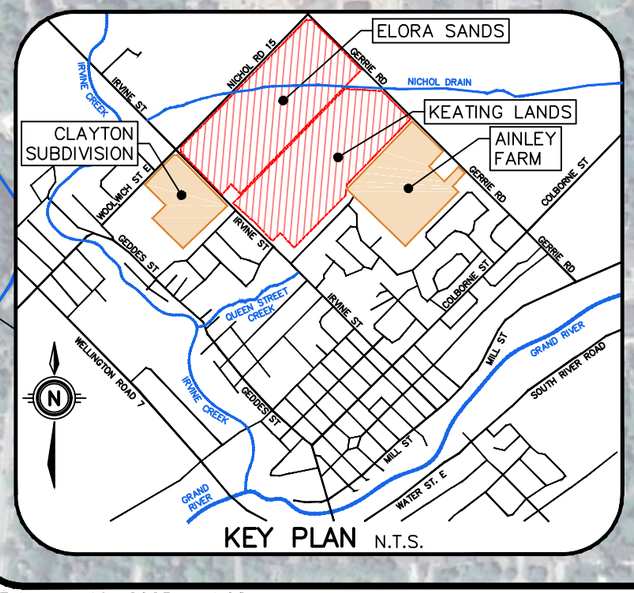
IRVINE STREET

KEATING LANDS

SETTLEMENT BOUNDARY

WALSER STREET

AINLEY FARM SUBDIVISION (LANDS OWNED BY KEATING)



KEY PLAN N.T.S.

MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
LOCATION PLAN

Drawn AXH	Scale	Figure **1.1**
Checked MXF	Project No. 49878-100	
Date (yyyy-mm-dd) 2025-01-28	Rev No. 0	

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1.2 Background Information

1.2.1 Excerpts from the Ontario Provincial Planning Statement 2024

The Ontario Provincial Planning Statement (PPS) 2024 outlines province-wide direction and regulation on land use planning and development within Ontario. This section outlines key statements and excerpts from the PPS that provide the basis for the servicing strategies presented in this report.

Chapter 3: Infrastructure and Facilities

3.1 General Policies for Infrastructure and Public Service Facilities

1. Infrastructure and public service facilities shall be provided in an efficient manner while *accommodating projected needs.*
2. *Planning for infrastructure and public service facilities shall be coordinated and integrated with land use planning and growth management so that they:*
    a. *are financially viable over their life cycle, which may be demonstrated through asset management planning;*
    b. *leverage the capacity of development proponents, where appropriate; and*
    c. *are available to meet current and projected needs.*
3. *Before consideration is given to developing new infrastructure and public service facilities:*
    a. *the use of existing infrastructure and public service facilities should be optimized; and*
    b. *opportunities for adaptive re-use should be considered, wherever feasible.*
4. *Infrastructure and public service facilities should be strategically located to support the effective and efficient delivery of emergency management services, and to ensure the protection of public health and safety in accordance with the policies in Chapter 5: Protecting Public Health and Safety.*

3.6 Sewage, Water and Stormwater

1. *Planning for sewage and water services shall:*
    a. *accommodate forecasted growth in a timely manner that promotes the efficient use and optimization of existing municipal sewage services and municipal water services and existing private communal sewage services and private communal water services;*
    b. *ensure that these services are provided in a manner that:*
        i. *can be sustained by the water resources upon which such services rely;*
        ii. *is feasible and financially viable over their life cycle;*
        iii. *protects human health and safety, and the natural environment, including the quality and quantity of water; and*
        iv. *aligns with comprehensive municipal planning for these services, where applicable.*
    c. *promote water and energy conservation and efficiency;*

d. *integrate servicing and land use considerations at all stages of the planning process;*

e. *consider opportunities to allocate, and re-allocate if necessary, the unused system capacity of municipal water services and municipal sewage services to support efficient use of these services to meet current and projected needs for increased housing supply; and*

2. *Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety. For clarity, municipal sewage services and municipal water services include both centralized servicing systems and decentralized servicing systems.*

8. *Planning for stormwater management shall:*

a) *be integrated with planning for sewage and water services and ensure that systems are optimized, retrofitted as appropriate, feasible and financially viable over their full life cycle;*

b) *minimize, or, where possible, prevent or reduce increases in stormwater volumes and contaminant loads;*

c) *minimize erosion and changes in water balance including through the use of green infrastructure;*

d) *mitigate risks to human health, safety, property and the environment;*

e) *maximize the extent and function of vegetative and pervious surfaces;*

f) *promote best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development; and*

g) *align with any comprehensive municipal plans for stormwater management that consider cumulative impacts of stormwater from development on a watershed scale.*

Chapter 4: Wise Use and Management of Resources

4.2 Water

1. *Planning authorities shall protect, improve or restore the quality and quantity of water by:*

a. *using the watershed as the ecologically meaningful scale for integrated and long-term planning, which can be a foundation for considering cumulative impacts of development;*

b. *minimizing potential negative impacts, including cross-jurisdictional and cross-watershed impacts;*

c. *identifying water resource systems;*

d. *maintaining linkages and functions of water resource systems;*

e. *implementing necessary restrictions on development and site alteration to:*

i. *protect all municipal drinking water supplies and designated vulnerable areas; and*

ii. *protect, improve or restore vulnerable surface and ground water, and their hydrologic functions;*

f. *planning for efficient and sustainable use of water resources, through practices for water conservation and sustaining water quality; and*

g. *ensuring consideration of environmental lake capacity, where applicable.*

2. *Development and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related hydrologic functions will be protected, improved or restored, which may require mitigative measures and/or alternative development approaches.*
3. *Municipalities are encouraged to undertake, and large and fast-growing municipalities shall undertake watershed planning to inform planning for sewage and water services and stormwater management, including low impact development, and the protection, improvement or restoration of the quality and quantity of water.*
4. *Despite policy 4.2.3, where planning is conducted by an upper-tier municipality that includes one or more lower-tier large and fast-growing municipalities, the upper-tier municipality shall undertake watershed planning in partnership with lower-tier municipalities, including lower-tier large and fast-growing municipalities.*
5. *All municipalities undertaking watershed planning are encouraged to collaborate with applicable conservation authorities.*

1.2.2 Subwatershed Study - Nichol Drain No. 1

A subwatershed study for the ND was undertaken by the Township of Centre Wellington and is detailed in the *Nichol Drain Subwatershed Study, Phase 1 Existing Conditions - Final Report* (NDSS) prepared by Aquafor Beech Limited (October 2008). This study was approved in June 2010. Based on the NDSS, the drainage area of the subwatershed encompasses an area of approximately 767ha, mostly of agricultural lands. The NDSS identified the ND as being a coldwater watercourse downstream of Sideroad 15 (without coldwater fish species) and a warmwater system upstream. However, the Grand River Conservation Authority's (GRCA) GRIN mapping shows the entire reach of the ND as being a warmwater system.

The ND is an open channel type municipal drain that starts adjacent to Beatty Line, at its most upstream point. The channel flows west approximately 4km and discharges to Irvine Creek immediately west of Irvine Street, which in-turn discharging to the Grand River just downstream of the Town of Elora.

Through the implementation of a stormwater management strategy for the subject lands, updates to the subwatershed study flow targets will be assessed. The updates to the NDSS will consider the subject lands as developed where the previous study did not contemplate any development beyond developments within Fergus.

1.2.3 Queen Street Creek (Irvine Creek Tributary)

The Queen Street Creek (QSC) flows through urban, residential lots southwest of the subject lands, with an outlet to Irvine Creek west of Geddes Street. The QSC drainage area is almost entirely built out except for the southwest corner of the Keating Lands. This drainage area within the Keating Lands first drains to a wetland along Irvine Street, before discharging to the QSC.

Drainage to this tributary under post-development conditions is not subject to an approved subwatershed study. Site specific controls may need to be implemented to limit both flow and volumes while maintaining a surface water balance to the existing wetland feature.

1.2.4 County of Wellington Official Plan

As shown within Schedule A-1 – Land Use Plan of the Official Plan (**Appendix C**), the subject lands are not currently designated as residential but are immediately adjacent to the current settlement boundary. As such, the owners of the subject lands are submitting applications for a settlement boundary expansion request in an effort to provide housing in the County of Wellington (County) with the overall objective of providing more housing which is aligned with the Provincial Goal of 1.5 million homes built in Ontario by 2031.

The subject lands are considered potential future development lands in the context of this report.

1.2.5 Development Charges Background Study

In 2020, Watson & Associated Economists Ltd. were retained by the Township to prepare a Development Charges (DC) Background Study. The study was prepared to analyse and describe the required DC eligible infrastructure required to accommodate future growth of the Township as described within the Official Plan.

Table A.1 in **Appendix A** describes the DC infrastructure projects adjacent to the subject lands.

Roadway urbanization improvements outlined in project 33 should also include new watermains on SR15 (between Irvine Street and Gerrie Road) which were not included in **Table A.1** and are required for the future development of the subject lands.

1.2.6 Other Studies

The following studies represent background studies completed by the broader study team:

- *Environmental Impact Study, Elora Sands and Keating Lands, Township of Centre Wellington (Beacon Environmental, February 2025).*
- *Hydrogeological Considerations (HC-SM), Proposed Residential Development Elora Sands and Keating Lands, Elora (Soil-Mat, February 28, 2025).*
- *Source Water Protection Due Diligence Review, Elora Sands, 7581 Sideroad 15 (SR15), and Keating Lands (Part of Lot 17, Concession 12), Salem (Elora), ON (Terra-Dynamics Inc., March 6, 2025).*
- *Nichol Drain and Queen Street Creek, Preliminary Fluvial Geomorphological Assessment, Elora Sands and Keating Lands, Township of Centre Wellington (GEO Morphix, February 2025).*
- *Traffic Impact Study, Residential Development Nichol Road 15 & Irvine Street (Paradigm Transportation Solutions Ltd, February 2025).*
- *Annual Performance Report for 2020, Elora Wastewater Treatment Plant (Township of Centre Wellington, February 2021).*
- *Annual Performance Report for 2023, Sewage Collection System (Township of Centre Wellington, January 2024).*

2.0 EXISTING CONDITIONS

2.1 Topographical Information

The subject lands are generally comprised of rolling agricultural land. A topographical survey was completed for the Elora Sands property by MTE in 2022. A topographical survey of the Keating Lands has not yet been completed and as such the topography for Keating presented in the existing conditions plans is extracted from digital terrain information from the GRCA.

A topographic survey for the Clayton Subdivision was completed by JD Barnes (formerly Black, Shoemaker, Robinson & Donaldson Limited) in the Fall of 2021, as part of its draft plan of subdivision application.

The existing topography of the subject lands are shown on **MTE Drawing 49878-100-EC2.1**.

The subject lands generally consist of moderately sloped topography with slopes typically ranging from 1.0% to 12.5%. Existing elevations within the lands range from approximately 400.8m in the ND to 420.5m at the north corner of the lands.

The subject lands have a topographical ridge which extends through the Elora Sands and Keating lands, generally parallel to the ND. The southwest corner of the subject lands drains from the ridge (from northwest to southeast) to a wetland located in the southwest corner, adjacent to Irvine Street. The wetland and Irvine Street drain to the QSC.

2.2 Geotechnical and Hydrogeological Information

In October 2021, Soil-Mat Engineers & Consultants Ltd. (Soil-Mat) prepared two geotechnical and hydrogeological investigations for the Clayton Subdivision and the Elora Sands development. The fieldwork for the investigations included: 4 boreholes, 3 of which included monitoring wells for the Clayton Subdivision and an additional 7 boreholes, of which 1 included a monitoring well for the Elora Sands. The boreholes were advanced to depths ranging between 2.1 to 7.6m. In March 2022, Soil-Mat prepared additional preliminary hydrogeological considerations for the Clayton Subdivision and the Elora Sands.

A supplementary hydrogeological assessment was completed by Soil-Mat dated July 20, 2022 for the Clayton Subdivision and the Elora Sands, advancing 14 additional boreholes, 12 of which included monitoring wells drilled in February and April 2022. The additional boreholes were advanced to depths ranging between 3.0 to 8.2m. This assessment included groundwater levels in all monitoring wells. Levels were measured from February to June 2022. An updated groundwater contour plan was also provided to supplement the groundwater contours establish within the original March 2022 hydrogeological report.

In August 2024, a supplemental groundwater data summary was completed by Soil-Mat to provide updated groundwater monitoring data. Based on this summary, groundwater levels were slightly higher as compared to previous monitored levels.

A Hydrogeological Considerations for the subject lands (Elora Sands and Keating Lands) was prepared by Soil-Mat dated February 2025. Detailed field investigation on the Keating Lands to confirm conclusions from the Hydrogeological Considerations is recommended to be completed at a later date to support detailed design.

Based on the results of the previous detailed investigations, the subsurface stratigraphy for the subject lands is generally described as topsoil underlain by sandy silt, silty sand till, and clayey sandy silt till deposits, with generally trace amounts of gravel. Based on the groundwater level readings recorded by Soil-Mat and extrapolation for the Keating Lands, groundwater levels generally rise and fall with the topography. Groundwater flow is interpreted as having a high point located near the topographical ridge. The groundwater flow generally mimics the surface water flow direction. Based on the findings in the NDSS and the hydrogeological assessment by Soil-Mat, generally groundwater contributes to the ND as shallow interflow and baseflow. The wetland in the southwest corner of the subject lands is generally characterized as being supplied by precipitation and surface water runoff with a slight vertical downward gradient to shallow groundwater.

The geotechnical and hydrogeological reports can be found in **Appendix D**.

2.3 Source Water Protection and GRCA Mapping

The subject lands are within a Wellhead Protection Area (WHPA) and a Significant Groundwater Recharge Area-Tier 2 (SGRA) as defined by the Source Water Protection Plan Mapping, as illustrated in **Appendix E**. A majority of the lands have a WHPA classification of WHPA-C, while the southwestern portion of the lands have a classification of WHPA-B and the eastern portion of the lands have a classification of WHPA-D. The majority of the subject lands are within a wellhead vulnerability score of 6 with a small portion in the southwest corner having a vulnerability score of 8 and the eastern portion of the lands with a vulnerability of 4. There is an existing municipal drinking water supply well located on Aqua Street approximately 550m south of the subject lands.

The intrinsic vulnerability for the SGRA is characterised as moderate (generally having a vulnerability score of 4), generally indicative of shallow groundwater flow towards Irvine Creek west of the subject lands.

As part of the Hydrogeological Considerations, Terra-Dynamics Inc. conducted a Source Water Protection Due Diligence Review of the subject lands dated March 2025. The management strategies proposed for mitigation of impacts for quality and quantity to WHPAs and SGRAs by Terra-Dynamics aligns with the stormwater management strategies and servicing proposed in this FSR and the Preliminary Stormwater Management Strategy Report. Refer to **Appendix D and E** for details.

2.4 Pre-Development Drainage Conditions

Approximately 72% of the subject lands (56.9ha) located in the northeast drains to the ND, which in-turn drains to Irvine Creek. Approximately 28% of the subject lands (22.7ha) located in the southwest drains to the Queen Street Creek which also drains to Irvine Creek.

Refer to **Figure 2.1** for Upstream Drainage Areas documented in the NDSS.

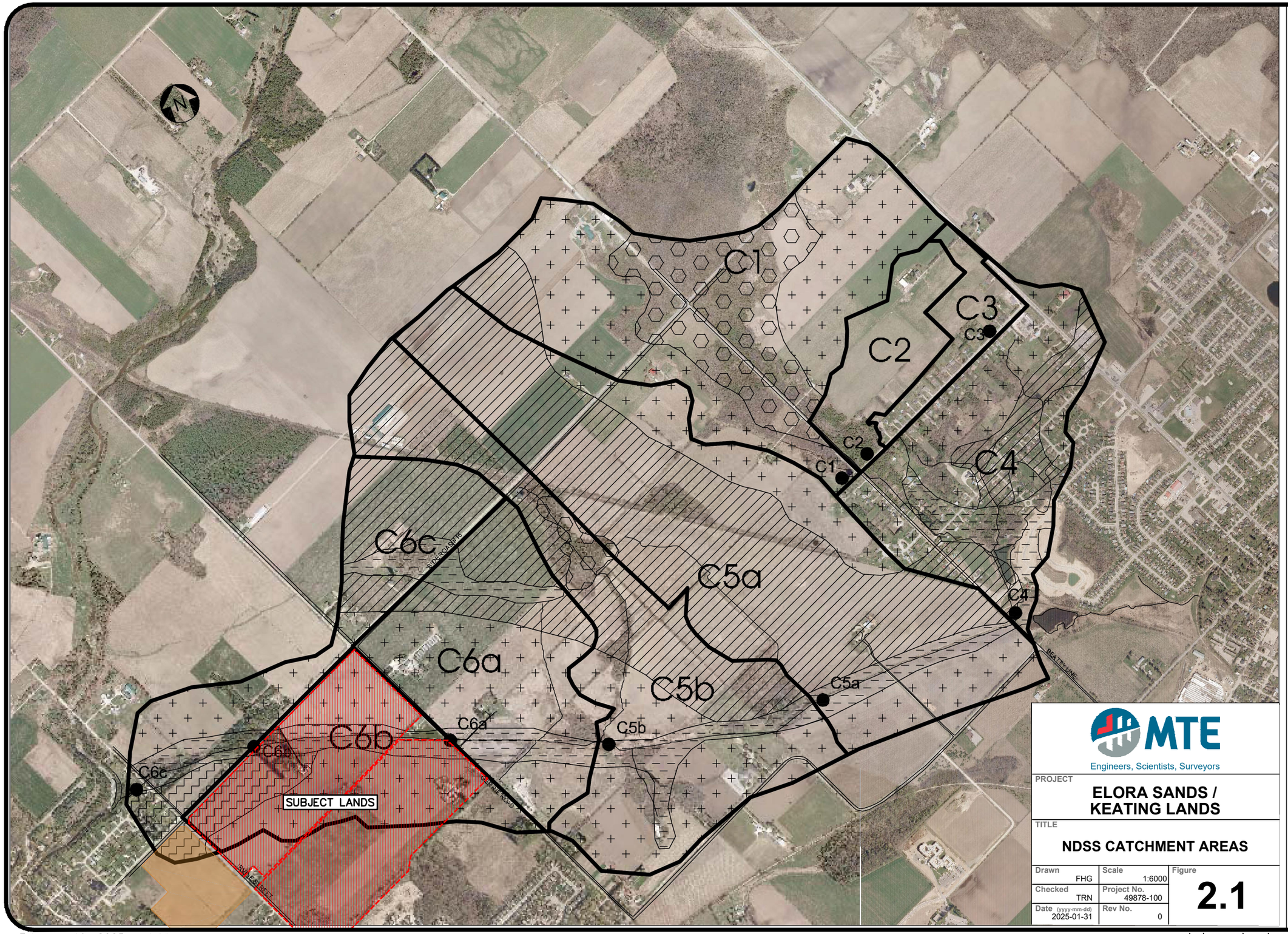
Refer to **Figure 2.2** for the current conditions drainage area plan which documents current conditions including upstream areas that have been approved for development since the NDSS.

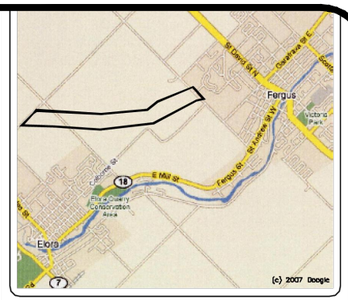
The current conditions catchments for the subject lands can be summarized as follows:

- Sub-catchment 622 - Surface runoff from the northeast corner flows from northeast to southwest and directly into the ND. A future Stormwater Management Facility (SWMF) will be in 622 at the downstream end of the ND.
- Sub-catchments 621 and 623 - Surface runoff from the subject lands flows from south to north directly into the ND.
- Sub-catchment 624 - Surface runoff from the subject lands flows from southwest to northeast and into the south ditch of Sideroad 15 or directly into the ND.
- The Sideroad 15 ditch, which originates west of Irvine Street receiving flows from the Clayton Subdivision (625) and existing external roads (626), conveys flows northeasterly across Irvine Street via a culvert to the ND.
- The development of the Clayton Subdivision proposes an interim SWMF to be located where the future SWMF would be located in 624 at the downstream end of the ND to service 621, 623, 624, 625 and 626. Sub-catchment 625 was updated from the original NDSS as part of this report based on current site-specific topography.
- Sub-catchment 709 - Surface runoff from the subject lands flows from the ridge in the northeast to the wetland (706) located in the southwest, then onto Irvine Street which outlets to the QSC.

The SWM strategy for the subject lands includes three SWM facilities (SMWF); two of which are located in the northeast portion of the development outletting to ND and the third is located in the southwest portion of the development adjacent to the wetland which outlets to the QSC.

Refer to the *Elora Sands/Keating Lands – Preliminary Stormwater Management Strategy Report*, prepared by MTE (March 2025) for more details.





LEGEND

- SUBCATCHMENT
- FLOW NODE

SOIL TYPE

- LISTOWEL LOAM
- HARRISTON LOAM
- MUCK
- PARKHILL LOAM
- BRANT

No.	By	Date	Revison	Chk'd

Aquafor Beech limited

ENGINEER

FLUVIAL GEOMORPHOLOGIST

CLIENT:
TOWNSHIP OF CENTRE WELLINGTON

PROJECT:
NICHOL DRAIN SUB WATERSHED STUDY

TITLE:
FIGURE 3
SOIL MAP

Scale: 1:15,000
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MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
NDSS CATCHMENT AREAS

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Date (yyyy-mm-dd): 2025-01-31	Rev No.: 0	

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Plot Date: March 6, 2025 - 9:37 AM

IRVINE CREEK

WOOLWICH STREET EAST

SIDEROAD 15

NICHOL DRAIN

GERRIE ROAD

BEATTY LINE

HIGHWAY 6

IRVINE STREET

QUEEN STREET CREEK

COLBORNE STREET

GRAND RIVER

SALEM PUBLIC SCHOOL

CLAYTON SUBDIVISION

ELORA MEADOWS SUBDIVISION

ELORA SANDS

KEATING LANDS

AINLEY FARM SUBDIVISION

EX. BONAIRE HIGHLANDS SUBDIVISION (MODELED AS POST DEVELOPMENT)

EX.STORYBROOK SUBDIVISION (MODELED AS POST DEVELOPMENT)

803 5.32ha	802 11.61ha	639 4.60ha
636 3.32ha	638 20.63ha	637 8.36ha
630 33.04ha	804 4.51ha	801 0.53ha
626 1.06ha	625 6.72ha	624 11.84ha
627 9.39ha	622 9.69ha	610 78.13ha
510 91.44ha	100 136.98ha	806 10.60ha
805 3.53ha	707 1.69ha	623 19.37ha
813 4.88ha	712 14.67ha	708 3.50ha
706 1.54ha	709 21.19ha	621 6.56ha
714 1.54ha	711 5.75ha	620 4.15ha
710 17.91ha	516 10.78ha	520 108.36ha
511 55.52ha	515 5.01ha	200 27.50ha
300 17.14ha	400 82.86ha	513 6.68ha
512 27.13ha	518 6.44ha	517 2.14ha

LEGEND

- EXISTING GRCA CONTOURS (526)
- EXISTING DRAINAGE DIRECTION
- PRE-EXISTING DEVELOPMENT CATCHMENT
- CATCHMENT NUMBER (No=101)
- CATCHMENT AREA (ha) (4.59ha)
- SUBJECT LANDS SITE BOUNDARY
- AGRICULTURAL
- OPEN SPACE
- EXTERNAL DEVELOPMENT
- BUILT BOUNDARY
- SUBJECT LANDS

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Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
CURRENT CONDITIONS DRAINAGE AREA PLAN

Drawn	TJD	Scale	1:6000
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Date (yyyy-mm-dd)	2024-12-16	Rev No.	0

Figure **2.2**

3.0 CONCEPT DEVELOPMENT PLAN

The Concept Plans (**Appendix B**) for this potential residential development comprises the following:

- Low and Medium Density Residential lands;
- Park block;
- Three (3) SWMF Blocks;
- One (1) Sanitary Pumping Station (SPS) Block; and,
- Municipal Right-of-Ways.

The concept plan implementation of low and medium density development would result in a growth population of approximately 4,300 people (approximately 1,300 units).

As shown on the Concept Plan, the subject lands are serviced by three major collector roads being Irvine Street on the west, SR15 on the north and Gerrie Road on the East and two local Street connections to the Ainley Farm Subdivision to the south.

These collector roadways should be upgraded to an urban cross-section as outlined in the DC Background Study, including asphalt pavement, concrete curb and gutters, concrete sidewalks, street illumination, and boulevard landscaping. SR15 and Gerrie Road are being upgraded as part of the current DC Background Study works. Irvine Street should be included in the following DC background study update to connect the improved SR15 and Gerrie Road Sections. Irvine Street will be a critical road and water infrastructure connection.

4.0 CONCEPT GRADING PLAN

4.1 Grading Considerations

Refer to **Figure 4.1** – Preliminary Road Grade Plan for the subject lands.

The following is a list of considerations which influenced and/or governed the Concept grading design of the subject lands:

- Match centreline elevations of existing and proposed road grades;
- Match boundary grades around the perimeter of the subject lands;
- Match grades at Natural Heritage System buffer limits
- Ensure major storm event overland flows are directed towards the proposed SWMFs;
- Comply with municipal standards for minimum and maximum road and landscaped area grades;
- Ensure adequate cover is feasible, over municipal services;
- Manage the cut/fill balance for the concept development to the extent possible at this time; and,
- Maintain 0.30m vertical separation from underside of footing to seasonal high groundwater levels.

Preliminary centreline road grades ranging from 0.5% (minimum) to 6% were used to complete the concept grading design. The other considerations listed above were incorporated into the overall concept grading design.

4.2 Groundwater Separation

Refer to the Concept Grading Plan (**Figure 4.1**) and Groundwater Contour Map provided in the HC-SM report (**Appendix D**).

The concept grading established development levels such that the underside of footing elevations were generally designed to maintain a minimum vertical separation of 0.30m above the seasonal high groundwater elevations as provided in the Groundwater Contour Map (Soil-Mat). Once additional groundwater information is available, refinement of the grading would be completed in future Draft Plan submissions.

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WOOLWICH STREET EAST

SIDEROAD 15

BRICKER AVENUE

IRVINE STREET

GERRIE ROAD

EXISTING AGRICULTURAL

CLAYTON SUBDIVISION

ELORA SANDS

KEATING LANDS

ELORA MEADOWS SUBDIVISION

AINLEY FARM SUBDIVISION

EXISTING RESIDENTIAL

WALSER STREET

NICHOL DRAIN No.1

REGULATORY FLOODPLAIN

APPROXIMATE FLOODPLAIN (FROM NICHOL DRAIN SUBWATERSHED STUDY PHASE 1 EXISTING CONDITIONS FINAL REPORT)

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

STREET 8

STREET 9

STREET 10

STREET 11

STREET 12

STREET 13

SWMF 1
PP=404.0

SWMF 2
PP=405.0

SWMF 3
PP=410.5

MATCH INTO PROPOSED GRADING OF AINLEY FARM SUBDIVISION

MATCH INTO EXISTING GERRIE ROAD GRADING

MM305 SOIL-MAT (FEB, 2022)

BH307 SOIL-MAT (FEB, 2022) (APPROXIMATE LOCATION)

BH306 SOIL-MAT (FEB, 2022) (APPROXIMATE LOCATION)

LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS
- PROPOSED CONTOURS (CLAYTON SUBDIVISION)
- EXISTING CONTOURS
- GRCA CONTOURS
- (415.35) + LP HP — PROPOSED ELEVATION, LOW POINT, HIGH POINT
- OVERLAND FLOW ROUTE (MAJOR STORM)
- EXISTING DIRECTION OF DRAINAGE

10m WOODLAND BUFFER
WOODLAND LIMIT
10m WETLAND BUFFER (BEACON)
WETLAND LIMIT (BEACON)

MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
PRELIMINARY ROAD GRADE PLAN

Drawn	Scale	Figure
ACH	1:1500	4.1
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Date (yyyy-mm-dd)	Rev No.	
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5.0 SANITARY SERVICING

5.1 Elora Wastewater Treatment Plant Capacity

The subject lands will be serviced by the Elora Wastewater Treatment Plant (WWTP). The Elora WWTP is a Class III extended Aeration Facility. Aeration Tank #1 and Clarifier #3 remain offline until sewage flows increase and when more treatment capacity is required.

The Township's Annual Performance Report for 2020 for the WWTP documents the Design Limit Capacity of 5,000m^3 per day and the average Daily Flow at 1,717m^3 per day which represents 34.3% of the design flow. The Elora WWTP receives sewage from the Salem Low Pressure system, the Elora collection system and the Elora Gorge campground. The treatment volume in 2020 decreased by 10.4% from 2019 and 18% from 2018.

The available capacity in the WWTP as of the 2020 Annual Performance Report is equivalent to a growth population of an additional 14,000 people based on a 235 litres per capita daily consumption rate.

Since 2020, other Elora developments requiring capacity include Haylock, Youngblood, Ainley Farm, and Clayton subdivisions which represent an approximate population of 5,000 people.

The subject lands represent a growth population of approximately 4,300 people leaving an available capacity of 5,000 people or 1,200m^3 per day.

The Township prepared an Annual Performance Report for 2023 – Sewage Collection System dated January 2024. This report has a modified format as compared to the 2020 report which appears to have been prepared to satisfy the new provincial requirements of the Township-wide Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA #098-W601). The 2023 report summarizes the Township's entire sewage collection system as a whole but does not specify annual flows at the Elora WWTP. A separate annual report with the flows at the Elora WWTP that is more current was not available at the time of writing this FSR.

MTE (Jeff Martens and Steve Peterson) had a virtual meeting with Colin Baker (Township's Managing Director of Infrastructure Services) on November 29, 2021 to discuss the context of an overall servicing review of the sanitary sewer system in the Town of Elora. Mr. Baker provided MTE with an existing conditions plan of Elora whereby sanitary sewer reach, pipe size and slope were inventoried. The 2020 Elora WWTP Annual Performance Report was discussed with Mr. Baker, where collectively the estimated WWTP serviced population of 7,900 people and average daily flow of 1,717m^3/d resulted in a sanitary flow of 235L/capita/day (including sewage flow of 217 and inflow and infiltration of 18) which represents the long-term historical average in Elora.

Based on the analysis above, the Elora WWTP has capacity for the development of the subject lands.

5.2 External Sanitary Conveyance to WWTP

In January 2022, MTE completed a sanitary servicing overview of the subject lands and adjacent Clayton Subdivision. The technical memo dated February 9, 2022, was prepared to demonstrate that the subject lands could be brought into the settlement area as it was a logical extension and an efficient use of the existing infrastructure. The memo demonstrates sanitary serviceability, and documents any upgrades required within the existing sanitary infrastructure to accommodate the additional flows from the subject lands.

The sanitary servicing overview confirmed capacity for the Clayton Subdivision discharging to downstream sewers within the existing Elora Meadows development.

To accommodate future development of the subject lands, some improvements are required to the trunk sewers on North Queen Street and Colborne Street. Some of these works have been previously identified within the Township's DC Background Study, specifically, the trunk sanitary sewer on Colborne Street is scheduled for an upgrade in 2024/2025 between Wilson Crescent and Irvine Street.

The scope of the improvement may need to be broadened as the trunk sewers west of Irvine Street and on North Queen Street also appear to be at capacity.

5.2.1 Existing Conditions Sanitary Sewer Assessment

Utilizing the existing conditions plan which inventories sewer reach data provided by the Township, MTE delineated the primary and branch trunk sewer drainage sheds. The trunks were divided into sequential reaches and numbered with numeric node references. A drainage area shed was developed for each sewer shed and discretized in small portions to analyze critical sections of the sewer reach. The drainage areas were measured and the units were counted or estimated based on the best available aerial mapping. The analysis considered the full load from its drainage area for each run for the sewer sections with the lowest capacity being the focus of analysis within that run.

The following assumptions were used for the sanitary analysis:

- The Ainley Farm Subdivision was considered as fully developed, being described in the Draft Plan by BSR&D, dated July 30, 2019 and in the Preliminary Servicing and Stormwater Management Report by GM Blue Plan, dated July 3, 2019 and revised August 2023.
- The Salem Low Pressure System flows included with an estimated continuous flow based on the 2020 Elora WWTP Annual Performance Report and the David Street Pumping Station
- For single family lots 2.8 people per unit (ppu) was assumed, and for multi-units 2.0ppu.
- For the commercial and institutional land uses, the current Centre Wellington Guidelines were applied.
- Sewer capacities were calculated utilizing Manning's formula, using 0.013 manning coefficient.
- Harmon Peaking Factor was applied for the residential areas to determine peak flows.
- The flow per capita utilized in our analysis was based on the current wastewater flow usage, 235L/c/d, which included an allowance for inflow and infiltration.

The existing sanitary system in Elora, is separated by the Grand River. The north sewer system connects to the south system by a siphon near Metcalfe Street which drains to the WWTP. For the purpose of this study, MTE has analyzed the north sewer system only. The primary main trunk runs along East Mill Street collecting numerous branch trunks. Refer to **Figure 5.1** which illustrates the existing conditions and **Appendix F** for the calculation design sheet.

Summarized below are the descriptions of the branch trunk sewers and reaches limiting the capacity of those branch trunks.

Princess Street Trunk

Starting from Clayton Subdivision in the north and flowing south through Elora Meadows, along Marr Drive, Bricker Avenue, Salem Street, Erb Street, and Princess Street. The branch trunk is 200mm in diameter for all reaches. The pipe sloping ranges between 0.23% to 6.83%. It is illustrated on **Figure 5.1** from nodes 41 to node 4.

This trunk collects sanitary sewer drainage from Salem and the west side of Elora. It also conveys flows from the Salem Low Pressure System and from the David Street Pumping Station. The total estimated load at the confluence to East Mill Street Trunk is 17.4L/s. Directly north of Colborne Street is the sewer reach with the least capacity of 17.6L/s.

Irvine Street Trunk

Starting from the east side of the Clayton subdivision and flowing south along Irvine Street (servicing Walser Street and the lots along Irvine Street) to the Colborne Street confluence with the Steven Way Trunk and jointly continues along Colborne Street and North Queen Street and flows into the primary trunk on East Mill Street. The branch trunk is 200mm size for all reaches. The pipe slope ranges from 0.27% to 1.96%. It is illustrated on **Figure 5.1** from nodes 31 to 14.

The proposed connection of the northern portion of the Ainley Farm Subdivision to Walser Street is included in the calculations. The total flow under existing conditions is 6.6L/s upstream of Colborne Street. The capacity between Sophia Street and Colborne Street on Irvine Street is 33.1L/s providing additional available capacity of 26.5L/s which could serve 2,800 people. There is a flat section north of Walser Street that restricts the flow further. The available capacity upstream of Walser Street is 16.5L/s which could serve about 1,660 people.

Steven Way Trunk

This trunk connects Keating Drive and the southern portion of the proposed Ainley Farm Subdivision to Colborne Street and flows into the East Mill Street Trunk via North Queen Street. The branch trunk is 250mm and 300mm along Colborne Street and 200mm along North Queen Street. The sewer slopes for Steven Way range between 0.52% to 4.29%. The total load immediately upstream of Colborne Street is 10.9L/s. The total capacity of the Steven Way trunk upstream of Colborne Street is 42.9L/s and the available capacity is 32.0L/s which could serve 3,470 people. It is illustrated on **Figure 5.1** from nodes 22 to 13.

The North Queen Street sewer is over capacity and requires an upgrade under existing conditions. The proposed sewer upgrades in this area contemplated within the DC study should be expanded to include this sewer as well.

Colborne Street / North Queen Street Trunk

This trunk runs from Gerrie Road up to and along North Queen Street joining to the primary trunk on East Mill Street. It collects sanitary drainage of Colborne Street and from its side streets including among others Keating Drive, Steven Way, and Irvine Street. The trunk sewer has pipe sizes from 200 to 300mm with sewer slopes ranging from 0.45% to 2.0%. It is illustrated on **Figure 5.1** from nodes 11 to 3.

The available capacity east of Steven Way is 13.3L/s. The trunk from Steven Way to North Queen Street is at capacity and this section of trunk is scheduled for an upgrade in the current DC Study. The upgrade is from Wilson Crescent to Irvine Street. Additional upgrades may be necessary for this trunk sewer west of Irvine Street where the trunk flows southerly into the North Queen Street sewer which is slightly surcharged. The total load from North Queen Street north of East Mill Street (between Junctions 15 and 3) is 29.5L/s and the capacity is 24.1L/s which means the sewer has an additional 5.4L/s above its full flow capacity.

East Mill Street Trunk

Starting from Wellington Place (proposed County development lands) it collects sanitary drainage from the branch trunks of the north system. The last pipe upstream of the siphon is a 375mm at 0.5%. It is illustrated on **Figure 5.1** from nodes 1 to 5. The reach immediately upstream of the syphon has a full flow capacity of 123.9L/s.

5.2.2 Ultimate Conditions Sanitary Sewer Assessment

Refer to **Figure 5.2** which illustrates the conditions under Ultimate Build-Out. The west side of the subject lands will optimize the existing capacity of the Irvine Street trunk sewer with the balance of the lands draining to the Ainley Farm Subdivision and Steven Way trunk sewer.

The development areas were established as low and medium density residential units with approximately 60pph for low density and 85pph for medium density residential. The additional sanitary sewer load to the Irvine Street Trunk and the Steven Way Trunk will be 15.0L/s and 26.4L/s, respectively. Refer to the design sheet in **Appendix F**.

The trunk from Steven Way to North Queen Street along Colborne will be upgraded to 300mm for the ultimate conditions of the subject lands as contemplated in the DC Background Study. Downstream of the upgrades proposed by the DC study, along North Queen Street requires the trunk sewers to be upgraded as illustrated on **Figure 5.2**. With these upgrades on Colborne and North Queen Street, the available capacity of the upgraded sewer is 71.0L/s and the load as a result of development is 62.7L/s leaving 8.3L/s of available capacity after the development of subject lands.

The Ainley Farm Subdivision, which received draft plan approval on November 14, 2023 should be designed to accommodate the subject lands. The proposed design flow of the southern portion of the proposed Ainley Farm Subdivision directed to the Steven Way trunk is 3.3L/s. The sewer invert at Ainley and Keating should be kept as low as possible to maximize the area draining by gravity and minimize the catchment area for the proposed future sanitary pumping station. Currently, GEI (formerly GM BluePlan) has a preliminary design invert of 409.5masl at the common property line with the subject lands. The sanitary sewer has been designed as a 300mm at 0.35%.

The sewer immediately upstream of the syphon on East Mill Street is the limiting sewer being a 375mm at 0.5% slope having a full flow capacity of 123.9L/s and a development load of 127.4L/s. The sewer is a historical 15” concrete pipe equivalent to a 382mm diameter. Analyzing this sewer under a condition whereby it is flowing at 90% of its depth and 110% of its full flow capacity would yield a capacity of 136.3L/s. Essentially, this limiting sewer is at capacity or should be permitted to surcharge to a safe level to accommodate additional growth warranted.

5.2.3 Future Study and Monitoring

Through consultation with the Township, it is understood that a Water and Wastewater Servicing Master Plan (WWSMP) was initiated in 2024. The analysis completed to date predicts flows based on normal consumption and a Harmon Peaking Factor which tends to predict flows larger than actual. Typically, monitored flows are commonly much less than design flows. MTE recommends that the Township complete monitoring as part of the WWSMP to compare the flows to determine residual capacity within the existing system.

Specifically, we recommend that flow monitoring be considered at Junction 14 (on the north and east legs), Junction 15, and Junction 3 (north leg).

NOTES
1. LOAD = 29.5 L/s
FULL FLOW CAP = 24.1 L/s
MAX. CAP = 26.5 L/s
UPGRADE REQUIRED

SALEM LOW PRESSURE SYSTEM ESTIMATED CONTINUOUS FLOW 3.0 l/S

DAVID STREET PUMPING STATION ESTIMATED CONTINUOUS FLOW 0.8 l/S

SEE NOTE 1.

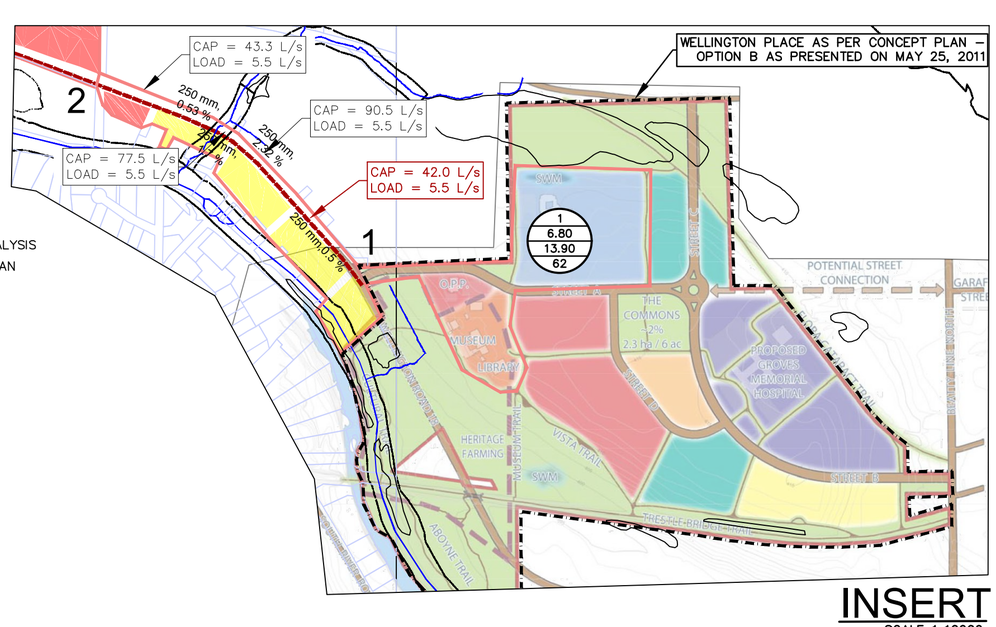
CONTINUED ON INSERT BELOW

OVERALL PLAN
SCALE 1: 4000

LEGEND

- 300 mm, 2.46% — EXISTING SANITARY SEWER TRUNK
- EXISTING SANITARY SEWER PIPE AND MANHOLE
- FUTURE CONNECTION AS DESCRIBED IN AINLEY FSR
- DRAINAGE AREA
- 101 / 8.78 / 10.35 / 103 — ID No. / RESIDENTIAL AREA (Ha) / NON-RESIDENTIAL AREA (Ha) / POPULATION
- REGULATION AREA LIMIT
- FLOODLINE LIMIT
- PUMPING STATION
- WASTEWATER TREATMENT PLAN
- 2 — JUNCTION NUMBER
- CAP = 39.9 L/s / LOAD = 28.4 L/s — CAPACITY AND FLOW LOAD OF PIPE SECTION RED COLOUR MEANS LOWEST CAPACITY WITHIN JUNCTIONS
- UPGRADE REQUIRED

LAND-USE FOR SANITARY ANALYSIS BASED ON ELORA OFFICIAL PLAN
- RESIDENTIAL
- MULTI-RESIDENTIAL
- COMMERCIAL
- INSTITUTIONAL
- OPEN SPACE
- SUBJECT LANDS



INSERT
SCALE 1:10000

PRELIMINARY

0 50 100 150 200 250m

MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
EXISTING CONDITIONS SANITARY ASSESSMENT

Drawn	Scale	Figure
ACH	1:4,000	5.1
Checked: MXF	Project No.: 49878-100	
Date (yyyy-mm-dd): 2025-01-31	Rev No.: 0	

Plot Date: March 5, 2025 – 2:54 PM

CAD: P:\P\49878\100\49878-100 SANITARY TRUNK CAPACITY FIGURES.DWG

OVERALL PLAN

SCALE 1:4000

PRELIMINARY

Sources: May include data from the Grand River Conservation Authority, County of Wellington, Teranet (2004) and © 2021 of the Queens Printer For Ontario.

Data provided herein is derived from sources with varying levels of accuracy and currency.

This is not a survey product.

0 50 100 150 200 250m

LEGEND

- 300 mm, 2.46% — EXISTING SANITARY SEWER TRUNK
- EXISTING SANITARY SEWER PIPE AND MANHOLE
- DRAINAGE AREA
- 101 / 8.78 / 10.35 / 103 — ID No. / RESIDENTIAL AREA (Ha) / NON-RESIDENTIAL AREA (Ha) / POPULATION
- FUTURE DRAINAGE AREA
- 100 / 30 / 1390 — ID No. / AREA (Ha) / POPULATION
- REGULATION AREA LIMIT
- FLOODLINE LIMIT
- PUMPING STATION
- WASTEWATER TREATMENT PLAN
- × EXISTING GROUND ELEVATION
- OG=415.0 / SAN OBV.=408.8± / DEPTH=6.2m± — ESTIMATED SANITARY CONNECTION CONDITIONS
- 2 — JUNCTION NUMBER
- CAP = 39.9 L/s / LOAD = 28.4 L/s — CAPACITY AND FLOW LOAD WITHIN JUNCTIONS
- PROPOSED FORCEMAIN
- PROPOSED SANITARY SEWER
- UPGRADE ALREADY IN PROGRESS (SHOWING ASSUMED UPGRADED SIZE AND CAPACITY)
- UPGRADE REQUIRED (SHOWING UPGRADED SIZE AND CAPACITY)

LAND-USE FOR SANITARY ANALYSIS BASED ON ELORA OFFICIAL PLAN

- RESIDENTIAL
- MULTI-RESIDENTIAL
- COMMERCIAL
- INSTITUTIONAL
- OPEN SPACE
- SUBJECT LANDS

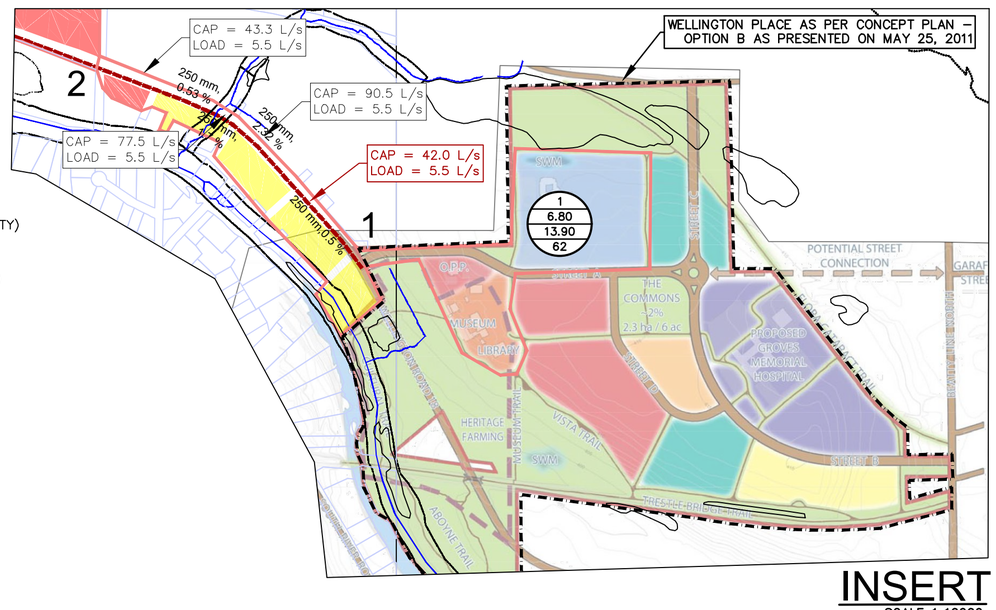
NOTE:
LOAD = 127.4 L/s
FULL FLOW CAP = 123.9 L/s
MAX. CAP = 136.3 L/s
AT CAPACITY, NO UPGRADE REQUIRED

SALEM LOW PRESSURE SYSTEM ESTIMATED CONTINUOUS FLOW 3.0 l/S

DAVID STREET PUMPING STATION ESTIMATED CONTINUOUS FLOW 0.8 l/S

INSERT

SCALE 1:10000



MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
ULTIMATE CONDITIONS SANITARY ASSESSMENT

Drawn	Scale	Figure
ACH	1:4,000	5.2
Checked: MXF	Project No.: 49878-100	
Date (yyyy-mm-dd): 2025-01-31	Rev No.: 0	

Plot Date: March 5, 2025 – 2:52 PM

CAD: P:\P\49878\100\49878-100-F5-ALT1.DWG

5.2.4 Internal Sanitary Servicing for Concept Plan

There are two sanitary outlets for the subject lands. The Irvine Street Trunk which outlets to the Colborne/North Queen Street Trunk and the Ainley Farm Subdivision Trunk which outlets to the Steven Way trunk which outlets to the Colborne/North Queen Street Trunk which are being proposed for improvements.

Refer to **Figure 5.3** which illustrates a schematic of the internal sanitary sewer layout, concept finished road grades at key points in the sewer network and the gravity catchment area limits for the Irvine and Ainley Trunks (Steven Way/Colborne/North Queen Street) as well as the catchment area for the proposed SPS which has a forcemain outlet to the Ainley Trunk sewer system. The catchment area for the Irvine Trunk is shown in pink (101 and 201) discharging to existing 200mm diameter sewer on Irvine Street. The catchment area for the Ainley Trunk is shown in orange (202) discharging to the 300mm diameter sewer (proposed by others) within the Ainley Farm Subdivision. The catchment area for the proposed SPS is shown in purple/brown (102, 103 and 104) capturing drainage from the northwest and northeast (north of ND) corners of the subject lands. The SPS has a forcemain outlet discharging to the maintenance hole located on Street 5 at the north end of sanitary catchment 202.

There is a very small drainage area (approximately 0.23ha) in the southeast corner of the subject lands representing the transition grading towards Gerrie Road which is unable to be serviced by gravity. This small drainage area is proposed to be serviced with a Low Pressure Forcemain System (LPFS).

Proposed sanitary sewers will generally maintain a cover within the Township's standards (>2.5m and <5m). Some sewers which may have a cover greater than 5m will not have any lot services connected but rather an additional local sewer is proposed above the trunk sewer in these sections.

As per the recommendations in Soil-Mat's hydrogeological assessments, any municipal infrastructure, specifically the sanitary sewers, located within groundwater, will incorporate appropriate groundwater cut-off collars.

CAD: P:\P\49878\100\49878-100-F9 SAN.DWG

WOOLWICH STREET EAST

SIDEROAD 15

SAN. @ 0.35%

SPS

INV.=399.0±

ND1 CROSSING:
ND1 INV.=400.8±
SAN. OBV.= 400.0±
(CONCRETE ENCASED)

EX=415.97
SAN OBV.=407.80±
DEPTH=8.17m±

F/G=409.05
SAN OBV.=406.55±
DEPTH=2.50m±

F/G=411.05
SAN OBV.=408.55±
DEPTH=2.50m±

F/G=417.30
SAN OBV.=414.80±
DEPTH=2.50m±

F/G=413.92
SAN OBV.=408.54±
DEPTH=5.38m±

102
4.9ha
85
445

103
8.1ha
60
485

104
0.98ha
100
100

101
10.3ha
85
865

201
7.6ha
85
635

202
29.5ha
60
1770

STREET 2

STREET 13

NICHOL DRAIN No.1

REGULATORY FLOODPLAIN

IRVINE STREET

GERRIE ROAD

CLAYTON SUBDIVISION

SAN. @ 0.40%

F/G=412.06
SAN OBV.=409.56±
DEPTH=2.50m±

ELORA SANDS

STREET 5

F/G=416.14
SAN OBV.=413.64±
DEPTH=2.50m±

F/G=414.78
SAN OBV.=411.78±
DEPTH=3.00m±

F/G=414.47
SAN OBV.=411.97±
DEPTH=2.50m±

F/G=414.05
SAN OBV.=411.65±
DEPTH=2.40m±

STREET 4

HP

STREET 1

BRICKER AVENUE

SAN. @ 0.60%

F/G=412.80
SAN OBV.=407.47±
DEPTH=5.33m±

F/G=415.27
SAN OBV.=412.47±
DEPTH=2.80m±

F/G=415.48
SAN OBV.=412.50±
DEPTH=2.98m±

F/G=414.90
SAN OBV.=412.38±
DEPTH=2.52m±

F/G=414.74
SAN OBV.=411.14±
DEPTH=2.60m±

STREET 8

STREET 11

F/G=415.08
SAN OBV.=411.17±
DEPTH=3.91m±

ELORA MEADOWS SUBDIVISION

CLEGG ROAD

IRVINE STREET

Ex. 200mmØ

F/G=413.97
SAN OBV.=408.97±
DEPTH=5.0m±

F/G=410.90
SAN OBV.=406.60±
DEPTH=4.30m±

F/G=414.05
SAN OBV.=411.55±
DEPTH=2.50m±

SAN. @ 0.35%

STREET 12

STREET 3

F/G=416.48
SAN OBV.=412.85±
DEPTH=3.63m±

KEATING LANDS

F/G=415.82
SAN OBV.=410.60±
DEPTH=5.22m±

STREET 9

F/G=415.90
SAN OBV.=413.40±
DEPTH=2.50m±

STREET 6

SAN. @ 0.60%

10m WOODLAND BUFFER

WOODLAND LIMIT

10m WETLAND BUFFER (BEACON)

10m WETLAND BUFFER (BEACON)

WETLAND LIMIT (BEACON)

F/G=412.97
SAN OBV.=410.47±
DEPTH=2.50m±

F/G=415.86
SAN OBV.=413.36±
DEPTH=2.50m±

F/G=416.27
SAN OBV.=412.14±
DEPTH=5.13m±

F/G=416.07
SAN OBV.=411.06±
DEPTH=5.01m±

F/G=416.30
SAN OBV.=409.97±
DEPTH=6.33m±

APPROXIMATELY 0.23ha SERVICED BY LOW PRESSURE SEWER SYSTEM (LPSS).

STREET 7

STREET 10

SAN. @ 0.40%

AINLEY FARM SUBDIVISION

WALSER STREET

PROP 300mmØ SAN (BY OTHERS)

F/G=413.45
SAN OBV.=410.60±
DEPTH=2.85m±

LEGEND

- PROPERTY BOUNDARY
- EXISTING CONTOURS (411.0 / 410.0)
- GRCA CONTOURS
- SUBJECT LANDS
- PROPOSED FORCEMAIN
- PROPOSED LOCAL SANITARY SEWER
- PROPOSED TRUNK SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER (BY OTHERS)
- F/G=224.47 / SAN OBV.=221.80± / DEPTH=2.67m± — C/L ROAD GRADE / SANITARY OBVERT / SANITARY COVER
- 112 / 2.5A / 196 / 498 — ID No. / AREA (ha) / DENSITY (pp/ha) / ACTUAL DESIGN POPULATION

Plot Date: March 5, 2025 - 4:25 PM

MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
PRELIMINARY SANITARY SERVICING PLAN

Drawn	Scale	Figure
ACH	1:1500	5.3
Checked: MXF	Project No.: 49878-100	
Date (yyyy-mm-dd): 2025-01-28	Rev No.: 0	

6.0 WATER

6.1 Wellfield Capacity

A Wellfield Capacity Assessment (WFCA) dated December 2023 was prepared by AECOM on behalf of the Township as required under the Township's Permit to Take Water (PTTW) No. 4856-9KBH5A. Prior to the acceptance of the WFCA by the MECP, the Township's municipal supply wells were required to be restricted to 60% of the PTTW combined maximum volume of 15,031m^3/day. At the time of writing this report, it is unknown if the WFCA has been accepted by the MECP. The WFCA concluded that the maximum sustainable pumping capacity for the Township's water supply system based on the existing wells is 14,947m^3/day which is slightly less than the PTTW.

Further to the WFCA, the Township's PTTW was set to expire on June 30, 2024 and it is understood that the Township has applied for a new PTTW.

6.2 Water Supply

A Draft Water Supply Master Plan (WSMP) dated July 2019 was prepared by AECOM on behalf of the Township in order to assess the existing water supply system and required upgrades to support the Township's projected population growth to 2041. The recommendations from the study were that the F5 and F2 wells in Fergus needed to be replaced first and subsequently four new areas to be investigated as potential future municipal supply well areas. Refer to **Figure 6.1** for the locations of the potential new well areas in context with the subject lands.

The WSMP also provided the recommended timeline for these projects based on when the water supply would be required. Refer to **Table 6.1** below for an excerpt from the WSMP.

Table 6.1 – Timing of Proposed Water Supply Projects (WSMP – Table 3)

Project No.	Project Name *order may change based on groundwater investigation results	Project Phases and Estimated Timing				Current Status
		Year Supply Required	Preliminary Studies	Design	Implementation	
Project 1	F5 Well Replacement	2019	Groundwater investigation – 2019-2020 Well installation & testing – 2020	2020	2020	Township undertaking EA study to amend PTTW and bring well online
Project 2	F2 Well Replacement	2022	Groundwater investigation – 2019-2020 Class EA – 2020 Well installation & testing – 2020	2021	2021-2022	Township undertaking EA process to amend PTTW and bring well online
Project 3	New Well – Area #3	2028	Groundwater investigation – 2019-2020 Class EA – 2023 Well installation & testing – 2024	2025	2026	Township undertaking EA study in 2024
Project 4	New Well – Area # 5	2033	Groundwater investigation – 2019-2020 Class EA – 2028 Well installation & testing – 2029	2030	2031	Township deferring EA study to a later date
Project 5	New Well – Area # 8	2039	Groundwater investigation – 2019-2020 Class EA – 2033 Well installation & testing – 2034	2035	2036-2037	Does not exhibit good water supply potential – Area was removed from further investigation.
Project 6	New Well – Area # 7	Beyond 2041	Groundwater investigation – 2032-2033 Class EA – 2037 Well installation & testing – 2038	2039	2040	Township undertaking EA study in 2024

Based on the WSMP recommendations, the Township's DC background study (dated 2020) includes funding for these projects as well as watermain extensions to bring the new wells into the water distribution system. As shown in **Table A.1 (Appendix A)**, the funding includes replacement of F5 ($0.86M in 2022), replacement of F2 ($1.80M in 2022), Well Area 3 ($4.73M in 2023 to 2026), Well Area 5 ($4.71M in 2028 to 2030), Well Area 7 ($3.61M in 2032-2040) and Well Area 8 ($6.72M in 2020 to 2037). The watermain extension projects to connect these new well areas to the water distribution system are also DC eligible within their respective timelines. Specifically, watermain extensions out to Well Area 5 (approximately 1km north of the subject lands) along Irvine Street is included. It should be noted that the DC study does not include a watermain extension on SR15 from Well Area 7 (which is located approximately 500m east of the subject lands) west to Gerrie Road. Considering this section of SR15 is slated for road improvements in the DC study, the watermain infrastructure should also be included.

At the time of writing this report, it is understood that replacement wells F5 and F2 (being Projects 1 and 2 from the WSMP) are still in progress and not yet active for municipal water supply. The Township has constructed test wells at the F5 and F2 locations and after monitoring determined a sustainable pumping rate at these locations. The Township is also currently undertaking the Municipal Class Environmental Assessment (EA) to increase the rated capacity of the PTTW in these locations prior to bringing them into the municipal water supply system. As noted in the WSMP, these two wells were needed for the Township's water supply system in 2019 and 2022, respectively.

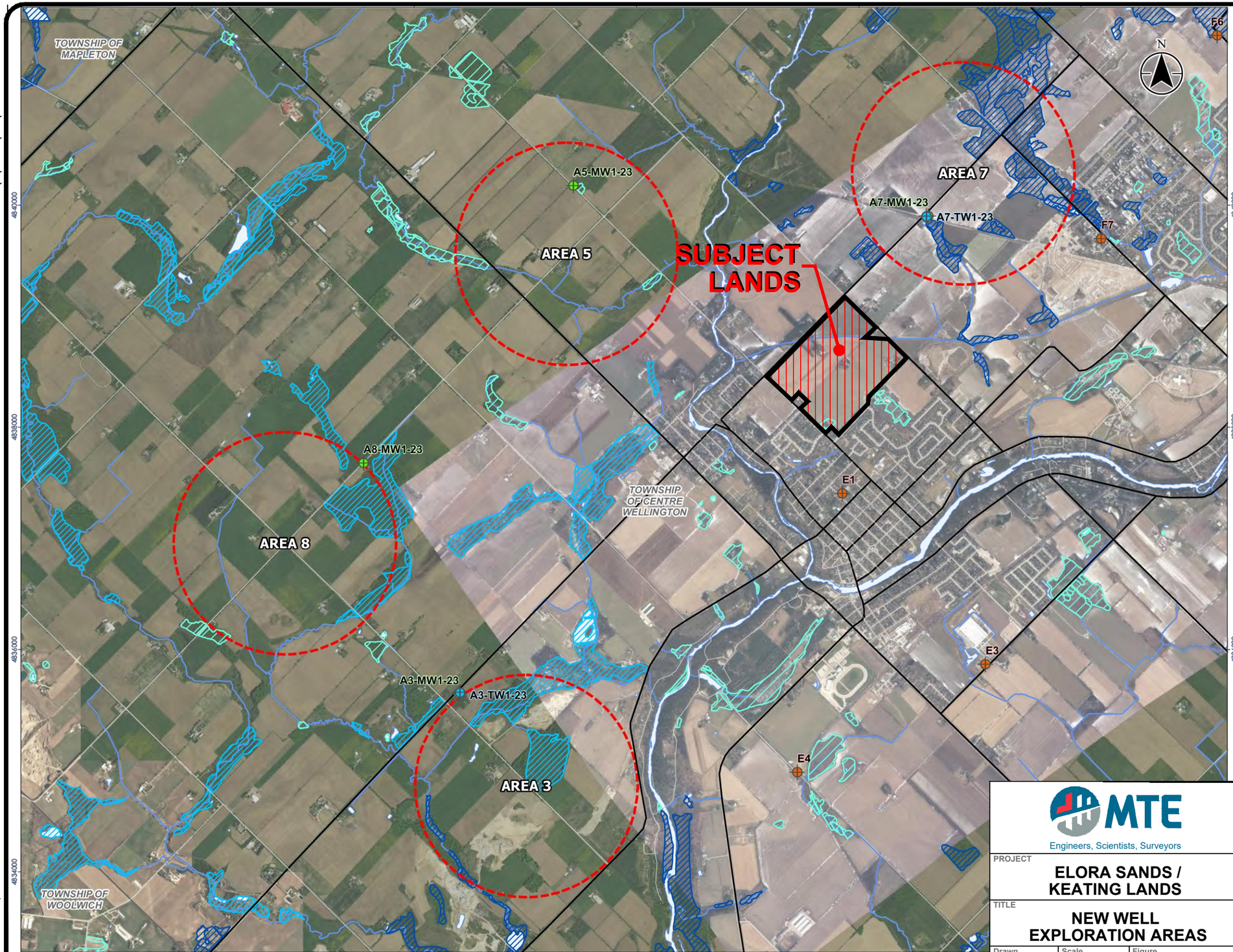
Based on the documentation available on the Township's website, it is understood that the once the production wells F5 and F2 are active, they will each have a capacity of 20L/s which accounts for approximately 10,000 to 15,000 people.

As recommended in the WSMP (**Table 6.1** - Projects 3 to 6), the Township proceeded with the groundwater investigation component of the four potential new well areas as part of the New Well Exploration Program (NWEP) with a NWEP Feasibility Assessment Report dated February 2024 completed by Stantec. Refer to **Figure 6.1**. The NWEP included drilling, pump testing and monitoring of test wells at the four locations. The NWEP concluded that Areas 3, 5 and 7 show potential for high-quality good water supply capable of producing 30L/s per area. Area 8 did not exhibit good supply potential. Based on this, each new well area having a capacity of 30L/s would represent an additional service population of approximately 7,500 to 10,000 people per new well for a total of 22,500 to 30,000 people.

Further to this and based on the updates provided on the Township's website, the Township is proceeding with Municipal Class EA studies for well areas 3 and 7 in 2024; Area 5 would proceed at a later date. As shown in **Table 6.1**, Well Areas 3 and 5 were proposed to be implemented and active in 2026 and 2031 respectively.

Based on the studies being completed by the Township, adequate water supply will be in place for the development of the subject lands.

CAD: P:\P\49878\100\49878-100-F15.DWG



Stantec

Legend

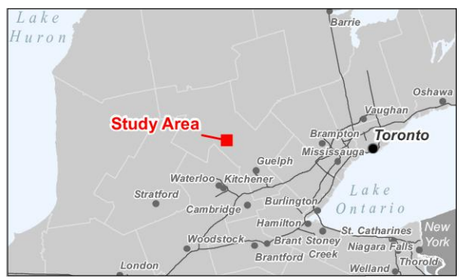
- NWEP Target Area
- NWEP Monitoring Well (Stantec, 2024)
- NWEP Pilot Test Well (Stantec, 2024)
- Municipal Water Well
- Major Road
- Minor Road
- Watercourse
- Waterbody
- Wetland - Evaluated (Provincial)
- Wetland - Evaluated (Other)
- Wetland - Not evaluated per Ontario Wetland Evaluation System
- Municipal Boundary - Lower Tier

0 1 2 km

1:35,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.



Project Location
Township of Centre Wellington

160951289 REVA
Prepared by PRM on 2024-01-09
Technical Review by SMD on 2024-01-11

Client/Project
TOWNSHIP OF CENTRE WELLINGTON
NEW WELL EXPLORATION PROGRAM
FEASIBILITY ASSESSMENT REPORT

Figure No.
1

Title
NWEP Study Area

MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
NEW WELL EXPLORATION AREAS

Drawn	Scale	Figure
AXH	N.T.S	6.1
Checked: MXF	Project No.: 49878-100	
Date (yyyy-mm-dd): 2025-01-28	Rev No.: 0	

Plot Date: March 5, 2025 - 3:06 PM

6.3 Water Distribution

The subject lands are located within the community of Salem, adjacent to several existing residential subdivisions and rights-of-way with available domestic water supply.

The existing 300mm diameter watermain on Irvine Street is proposed to be extended from the existing stub near Bricker Avenue to SR15/Woolwich Street East and then west on Woolwich Street East to the western limit of the Clayton Subdivision as part of its development. Watermain extensions along Gerrie Road and SR15 are also anticipated to be required for the development of the subject lands and for adequate looping of the development.

As outlined in the DC Background Study, the Irvine Street and Woolwich Street East watermain extension projects are DC eligible with anticipated timing for the Irvine Street (2029) and Woolwich Street East (2028). The watermain extension on Woolwich Street East (as contemplated in the DC Study) extends beyond the limits of the Clayton Subdivision up to James Street. The watermain extensions on SR15 and Gerrie Road in front of the subject lands are not listed in the DC study. Considering the road improvements of Irvine Street, SR15 and Gerrie Road are DC eligible projects, discussion with the Township to advance all these projects such that construction coincides with development is warranted.

Water supply for the proposed development will be provided by eight (8) external connections to the existing municipal water distribution system as follows:

- Connect 3-300mm watermains to the proposed 300mm watermain extension on Irvine Street.
- Connect 1-200mm watermain to the proposed 300mm watermain on SR15.
- Connect 1-300mm and 1-200mm watermain to the proposed 300mm watermain on Gerrie Road.
- Connect 2-200mm watermains to the proposed 200mm watermains within the Ainley Subdivision.

To confirm that adequate pressure and flow demands can be satisfactorily met for the subject lands, a water distribution analysis could be completed by the Township's Engineer with the Township-wide water model.

The analysis should confirm the preliminary pipe sizes for the internal water distribution network which has good looping following the proposed road allowances as shown in **Figure 6.2**.

CAD: P:\P\49878\100\49878-100-F12 WTM.DWG

Plot Date: March 6, 2025 - 1:20 PM

300mmØ WTM (DC ELIGIBLE)

PROPOSED WTM BY OTHERS (DC ELIGIBLE)

SIDEROAD 15

300mmØ WTM

300mmØ WTM

FUTURE WTM BY OTHERS

TOWNSHIP DC BACKGROUND STUDY INCLUDES ROAD IMPROVEMENTS FOR SIDEROAD 15 (EAST OF GERRIE ROAD). TOWNSHIP SHOULD CONSIDER INCLUDING A WATERMAIN EXTENSION ALONG SIDEROAD 15 REPRESENTING A KEY CONNECTION TO WELL AREA 7 AND FOR LOOPING.

150mmØ WTM.

STREET 2

300mmØ WTM (DC ELIGIBLE)

REFER TO CLAYTON SUBDIVISION FUNCTIONAL SERVICING REPORT FOR PROPOSED WATERMAIN SERVICING

CLAYTON SUBDIVISION

IRVINE STREET

300mmØ WTM.

300mmØ WTM.

NICHOL DRAIN No.1

STREET 13

200mmØ WTM.

REGULATORY FLOODPLAIN

300mmØ WTM.

GERRIE ROAD

ELORA SANDS

STREET 5

200mmØ WTM.

STREET 4

150mmØ WTM.

150mmØ WTM.

BRICKER AVENUE

STREET 1

EXISTING 150mmØ WTM

300mmØ WTM.

STREET 11

STREET 8

300mmØ WTM.

200mmØ WTM.

150mmØ WTM.

150mmØ WTM.

200mmØ WTM.

REGULATORY FLOODPLAIN

CLEGG ROAD

EXISTING 300mmØ WTM.

300mmØ WTM.

200mmØ WTM.

KEATING LANDS

STREET 6

STREET 12

STREET 9

ELORA MEADOWS SUBDIVISION

IRVINE STREET

STREET 3

300mmØ WTM.

200mmØ WTM.

150mmØ WTM.

10m WOODLAND BUFFER

WOODLAND LIMIT

10m WETLAND BUFFER (BEACON)

WETLAND LIMIT (BEACON)

10m WETLAND BUFFER (BEACON)

WETLAND LIMIT (BEACON)

WETLAND LIMIT (BEACON)

WOODLAND LIMIT (BEACON)

10m WOODLAND BUFFER (BEACON)

300mmØ WTM.

200mmØ WTM.

STREET 10

200mmØ WTM

200mmØ WTM

150mmØ WTM.

STREET 7

200mmØ WTM (BY OTHERS)

WALSER STREET

200mmØ WTM (BY OTHERS)

AINLEY FARM SUBDIVISION

EXISTING 300mmØ WTM

200mmØ WTM (BY OTHERS)

LEGEND

- SUBJECT LANDS
- EXISTING 150mmØ WTM
- EXISTING 300mmØ WTM
- FUTURE WTM EXTENSION (BY OTHERS)
- PROPOSED WTM. (BY OTHERS)
- 150mmØ WTM. — PROPOSED 150mmØ WTM.
- 200mmØ WTM. — PROPOSED 200mmØ WTM.
- 300mmØ WTM. — PROPOSED 300mmØ WTM.
- 300mmØ WTM. — PROPOSED 300mmØ WTM. (DC ELIGIBLE)

Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
PRELIMINARY WATERMAIN SERVICING PLAN

Drawn	FHG	Scale	1:1500
Checked	MXF	Project No.	49878-100
Date (yyyy-mm-dd)	2025-01-28	Rev No.	0

Figure **6.2**

7.0 STORM DRAINAGE

Refer to the Preliminary Storm Servicing Catchment Plan (**Figure 7.1**).

Storm drainage for the subject lands will be provided through a combination of minor (storm sewer) and major (overland flow) drainage systems.

The northeast storm drainage catchment areas within the subject lands are conveyed via internal storm sewers to the proposed SWMFs (2) located adjacent to the ND.

The southeast catchment area is reduced from 21.2ha to 10.7ha and is directed to a SWMF which outlets to the QSC. The reduced drainage area in post-development conditions provide an opportunity to reduce peak flows, manage runoff volume to mitigate the impacts of flow, volume and erosion to the QSC. Water balance to the wetland will be maintained.

Roof areas for most units will be directed to lot-level stone infiltration galleries to infiltrate the 25mm storm event. Storm sewers will be constructed to typical depths with a minimum cover of 1.2m within the road allowance. The major overland flow route from the subject lands will be directed through municipal streets/easements into the SWMFs. The outflow from the SWMFs will be conveyed to the ND and QSC.

As outlined in the Preliminary SWM Strategy Report, the stormwater management strategy for the subject lands is described as follows:

- **Water Quality** – Provide an Enhanced (MOE, 2003) level of stormwater quality treatment prior to discharge to the ND and the QSC.
- **Water Quantity** – Control the peak flow rates of existing catchment areas for all storms up to and including the 100-year storm event to the allowable flow rates prior to releasing the flows to the ND.
- **Instream Erosion Control** – Provide erosion protection through the extended detention of the 25mm storm event over a 48-hour period.
- **Thermal Mitigation** – Implement Low Impact Development (LID) measures and mitigation measures at SWMF outlets.
- **Water Balance - Infiltration** – Maintain or exceed pre-development groundwater volume inputs established within the NDSS through active and/or passive infiltration measures.
- **Water Balance - Surface Water Runoff** – Maintain or exceed pre-development surface water volume inputs into significant environmental features.
- **Chloride Mitigation –** minimize chloride impacts to the wetland feature upstream of the QSC.

CAD: P:\P\49878\100\49878-100-F11 STM.DWG

Plot Date: March 6, 2025 - 9:28 AM

WOOLWICH STREET EAST

SIDEROAD 15

GERRIE ROAD

BRICKER AVENUE

STUMPF STREET

MARR DRIVE

CLEGG ROAD

IRVINE STREET

MARR DRIVE

WALSER STREET

WALSER STREET

QUEEN STREET CREEK

CLAYTON SUBDIVISION

ELORA SANDS

KEATING LANDS

AINLEY FARM SUBDIVISION

NICHOL DRAIN No.1

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 7

STREET 8

STREET 9

STREET 10

STREET 11

STREET 12

STREET 13

INV.=406.00

PROPOSED STM SEWER FROM CLAYTON SUBDIVISION

PROP. STM SEWER INLET FOR CLAYTON SUBDIVISION, IRVINE ST. & WOOLWICH ST. E.

(409.05) LP

INV.=404.00

INV.=401.50

PROP. STM. SEWER OUTLETS ON UPSTREAM SIDE OF SIDEROAD 15

INV.=405.00

INV.=405.00

(411.05) LP

INV.=404.00

INV.=404.00

PROP. STM. SEWER INLET (1m± INTO FLOODPLAIN)

(414.47) LP

(414.05) LP

INV.=410.50

(412.97) LP

INV.=410.50

PROP. STM. SEWER OUTLET/ WINTER BYPASS VIA EASEMENT/ OTHER TO QUEEN STREET CREEK

INV.=406.10

TRANSITION GRADING AREA NOT ABLE TO DRAIN TO SWMF

9625	8625	
8.07ha	4.11ha	
8624	9624	9628
4.28ha	8.39ha	5.35ha
8623	9623	9622	8622
2.17ha	4.67ha	6.74ha	2.20ha
8709	9709	8621	9621
3.38ha	6.98ha	4.69ha	16.18ha

LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS
- CATCHMENT AREA TO SWMF1
- CATCHMENT AREA TO SWMF2
- CATCHMENT AREA TO SWMF3
- PROPOSED STORM SEWER
- EXISTING CONTOURS
- GRCA CONTOURS
- 0.180 / 0.60 — AREA (ha) / RUNOFF COEFFICIENT

MTE

Engineers, Scientists, Surveyors

PROJECT

ELORA SANDS / KEATING LANDS

TITLE

PRELIMINARY STORM SERVICING CATCHMENT PLAN

Drawn	FHG	Scale	1:2000
Checked	MXF	Project No.	49878-100
Date yyyy-mm-dd	2025-01-28	Rev No.	0

Figure **7.1**

8.0 UTILITY SERVICING

It is anticipated that Hydro One (electrical), Bell Canada (telephone), Enbridge (natural gas), and telecommunication (e.g., Rogers Cable, Cogeco, and Wightman) can all adequately service the concept development through the connection to and extension of existing services from Irvine Street and Gerrie Road where required.

9.0 CONCLUSIONS

The main findings of this report for the subject lands are:

1. The roadworks and lot grading within the proposed development can generally be completed and upgraded in accordance with the Township's standards.
2. Adequate WWTP capacity exists in the Elora WWTP.
3. Through planned DC upgrades proposed within the Elora sanitary sewer system along North Queen Street and Colborne Street, adequate sanitary sewer capacity can be provided for the subject lands to convey wastewater to the Elora WWTP.
4. The subject lands are serviced by two trunk sanitary sewer systems being along Irvine Street and the Ainley/Steven Way, both outletting to the Colborne Street trunk sewer which is proposed to be upgraded in the DC Background Study. The proposed upgrades should be expanded to include the North Queen Street sewer.
5. Through the Implementation of Area Wells 3, 5 and possibly 7 adequate water supply should be readily available by 2030 as indicated in the DC background study.
6. A number of connection points to the existing and proposed municipal watermain system are available to provide water supply for the proposed development.
7. The subject lands will be serviced by a new watermain on Irvine Street up to the Well Area 5 as contemplated in the DC background study.
8. The external watermains and internal watermains for the subject lands provide a robust level of looping and provisions for staging and water quality.
9. Irvine Street, SR15 and Gerrie Road are to be re-constructed with an urban cross-section in accordance with the Township's standards. Municipal infrastructure required for the current and future development including sanitary sewers, watermains and storm sewers are proposed to be installed as part of the re-construction of these streets.
10. Stormwater management for the development will provide the appropriate levels of quality, quantity, erosion, and water balance controls to meet the objectives of the NDSS, as outlined in the *Preliminary Stormwater Management Strategy Report*, dated February 2025.
    - *Enhanced* quality control of stormwater runoff can be provided by the proposed stormwater management strategy through the implementation of SWMFs which include a forebay, and a wet pond cell.
    - Quantity control targets for post-development peak flows rates attenuation to pre-development levels that are directed to the ND can be achieved in the proposed SWMFs for all storm events up to and including the 100-year event.
    - Post-development instream erosion will be mitigated by the use of a minimum 24 to 48-hour extended detention of the 25mm storm event.
    - The SWMFs will be designed with measures to mitigate thermal impacts to the ND.
    - Lot-level infiltration of roof water for all storm events up to the 25mm event will also mitigate thermal impacts.

- Infiltration (both active and passive) on the subject lands will provide an enhancement to the groundwater balance.
- Chloride mitigation should be implemented through a winter bypass for the wetland feature upstream of the QSC.
- Conveyance of the Regional storm flows through the SWMFs to the ND can be achieved.

11. The concept development plan can be adequately serviced through the extension of existing utilities including hydro, gas, and telecommunications.
12. The Development of the Subject Lands would utilize existing and planned infrastructure in an efficient manner in accordance with the PPS.

All of which is respectfully submitted,

MTE Consultants Inc.

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VAL:sgd

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Appendix A

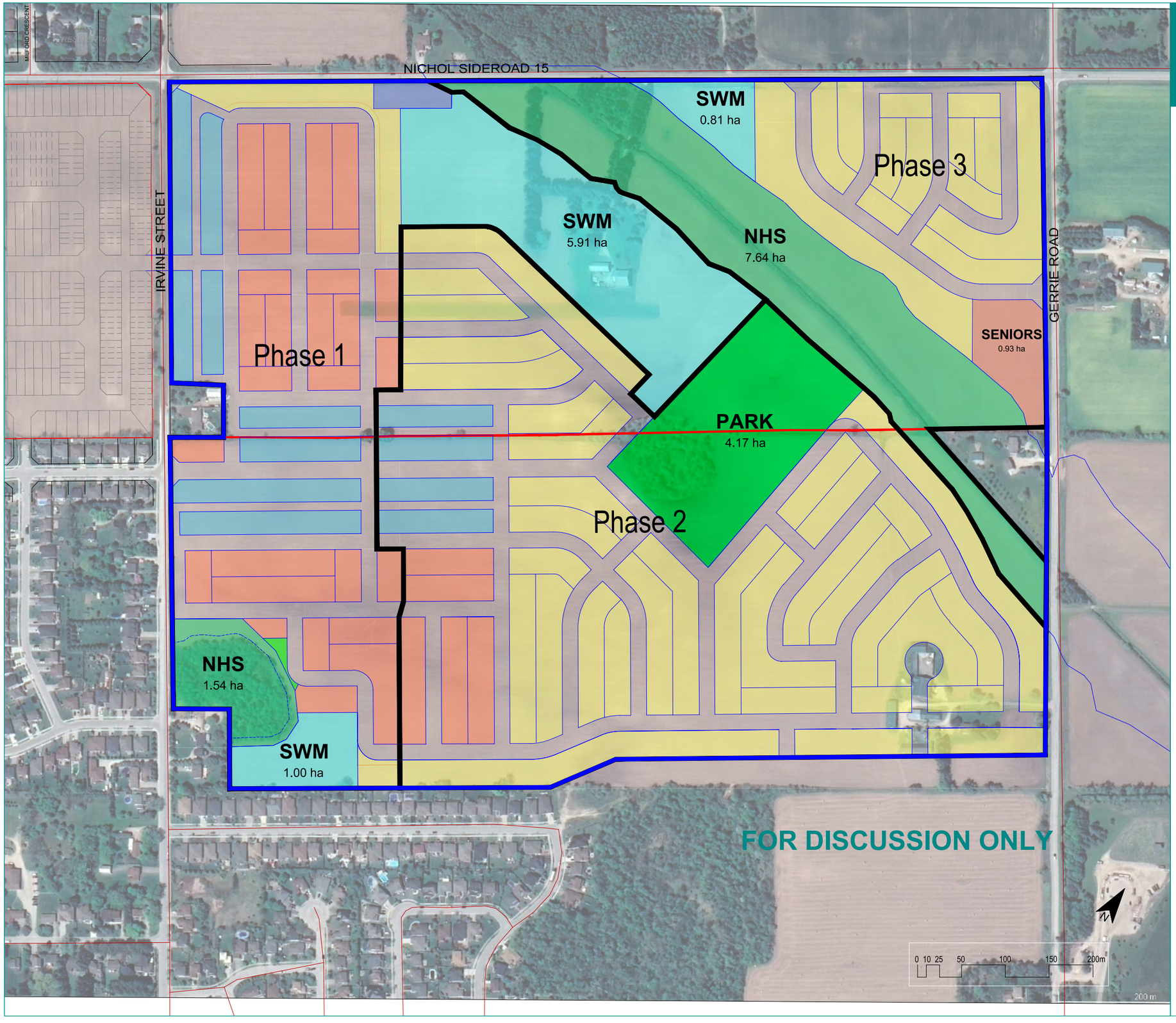
Tables

Table A.1 – Infrastructure Costs Included in Development Charges Calculation

Project No.	Increased Service Needs Attributable to Anticipated Development	Timing (Year)	Gross Capital Cost Estimate (2020$)	Comments
Roads				
1	Sideroad 15, Beatty Line N to Highway 6	2021-2023	1,950,000	Sideroad 15 improvements to connect to Highway 6
15	Sideroad 15, Gerrie Road to Beatty Line N	2024-2031	3,990,000	Sideroad 15 improvements to connect to Beatty Line and Project 1 Highway 6
16	Sideroad 15, James Street to Irvine Street	2024-2031	1,120,000	Sideroad 15 improvements from James Street to Irvine Street
33	Sideroad 15, Gerrie Road to Irvine Street	2024-2031	2,050,000	Sideroad 15 improvements to connect James through to Highway 6
17	Walser Street Ext E, Walser Street to Gerrie Road	2024-2031	1,560,000	Roadway improvements within Ainley subdivision with road stubs to the subject lands
19	Gerrie Road, Sideroad 15 to Walser Street Ext East	2024-2031	1,350,000	Roadway improvements adjacent to the Ainley subdivision
27	Gerrie Road, Walser Street Ext E to Colborne Street	2024-2031	1,220,000	Roadway improvements adjacent to the subject lands
68	Gerrie Road and Colborne Street	2024-2031	350,000	Intersection improvements south of the subject lands
New	Intersection improvements at Irvine Street Sideroad 15			Works contemplated to accommodate Clayton subdivision
New	Intersection improvements at Gerrie Road and Sideroad 15			Works contemplated to accommodate the subject lands
Wastewater – Sewers				
1	Colborne Sanitary Upsizing – Wilson to Irvine	2024	170,200	Trunk sewer improvements on Colborne near intersection of Irvine. Project should be extended to include Queen Street North trunk.
Water Facilities				
4	Replacement of F2 Well with additional capacity expanded	2022	1,795,000	
5	Replacement and expansion of F5 Well	2022	863,000	
1	New Well - Area #3	2023-2026	4,734,000	
2	New Well - Area #5	2028-2030	4,710,000	Well field immediately north of the subject lands
6	New Well - Area 7	2032-2040	3,608,000	
7	New Well - Area 8	2020-2037	6,721,000	
Water Distribution				
1	Gerrie Watermain Extension - Colborne to ER10 (North Limit)	2024	614,000	Watermain extension to Ainley subdivision northern limit and the southern limit of the subject lands.
2	Irvine Watermain Extension – Bricker to SR 15	2029	798,000	Watermain extension immediately adjacent to the subject lands on Irvine Street.
12	Woolwich Watermain Extension - Irvine to James	2028	436,000	Watermain extension immediately adjacent to the Clayton subdivision and a key supply at the northwest corner of the subject lands.
19	Irvine Watermain Extension - Woolwich to Well Area 5	2030	2,534,000	North connection to expanded water supply at Well 5
20	Sideroad 10(11) Watermain Extension - Irvine to Well Area 5	2030	691,000	Watermain extension along Irvine Street from Sideroad 15 then extending ~ 1km north to well area 5. Key water supply for the subject lands.
28	SDRD 15 Watermain Extension - Beatty Line to Well Area 7	2039	145,000	Future water supply for further growth and expansion.
Future	Sideroad 15 watermain from Gerrie Road to Beatty Line			Key connection for watermain transmission.

Appendix B

Concept Plans (MGP)



PHASING PLAN

PHASE 1

LAND USE		AREA ha	AREA ac.	FRONTAGE m	FRONTAGE ft.	APPROX. UNITS
Developable Area						
Low Density Residential @	11 m	1.30	3.21	343	1,125	31
Low/Medium Density Residential @	6 m	6.56	16.21	1,864	6,115	311
Lane Access Residential @	6 m	3.31	8.18	1,105	3,626	184
Vista		0.05	0.12			
SWM		6.91	17.07			
Pumping Station		0.26	0.64			
Roads / Lanes		5.84	8.70			
SUBTOTAL		**24.23**	**59.87**	**3,312**	**10,866**	**526**
Non Developable Area						
NHS		1.54	3.81			
TOTAL		**25.77**	**63.68**	**3,312**	**10,866**	**526**

PHASE 2

LAND USE		AREA ha	AREA ac.	FRONTAGE m	FRONTAGE ft.	APPROX. UNITS
Low Density Residential @	11 m	17.61	43.51	4,735	15,534	430
Low/Medium Density Residential @	6 m	1.92	4.74	553	1,813	92
Lane Access Residential @	6 m	1.40	3.46	455	1,491	76
Park		4.17	10.30			
Vista		0.00	0.00			
SWM		0.00	0.00			
Roads / Lanes		9.09	22.46			
TOTAL		**34.19**	**84.48**	**5,742**	**18,838**	**598**

PHASE 3

LAND USE		AREA ha	AREA ac.	FRONTAGE m	FRONTAGE ft.	APPROX. UNITS
Developable Area						
Low Density Residential @	11 m	5.37	13.27	1,354	4,441	123
Seniors Residence		0.93	2.30			
Park		0.00	0.00			
SWM		0.81	2.00			
Roads / Lanes		2.07	5.11			
SUBTOTAL		**9.18**	**22.68**	**1,354**	**4,441**	**123**
Non Developable Area						
NHS		7.64	18.88			
TOTAL		**16.82**	**41.56**	**1,354**	**4,441**	**123**

TOTAL ALL PHASES

LAND USE		AREA ha	AREA ac.	FRONTAGE m	FRONTAGE ft.	APPROX. UNITS
Developable Area						
Low Density Residential @	11 m	24.28	60.00	6,431	21,100	585
Low/Medium Density Residential @	6 m	8.48	20.95	2,417	7,928	403
Lane Access Residential @	6 m	4.71	11.64	1,560	5,117	260
Seniors Residence		0.93	2.30			
Vista		0.05	0.12			
SWM		7.72	19.08			
Pumping Station		0.26	0.64			
Roads / Lanes		17.00	8.70			
TOTAL NET DEVELOPABLE AREA		**67.60**	**167.04**	**10,408**	**34,145**	**1,247**
Non Developable Area						
NHS		9.18	22.68			
TOTAL PROPERTY AREA		**76.78**	**189.72**	**10,408**	**34,145**	**1,247**

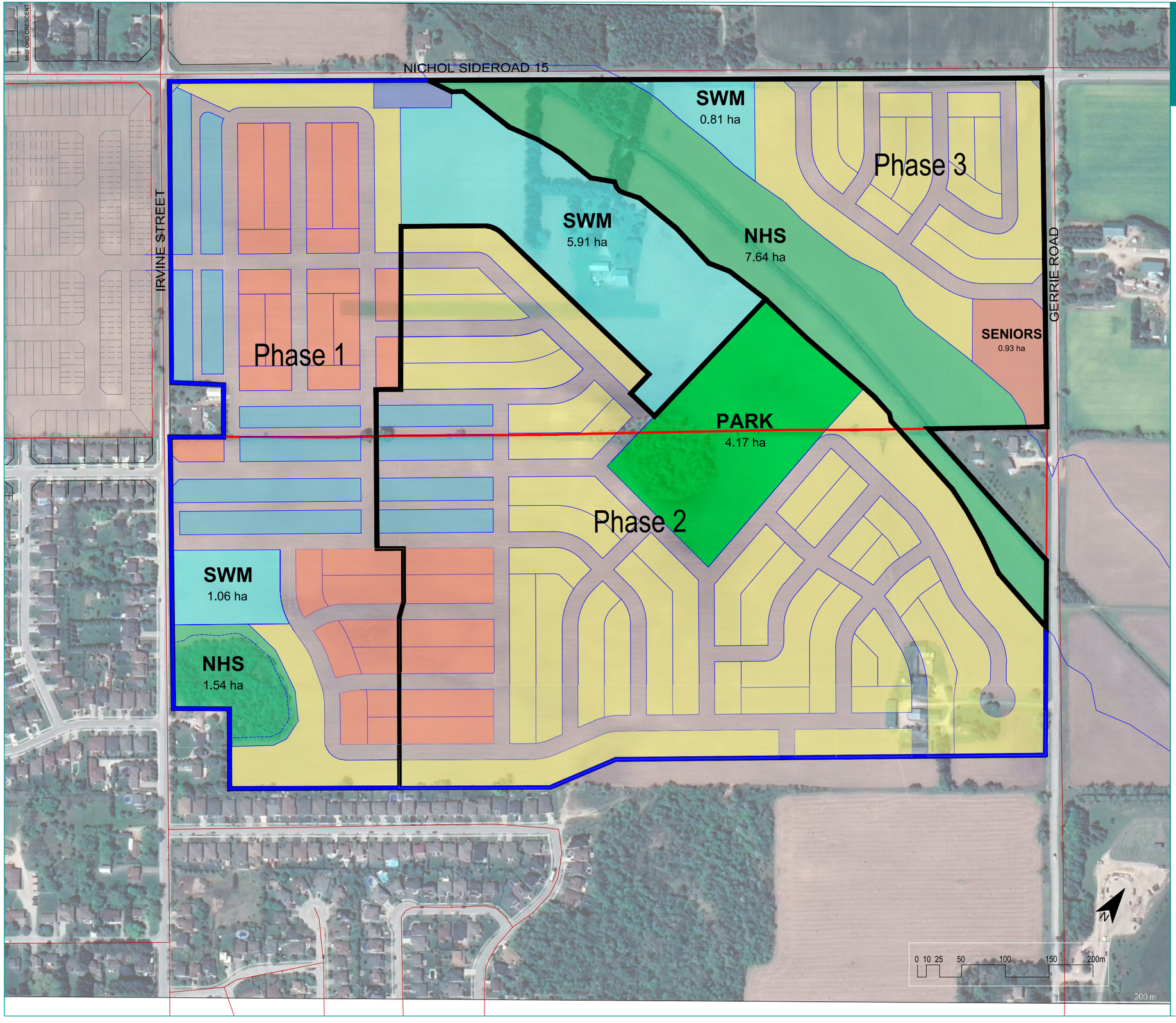
NOTE: Development limits are preliminary and subject to ruther technical study.

Frontage lengths have been discounted by 10% to compensate for inefficiencies in lotting.

Prepared For:
ELORA SANDS DEVELOPMENTS INC.

MGP File No.: 22-3192
Date:February 28, 2025

MGP Malone Given Parsons.
140 Renfrew Drive, Suite 201 | Markham, ON | L3R 6B3
905 513 0170 | mgp.ca



ALTERNATIVE CONCEPT PLAN

PHASE 1

LAND USE		AREA		FRONTAGE		APPROX. UNITS
Developable Area		ha	ac.	m	ft.	
Low Density Residential @	11 m	2.45	6.05	523	1,716	48
Low/Medium Density Residential @	6 m	5.68	14.04	1,638	5,374	273
Lane Access Residential @	6 m	3.31	8.18	1,105	3,626	184
SWM		6.98	17.25			
Pumping Station		0.26	0.64			
Roads / Lanes		5.55	8.70			
SUBTOTAL		**24.23**	**59.87**	**3,266**	**10,715**	**505**
Non Developable Area						
NHS		1.54	3.81			
TOTAL		**25.77**	**63.68**	**3,266**	**10,715**	**505**

PHASE 2

LAND USE		AREA		FRONTAGE		APPROX. UNITS
		ha	ac.	m	ft.	
Low Density Residential @	11 m	17.79	43.96	4,563	14,970	415
Low/Medium Density Residential @	6 m	1.99	4.92	569	1,866	95
Lane Access Residential @	6 m	1.40	3.46	455	1,491	76
Park		4.17	10.30			
SWM		0.00	0.00			
Roads / Lanes		8.84	21.84			
TOTAL		**34.19**	**84.48**	**5,586**	**18,328**	**585**

PHASE 3

LAND USE		AREA		FRONTAGE		APPROX. UNITS
Developable Area		ha	ac.	m	ft.	
Low Density Residential @	11 m	5.37	13.27	1,354	4,441	123
Seniors Residence		0.93	2.30			
Park		0.00	0.00			
SWM		0.81	2.00			
Roads / Lanes		2.07	5.11			
SUBTOTAL		**9.18**	**22.68**	**1,354**	**4,441**	**123**
Non Developable Area						
NHS		7.64	18.88			
TOTAL		**16.82**	**41.56**	**1,354**	**4,441**	**123**

TOTAL ALL PHASES

LAND USE		AREA		FRONTAGE		APPROX. UNITS
Developable Area		ha	ac.	m	ft.	
Low Density Residential @	11 m	25.61	63.28	6,440	21,127	585
Low/Medium Density Residential @	6 m	7.67	18.95	2,207	7,240	368
Lane Access Residential @	6 m	4.71	11.64	1,560	5,117	260
Seniors Residence		0.93	2.30			
SWM		7.79	19.25			
Pumping Station		0.26	0.64			
Roads / Lanes		16.46	8.70			
TOTAL NET DEVELOPABLE AREA		**67.60**	**167.04**	**10,206**	**33,484**	**1,213**
Non Developable Area						
NHS		9.18	22.68			
TOTAL PROPERTY AREA		**76.78**	**189.72**	**10,206**	**33,484**	**1,213**

FOR DISCUSSION ONLY

NOTE: Development limits are preliminary and subject to ruther technical study.

Prepared For:

ELORA SANDS DEVELOPMENTS INC.

MGP File No.: 22-3192
Date: February 28, 2025

MGP Malone Given Parsons.
140 Renfrew Drive, Suite 201 | Markham, ON | L3R 6B3
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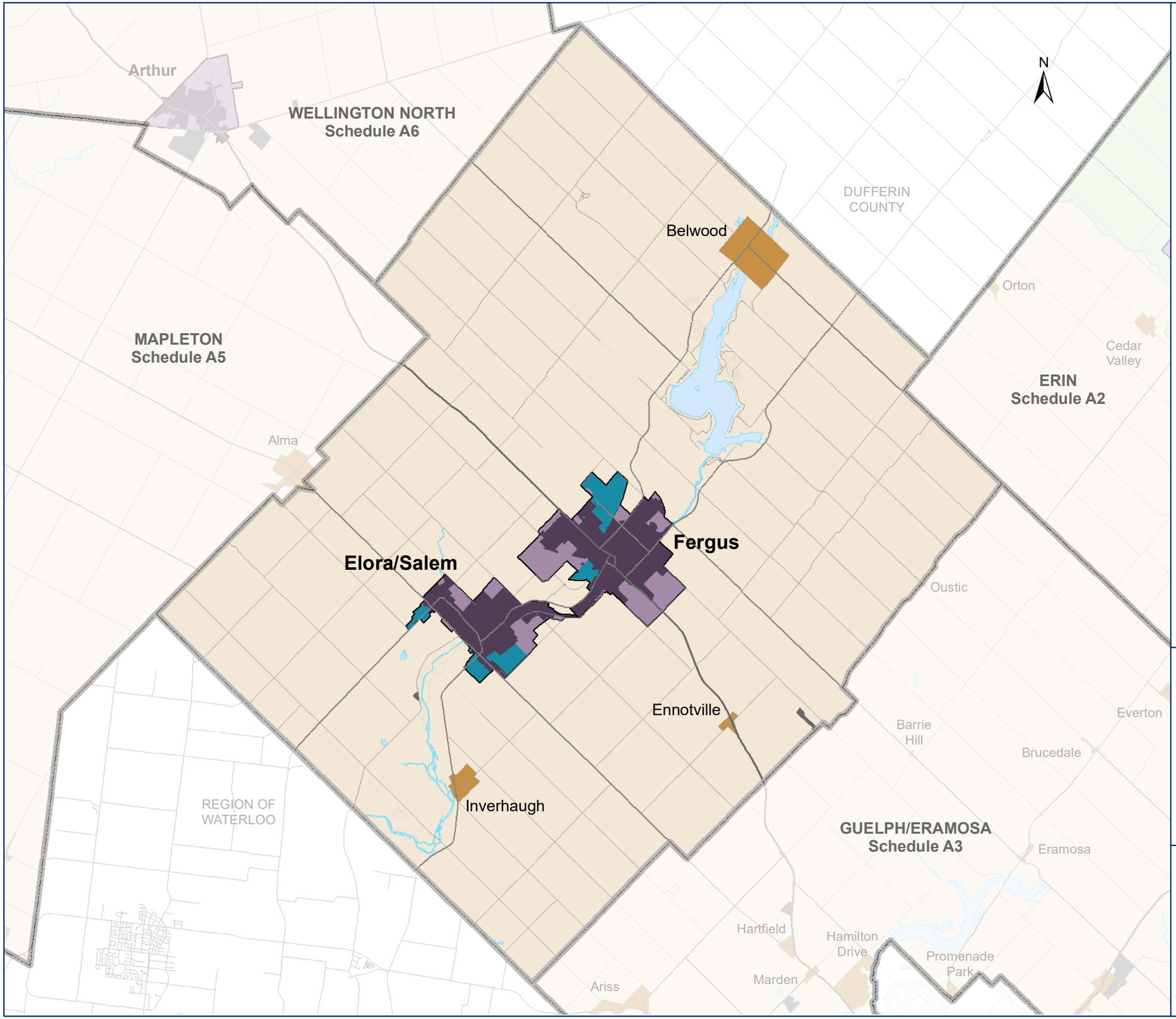
Appendix C

County of Wellington Official Plan Schedule A1

County Growth Structure

CENTRE WELLINGTON



Urban System

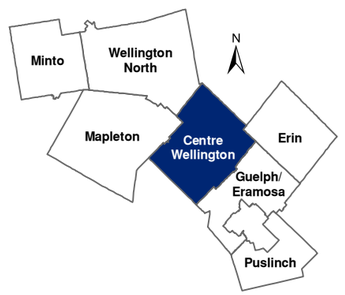
- Primary Urban Centre
- Delineated Built-up Area
- Designated Greenfield Area
- Employment Area

Rural System

- Hamlet
- Rural Employment Area

Other

- Waterbody/Watercourse



Produced by: County of Wellington Planning & Development Department

Sources:
County of Wellington 2024
Ministry of Natural Resources and Forestry,
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Last Revised: July 2024

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Schedule A1
County of Wellington Official Plan

Document Path: F:\LIS\Projects\Official Plan\Official Plan Schedules and Mapping\Schedule A1_Centre Wellington_Growth Structure.mxd

Appendix D

Geotechnical and Hydrogeological Investigations

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

401 Grays Road · Hamilton, ON · L8E 2Z3

www.soil-mat.ca info@soil-mat.ca 905.318.7440 / 800.243.1922 (*toll free*) 905.318.7455

PROJECT NO.: SM 241154-G February 28, 2025

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Brendan Walton, P.Eng.
Engineering Manager, Land Development

HYDROGEOLOGICAL CONSIDERATIONS
PROPOSED RESIDENTIAL DEVELOPMENT
ELORA SAND AND KEATING LANDS
ELORA, ONTARIO

Dear Mr. Walton,

Further to your recent information and request, and meetings with the project team, SOIL-MAT ENGINEERS & CONSULTANTS LTD. have prepared the following hydrogeological considerations report to address the existing subsurface soil and groundwater conditions over the Elora Sands and Keating Lands development area.

1. INTRODUCTION

SOIL-MAT ENGINEERS has conducted a Preliminary Hydrogeological Assessment [SM - 301951-G, dated July 20, 2022], Supplemental Groundwater Data [SM 301951-G, dated August 19, 2024] and Geotechnical Investigation [SM 301951-G, dated September 3, 2021] over the Elora Sands and Clayton Lands portion of the proposed development area. In addition to this information, we have been provided borehole and ground water information for the Ainley Farm Subdivision [Hydrogeological Study Ainley Farm Subdivision, GM BluePlan Engineering, April 12, 2023] to the south of the Keating Lands and the Elora Medows Residential Development [Hydrogeological Investigation Elora Medows Residential Development, Waterloo Geoscience Consultants Ltd., September 19, 2025] which has since been constructed. The purpose of this hydrogeological considerations report is to provide a high-level summary of the hydrogeological conditions of the subject site from geotechnical perspective, and comments with respect to the feasibility of proposed development of the subject lands.

2. SITE AND SUBSURFACE CONDITIONS

Drawing No. 1, Site Plan, illustrates the subject lands.

As noted above, prior investigations by our office have been conducted on the Elora Sands lands, as well as the Clayton lands to the northwest. In addition, investigations by others have been conducted on the Elora Meadows development to the west, and the Ainley Farm lands to the southeast. This information has been reviewed and summarised in the following discussion, however it is noted that our full reports for Elora Sands and Clayton lands should be referenced for the complete description and discussion of the site conditions.

GEOLOGIC SETTING

A review of publicly available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soil in the immediate area to consist of a mixture of stone poor silty sand to sandy silt till, ice-contact stratified deposits of sand and gravel with minor silt and clay, and glaciofluvial deposits of gravely and sandy material.

SUBSURFACE SOIL CONDITIONS

SOIL-MAT ENGINEERS has conducted detailed geotechnical investigation works over the subject site [SM 301915-G, dated October 14, 2021], as well as hydrogeological assessment [SM 301951-G, dated July 20, 2022]. These site investigations included the advancement of sampled boreholes across the site, multiple grain size analyses on recovered soil samples, and have thoroughly characterised the onsite subsurface conditions.

The subsurface soils were investigated to depths of up to approximately 8.2 metres below the existing grade, and found to consist of sandy silt to silty sand till deposits in the upper levels with some areas and variable layers of clayey sandy silt till with depth, with generally trace amounts of gravel. Occasional deposits of gravelly sand were encountered within some of the boreholes. As such, the presence of permeable granular deposits or ‘veins’ should be expected across the site.

Grain size analyses conducted on ten [10] recovered soil samples at varying depths demonstrated the following:

- Clay contents in the range of 2 to 22%, average of 10%
- Silt in the range of 4 to 51%, average of 26%
- Sand in the range of 26 to 94%, average of 53%
- Gravel in the range of 0 to 43%, average of 9%

These conditions are consistent with the referenced geology mapping information indicating stone poor silty sand to sandy silt till, to glaciofluvial deposits of gravely and sandy material. There is limited to negligible indication of ice-contact stratified deposits of sand and gravel with minor silt and clay.

It is noted that the conditions established in the boreholes advanced on the Elora Sands lands are consistent with those reported in referenced reports by others for the Elora Meadows and Ainley Farm lands. Predominantly sandy silt and silty sand till, with varying more clayey layers, and limited gravel content.

The areas indicated as having greater clay content should be further evaluated for potential use as low-permeable recompacted clay liner material for SWM ponds, in the event that lining of the ponds is determined to be required.

It is noted that a portion of the site has been designated as an area of sand and gravel resource of primary and secondary significance. However, given the limited gravel content established, these deposits would not be considered as significant sand and gravel resource in terms of aggregate production.

GROUNDWATER CONDITIONS

A total of seventeen [17] groundwater monitoring wells were installed within the Elora Sands and Clayton Lands development areas over the course of the geotechnical investigation and hydrogeological assessment works. Groundwater readings have been collected both manually and through installed data loggers from August of 2021 to May 2023, the results of which have been summarised as follows;

TABLE A
SUMMARY OF MANUAL GROUNDWATER READINGS (ELORA SANDS)

Borehole No. 004 (Ground Surface Elevation of 405.55 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	2.74	402.8
August 27, 2021	1.75	403.8
February 23, 2022	1.33	404.2
April 22, 2022	1.47	404.1
June 1, 2022	1.78	403.8
May 3, 2023	1.20	404.35

Borehole No. 201 (Ground Surface Elevation of 404.80 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.69	402.1
April 22, 2022	1.88	402.9
June 1, 2022	2.44	402.4
May 3, 2023	1.88	402.9

Borehole No. 201A (Ground Surface Elevation of 404.75 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.8
April 22, 2022	2.05	402.7
June 1, 2022	2.43	402.3
May 3, 2023	1.71	403.1

Borehole No. 202 (Ground Surface Elevation of 406.59 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	5.5	401.1
April 22, 2022	4.76	401.8
June 1, 2022	5.43	401.2
May 3, 2023	4.51	402.1

Borehole No. 203 (Ground Surface Elevation of 407.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.0
April 22, 2022	5.90	401.2
June 1, 2022	5.91	401.2
May 3, 2023	Dry	<401.0

Borehole No. 204 (Ground Surface Elevation of 409.56 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.81	406.7
April 22, 2022	1.16	408.4
June 1, 2022	1.53	408.0
May 3, 2023	1.20	408.4

Borehole No. 205 (Ground Surface Elevation of 412.99 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.56	410.4
April 22, 2022	2.25	410.7

June 1, 2022	2.39	410.6
May 3, 2023	2.34	410.6

Borehole No. 206 (Ground Surface Elevation of 412.88 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	6.83	406.1
April 22, 2022	4.60	408.3
June 1, 2022	4.66	408.2
May 3, 2023	4.76	408.1

Borehole No. 401 (Ground Surface Elevation of 420.91 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
April 22, 2022	2.29	418.6
June 1, 2022	2.39	418.5
May 3, 2023	2.31	418.6

TABLE B
SUMMARY OF MANUAL GROUNDWATER READINGS (CLAYTON LANDS)

Borehole No. 101 (Ground Surface Elevation of 408.60 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	4.78	403.8
August 27, 2021	4.71	403.9
October 14, 2021	4.33	404.3
February 23, 2022	4.31	404.3
April 22, 2022	4.07	404.5
June 1, 2022	4.15	404.5
May 3, 2023	4.06	404.5

Borehole No. 102 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	3.58	410.6
August 27, 2021	3.61	410.5
October 14, 2021	3.62	410.5
February 23, 2022	3.50	410.6
April 22, 2022	2.89	411.2
June 1, 2022	3.05	411.1
May 3, 2023	3.00	411.0

Borehole No. 103 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	6.78	407.3
August 27, 2021	6.96	407.2
October 14, 2021	7.09	407.0
February 23, 2022	6.83	407.3
April 22, 2022	6.13	408.0
June 1, 2022	6.28	407.8
May 3, 2023	6.56	407.6

Borehole No. 301 (Ground Surface Elevation of 412.75 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.29	406.5
April 22, 2022	5.65	407.1
June 1, 2022	5.71	407.0
May 3, 2023	5.85	406.9

Borehole No. 302 (Ground Surface Elevation of 413.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.62	406.4
April 22, 2022	6.06	406.9
June 1, 2022	6.12	406.9
May 3, 2023	6.35	406.7

Borehole No. 303 (Ground Surface Elevation of 414.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	5.40	408.6
April 22, 2022	6.04	407.9
June 1, 2022	6.11	407.9
May 3, 2023	6.41	407.6

Borehole No. 304 (Ground Surface Elevation of 407.90 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	2.87	405.0
April 22, 2022	2.60	405.3
June 1, 2022	2.96	404.9
May 3, 2023	2.42	4055

Borehole No. 305 (Ground Surface Elevation of 408.60 metres)*

	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	Dry	<405.6
April 22, 2022	Dry	<405.6
June 1, 2022	Dry	<405.6
May 3, 2023	Dry	<405.6

*Ground surface elevations have been interpolated based on contours from current topographic survey

As noted above, additional groundwater information was provided for the Ainley Farm subdivision as well as the Elora Medows development. The spring high values were utilised in conjunction with the above recorded measurements to evaluate the groundwater conditions across the proposed development lands. The readings used have been summarised as follows;

TABLE C
SUMMARY OF MANUAL GROUNDWATER READINGS (AINLEY FARM)

Borehole No.	Date	Elevation
101	April 8, 2014	413.60
102	April 8, 2014	412.51
103	April 8, 2014	413.77
104	April 8, 2014	410.71
105	April 8, 2014	414.02
106	April 8, 2014	411.02
107	April 8, 2014	409.61
108	April 8, 2014	409.33

TABLE D
SUMMARY OF MANUAL GROUNDWATER READINGS (ELORA MEADOWS)

Borehole No.	Date	Elevation
12	April 14, 2005	395.17
13	April 14, 2005	406.68
14	April 14, 2005	405.29
15	April 14, 2005	405.97
16	April 14, 2005	410.71
17	April 14, 2005	410.09
18	April 14, 2005	410.00
19	April 14, 2005	407.98
20	April 14, 2005	405.48

The combined groundwater data from similar time of year has been utilised to compile the groundwater contour plan for the area, illustrated in Drawing No. 2. It is noted that the current data provides for a good resolution and confidence in the groundwater contours over the Elora Sand and Clayton lands, Elora Meadows and Ainley Farm lands.

Within the Keating lands the groundwater contours have been extrapolated based on the available data, and considering the existing topography. These are considered to be reasonable and appropriate at this stage of assessment, however it would be necessary to undertake specific detailed study to support detailed design of future proposed development on the Keating lands.

The groundwater flow, as illustrated in Drawing No. 2, generally follows the site topography. Overall, the groundwater flow is from southeast to northwest across the subject sites, and then splitting to the north towards the Nichol Drain and Irvine Creek, and to the southwest and west to Irvine Creek. The majority of the site drains toward the Nichol Drain to the north which ultimately outlets to the Irvine Creek and the Grand River. The southwest portion of the sites drain towards a noted wetland at the southwest corner of the Keating lands, and ultimately west to Irvine Creek and the Grand River.

WETLAND AREA

It is noted a designated wetland area [Queen Street Wetland] is located in the southwest corner of the Keating lands. The available topography indicates the average ground surface elevation at this location is approximately 410 to 411 metres, with a preliminary measurement of water level within the wetland on the order of 410.5 metres. This is roughly coincident with the groundwater elevation at that location indicated on the Groundwater Contour Plan. The wetland does not have any apparent connection to a watercourse, and it is anticipated that the wetland is fed through shallow groundwater due to localised low topography versus the groundwater level, and surface runoff. There does not appear to be any indication of an upward gradient, or upwelling, in the groundwater conditions that would be supply the wetland. Rather, there may be a slight downward vertical gradient. This would suggest the wetland is primarily supplied by precipitation and surface runoff, however this should be confirmed through more detailed hydrogeological assessment.

SOURCE WATER PROTECTION CONSIDERATIONS

Terra-Dynamics Inc. has conducted a Source Water Protection Due Diligence Review of the subject site, and is appended for reference. This review provides detailed information and discussion with respect to surface and groundwater, including Well Head Protection Areas and Significant Groundwater Recharge Areas. This report is appended for reference, and key items noted as follows.

Nichol Drain is identified as a groundwater discharge area, with the regional groundwater levels above the elevation of the drain. This is consistent with monitoring well observations on the Elora Sands lands. The Drain is noted as having coldwater fishery potential, and should be considered as a coldwater stream with respect to stormwater management design and construction. Further assessment of the Nichol Drain is warranted to support and inform detailed design of site development.

Groundwater recharge of the site has likely been over-estimated in regional studies, as site specific investigations have demonstrated predominantly silty sand/sandy silt till deposit, less permeable than the sand and gravel indicated on regional mapping.

The bedrock aquifer beneath the site has a primarily low vulnerability [vulnerability scores of 2, 4 and 6], with a small portion of the southern area [Keating Lands] mapped as medium vulnerability [score of 8], and a very small portion at the southwest of the site mapped and high vulnerability [score of 10]. Considering the conditions and relevant policies significant water quality threats are not expected as part of residential development, it is not expected that there will be constraints on the residential development of the site.

DISCUSSION AND RECOMMENDATIONS

The subsurface soil and groundwater conditions, as outlined above, are discussed in detail in our Hydrogeological Investigation for the Clayton and Elora Sands lands. This report should be referred to as the commentary and discussion remains valid and applicable to assessing the feasibility of development for both the Elora Sands and Keating lands. The overburden soils are predominantly silty sand and sandy silt till, with occasional more clayey zones and limited sand and gravel.

Groundwater is present at depths ranging between approximately 2 to 7 metres below the existing grade, generally being shallower in topographically low areas, including near the Nichol Drain and adjacent to the Queen Street Wetland at the southwest of the Keating lands.

Site grading should consider the existing topography, raising the grade in low areas and cutting in higher areas, in order to minimise potential interaction with groundwater. With appropriate grading preventing interaction between groundwater and foundations, and largely limiting interaction during construction of site servicing. As such, conflict or impact to groundwater conditions are not expected to be a significant concern. The exception may be deeper services [trunk sewers], which may require some level of temporary construction dewatering. On a preliminary basis, this would be anticipated to be below 50,000 L/day in most cases, with potential for deeper excavations to exceed 400,000 L/day. This would warrant further assessment as part of detailed design.

The on-site soils, while generally less permeable than the sand and gravel indicated on regional mapping, present a moderately permeable condition that would be supportive of LID systems. This would include lot level infiltration, infiltration galleries, etc., as part of the overall stormwater management and water balance for the site development. This would warrant further assessment as part of detailed design.

Stormwater management ponds located at topographic low locations on the site would be appropriate. Portions of the site presents as potentially sufficiently clayey to be suitable for use as recompacted clay liner, in the event that it is determined that lining of the SWM ponds is required. Alternatively, the use of available geosynthetic clay liner systems may be considered.

It is noted that the subject lands are within a Wellhead Protection Area (WHPA). Water wells in the area are drawing from a much deeper confined aquifer, and would be unaffected by proposed development of the subject lands. Based on the available information, there will be no anticipated negative impact with respect to the deep bedrock aquifer serving as the potable supply source for private and municipal potable wells within the area.

Based on the currently available information, including detailed hydrogeological assessments of the Elora Sands lands, and the Elora Meadows and Ainley Farm lands, the subject lands are considered to be feasible for residential development. Appropriate design considerations and strategies will be able to readily and adequately account for and mitigate potential concerns. Further detailed assessment will be warranted, as noted, to support detailed design of future development.

GENERAL COMMENTS

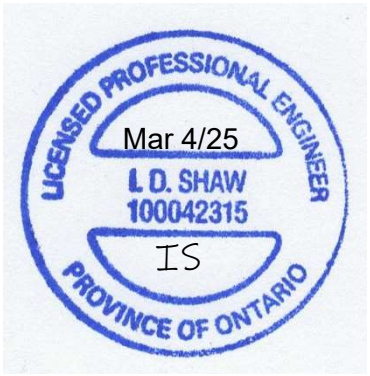
The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this Hydrogeological Report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Kevin Reid, B.Eng., EIT.
Engineer in Training

Ian Shaw, P. Eng., QP_{ESA}
Senior Engineer

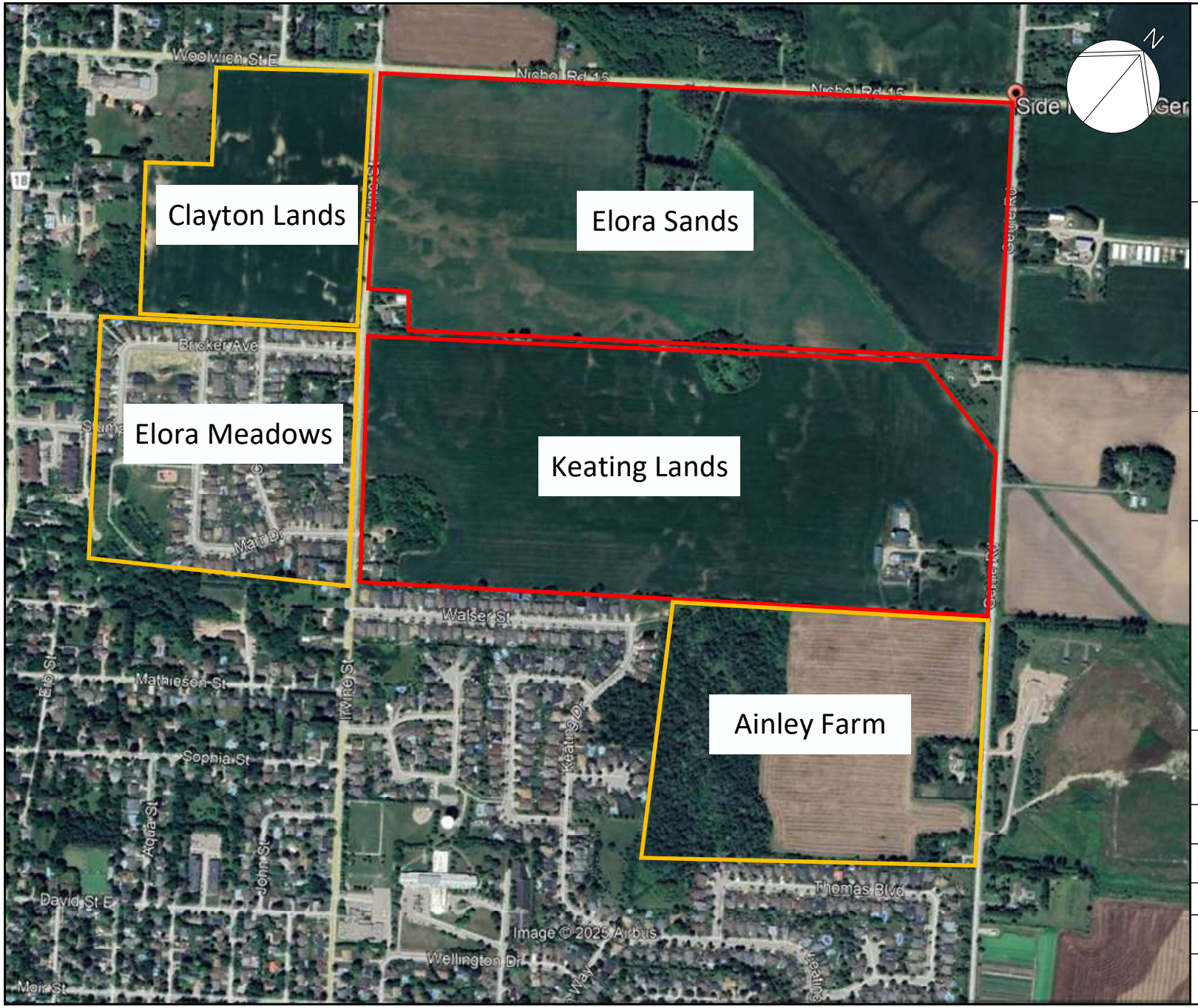


Enclosures: Drawing No. 1, Site Plan
Drawing No. 2, Groundwater Contour Plan

References:

Source Water Protection Due Diligence Review [Terra-Dynamics, dated February 27, 2025]
Preliminary Geotechnical and Hydrogeological Investigation [SM 301951A-G, dated October 12, 2021]
Preliminary Hydrogeological Assessment [SM 301951-G, dated November 4, 2022]
Supplemental Groundwater Data [SM 301951-G, dated August 19, 2024]

Distribution: Cachet Developments [pdf]



LEGEND

Subject Lands

Adjacent Sites

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 241154-G.

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SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Hydrogeological Considerations
Elora Sands and Keating Lands
Elora, Ontario

Site Plan

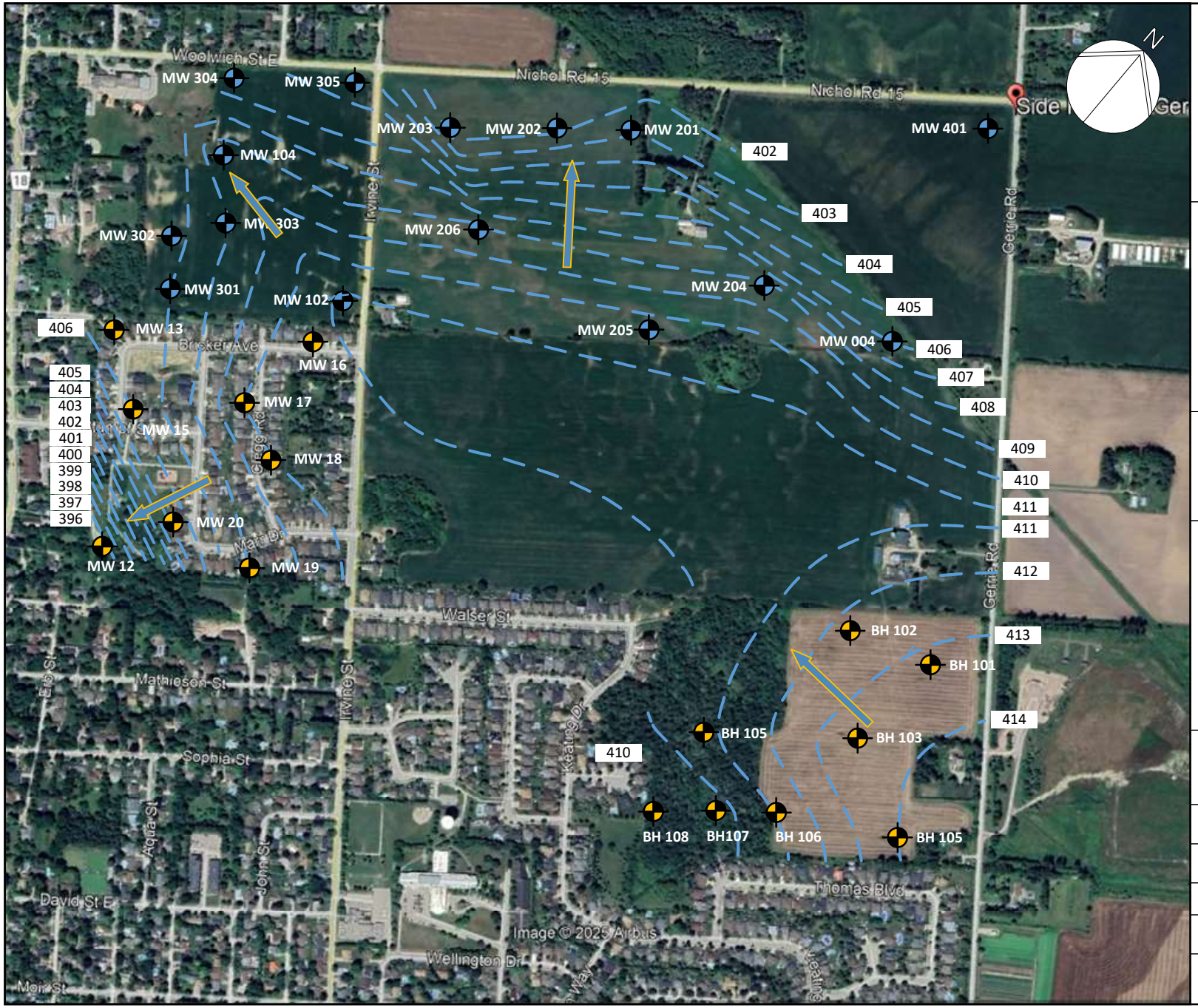
Project No. SM 241154-G

Date: February 2025

Drawn: KJR	Checked: IS

SM 241154-G Site Plan

Drawing No. 1



LEGEND

Soil-Mat Monitoring Well Location
MW#

Monitoring Well Location By Others

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 241154-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Hydrogeological Considerations
Elora Sands and Keating Lands
Elora, Ontario

Groundwater Contour Map

Project No. SM 241154-G

Date: February 2025

Drawn: KJR | Checked: IS

SM 241154-G Groundwater Contour Map

Drawing No. 2

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455
Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951B-G October 14, 2021

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

PRELIMINARY GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
75 WOOLWICH STREET EAST
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your authorisation and subsequent discussions with Mr. Michael DeBiasio, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P301951, dated July 1, 2021, later revised and confirmed through email communication on August 3, 2021. This report should be read in conjunction with the formal report for the Gibson Farms to the east SM 301951A-G, dated October 5, 2021. Our comments and recommendations based on our findings at the four [4] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development consisting of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services, located at 75 Woolwich Street East [Clayton Lands] in Elora, Ontario. The purpose of this preliminary geotechnical investigation work was to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

SOIL-MAT ENGINEERS was provided with a sub-watershed study that encompasses the surrounding area – including the subject site – prepared by Aquafor Beech Limited, dated February 2008. The results of this investigation have been considered in preparation of this geotechnical report.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation. It is noted that SOIL-MAT ENGINEERS has also conducted Phase One and Two Environmental Site Assessments (ESAs) for the subject site, which have been reported under a separate cover.

2. PROCEDURE

A total of four [4] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on August 6, 2021 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 3.6 and 7.6 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Upon completion of drilling, groundwater monitoring wells were installed at Borehole Nos. 1, 2, and 4 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 to 3.0 metres. The monitoring well was encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite 'hole plug' to the surface and fitted with a protective steel 'stick up' casing. The remaining boreholes were backfilled in

general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at the borehole locations has been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 4, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is currently an undeveloped agricultural property located at Woolwich Street East in Elora, Ontario. The parcel is bordered to the east by Irvine Street, to the south by Bricker Avenue, to the west by residential dwellings and a public school, and to the north by Woolwich Street East. The grade is relatively flat and even at the south portion of the site, sloping gently up towards the north, before quickly descending to the north towards Woolwich Street East with an approximate relief of 6 metres measured across the boreholes.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 100 to 250 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term ‘topsoil’ has been used from a geotechnical point of view, and does

not necessarily reflect its nutrient content or ability to support plant life. Given the property has been historically used for agricultural purposes the upper levels of the soils would be expected to have a reworked nature resulting in more variable depths of topsoil over the site. As such, it is recommended that a conservative approach be taken when estimating topsoil quantities across the site for stripping, i.e. account for slightly greater stripping depth than those specifically noted at the borehole locations.

Sandy Silt/Clayey Silt

Native sandy silt/clayey silt was encountered beneath the topsoil in Borehole Nos. 1, 2, and 3. The fine-grained granular to slightly cohesive soils were brown in colour, with trace to some clay and gravel, with a notable increasing clay content with depth in some of the boreholes. The native sandy silt/clayey silt soils were generally noted to have a reworked or weathered appearance in the upper levels, and were generally noted to have a compact state. The sandy silt/clayey silt deposit was present to depths of approximately 0.9 to 2.2 metres in Borehole Nos. 2 and 3, and proven to termination within Borehole No. 1 at a depth of approximately 6.1 metres below the existing ground surface.

Sand

A native sand deposit was encountered beneath the topsoil in Borehole No. 4, and beneath the sandy silt/clayey silt layer in Borehole Nos. 2 and 3. The fine to medium grained soils were brown in colour, contained trace amounts of clay, silt, and gravel, and was generally in a loose to compact state. The native sand soils were proven to termination at depths of approximately 3.6 and 7.6 metres below the existing ground surface.

Grain Size Analyses

Grain size analyses were conducted on three [3] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH2 SS6	4.6 m	2	6	91	1	10^{-2}	150 to 300
BH3 SS3	1.5 m	14	45	34	7	10^{-6}	<10
BH4 SS4	2.3 m	2	9	89	0	10^{-3} to 10^{-2}	100 to 150

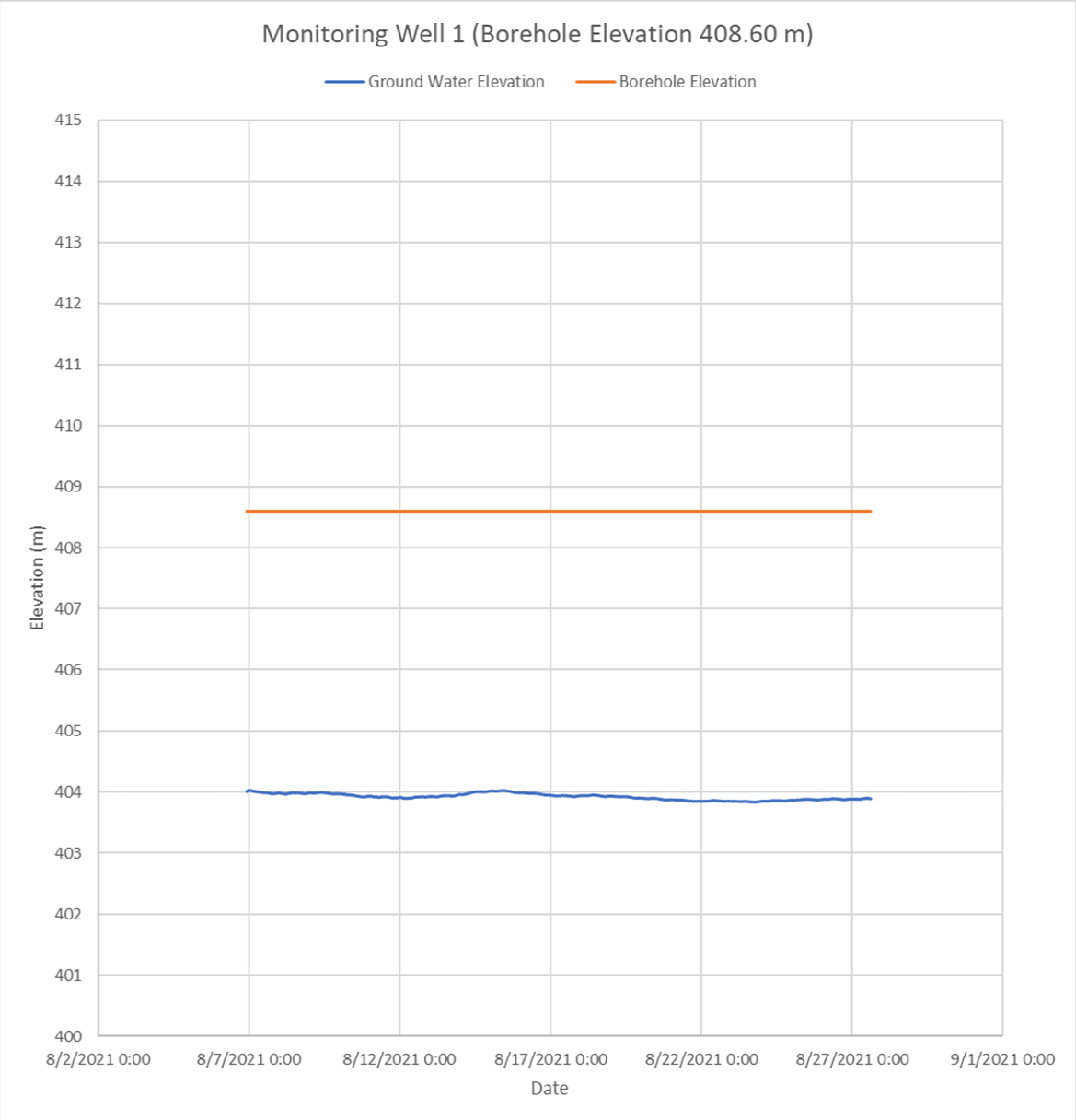
The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines at depth. The sandy silt/clayey silt in the upper levels would generally behave as a low permeable material, but would not be considered as an impermeable material, and would be highly frost susceptible. The underlying sand deposit is highly permeable, relatively free draining.

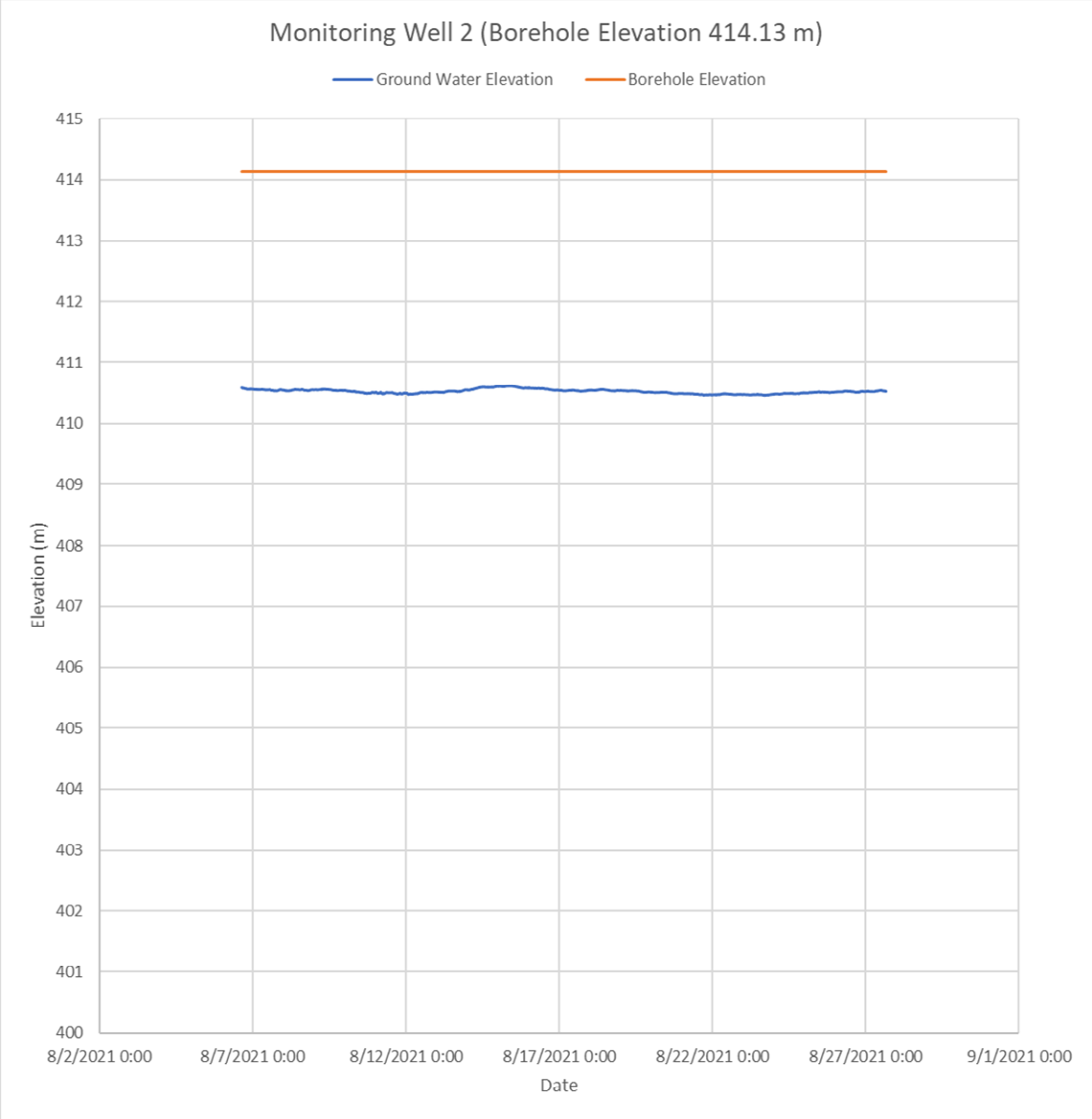
A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

Groundwater Observations

Borehole No. 2 was noted to have ‘caved’ to a depth of approximately 3.8 metres and ‘wet’ at a depth of approximately 3.6 metres, while Borehole No. 4 was noted to be open and ‘wet’ at a depth of 7.0 metres upon completion. Borehole Nos. 3 was noted to have cave to a depth of 2.7 metres, and dry upon completion. Borehole No. 1 was noted as being open and ‘dry’ [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, a monitoring well was installed at Borehole Nos. 1, 2, and 4, to allow for future measurements of the static groundwater level. Furthermore, it is noted that an additional monitoring well was installed on the abutting parcel of land to the east, the work of which was completed in concert with the fieldwork on the Clayton Lands. A data logger was installed in Borehole Nos. 1 and 2 to allow for continuous monitoring of the groundwater level between August 6 and August 27, 2021, the readings of which have been illustrated in the following graphs:




Monitoring Well 2 (Borehole Elevation 414.13 m)
Ground Water Elevation
Borehole Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
406
405
404
403
402
401
400
8/2/2021 0:00
8/7/2021 0:00
8/12/2021 0:00
8/17/2021 0:00
8/22/2021 0:00
8/27/2021 0:00
9/1/2021 0:00
Date

In addition to this, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on August 6 and August 27, 2021 and have been summarized in the following chart:

TABLE B
SUMMARY OF GROUNDWATER LEVELS

Monitoring Well	Ground Surface Elevation [m]	August 6, 2021		August 27, 2021	
		Groundwater Depth [m]	Groundwater Elevation [m]	Groundwater Depth [m]	Groundwater Elevation [m]
MW1	408.60	4.78	403.82	4.71	403.89
MW2	414.13	3.58	410.55	3.61	410.52
MW4	414.87	6.78	408.09	6.96	407.91

The groundwater levels observed at these monitoring well locations, as well as the monitoring well installed at the adjacent property [summarised in our geotechnical report SM 301951A-G under a separate cover] indicate a stabilized groundwater level on the order of approximately 2 to 7 metres below the existing grade, at an elevation of roughly 403.8 to 410.5 metres, varying with the physical topography. This data is based on the groundwater data collected from Borehole Nos. 1, 2, and 4, as well as the monitoring well installed on the Gibson Farm land to the east. It is noted that the groundwater level would be expected to fluctuate seasonally. It is also noted that the observed groundwater levels may be influenced by more localised shallower 'perched' deposits in more permeable seams within the sandy silt/clayey silt. Further long-term monitoring may allow for a more accurate estimate of the static groundwater level, including more data during the 'wet' and 'dry' seasons.

As noted above, SOIL-MAT ENGINEERS was also provided a sub-watershed study by Aquafor Beech, which included a number of monitoring wells to the east to monitor the groundwater elevations. The conditions and groundwater levels described in this geotechnical report are consistent with those encountered during our fieldwork as described above.

General Soil Conditions

As noted above the subsurface conditions are generally characterized as sandy silt/clayey silt deposit in the upper levels, underlain by a permeably cohesionless sand deposit. The grain size analyses indicate the sandy silt/clayey silt soils to have 10 to 20 percent clay content, lending a slightly cohesive characteristic. The sandy silt/clayey silt soils are relatively consistent in terms of its constituents but are noted to contain an increasing clay content with depth in some of the boreholes, as noted above. Where the material transitions into a sand the native soils are generally fine in gradation in the upper levels, becoming medium to coarse with depth. As demonstrated above the subsurface conditions exhibit a relatively inconsistent layered structure across the large area, but can be generally distinguished by a layer of slightly cohesive sandy silt overlying a cohesionless sand. The conditions will be best assessed during excavations on an area-by-area basis. As such it may also be prudent to advance a series of test excavations in the area of proposed deeper excavations and/or stormwater management ponds to confirm soil composition and groundwater conditions in the area of deep excavations.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 5 metres below the existing grade. Excavations through the native sandy silt/clayey silt and sand soils, as well as any engineered fill placed as part of site grading works, should be relatively straightforward, with the sides remaining stable for short construction periods at inclinations of up to 45 degrees to the horizontal, and possibly steeper depending on moisture condition and clay content. Where wet or more permeable seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to ‘slough in’ to as flat as 3 horizontal to 1 vertical, or flatter.

Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native sandy silt/clayey silt and sand soils would generally be considered a Type 2 or 3 soil, depending on the moisture content and relative compact to dense condition, as outlined in the Ontario Health and Safety Act III – Excavations. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above, the groundwater level varies between depths of approximately 2 to 7 metres below the existing grade, roughly elevation 403.8 to 410.5 metres. The majority of excavations are anticipated to be above the groundwater level. Nevertheless, some infiltration of water from more permeable seams and surface runoff into the open excavations should be anticipated. Such infiltration should be readily controlled using typical construction dewatering methods. 'Perched' deposits of water may be encountered within more permeable pockets, which may require greater initial dewatering efforts and instability in the excavations, especially during the 'wet' times of the year. Where excavations extend to greater depths, to and below the groundwater level, especially within the sand deposit, the rate of infiltration will be much greater and additional pumping or more sophisticated dewatering methods should be anticipated. In this regard, ongoing monitoring of the groundwater levels, and careful review of the design servicing elevations, is recommended. As noted above, the advancement of test excavations in the area of proposed deep services and stormwater management ponds would allow for a first hand look at how groundwater levels may affect such excavations. More water should be expected when connections are made to existing services. Surface water should be directed away from the excavations.

The base of the excavations in the native soils, above the groundwater level, encountered in the boreholes should generally remain firm and stable. Where excavations extend to greater depths, to or below the groundwater level, or where 'perched' water is encountered, some base instability should be expected, especially during 'wet' times of the year. This will be especially likely in the high silt content sandy silt/clayey silt soils. Areas of base instability may be stabilised with the placement of additional bedding or ballast stone, the use of coarser stone material, etc. The appropriate measures are best assessed based on the actual conditions at the time of construction. With a firm and stable base condition, stabilised where warranted, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or County of Wellington should be satisfactory. The bedding should be well compacted to provide sufficient support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations

extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist primarily of the sandy silt/clayey silt and sand soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

It is noted that the sandy silt/clayey silt soils encountered are not considered to be free draining and should not be used where this characteristic is necessary. It is also noted that these fine grained granular soils will present difficulties in achieving effective compaction when they become 'wet' of optimum, and where access with compaction equipment is restricted. The sandy silt/clayey silt soils encountered are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content, with some noted 'wet' seams. Some moisture conditioning will be required depending upon the weather conditions at the time of construction. It is noted that these silty soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas. The sand soils are generally well draining, and tend to be near optimum moisture content. At depth, approaching or below the water level, the sand soils will be expected to be saturated, requiring time to drain excess moisture or other drying efforts in order to achieve effective compaction.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is

well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The fine grained to cohesive soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 95 per cent of its standard Proctor maximum dry density [SPMDD], and to 100 per cent of its SPMDD in the upper 1 metre below the design subgrade level. All structural fill should be compacted to 100 per cent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc. in the native competent soils, stabilised where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if compaction of the fill around these structures is not adequate, causing settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining, non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density. A geofabric separator

should be provided between the free draining material and the on-site silt soils to prevent the intrusion of fines.

The thrust blocks in the native soils or engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~2,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, 'rip rap', etc.] 'punched' into the soft areas.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock) sub-base material. It is also important

that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. A typical generic pavement structure would consist of 350 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 60 millimetres of HL8 or HL4 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete. Where a pit run, Granular B Type I, aggregate is utilised in the granular base, it should be increased to a minimum thickness of 450 millimetres. It is our opinion that this design is suitable for use on a residential roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base course material is placed. Notwithstanding, the pavement structure should conform to the relevant County of Wellington requirements where they are to be assumed by the County. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or County of Wellington requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. A typical recommended light duty pavement structure for residential driveways would

consist of a minimum of 200 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE AND TOWNHOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings, below any fill, organic, or otherwise unsuitable materials. Bearing pressures of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils. In areas where 'wet' seams are present, or the native soils present in less compact condition, reduced bearing values of 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] are recommended. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete.

In the event that site grading works result in engineered fill below founding elevations, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 percent standard Proctor maximum dry density, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. The design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for variable support and loading conditions. The use of nominal reinforcement is considered good construction practice as it will act to reduce the potential for cracking in the foundation walls due to minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This

reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimeters from the top of the foundation walls at a minimum, depending on ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

All basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an 'oversized' reservoir and a 'back-flow' prevention valve so that the sump pump will not cycle repeatedly within short time periods.

All footings exposed to the environment must be provided with a minimum of 1.2 meters of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development will consist of single family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend up to approximately 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, however further groundwater monitoring may be conducted to more accurately assess the static groundwater level.

The short term excavations for the proposed servicing are generally anticipated to extend into the sandy silt/clayey silt and sand soils to depths above the static groundwater level. Depths of excavations should be confirmed via a preliminary site servicing and grading plan, which should be forwarded onto our office for further review and comments. Such excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. During wet times of year, some instability of the excavations may be experienced. The rate of dewatering would be expected to be below 50,000 L/day, and certainly below 400,000 L/day, such that an EASR or PTTW should not be required. Where deeper excavations are identified to be required, extending below the static groundwater level, the need for temporary dewatering controls during construction should be more closely evaluated. Depending on the proposed depths of excavations for the proposed footings and site services, the rate of dewatering could approach or be greater than 50,000 L/day, potentially requiring an EASR. As such, once available, the site servicing and grading plans detailing depths of construction should be forwarded onto our office for further review and comments.

The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions. As such, the provision of clay ‘cut-offs’ within trench backfill is not expected to be required.

Excavations for the proposed basement levels should be well above the groundwater level, and so would not be expected to require significant ongoing groundwater control,

other than typical perimeter weeping tile and sump pump as noted above. This should be confirmed once our office has had a chance to review the site servicing and grading plans.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such is in 'dry' ponds, infiltration galleries, etc.

Based on our observations and details of the proposed development, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area, and further detailed hydrogeological assessment is not considered warranted at this time. As the detailed design of the proposed development proceeds, this office should be consulted to review the hydrogeological conditions and assess the potential for concern, or need for additional study.

10. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Scott Wylie, B.Eng., EIT.

Ian Shaw, P. Eng.
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 4, inclusive
Grain Size Analyses
Drawing No. 2, Recommended Design Requirements for Basement Construction

Distribution: Cachet Developments [pdf]

LEGEND

Borehole Location
BH#

Monitoring Well Location
MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301951B-G.

2. Borehole locations are approximate.

SOIL-MAT
ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
75 Woolwich Street East
Elora, Ontario

Borehole Location Plan

Project No. SM 301591B-G

Date: October 2021

Drawn: SW | Checked: KR

SM 301591B-G Borehole Location Plan

Drawing No. 1

Log of Borehole No. 1

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838437
E: 545149

Depth (ft)	Depth (m)	Elevation (m)	Description	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)
0	0	408.60	Ground Surface							
20	6	402.50	End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 6.10 metres.
2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. No soil samples were retrieved. The following free groundwater level readings have been measured:

August 6, 2021 - 4.78 metres below ground surface.

August 27, 2021 - 4.71 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 2

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838180
E: 545422

Depth (ft)	Depth (m)	Elevation (m)	Description	Sample Type	Sample Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		414.13	Ground Surface							
0	0	413.90	**Topsoil** Approximately 250 millimetres of topsoil.							
3	1	413.20	**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, loose to compact.	SS	1	4 5 7 8	12			
				SS	2	2 3 6 5	9			
			Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, loose to compact.	SS	3	3 9 12 14	21			
				SS	4	7 8 11 10	19			
				SS	5	6 9 11 17	20			
16	5	408.90	End of Borehole	SS	6	7 5 4 9	9			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as caved to a depth of 3.8 metres and 'wet' at a depth of 3.6 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 3.58 metres below ground surface.

August 27, 2021 - 3.61 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 3

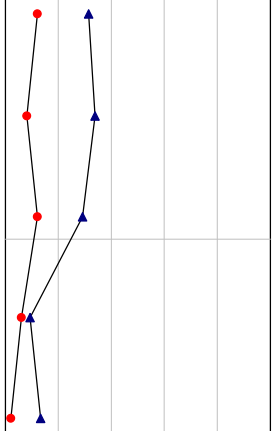
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4837942
E: 545194

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
ft m	412.55	Ground Surface								
0 0		**Topsoil** Approximately 100 millimetres of topsoil.		SS	1	5 5 7 8	12			
1		**Sandy Silt** Brown, trace to some gravel and clay, reworked in upper levels, compact.		AS	2	6 5 3 3	8			
2 1				SS	3	5 6 6 6	12			
7 2	410.30									
8		**Sand** Brown, trace clay, silt, and gravel, medium gradation, loose.		SS	4	2 3 3 2	6			
10 3				SS	5	2 1 1 2	2			
12	408.90									
13 4		End of Borehole								
16 5										
20 6										
23 7										
26 8										
29 9										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded dry and caved to a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 4

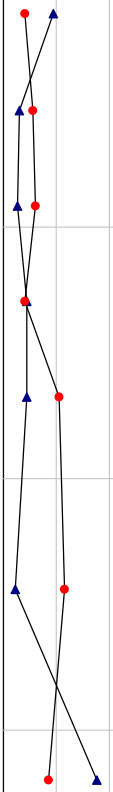
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838174
E: 545084

Depth (ft)	Depth (m)	Elevation (m)	Description	Sample Type	Sample Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		414.87	Ground Surface							
0	0	414.60	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, fine to medium gradation, compact.	SS	1	5 5 6 7	11			
2										
3	1			SS	2	8 9 9 7	18			
4										
5				SS	3	2 5 8 7	13			
6	2									
7										
8				SS	4	6 11 16 13	27			
9										
10	3			SS	5	10 12 11 13	23			
11										
12										
13	4									
14										
15										
16				SS	6	5 10 13 15	23			
17	5									
18										
19										
20	6	408.80	Wet spoon							
21				SS	7	9 9 8 6	17			
22										
23	7									
24		407.30								
25			End of Borehole							
26	8									
27										
28										
29										
30	9									
31										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 7.6 metres.
2. Borehole was recorded as open and 'wet' at depth of 7.0 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

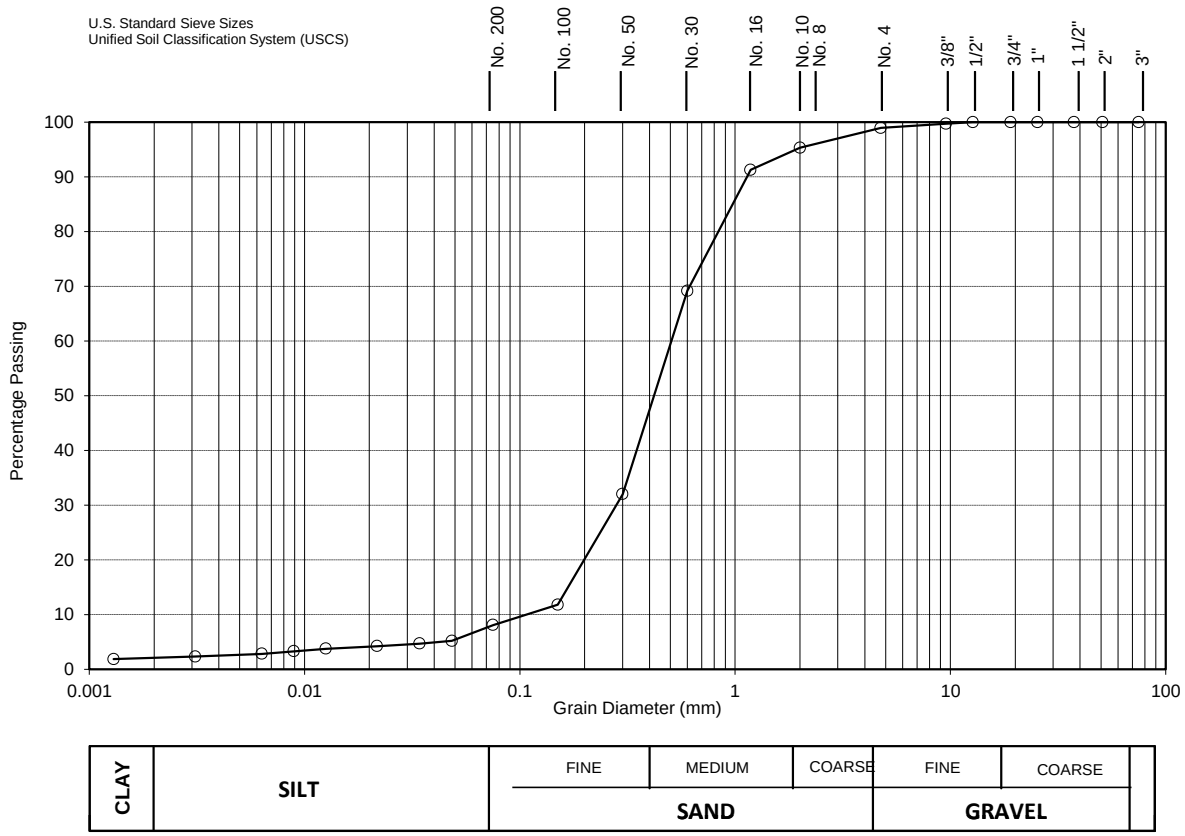
August 6, 2021 - 6.78 metres below ground surface.
August 27, 2021 - 6.96 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



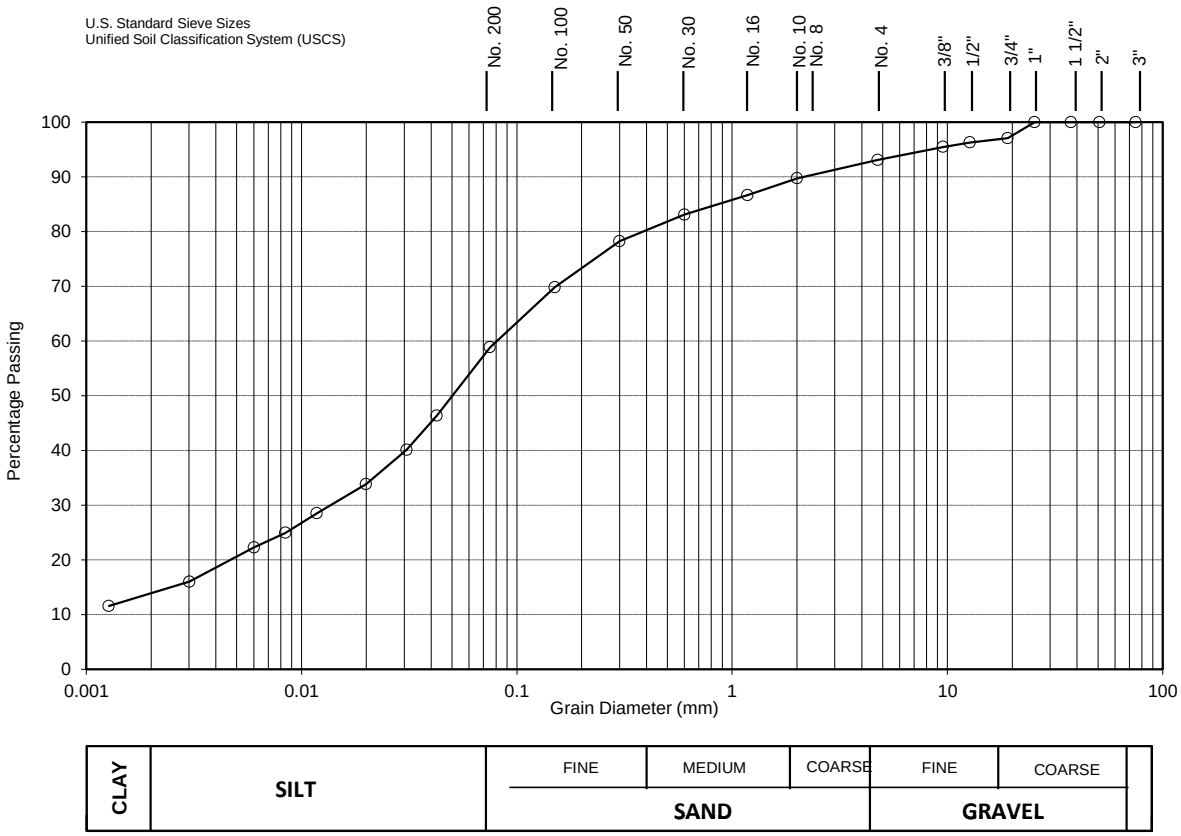
Lab No.:	**21-339**	Notes: Depth: 15'	
Sample No.:	**6**		
Borehole No.:	**2**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt, Clay and Gravel**	
SILT [%]:	**6**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**91**		
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.10**	Coefficient of Uniformity C_U: **5.1**	Coefficient of Curvature C_C: **1.5**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



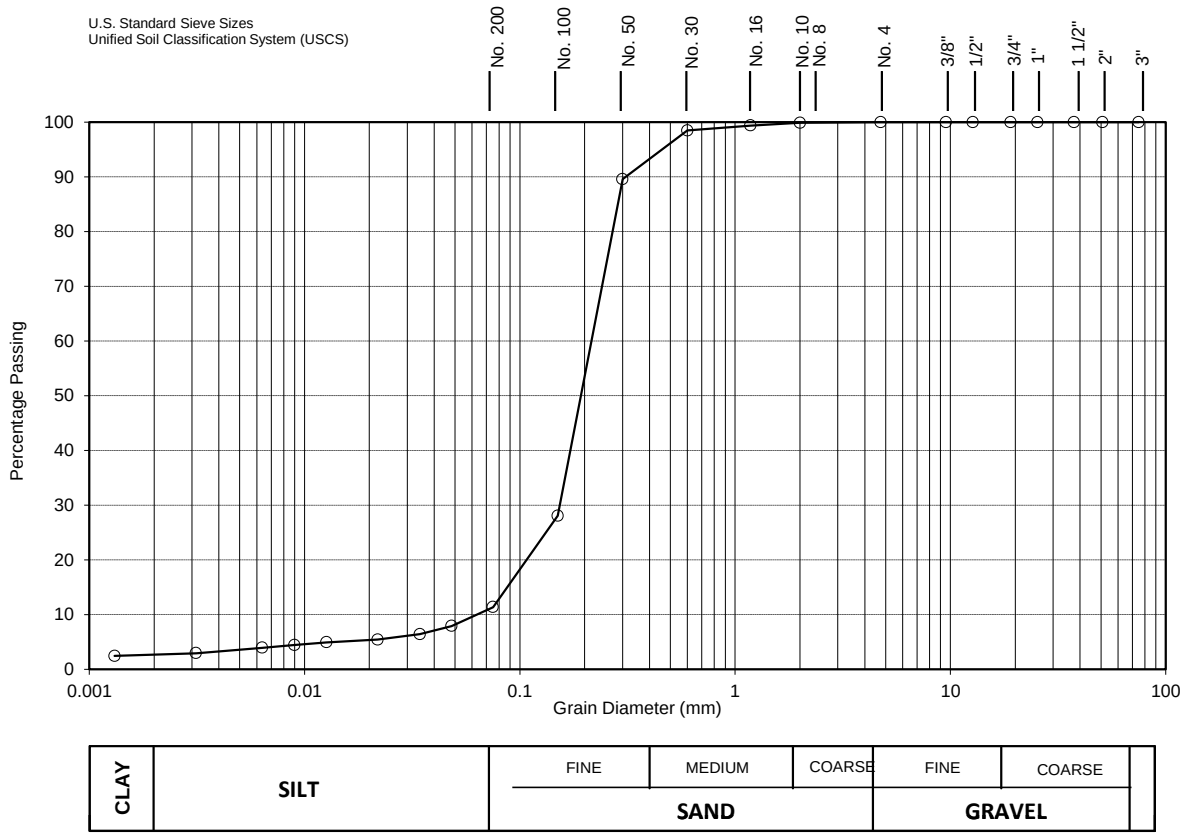
Lab No.:	**21-338**	Notes: Depth: 5'	
Sample No.:	**3**		
Borehole No.:	**3**		
CLAY [%]:	**14**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**45**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**34**		
GRAVEL [%]:	**7**	Estimated Infiltration Rate [mm/hr] : **< 10**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.00100**	Coefficient of Uniformity C_U: **80.0**	Coefficient of Curvature C_C: **2.1**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses

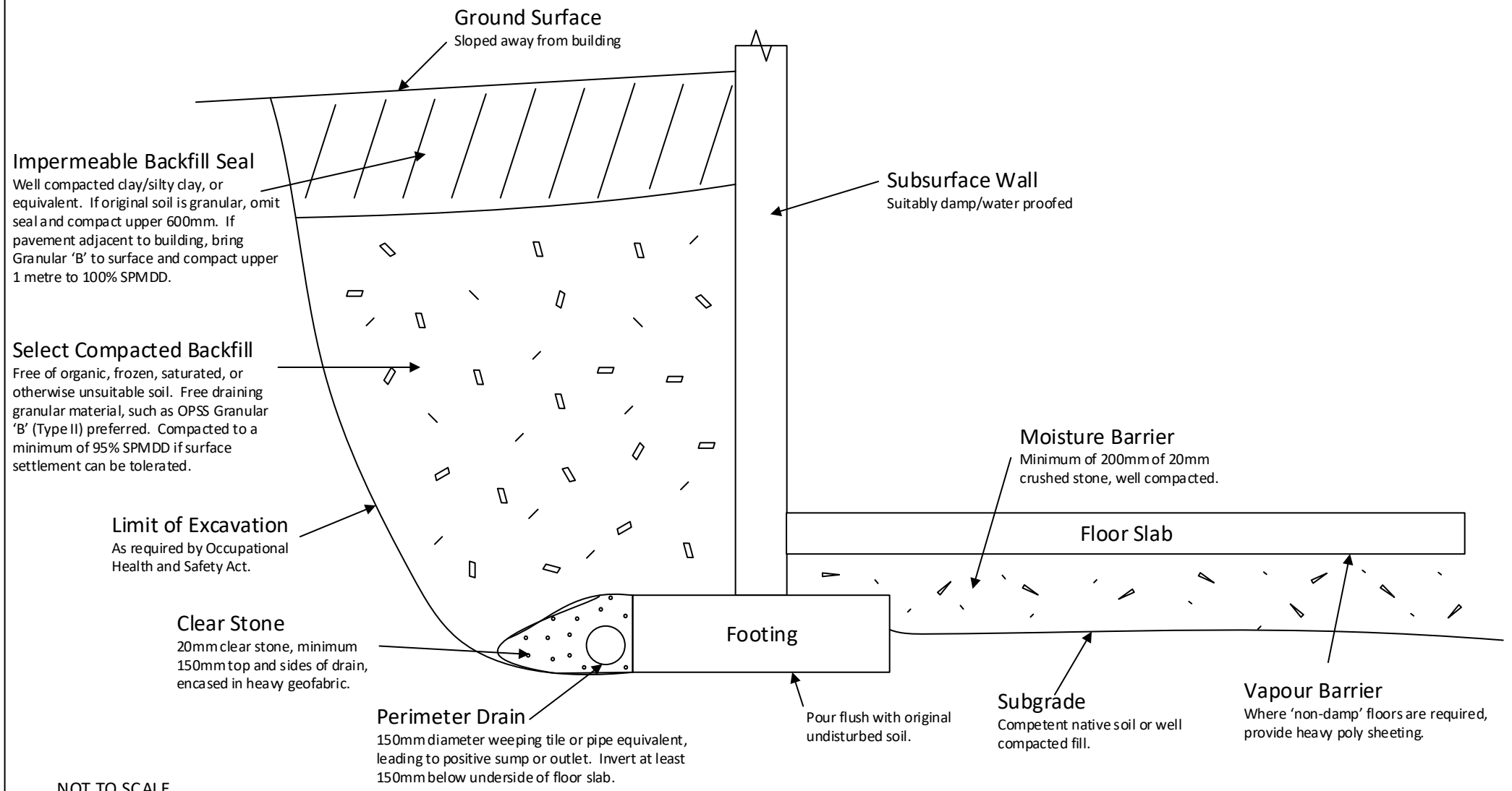


Lab No.:	**21-337**	Notes: Depth: 7.5'	
Sample No.:	**4**		
Borehole No.:	**4**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt and Clay**	
SILT [%]:	**9**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**89**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **100 to 150**	Estimated Permeability, k [cm/s] **10^{-3} to 10^{-2}**
D_{10} (Effective Diam. in mm):	**0.0600**	Coefficient of Uniformity C_U: **3.7**	Coefficient of Curvature C_C: **1.9**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**



NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 301951-G
Date:	September 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455
Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951A-G October 14, 2021

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

PRELIMINARY GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
7581 SIDEROAD 15
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your authorisation and subsequent discussions with Mr. Michael DeBiasio, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P301951, dated July 1, 2021, later revised and confirmed through email communication on August 3, 2021. This report should be read in conjunction with the formal report for the Clayton Lands to the west SM 301951B-G, dated October 5, 2021. Our comments and recommendations based on our findings at the seven [7] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development consisting of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services, located at 7581 Sideroad 15 [Gibson Farms] in Elora, Ontario. The purpose of this preliminary geotechnical investigation work was to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

SOIL-MAT ENGINEERS was provided with a sub-watershed study that encompasses the surrounding area – including the subject site – prepared by Aquafor Beech Limited, dated February 2008. The results of this investigation have been considered in preparation of this geotechnical report.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation. It is noted that SOIL-MAT ENGINEERS has also conducted Phase One and Two Environmental Site Assessments (ESAs) for the subject site, which have been reported under a separate cover.

2. PROCEDURE

A total of seven [7] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on August 5 and 6, 2021 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 2.1 and 5.2 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Upon completion of drilling, a groundwater monitoring well was installed at Borehole No. 4 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 metres. The monitoring well was encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite ‘hole plug’ to the surface and fitted with a protective steel ‘stick up’ casing. The remaining boreholes were backfilled in general accordance with

Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at the borehole locations has been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 7, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is currently an undeveloped agricultural property located at 7581 Sideroad 15 in Elora, Ontario. There is a single-family dwelling and an existing barn structure near the middle of the site, setback approximately 200 metres from Sideroad 15. The parcel is bordered to the south by an existing agricultural field, to the east by Gerrie Road, to the north by Sideroad 15, and to the west by Irvine Street, assuming a north-south orientation of Irvine Street. The field is bisected by a tributary of the Irvine Creek – a ditch-like drainage feature – at the north eastern portion of the site. West of the tributary, the two parcels generally slope down to the north, with a relief of approximately 6 metres, as measured across the boreholes. The grade is relatively flat and even with Gerrie Road on the east side of the tributary descending towards the creek with an approximate relief of 15 metres measured across the boreholes.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 150 to 250 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term 'topsoil' has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life. Given the property has been historically used for agricultural purposes the upper levels of the soils would be expected to have a reworked nature resulting in more variable depths of topsoil over the site. As such, it is recommended that a conservative approach be taken when estimating topsoil quantities across the site for stripping, i.e. account for slightly greater stripping depth than those specifically noted at the borehole locations.

Sandy Silt/Clayey Silt

Native sandy silt/clayey silt was encountered beneath the topsoil in the majority of the boreholes, and beneath a sand deposit in Borehole Nos. 3 and 6. The fine-grained granular to slightly cohesive soils were brown in colour, transitioning to grey below about 2.5 metres in Borehole No. 2, with trace to some clay and gravel, with a notable increasing clay content with depth in some of the boreholes. The native sandy silt/clayey silt soils were generally noted to have a reworked or weathered appearance in the upper levels, and were generally noted to have a loose to compact state. The sandy silt/clayey silt deposit was present to depths of approximately 1.1 to 1.9 metres in Borehole Nos. 1 and 4, and was proven to termination at depths of approximately 2.1 to 3.7 metres below the existing ground surface in Borehole Nos. 2, 3, 5, 6, and 7.

Sand

A native sand deposit was encountered beneath the topsoil in Borehole Nos. 3 and 6, and beneath the sandy silt/clayey silt layer in Borehole Nos. 1 and 4. The fine to medium grained soils were brown in colour, with a noted to transition to grey at a depth of approximately 4.8 metres in Borehole No. 4, contained trace amounts of clay, silt, and gravel, and was generally in a compact to dense state. The native sand soils were proven to a depth of approximately 1.5 and 1.8 metres within Borehole Nos. 3 and 6, and proven to termination at depths of between approximately 3.6 and 5.2 metres below the existing ground surface in Borehole Nos. 1 and 4.

Grain Size Analyses

Grain size analyses were conducted on three [3] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH3 SS3	1.5 m	22	44	28	6	10^{-7}	<10
BH4 SS5	3.0 m	2	7	80	11	10^{-2}	150 to 300
BH6 SS5	3.0 m	11	44	36	9	10^{-6}	10 to 15

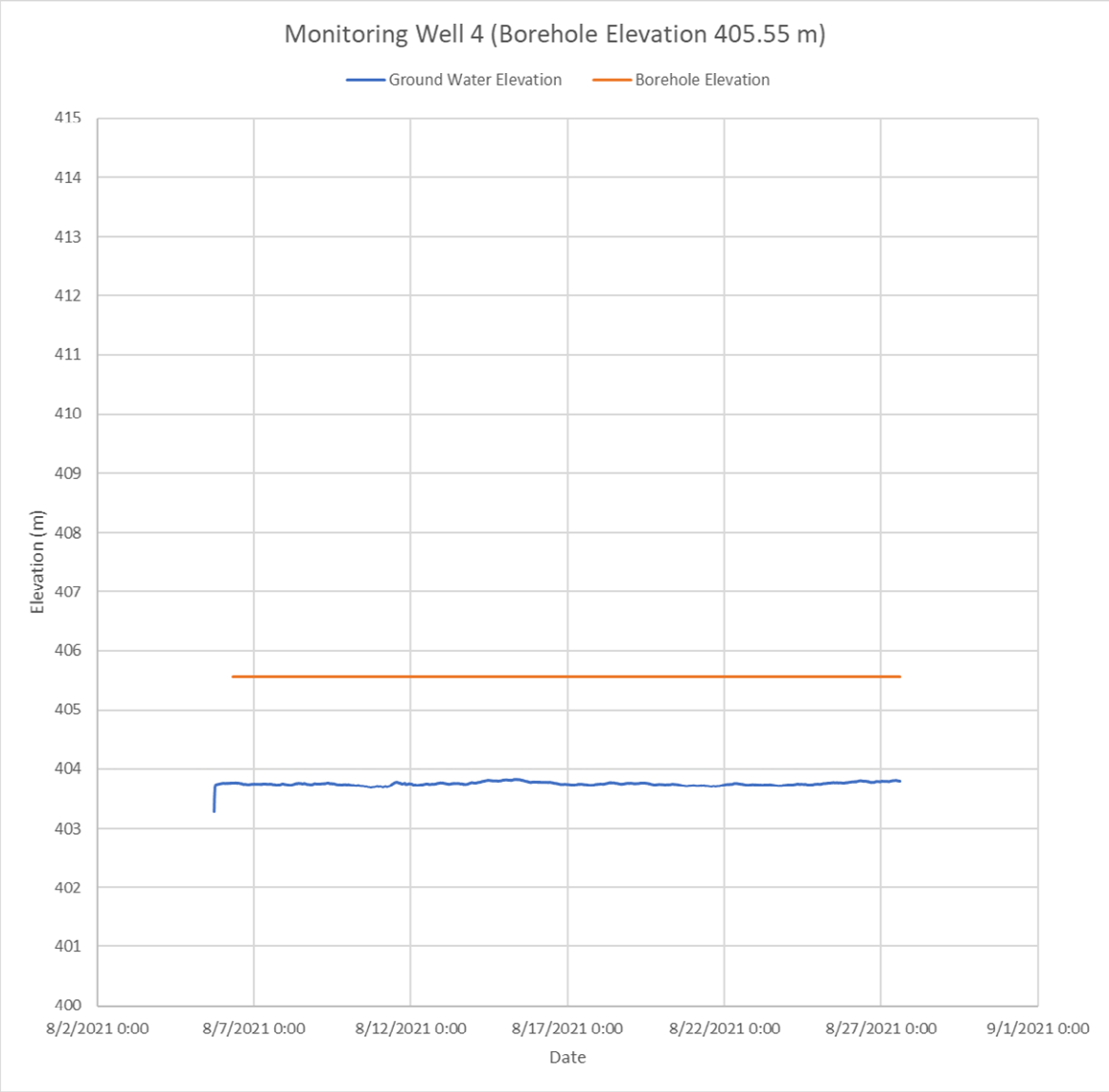
The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines at depth. The sandy silt/clayey silt in the upper levels would generally behave as a low permeable material, but would not be considered as an impermeable material, and would be highly frost susceptible. The underlying sand deposit is highly permeable, relatively free draining.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

Groundwater Observations

Borehole No. 6 was noted to have 'caved' to a depth of approximately 2.4 metres and 'wet' at a depth of approximately 2.0 metres, while Borehole No. 4 was noted to be open and 'wet' at a depth of 2.7 metres upon completion. Borehole Nos. 1 was noted to have cave to a depth of 1.5 metres, and dry upon completion. The remainder of the boreholes were noted as being open and 'dry' [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, a monitoring well was installed at Borehole No. 4, to allow for future measurements of the static groundwater level. Furthermore, it is noted that 3 additional monitoring wells were installed on the abutting parcel of land to the west, the work of which was completed in concert with the fieldwork on the Gibson Farm lands. A data logger was installed in Borehole No. 4 to allow for continuous monitoring of the groundwater level between August 6 and August 27, 2021, the readings of which have been illustrated in the following graph:


Monitoring Well 4 (Borehole Elevation 405.55 m)
Ground Water Elevation
Borehole Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
406
405
404
403
402
401
400
8/2/2021 0:00
8/7/2021 0:00
8/12/2021 0:00
8/17/2021 0:00
8/22/2021 0:00
8/27/2021 0:00
9/1/2021 0:00
Date

In addition to this, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on August 6 and August 27, 2021 and have been summarized in the following chart:

TABLE B
SUMMARY OF GROUNDWATER LEVELS

Monitoring Well	Ground Surface Elevation [m]	August 6, 2021		August 27, 2021	
		Groundwater Depth [m]	Groundwater Elevation [m]	Groundwater Depth [m]	Groundwater Elevation [m]
MW4	405.55	2.74	402.81	1.75	403.80

The groundwater level observed at this monitoring well location, as well as the monitoring wells installed on the adjacent property [summarised in our geotechnical report SM 301951B-G under a separate cover] indicate a groundwater level on the order of approximately 2 to 7 metres below the existing grade, at an elevation of roughly 403.8 to 410.5 metres, varying with the physical topography, and shallower closer the tributary. As noted above this estimate is based on the groundwater data collected from Borehole No. 4, as well as the monitoring wells installed on the Clayton Lands to the west. There is an evident drop in the groundwater level from southwest to northeast, generally following the topography towards the Irvine Creek Tributary. It is noted that the groundwater level would be expected to fluctuate seasonally. It is also noted that the observed groundwater levels may be influenced by more localised shallower 'perched' deposits in more permeable seams within the sandy silt/clayey silt. Further long-term monitoring may allow for a more accurate estimate of the static groundwater level, including more data during the 'wet' and 'dry' seasons.

As noted above, SOIL-MAT ENGINEERS was also provided a sub-watershed study by Aquafor Beech, which included a number of monitoring wells to the east to monitor the groundwater elevations. The conditions and groundwater levels described in this geotechnical report are consistent with those encountered during our fieldwork as described above.

General Soil Conditions

As noted above the subsurface conditions are generally characterized as sandy silt/clayey silt deposit in the upper levels, underlain by a permeably cohesionless sand deposit. The grain size analyses indicate the sandy silt/clayey silt soils to have 10 to 20 percent clay content, lending a slightly cohesive characteristic. The sandy silt/clayey silt soils are relatively consistent in terms of its constituents but are noted to contain an increasing clay content with depth in some of the boreholes, as noted above. Where the material transitions into a sand the native soils are generally fine in gradation in the upper levels, becoming medium to coarse with depth. As demonstrated above the subsurface conditions exhibit a relatively inconsistent layered structure across the large area, but can be generally distinguished by a layer of slightly cohesive sandy silt overlying a cohesionless sand. The conditions will be best assessed during excavations on an area-by-area basis. As such it may also be prudent to advance a series of test excavations in the area of proposed deeper excavations and/or stormwater management ponds to confirm soil composition and groundwater conditions in the area of deep excavations.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 5 metres below the existing grade. Excavations through the native sandy silt/clayey silt and sand soils, as well as any engineered fill placed as part of site grading works, should be relatively straightforward, with the sides remaining stable for short construction periods at inclinations of up to 45 degrees to the horizontal, and possibly steeper depending on moisture condition and clay content. Where wet or more permeable seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to ‘slough in’ to as flat as 3 horizontal to 1 vertical, or flatter.

Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native sandy silt/clayey silt and sand soils would generally be considered a Type 2 or 3 soil, depending on the moisture content and relative compact to dense condition, as outlined in the Ontario Health and Safety Act III – Excavations. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above, the groundwater level varies between depths of approximately 2 to 7 metres below the existing grade, roughly elevation 403.8 to 410.5 metres. The majority of excavations are anticipated to be above the groundwater level. Nevertheless, some infiltration of water from more permeable seams and surface runoff into the open excavations should be anticipated. Such infiltration should be readily controlled using typical construction dewatering methods. 'Perched' deposits of water may be encountered within more permeable pockets, which may require greater initial dewatering efforts and instability in the excavations, especially during the 'wet' times of the year. Where excavations extend to greater depths, to and below the groundwater level, especially within the sand deposit, the rate of infiltration will be much greater and additional pumping or more sophisticated dewatering methods should be anticipated. In this regard, ongoing monitoring of the groundwater levels, and careful review of the design servicing elevations, is recommended. As noted above, the advancement of test excavations in the area of proposed deep services and stormwater management ponds would allow for a first hand look at how groundwater levels may affect such excavations. More water should be expected when connections are made to existing services. Surface water should be directed away from the excavations.

The base of the excavations in the native soils, above the groundwater level, encountered in the boreholes should generally remain firm and stable. Where excavations extend to greater depths, to or below the groundwater level, or where 'perched' water is encountered, some base instability should be expected, especially during 'wet' times of the year. This will be especially likely in the high silt content sandy silt/clayey silt soils. Areas of base instability may be stabilised with the placement of additional bedding or ballast stone, the use of coarser stone material, etc. The appropriate measures are best assessed based on the actual conditions at the time of construction. With a firm and stable base condition, stabilised where warranted, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or County of Wellington should be satisfactory. The bedding should be well compacted to provide sufficient support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations

extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist primarily of the sandy silt/clayey silt and sand soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

It is noted that the sandy silt/clayey silt soils encountered are not considered to be free draining and should not be used where this characteristic is necessary. It is also noted that these fine grained granular soils will present difficulties in achieving effective compaction when they become 'wet' of optimum, and where access with compaction equipment is restricted. The sandy silt/clayey silt soils encountered are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content, with some noted 'wet' seams. Some moisture conditioning will be required depending upon the weather conditions at the time of construction. It is noted that these silty soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas. The sand soils are generally well draining, and tend to be near optimum moisture content. At depth, approaching or below the water level, the sand soils will be expected to be saturated, requiring time to drain excess moisture or other drying efforts in order to achieve effective compaction.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is

well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The fine grained to cohesive soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 95 per cent of its standard Proctor maximum dry density [SPMDD], and to 100 per cent of its SPMDD in the upper 1 metre below the design subgrade level. All structural fill should be compacted to 100 per cent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc. in the native competent soils, stabilised where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if compaction of the fill around these structures is not adequate, causing settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining, non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density. A geofabric separator

should be provided between the free draining material and the on-site silt soils to prevent the intrusion of fines.

The thrust blocks in the native soils or engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~2,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, 'rip rap', etc.] 'punched' into the soft areas.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock) sub-base material. It is also important

that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. A typical generic pavement structure would consist of 350 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 60 millimetres of HL8 or HL4 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete. Where a pit run, Granular B Type I, aggregate is utilised in the granular base, it should be increased to a minimum thickness of 450 millimetres. It is our opinion that this design is suitable for use on a residential roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base course material is placed. Notwithstanding, the pavement structure should conform to the relevant County of Wellington requirements where they are to be assumed by the County. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or County of Wellington requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. A typical recommended light duty pavement structure for residential driveways would

consist of a minimum of 200 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE AND TOWNHOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings, below any fill, organic, or otherwise unsuitable materials. Bearing pressures of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils. In areas where 'wet' seams are present, or the native soils present in less compact condition, reduced bearing values of 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] are recommended. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete.

In the event that site grading works result in engineered fill below founding elevations, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 percent standard Proctor maximum dry density, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. The design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for variable support and loading conditions. The use of nominal reinforcement is considered good construction practice as it will act to reduce the potential for cracking in the foundation walls due to minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This

reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimeters from the top of the foundation walls at a minimum, depending on ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

All basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an 'oversized' reservoir and a 'back-flow' prevention valve so that the sump pump will not cycle repeatedly within short time periods.

All footings exposed to the environment must be provided with a minimum of 1.2 meters of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development will consist of single family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend to up to approximately 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, however further groundwater monitoring may be conducted to more accurately assess the static groundwater level.

The short term excavations for the proposed servicing are generally anticipated to extend into the sandy silt/clayey silt and sand soils to depths above the static groundwater level. Such excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. During wet times of year, some instability of the excavations may be experienced. The rate of dewatering would be expected to be below 50,000 L/day, and certainly below 400,000 L/day, such that an EASR or PTTW should not be required. Where deeper excavations are identified to be required, extending below the static groundwater level, the need for temporary dewatering controls during construction should be more closely evaluated. Depending on the proposed depths of excavations for the proposed footings and site services, the rate of dewatering could approach or be greater than 50,000 L/day, potentially requiring an EASR. As such, once available, the site servicing and grading plans detailing depths of construction should be forwarded onto our office for further review and comments.

The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions. As such, the provision of clay ‘cut-offs’ within trench backfill is not expected to be required.

Excavations for the proposed basement levels should be well above the groundwater level, and so would not be expected to require significant ongoing groundwater control, other than typical perimeter weeping tile and sump pump as noted above.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such is in 'dry' ponds, infiltration galleries, etc.

Based on our observations and details of the proposed development, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area, and further detailed hydrogeological assessment is not considered warranted at this time. As the detailed design of the proposed development proceeds, this office should be consulted to review the hydrogeological conditions and assess the potential for concern, or need for additional study.

10. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

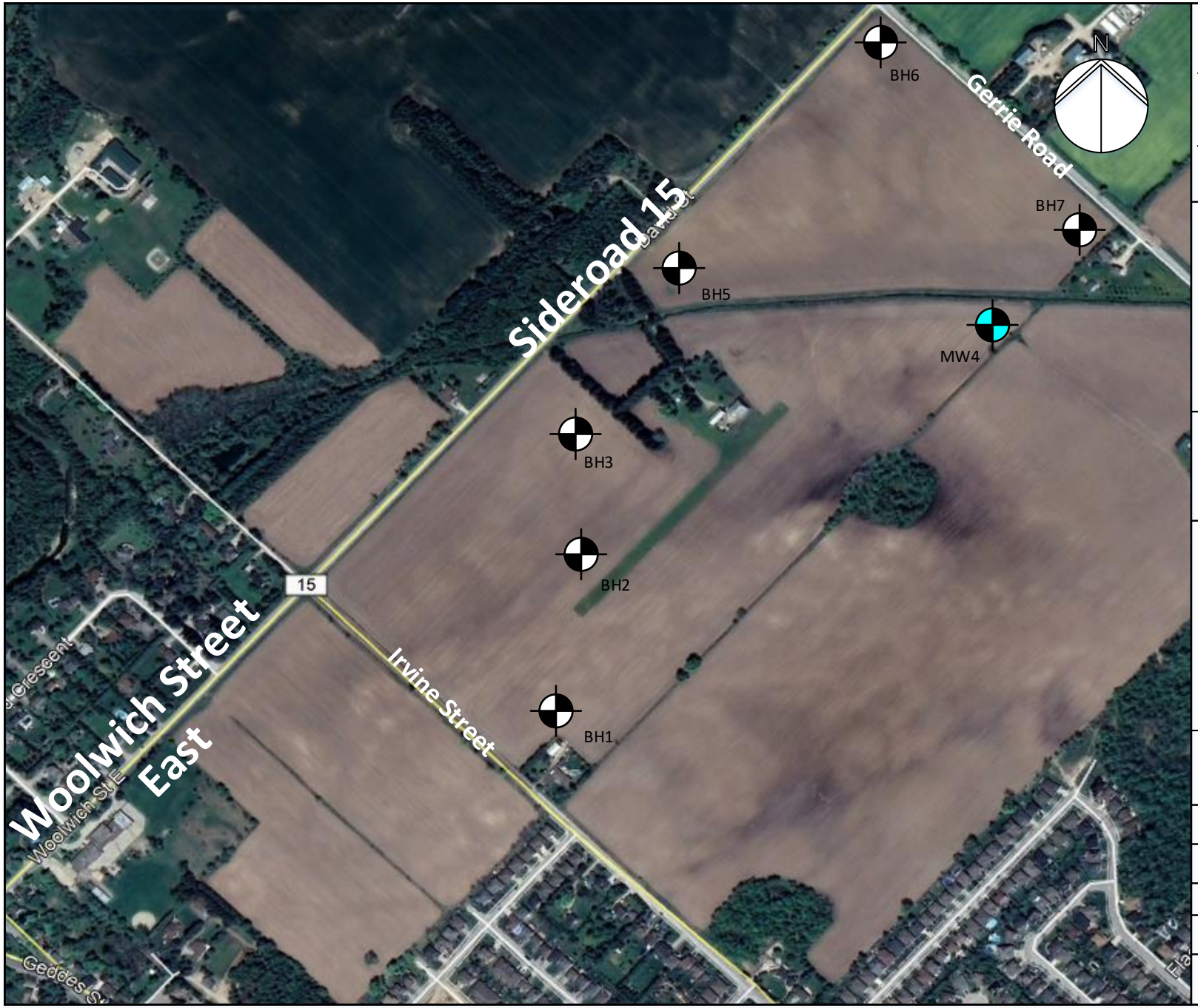
Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Scott Wylie, B.Eng., EIT.

Ian Shaw, P. Eng.
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 7, inclusive
Grain Size Analyses
Drawing No. 2, Recommended Design Requirements for Basement Construction

Distribution: Cachet Developments [pdf]



LEGEND

Borehole Location
BH#

Monitoring Well Location
MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301951A-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Sideroad 15
Elora, Ontario

Borehole Location Plan

Project No. SM 301591A-G

Date: September 2021

Drawn: SW	Checked: KR

SM 301591A-G Borehole Location Plan

Drawing No. 1

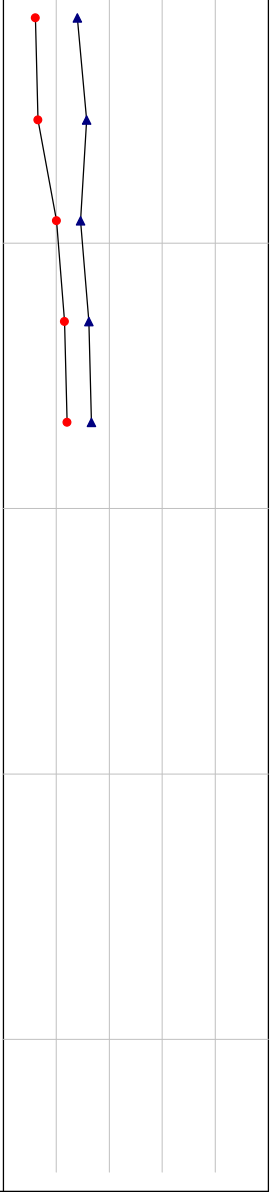
Log of Borehole No. 1

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838268
E: 545454

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		413.05		Ground Surface								
0	0	412.80		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	4 5 7 6	12			
3	1	411.90		**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, compact.		SS	2	6 7 6 6	13			
				Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, compact.		SS	3	5 8 12 14	20			
9	3					SS	4	12 10 13 10	23			
11		409.40				SS	5	6 11 13 15	24			
12	4			End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as dry and caved to a depth of 1.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

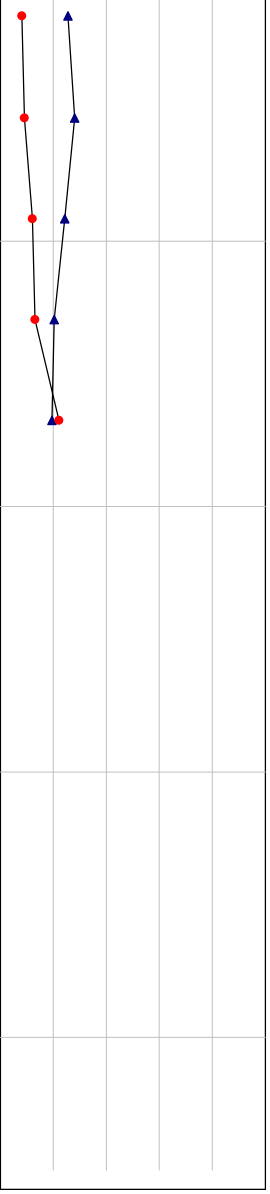
Log of Borehole No. 2

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838469
E: 545516

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	415.00	Ground Surface								
0 / 0	414.80	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	2 4 4 5	8			
3 / 1	413.50	**Sandy Silt** Brown, reworked in upper levels, trace clay, silt, and gravel, loose.		SS	2	4 3 6 8	9			
7 / 2	412.50	**Clayey Silt** Brown, trace to some sand and gravel, stiff to very stiff.		SS	3	6 6 6 7	12		3.5	
8 / 2		Transition to grey.		SS	4	3 7 6 7	13		4.0	
11 / 3	411.30			SS	5	9 7 15 18	22		>4.5	
12 / 4		End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 3

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838652
E: 545505

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
		409.93		Ground Surface									
0	0			**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4 6 10 8	16				
3	1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, compact.		SS	2	6 10 10 7	20				
6		408.10				SS	3	6 8 10 11	18				
7	2	407.80		**Sandy Silt** Brown, trace to some gravel and clay, compact.									
				End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838792
E: 546044

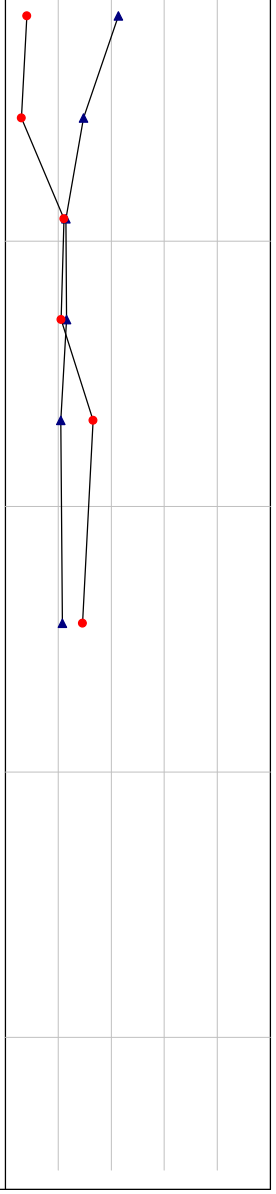
Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		405.55	Ground Surface							
0	0	405.35	**Topsoil** Approximatelty 200 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay, trace gravel, reworked in upper levels, loose.	SS	1	2 3 5 6	8			
2				SS	2	4 3 3 5	6			
3	1									
4										
5										
6		403.70	**Sand** Brown, trace clay, silt, and gravel, medium to coarse gradation, wet, compact to dense.	SS	3	8 10 12 15	22			
7	2									
8				SS	4	8 10 11 10	21			
9										
10	3			SS	5	8 10 23 30	33			
11										
12										
13	4									
14										
15		400.70								
16	5	400.40	Transition to grey.	SS	6	3 11 18 23	29			
17			End of Borehole							
18										
19										
20	6									
21										
22										
23	7									
24										
25										
26	8									
27										
28										
29	9									

Well Data

SAMPLE

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 5, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 2.74 metres below ground surface.

August 27, 2021 - 1.75 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 5, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 5

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838939
E: 545636

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.10		Ground Surface								
0	0	411.90		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2 4 5 7	9			
3	1			**Sandy Silt** Brown, reworked in upper levels, trace to some clay, increasing clay content with depth, occasional gravel, loose to compact.		SS	2	1 3 3 5	6			
6	2	410.00				SS	3	3 5 7 9	12			
				End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 6

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839162
E: 545871

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	420.91		Ground Surface								
0 / 0	420.70		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	4 4 4 4	8			
3 / 1	419.40		**Sand** Brown, reworked in upper levels, trace rootlets, loose to compact.		SS	2	3 5 6 6	11			
6 / 2			**Sandy Silt** Brown, trace clay, increasing clay content with depth, loose to compact.		SS	3	5 6 6 7	12			
9 / 3					SS	4	3 4 4 4	8			
11 / 3	417.30				SS	5	5 11 10 15	21			
12 / 4			End of Borehole								

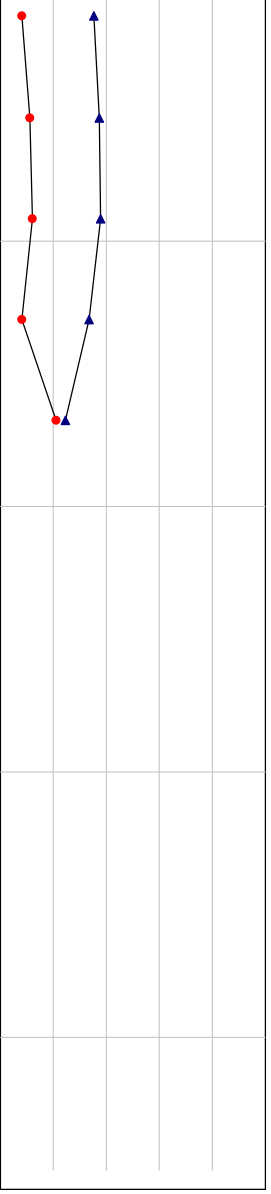
NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as wet at depth of 2.0 metres, and caved to a depth of 2.4 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w%: 10 20 30 40
Standard Penetration Test blows/300mm: 20 40 60 80



Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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130 Lancing Drive, Hamilton, ON L8W 3A1
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E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 7

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838910
E: 546126

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.39		Ground Surface								
0 / 0	408.10		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	3 5 6 7	11			
3 / 1	406.90		**Sandy Silt** Brown, trace rootlets, trace clay, reworked in upper levels, increasing clay content with depth, compact.		SS	2	10 8 10 10	18			
6 / 2			**Clayey Silt** Brown, trace to some sand and gravel, stiff to hard.		SS	3	3 5 6 6	11		2.0	
9 / 3					SS	4	5 7 10 18	17		2.5	
11 / 3	404.70				SS	5	24 36 50/5"	100		>4.5	
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.0 metres.

2. Borehole was recorded as open and dry upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
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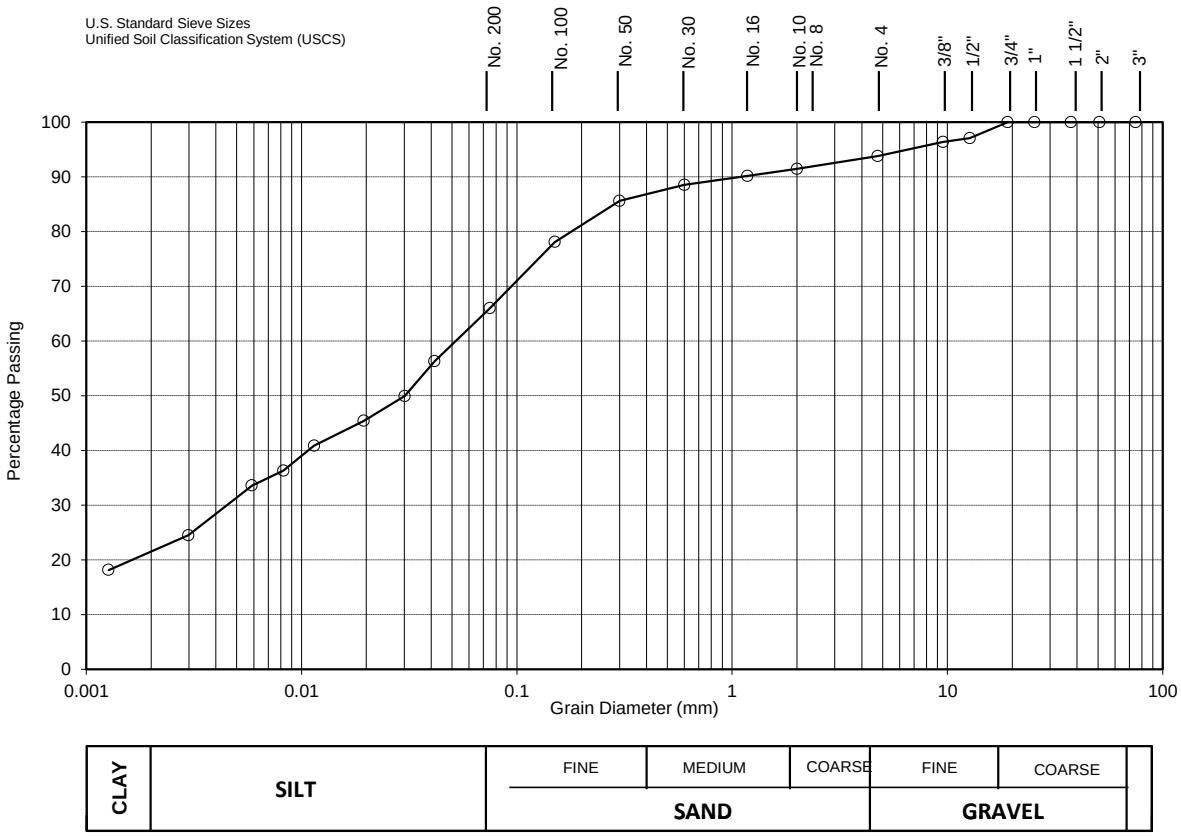
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



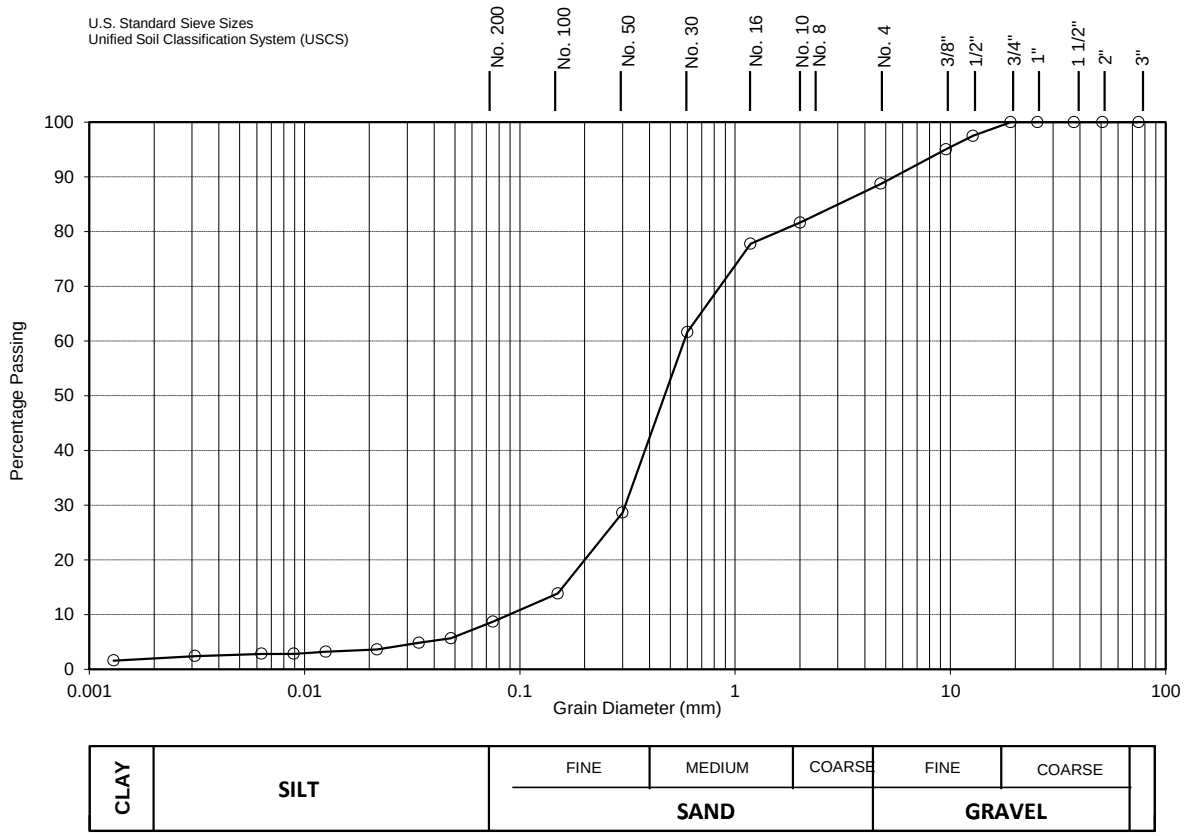
Lab No.:	**21-335**	Notes: Depth: 5'			
Sample No.:	**3**				
Borehole No.:	**3**				
CLAY [%]:	**22**	Soil Description:	**Brown Sandy Silt w/ some Clay and trace Gravel**		
SILT [%]:	**44**		**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**		
SAND [%]:	**28**				
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0005**	Coefficient of Uniformity C_U:	**102.0**	Coefficient of Curvature C_C:	**0.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



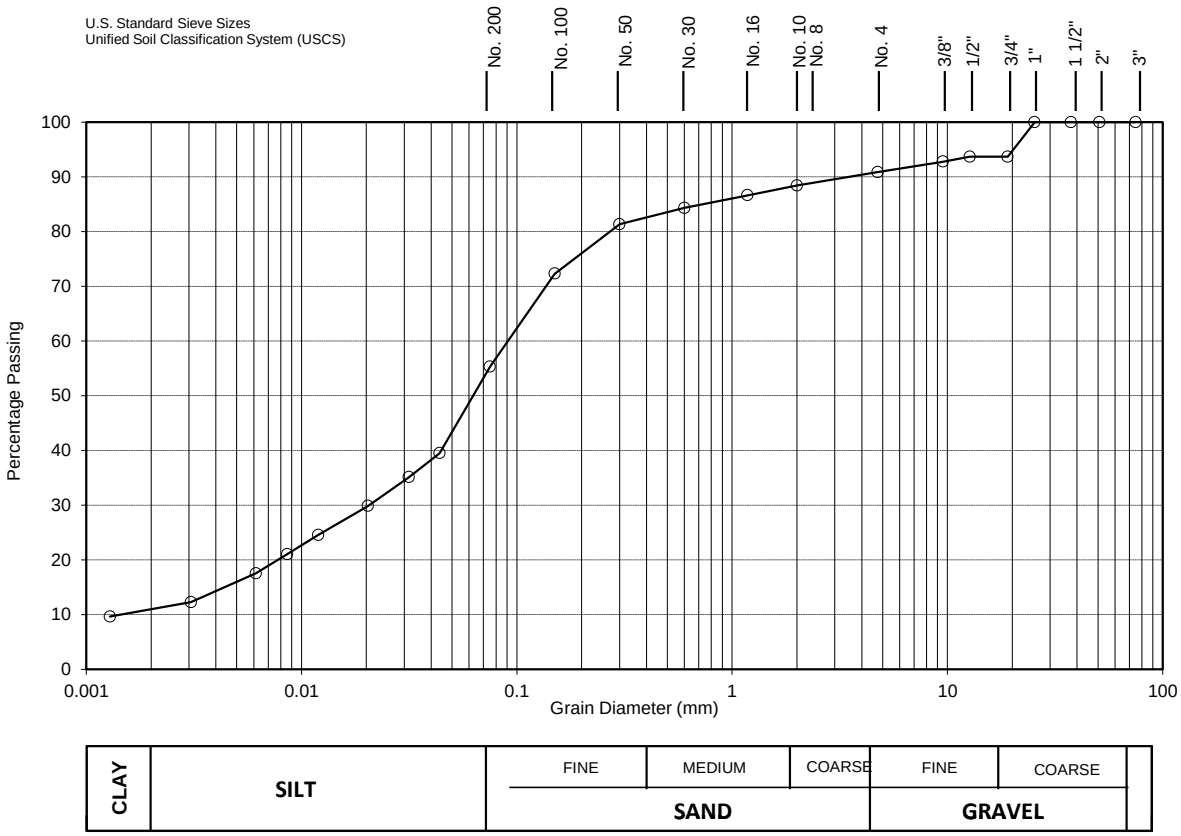
Lab No.:	**21-340**	Notes: Depth: 10'	
Sample No.:	**5**		
Borehole No.:	**4**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ some Gravel and traces of Silt and Clay**	
SILT [%]:	**7**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**80**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.090**	Coefficient of Uniformity C_U: **6.6**	Coefficient of Curvature C_C: **1.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses

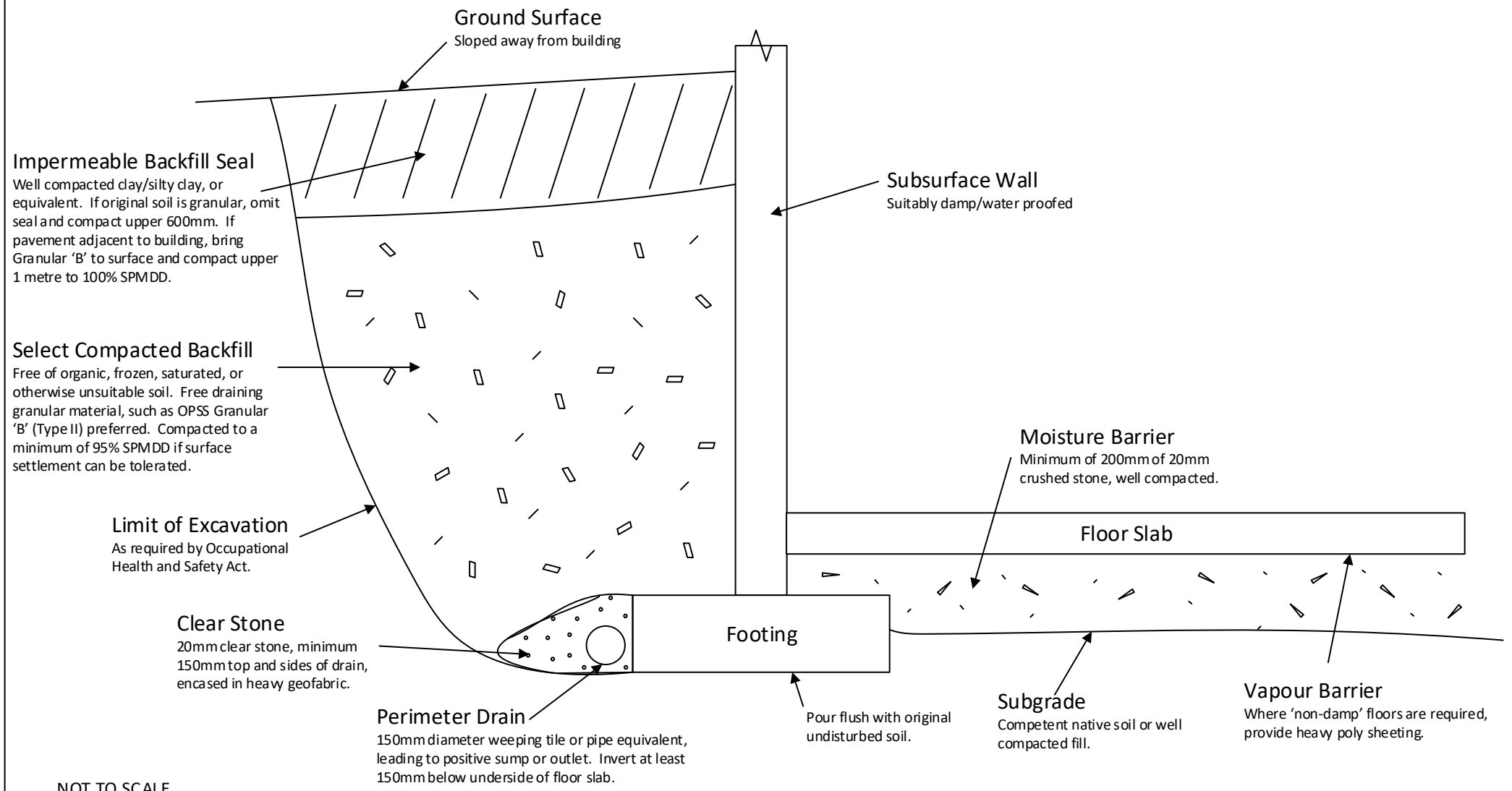


Lab No.:	**21-336**	Notes: Depth: 10'	
Sample No.:	**5**		
Borehole No.:	**6**		
CLAY [%]:	**11**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**44**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**36**		
GRAVEL [%]:	**9**	Estimated Infiltration Rate [mm/hr] : **10 to 15**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0015**	Coefficient of Uniformity C_U: **60.0**	Coefficient of Curvature C_C: **3.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**



NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 301951-G
Date:	September 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

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Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951-G March 11, 2022

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS
PROPOSED RESIDENTIAL DEVELOPMENT
CLAYTON LANDS
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your recent correspondence and discussions, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has prepared the following preliminary hydrogeological considerations memo. These comments are further to our Preliminary Geotechnical and Hydrogeological Investigation reports for the subject lands [SM 301951A-G and SM 301951B-G, dated October 14, 2021], and recent discussions with the design team. It is also noted that further more detailed hydrogeological assessment works are presently underway, and will be formally reported once complete.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development on the Clayton Lands located at 75 Woolwich Street East [Clayton Lands] in Elora, Ontario, along with potential future development on the Elora Sands [Gibson Lands] to the east. The development details are to be established, but are anticipated to consist of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services. The purpose of these preliminary hydrogeological considerations is to provide initial information and comments to support the assessment of site servicing options for the proposed development, from a geotechnical point of view.

2. PROCEDURE

A total of eleven [11] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on August 5 and 6, 2021 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 3.6 and 7.6 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Upon completion of drilling, groundwater monitoring wells were installed at Borehole Nos. 004, 101, 102, and 104 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 to 3.0 metres. The monitoring well was encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite 'hole plug' to the surface and fitted with a protective steel 'stick up' casing. The remaining boreholes were backfilled in general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at the borehole locations has been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 001 to 007, and 101 to 104, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is currently two [2] undeveloped agricultural properties located at 7581 Sideroad 15 and 75 Woolwich Street East in Elora, Ontario. The eastern parcel, 7581 Sideroad 15, is bordered to the south by an existing agricultural field, to the east by Gerrie Road, to the north by Sideroad 15, and to the west by Irvine Street, assuming a north-south orientation of Irvine Street. The field is bisected by a tributary of the Irvine Creek [Nichol Drain] at the north eastern corner of the site. There is also a single-family dwelling and an existing barn structure near the middle of the site, setback approximately 200 metres from Sideroad 15.

The western parcel, located at 75 Woolwich Street East, is bordered to the east by Irvine Street, to the south by Bricker Avenue, to the west by residential dwellings and a public school, and to the north by Woolwich Street East. West of the tributary, the two parcels generally slope down to the north, with a relief of approximately 6 metres measured across the boreholes. The grade is relatively flat and even with Gerrie Road on the east side of the tributary but quickly descends towards it with an approximate relief of 15 metres measured across the boreholes.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 100 to 250 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term ‘topsoil’ has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life.

Sandy Silt/Clayey Silt

Native sandy silt/clayey silt was encountered beneath the topsoil in the majority of the boreholes, and beneath a sand deposit in Borehole Nos. 003, 006, and 002. The fine-grained granular to slightly cohesive soils were brown in colour, transitioning to grey below about 2.5 metres in Borehole No. 002, with trace to some clay and gravel, with a notable increasing clay content with depth in some of the boreholes. The native sandy silt/clayey silt soils were generally noted to have a reworked or weathered appearance in the upper levels, and were generally noted to have a loose to compact state. The sandy silt/clayey silt deposit was present to depths of approximately 0.9 to 2.2 metres in Borehole Nos. 103, 102, 001 and 004, and was proven to termination at depths of approximately 2.1 to 6.1 metres below the existing ground surface in Borehole Nos. 101, 003, 005, 006, 002, and 007.

Sand

A native sand deposit was encountered beneath the topsoil in Borehole Nos. 003, 006, and 104 and beneath the sandy silt/clayey silt layer in Borehole Nos. 103, 102, 001, and 004. The fine to medium grained soils were brown in colour, with a noted to transition to grey at a depth of approximately 4.8 metres in Borehole No. 10, contained trace amounts of clay, silt, and gravel, and was generally in a compact to dense state. The native sand soils were proven to a depth of approximately 1.5 and 1.8 metres within Borehole Nos. 003 and 006, and proven to termination at depths of between approximately 3.6 and 7.6 metres below the existing ground surface in Borehole Nos. 104, 103, 102, 001 and 004.

Grain Size Analyses

Grain size analyses were conducted on six [6] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH003 SS3	1.5 m	22	44	28	6	10^{-7}	<10
BH006 SS5	3.0 m	11	44	36	9	10^{-6}	10 to 15
BH104 SS4	2.3 m	2	9	89	0	10^{-3} to 10^{-2}	100 to 150
BH103 SS3	1.5 m	14	45	34	7	10^{-6}	<10
BH102 SS6	4.6 m	2	6	91	1	10^{-2}	150 to 300
BH004 SS5	3.0 m	2	7	80	11	10^{-2}	150 to 300

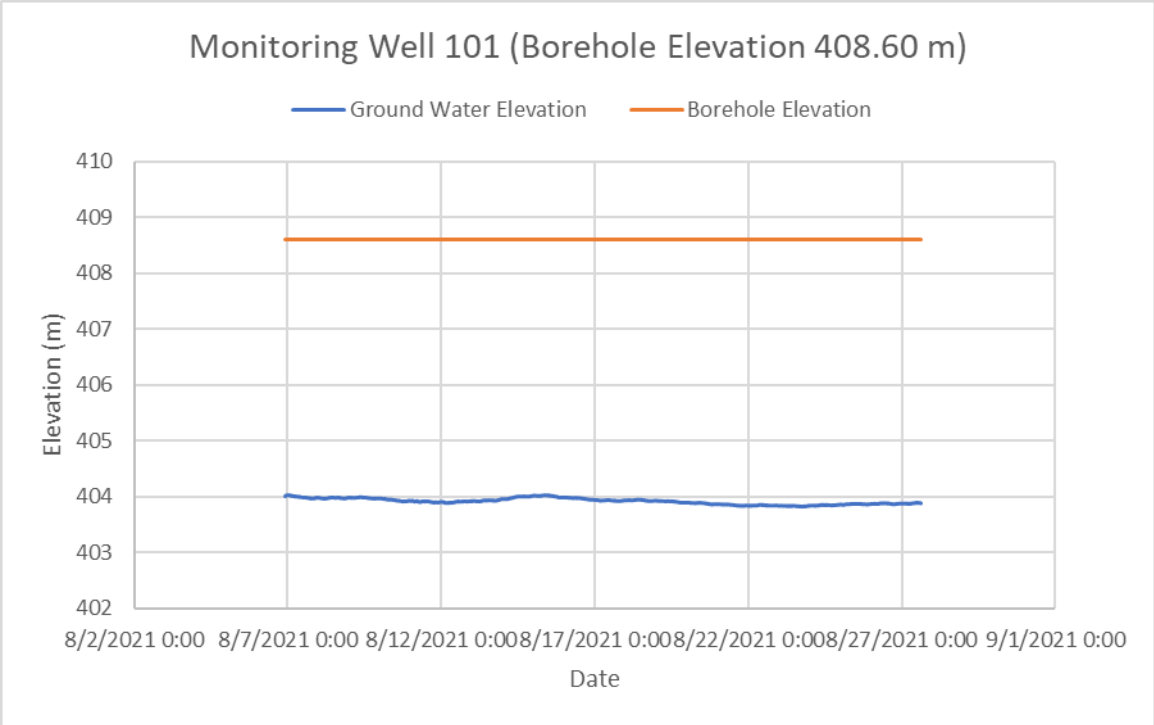
The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines at depth. The sandy silt/clayey silt in the upper levels would generally behave as a low permeable material, but would not be considered as an impermeable material, and would be highly frost susceptible. The underlying sand deposit is highly permeable, relatively free draining.

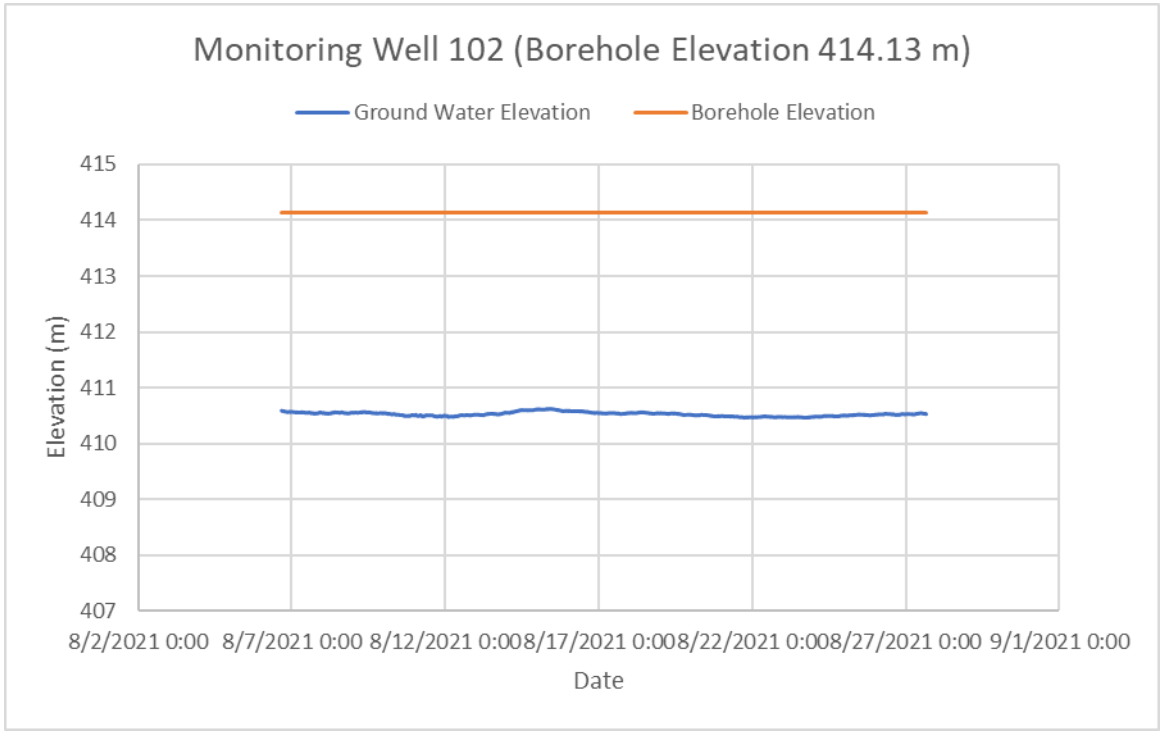
A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

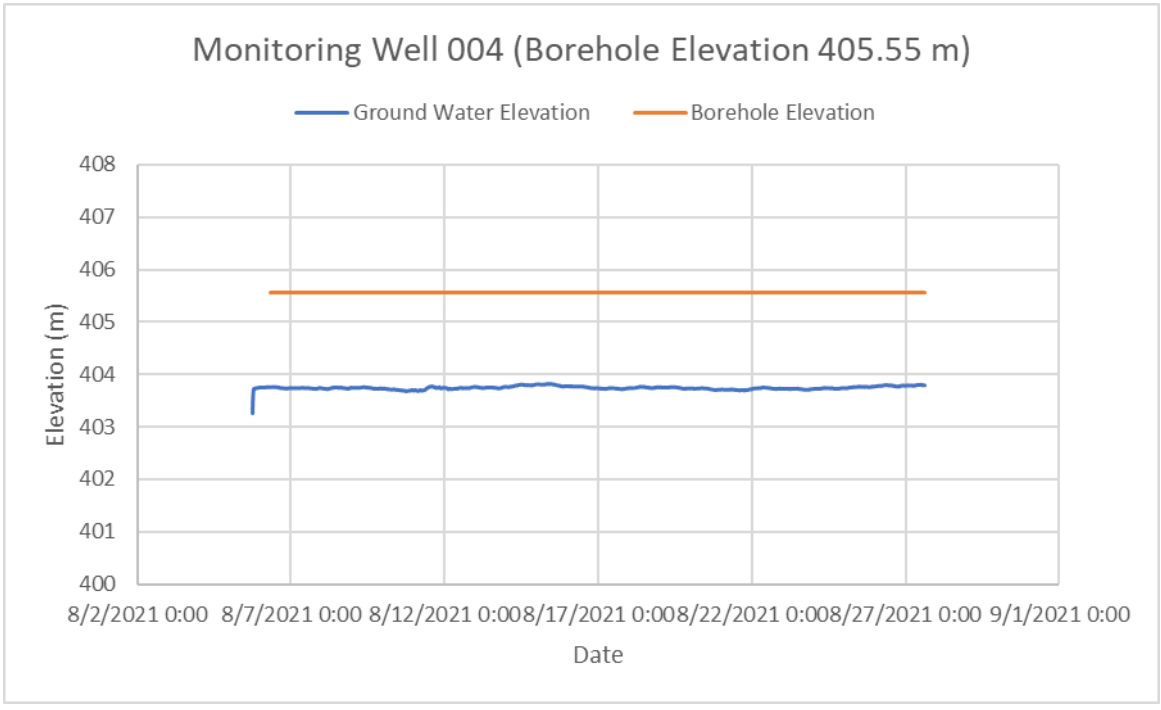
Groundwater Observations

Borehole Nos. 006, 102, and 004 were noted to have 'caved' to depths of between approximately 2.4 to 3.8 metres and 'wet' at depths of between approximately 2.0 to 3.4 metres, while Borehole No. 104 was noted to be open and 'wet' at a depth of 7.0 metres upon completion. Borehole Nos. 103 and 001 were noted to have cave to depths of 2.7 and 1.5 metres, respectively, and dry upon completion. The remainder of the boreholes were noted as being open and 'dry' [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, a monitoring well was installed at Borehole Nos. 101, 102, 104, and 004, to allow for future measurements of the static groundwater level. A data logger was installed in Borehole Nos. 101, 102, and 004 to allow for continuous monitoring of the groundwater level between August 6 and August 27, 2021, the readings of which have been illustrated in the following graphs:




Monitoring Well 102 (Borehole Elevation 414.13 m)
Ground Water Elevation
Borehole Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
8/2/2021 0:00
8/7/2021 0:00
8/12/2021 0:00
8/17/2021 0:00
8/22/2021 0:00
8/27/2021 0:00
9/1/2021 0:00
Date


Monitoring Well 004 (Borehole Elevation 405.55 m)
Ground Water Elevation
Borehole Elevation
Elevation (m)
408
407
406
405
404
403
402
401
400
8/2/2021 0:00
8/7/2021 0:00
8/12/2021 0:00
8/17/2021 0:00
8/22/2021 0:00
8/27/2021 0:00
9/1/2021 0:00
Date

In addition, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on August 6 and 27, 2021 and February 23, 2022. These have been summarized in the following chart:

TABLE B
SUMMARY OF GROUNDWATER LEVELS

	MW 101		MW 102		MW 104		MW 004	
Surface Elevation [m]	408.60		414.13		414.87		405.55	
	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.
Aug 6, 2021	4.78	403.82	3.58	410.55	6.78	408.09	2.74	402.81
Aug 27, 2021	4.71	403.89	3.61	410.52	6.96	407.91	1.75	403.80
Feb 23, 2022	4.31	404.29	3.50	410.63	6.83	408.04	1.33	404.22

The groundwater level observed indicates a stabilized groundwater level on the order of approximately 2 to 7 metres below the existing grade, at an elevation of roughly 403.8 to 410.5 metres, varying with the physical topography. There is an evident drop in the groundwater level with a groundwater flow direction of NNE, generally following the topography towards the Irvine Creek Tributary. The approximate groundwater contours are illustrated in the attached Drawing No. 2.

Given the time of year of monitoring, the observed levels in August of 2021 would be considered reasonably representative of a seasonal ‘low’. The readings in February show seasonal fluctuation, but would not be considered representative of the seasonal ‘high’. However, the present data does provide an indication that the static groundwater level remains relatively steady over the year, with seasonal fluctuations on the order of perhaps 0.5 to 1.0 metre.

General Discussion of Subsurface Conditions

As noted above the subsurface conditions are generally characterized as sandy silt/clayey silt deposit in the upper levels, underlain by a permeably cohesionless sand deposit. The static groundwater level is within the permeable sand deposit, generally following the topography dropping to the north down to the Irvine Creek tributary. Representative geological cross sections are illustrated in Drawing Nos. 3, 4 and 5, attached.

4. PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development is anticipated to consist of single family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend up to approximately 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, generally 3.5 to 7 metres over the Clayton lands presently proposed for development. The groundwater level is shallower to the east, approaching the Irvine Creek tributary, generally following the drop in topography toward the creek.

These conditions, with relatively permeable soil conditions at depth, and groundwater at sufficient depth, are well suited to proposed development. Site earthworks and servicing should be readily designed to avoid or limit encountering the natural groundwater level and thus minimise any potential interaction with the groundwater. The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions. The exception might be deeper trunk sewers, which would warrant closer assessment as the detailed design proceeds. As noted above, additional detailed hydrogeological assessment work is presently underway to help further inform the design and construction.

The short-term excavations for the proposed servicing are generally anticipated to extend into the sandy silt/clayey silt and sand soils to depths above the static groundwater level. Such excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. During wet times of year, some instability of the excavations may be experienced. The rate of dewatering would be expected to be below 50,000 L/day for most shallow excavations, and certainly below 400,000 L/day, such that an EASR or PTTW should not be required. Where deeper excavations are identified to be required, extending below the static groundwater level, [i.e. deeper sewer mains, pumping chambers, etc.] the need for temporary dewatering controls during construction should be more closely evaluated. Depending on the proposed depths of excavations for the proposed footings and site services, the rate of dewatering could be

greater than 50,000 L/day, potentially requiring an EASR. As such, once available, the site servicing and grading plans detailing depths of construction should be forwarded onto our office for further review and comments.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible. This would suggest SWM pond as best located to the north of the site, adjacent to Woolwich Street and ideally as far east as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such as in 'dry' ponds, infiltration galleries, etc. As noted above, the sand deposit would have hydraulic conductivity on the order of 10^{-2} to 10^{-3} cm/sec, correlating to design infiltration rates on the order of 100 to 300 mm/hr. The use of infiltration systems could be readily utilised for lot level infiltration of rain water from downspouts, and also within the overall SWM pond.

Based on our present observations and available information, it is not anticipated that the proposed development will have an adverse impact on the groundwater condition in the area. As noted, further detailed hydrogeological assessment is presently underway, and will be formally reported to support the detailed design processes. As the detailed design of the proposed development proceeds, this office should be consulted to review the hydrogeological conditions and assess the potential for concern.

5. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Scott Wylie, B.Eng., EIT.

Ian Shaw, P. Eng., QP_{ESA}
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Drawing No. 2, Groundwater Contour Map
Drawing Nos. 3, 4 and 5, Geological Cross-Sections
Log of Borehole Nos. 101 to 104, and 001 to 007 inclusive
Grain Size Analyses

Distribution: Cachet Developments [pdf]

LEGEND

- Borehole Location — BH#
- Monitoring Well Location — MW#
- Geological Cross Section Location

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301951-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Sideroad 15 and 75 Woolwich Street East
Elora, Ontario

Borehole Location Plan

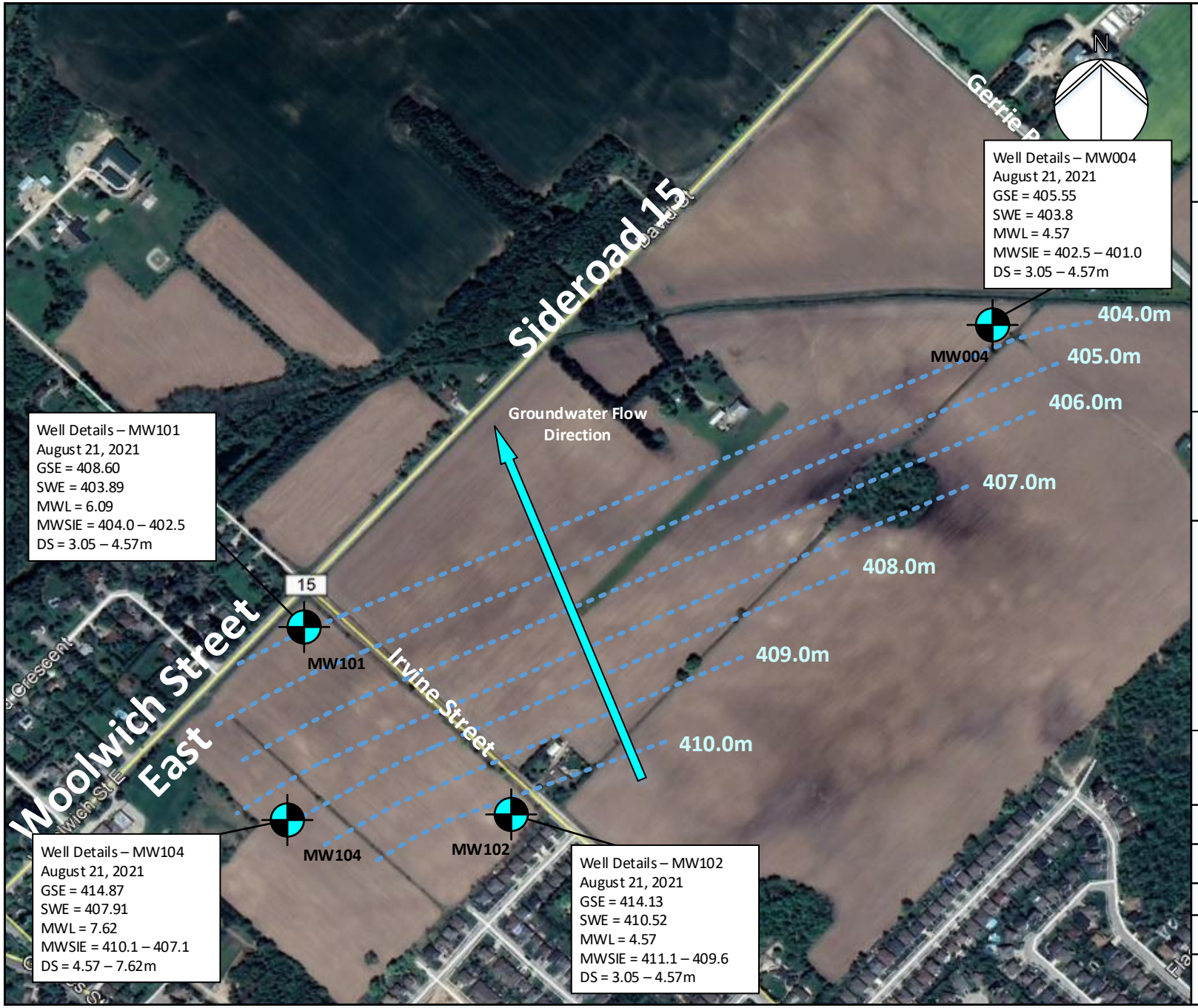
Project No. SM 301591-G

Date: February 2022

Drawn: SW	Checked: IS

SM 301591-G Borehole Location Plan

Drawing No. 1



LEGEND

Monitoring Well Location
MW#

GSE = Monitoring Well Ground Surface Elevation
SWE = Static Water Elevation [taken on Aug. 21, 2021]
MWL = Monitoring Well Length
MWSIE = Monitoring Well Screen Interval Elevation
DS = Depth of Screen

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301951-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Sideroad 15 and 75 Woolwich Street East
Elora, Ontario

Groundwater Contour Map

Project No. SM 301591-G

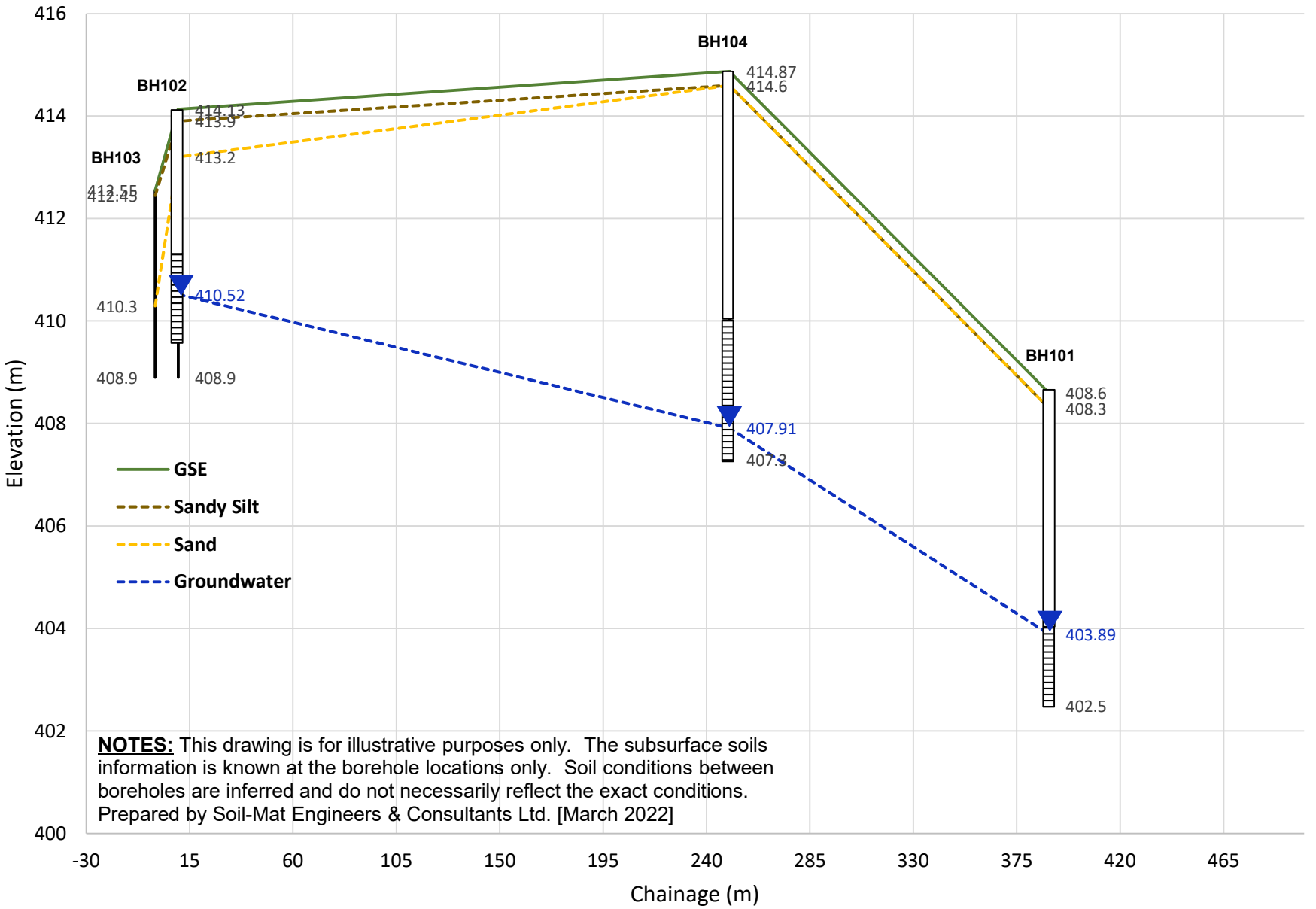
Date: February 2022

Drawn: SW | Checked: IS

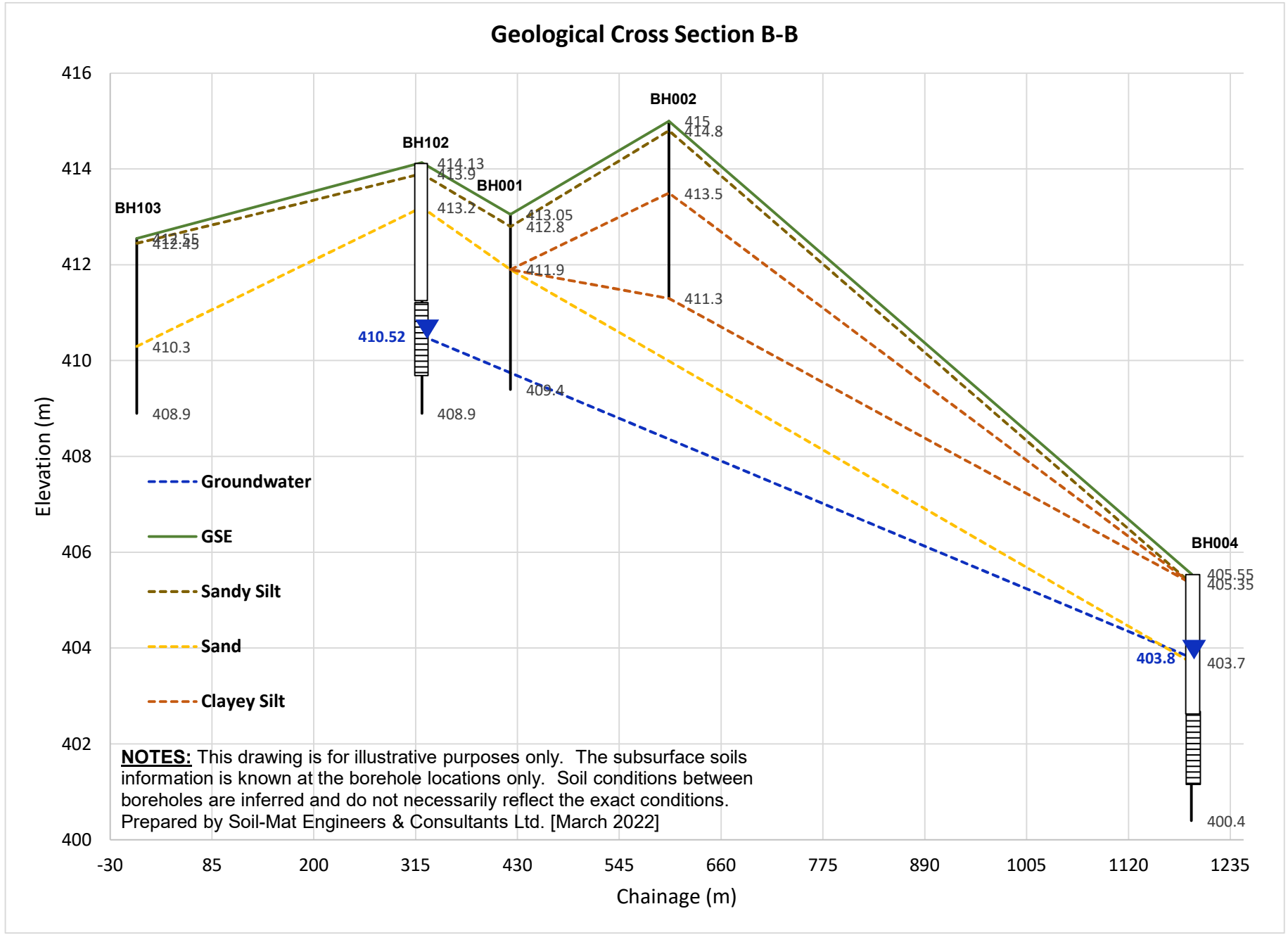
SM 301591-G Groundwater Contour Map

Drawing No. 2

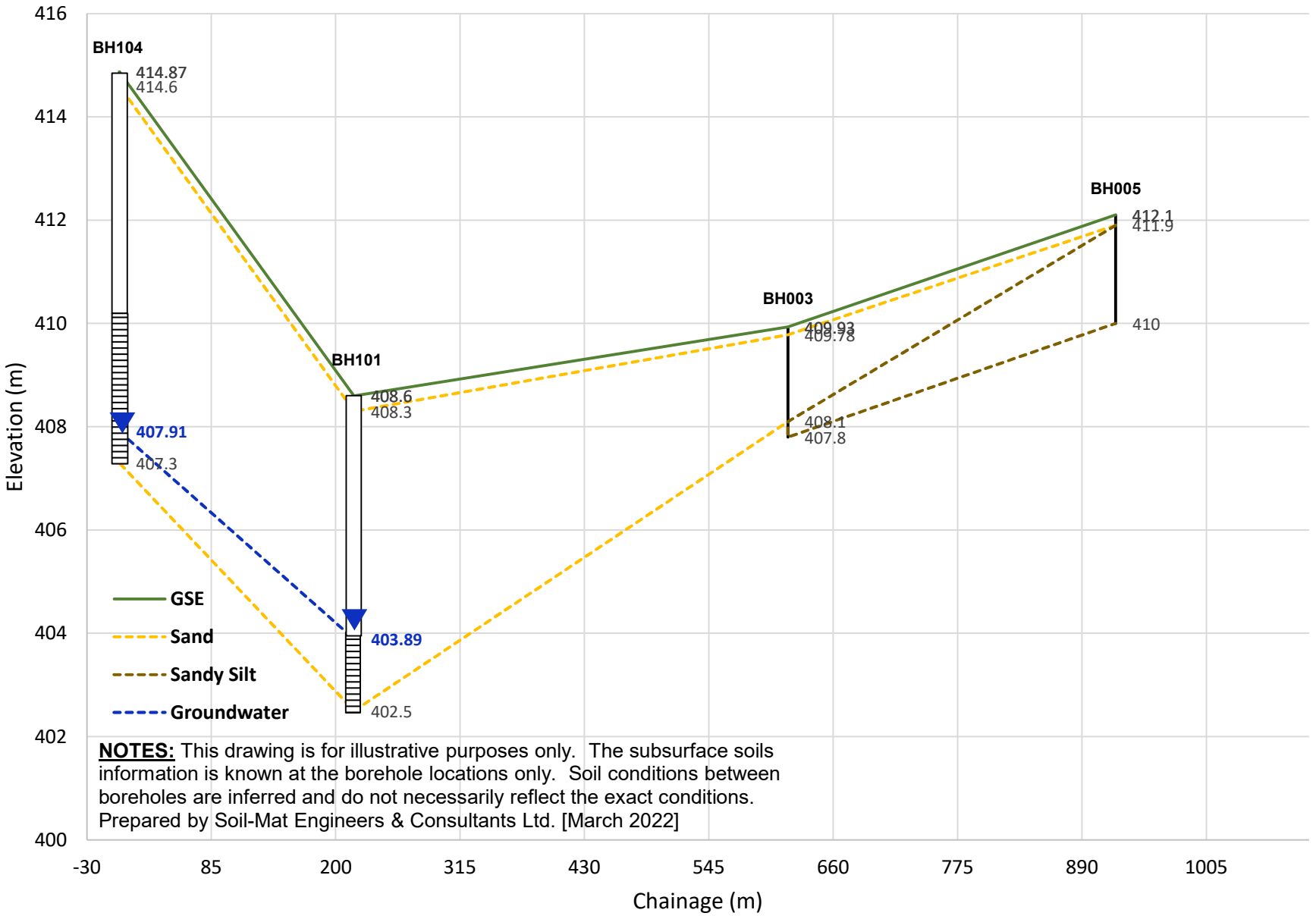
Geological Cross Section A-A



NOTES: This drawing is for illustrative purposes only. The subsurface soils information is known at the borehole locations only. Soil conditions between boreholes are inferred and do not necessarily reflect the exact conditions.
Prepared by Soil-Mat Engineers & Consultants Ltd. [March 2022]


Geological Cross Section B-B
Elevation (m)
Chainage (m)
416
414
412
410
408
406
404
402
400
-30
85
200
315
430
545
660
775
890
1005
1120
1235
BH103
412.55
412.45
410.3
408.9
BH102
414.13
413.9
413.2
410.52
408.9
BH001
413.05
412.8
411.9
409.4
BH002
415
414.8
413.5
411.3
403.8
BH004
405.55
405.35
403.7
400.4
Groundwater
GSE
Sandy Silt
Sand
Clayey Silt
NOTES: This drawing is for illustrative purposes only. The subsurface soils information is known at the borehole locations only. Soil conditions between boreholes are inferred and do not necessarily reflect the exact conditions.
Prepared by Soil-Mat Engineers & Consultants Ltd. [March 2022]

Geological Cross Section C-C

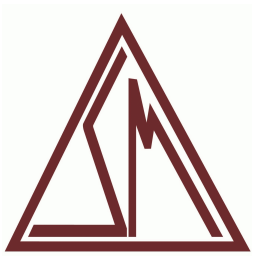


NOTES: This drawing is for illustrative purposes only. The subsurface soils information is known at the borehole locations only. Soil conditions between boreholes are inferred and do not necessarily reflect the exact conditions.
Prepared by Soil-Mat Engineers & Consultants Ltd. [March 2022]

Log of Borehole No. 101

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838437
E: 545149



Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
		408.60	Ground Surface									
0	0	408.30	**Topsoil** Approximately 250 millimetres of topsoil.									
			Sand Brown, trace gravel.									
		403.10	Transition to grey in colour									
		402.50	End of Borehole									

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 6.10 metres.
2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. No soil samples were retrieved. The following free groundwater level readings have been measured:

August 6, 2021 - 4.78 metres below ground surface.

August 27, 2021 - 4.71 metres below ground surface.

October 14, 2021 - 4.33 metres below ground surface.

February 23, 2021 - 4.31 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 102

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838180
E: 545422

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	414.13	Ground Surface								
0 / 0	413.90	**Topsoil** 250 millimetres of topsoil.								
3 / 1	413.20	**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, loose to compact.		SS	1	4 5 7 8	12			
				SS	2	2 3 6 5	9			
		Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, loose to compact.		SS	3	3 9 12 14	21			
				SS	4	7 8 11 10	19			
				SS	5	6 9 11 17	20			
16 / 5	408.90	End of Borehole		SS	6	7 5 4 9	9			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as caved to a depth of 3.8 metres and 'wet' at a depth of 3.6 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 3.58 metres below ground surface.

August 27, 2021 - 3.61 metres below ground surface.

October 14, 2021 - 3.62 metres below ground surface.

February 23, 2021 - 3.5 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 103

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4837942
E: 545194

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.55	Ground Surface								
0	0		**Topsoil** Approximately 100 millimetres of topsoil.		SS	1	5 5 7 8	12			
3	1		**Sandy Silt** Brown, trace to some gravel and clay, reworked in upper levels, compact.		AS	2	6 5 3 3	8			
6	2				SS	3	5 6 6 6	12			
7		410.30									
8			**Sand** Brown, trace clay, silt, and gravel, medium gradation, loose.		SS	4	2 3 3 2	6			
11	3				SS	5	2 1 1 2	2			
12		408.90									
13	4		End of Borehole								
29	9										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded dry and caved to a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 104

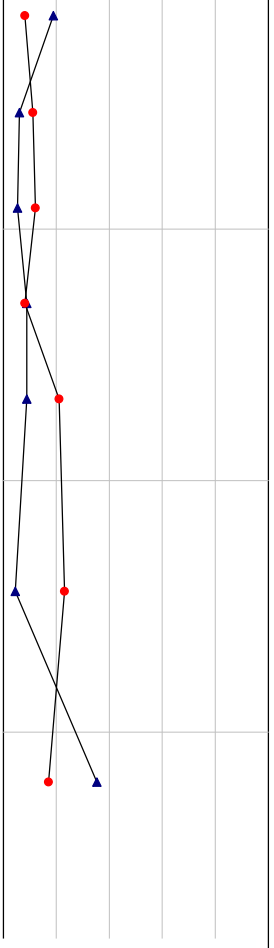
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838174
E: 545084

Depth (ft)	Depth (m)	Elevation (m)	Description	Sample Type	Sample Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		414.87	Ground Surface							
0	0	414.60	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, fine to medium gradation, compact.	SS	1	5 5 6 7	11			
2										
3	1			SS	2	8 9 9 7	18			
4										
5				SS	3	2 5 8 7	13			
6	2									
7				SS	4	6 11 16 13	27			
8										
9				SS	5	10 12 11 13	23			
10	3									
11										
12										
13	4									
14										
15				SS	6	5 10 13 15	23			
16										
17	5									
18										
19										
20	6	408.80	Wet spoon							
21				SS	7	9 9 8 6	17			
22										
23	7									
24		407.30								
25			End of Borehole							
26	8									
27										
28										
29										
30	9									
31										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 7.6 metres.

2. Borehole was recorded as open and 'wet' at depth of 7.0 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 6.78 metres below ground surface.

August 27, 2021 - 6.96 metres below ground surface.

October 14, 2021 - 7.09 metres below ground surface.

February 23, 2022 - 6.83 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

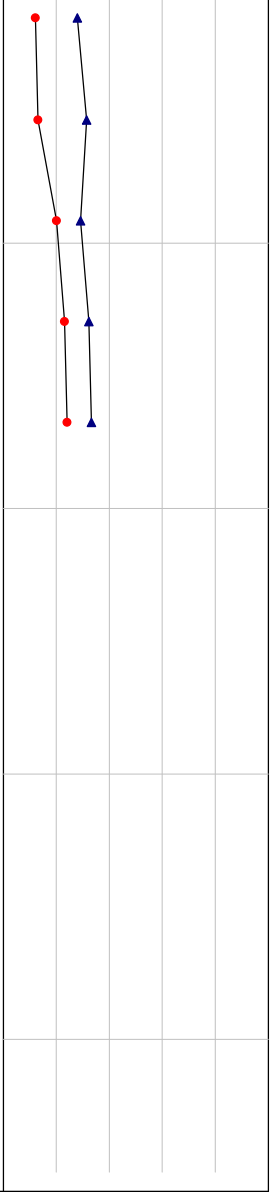
Log of Borehole No. 001

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838268
E: 545454

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	413.05		Ground Surface								
0 / 0	412.80		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	4 5 7 6	12			
3 / 1	411.90		**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, compact.		SS	2	6 7 6 6	13			
			Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, compact.		SS	3	5 8 12 14	20			
					SS	4	12 10 13 10	23			
11 / 3	409.40				SS	5	6 11 13 15	24			
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as dry and caved to a depth of 1.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 002

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838469
E: 545516

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		415.00	Ground Surface								
0	0	414.80	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	2 4 4 5	8			
3	1	413.50	**Sandy Silt** Brown, reworked in upper levels, trace clay, silt, and gravel, loose.		SS	2	4 3 6 8	9			
7	2	412.50	**Clayey Silt** Brown, trace to some sand and gravel, stiff to very stiff.		SS	3	6 6 6 7	12		3.5	
			Transition to grey.		SS	4	3 7 6 7	13		4.0	
11	3	411.30			SS	5	9 7 15 18	22		>4.5	
12	4		End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 003

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838652
E: 545505

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
		409.93		Ground Surface									
0	0			**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4 6 10 8	16				
3	1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, compact.		SS	2	6 10 10 7	20				
6		408.10				SS	3	6 8 10 11	18				
7	2	407.80		**Sandy Silt** Brown, trace to some gravel and clay, compact.									
				End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 004

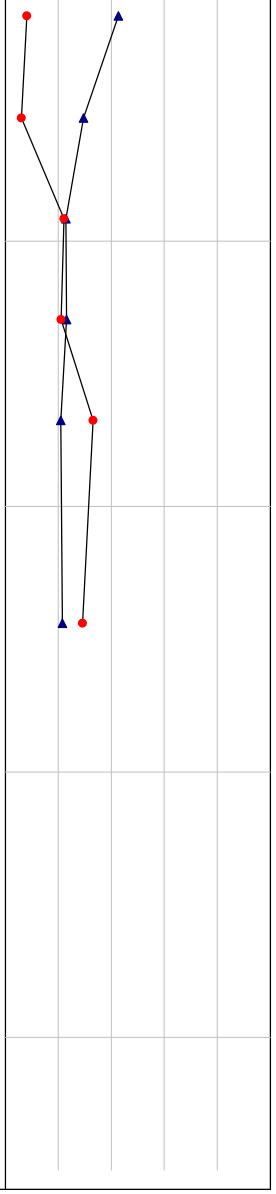
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838792
E: 546044

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		405.55	Ground Surface							
0	0	405.35	**Topsoil** Approximatelty 200 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay, trace gravel, reworked in upper levels, loose.	SS	1	2 3 5 6	8			
2										
3	1			SS	2	4 3 3 5	6			
4										
5										
6		403.70	**Sand** Brown, trace clay, silt, and gravel, medium to coarse gradation, wet, compact to dense.	SS	3	8 10 12 15	22			
7	2									
8				SS	4	8 10 11 10	21			
9										
10	3			SS	5	8 10 23 30	33			
11										
12										
13	4									
14										
15		400.70								
16	5	400.40	Transition to grey.	SS	6	3 11 18 23	29			
17			End of Borehole							
18										
19										
20	6									
21										
22										
23	7									
24										
25										
26	8									
27										
28										
29	9									

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 5, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 2.74 metres below ground surface.

August 27, 2021 - 1.75 metres below ground surface.

February 23, 2021 - 1.33 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 5, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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130 Lancing Drive, Hamilton, ON L8W 3A1
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Sheet: 1 of 1

Log of Borehole No. 005

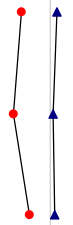
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838939
E: 545636

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.10		Ground Surface								
0	0	411.90		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2 4 5 7	9			
3	1			**Sandy Silt** Brown, reworked in upper levels, trace to some clay, increasing clay content with depth, occasional gravel, loose to compact.		SS	2	1 3 3 5	6			
6	2	410.00				SS	3	3 5 7 9	12			
				End of Borehole								
10	3											
13	4											
16	5											
20	6											
23	7											
26	8											
29	9											

Moisture Content w%
10 20 30 40

Standard Penetration Test blows/300mm
20 40 60 80



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 006

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839162
E: 545871

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		420.91		Ground Surface								
0	0	420.70		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	4 4 4 4	8			
1				**Sand** Brown, reworked in upper levels, trace rootlets, loose to compact.		SS	2	3 5 6 6	11			
2	1	419.40		**Sandy Silt** Brown, trace clay, increasing clay content with depth, loose to compact.		SS	3	5 6 6 7	12			
3						SS	4	3 4 4 4	8			
4		417.30				SS	5	5 11 10 15	21			
5				End of Borehole								
6	2											
7												
8	3											
9												
10												
11	4											
12												
13												
14												
15	5											
16												
17												
18												
19	6											
20												
21												
22												
23	7											
24												
25												
26	8											
27												
28												
29	9											

Moisture Content w%: 10 20 30 40

Standard Penetration Test blows/300mm: 20 40 60 80

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as wet at depth of 2.0 metres, and caved to a depth of 2.4 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

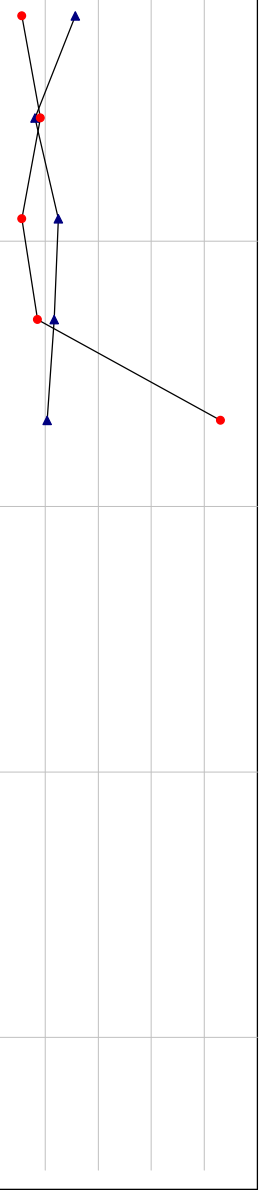
Log of Borehole No. 007

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838910
E: 546126

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.39	Ground Surface								
0 / 0	408.10	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	3 5 6 7	11			
3 / 1	406.90	**Sandy Silt** Brown, trace rootlets, trace clay, reworked in upper levels, increasing clay content with depth, compact.		SS	2	10 8 10 10	18			
6 / 2		**Clayey Silt** Brown, trace to some sand and gravel, stiff to hard.		SS	3	3 5 6 6	11		2.0	
9 / 3				SS	4	5 7 10 18	17		2.5	
11 / 3	404.70			SS	5	24 36 50/5"	100		>4.5	
12 / 4		End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.0 metres.

2. Borehole was recorded as open and dry upon completion and backfilled as per Ontario Regulation 903.

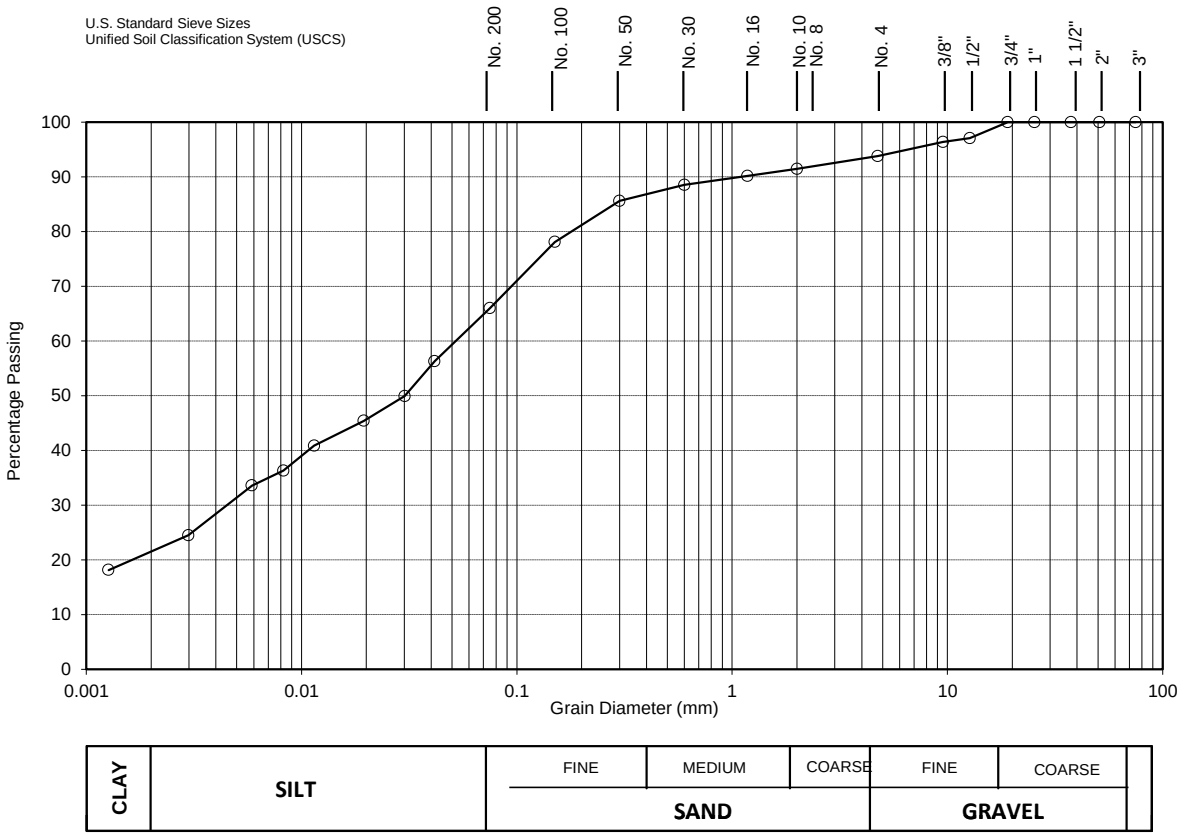
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



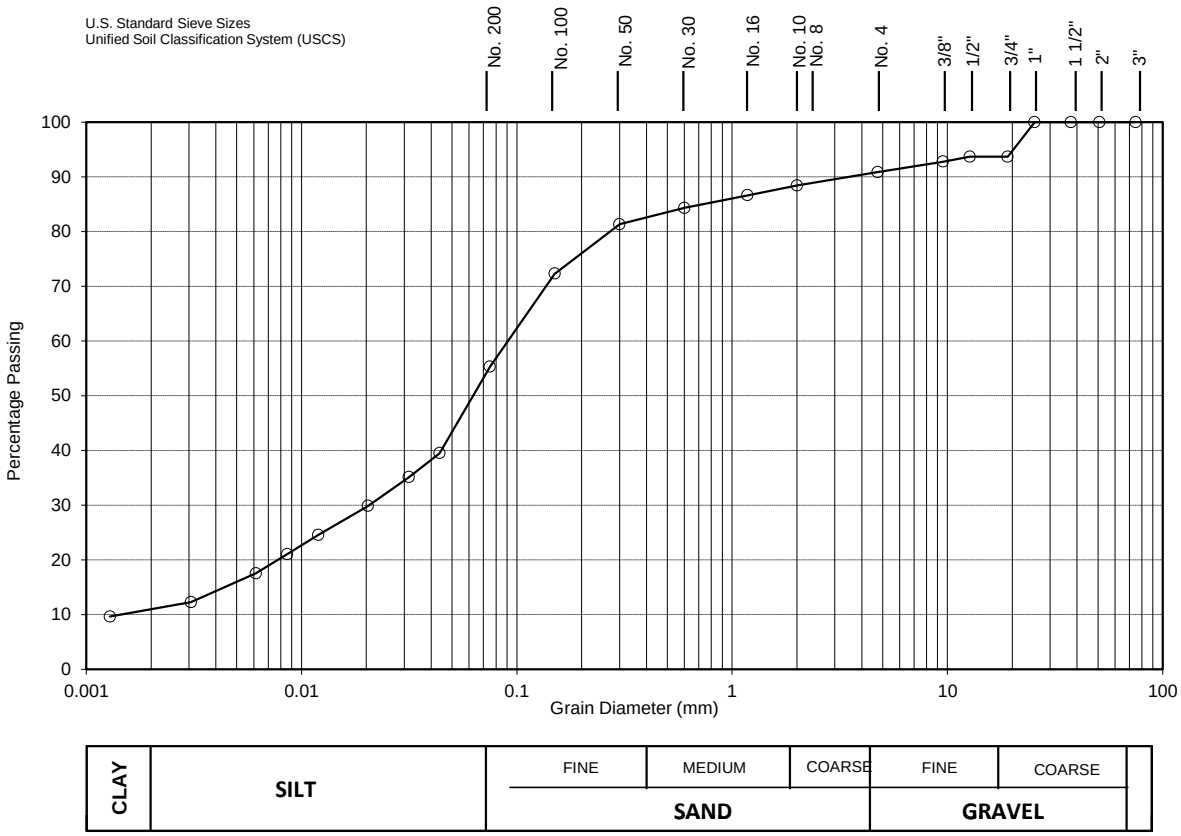
Lab No.:	**21-335**	Notes: Depth: 5'			
Sample No.:	**3**				
Borehole No.:	**2**				
CLAY [%]:	**22**	Soil Description:	**Brown Sandy Silt w/ some Clay and trace Gravel**		
SILT [%]:	**44**		**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**		
SAND [%]:	**28**				
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0005**	Coefficient of Uniformity C_U:	**102.0**	Coefficient of Curvature C_C:	**0.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



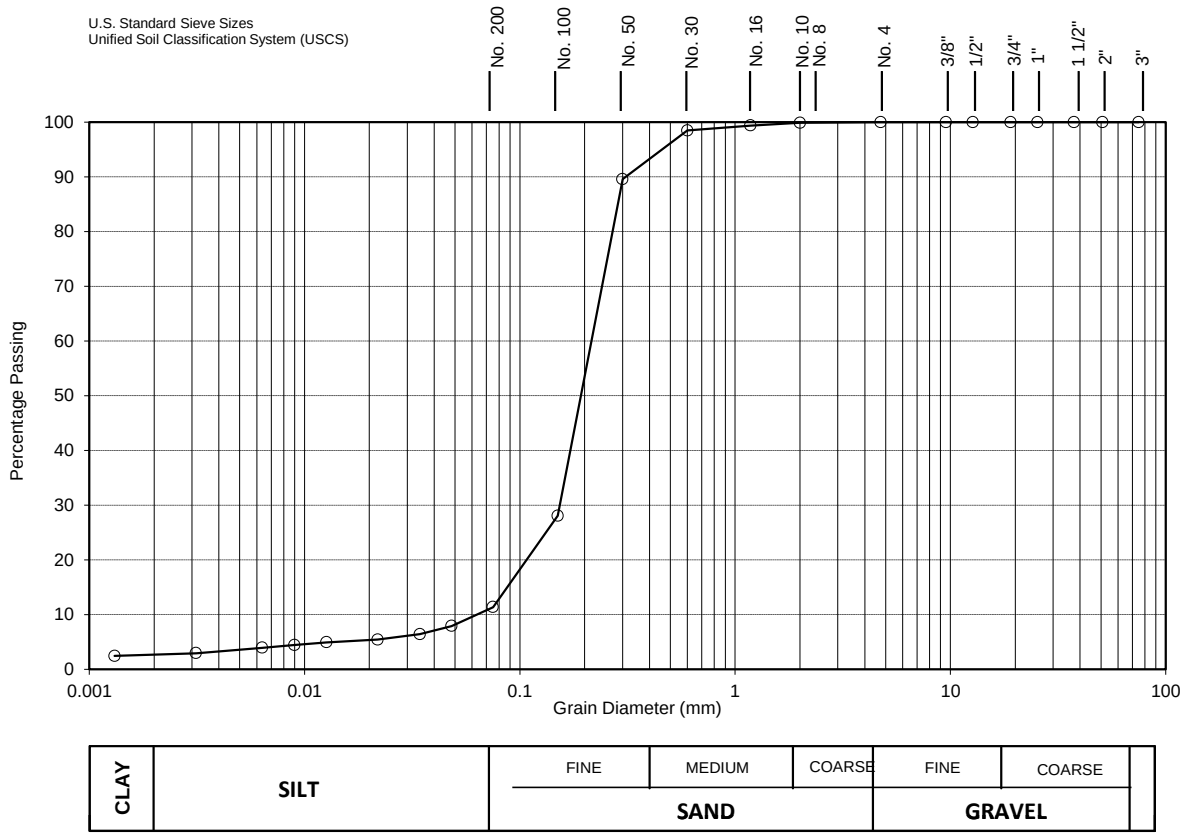
Lab No.:	**21-336**	Notes: Depth: 10'			
Sample No.:	**5**				
Borehole No.:	**4**				
CLAY [%]:	**11**	Soil Description:	**Brown Sandy Silt w/ some Clay and trace Gravel**		
SILT [%]:	**44**		**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**		
SAND [%]:	**36**				
GRAVEL [%]:	**9**	Estimated Infiltration Rate [mm/hr] :	**10 to 15**	Estimated Permeability, k [cm/s]	**10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0015**	Coefficient of Uniformity C_U:	**60.0**	Coefficient of Curvature C_C:	**3.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



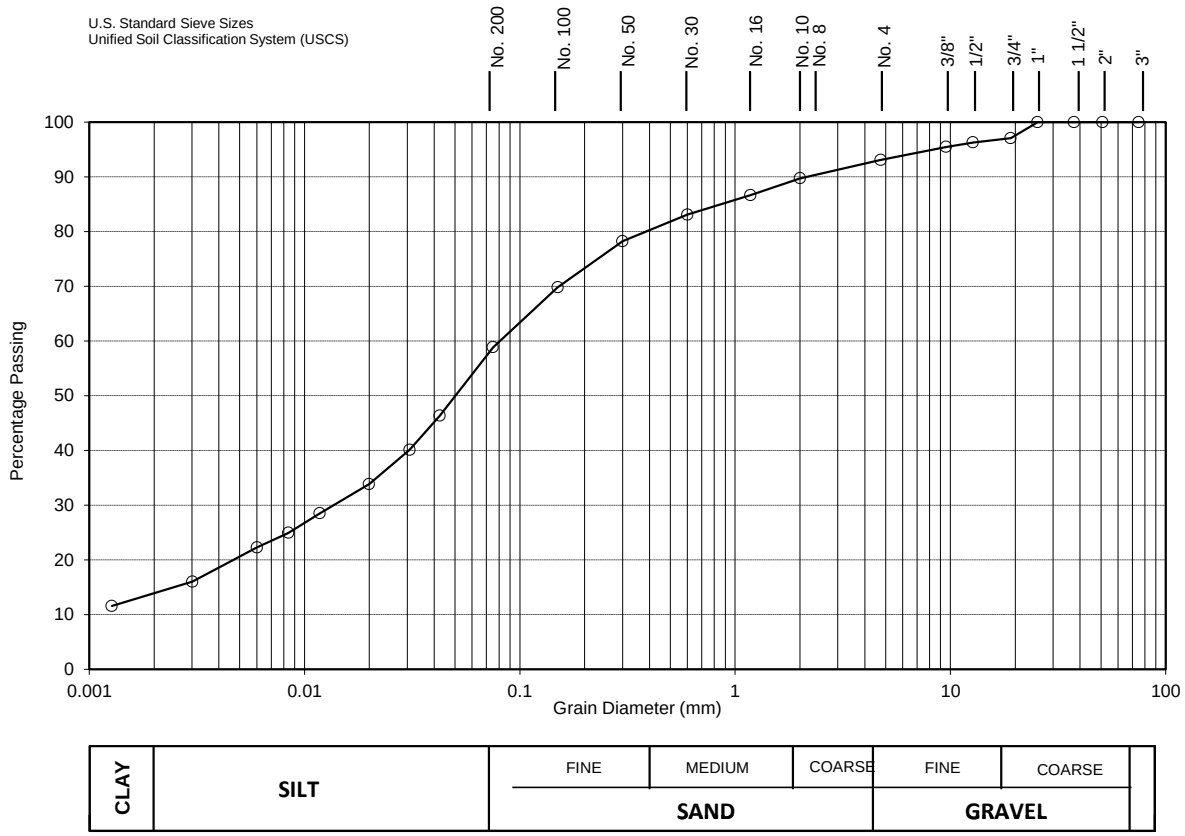
Lab No.:	**21-337**	Notes: Depth: 7.5'	
Sample No.:	**4**		
Borehole No.:	**5**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt and Clay**	
SILT [%]:	**9**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**89**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **100 to 150**	Estimated Permeability, k [cm/s] **10^{-3} to 10^{-2}**
D_{10} (Effective Diam. in mm):	**0.0600**	Coefficient of Uniformity C_U: **3.7**	Coefficient of Curvature C_C: **1.9**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



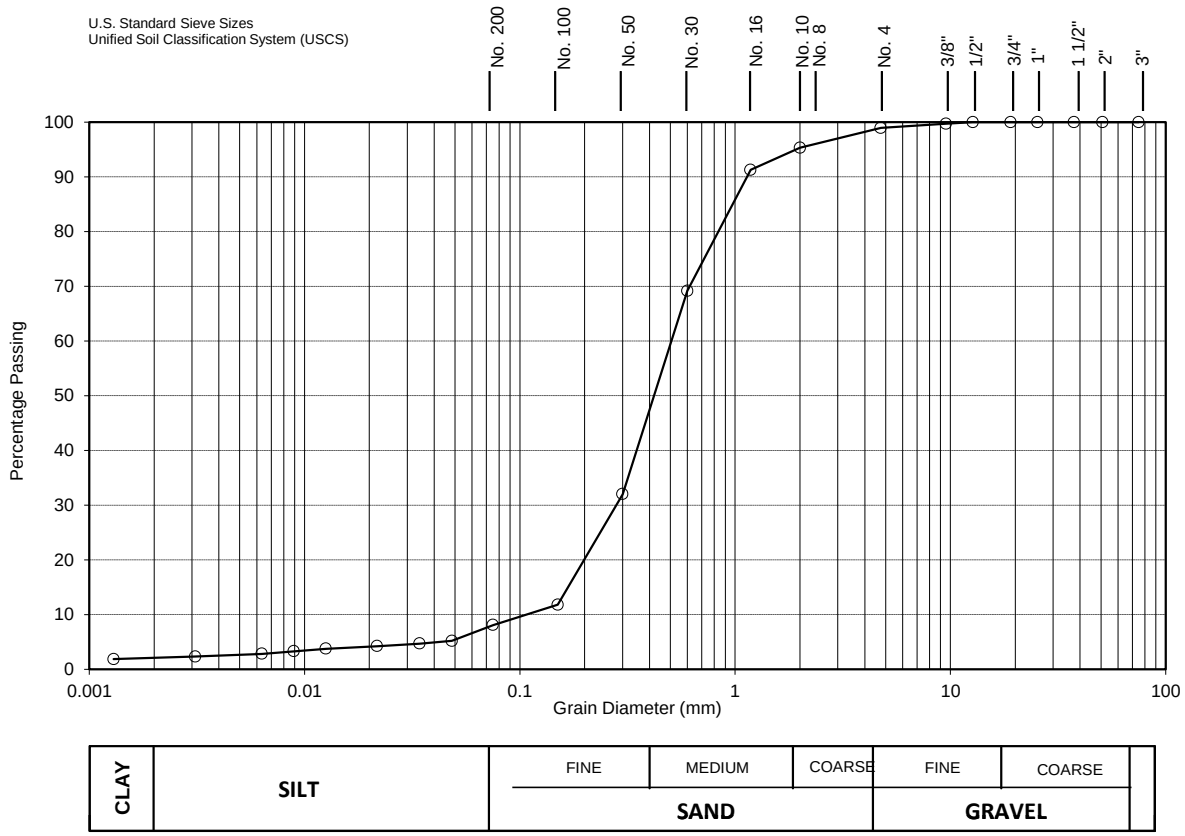
Lab No.:	**21-338**	Notes: Depth: 5'	
Sample No.:	**3**		
Borehole No.:	**7**		
CLAY [%]:	**14**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**45**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**34**		
GRAVEL [%]:	**7**	Estimated Infiltration Rate [mm/hr] : **< 10**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.00100**	Coefficient of Uniformity C_U: **80.0**	Coefficient of Curvature C_C: **2.1**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 4**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



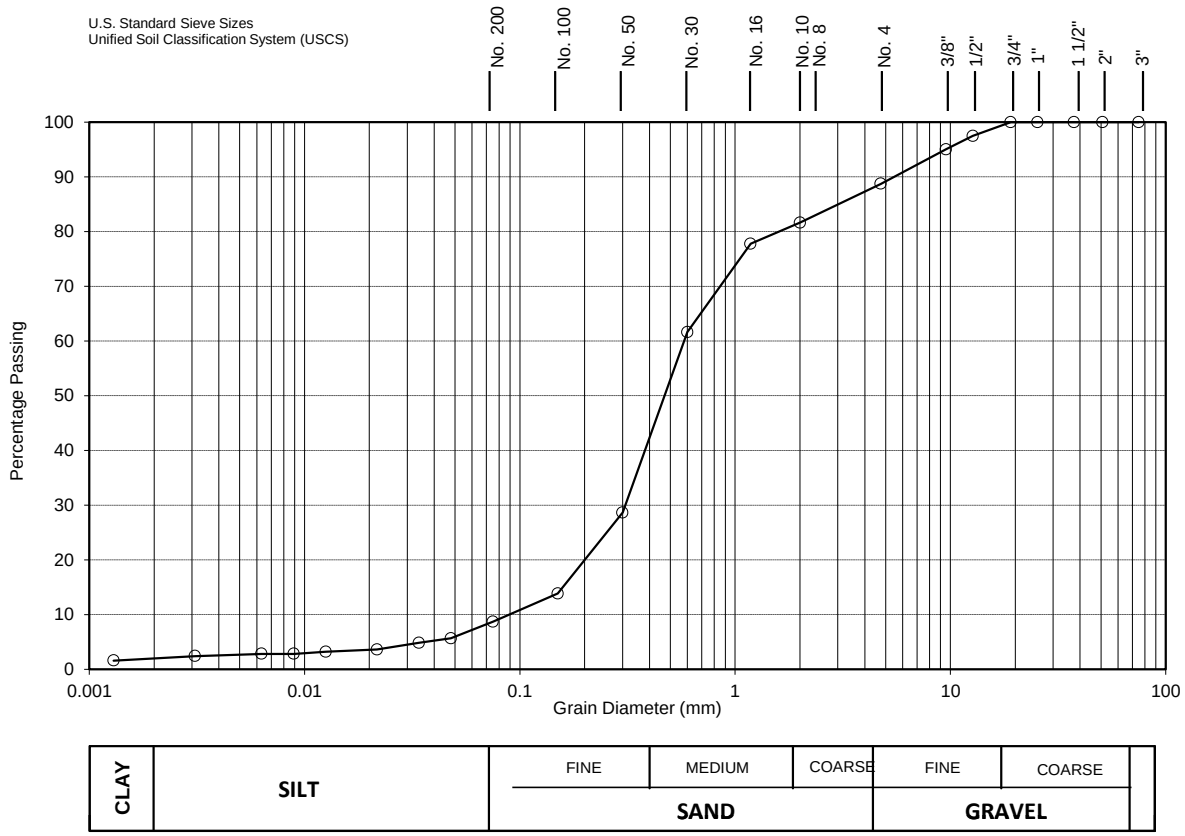
Lab No.:	**21-339**	Notes: Depth: 15'	
Sample No.:	**6**		
Borehole No.:	**8**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt, Clay and Gravel**	
SILT [%]:	**6**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**91**		
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.10**	Coefficient of Uniformity C_U: **5.1**	Coefficient of Curvature C_C: **1.5**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 5**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**21-340**	Notes: Depth: 10'	
Sample No.:	**5**		
Borehole No.:	**10**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ some Gravel and traces of Silt and Clay**	
SILT [%]:	**7**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**80**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.090**	Coefficient of Uniformity C_U: **6.6**	Coefficient of Curvature C_C: **1.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 6**	**Project No.: SM 301951-T**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455
Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951-G July 20, 2022

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

DRAFT HYDROGEOLOGICAL ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
CLAYTON AND ELORA SANDS
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your recent correspondence and discussions, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has prepared the following hydrogeological assessment based on the updated groundwater information to date. These comments are further to our Preliminary Geotechnical and Hydrogeological Investigation reports for the subject lands [SM 301951A-G and SM 301951B-G, dated October 14, 2021 and March 11, 2022], and recent discussions with the design team. As such, this hydrogeological report should be read in conjunction with our previous reports stated above. It is also noted that this report marks the completion of all of the proposed drilling fieldwork, and as such a new borehole numbering system has been implemented.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development on the Clayton Lands located at 75 Woolwich Street East [Clayton Lands] in Elora, Ontario, along with potential future development on the Elora Sands [Elora Sands] to the east. The development details are to be established, but are anticipated to consist of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services. The purpose of this hydrogeological assessment is to provide additional and more detailed information and comments to support the assessment of site servicing options for the proposed development, from a geotechnical point of view.

2. PROCEDURE

Ten [10] and fifteen [15] sampled boreholes were advanced on the Clayton and Elora Sands respectively, totalling twenty-five [25] boreholes at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment between August 5, 2021 and April 18, 2022 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 2.1 and 8.2 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses to allow for an estimate of the hydraulic conductivity of the subsurface soils. It is noted that slug testing will be performed on a number of the monitoring wells to get a more accurate in-situ measurement of the hydraulic conductivity, results of which will be summarised in a subsequent supplemental report.

Upon completion of drilling, groundwater monitoring wells were installed at Borehole Nos. 004, 101, 102, 104, 201, 201A, 202, 203, 204, 205, 206, 301 through 305, and 401 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 to 3.0 metres. The monitoring wells were encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite ‘hole plug’ to the surface and fitted with a protective steel ‘stick up’ casing. The remaining boreholes were backfilled in general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade. The depths screening intervals for each monitoring well has been summarized below.

Monitoring Well ID	Depth (m)	Screening Interval (m)
MW004	4.6	3.0 – 4.6
MW101	6.1	4.6 – 6.1
MW102	4.6	3.8 – 4.6
MW104	7.6	4.6 – 7.6
MW201	4.6	3.8 – 4.6
MW201A	3.0	2.2 – 3.0
MW202	6.1	4.6 – 6.1

Monitoring Well ID	Depth (m)	Screening Interval (m)
MW203	6.1	4.6 – 6.1
MW204	4.6	3.0 – 4.6
MW205	4.6	3.0 – 4.6
MW206	7.6	6.1 – 7.6
MW301	7.6	6.1 – 7.6
MW302	7.6	6.1 – 7.6
MW303	7.6	6.1 – 7.6
MW304	6.1	4.6 – 6.1
MW305	3.0	2.3 – 3.0
MW401	6.1	4.6 – 6.1

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at all of the borehole locations with the exception of Borehole Nos. 301 through 307 have been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office. The ground surface elevations at Borehole Nos. 301 through 307 have been linearly interpolated based on the topographic survey provided by BSR&D (Reference No. 21-14-573-00-topo) dated January 4, 2022 which was provided to our office. Once a complete topographic survey has been completed with up-to-date geodetic elevations of Borehole Nos. 301 through 307, this report will be updated.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 001 to 007, 101 to 104, 201 to 206, 301 to 307, and 401, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

2. SUBSURFACE CONDITIONS

The subsurface are presented in detail in our referenced Preliminary Geotechnical Investigation report. To summarize, the soil conditions encountered on the Elora Sands generally consisted of a sandy silt/silty sand deposit in the upper levels with some areas and layers of clayey sandy silt till with depth. The soils encountered on the perimeter of the site were highly variable, often encountering layered deposits of clayey sandy silt till

or sand. Occasional deposits of gravelly sand were encountered within some of the boreholes. As such, the presence of permeable granular deposits or 'veins' should be expected across the site. In areas where the presence of a predominately clayey material is expected or would be beneficial, such as in the area of the proposed SWM pond, it may be prudent to advance a series of test excavations to confirm the condition of the subsurface soils including composition, groundwater conditions, suitability for use as an impermeable SWM pond liner, etc.

The Clayton Lands was generally characterised by an upper layer consisting of a clayey sandy silt till underlain by a sand deposit that extended to deep depths. Some isolated areas were encountered that contained a more impermeable clayey sandy silt till. Representative geological cross sections are illustrated in Drawing Nos. 3, 4 and 5, attached.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

Grain size analyses were conducted on sixteen [16] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Elora Sands							
Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH003 SS3	1.5 m	22	44	28	6	10^{-7}	<10
BH004 SS5	3.0 m	2	7	80	11	10^{-2}	150 to 300
BH006 SS5	3.0 m	11	44	36	9	10^{-6}	10 to 15
BH201 SS2	1.5 m	5	17	76	2	10^{-4}	50
BH202 SS2	1.5 m	30	38	26	0	10^{-8}	<10
BH202 SS5	6.1 m	10	51	39	0	10^{-6}	10 to 15
BH203 SS2	1.5 m	3	17	37	43	10^{-4}	50 to 60
BH203 SS5	6.1 m	3	8	87	2	10^{-3}	125 to 150
BH204 SS2	1.5 m	16	34	30	20	10^{-7}	10
BH205 SS3	3.0 m	2	4	94	0	10^{-3}	150 to 300

Clayton Lands							
Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH102 SS6	4.6 m	2	6	91	1	10^{-2}	150 to 300
BH103 SS3	1.5 m	14	45	34	7	10^{-6}	10
BH104 SS4	2.3 m	2	9	89	0	10^{-3} to 10^{-2}	100 to 150
BH302 SS2	1.5 m	2	3	95	0	10^{-2}	150 to 300
BH304 SS2	1.5 m	16	40	33	11	10^{-7}	10
BH305 SS2	1.5 m	7	16	77	0	10^{-4}	50 to 60

The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines to S.M. – Sand-silt mixtures at depth.

The clay and silt soils would generally behave as a cohesive material with slight to medium plasticity, and low hydraulic conductivity, on the order of 10^{-6} to 10^{-7} cm/sec, and would be of low permeability to effectively impermeable. The on-site clayey soils would generally be considered suitable for use as an impermeable clay liner for the stormwater management (SWM) pond, however should be confirmed with more specific testing and assessment, and would require selecting sorting to separate out from more sandy deposits. Further testing should be conducted within the area of the proposed stormwater management pond [SWM] in order to confirm the suitability of the clayey material for use as an impermeable liner.

The sand deposit would tend to yield a highly permeable characteristic. Provided that the low impact development (LID) stormwater management systems are located within the highly permeable sand deposits, the hydraulic conductivity for this material would be on the order of 10^{-2} to 10^{-4} cm/sec yielding infiltrations rates in the range of 50 to 300 mm/hr. LID systems such as rear yard catch basins, infiltration swales, etc. will be highly effective within the permeable sand soils and will be able to help with natural groundwater recharge as well as maintain pre and post development runoff volumes, specifically on the Clayton Lands. As noted previously, slug testing is slated to be performed within a number of the monitoring wells across the site to yield a more accurate estimate of the hydraulic conductivity of the native soils. Once available,

information on the location of these LID systems should be forwarded to our office in order to target specific areas with the slug testing.

Groundwater Observations

Borehole Nos. 006, 102, and 004 were noted to have 'caved' to depths of between approximately 2.4 to 3.8 metres and 'wet' at depths of between approximately 2.0 to 3.4 metres, while Borehole No. 104 was noted to be open and 'wet' at a depth of 7.0 metres upon completion. Borehole Nos. 103 and 001 were noted to have cave to depths of 2.7 and 1.5 metres, respectively, and dry upon completion. The remainder of the boreholes were noted as being open and 'dry' [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, monitoring wells were installed at Borehole Nos. 004, 101, 102, 104, 201, 201A, 202, 203, 204, 205, 206, 301 through 305, and 401, to allow for future measurements of the static groundwater level. A data logger was in each of the monitoring wells to allow for continuous monitoring of the groundwater level between August 2021 to June 2022, the readings of which have been illustrated in graphs which can be found appended to the end of this report.

In addition, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on various dates, ranging from August 2021 to June 2022. These have been summarized in the following charts:

TABLE B
SUMMARY OF MANUAL GROUNDWATER READINGS (ELORA SANDS)

Borehole No. 004 (Ground Surface Elevation of 405.55 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	2.74	402.8
August 27, 2021	1.75	403.8
February 23, 2022	1.33	404.2
April 22, 2022	1.47	404.1
June 1, 2022	1.78	403.8

Borehole No. 201 (Ground Surface Elevation of 404.80 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.69	402.1
April 22, 2022	1.88	402.9
June 1, 2022	2.44	402.4

Borehole No. 201A (Ground Surface Elevation of 404.75 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.8
April 22, 2022	2.05	402.7
June 1, 2022	2.43	402.3

Borehole No. 202 (Ground Surface Elevation of 406.59 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	5.5	401.1
April 22, 2022	4.76	401.8
June 1, 2022	5.43	401.2

Borehole No. 203 (Ground Surface Elevation of 407.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.0
April 22, 2022	5.90	401.2
June 1, 2022	5.91	401.2

Borehole No. 204 (Ground Surface Elevation of 409.56 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.81	406.7
April 22, 2022	1.16	408.4
June 1, 2022	1.53	408.0

Borehole No. 205 (Ground Surface Elevation of 412.99 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.56	410.4
April 22, 2022	2.25	410.7
June 1, 2022	2.39	410.6

Borehole No. 206 (Ground Surface Elevation of 412.88 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	6.83	406.1
April 22, 2022	4.60	408.3
June 1, 2022	4.66	408.2

Borehole No. 401 (Ground Surface Elevation of 420.91 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
April 22, 2022	2.29	418.6
June 1, 2022	2.39	418.5

TABLE C
SUMMARY OF MANUAL GROUNDWATER READINGS (CLAYTON LANDS)

Borehole No. 101 (Ground Surface Elevation of 408.60 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	4.78	403.8
August 27, 2021	4.71	403.9
October 14, 2021	4.33	404.3
February 23, 2022	4.31	404.3
April 22, 2022	4.07	404.5
June 1, 2022	4.15	404.5

Borehole No. 102 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	3.58	410.6
August 27, 2021	3.61	410.5
October 14, 2021	3.62	410.5
February 23, 2022	3.50	410.6
April 22, 2022	2.89	411.2
June 1, 2022	3.05	411.1

Borehole No. 103 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	6.78	408.1
August 27, 2021	6.96	407.9
October 14, 2021	7.09	407.8
February 23, 2022	6.83	408.0
April 22, 2022	6.13	408.7
June 1, 2022	6.28	408.6

Borehole No. 301 (Ground Surface Elevation of 412.75 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.29	406.5
April 22, 2022	5.65	407.1
June 1, 2022	5.71	407.0

Borehole No. 302 (Ground Surface Elevation of 413.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.62	406.4
April 22, 2022	6.06	406.9
June 1, 2022	6.12	406.9

Borehole No. 303 (Ground Surface Elevation of 414.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	5.40	408.6
April 22, 2022	6.04	407.9
June 1, 2022	6.11	407.9

Borehole No. 304 (Ground Surface Elevation of 407.90 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	2.87	405.0
April 22, 2022	2.60	405.3
June 1, 2022	2.96	404.9

Borehole No. 305 (Ground Surface Elevation of 408.60 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	Dry	<405.6
April 22, 2022	Dry	<405.6
June 1, 2022	Dry	<405.6

*Ground surface elevations have been interpolated based on contours from current topographic survey

The available data to date presented above illustrates a variable groundwater level, ranging from about 3 to 6 metres (elevations of between 407 to 411 metres) below the existing ground surface at Borehole Nos. 102, 104, 301, 302, and 303, at the southern half of the Clayton Lands, with the highest groundwater levels during the wet spring months. The groundwater drops to the southwest and to the north, as illustrated on Drawing No. 2, Groundwater Contour Map. The groundwater level drops to ranges of between 3 to 4 metres (elevations of between 404.5 to 405.3 metres) below the existing ground surface at the northern limits of the Clayton Lands. Based on the visual data displayed within the groundwater graphs, the data indicates a relatively stable groundwater level with small fluctuations between the 'wet' and 'dry' months of the year. This can be attributed to highly permeable fine to coarse grained sand and silty sand deposits within the southern half of the Clayton lands. The groundwater level within Borehole No. 304 was noted to be higher in comparison to the other wells, however may be more susceptible to precipitation, resulting in 'perched deposits' of water within the

more permeable above the clayey soils. The groundwater was noted to be deepest on the southern portion of the Clayton Lands, where the soil conditions at the borehole conditions generally indicated more permeable sandy soils until termination. The groundwater was shallowest at the northern portion of the Clayton lands, generally following the physical topography. Where encountered within the boreholes, the clayey deposits would tend to 'trap' the water within the low permeable layer and present a high groundwater condition than would otherwise be found within areas of permeable sandy soils. The manual readings gathered in April 2022 would be considered representative of a seasonal 'high'

The groundwater data gathered on the Elora Sands to date indicate a groundwater level on the order of 1.2 to 4.6 metres (elevations of between 408.5 to 410.7 metres) below the existing ground surface at Borehole Nos. 204, 205, and 206, predominantly located south of the landing strip within the farmer's field. The groundwater drops to the east towards a tributary of the Irvine Creek [also identified as Nichol Drain] with a groundwater elevation of between 402.8 to 404.2 metres measured manually periodically within Borehole No. 004 from August 2021 to June 2022. The groundwater level drops to the north as well towards Nichol Road 15 and where the storm water management pond is proposed. The groundwater level at this location is noted to be stabilizing at an elevation of between roughly 401 to 403 metres. The magnitude of fluctuations demonstrated within these areas are on the order of approximately 2 metres, according to the groundwater data graphs and may be attributed to the soil conditions, which is noted to be more layered.

It is also noted that the groundwater levels and elevations would tend to vary with the elevation changes across the site, which varies significantly. As such, it would be prudent to advance a series of test pits or additional boreholes across the site, specifically in the areas of notably higher groundwater levels and areas of large excavations for deeper services or pumping stations, in order to assess first hand how the groundwater will affect the excavations during site earthworks and servicing.

The direction of groundwater flow has been inferred from these groundwater levels, and has been illustrated on the groundwater contour map Drawing No. 2, Groundwater Contour Map. The direction of groundwater is locally flowing towards the Irvine Creek to the north and west on the Clayton Lands. The groundwater is flowing towards the tributary of the Irvine Creek [Nichol Drain] on the east side of the Elora Sands and to the north towards the Irvine Creek on the west side of the site. As such, the shallow groundwater is contributing to the base flow to the Nichol Drain. Best efforts should be exercised to maintain the overall natural drainage as part of the site grading, stormwater management plan and water balance across the site.

The subsurface soil and groundwater conditions described above are illustrated in the attached geological cross sections, Drawing Nos. 3, 4 and 5.

3. HYDROGEOLOGICAL SETTING AND WATER WELL STUDY

A review of available information, including water well records within an approximate 250 metre radius, was undertaken to inform the hydrogeological setting of the subject lands.

3.1.1 METHODS

Information was compiled for this hydrogeological assessment from sources including:

- Topographic, Bedrock Geology, and Soils maps.
- Ministry of Environment, Conservation and Parks [MOE] Water Well Records.
- Site visit of the property and review of adjacent lands.
- Site specific geotechnical investigation program involving a series of boreholes.

3.1.2 LIMITATIONS AND CONDITIONS

Information for this study was compiled from geological maps and well records for water wells drilled in the study area. Water well locations are approximated in well records using the UTM coordinate system and in some instances may be in error by more than 50 metres. Potential for mapping error therefore exists in correlation of well registration numbers with street addresses. Soils and bedrock descriptions in the well records are limited and generalized regarding formation lithology. Stratigraphic interpretation in this report is based on information from water well records, topographic maps, Paleozoic Geology maps of the area, and geotechnical investigations performed by SOIL-MAT ENGINEERS in the area.

3.2.1 GEOLOGY – OVERBURDEN SOIL

Local soils identified in the Ministry of Northern Development and Mine's "Quaternary Geology of Ontario, Southern Sheet Map M2556" are described predominantly as a silt to sandy silt 'till'. This is consistent with our geotechnical investigation, which found the overburden soils to consist primarily of sandy silt with some areas of sand with trace silt. Grain size analyses of representative soil samples yielded clay content in the range of 2 to 22 percent, silt content of 6 to 45 percent, sand content of 28 to 91 percent, and gravel content of 0 to 11 percent.

3.2.2 GEOLOGY – BEDROCK

Bedrock in the in the vicinity of the Site is recorded from the Ministry of Northern Development and Mine's "Bedrock Geology of Ontario, Southern Sheet Map M2344," as Limestone and Dolostone of the Guelph Formation. The depth to bedrock, as reported

in MOE water well records for wells in the proximity of the Site, is on the order of approximately 0.3 to 22.6 metres below ground surface.

3.2.3 GROUNDWATER CONDITIONS

The referenced geotechnical investigation for the site provides an estimate of the static groundwater level at approximately 2 to 7 metres below the existing grade. This is consistent with our experience on other nearby development projects. It is noted that the groundwater conditions within the overburden soils would be influenced by prevailing weather conditions and would experience seasonal fluctuation.

3.2.4 WATER WELL INVENTORY

MOE water well records revealed forty-four [44] wells located within an approximate 250 metre radius of the limits of the Site. The location of these available well records is illustrated in the attached Drawing No. 3. The water well records [https://www.ontario.ca/environment-and-energy/map-well-records] locations are approximated in well records using the UTM co-ordinate system and in some instances may be in error by more than 50 metres. Potential for mapping error therefore exists in correlation of well registration numbers with street addresses. Soils and bedrock descriptions in the well records are limited and generalized regarding formation lithology.

It is understood that the existing residential properties to the west and north are privately serviced with water wells or cisterns and septic systems, with the existing residential properties to the south and east are serviced with municipal water, storm and sanitary sewers.

The data contained in the water well records suggests that there are two [2] predominant aquifers in the Study Area, one which is considered a confined aquifer within the limestone bedrock at an estimated depth between 17.7 to 79.0 m bgs, with an average static water level of 11.3m. The other is an unconfined aquifer within the sandy silt, situated at an estimated depth between 2 and 7 m bgs. Data contained in MOE Water Well Records for forty-four [44] water wells within the *Study Area* are presented for statistical observations in Table A below.

The information gathered from the records indicates the following:

- Ground water was encountered as shallow as 17.7 metres below ground surface [“m bgs”] and as deep as 79.0 m bgs, with an average depth of 52.5 m bgs during the well drilling.
- Static water levels varied from 0.3 to 41.2 m bgs, with an average static level of 11.3 m bgs, and;
- The Pressure Head varied from 13.4 to 71.0 metres with an average of 41.2 metres.
- Recommended available pumping rates ranging between 3.5 and 25 gpm.
- The water bearing formation lithology reported in the majority of the wells was within the limestone bedrock.

Table 1: Water Well Records – Statistical Observations

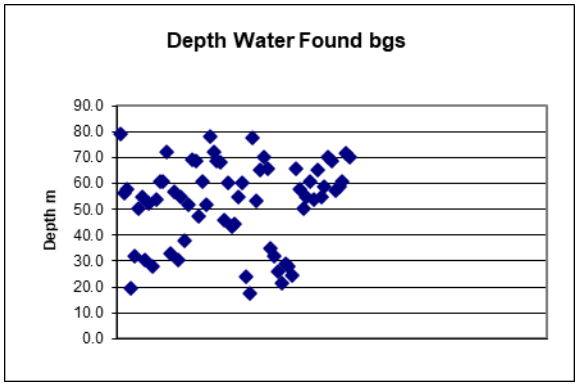
Part Lots 15-17 **Total wells =**
Concessions 8-10 **44**

Surface Elevation		Depth found bgs		Elevation found		Static depth bgs		Static Elevation		Pressure Head
fasl	masl	fasl	masl	fasl	masl	ft	m	fasl	masl	m
1380	420.7	*259*	79.0	*1121*	341.8	*26*	7.9	*1354*	412.8	71.0
1380	420.7	*184*	56.1	*1196*	364.6	*65*	19.8	*1315*	400.9	36.3
1358	414.0	*189*	57.6	*1169*	356.4	*20*	6.1	*1338*	407.9	51.5
1355	413.1	*64*	19.5	*1291*	393.6	*5*	1.5	*1350*	411.6	18.0
1350	411.6	*104*	31.7	*1246*	379.9	*23*	7.0	*1327*	404.6	24.7
1320	402.4	*165*	50.3	*1155*	352.1	*57*	17.4	*1263*	385.1	32.9
1300	396.3	*180*	54.9	*1120*	341.5	*47*	14.3	*1253*	382.0	40.5
1300	396.3	*100*	30.5	*1200*	365.9	*30*	9.1	*1270*	387.2	21.3
1300	396.3	*172*	52.4	*1128*	343.9	*53*	16.2	*1247*	380.2	36.3
1298	395.7	*91*	27.7	*1207*	368.0	*30*	9.1	*1268*	386.6	18.6
1305	397.9	*176*	53.7	*1129*	344.2	*30*	9.1	*1275*	388.7	44.5
1314	400.6	*200*	61.0	*1114*	339.6	*35*	10.7	*1279*	389.9	50.3
1314	400.6	*200*	61.0	*1114*	339.6	*135*	41.2	*1179*	359.5	19.8
1314	400.6	*237*	72.3	*1077*	328.4	*55*	16.8	*1259*	383.8	55.5
1315	400.9	*108*	32.9	*1207*	368.0	*36*	11.0	*1279*	389.9	22.0
1300	396.3	*186*	56.7	*1114*	339.6	*48*	14.6	*1252*	381.7	42.1
1290	393.3	*100*	30.5	*1190*	362.8	*35*	10.7	*1255*	382.6	19.8
1295	394.8	*180*	54.9	*1115*	339.9	*60*	18.3	*1235*	376.5	36.6
1300	396.3	*125*	38.1	*1175*	358.2	*20*	6.1	*1280*	390.2	32.0
1325	404.0	*170*	51.8	*1155*	352.1	*30*	9.1	*1295*	394.8	42.7
1335	407.0	*227*	69.2	*1108*	337.8	*50*	15.2	*1285*	391.8	54.0
1335	407.0	*226*	68.9	*1109*	338.1	*44*	13.4	*1291*	393.6	55.5
1335	407.0	*155*	47.3	*1180*	359.8	*66*	20.1	*1269*	386.9	27.1
1335	407.0	*200*	61.0	*1135*	346.0	*45*	13.7	*1290*	393.3	47.3
1330	405.5	*170*	51.8	*1160*	353.7	*46*	14.0	*1284*	391.5	37.8
1330	405.5	*257*	78.4	*1073*	327.1	*73*	22.3	*1257*	383.2	56.1
1330	405.5	*237*	72.3	*1093*	333.2	*33*	10.1	*1297*	395.4	62.2
1325	404.0	*225*	68.6	*1100*	335.4	*89*	27.1	*1236*	376.8	41.5
1325	404.0	*223*	68.0	*1102*	336.0	*61*	18.6	*1264*	385.4	49.4
1325	404.0	*150*	45.7	*1175*	358.2	*27*	8.2	*1298*	395.7	37.5
1325	404.0	*198*	60.4	*1127*	343.6	*47*	14.3	*1278*	389.6	46.0
1325	404.0	*142*	43.3	*1183*	360.7	*38*	11.6	*1287*	392.4	31.7
1350	411.6	*145*	44.2	*1205*	367.4	*39*	11.9	*1311*	399.7	32.3
1345	410.1	*180*	54.9	*1165*	355.2	*57*	17.4	*1288*	392.7	37.5
1345	410.1	*198*	60.4	*1147*	349.7	*53*	16.2	*1292*	393.9	44.2
1340	408.5	*78*	23.8	*1262*	384.8	*4*	1.2	*1336*	407.3	22.6
1325	404.0	*58*	17.7	*1267*	386.3	*1*	0.3	*1324*	403.7	17.4
1325	404.0	*255*	77.7	*1070*	326.2	*23*	7.0	*1302*	397.0	70.7

1315	400.9	*175*	53.4	*1140*	347.6	*24*	7.3	*1291*	393.6	46.0
1320	402.4	*214*	65.2	*1106*	337.2	*19*	5.8	*1301*	396.6	59.5
1310	399.4	*230*	70.1	*1080*	329.3	*15*	4.6	*1295*	394.8	65.5
1305	397.9	*215*	65.5	*1090*	332.3	*22*	6.7	*1283*	391.2	58.8
1305	397.9	*114*	34.8	*1191*	363.1	*1*	0.3	*1304*	397.6	34.5
1310	399.4	*105*	32.0	*1205*	367.4	*23*	7.0	*1287*	392.4	25.0
1305	397.9	*85*	25.9	*1220*	372.0	*6*	1.8	*1299*	396.0	24.1
1310	399.4	*70*	21.3	*1240*	378.0	*26*	7.9	*1284*	391.5	13.4
1310	399.4	*95*	29.0	*1215*	370.4	*22*	6.7	*1288*	392.7	22.3
1315	400.9	*91*	27.7	*1224*	373.2	*14*	4.3	*1301*	396.6	23.5
1315	400.9	*81*	24.7	*1234*	376.2	*35*	10.7	*1280*	390.2	14.0
1315	400.9	*215*	65.5	*1100*	335.4	*24*	7.3	*1291*	393.6	58.2
1310	399.4	*190*	57.9	*1120*	341.5	*30*	9.1	*1280*	390.2	48.8
1305	397.9	*165*	50.3	*1140*	347.6	*24*	7.3	*1281*	390.5	43.0
1310	399.4	*179*	54.6	*1131*	344.8	*20*	6.1	*1290*	393.3	48.5
1320	402.4	*200*	61.0	*1120*	341.5	*34*	10.4	*1286*	392.1	50.6
1320	402.4	*176*	53.7	*1144*	348.8	*30*	9.1	*1290*	393.3	44.5
1320	402.4	*214*	65.2	*1106*	337.2	*43*	13.1	*1277*	389.3	52.1
1315	400.9	*180*	54.9	*1135*	346.0	*38*	11.6	*1277*	389.3	43.3
1305	397.9	*193*	58.8	*1112*	339.0	*40*	12.2	*1265*	385.7	46.6
1305	397.9	*230*	70.1	*1075*	327.7	*39*	11.9	*1266*	386.0	58.2
1315	400.9	*225*	68.6	*1090*	332.3	*34*	10.4	*1281*	390.5	58.2
1305	397.9	*188*	57.3	*1117*	340.5	*26*	7.9	*1279*	389.9	49.4
1310	399.4	*192*	58.5	*1118*	340.9	*30*	9.1	*1280*	390.2	49.4
1310	399.4	*200*	61.0	*1110*	338.4	*77*	23.5	*1233*	375.9	37.5
1325	404.0	*235*	71.6	*1090*	332.3	*35*	10.7	*1290*	393.3	61.0
1325	404.0	*230*	70.1	*1095*	333.8	*44*	13.4	*1281*	390.5	56.7
		Avg.=	*52.5*	Avg.=	*350.1*	Avg.=	*11.3*	Avg.=	*391.3*	*41.2*
		SdevP=	*16.2*	SdevP=	*16.3*	SdevP=	*6.6*	SdevP=	*8.4*	*14.6*

Water bearing formation

Formation	#	%
Overburden	0	0
Bedrock	44	100



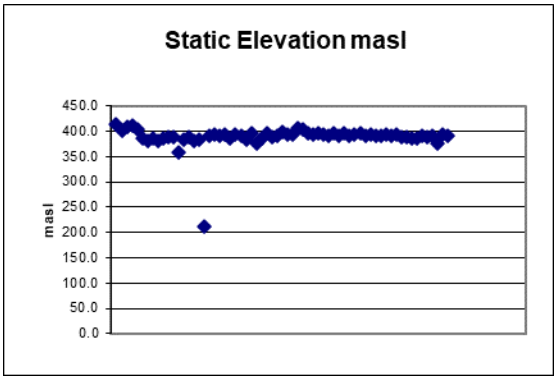


Table D – MOE Water Well Record Statistical Observations

The term aquifer here generally refers to a geologic unit(s) or formation permeable enough to yield economic quantities of water to wells. The term aquitard refers to a geologic unit(s) or formation with insufficient permeability to supply production wells. Aquifers and aquitards are interpreted here based on statistical observation of data contained in the MOE water well records. Hydrographs of water levels are normally not kept for private wells, therefore historical fluctuations in water levels are not known.

3.3 HYDROGEOLOGICAL SETTING

Based on the available information the following comments can be made:

- There are two [2] predominant aquifers in the Study Area, one which is considered a confined aquifer within the limestone bedrock at an estimated depth between 17.7 to 79.0 m bgs, with an average static water level of 11.3m. The other is an unconfined aquifer within the sandy silt, situated at an estimated depth between 2 and 7 m bgs.;
- In each case the aquifer within the limestone bedrock exhibited a positive pressure head [i.e., the static water level is above the elevation where the groundwater was encountered] in each well record, indicating the aquifer was under confined artesian conditions with respect to the confining layer.
- Pressure head (hydraulic head above aquifer) ranged from 13.4 to 71.0 metres with an average of 41.2 metres;
- Recommended available pumping rates ranging between 3.5 and 25 gpm.

Given the above, any active potable water wells in the area would be at greater depths as drilled bedrock wells. Such wells would be drawing water from within the limestone bedrock aquifer. The overburden soils consist of primarily sand and silty sands, with less permeable clayey silt. The shallow groundwater condition on the site is typical of an unconfined near surface aquifer, which would be influenced by seasonal weather conditions, drainage, and the presence of variable more permeable seams in the overburden soils.

4. EARTHWORKS AND SITE GRADING OPERATIONS

Based on the provided preliminary grading plan forwarded to our office by MTE (Project No. 50250-100, F16-FG.dwg) dated April 7, 2022 some cut and fill on the order of 2 to 4 metres will take place. Despite the moderate cut and fill operations, the preliminary grading plan has taken into consideration the groundwater elevations across this parcel of land, such that fill operations will take place on the northern portion of the site where groundwater was noted to be highest and cut operations in the middle and south portions of the site, where groundwater was observed to be deepest. It would be expected that natural surface drainage would result in pooling of water in low spots across the site, which are noted to be within the areas of fill. The predominantly sandy soils on the Clayton Lands will promote natural infiltration and will make site servicing easier, provided that contractors work their way from the low end of the site to the high end of the site.

At this time a preliminary site servicing and grading plan for the Elora Sands has not been provided to our office, as the potential development of those lands is a future

consideration. However, the existing topography of this parcel of land contains larger undulations and changes in elevations. Therefore, it is anticipated that the cut and fill operations for this parcel of land will require more significant regrading. It is recommended that the cut/fill operations be handled in a similar manner as the Clayton Lands, such that fill operations take place where groundwater is shallowest at the northern portion of the site and cut operations take place where the deepest groundwater was encountered at the southern end of the site. As noted above, the Elora Sands generally consists of sandy silt/silty sand within the upper levels, transitioning to a clayey sandy silt with depth, however is more variable at times with clayey or gravelly deposits. As such, 'perched' water deposits within the permeable seams may yield 'wet' excavated material. Contractors should anticipate difficulties with base stabilisation and engineered fill works when work is conducted during the 'wet' times of the year. It is recommended that where possible, earthworks be conducted during the dry summer months. Where engineered fill occurs during the 'wet' times of the year, considerable delays and challenges in achieving effective compaction associated with wet soil conditions may be incurred and should be anticipated. It may be necessary to spread a thin lift of wet backfill to 'air dry' for several days or more if engineered fill is undertaken during the 'wet' times of the year.

5. HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development is anticipated to consist of single-family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend up to approximately 1.5 to 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, generally 3.5 to 7 metres over the Clayton lands presently proposed for development. The groundwater level is shallower to the east, approaching the Irvine Creek tributary [Nichol Drain], generally following the drop in topography toward the creek. As the conditions consisted mostly of the permeable sand on the Clayton Lands, the groundwater level between the 'wet' and 'dry' seasons of the year was relatively consistent with little to no fluctuation. These conditions, with relatively permeable soil conditions at depth, and groundwater at sufficient depth, are well suited to proposed development. The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions.

The exception might be deeper trunk sewers, which would warrant closer assessment as the detailed design proceeds.

Shallower groundwater was observed on the Elora Sands at the northern portion of the site where more clayey and gravelly deposits were encountered, as noted above. These deposits are likely to trap and create a 'perched' water condition which may exacerbate the infiltration of groundwater into open excavations, however would likely be able to be handled with conventional dewatering methods and techniques. Furthermore, the fluctuations in groundwater level were higher on the Elora Sands as the soils conditions encountered within the boreholes consisted of more clayey deposits.

The short-term excavations for the proposed servicing are generally anticipated to extend through the permeable sandy soils and into the clayey sandy silt till where deeper excavations are required. Where the site calls for the placement of engineered fill, raising the grade, it would create an even larger separation between the groundwater table and the proposed servicing and foundation construction. Excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. However, during wet times of year and in deeper excavations, some instability of the excavations should be expected. In the event that deeper excavations are required below the groundwater level or where more permeable sand and gravel seams are encountered, a greater rate of infiltration should be anticipated, requiring multiple pumps and possibly more sophisticated dewatering techniques for deeper excavations.

The rate of dewatering would be a function of the time of year, depth of excavation, length of trench opened by the contractor, etc. In most cases it is expected to be below 50,000 L/day, though for deeper excavations may be as much as up to 400,000 L/day. Where dewatering rates of greater than 50,000 L/day are anticipated it would be necessary to file an EASR notice for construction dewatering. However, it is not anticipated that dewatering would be greater than 400,000 L/day, and so the need for a permit to take water [PTTW] is not expected. As noted above, the advancement of a number of test pits, would be prudent to assist in refining the anticipated construction dewatering requirements as the design of the site grading and servicing proceeds.

The layering of sandy and clayey soils encountered specifically on the Elora Sands would allow for some natural drainage and movement of groundwater, however given the high silt content this should not be solely relied upon. As such, excavations may have the potential to intercept shallow groundwater on parts of the site and thus create a "French Drain" within the bedding material, with possible affect to the groundwater.

Consequently, if groundwater is encountered during digging of the service trenches, measures may need to be implemented to mitigate/eliminate groundwater interference. These would include clay cut-offs within the service trench fill encasing the pipe/service. Such clay cut-offs should be installed in accordance with OPSD 80.095, using a suitable clay soil or alternatively a blend of 1 part bentonite chips to 3 parts OPSS Granular A, or suitably clayey soil encountered on site. The need for such measures is best assessed as the detailed design proceeds, and in the field during construction. Regardless, any such locally lowering of the groundwater associated with site servicing would be limited to the near surface soils, and would not be expected to significantly impact the regional groundwater conditions.

Excavations for the proposed basement levels should be well above the groundwater level, pending review of the final site grading plans and foundation depths, along with more detailed assessment such as test pits in the area of observed shallow groundwater levels. With proper consideration to the site grading and design founding elevations, it is not anticipated that foundation excavations would require ongoing groundwater control, other than typical perimeter weeping tile and sump pumps.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during pre and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit predominantly on the Clayton Lands, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such as in 'dry' ponds, infiltration galleries, rear yard infiltration swales or galleries, etc. As noted above, the sand deposit would have hydraulic conductivity on the order of 10^{-2} to 10^{-3} cm/sec, correlating to design infiltration rates on the order of 100 to 300 mm/hr. The use of infiltration systems could be readily utilised for lot level infiltration of rain water from downspouts, and also within the overall SWM plan. The soil conditions on the Elora Sands are more variable and contain more clayey deposits which are considered to have a low permeability characteristic. Preliminary grain size analyses on the clayey sandy silt till indicate a hydraulic conductivity on the order of 10^{-6} to 10^{-8} cm/sec, correlating to design infiltration rates on the order of less than 10 to 15 mm/hr. As such, LID systems aren't recommended where areas of clayey sandy silt till are encountered [generally the lower areas of the site, towards the tributary to Irvine Creek] but should be considered in areas consisting

of the more permeable sandy deposits [generally the higher portions of the site, to the south]. This would be better addressed during the detailed design process, supported with the advancement of test pits at specific locations proposed for LID measures. It is noted that single well response testing will be performed in a number of the monitoring wells installed which will allow for a more accurate estimate of the hydraulic conductivity for the various soil layers.

Based on our observations and details of the proposed development, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area, provided the comments and recommendations provided in this report are adhered to. There is not expected to be a significant or long-term impact on the development, such as ongoing dewatering, etc., provided the above discussion and recommendations are considered in the site grading, servicing and stormwater design.

As outlined above, the hydrogeological setting of the site is such that potable wells in the area would be drawing from a deep confined bedrock aquifer, and would be largely unaffected by potential construction activities encountering the shallow near surface groundwater regime. Construction of the proposed development would involve relatively shallow excavations only, with limited interaction with the shallow groundwater regime, and would not have an impact on deeper supply aquifers. As such, there would be no anticipated negative impact from the proposed development on nearby potable wells, including municipal supply wells. Further, as the proposed development would be provided with municipal water supply, there would be no impact to potential supply aquifers or associated water wells in the area, if any.

It is noted that the subject lands are within a Wellhead Protection Area (WHPA). However, based on the comments noted above, there will be no anticipated negative impact with respect to the deep bedrock aquifer serving as the potable supply source for private and municipal potable wells within the area.

6. STORMWATER MANAGEMENT (SWM) POND DESIGN CONSIDERATIONS

As noted above, the static groundwater level at the northern portion of the Elora Sands is on the order of 0.5 to 4.5 metres below the existing ground surface, at a relative elevation of roughly 403 to 401 metres, based on the available groundwater data to date. The groundwater charts for the monitoring wells at these locations have illustrated the large fluctuations that are experienced during the ‘wet’ and ‘dry’ seasons of the year. At this time the design details of the proposed SWM pond proposed at the north edge of the Elora Sands are not known, however it is anticipated that the pool will have a

permanent pool elevation near the observed groundwater level, and the use of an impermeable liner would be expected to be required.

In general, where the permanent pool elevation is below the static groundwater elevation, it will be necessary to provide a low permeability layer over the base of the pond to resist the infiltration of natural groundwater, and of sufficient weight to resist the hydrostatic uplift pressures. Conversely, where the permanent pool elevation is above the static groundwater level, a low permeability liner will be required to prevent the exfiltration of water out of the pond. This could be accomplished through the use of a compacted clay liner, or with a weighed down proprietary liner system, etc. The weight of the liner system would have to exceed the uplift pressure of the ground water during the most severe periods of the year, likely when maximum storage is required. In approximate terms for example, one metre of clay liner, or equivalent, would be required for about every two meters of water storage below static ground water level, i.e., when the water level in the pond is 2 metres below the static ground water table, the clay liner would have to be at least one metre thick; if 3 metres below the static level, then 1.5 metres thick, etc.

Where the permanent pool elevation is below the static groundwater elevation, it will be necessary to provide a low permeability layer over the base of the pond to resist the infiltration of natural groundwater, and of sufficient weight to resist the hydrostatic uplift pressures. Conversely, where the permanent pool elevation is above the static groundwater level, a low permeability liner will be required to prevent the exfiltration of water out of the pond. This could be accomplished through the use of a compacted clay liner, or with a weighed down proprietary liner system, etc. The weight of the liner system would have to exceed the uplift pressure of the ground water during the most severe periods of the year, likely when maximum storage is required. In approximate terms for example, one metre of clay liner, or equivalent, would be required for about every two meters of water storage below static ground water level, i.e., when the water level in the pond is 2 metres below the static ground water table, the clay liner would have to be at least one metre thick; if 3 metres below the static level, then 1.5 metres thick, etc. It is recommended that best efforts be made to design the static pool elevation close to the static groundwater elevation so that the natural seasonal fluctuations of the groundwater elevation dictate the permanent pool elevation. This would eliminate the need to construct a weighted liner to resist the hydrostatic uplift pressures of the static groundwater elevation. That being said, this would only work if the former solution could be achieved whilst attaining the required water storage volume for the development.

An impermeable compacted clay liner would consist of a sufficiently plastic clay soil, with a recommended minimum clay content of 20 per cent and plasticity index of 7. Based on the current laboratory testing of the native soils, the majority of the clayey silt soils are generally suitable for use as an impermeable liner for the proposed SWM ponds, however any sandy deposits or silt material encountered should be selectively sorted and separated from its distinctly different counterpart to avoid use of the more permeable material. As such, during site grading and servicing activities, it would be prudent to stockpile such clayey soil near the area of the proposed SWM pond for use as such an impermeable liner. Additional testing may then be conducted on the stockpiled material, to confirm its suitability for use as an impermeable clay liner.

As noted above, the clayey soils encountered might be suitable for use as an impermeable clay liner but would require additional testing on at the specific location of the SWM pond. The base of the SWM pond may be prepared by scarifying or 'discing' in the upper perhaps 0.3 to 0.5 metres to destroy any natural layering structure, moisture conditioned to within -2 to +4 per cent of its optimum moisture content, and recompacted in place, however the soils present at the proposed base of the SWM pond should be confirmed. In the event that an imported clayey soil is required for use as an impermeable liner, the clay liner should be placed in nominal lifts of 300 millimetres, sufficiently worked and moisture conditions as noted above, and compacted to 95 per cent of its SPMDD. It is noted as well, regardless of the provision of an impermeable liner, the sides of the pond should be well worked or scarified to destroy any natural layers or seams, specifically any more permeable sandy or gravely seams. Where such layers are encountered, a layer of available on-site clayey soil should be placed and compacted, as outlined above, to restrict the natural infiltration of groundwater into the pond through these more permeable horizontal seams.

Alternatively, weighed down proprietary liners could be considered, however the suppliers of such materials (such as Layfield, Terrafix, Suprema) would have to be consulted for recommendations on the appropriate product and installation methods for the site conditions. Such artificial liners would not require compaction efforts and could be weighed down with practically any available soil or granular material.

Interior pond slopes beneath the permanent pool elevation should be limited to inclinations no steeper than 4 horizontal to 1 vertical, with interior slopes above permanent pool elevation and exterior slopes no steeper than 3 horizontal to 1 vertical. Should steeper slopes be required, it will be necessary to provide some form of stabilisation such as the placement of coarse 'rip rap' stone, or proprietary product such as Turfstone or Cable-Crete, or construction as a reinforced earth embankment. It is recommended that all interior pond slopes be provided with at least some form of

nominal stabilisation/protection to control loss erosion/loss of ground. Above the pond level this may consist of appropriate vegetation.

Material utilised in construction of pond slopes must be free of significant organic deposits, construction debris, or any other deleterious materials which would affect stability of the pond walls. Our office should be retained to review any imported material to the site, as well as to provide quality control services during construction.

It is also noted that appropriate care and effort will be required by the contractor around inlet and outlet structures to ensure the impermeable liner is continuous and avoid the potential of 'piping'. In this regard the clay liner should be completely constructed prior to the installation of inlet/outlet structures. A bentonite clay material could be utilised within the fill around any structures to provide a continuous impermeable seal.

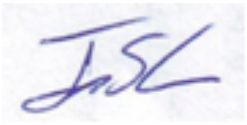
7. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Scott Wylie, B.Eng., EIT.



Ian Shaw, P. Eng., QP_{ESA}
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Drawing No. 2, Groundwater Contour Map
Drawing No. 3, Water Well Records
Drawing Nos. 4, 5 and 6, Geologic Cross Sections
Log of Borehole Nos. 001 to 007, 101 to 104, 201 to 206, 301 to 307 and 401, inclusive
Grain Size Analyses

Distribution: Cachet Developments [pdf]

LEGEND

- Borehole Location — BH#
- Monitoring Well Location — MW#
- Geological Cross Section Location

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301591-G.

2. Borehole and monitoring well locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Nichol Road 15
Elora, Ontario

Borehole Location Plan

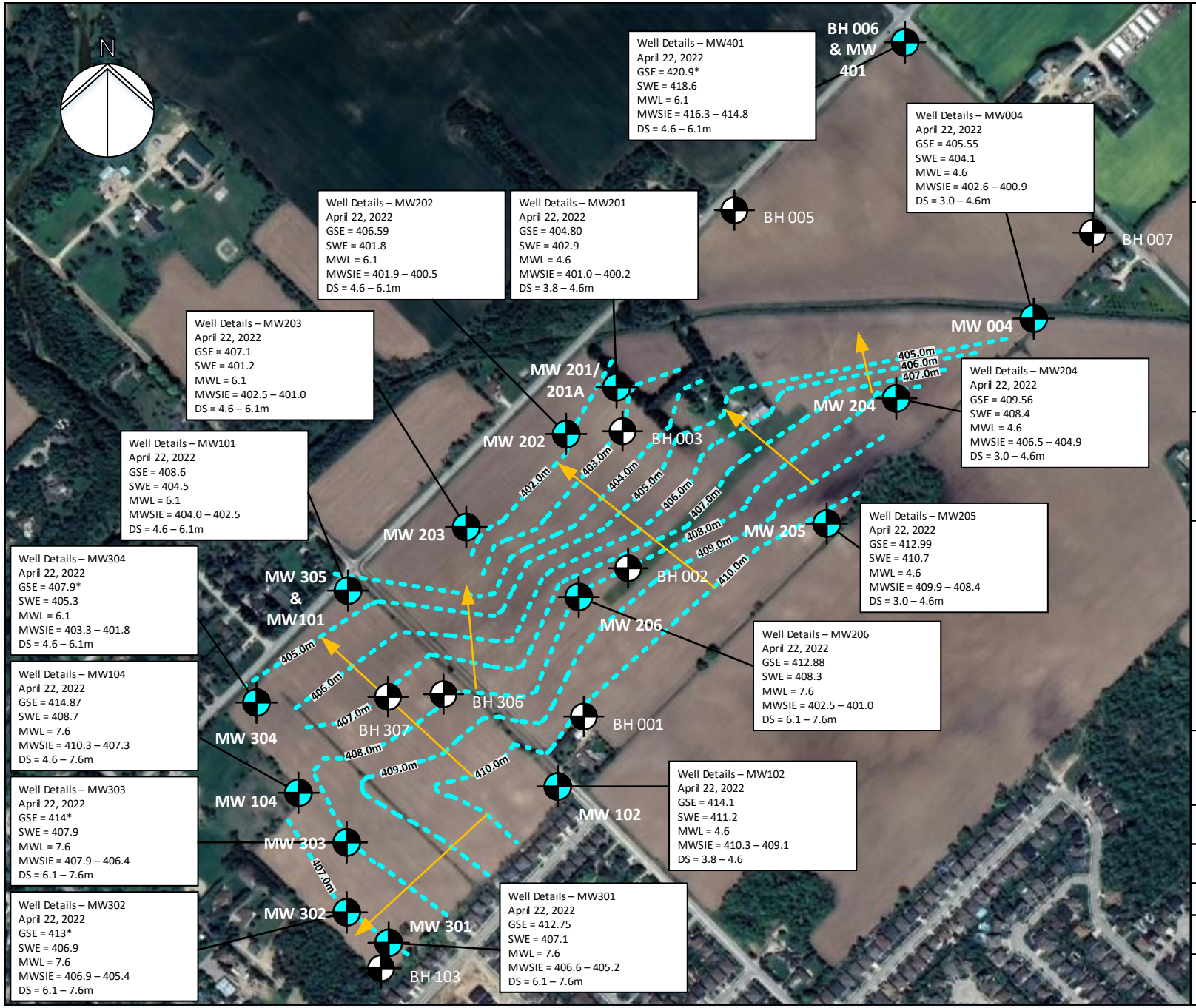
Project No. SM 301591-G

Date: June 2022

Drawn: SW | Checked: IS

SM 301591-G Borehole Location Plan

Drawing No. 1



LEGEND

Monitoring Well Location

MW#

GSE = Monitoring Well Ground Surface Elevation
SWE = Static Water Elevation [taken on April 22, 2022]
MWL = Monitoring Well Length
MWSIE = Monitoring Well Screen Interval Elevation
DS = Depth of Screen

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301591-G.

2. Borehole and monitoring well locations are approximate.

*GSE interpolated between contour lines from topographic survey

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Nichol Road 15
Elora, Ontario

Groundwater Contour Map

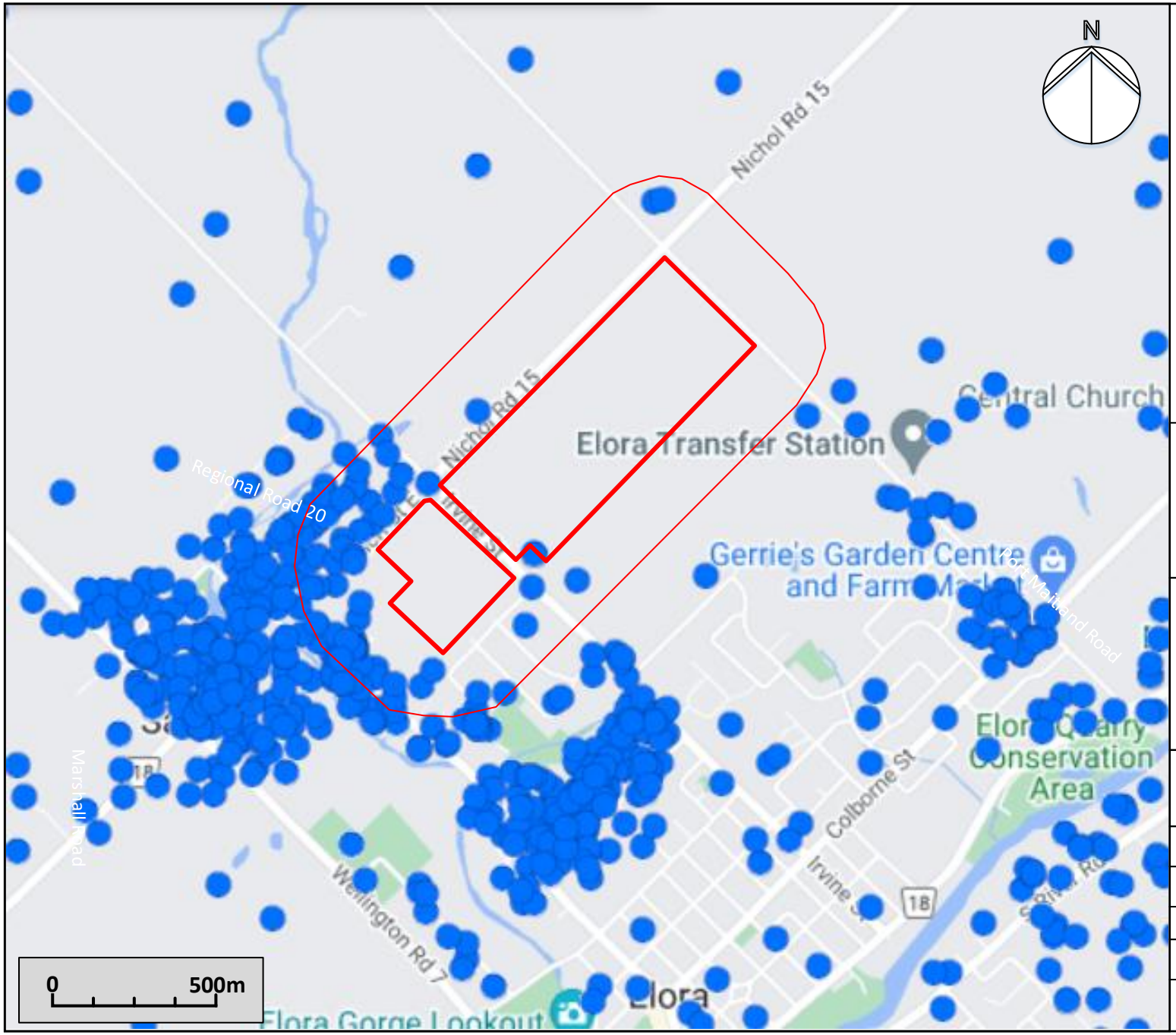
Project No. SM 301591-G

Date: June 2022

Drawn: SW | Checked: IS

SM 301591-G Groundwater Contour Map

Drawing No. 2



LEGEND

= Site

= Well Record

= Study Area

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Groundwater Well Survey
Proposed Residential Development
Nichol & Clayton Lands
Elora, Ontario

Ministry of the Environment
Water Well Records Plots

Project No. SM 302951-E

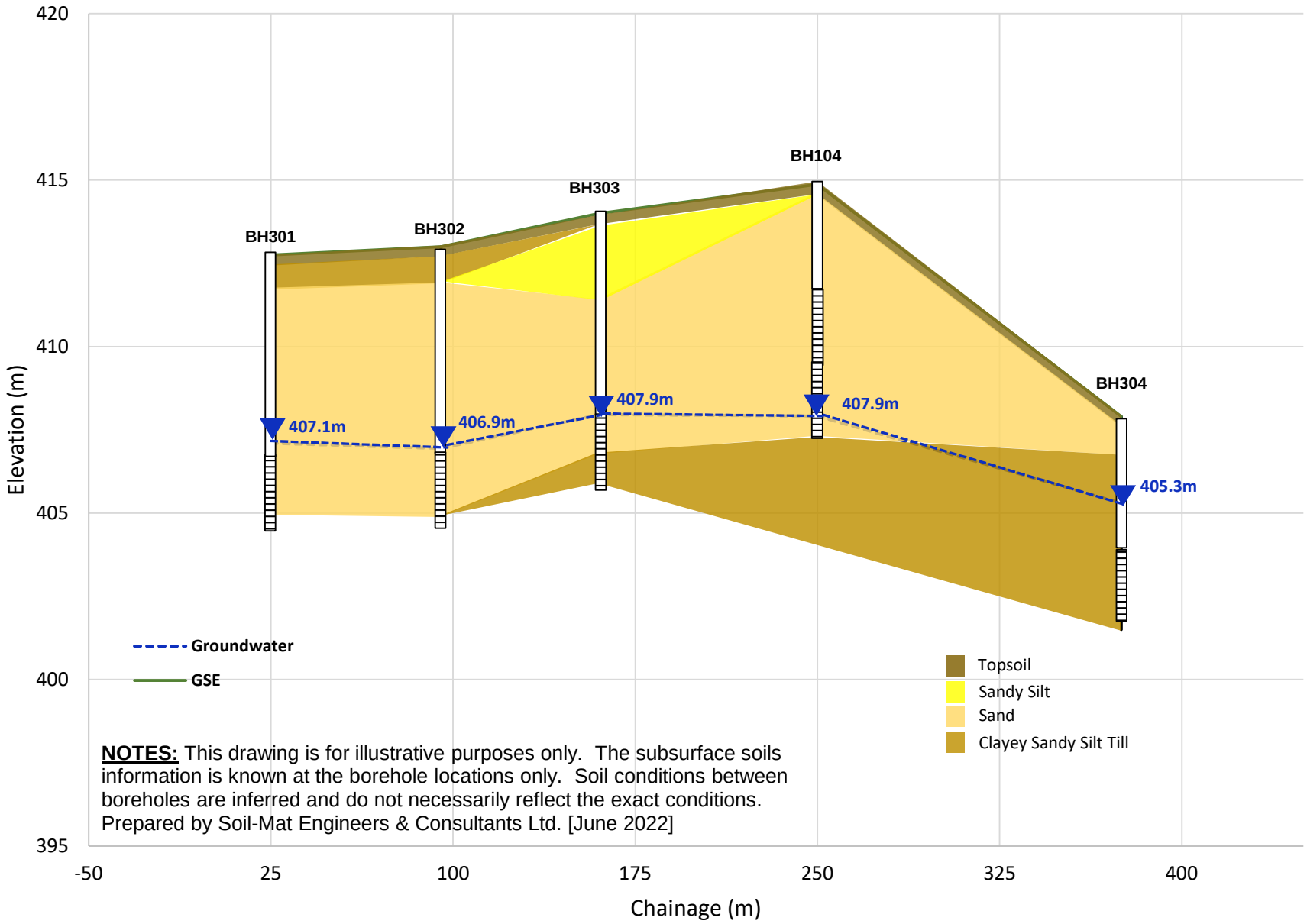
Date: July 2022

Drawn: PM | Checked: IS

SM 302951-E Water Well Records

Drawing No. 3

Geological Cross Section A-A

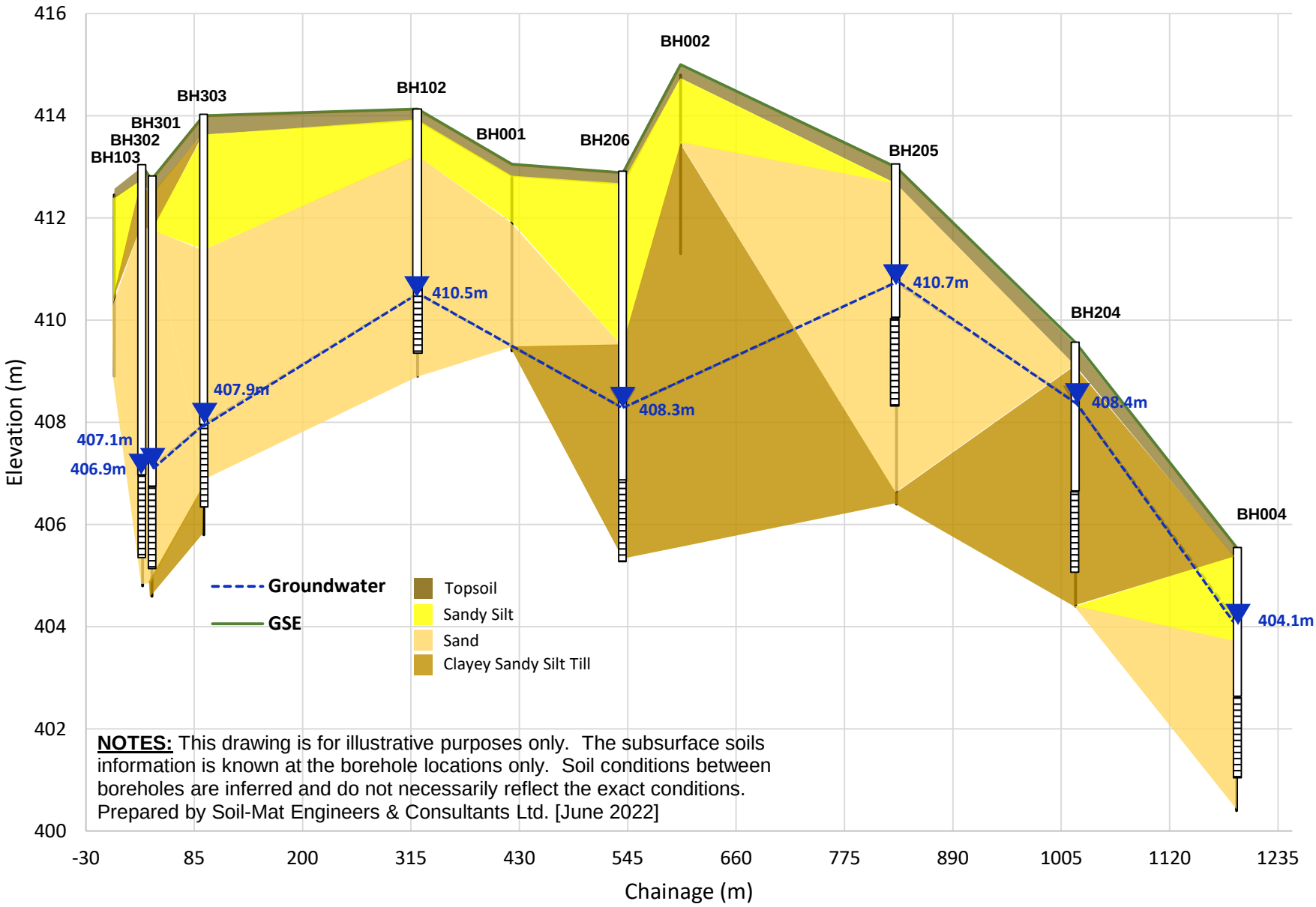


NOTES: This drawing is for illustrative purposes only. The subsurface soils information is known at the borehole locations only. Soil conditions between boreholes are inferred and do not necessarily reflect the exact conditions.
Prepared by Soil-Mat Engineers & Consultants Ltd. [June 2022]

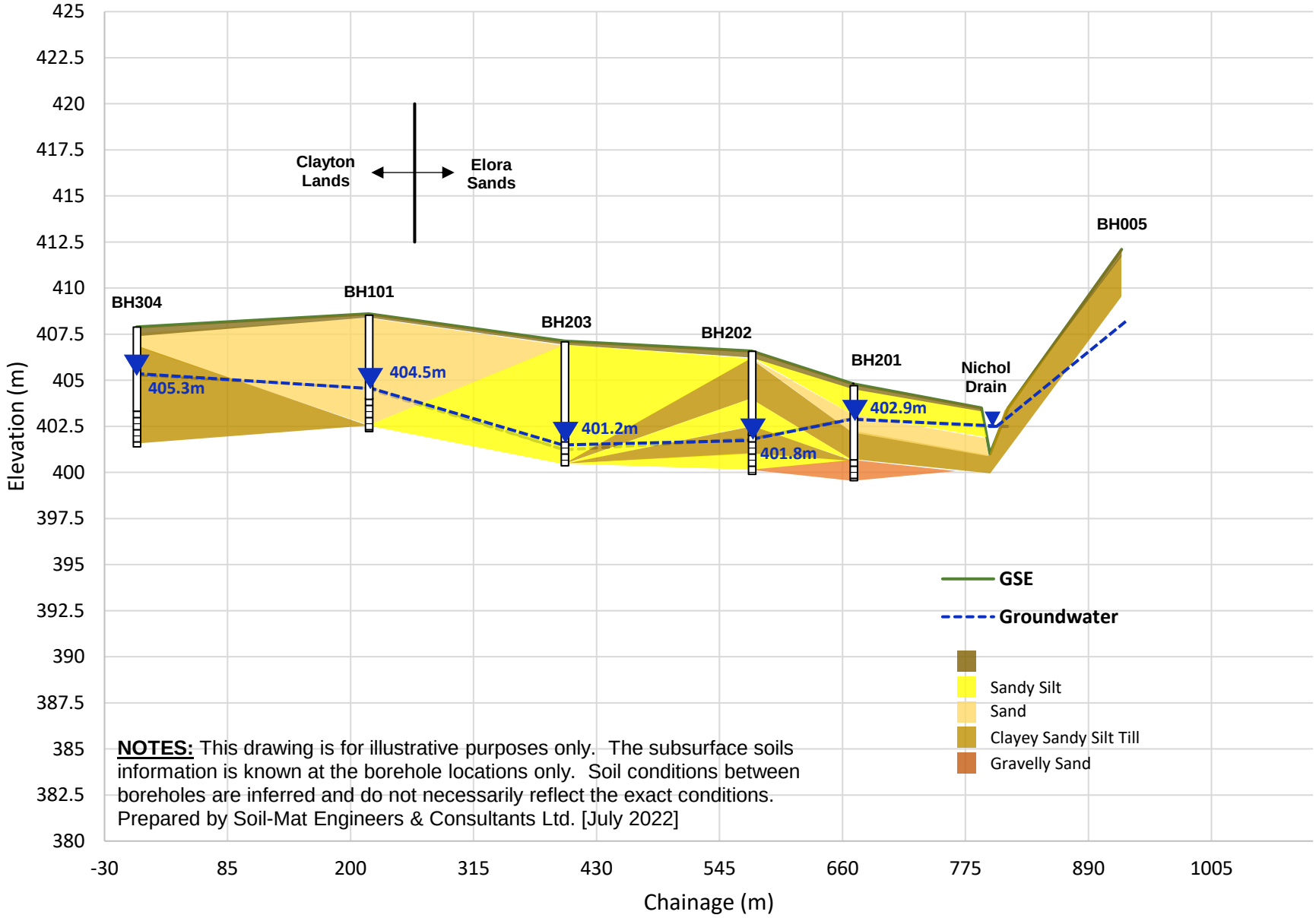
Drawing No. 4

Project No. SM 301951-G

Geological Cross Section B-B



Geological Cross Section C-C



NOTES: This drawing is for illustrative purposes only. The subsurface soils information is known at the borehole locations only. Soil conditions between boreholes are inferred and do not necessarily reflect the exact conditions.
Prepared by Soil-Mat Engineers & Consultants Ltd. [July 2022]

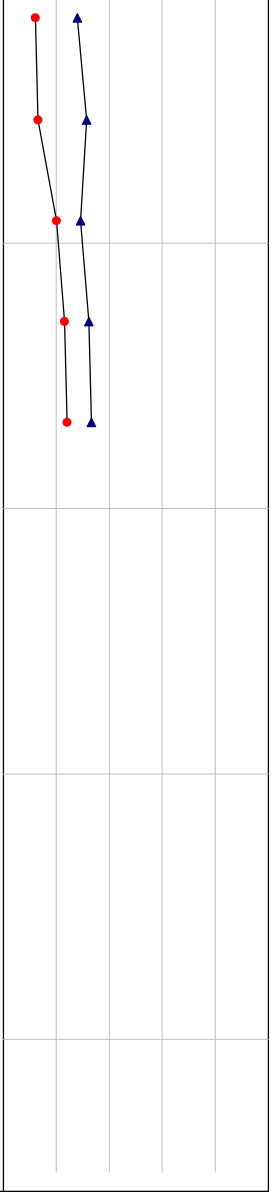
Log of Borehole No. 001

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838268
E: 545454

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	413.05		Ground Surface								
0 / 0	412.80		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	4 5 7 6	12			
3 / 1	411.90		**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, compact.		SS	2	6 7 6 6	13			
			Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, compact.		SS	3	5 8 12 14	20			
					SS	4	12 10 13 10	23			
11 / 3	409.40				SS	5	6 11 13 15	24			
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as dry and caved to a depth of 1.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 002

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838469
E: 545516

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		415.00	Ground Surface								
0	0	414.80	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	2 4 4 5	8			
3	1	413.50	**Sandy Silt** Brown, reworked in upper levels, trace clay, silt, and gravel, loose.		SS	2	4 3 6 8	9			
6	2	412.50	**Clayey Sandy Silt Till** Brown, trace to some gravel, stiff to very stiff.		SS	3	6 6 6 7	12		3.5	
9	3	411.30	Transition to grey.		SS	4	3 7 6 7	13		4.0	
12	4		End of Borehole		SS	5	9 7 15 18	22		>4.5	

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 003

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838652
E: 545505

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 ft / 0 m	409.93		Ground Surface									
0	409.93		**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4 6 10 8	16				
1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, compact.		SS	2	6 10 10 7	20				
2	408.10				SS	3	6 8 10 11	18				
2	407.80		**Clayey Sandy Silt Till** Brown, trace to some gravel, compact.									
			End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 004

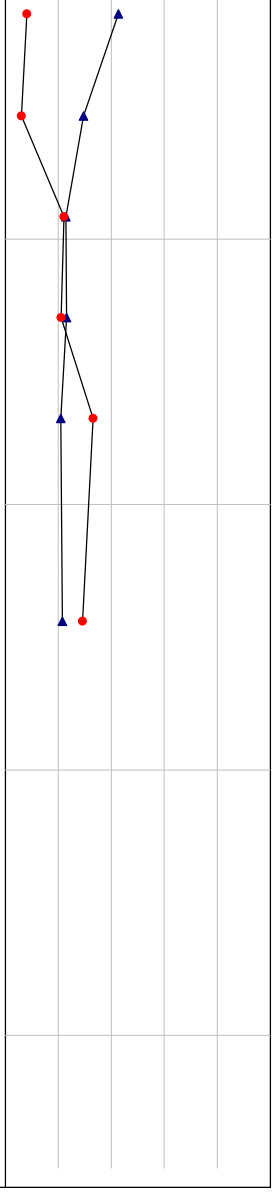
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838792
E: 546044

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		405.55	Ground Surface							
0	0	405.35	**Topsoil** Approximatelty 200 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay, trace gravel, reworked in upper levels, loose.	SS	1	2 3 5 6	8			
2										
3	1			SS	2	4 3 3 5	6			
4										
5										
6		403.70	**Sand** Brown, trace clay, silt, and gravel, medium to coarse gradation, wet, compact to dense.	SS	3	8 10 12 15	22			
7	2									
8				SS	4	8 10 11 10	21			
9										
10	3			SS	5	8 10 23 30	33			
11										
12										
13	4									
14										
15		400.70								
16	5	400.40	Transition to grey.	SS	6	3 11 18 23	29			
17			End of Borehole							
18										
19										
20	6									
21										
22										
23	7									
24										
25										
26	8									
27										
28										
29	9									

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 5, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 2.74 metres below ground surface.

August 27, 2021 - 1.75 metres below ground surface.

February 23, 2021 - 1.33 metres below ground surface.

April 22, 2022 - 1.47 metres below ground surface.

June 1, 2022 - 1.78 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 5, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 005

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838939
E: 545636

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 / 0	412.10		Ground Surface									
0 / 0	411.90		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2 4 5 7	9				
3 / 1			**Clayey Sandy Silt Till** Brown, reworked in upper levels, trace to some gravel, increasing clay content with depth, loose to compact.		SS	2	1 3 3 5	6				
6 / 2	410.00				SS	3	3 5 7 9	12				
7 / 2			End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
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Checked by: SW
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Log of Borehole No. 006

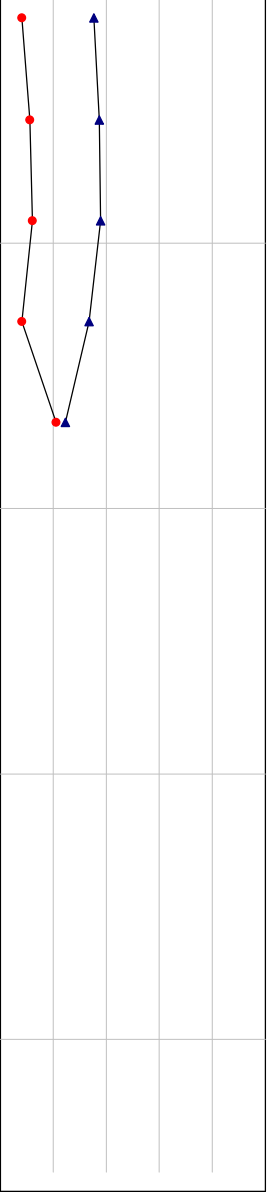
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839162
E: 545871

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		420.91	Ground Surface								
0	0	420.70	**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	4 4 4 4	8			
1			**Sand** Brown, reworked in upper levels, trace rootlets, loose to compact.		SS	2	3 5 6 6	11			
2	1	419.40	**Clayey Sandy Silt Till** Brown, trace gravel, increasing clay content with depth, loose to compact.		SS	3	5 6 6 7	12			
3					SS	4	3 4 4 4	8			
4	2	417.30			SS	5	5 11 10 15	21			
5			End of Borehole								
6	3										
7											
8	4										
9											
10	5										
11											
12	6										
13											
14	7										
15											
16	8										
17											
18	9										
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											

Moisture Content w%
10 20 30 40

Standard Penetration Test blows/300mm
20 40 60 80



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as wet at depth of 2.0 metres, and caved to a depth of 2.4 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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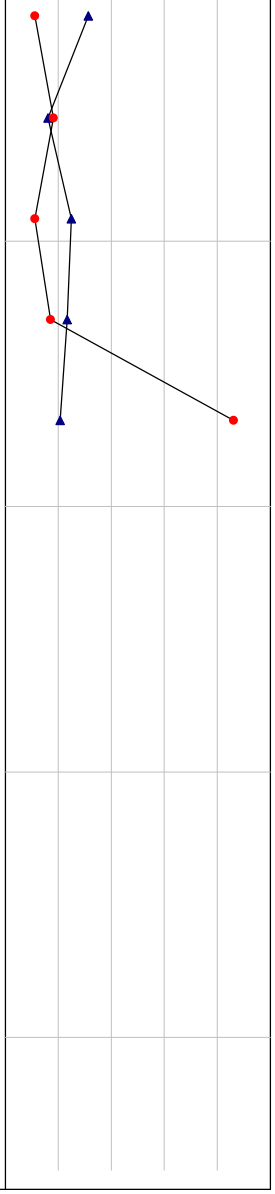
Log of Borehole No. 007

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838910
E: 546126

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.39		Ground Surface								
0–1 / 0	408.10		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	3 5 6 7	11			
1–3 / 1			**Sandy Silt** Brown, trace rootlets, trace clay, reworked in upper levels, increasing clay content with depth, compact.		SS	2	10 8 10 10	18			
3–5 / 1–2	406.90		**Clayey Sandy Silt Till** Brown, trace to some gravel, stiff to hard.		SS	3	3 5 6 6	11		2.0	
5–8 / 2–3					SS	4	5 7 10 18	17		2.5	
8–12 / 3					SS	5	24 36 50/5"	100		>4.5	
12 / 4	404.70		End of Borehole								
13–29 / 4–9											

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.0 metres.

2. Borehole was recorded as open and dry upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 101

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838437
E: 545149

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE: Type	SAMPLE: Number	SAMPLE: Blow Counts	SAMPLE: Blows/300mm	SAMPLE: Recovery	SAMPLE: PP (kgf/cm2)	SAMPLE: U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0 ft / 0 m	408.60		Ground Surface									
0	408.30		**Topsoil** Approximately 250 millimetres of topsoil.									
1 – 3 / 1			**Sand** Brown, trace gravel.									
2 – 7 / 2												
3 – 10 / 3												
4 – 13 / 4												
5 – 17 / 5	403.10		Transition to grey in colour									
6 – 20 / 6	402.50		End of Borehole									
7 – 23 / 7												
8 – 26 / 8												
9 – 30 / 9												
33												

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 6.10 metres.
2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. No soil samples were retrieved. The following free groundwater level readings have been measured:

August 6, 2021 - 4.78 metres below ground surface.

August 27, 2021 - 4.71 metres below ground surface.

October 14, 2021 - 4.33 metres below ground surface.

February 23, 2022 - 4.31 metres below ground surface.

April 22, 2022 - 4.07 metres below ground surface.

June 1, 2022 - 4.15 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 102

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838180
E: 545422

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	414.13	Ground Surface								
0 / 0	413.90	**Topsoil** 250 millimetres of topsoil.								
3 / 1	413.20	**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, loose to compact.		SS	1	4 5 7 8	12			
				SS	2	2 3 6 5	9			
		Sand Brown, trace clay, silt, and gravel, medium to coarse gradation, loose to compact.		SS	3	3 9 12 14	21			
				SS	4	7 8 11 10	19			
				SS	5	6 9 11 17	20			
16 / 5	408.90	End of Borehole		SS	6	7 5 4 9	9			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 5.2 metres.
2. Borehole was recorded as caved to a depth of 3.8 metres and 'wet' at a depth of 3.6 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 3.58 metres below ground surface.

August 27, 2021 - 3.61 metres below ground surface.

October 14, 2021 - 3.62 metres below ground surface.

February 23, 2021 - 3.5 metres below ground surface.

April 22, 2022 - 2.89 metres below ground surface.

June 1, 2022 - 3.05 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 103

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4837942
E: 545194

Depth (ft)	Depth (m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.55	Ground Surface								
0	0		**Topsoil** Approximately 100 millimetres of topsoil.		SS	1	5 5 7 8	12			
3	1		**Sandy Silt** Brown, trace to some gravel and clay, reworked in upper levels, compact.		AS	2	6 5 3 3	8			
6	2				SS	3	5 6 6 6	12			
7		410.30									
8			**Sand** Brown, trace clay, silt, and gravel, medium gradation, loose.		SS	4	2 3 3 2	6			
11	3				SS	5	2 1 1 2	2			
12		408.90									
13	4		End of Borehole								
29	9										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded dry and caved to a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Sheet: 1 of 1

Log of Borehole No. 104

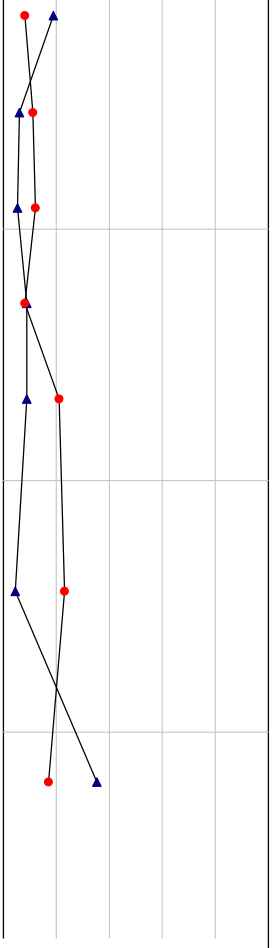
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838174
E: 545084

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	414.87	Ground Surface								
0 / 0	414.60	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	5 5 6 7	11			
1 /		**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, fine to medium gradation, compact.		SS	2	8 9 9 7	18			
2 / 1				SS	3	2 5 8 7	13			
3 /				SS	4	6 11 16 13	27			
4 / 2				SS	5	10 12 11 13	23			
5 /										
6 / 3				SS	6	5 10 13 15	23			
7 /										
8 / 4	408.80	Wet spoon		SS	7	9 9 8 6	17			
9 /										
10 / 5										
11 /										
12 / 6	407.30	End of Borehole								
13 /										
14 / 7										
15 /										
16 / 8										
17 /										
18 / 9										
19 /										
20 / 10										
21 /										
22 / 11										
23 /										
24 / 12										
25 /										
26 / 13										
27 /										
28 / 14										
29 /										
30 / 15										
31 /										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 6, 2021 to termination at a depth of 7.6 metres.

2. Borehole was recorded as open and 'wet' at depth of 7.0 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 6.78 metres below ground surface.

August 27, 2021 - 6.96 metres below ground surface.

October 14, 2021 - 7.09 metres below ground surface.

February 23, 2022 - 6.83 metres below ground surface.

April 22, 2022 - 6.13 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 6, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 201

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838708
E: 545501

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	404.80	Ground Surface								
0 / 0	404.35	**Topsoil** Approximately 450 millimetres of topsoil.		SS	1	5,3,3,3	6			
1 / 0		**Sandy Silt/Silty Sand** Brown, trace to some clay and gravel, loose.								
1 / 1	403.10	**Sand** Brown, loose.		SS	2	2,4,5,6	9			
2 / 1	402.20	**Clayey Sandy Silt Till** Brown, some gravel, ocasional cobbles, compact to dense								
3 / 1				SS	3	6,12,18,20	30			
4 / 2	400.70	**Gravely Sand** Brown, trace silt, compact.								
5 / 2	399.60			SS	4	10,9,9,13	18			
5 / 2		End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 16, 2022 to termination at a depth of 5.2 metres.

2. Borehole was recorded as caved to a depth of 3.0 metres and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 2.69 metres below ground surface.

April 22, 2022 - 1.88 metres below ground surface.

June 1, 2022 - 2.44 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 16, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
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Log of Borehole No. 201A

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838708
E: 545501

Depth ft	Depth m	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	SAMPLE PP (kgf/cm2)	SAMPLE U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
0	0	404.75		Ground Surface									
10	3	401.70		End of Borehole									

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 16, 2026 to termination at a depth of 3.1 metres.

2. Soil samples will be discarded after 3 months unless otherwise directed by our client.

3. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - dry

April 22, 2022 - 2.05 metres below ground surface.

June 1, 2022 - 2.43 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 16, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
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Datum: Geodetic
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Log of Borehole No. 202

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838647
E: 545436

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	406.59	Ground Surface							
	406.14	**Topsoil** Approximately 450 millimetres of topsoil.							
		Clayey Sandy Silt Till Brown, some gravel, compact.	SS	1	2,2,3,2	5			
			SS	2	4,7,9,12	16			
	404.00	**Sandy Silt** Brown, dense.	SS	3	21,19,18,24	37			
	402.50	**Clayey Sandy Silt Till** Brown, some gravel and sand, very dense dense	SS	4	10,24,50/4	100			
	401.00	**Sandy Silt** Brown, very dense.	SS	5	34,50/4	100			
	400.20	End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 17, 2022 to termination at a depth of 6.4 metres.

2. Borehole was recorded as open and 'wet' at a depth of 0 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 5.5 metres below ground surface.

April 22, 2022 - 4.76 meters below ground surface.

June 1, 2022 - 5.43 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 17, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 203

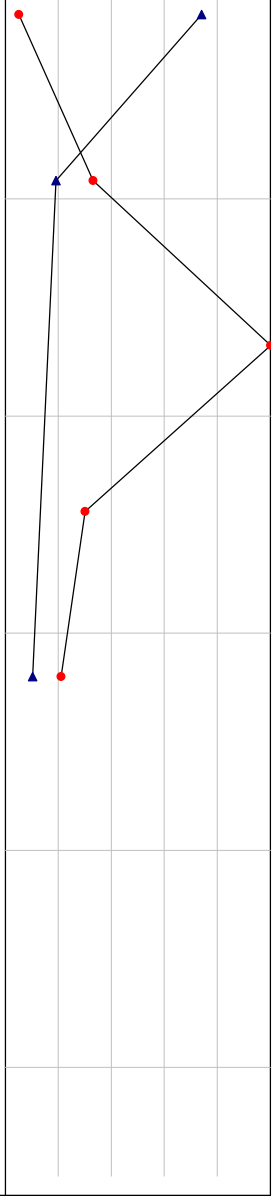
Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838523
E: 545307

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		407.13	Ground Surface							
0	0	406.88	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some gravel, frequent cobbles, loose to very dense.	SS	1	9,3,2,1	5			
2										
3	1									
4				SS	2	8,16,17,27	33			
5										
6										
7	2									
8										
9				SS	3	50/6	100			
10	3									
11										
12										
13	4									
14										
15				SS	4	36,15,15,8	30			
16										
17	5									
18										
19										
20	6									
21				SS	5	7,9,12,14	21			
22		400.40								
23	7		End of Borehole							
24										
25										
26	8									
27										
28										
29	9									
30										
31										
32										
33	10									
34										
35										
36	11									

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 17, 2022 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 0 metres upon completion and backfilled as per Ontario Regulation 903.

3 Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - dry

April 22, 2022 - 5.9 metres below ground surface.

June 1, 2022 - 5.91 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 16, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
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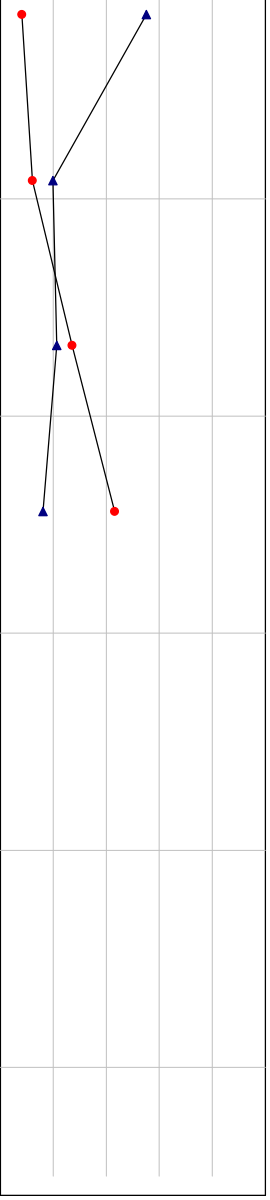
Log of Borehole No. 204

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838693
E: 545861

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	409.56	Ground Surface								
0 / 0	409.16	**Topsoil** Approximately 400 millimetres of topsoil.								
1 / 0		**Clayey Sandy Silt Till** Brown, trace to some gravel, compact to dense.		SS	1	9,4,4,4	8			
2 / 1										
3 / 1				SS	2	4,5,7,17	12			
4 / 1										
5 / 2				SS	3	5,7,20,29	27			
6 / 2										
7 / 3				SS	4	15,21,22,36	43			
8 / 3	404.40	End of Borehole								
9 / 4		NOTES: 1. Borehole was advanced using hollow stem auger equipment on February 18, 2022 to termination at a depth of 5.2 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client. 4. A monitoring well was installed. The following free groundwater level readings have been measured: February 17, 2022 - 2.81 metres below ground surface. April 22, 2022 - 1.16 metres below ground surface. June 1, 2022 - 1.53 metres below ground surface.								
10 / 5										
11 / 6										
12 / 7										
13 / 8										
14 / 9										
15 / 10										
16 / 11										
17 / 12										
18 / 13										
19 / 14										
20 / 15										
21 / 16										
22 / 17										
23 / 18										
24 / 19										
25 / 20										
26 / 21										
27 / 22										
28 / 23										
29 / 24										
30 / 25										
31 / 26										
32 / 27										
33 / 28										
34 / 29										
35 / 30										
36 / 31										

Moisture Content w%: 10 20 30 40
Standard Penetration Test blows/300mm: 20 40 60 80



Drill Method: Hollow Stem Augers
Drill Date: February 18, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Sheet: 1 of 1

Log of Borehole No. 205

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838523
E: 545777

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.99	Ground Surface							
0	0	412.74	**Topsoil** Approximately 250 millimetres of topsoil.							
			Sand Brown, loose.	SS	1	6,5,3,2	8			
				SS	2	4,4,4,4	8			
				SS	3	4,4,5,6	9			
				SS	4	3,3,4,6	7			
		406.60		SS	5	5,4,50/5	100			
6	2	406.40	**Clayey Sandy Silt Till** Brown, trace to some gravel, very dense.							
			End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 18, 2022 to termination at a depth of 6.6 metres.

2. Borehole was recorded as 'dry' and caved to a depth of 4.8 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 2.56 metres below ground surface.

April 22, 2022 - 2.25 metres below ground surface.

June 1, 2022 - 2.39 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 18, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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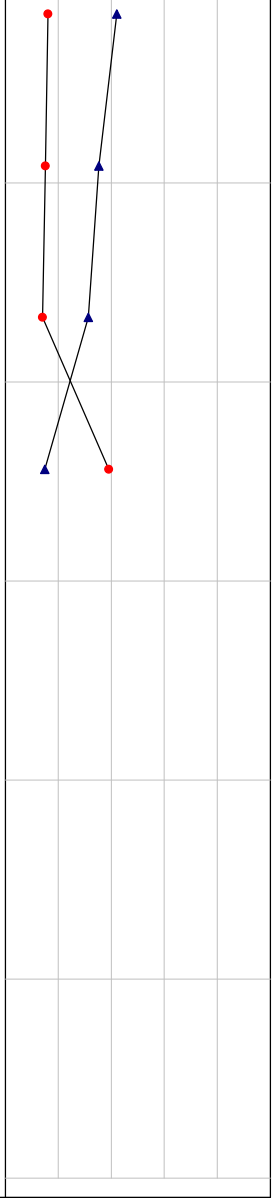
Log of Borehole No. 206

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838460
E: 545394

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.88	Ground Surface							
0	0	412.58	**Topsoil** Approximately 300 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay and gravel, compact.	SS	1	11,11,5,2	16			
2										
3	1			SS	2	7,7,8,9	15			
4										
5										
6	2			SS	3	3,4,10,12	14			
7										
8										
9	3			SS	4	10,15,24,30	39			
10		409.50	**Clayey Sandy Silt Till** Brown, trace to some gravel, compact to dense.							
11										
12										
13	4									
14										
15										
16										
17	5									
18										
19										
20	6									
21										
22										
23	7									
24		405.30								
25			End of Borehole							
26	8									
27										
28										
29										
30	9									
31										
32										
33	10									
34										
35										
36	11									
37										
38										
39										



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 18, 2022 to termination at a depth of 7.6 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 17, 2022 - 6.83 metres below ground surface.

April 22, 2022 - 4.6 metres below ground surface.

June 1, 2022 - 4.66 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 18, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 301

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4837975
E: 545199

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.75	Ground Surface							
0	0	412.50	**Topsoil** Approximately 250 millimetres of topsoil.							
3	1	411.70	**Clayey Sandy Silt Till** Brown, trace gravel, loose .	SS	1	2,1,3,4	4			
			Sand Brown, loose to compact.	SS	2	1,3,6,9	9			
	3			SS	3	7,7,6,9	13			
	4			SS	4	8,9,13,15	22			
	6			SS	5	6,7,10,13	17			
25	7	404.90								
26	8	404.60	**Clayey Sandy Silt Till** Brown, trace gravel, dense to very dense.	SS	6	3,13,32,42	45			

Well Data

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 22, 2022 to termination at a depth of 8.2 metres.
2. Borehole was recorded as open and 'wet' at a depth of 6.3 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 6.29 metres below ground surface.

April 22, 2022 - 5.65 metres below ground surface.

June 1, 2022 - 5.71 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 22, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 302

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838015
E: 545142

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	413.00	Ground Surface							
0 / 0	412.75	**Topsoil** Approximately 250 millimetres of topsoil.							
3 / 1	411.90	**Clayey Sandy Silt Till** Brown, trace gravel, loose .							
		Sand Brown, loose to compact.	SS	1	2,2,4,9	6			
			SS	2	2,4,6,8	10			
			SS	3	5,7,8,15	15			
			SS	4	5,8,9,11	17			
			SS	5	10,10,11,15	21			
26 / 8	404.80		SS	6	5,8,10,8	18			
		End of Borehole							

Well Data: Monitoring well installed

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 22, 2022 to termination at a depth of 8.2 metres.
2. Borehole was recorded as open and 'wet' at a depth of 6.6 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 6.62 metres below ground surface.

April 22, 2022 - 6.06 metres below ground surface.

June 1, 2022 - 6.12 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 22, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: KJR
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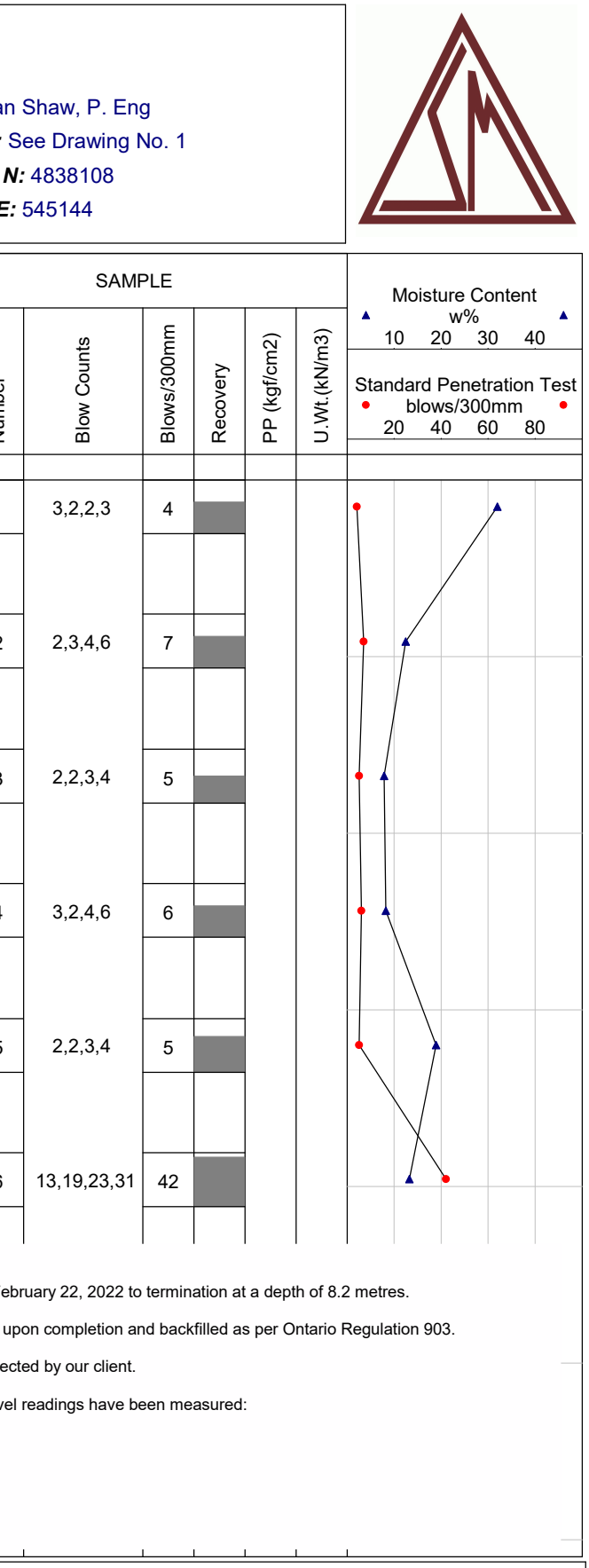
Sheet: 1 of 1

Log of Borehole No. 303

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838108
E: 545144



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 22, 2022 to termination at a depth of 8.2 metres.
2. Borehole was recorded as open and 'wet' at a depth of 5.4 metres upon completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.
4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 5.4 metres below ground surface.

April 22, 2022 - 6.04 metres below ground surface.

June 1, 2022 - 6.11 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 22, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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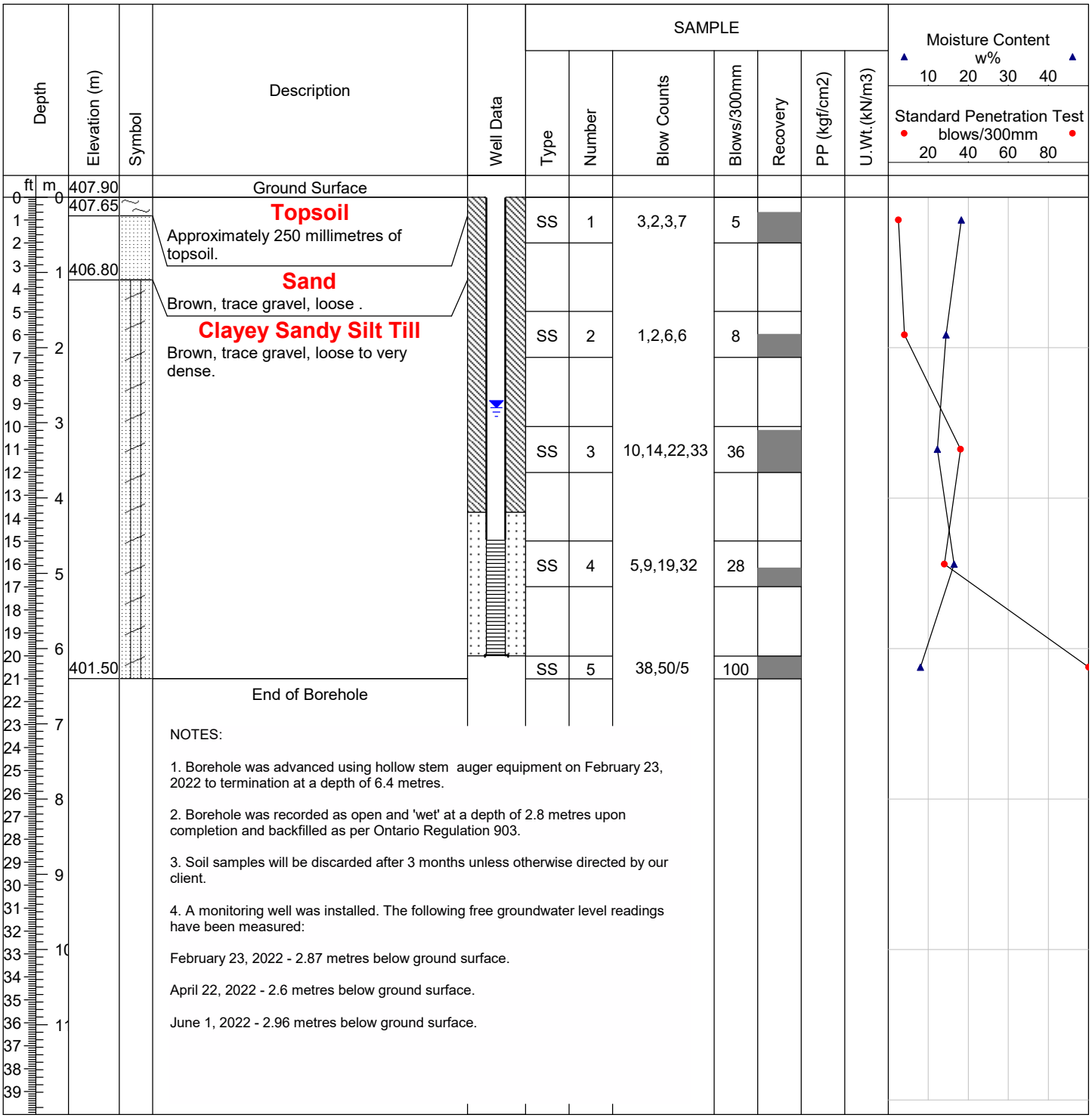
Sheet: 1 of 1

Log of Borehole No. 304

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4538292
E: 545023



NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 23, 2022 to termination at a depth of 6.4 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.8 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - 2.87 metres below ground surface.

April 22, 2022 - 2.6 metres below ground surface.

June 1, 2022 - 2.96 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: February 23, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
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Sheet: 1 of 1

Log of Borehole No. 305

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838438
E: 545144

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.60	Ground Surface								
0 / 0	408.35	**Topsoil** Approximately 250 millimetres of topsoil.		AS	1					
1 / 0		**Sand** Brown, trace gravel, loose to very loose.								
5 / 1				SS	2	2,3,4,4	7			
10 / 3				SS	3	2,1,1,5	2			
12 / 4	404.90	End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on February 23, 2022 to termination at a depth of 3.6 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

February 23, 2022 - dry

April 22, 2022 - dry

June 1, 2022 - dry

Drill Method: Hollow Stem Augers
Drill Date: February 23, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
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Sheet: 1 of 1

Log of Borehole No. 306

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838305
E: 545271

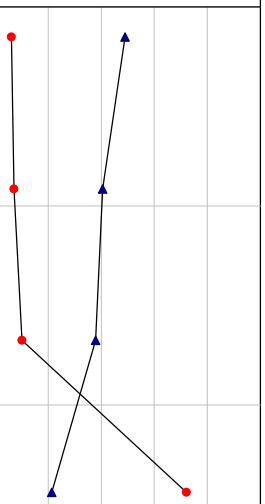
Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.85	Ground Surface							
0	0	412.60	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Sand** Brown, trace gravel, loose.	SS	1	2,2,4,5	6			
2										
3	1									
4										
5				SS	2	3,2,5,6	7			
6										
7	2									
8										
9										
10	3			SS	3	3,3,7,15	10			
11		409.40								
12			**Clayey Sandy Silt Till** Brown, some gravel, very dense							
13	4									
14										
15										
16				SS	4	20,34,38,50/4	72			
17	5	407.70								
18			End of Borehole							
19			NOTES:							
20	6		1. Borehole was advanced using solid stem auger equipment on February 23, 2022 to termination at a depth of 5.2 metres.							
21										
22			2. Borehole was recorded as caved to a depth of 2.4 metres and dry upon completion and backfilled as per Ontario Regulation 903							
23	7									
24										
25			3. Soil samples will be discarded after 3 months unless otherwise directed by our client.							
26										
27	8									
28										
29										
30	9									
31										
32										
33	10									
34										
35										
36	11									
37										
38										
39										

Well Data

SAMPLE

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: Solid Stem Augers
Drill Date: February 23, 2022
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Datum: Geodetic
Field Logged by: KJR
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Log of Borehole No. 307

Project No: SM 301951B-G
Project: Proposed Residential Development
Location: 75 Woolwich Street East, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 3838296
E: 545199

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	411.12	Ground Surface								
0 / 0	410.87	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	1,2,2,3	4			
		Clayey Sandy Silt Till Brown, some gravel, compact.								
6 / 2				SS	2	5,7,10,12	17			
10 / 3				SS	3	9,10,15,19	25			
16 / 5	405.90			SS	4	6,11,12,41	23			
		End of Borehole								

NOTES:

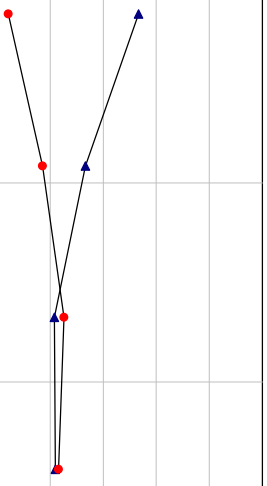
1. Borehole was advanced using solid stem auger equipment on February 23, 2022 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 4.3 metres below the existing grade upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: Solid Stem Augers
Drill Date: February 23, 2022
Hole Size: 150 millimetres
Drilling Contractor: Altech

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Log of Borehole No. 401

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Rd, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839146
E: 545881

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		420.91	Ground Surface							
0	0	420.66	**Topsoil** Approximately 250 millimetres of topsoil.							
1			**Silty Sand** Brown, trace to some gravel and clay, loose to compact.	SS	1	2,2,4,4	6			
2	1			SS	2	1,2,3,5	5			
3		419.10	**Clayey Sandy Silt Till** Brown, trace to some sand and gravel, compact to very dense	SS	3	1,4,9,7	13			
6	2			SS	4	6,15,50/4	100			
9	3			SS	5	6,17,16,24	33			
12	4									
15				SS	6	10,35,50/5	100			
16	5									
19										
20	6			SS	7	27,46,43, 50/3	89			
22		414.20	End of Borehole							
23	7									
26	8									
29	9									
33	10									
36	11									
39										

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on April 18, 2022 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 4.7 metres below the existing grade upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

April 22, 2022 - 2.29 metres below ground surface.

June 1, 2022 - 2.39 metres below ground surface.

Drill Method: Solid Stem Augers
Drill Date: April 18, 2022
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
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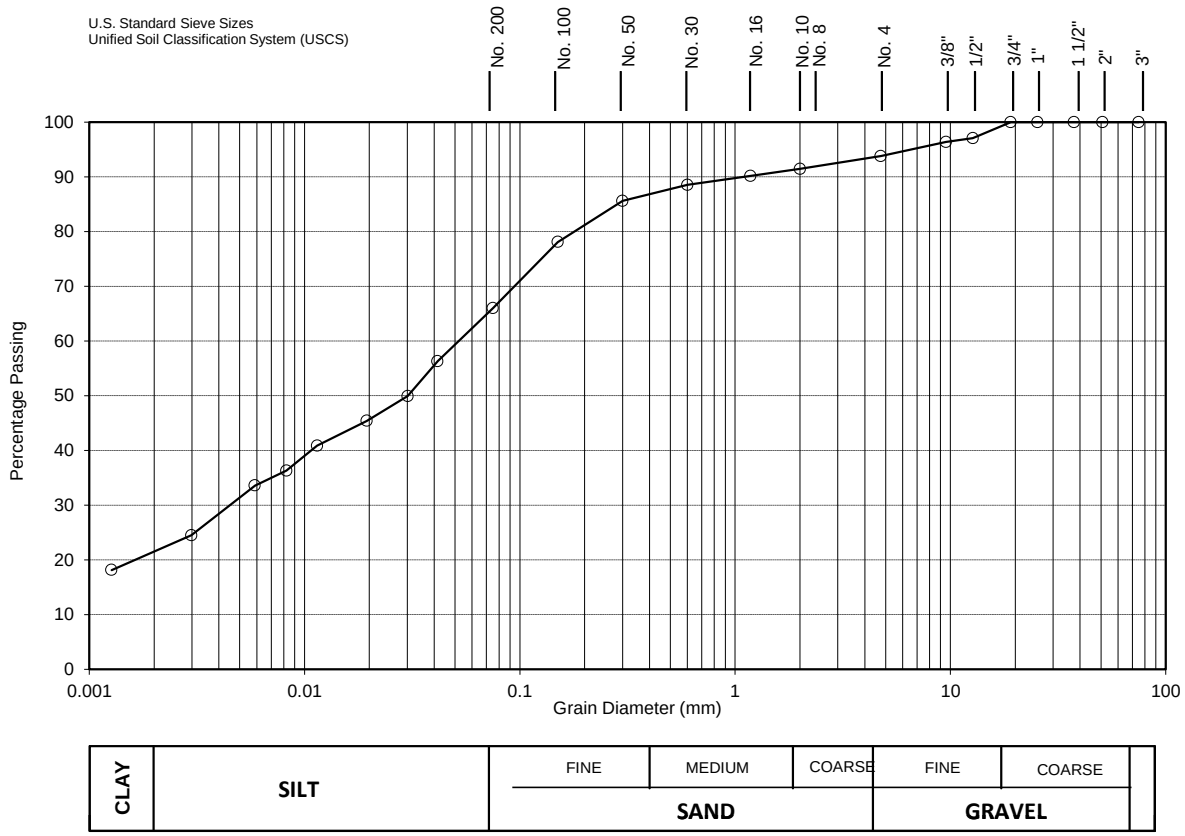
Mechanical & Hydrometer Analyses



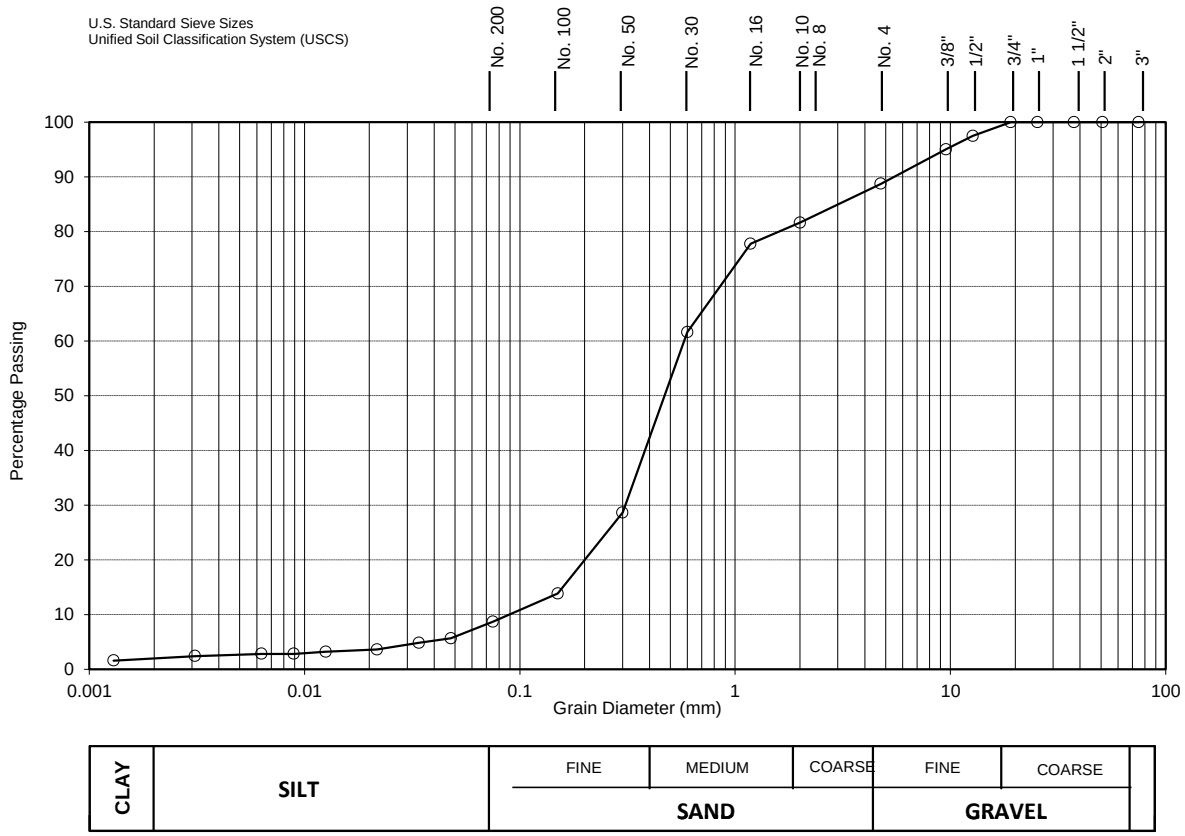
Lab No.:	**21-335**	Notes: Depth: 5'			
Borehole No.:	**003**				
Sample No.:	**3**				
CLAY [%]:	**22**	Soil Description:	**Brown Sandy Silt w/ some Clay and trace Gravel**		
SILT [%]:	**44**		**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**		
SAND [%]:	**28**				
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0005**	Coefficient of Uniformity C_U:	**102.0**	Coefficient of Curvature C_C:	**0.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**21-340**	Notes: Depth: 10'	
Borehole No.:	**004**		
Sample No.:	**5**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ some Gravel and traces of Silt and Clay**	
SILT [%]:	**7**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**80**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.090**	Coefficient of Uniformity C_U: **6.6**	Coefficient of Curvature C_C: **1.8**

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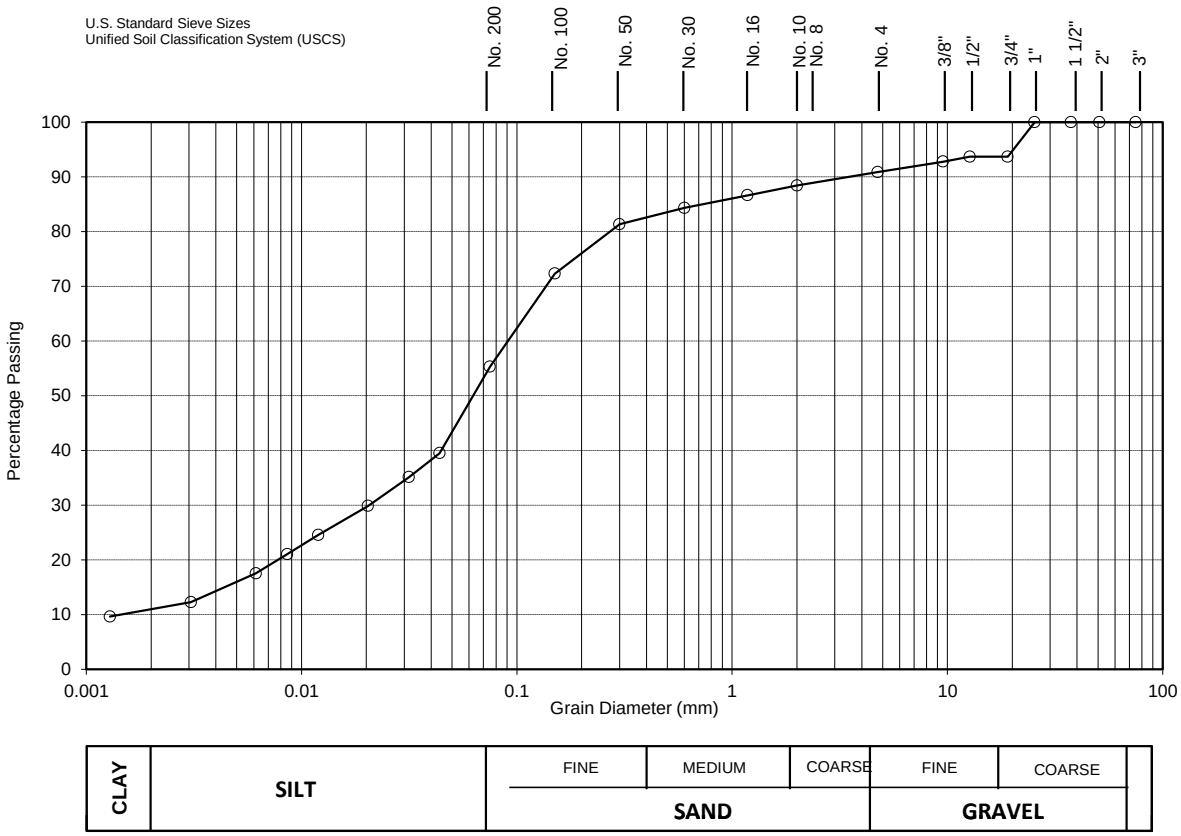
7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**21-336**	Notes: Depth: 10'	
Borehole No.:	**006**		
Sample No.:	**5**		
CLAY [%]:	**11**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**44**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**36**		
GRAVEL [%]:	**9**	Estimated Infiltration Rate [mm/hr] : **10 to 15**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0015**	Coefficient of Uniformity C_U: **60.0**	Coefficient of Curvature C_C: **3.3**

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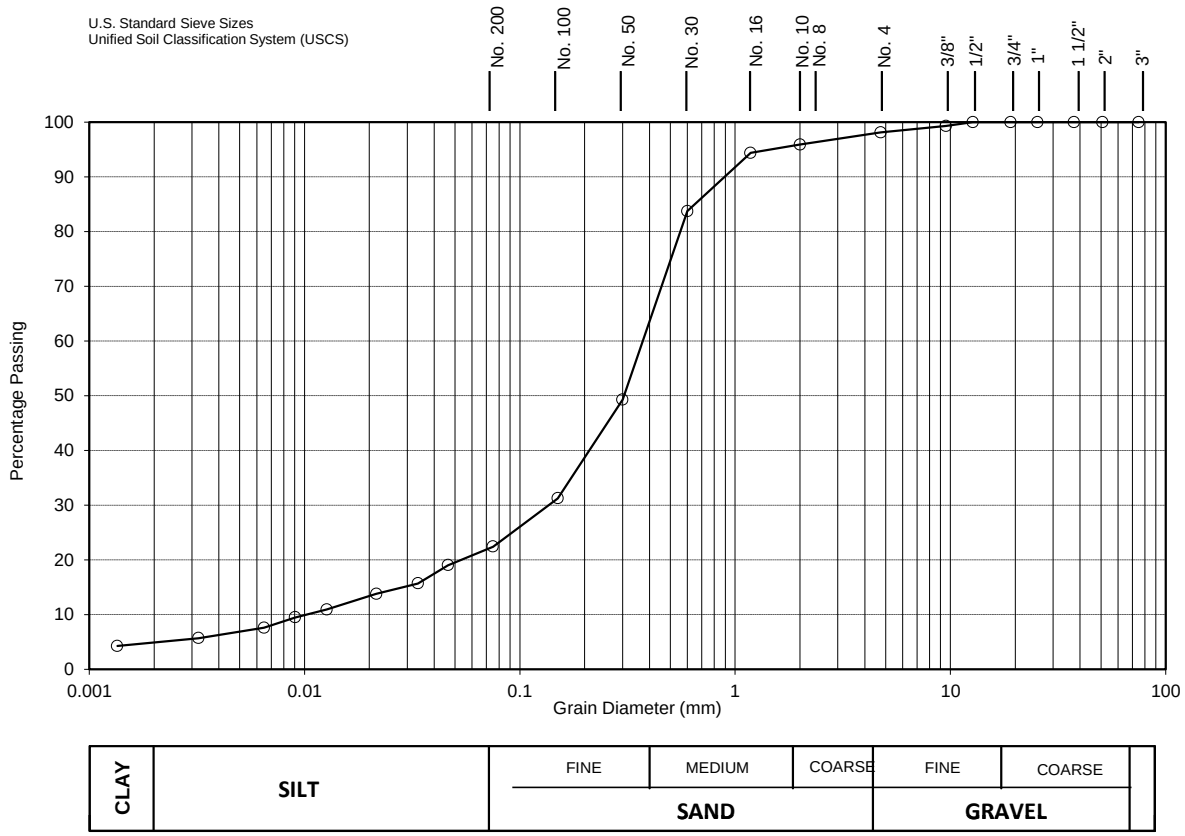
7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-088**	Notes: Depth: 5'	
Borehole No.:	**201**		
Sample No.:	**2**		
CLAY [%]:	**5**	Soil Description:	**Brown Sand w/ Some Silt and traces of Clay and Gravel**
SILT [%]:	**17**		**S.M. - Silty sands, sand-silt mixtures**
SAND [%]:	**76**		
GRAVEL [%]:	**2**	Estimated Infiltration Rate [mm/hr] : **50**	Estimated Permeability, k [cm/s] **10^{-4}**
D_{10} (Effective Diam. in mm):	**0.0001**	Coefficient of Uniformity C_U: **40.0**	Coefficient of Curvature C_C: **5.4**

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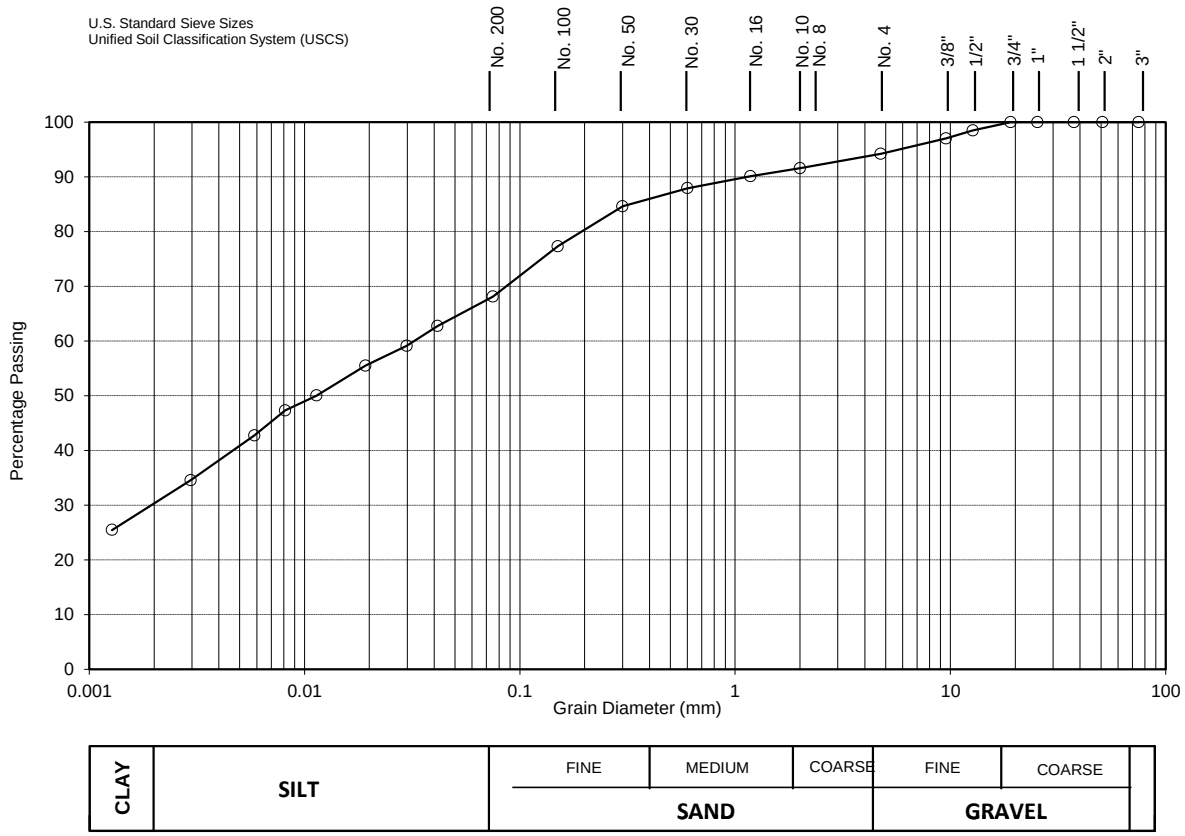
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 4**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-089**	Notes: Depth: 5'			
Borehole No.:	**202**				
Sample No.:	**2**				
CLAY [%]:	**30**	Soil Description:	**Brown Clayey Sandy Silt w/ a trace of Gravel**		
SILT [%]:	**38**		**M.L - Clayey silts with slight plasticity, silty or clayey fine sands,**		
SAND [%]:	**26**		**inorganic silts and very fine sands**		
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-8}**
D_{10} (Effective Diam. in mm):	**0.0004**	Coefficient of Uniformity C_U:	**80.0**	Coefficient of Curvature C_C:	**0.3**

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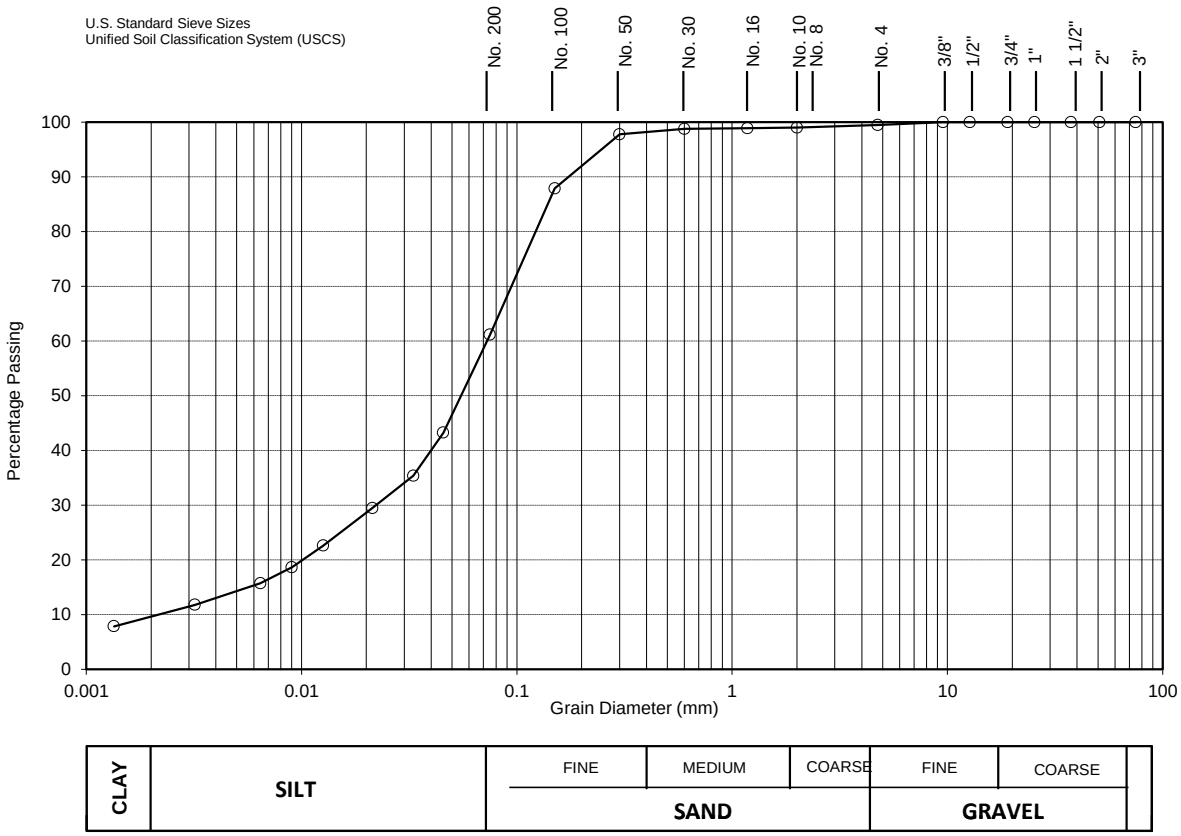
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 5**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-090**	Notes: Depth: 20'	
Borehole No.:	**202**		
Sample No.:	**5**		
CLAY [%]:	**10**	Soil Description: **Light Brown Silt and Sand w/ some Clay**	
SILT [%]:	**51**	**M.L. - Inorganic silts and very fine sands**	
SAND [%]:	**39**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **10 to 15**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0022**	Coefficient of Uniformity C_U: **33.2**	Coefficient of Curvature C_C: **3.0**

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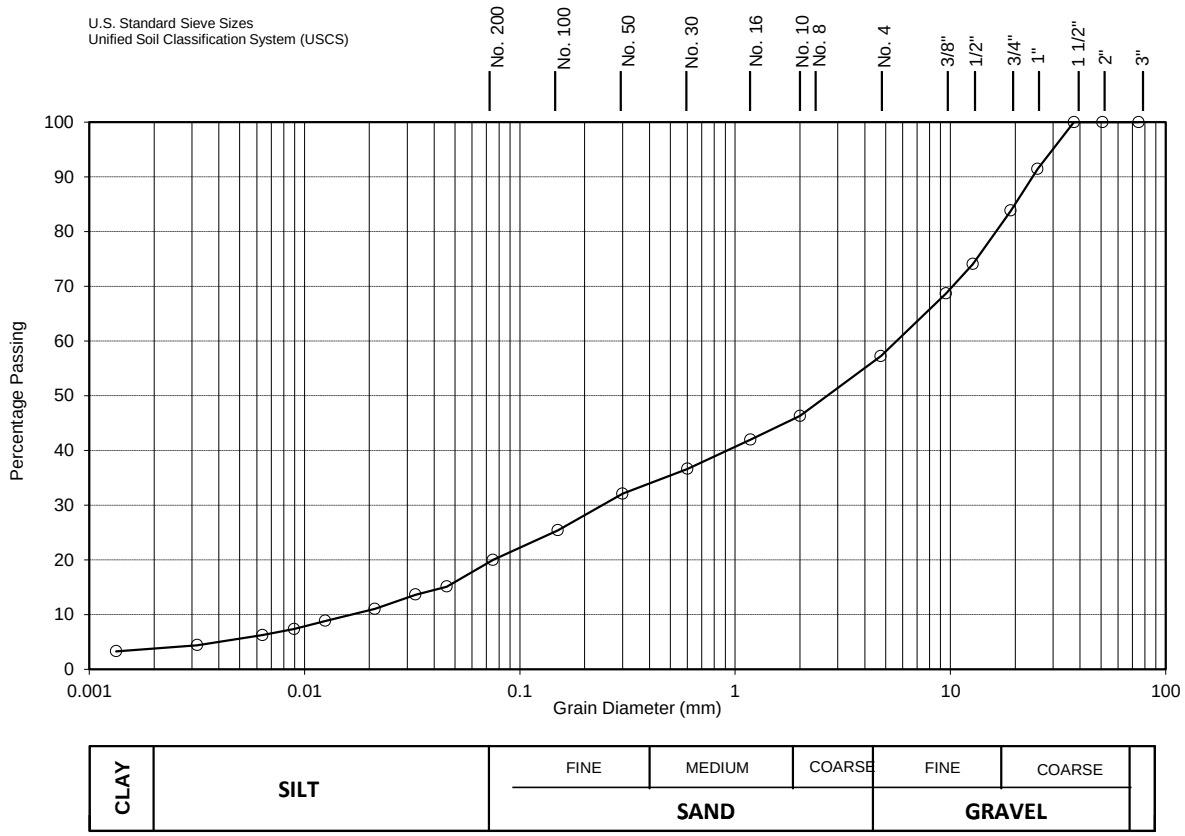
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 6**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-091**	Notes: Depth: 5'	
Borehole No.:	**203**		
Sample No.:	**2**		
CLAY [%]:	**3**	Soil Description:	**Brown Gravel and Sand w/ some Silt and a trace of Clay**
SILT [%]:	**17**		**G.M. - Gravel-sand-silt mixtures, silty gravels**
SAND [%]:	**37**		
GRAVEL [%]:	**43**	Estimated Infiltration Rate [mm/hr] : **50 to 60**	Estimated Permeability, k [cm/s] **10^{-4}**
D_{10} (Effective Diam. in mm):	**0.017**	Coefficient of Uniformity C_U: **335.3**	Coefficient of Curvature C_C: **0.6**

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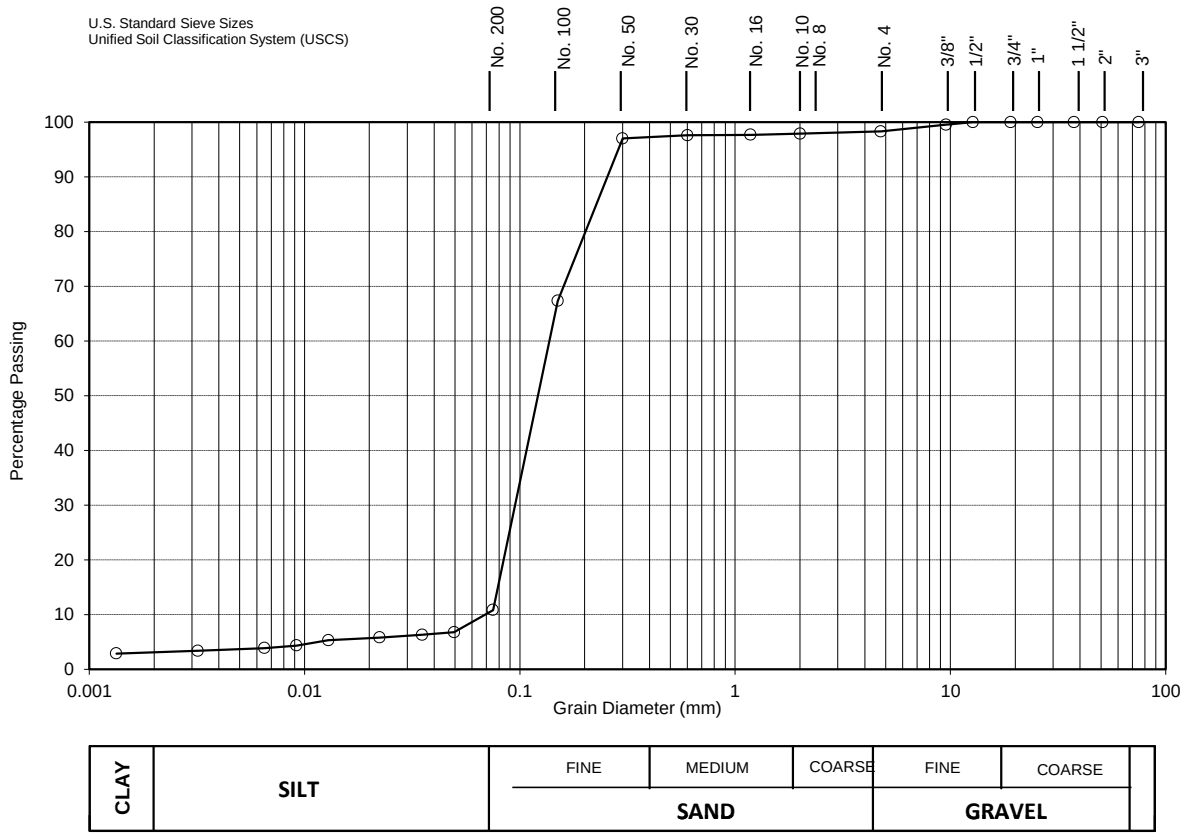
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 7**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-092**	Notes: Depth: 20'	
Borehole No.:	**203**		
Sample No.:	**5**		
CLAY [%]:	**3**	Soil Description: **Brown Sand w/ traces of Silt, Clay and Gravel**	
SILT [%]:	**8**	**S.P. - Poorly graded sands**	
SAND [%]:	**87**		
GRAVEL [%]:	**2**	Estimated Infiltration Rate [mm/hr] : **125 to 150**	Estimated Permeability, k [cm/s] **10^{-3}**
D_{10} (Effective Diam. in mm):	**0.07**	Coefficient of Uniformity C_U: **2.1**	Coefficient of Curvature C_C: **0.9**

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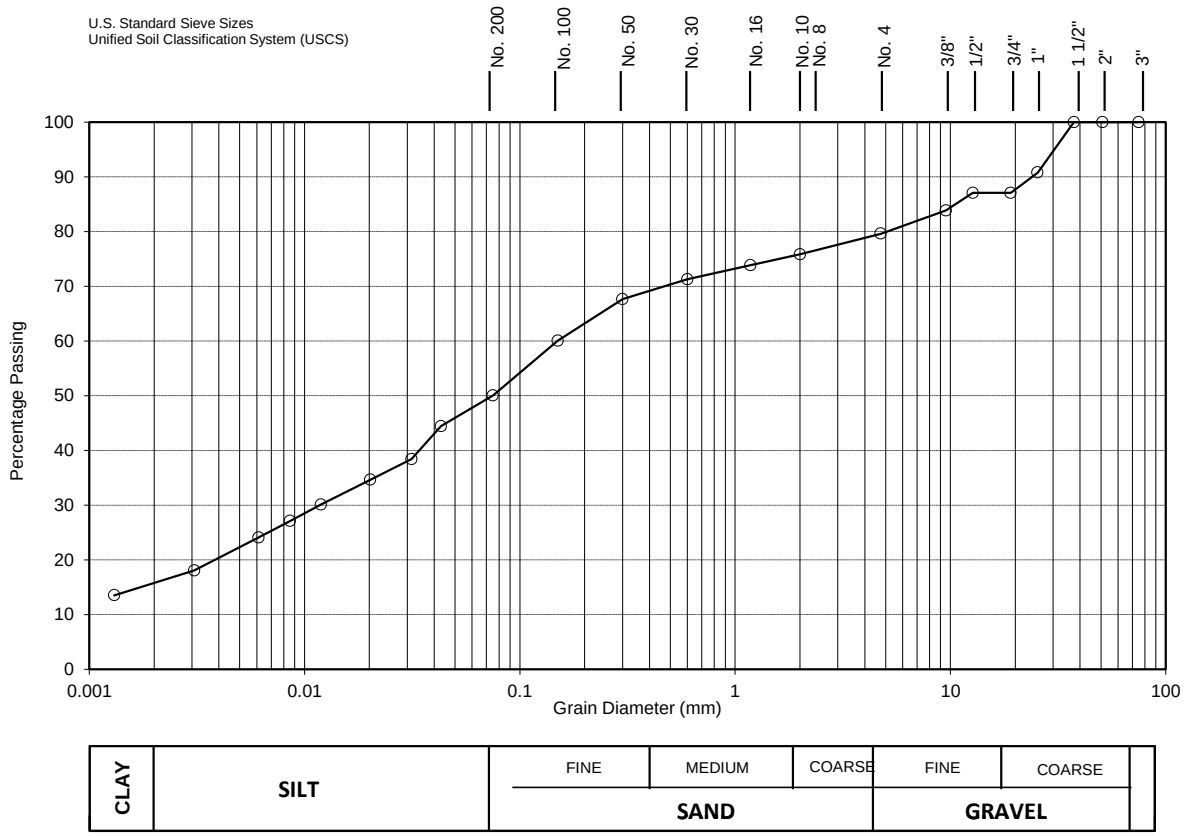
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 8**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-094**	Notes: Depth: 5'	
Borehole No.:	**204**		
Sample No.:	**2**		
CLAY [%]:	**16**	Soil Description: **Brown Sandy Gravelly Silt w/ some Clay**	
SILT [%]:	**34**	**M.L. - Silty or clayey fine sands**	
SAND [%]:	**30**		
GRAVEL [%]:	**20**	Estimated Infiltration Rate [mm/hr] : **10**	Estimated Permeability, k [cm/s] **10^{-7}**
D_{10} (Effective Diam. in mm):	**0.00085**	Coefficient of Uniformity C_U: **188.2**	Coefficient of Curvature C_C: **1.2**

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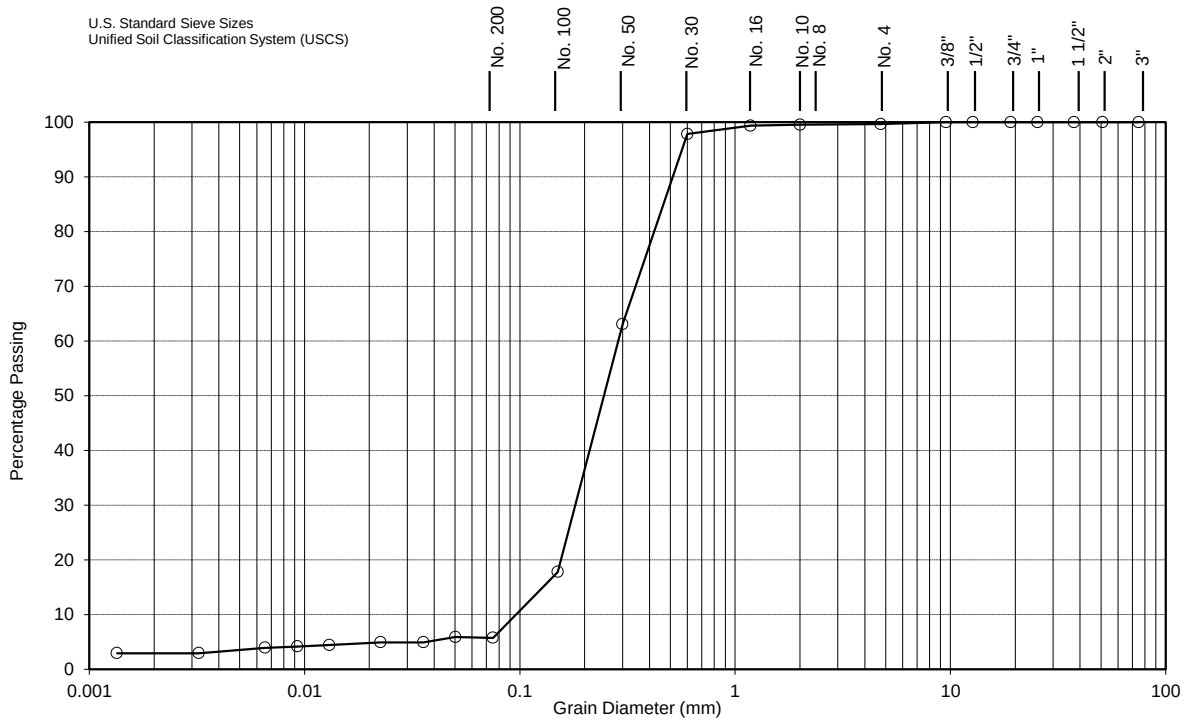
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 9**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE

Lab No.:	**22-093**	Notes: Depth: 10'			
Borehole No.:	**205**				
Sample No.:	**3**				
CLAY [%]:	**2**	Soil Description:	**Brown Sand w/ traces of Silt and Clay**		
SILT [%]:	**4**		**S.P. - Poorly graded sands**		
SAND [%]:	**94**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**150 to 300**	Estimated Permeability, k [cm/s]	**10^{-3}**
D_{10} (Effective Diam. in mm):	**0.095**	Coefficient of Uniformity C_U:	**3.1**	Coefficient of Curvature C_C:	**1.2**

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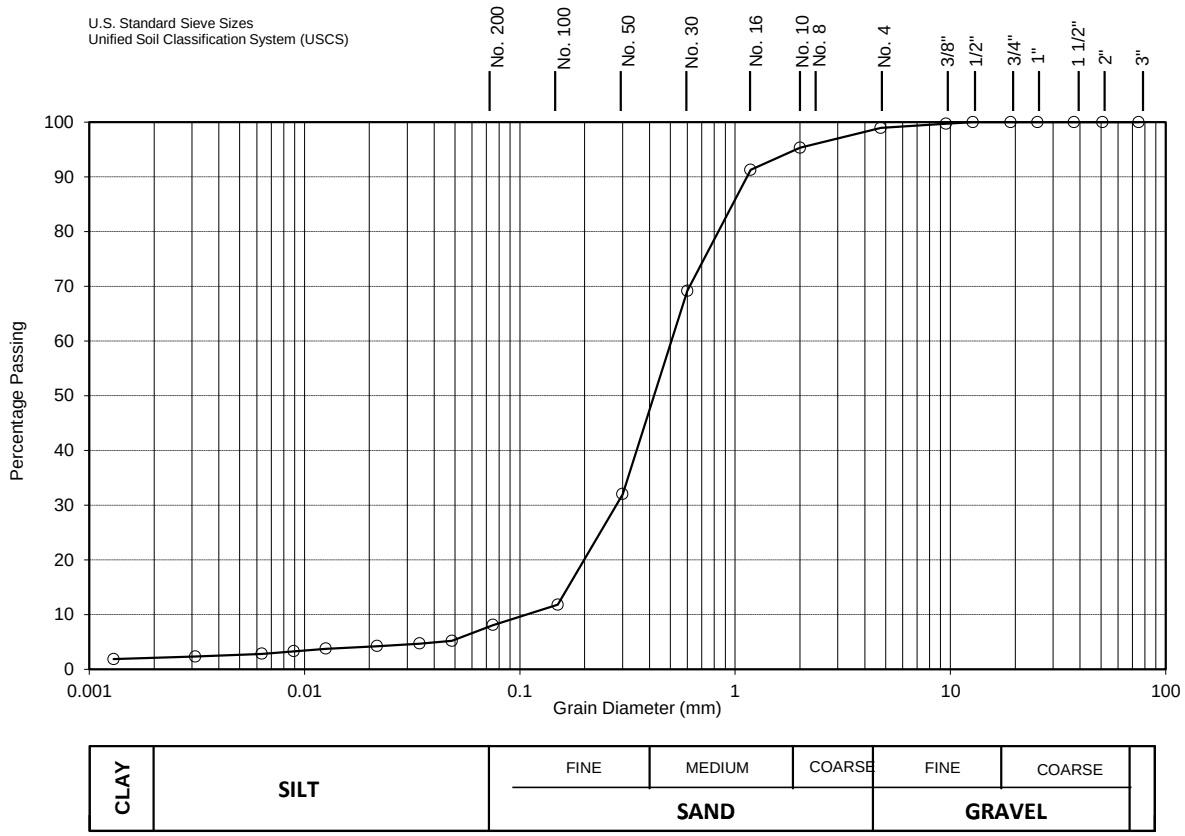
7581 Nichol Road 15, Elora ON

March 2022	**Grain Size Analysis No. 10**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**21-339**	Notes: Depth: 15'	
Borehole No.:	**102**		
Sample No.:	**6**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt, Clay and Gravel**	
SILT [%]:	**6**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**91**		
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.10**	Coefficient of Uniformity C_U: **5.1**	Coefficient of Curvature C_C: **1.5**

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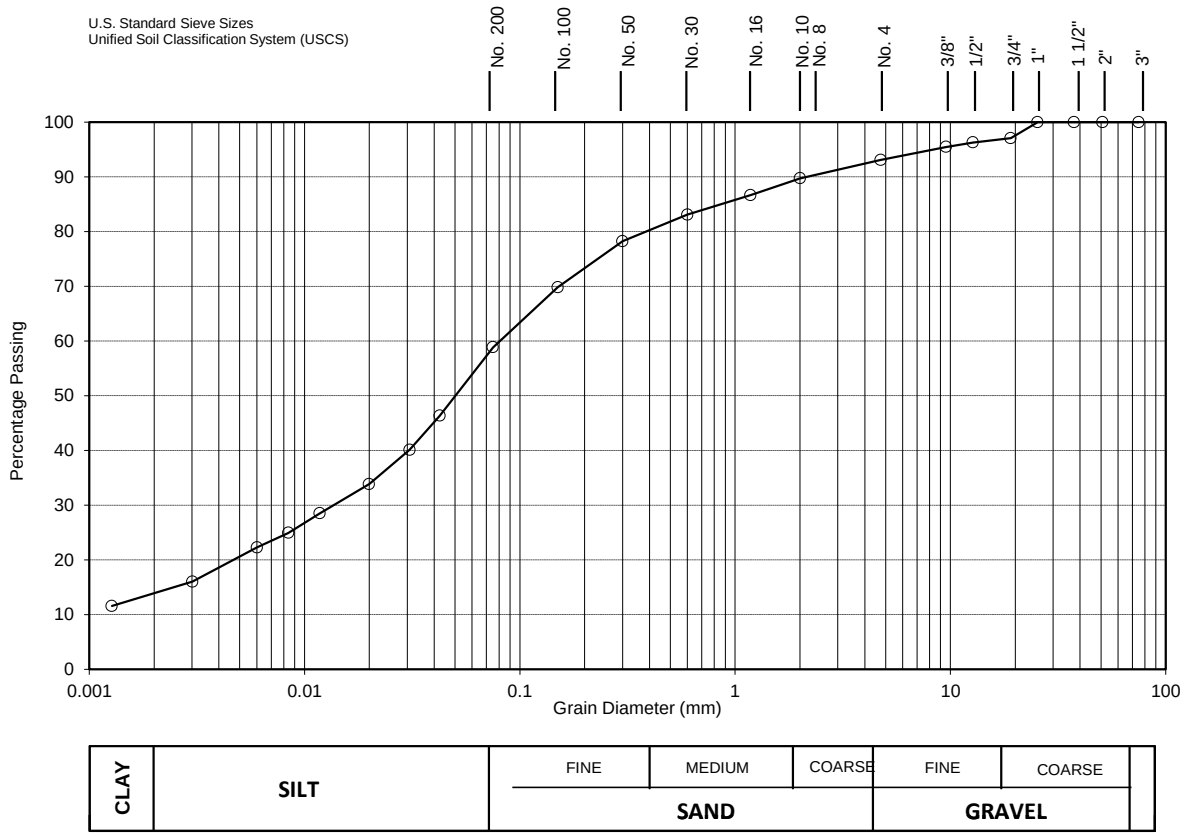
75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 11**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**21-338**	Notes: Depth: 5'	
Borehole No.:	**103**		
Sample No.:	**3**		
CLAY [%]:	**14**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**45**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**34**		
GRAVEL [%]:	**7**	Estimated Infiltration Rate [mm/hr] : **10**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.00100**	Coefficient of Uniformity C_U: **80.0**	Coefficient of Curvature C_C: **2.1**

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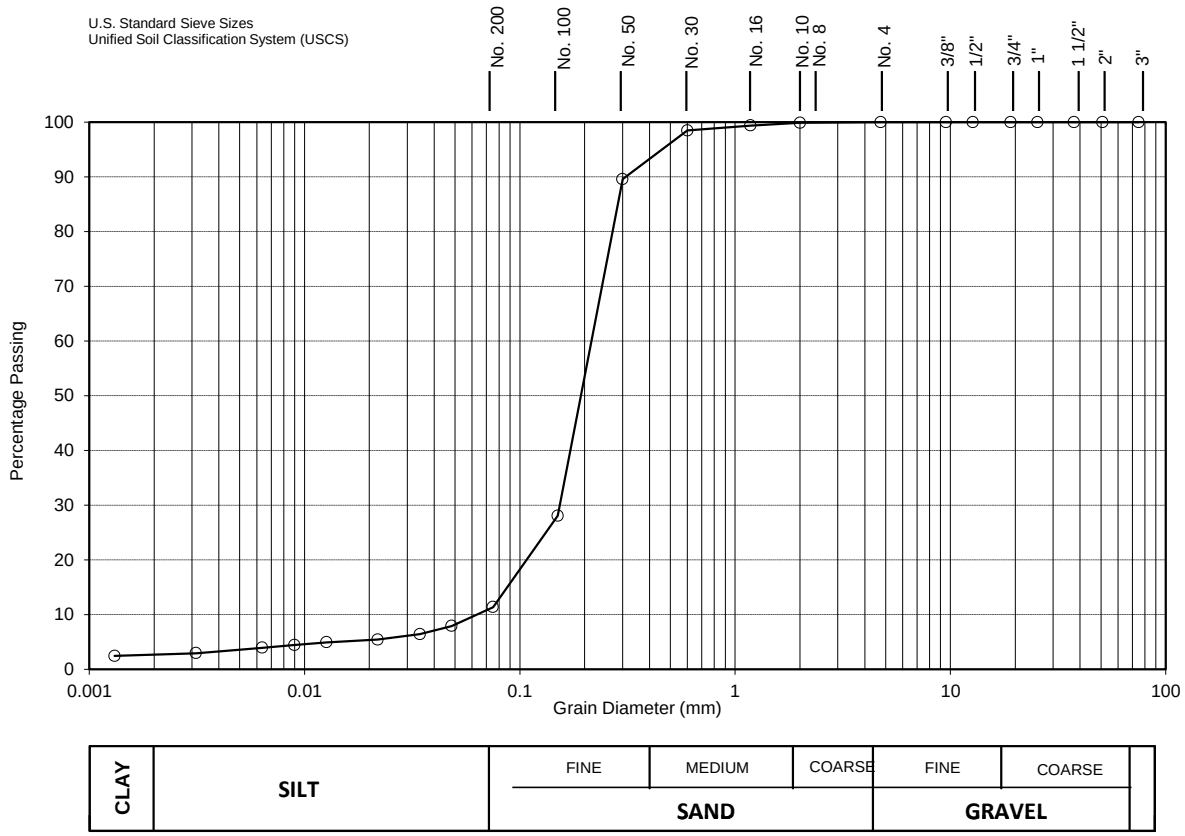
75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 12**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**21-337**	Notes: Depth: 7.5'	
Borehole No.:	**104**		
Sample No.:	**4**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt and Clay**	
SILT [%]:	**9**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**89**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **100 to 150**	Estimated Permeability, k [cm/s] **10^{-3} to 10^{-2}**
D_{10} (Effective Diam. in mm):	**0.0600**	Coefficient of Uniformity C_U: **3.7**	Coefficient of Curvature C_C: **1.9**

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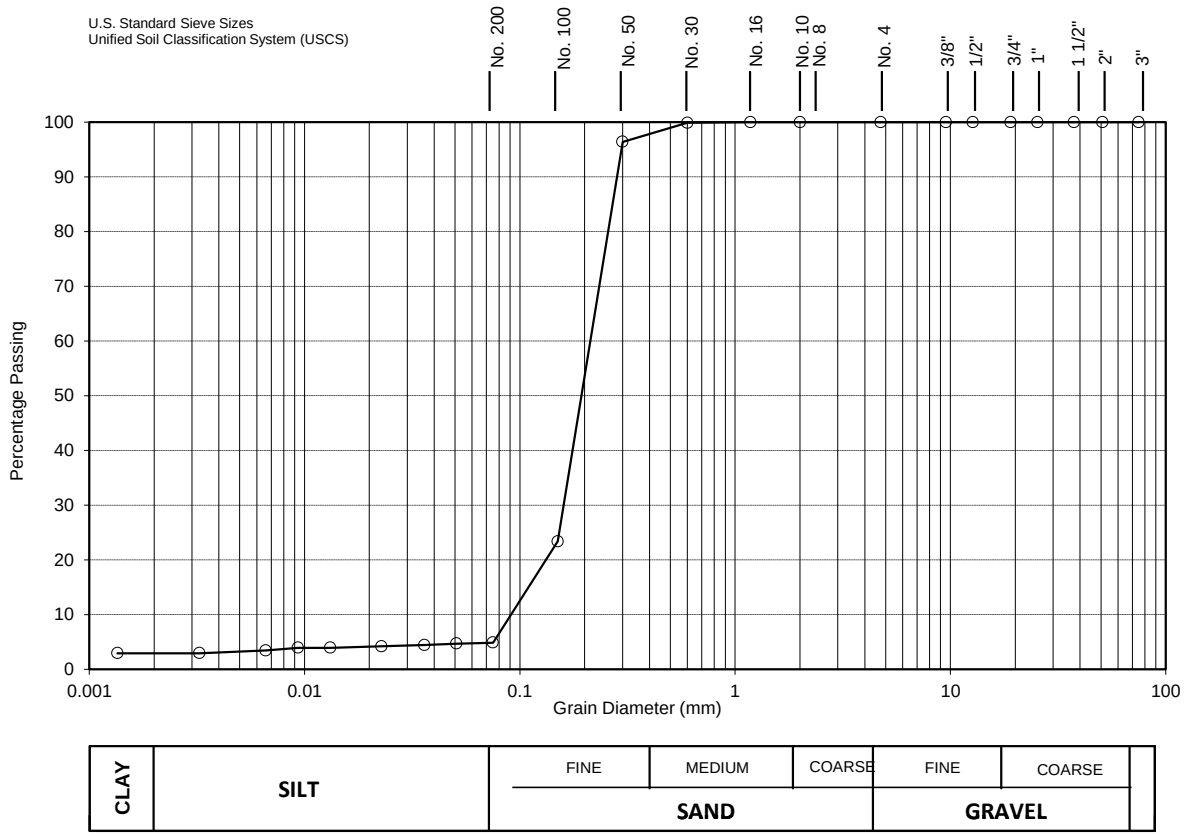
75 Woolwich Street East, Elora ON

August 2021	**Grain Size Analysis No. 13**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



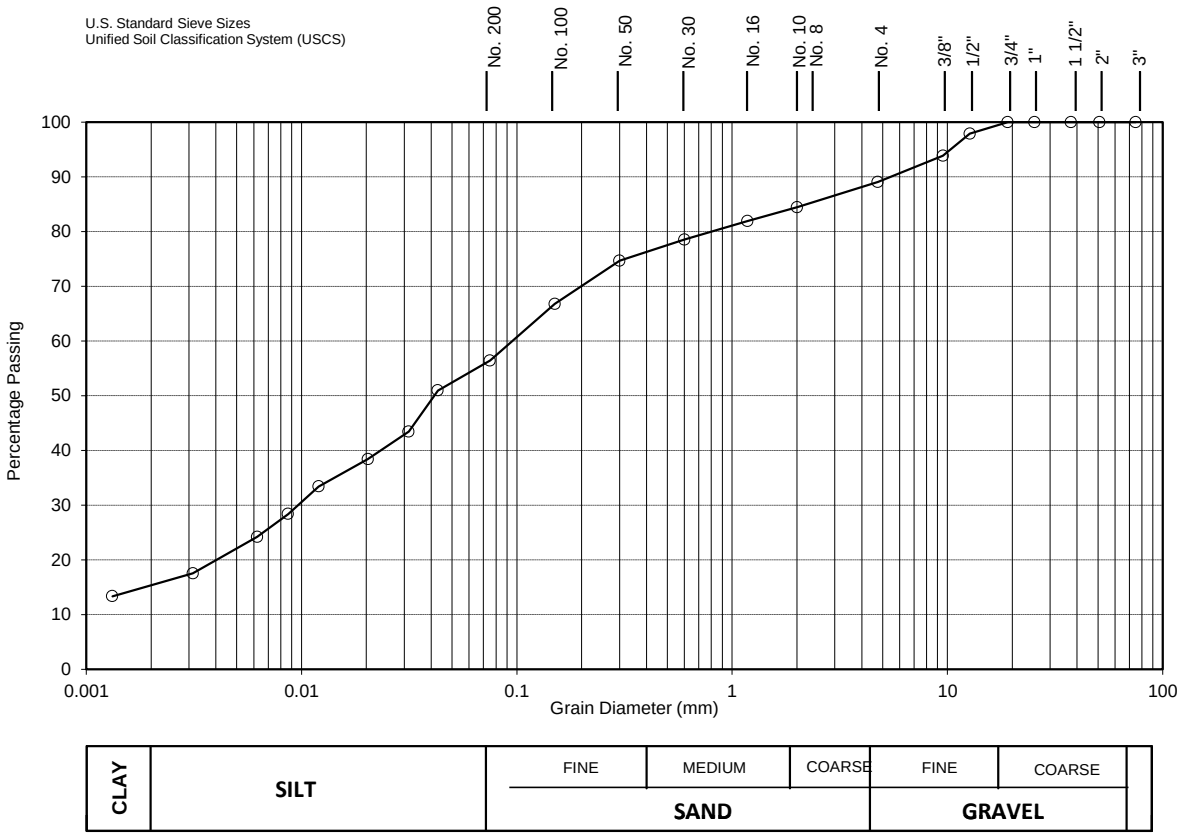
Lab No.:	**22-096**	Notes: Depth: 5'	
Borehole No.:	**302**		
Sample No.:	**2**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ traces of Silt and Clay**	
SILT [%]:	**3**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**95**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.09**	Coefficient of Uniformity C_U: **2.3**	Coefficient of Curvature C_C: **1.5**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

March 2022	**Grain Size Analysis No. 14**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



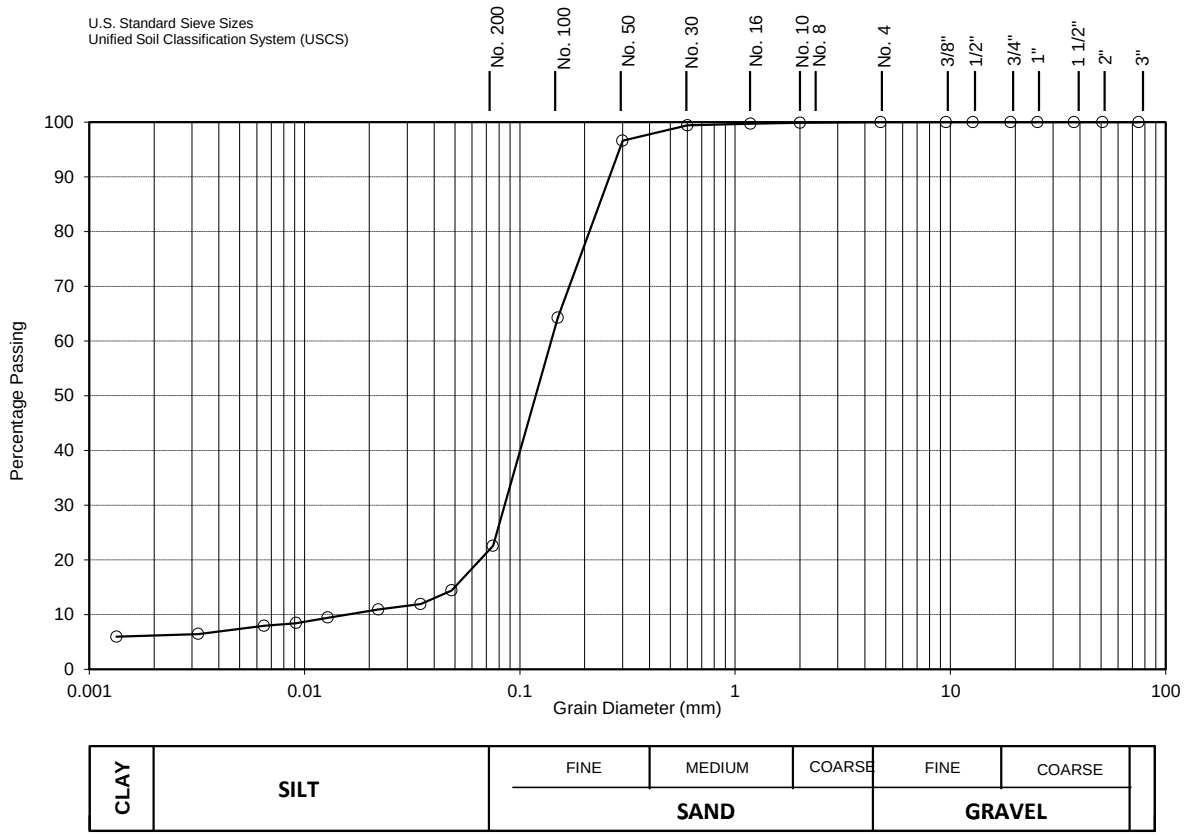
Lab No.:	**22-097**	Notes: Depth: 5'	
Borehole No.:	**304**		
Sample No.:	**2**		
CLAY [%]:	**16**	Soil Description: **Brown Sandy Silt w/ some Clay and Gravel**	
SILT [%]:	**40**	**M.L. - Inorganic silts and very fine sands, silty or clayey fine sands, clayey silts with slight plasticity to S.M. - Sand-silt mixtures**	
SAND [%]:	**33**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **10**	Estimated Permeability, k [cm/s] **10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0009**	Coefficient of Uniformity C_U: **103.3**	Coefficient of Curvature C_C: **1.1**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

March 2022	**Grain Size Analysis No. 15**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



Lab No.:	**22-098**	Notes: Depth: 5'	
Borehole No.:	**305**		
Sample No.:	**2**		
CLAY [%]:	**7**	Soil Description: **Brown Sand w/ some Silt and a trace of Clay**	
SILT [%]:	**16**	**S.M. - Sand-silt mixtures, silty sands**	
SAND [%]:	**77**		
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] : **50 to 60**	Estimated Permeability, k [cm/s] **10^{-4}**
D_{10} (Effective Diam. in mm):	**0.015**	Coefficient of Uniformity C_U: **10.0**	Coefficient of Curvature C_C: **3.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

75 Woolwich Street East, Elora ON

March 2022	**Grain Size Analysis No. 16**	**Project No.: SM 301951-T**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

401 Grays Road · Hamilton, ON · L8E 2Z3

www.soil-mat.ca info@soil-mat.ca 905.318.7440 / 800.243.1922 (*toll free*) 905.318.7455

PROJECT NO.: SM 301951-G August 19, 2024

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Hatim Jafferjee
Land Development Coordinator

SUPPLEMENTAL GROUNDWATER DATA
PROPOSED RESIDENTIAL DEVELOPMENT
CLAYTON AND ELORA SANDS
ELORA, ONTARIO

Dear Mr. Jafferjee,

Further to the recent request and correspondence with MTE Consultants, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has prepared the following brief updated groundwater level summary based on information collected between July 15, 2022 to May 3, 2023. This information is further to our preliminary hydrogeological assessment reports for the development lands [SM 301951-G, dated June 17 and July 20, 2022], and should be referenced in conjunction with those reports.

Groundwater Observations

Monitoring wells were installed at Borehole Nos. 004, 101, 102, 104, 201, 201A, 202, 203, 204, 205, 206, 301 through 305, and 401, to allow for future measurements of the static groundwater level. Monitoring data up to June 2022 was presented in the prior referenced reports. A data logger was maintained in each of the monitoring wells to allow for further continuous monitoring of the groundwater level between July 2022 to May 2023, the readings of which have been illustrated in graphs which can be found appended to the end of this report.

In addition, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on various dates, ranging from August 2021 to May 2023. These have been summarized in the following charts. As well, the detailed plots of continuous groundwater levels for each monitoring well are appended.

TABLE A
SUMMARY OF MANUAL GROUNDWATER READINGS (ELORA SANDS)

Borehole No. 004 (Ground Surface Elevation of 405.55 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	2.74	402.8
August 27, 2021	1.75	403.8
February 23, 2022	1.33	404.2
April 22, 2022	1.47	404.1
June 1, 2022	1.78	403.8
May 3, 2023	1.20	404.35

Borehole No. 201 (Ground Surface Elevation of 404.80 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.69	402.1
April 22, 2022	1.88	402.9
June 1, 2022	2.44	402.4
May 3, 2023	1.88	402.9

Borehole No. 201A (Ground Surface Elevation of 404.75 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.8
April 22, 2022	2.05	402.7
June 1, 2022	2.43	402.3
May 3, 2023	1.71	403.1

Borehole No. 202 (Ground Surface Elevation of 406.59 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	5.5	401.1
April 22, 2022	4.76	401.8
June 1, 2022	5.43	401.2
May 3, 2023	4.51	402.1

Borehole No. 203 (Ground Surface Elevation of 407.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	Dry	<401.0
April 22, 2022	5.90	401.2
June 1, 2022	5.91	401.2
May 3, 2023	Dry	<401.0

Borehole No. 204 (Ground Surface Elevation of 409.56 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.81	406.7
April 22, 2022	1.16	408.4
June 1, 2022	1.53	408.0
May 3, 2023	1.20	408.4

Borehole No. 205 (Ground Surface Elevation of 412.99 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	2.56	410.4
April 22, 2022	2.25	410.7
June 1, 2022	2.39	410.6
May 3, 2023	2.34	410.6

Borehole No. 206 (Ground Surface Elevation of 412.88 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 17, 2022	6.83	406.1
April 22, 2022	4.60	408.3
June 1, 2022	4.66	408.2
May 3, 2023	4.76	408.1

Borehole No. 401 (Ground Surface Elevation of 420.91 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
April 22, 2022	2.29	418.6
June 1, 2022	2.39	418.5
May 3, 2023	2.31	418.6

TABLE B
SUMMARY OF MANUAL GROUNDWATER READINGS (CLAYTON LANDS)

Borehole No. 101 (Ground Surface Elevation of 408.60 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	4.78	403.8
August 27, 2021	4.71	403.9
October 14, 2021	4.33	404.3
February 23, 2022	4.31	404.3
April 22, 2022	4.07	404.5
June 1, 2022	4.15	404.5
May 3, 2023	4.06	404.5

Borehole No. 102 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	3.58	410.6
August 27, 2021	3.61	410.5
October 14, 2021	3.62	410.5
February 23, 2022	3.50	410.6
April 22, 2022	2.89	411.2
June 1, 2022	3.05	411.1
May 3, 2023	3.00	411.0

Borehole No. 103 (Ground Surface Elevation of 414.13 metres)		
	Groundwater Depth (m)	Groundwater Elevation (m)
August 6, 2021	6.78	407.3
August 27, 2021	6.96	407.2
October 14, 2021	7.09	407.0
February 23, 2022	6.83	407.3
April 22, 2022	6.13	408.0
June 1, 2022	6.28	407.8
May 3, 2023	6.56	407.6

Borehole No. 301 (Ground Surface Elevation of 412.75 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.29	406.5
April 22, 2022	5.65	407.1
June 1, 2022	5.71	407.0
May 3, 2023	5.85	406.9

Borehole No. 302 (Ground Surface Elevation of 413.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	6.62	406.4
April 22, 2022	6.06	406.9
June 1, 2022	6.12	406.9
May 3, 2023	6.35	406.7

Borehole No. 303 (Ground Surface Elevation of 414.00 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	5.40	408.6
April 22, 2022	6.04	407.9
June 1, 2022	6.11	407.9
May 3, 2023	6.41	407.6

Borehole No. 304 (Ground Surface Elevation of 407.90 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	2.87	405.0
April 22, 2022	2.60	405.3
June 1, 2022	2.96	404.9
May 3, 2023	2.42	4055

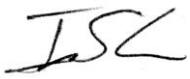
Borehole No. 305 (Ground Surface Elevation of 408.60 metres)*		
	Groundwater Depth (m)	Groundwater Elevation (m)
February 23, 2022	Dry	<405.6
April 22, 2022	Dry	<405.6
June 1, 2022	Dry	<405.6
May 3, 2023	Dry	<405.6

*Ground surface elevations have been interpolated based on contours from current topographic survey

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Kevin Reid, B. Eng
Junior Engineer



Ian Shaw, P. Eng., QP_{ESA}
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Groundwater Monitoring Well Plots

Distribution: Cachet Developments [pdf]

LEGEND

- Borehole Location — BH#
- Monitoring Well Location — MW#
- Geological Cross Section Location

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301591-G.

2. Borehole and monitoring well locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Nichol Road 15
Elora, Ontario

Borehole Location Plan

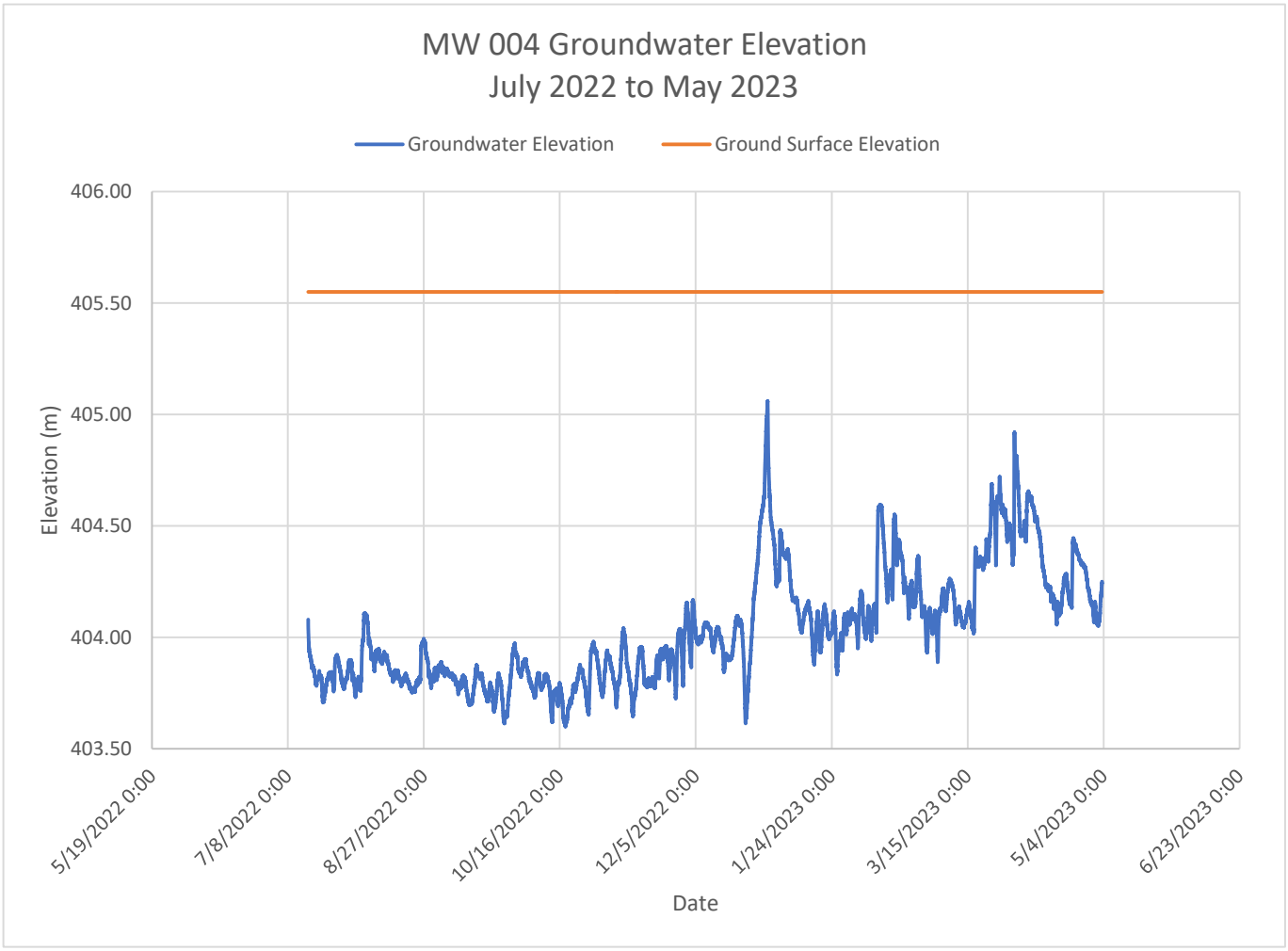
Project No. SM 301591-G

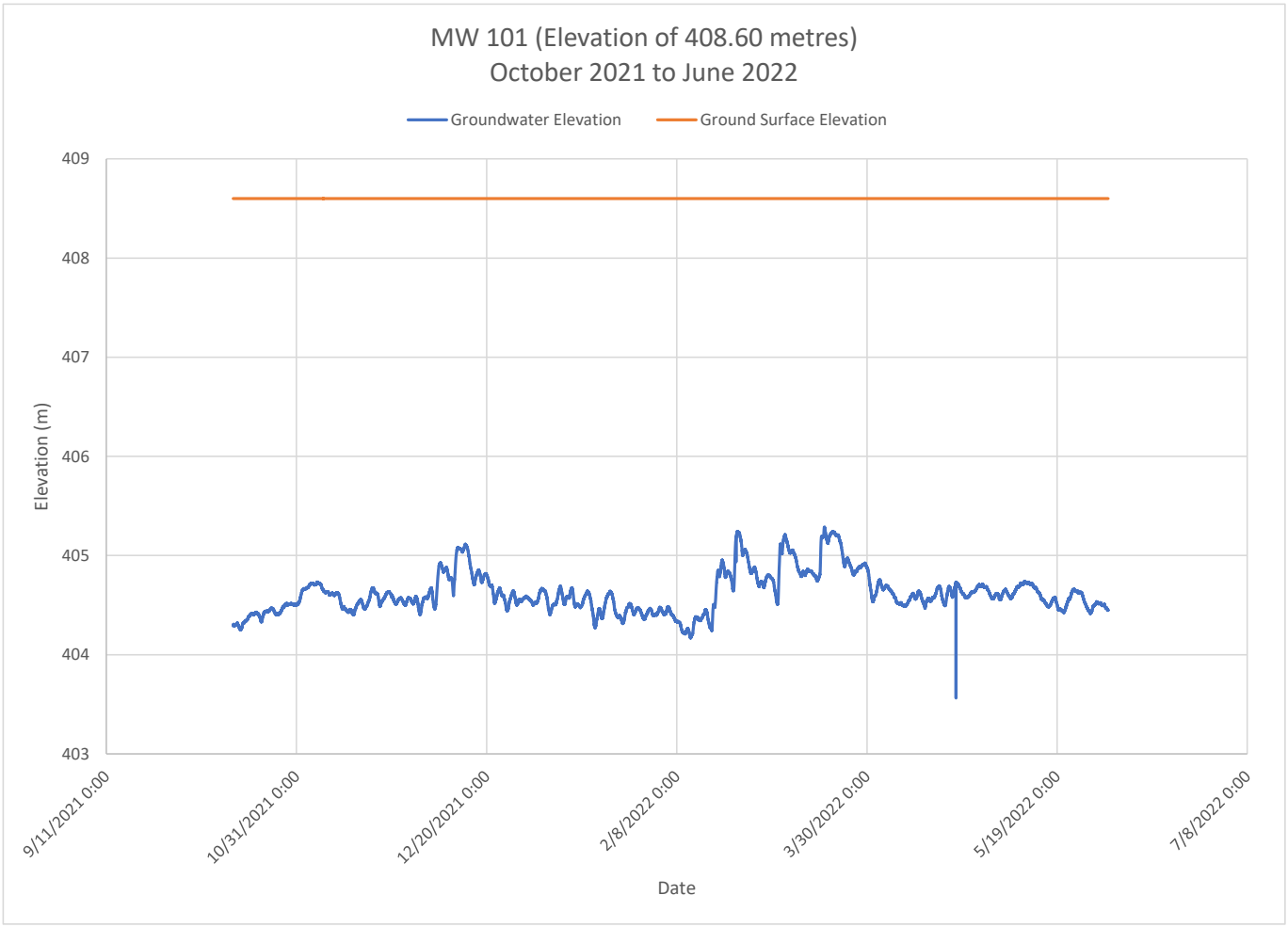
Date: June 2022

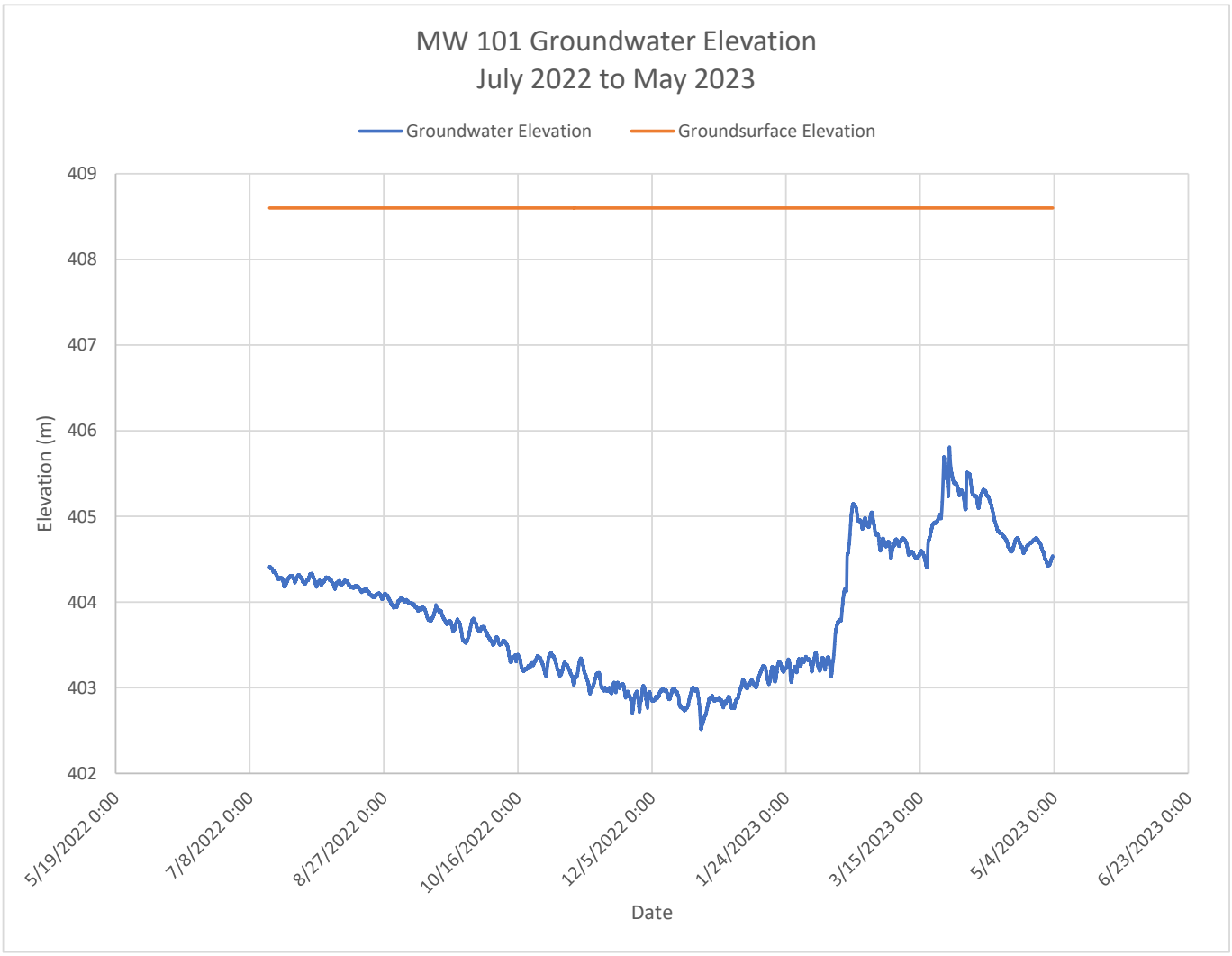
Drawn: SW | Checked: IS

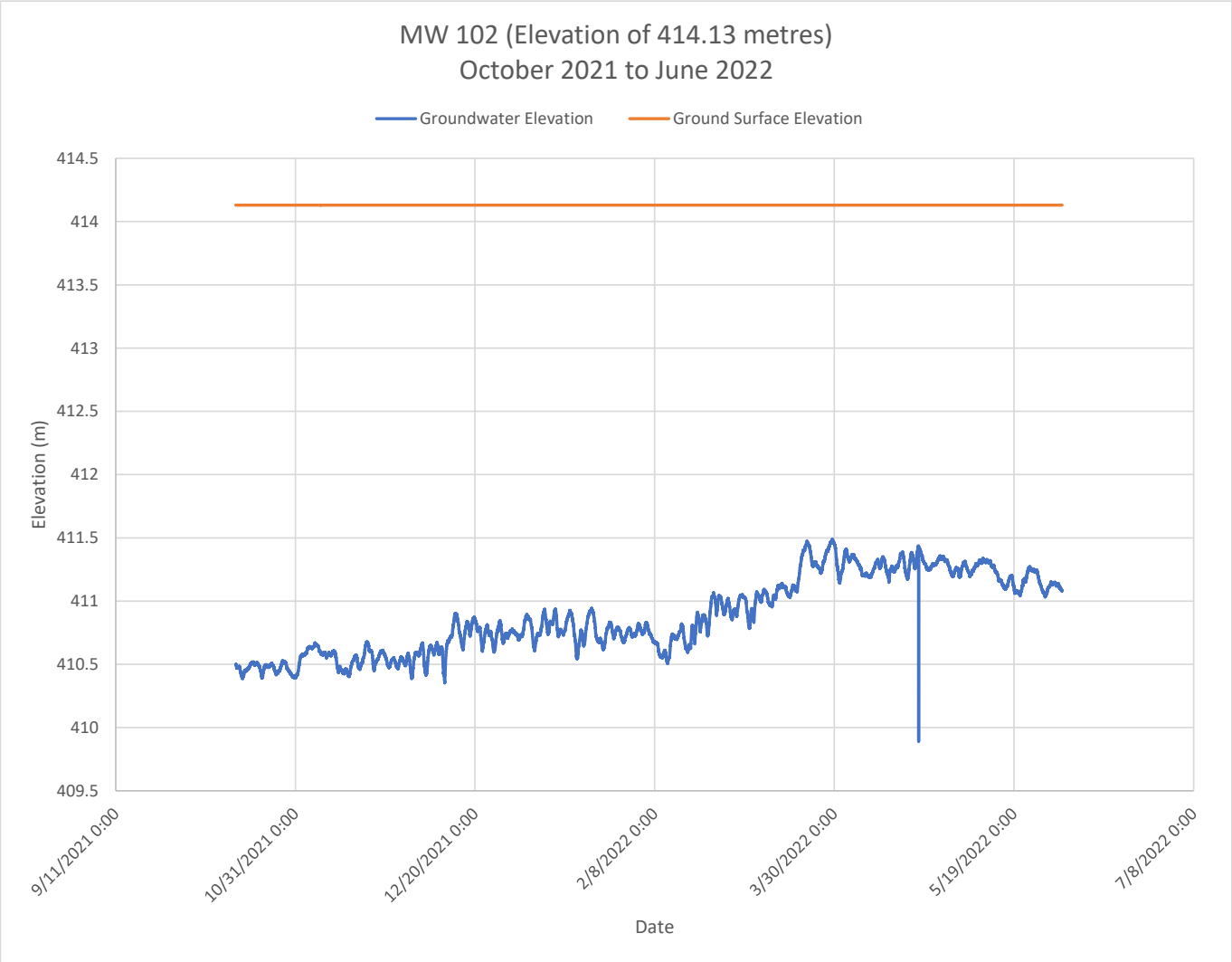
SM 301591-G Borehole Location Plan

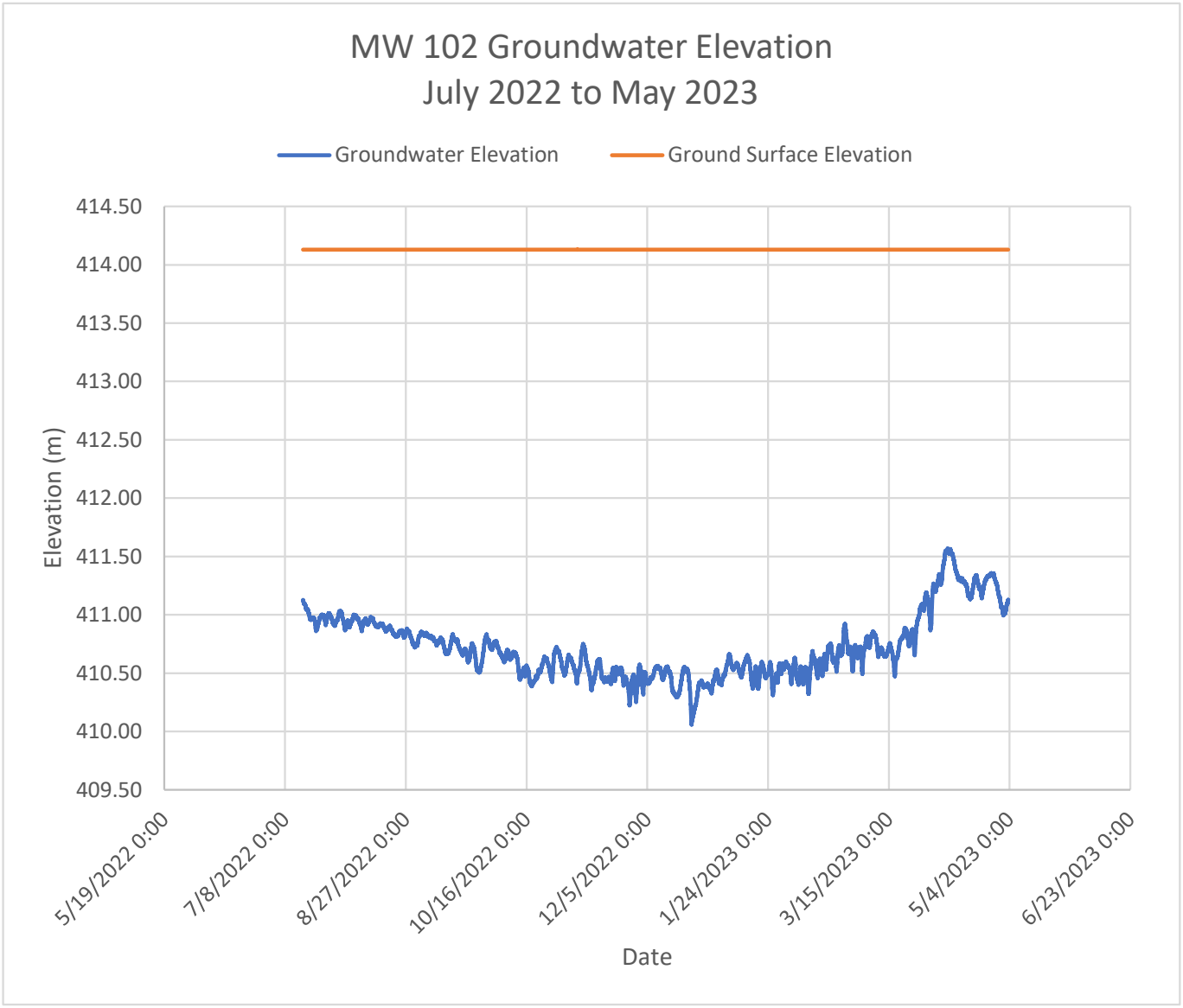
Drawing No. 1

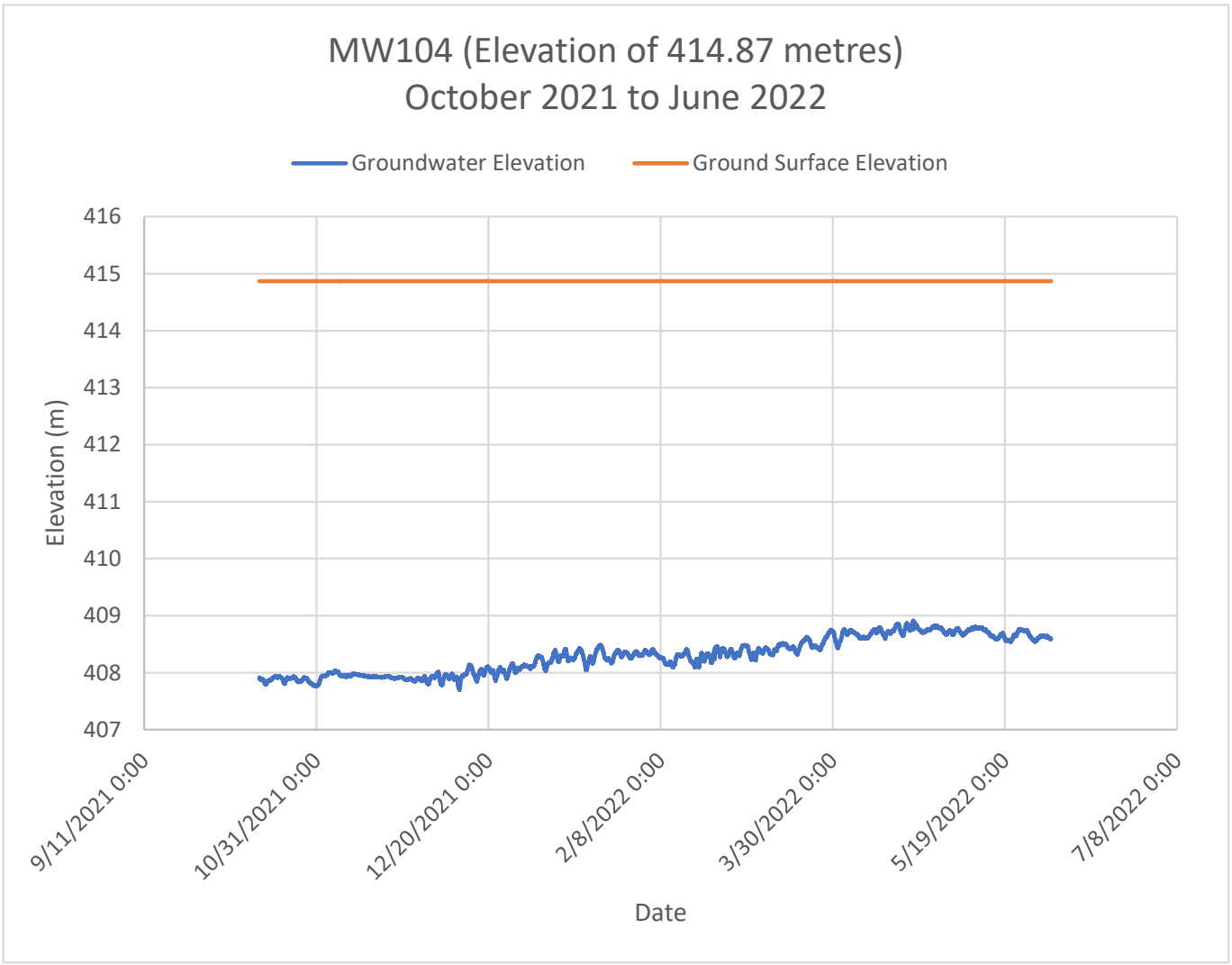

MW 004 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
406.00
405.50
405.00
404.50
404.00
403.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

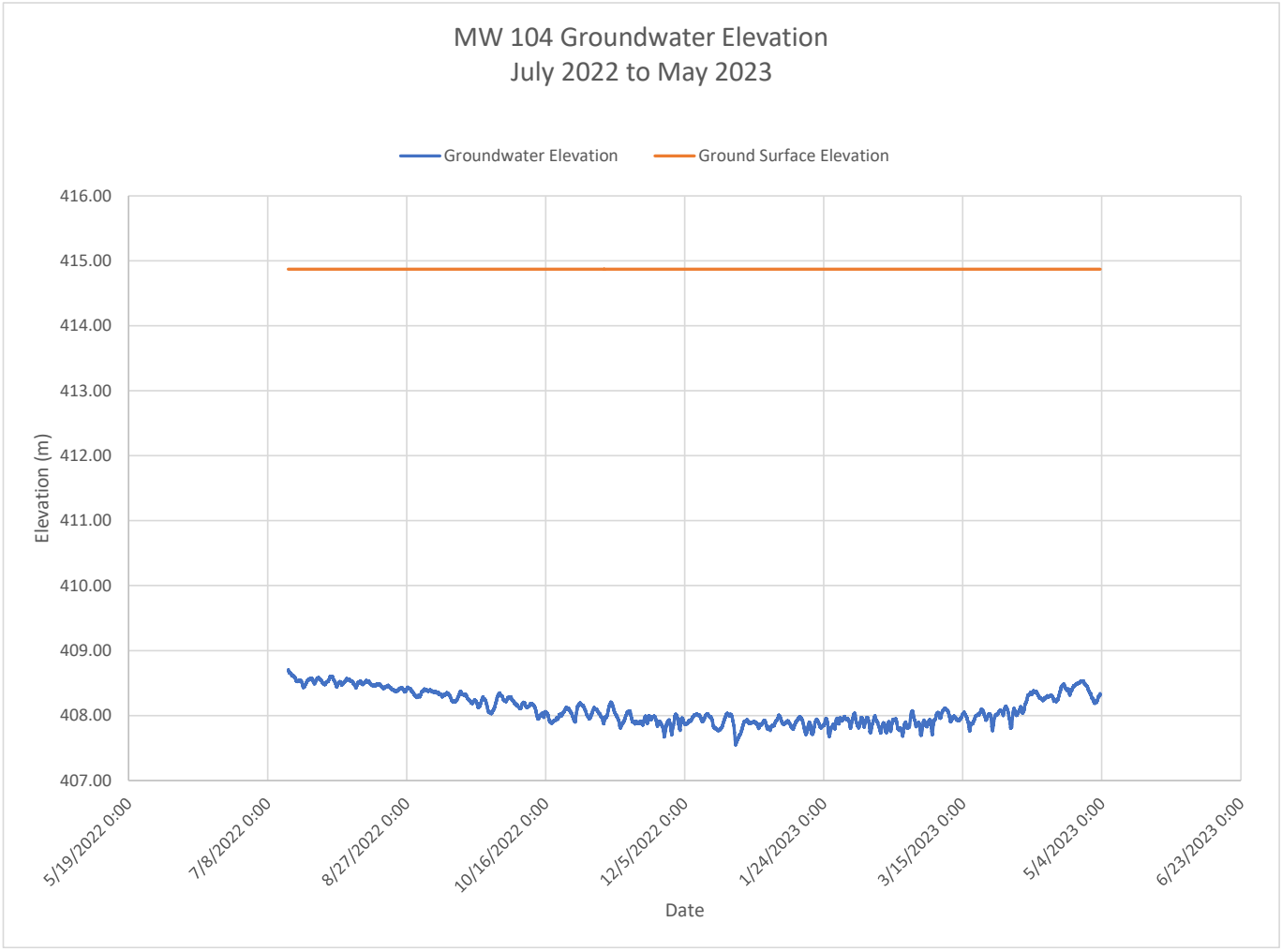

MW 101 (Elevation of 408.60 metres)
October 2021 to June 2022
Groundwater Elevation
Ground Surface Elevation
409
408
407
406
405
404
403
Elevation (m)
9/11/2021 0:00
10/31/2021 0:00
12/20/2021 0:00
2/8/2022 0:00
3/30/2022 0:00
5/19/2022 0:00
7/8/2022 0:00
Date

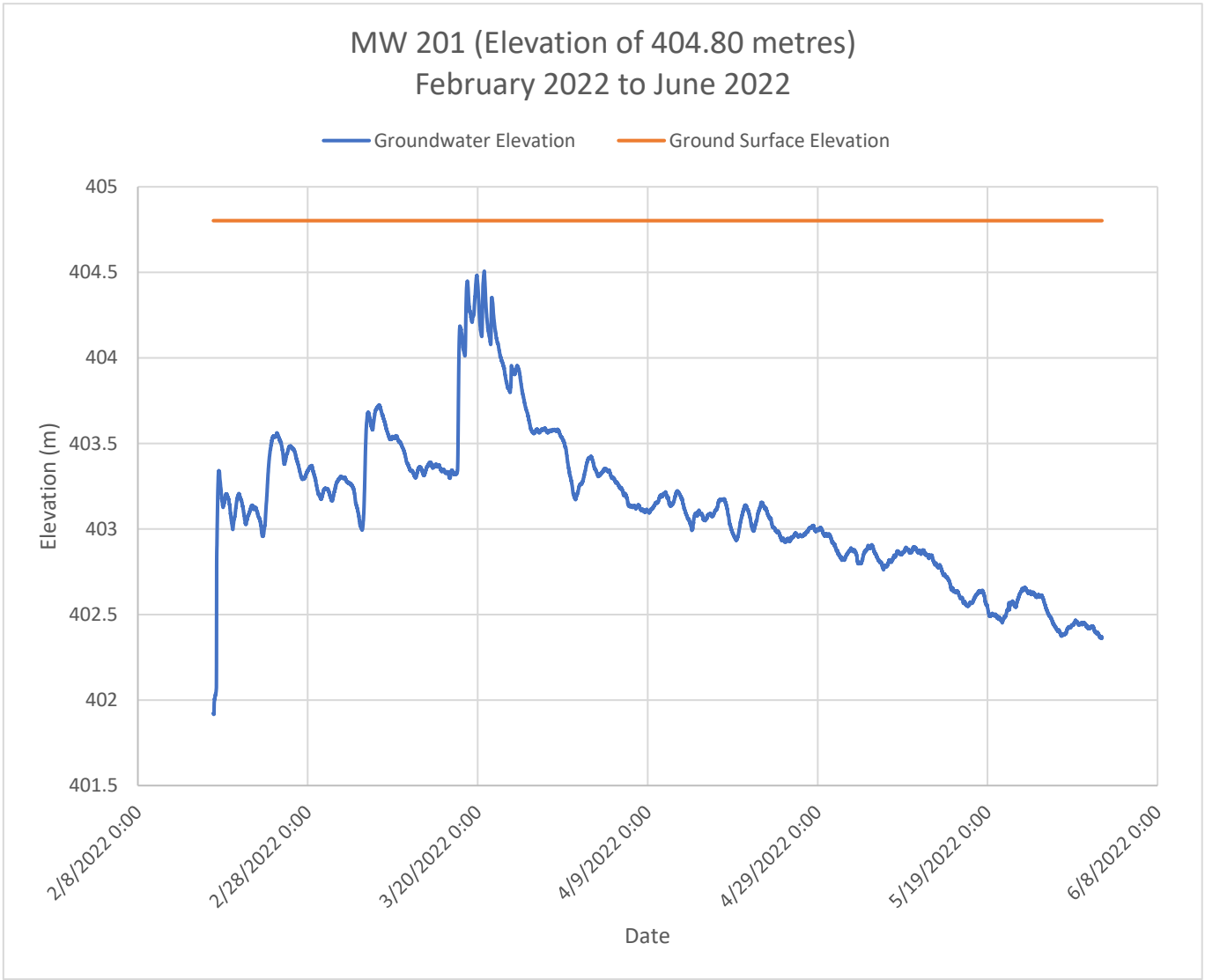

MW 101 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Groundsurface Elevation
409
408
407
406
405
404
403
402
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

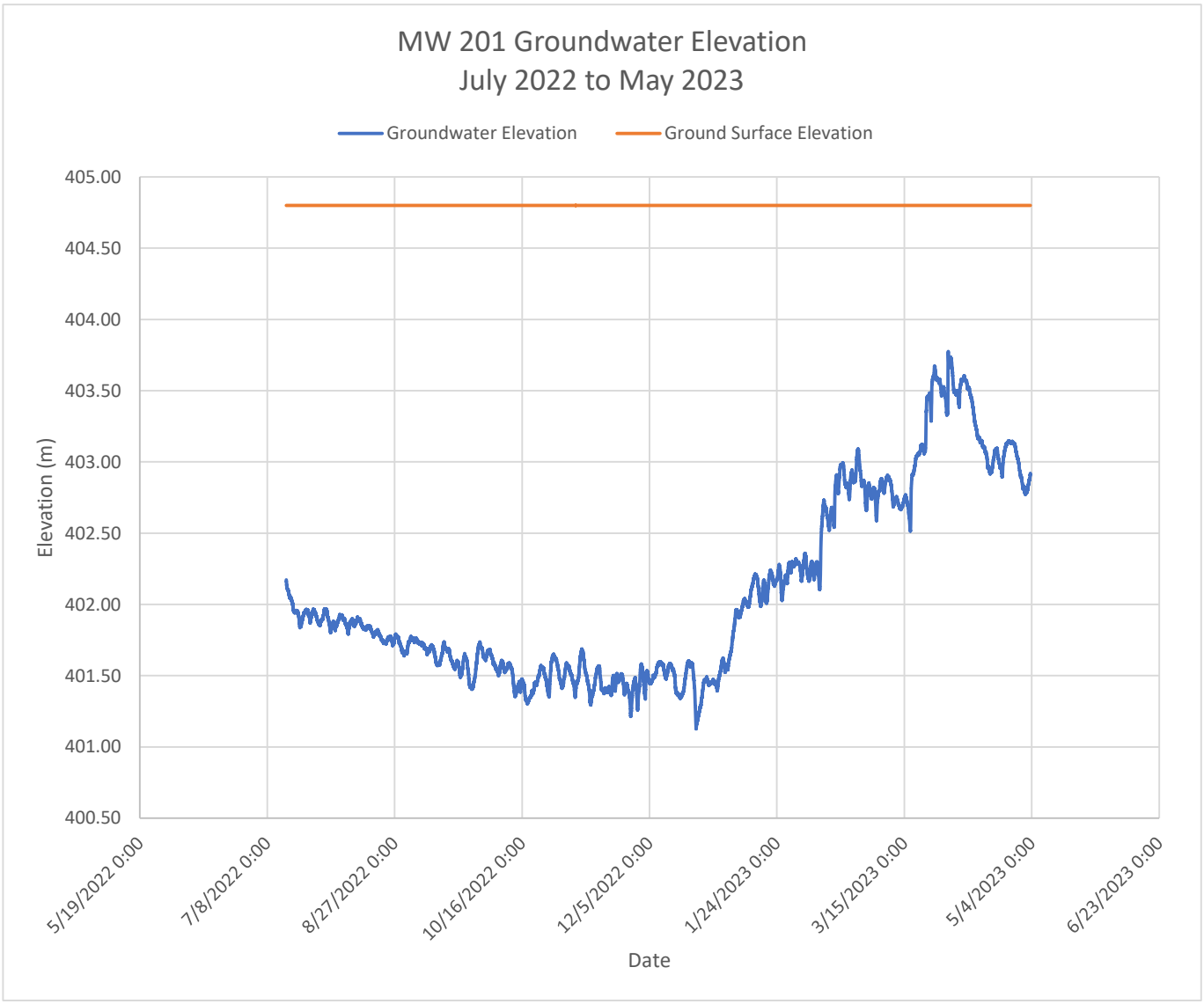

MW 102 (Elevation of 414.13 metres)
October 2021 to June 2022
Groundwater Elevation
Ground Surface Elevation
414.5
414
413.5
413
412.5
412
411.5
411
410.5
410
409.5
Elevation (m)
9/11/2021 0:00
10/31/2021 0:00
12/20/2021 0:00
2/8/2022 0:00
3/30/2022 0:00
5/19/2022 0:00
7/8/2022 0:00
Date

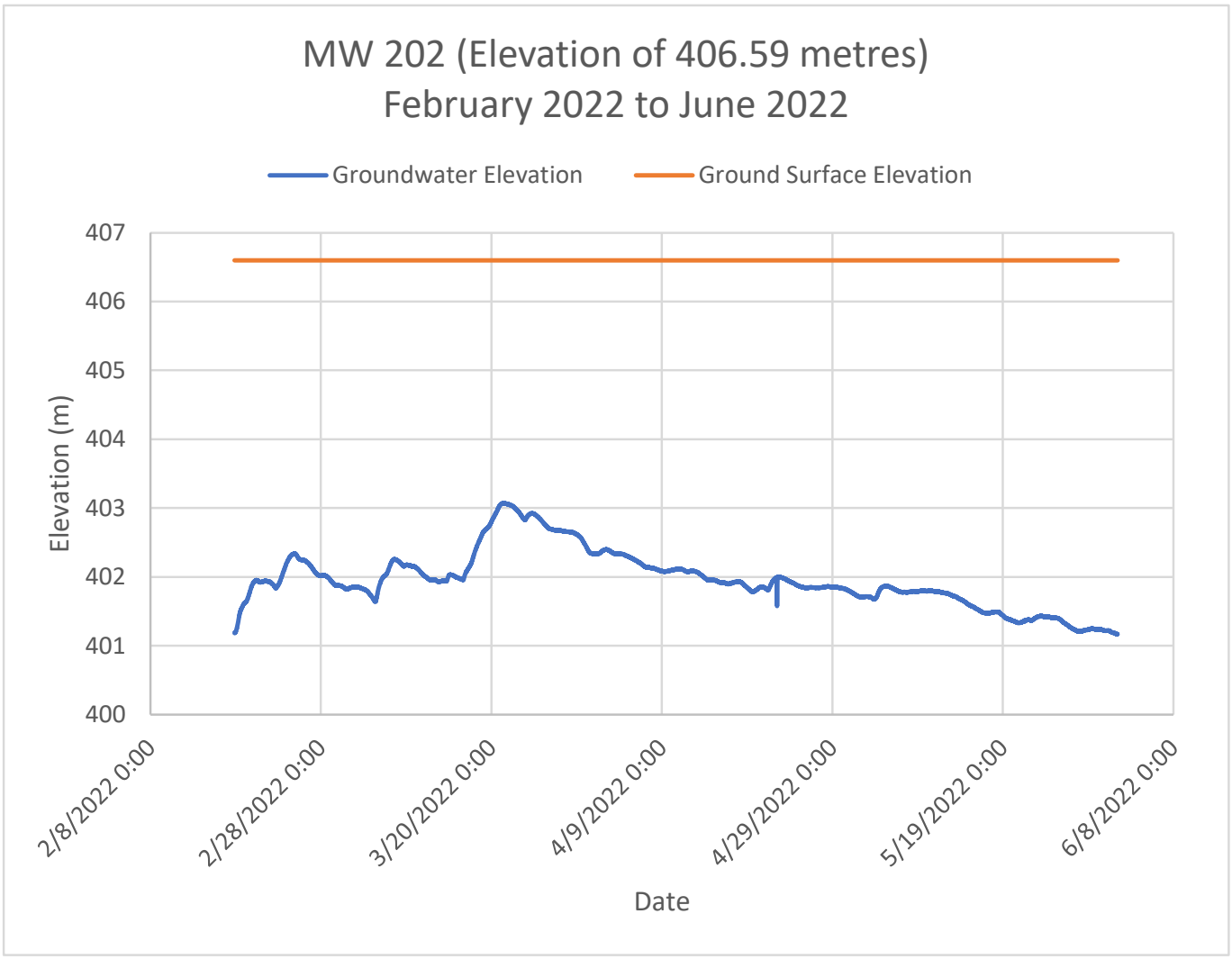

MW 102 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
414.50
414.00
413.50
413.00
412.50
412.00
411.50
411.00
410.50
410.00
409.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

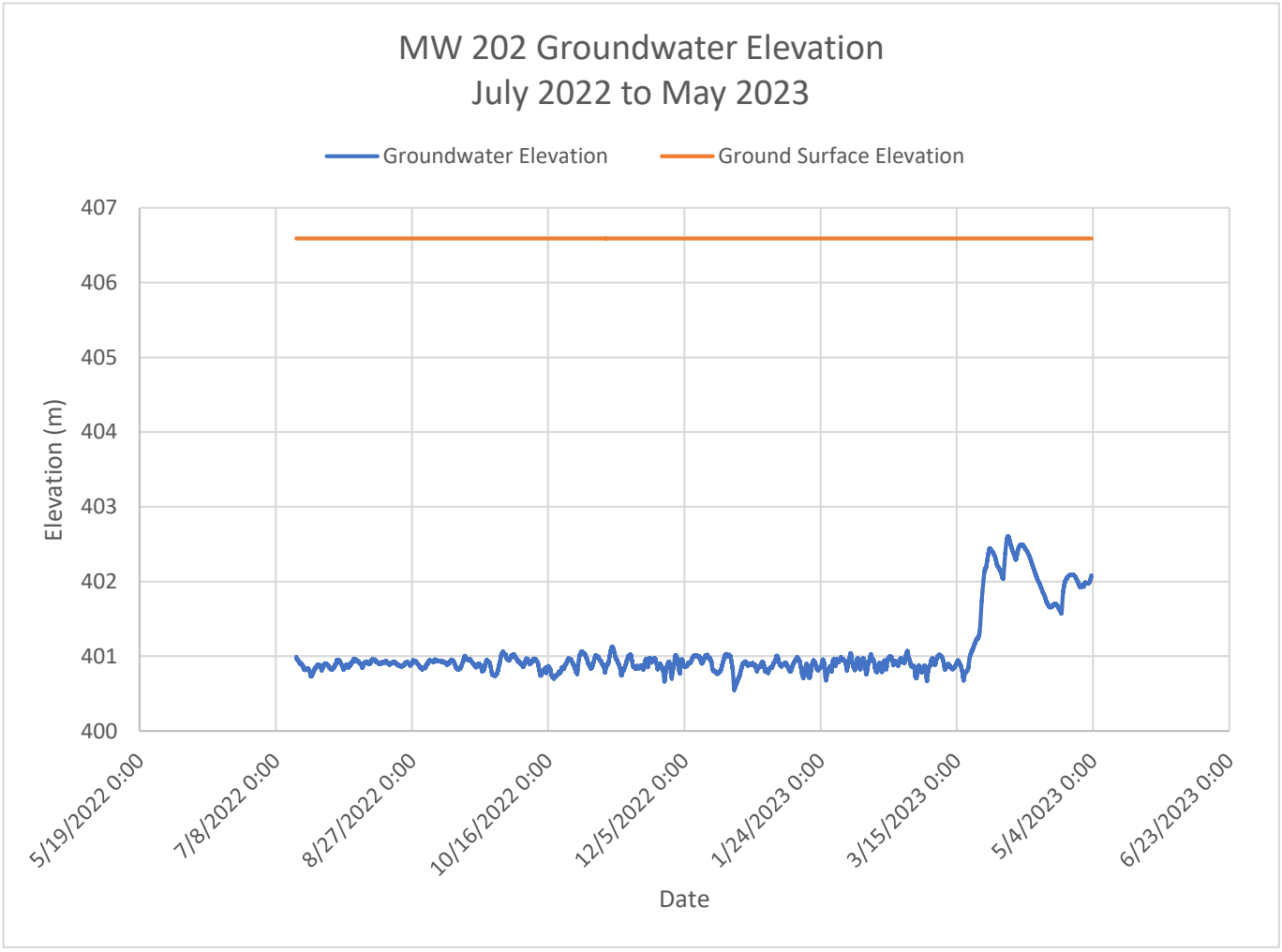

MW104 (Elevation of 414.87 metres)
October 2021 to June 2022
Groundwater Elevation
Ground Surface Elevation
Elevation (m)
416
415
414
413
412
411
410
409
408
407
9/11/2021 0:00
10/31/2021 0:00
12/20/2021 0:00
2/8/2022 0:00
3/30/2022 0:00
5/19/2022 0:00
7/8/2022 0:00
Date

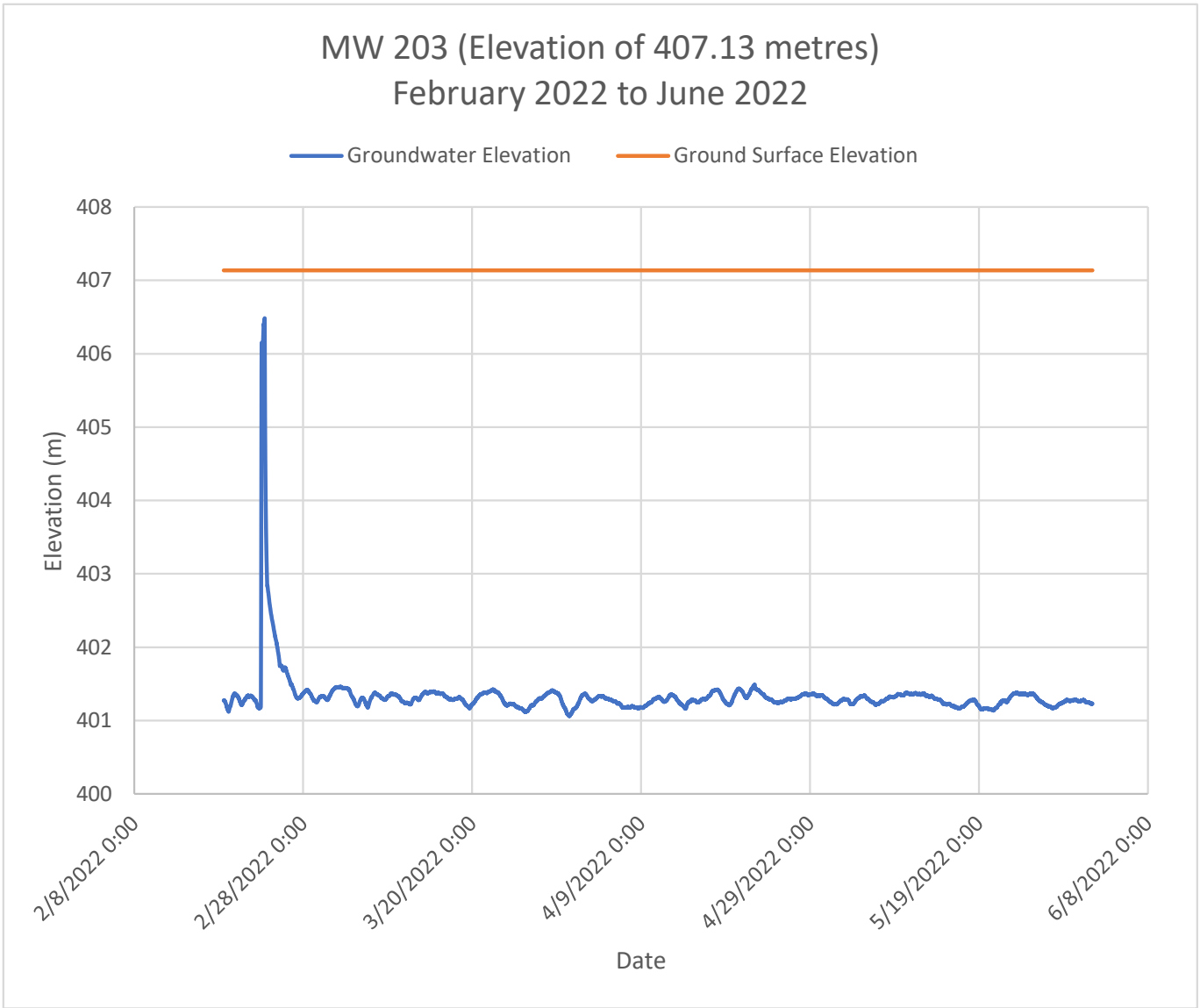

MW 104 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
416.00
415.00
414.00
413.00
412.00
411.00
410.00
409.00
408.00
407.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

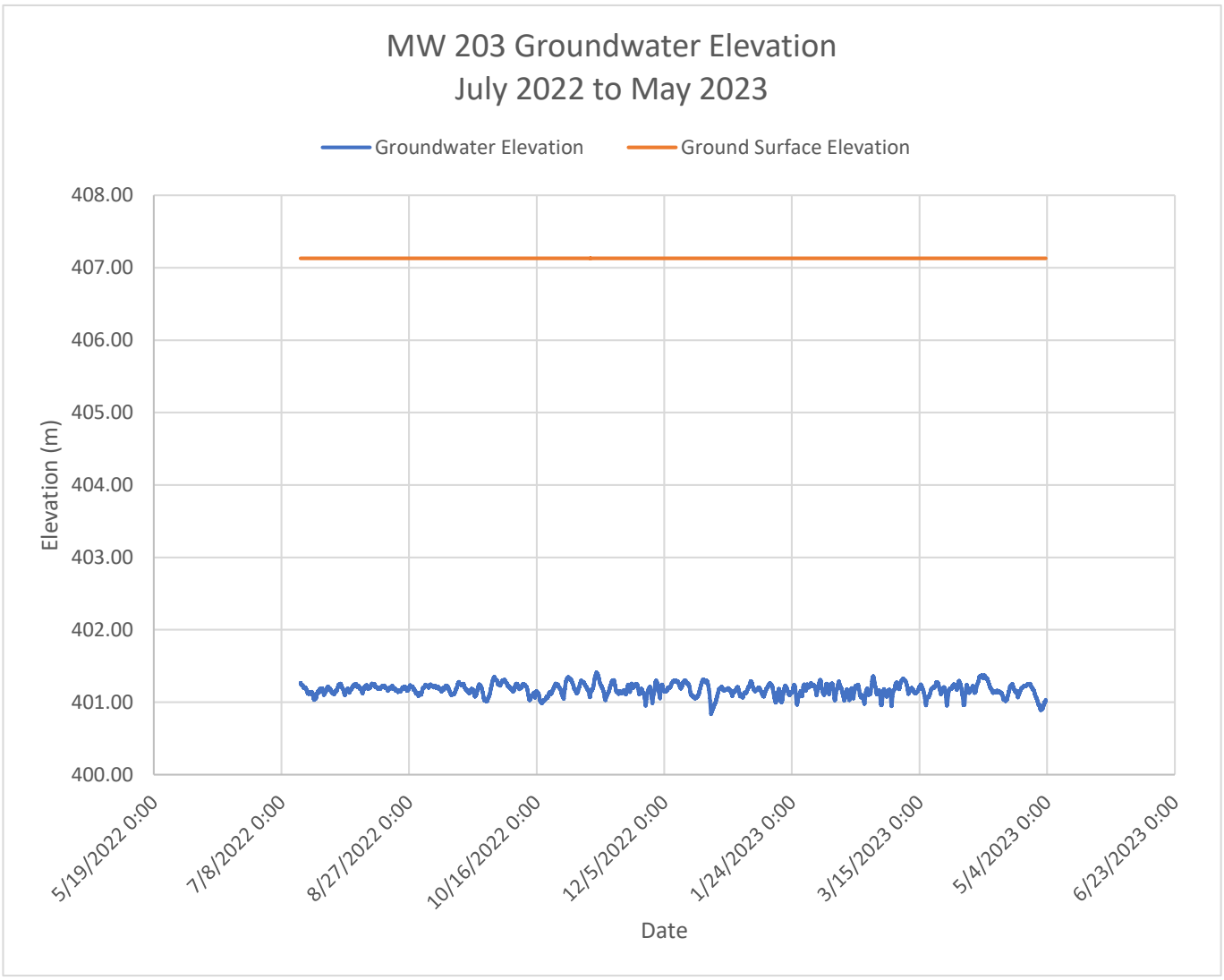

MW 201 (Elevation of 404.80 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
405
404.5
404
403.5
403
402.5
402
401.5
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

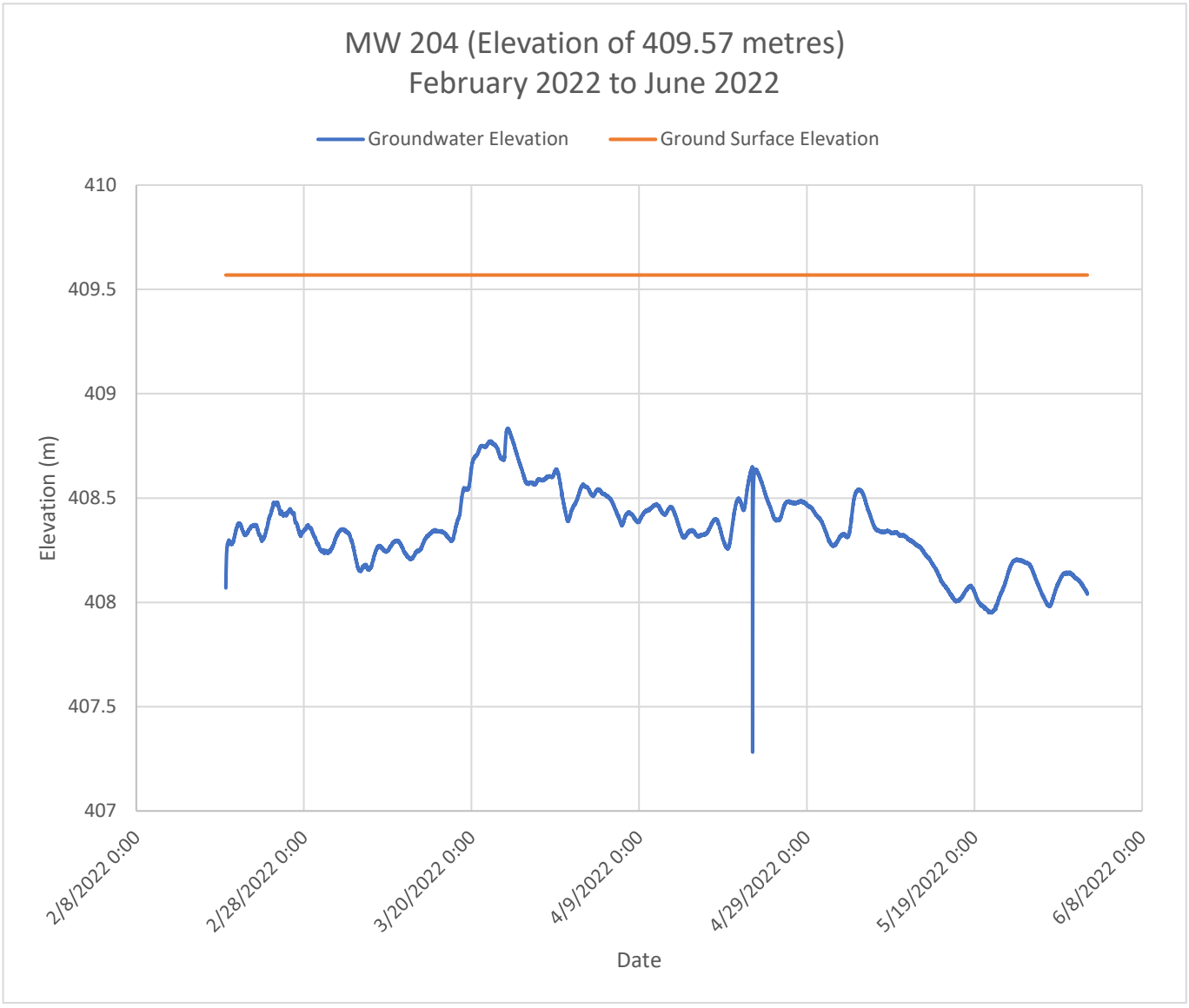

MW 201 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
405.00
404.50
404.00
403.50
403.00
402.50
402.00
401.50
401.00
400.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

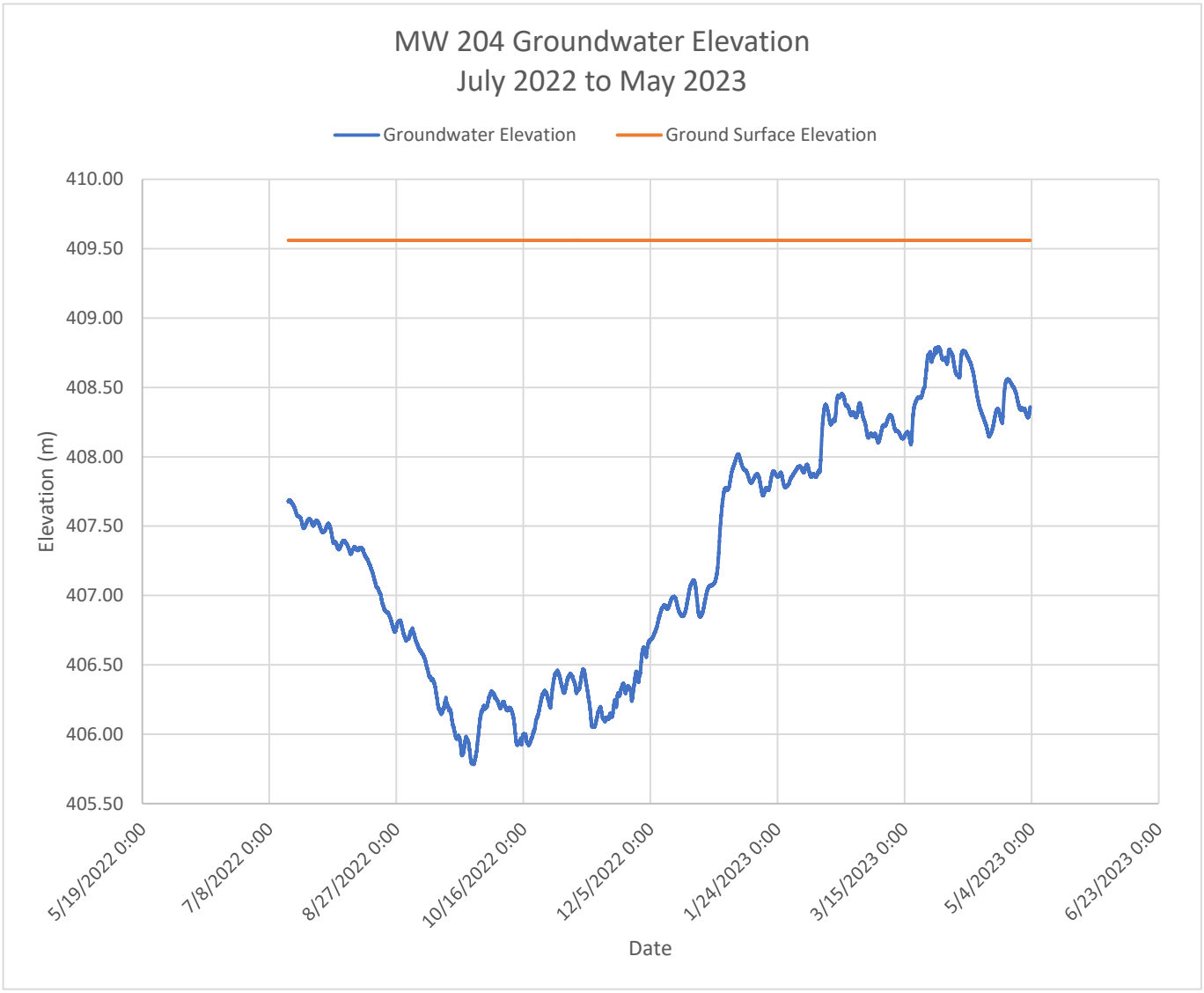

MW 202 (Elevation of 406.59 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
407
406
405
404
403
402
401
400
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

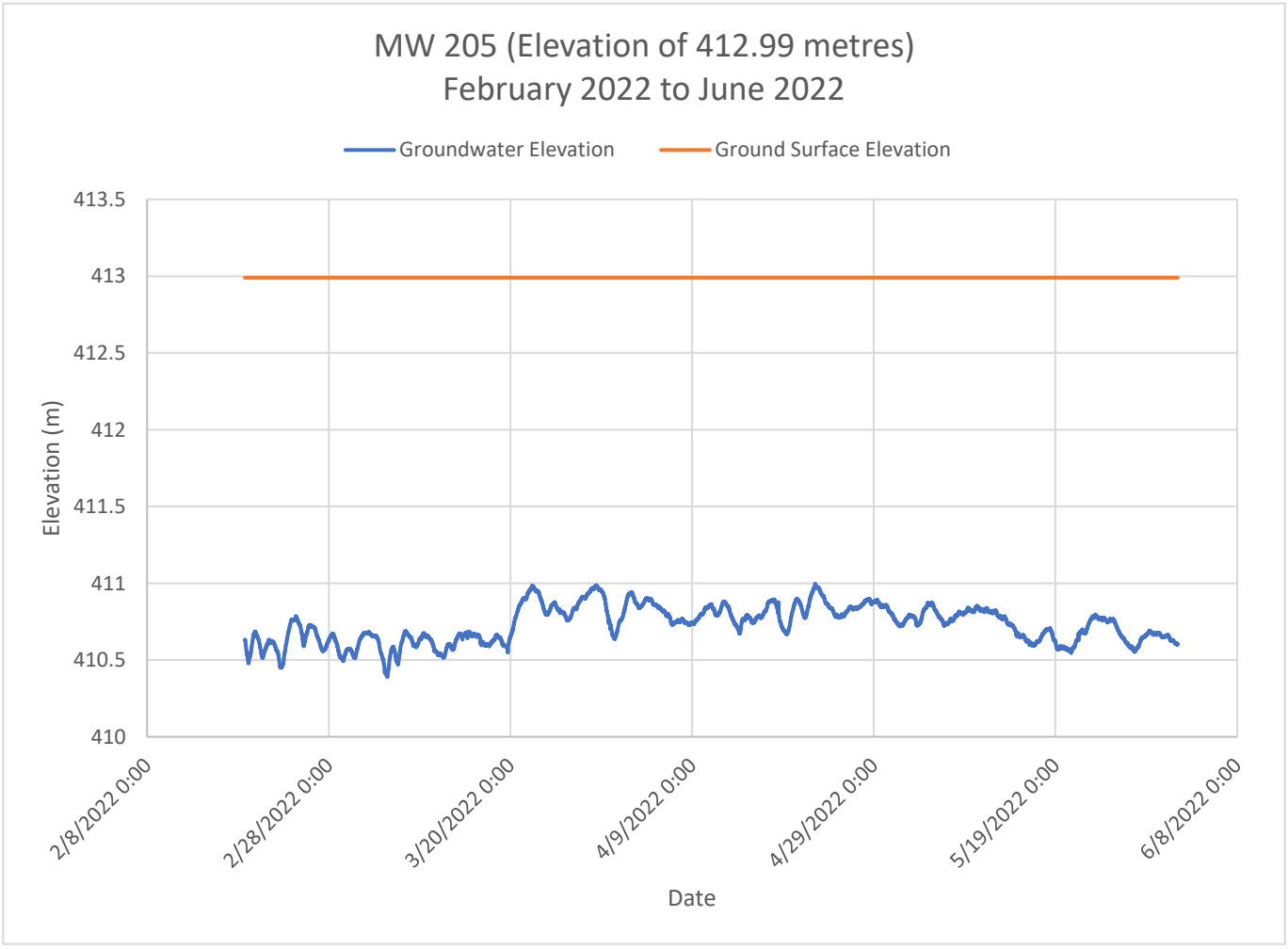

MW 202 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
407
406
405
404
403
402
401
400
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

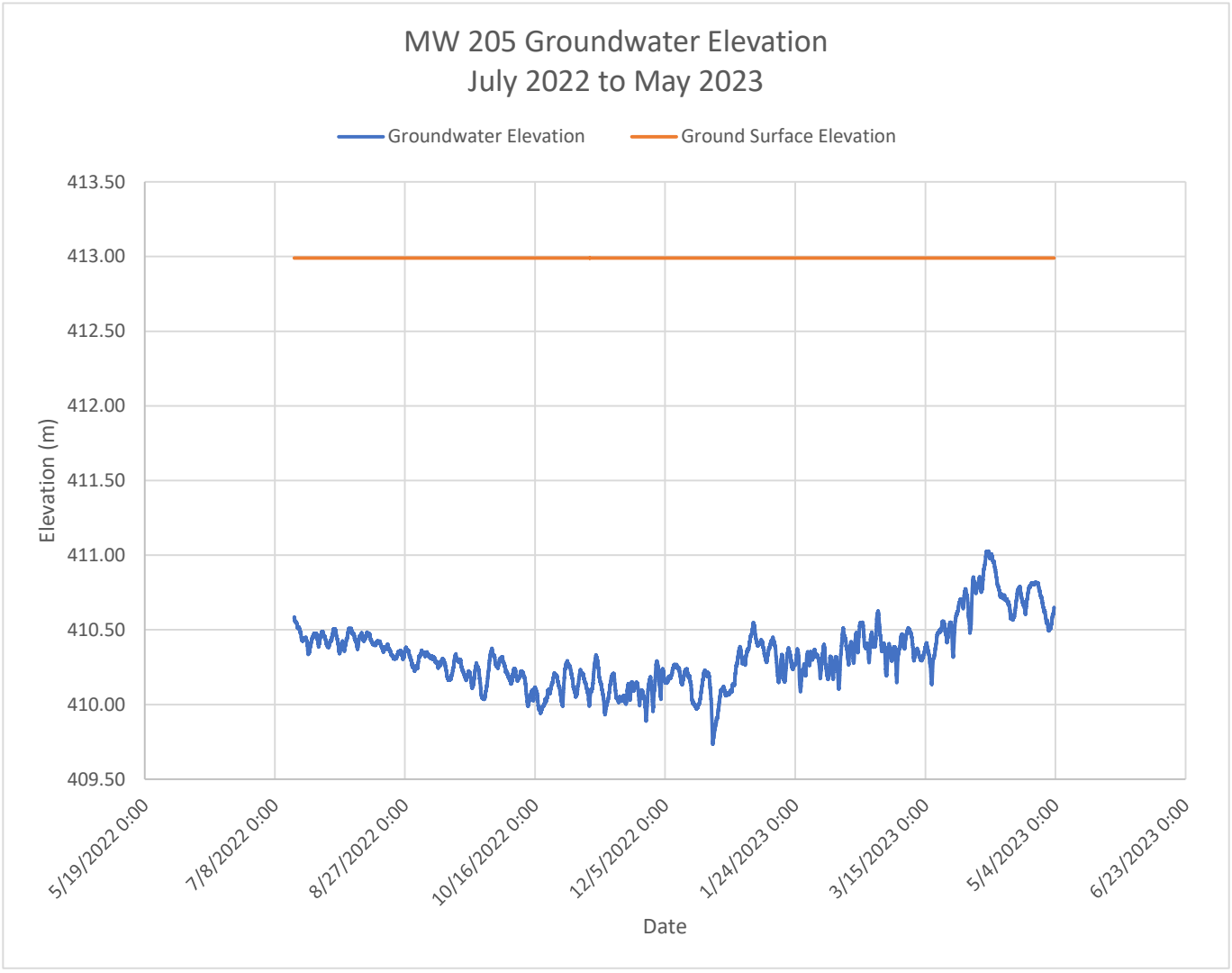

MW 203 (Elevation of 407.13 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
408
407
406
405
404
403
402
401
400
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

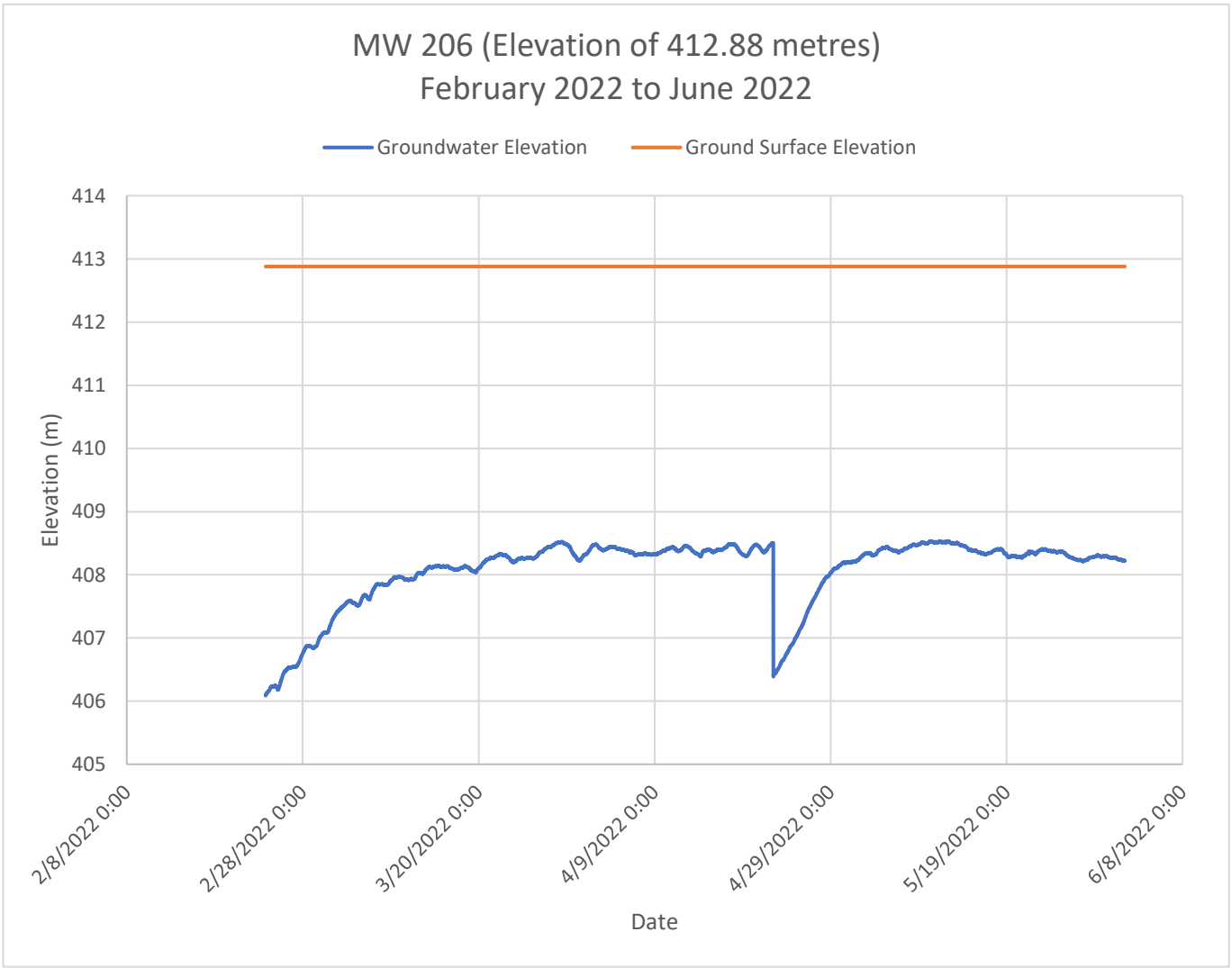

MW 203 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
408.00
407.00
406.00
405.00
404.00
403.00
402.00
401.00
400.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

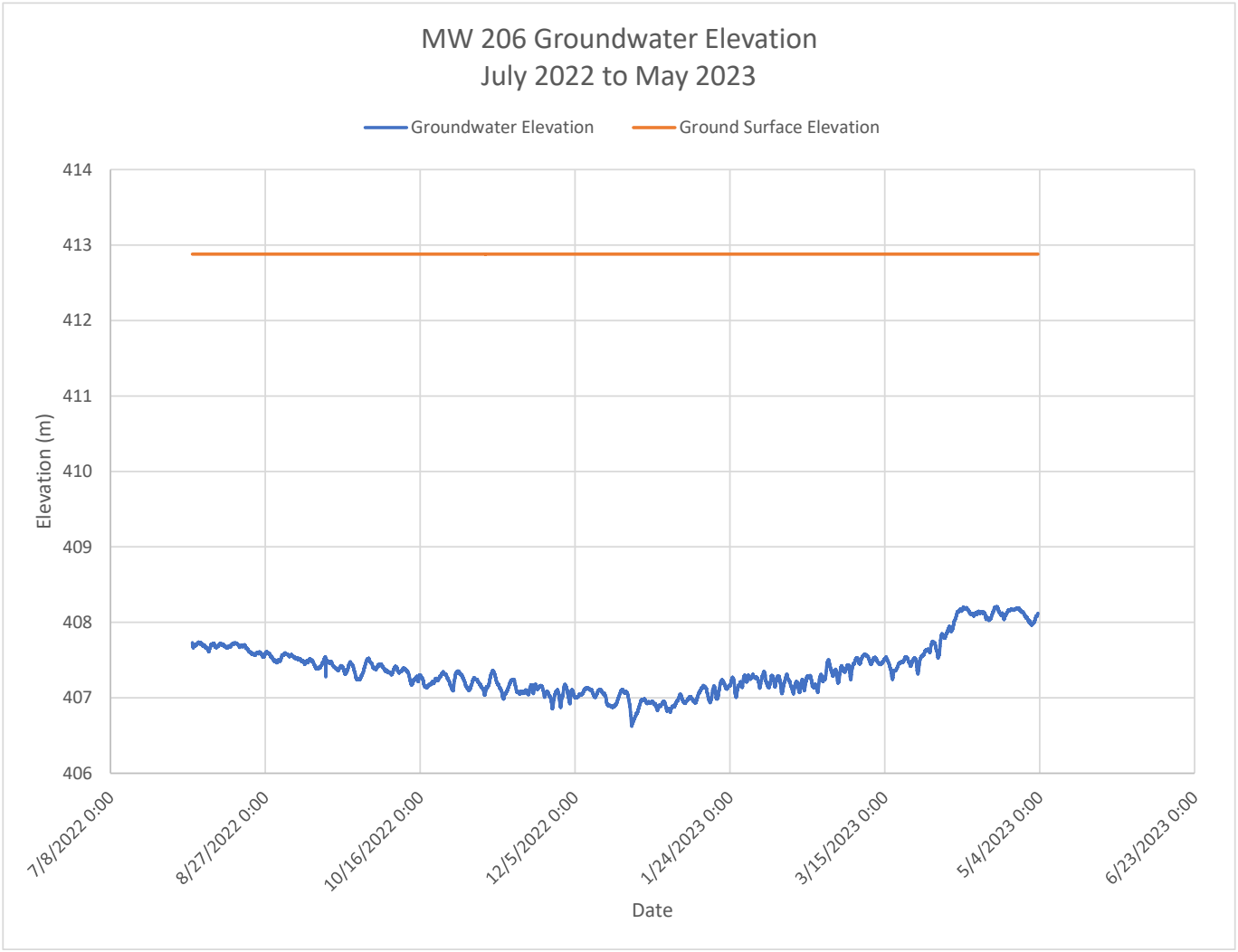

MW 204 (Elevation of 409.57 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
410
409.5
409
408.5
408
407.5
407
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

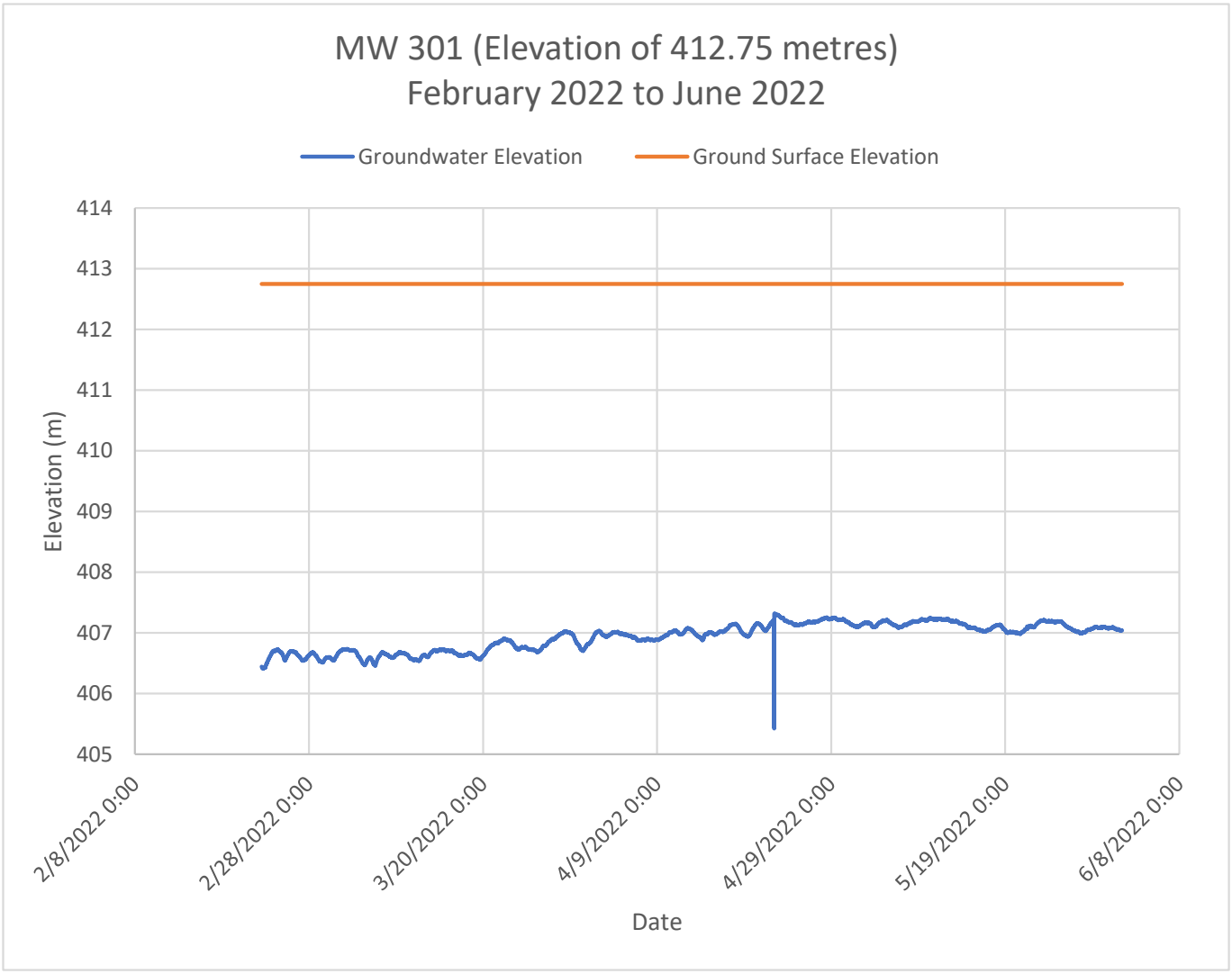

MW 204 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
410.00
409.50
409.00
408.50
408.00
407.50
407.00
406.50
406.00
405.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

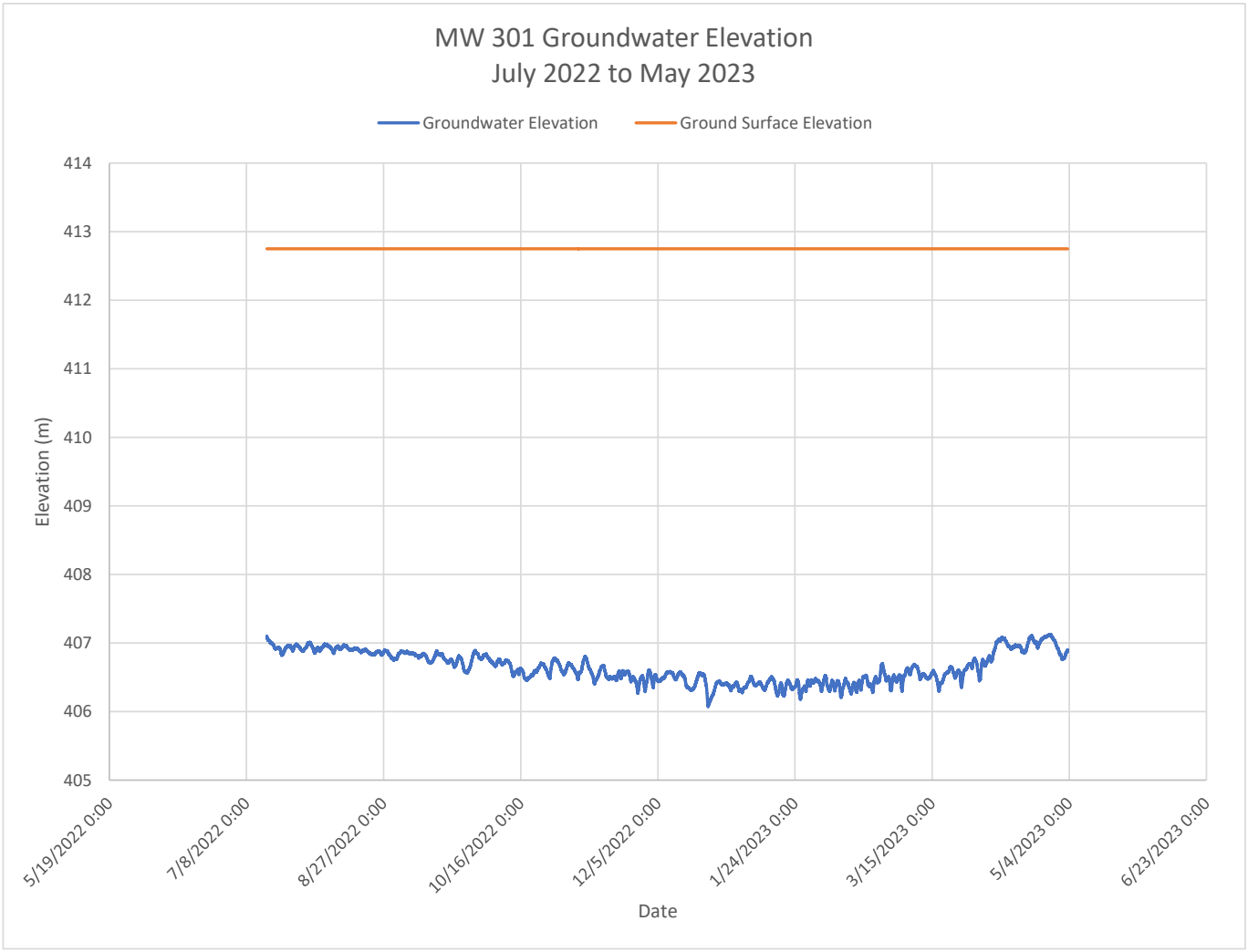

MW 205 (Elevation of 412.99 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
413.5
413
412.5
412
411.5
411
410.5
410
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

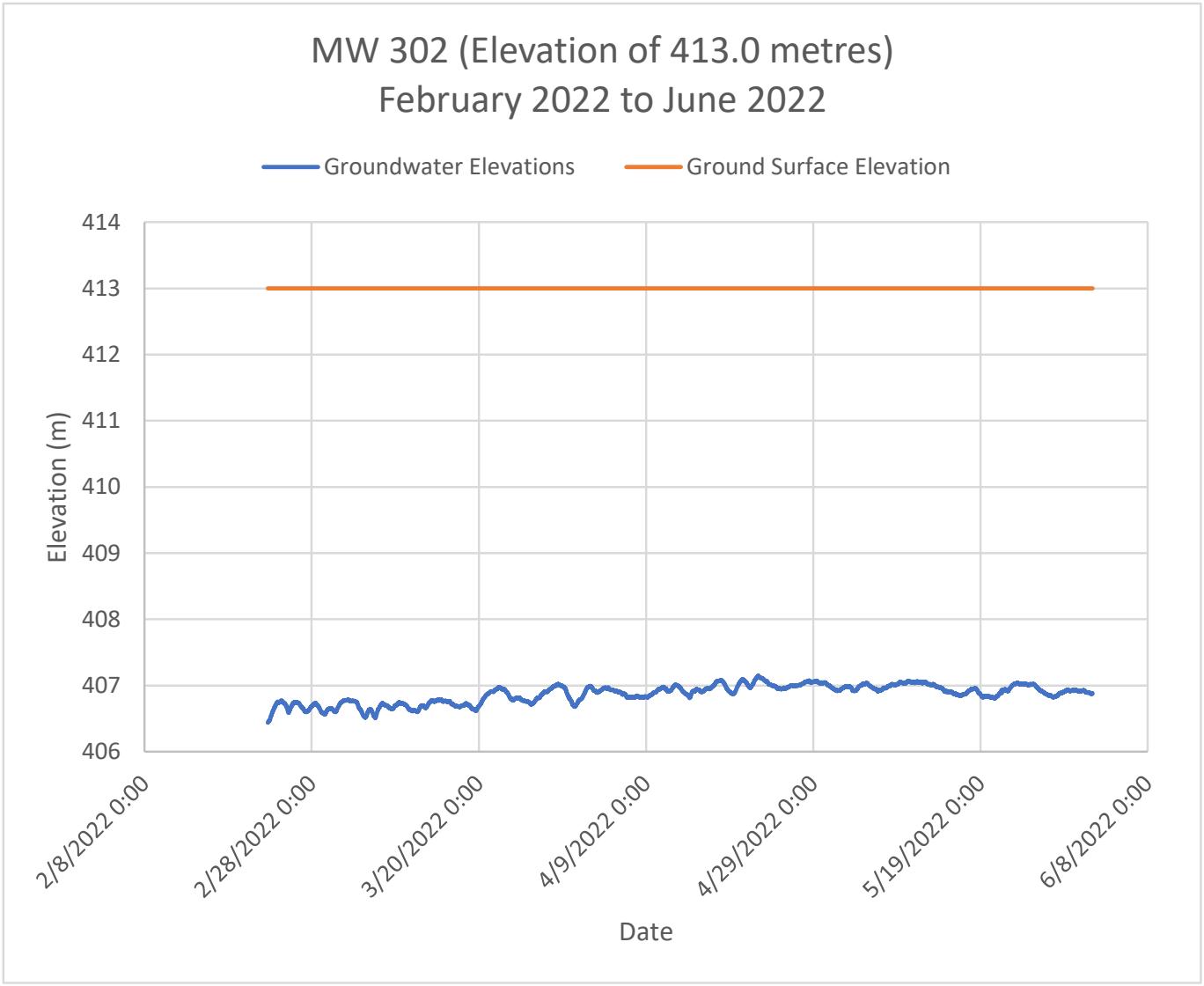

MW 205 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
413.50
413.00
412.50
412.00
411.50
411.00
410.50
410.00
409.50
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

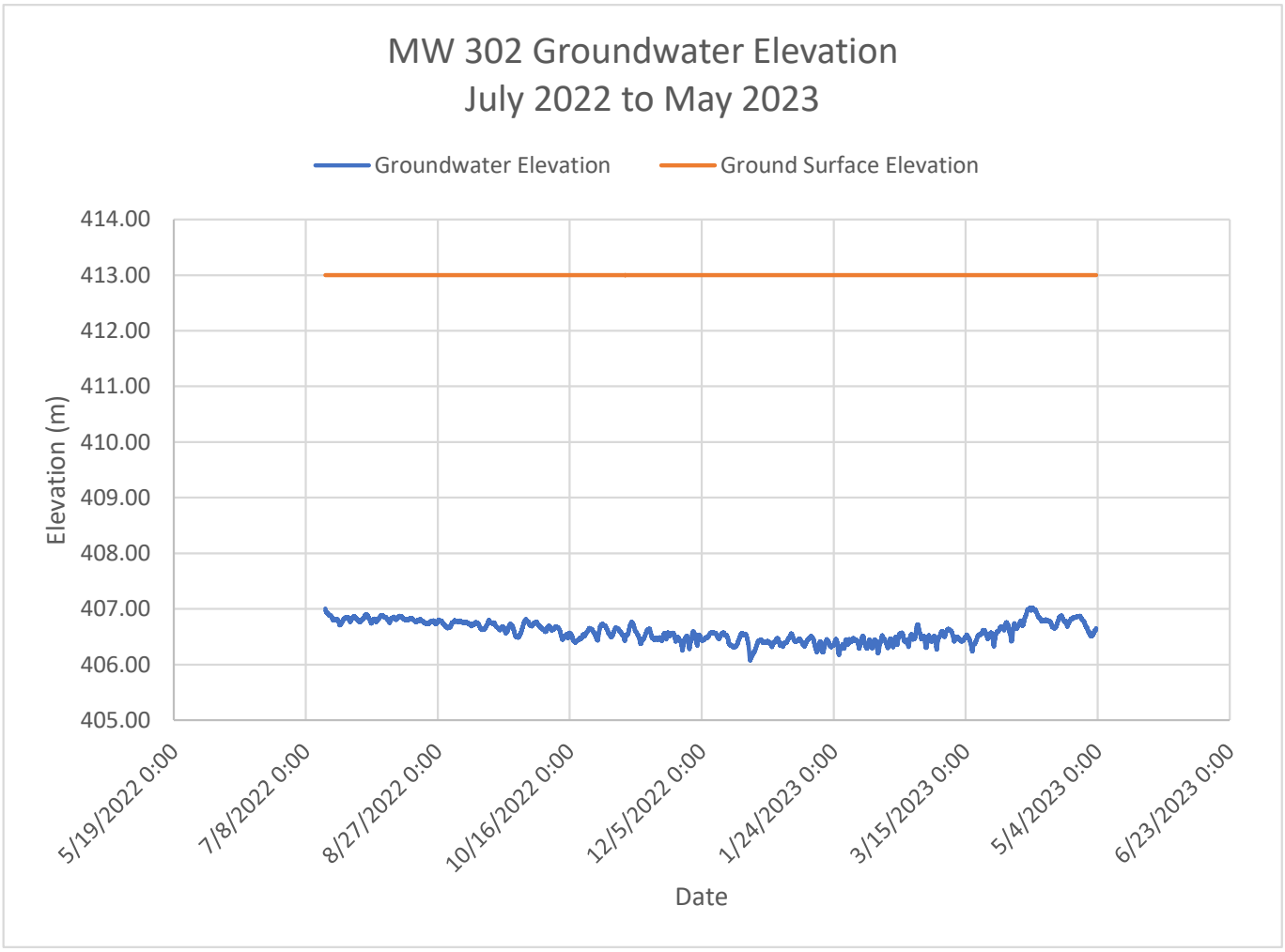

MW 206 (Elevation of 412.88 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date

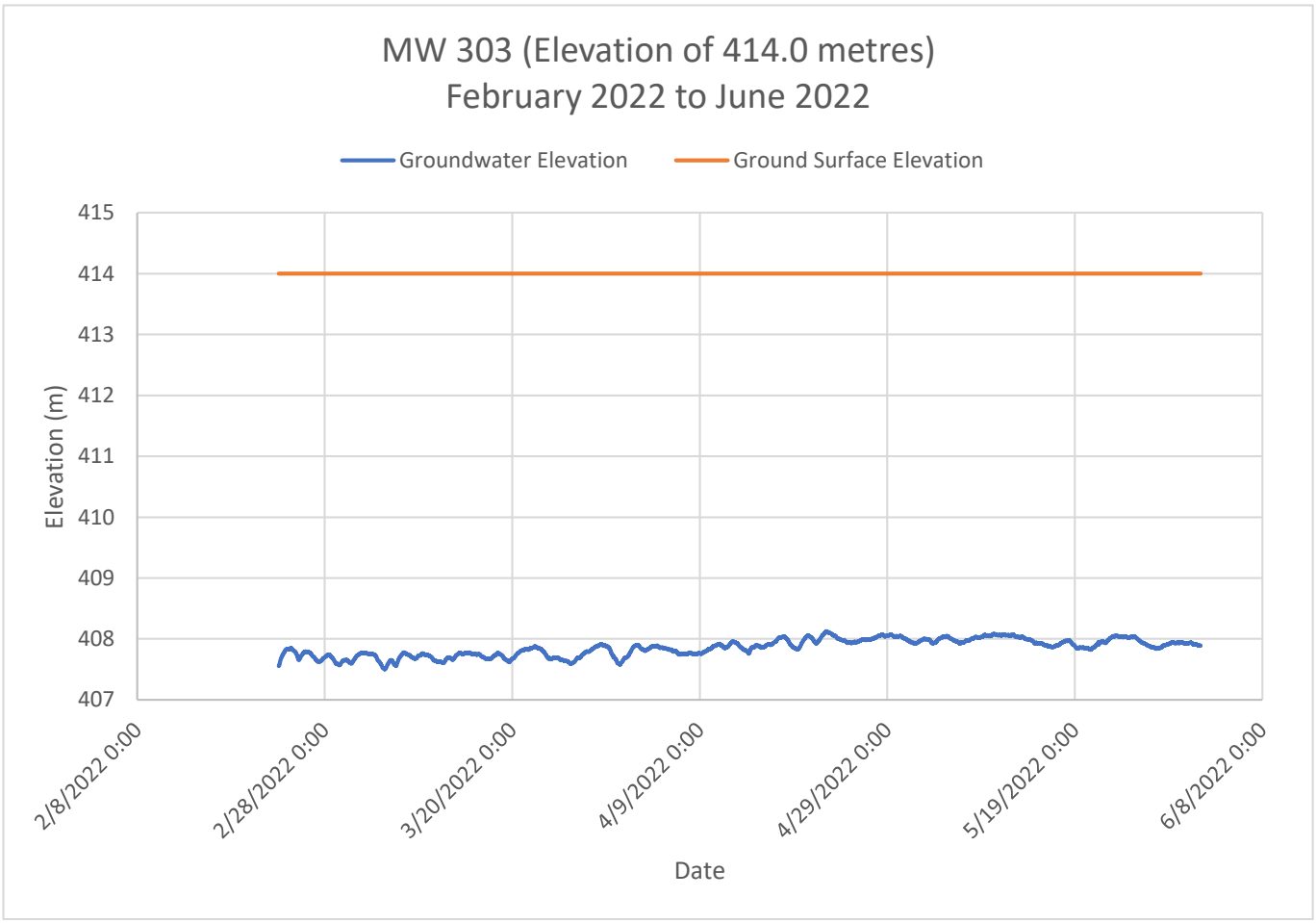

MW 206 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
Elevation (m)
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date

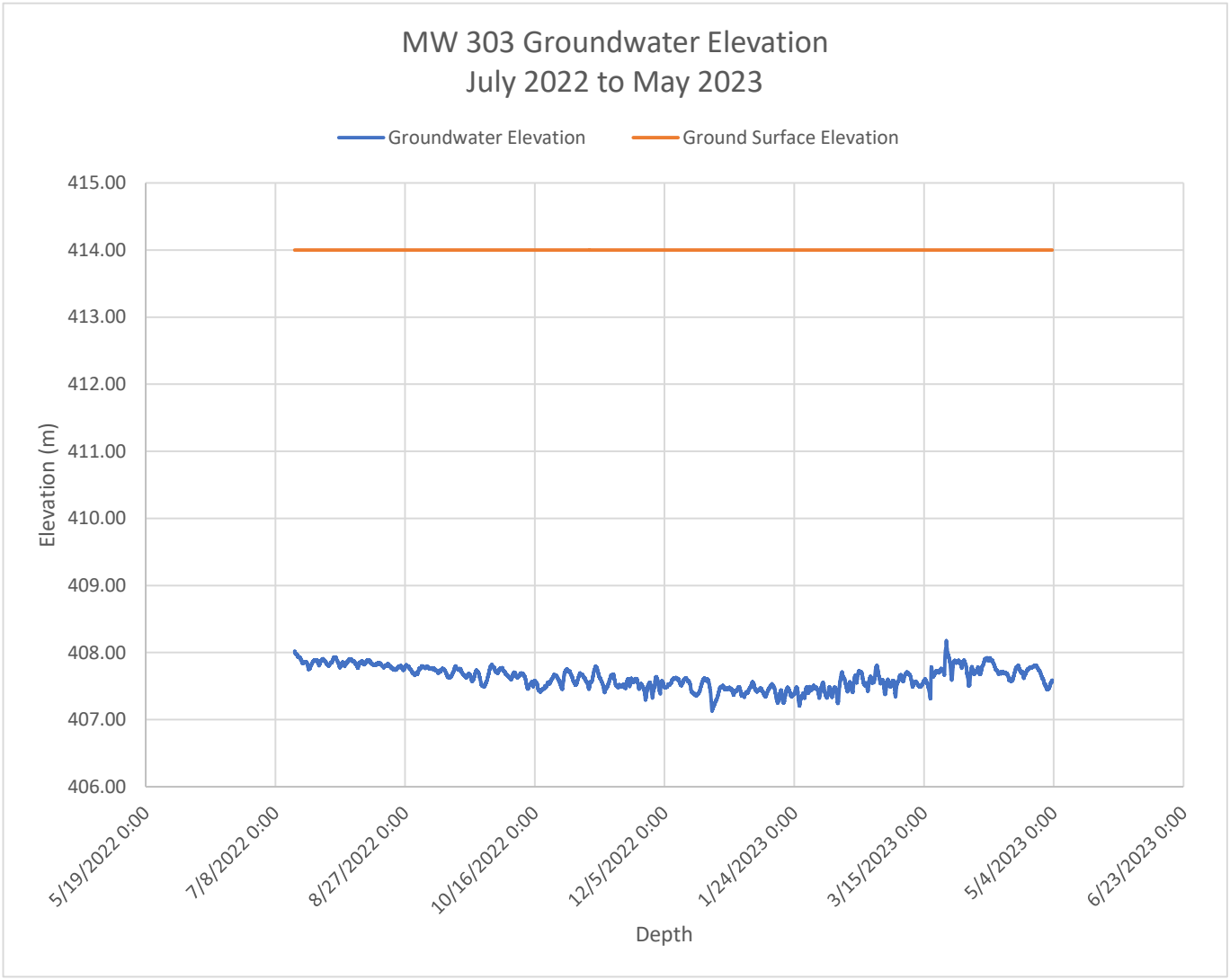

MW 301 (Elevation of 412.75 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date


MW 301 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
405
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date


MW 302 (Elevation of 413.0 metres)
February 2022 to June 2022
Groundwater Elevations
Ground Surface Elevation
414
413
412
411
410
409
408
407
406
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date


MW 302 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
414.00
413.00
412.00
411.00
410.00
409.00
408.00
407.00
406.00
405.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
12/5/2022 0:00
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Date


MW 303 (Elevation of 414.0 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date


MW 303 Groundwater Elevation
July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
415.00
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408.00
407.00
406.00
Elevation (m)
5/19/2022 0:00
7/8/2022 0:00
8/27/2022 0:00
10/16/2022 0:00
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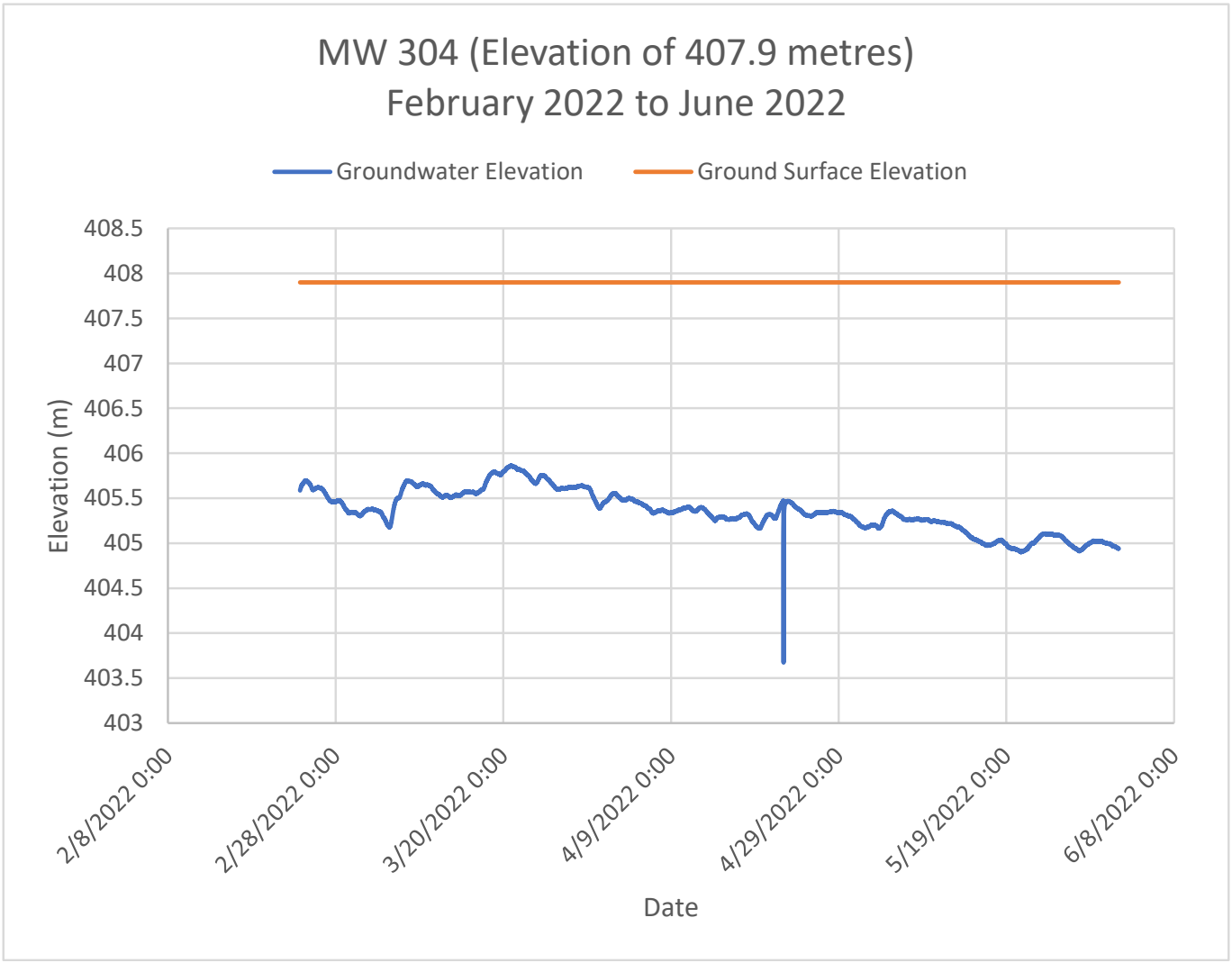
1/24/2023 0:00
3/15/2023 0:00
5/4/2023 0:00
6/23/2023 0:00
Depth


MW 304 (Elevation of 407.9 metres)
February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
408.5
408
407.5
407
406.5
406
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405
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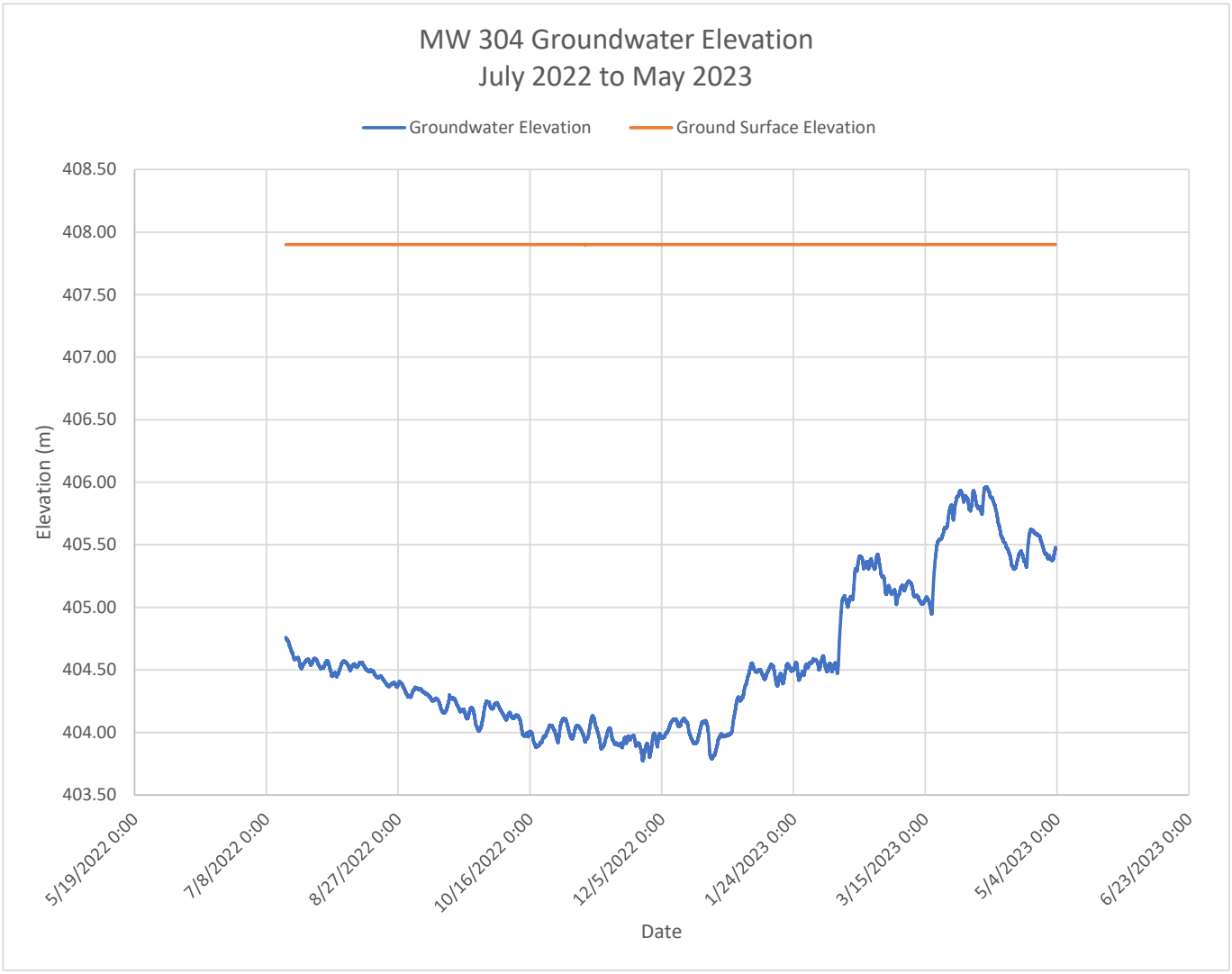
403.5
403
Elevation (m)
2/8/2022 0:00
2/28/2022 0:00
3/20/2022 0:00
4/9/2022 0:00
4/29/2022 0:00
5/19/2022 0:00
6/8/2022 0:00
Date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July 2022 to May 2023
Groundwater Elevation
Ground Surface Elevation
408.50
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Elevation (m)
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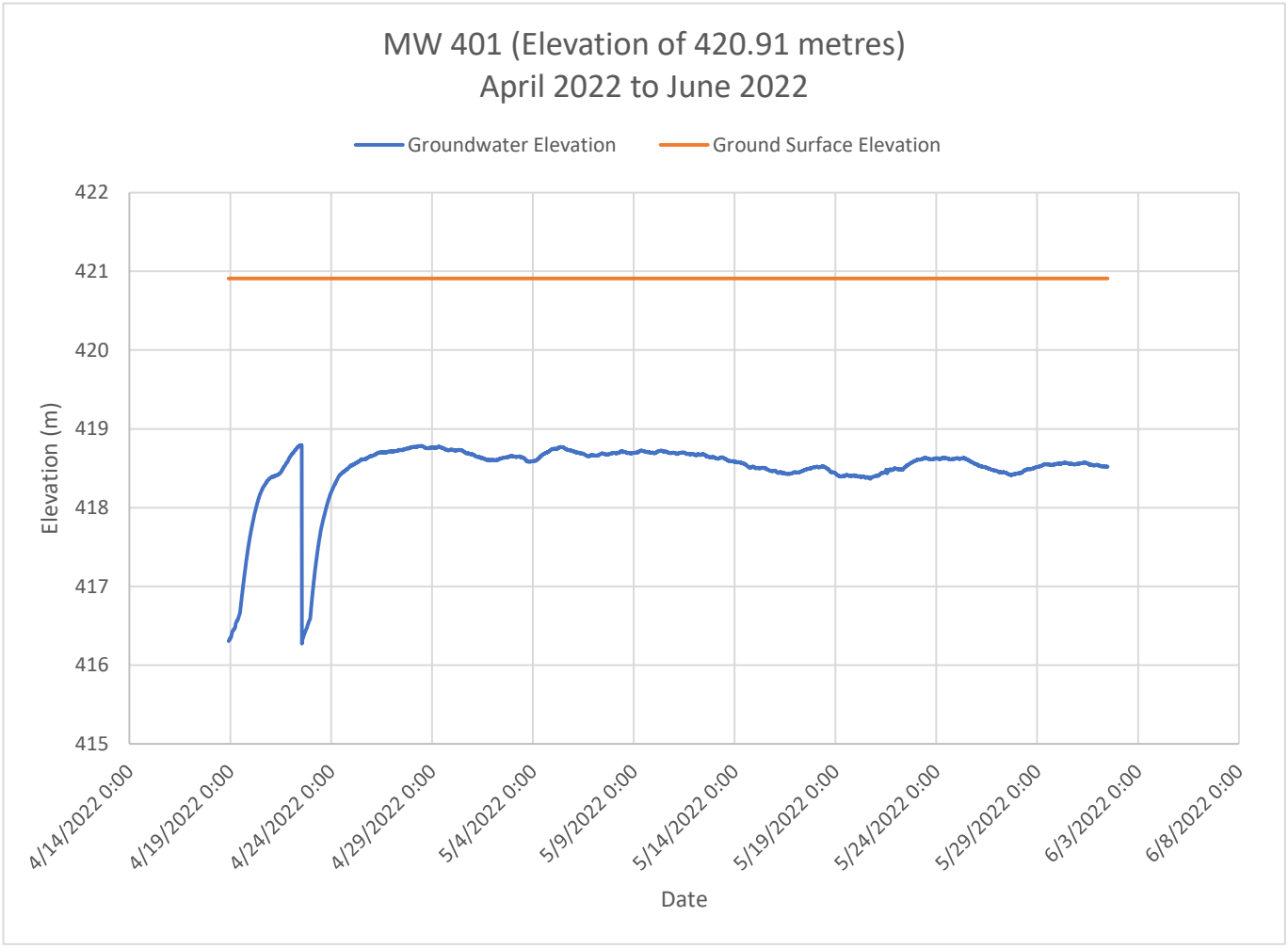
MW 401 (Elevation of 420.91 metres)
April 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
422
421
420
419
418
417
416
415
Elevation (m)
4/14/2022 0:00
4/19/2022 0:00
4/24/2022 0:00
4/29/2022 0:00
5/4/2022 0:00
5/9/2022 0:00
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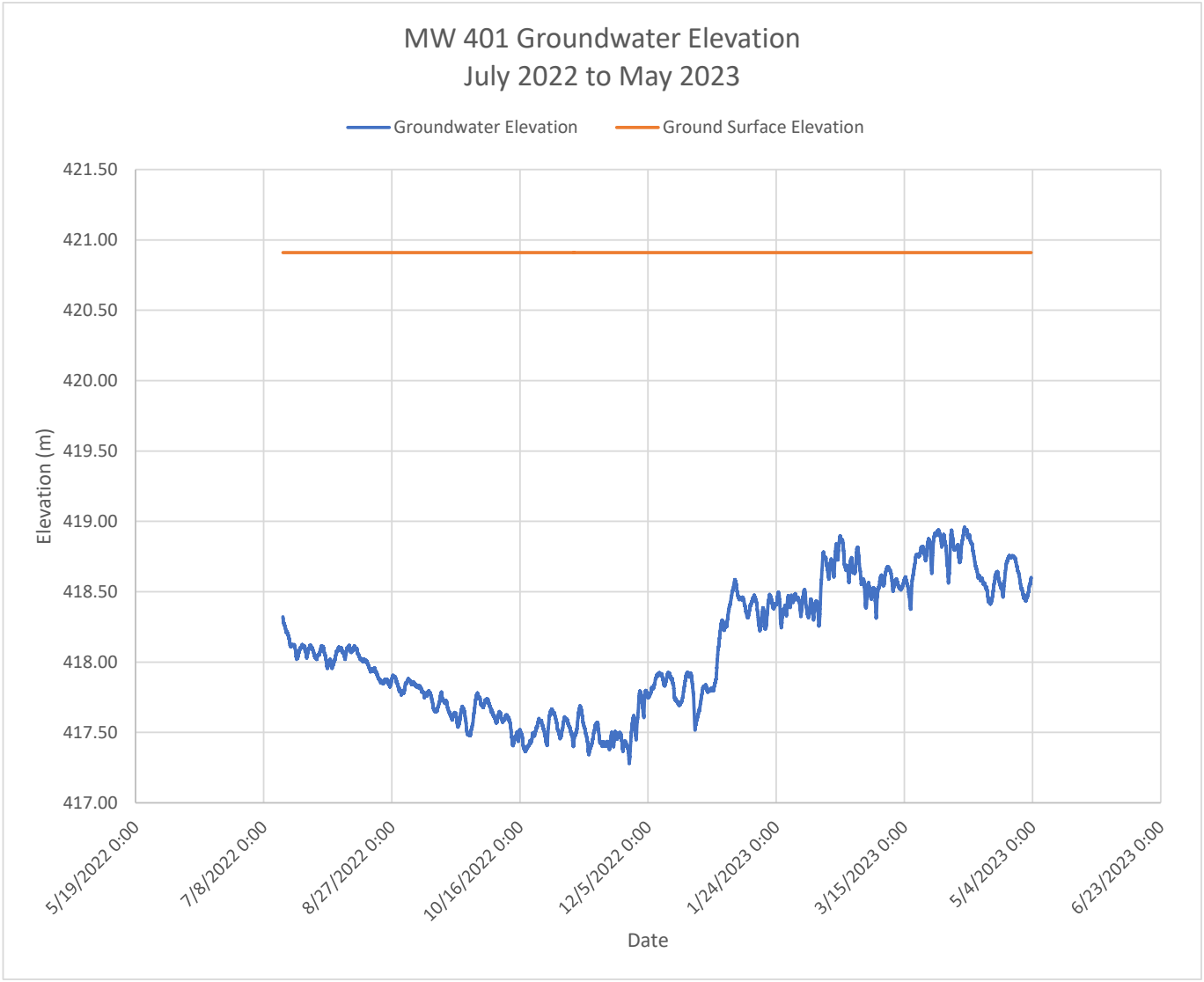
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July 2022 to May 2023
Groundwater Elevation
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Elevation (m)
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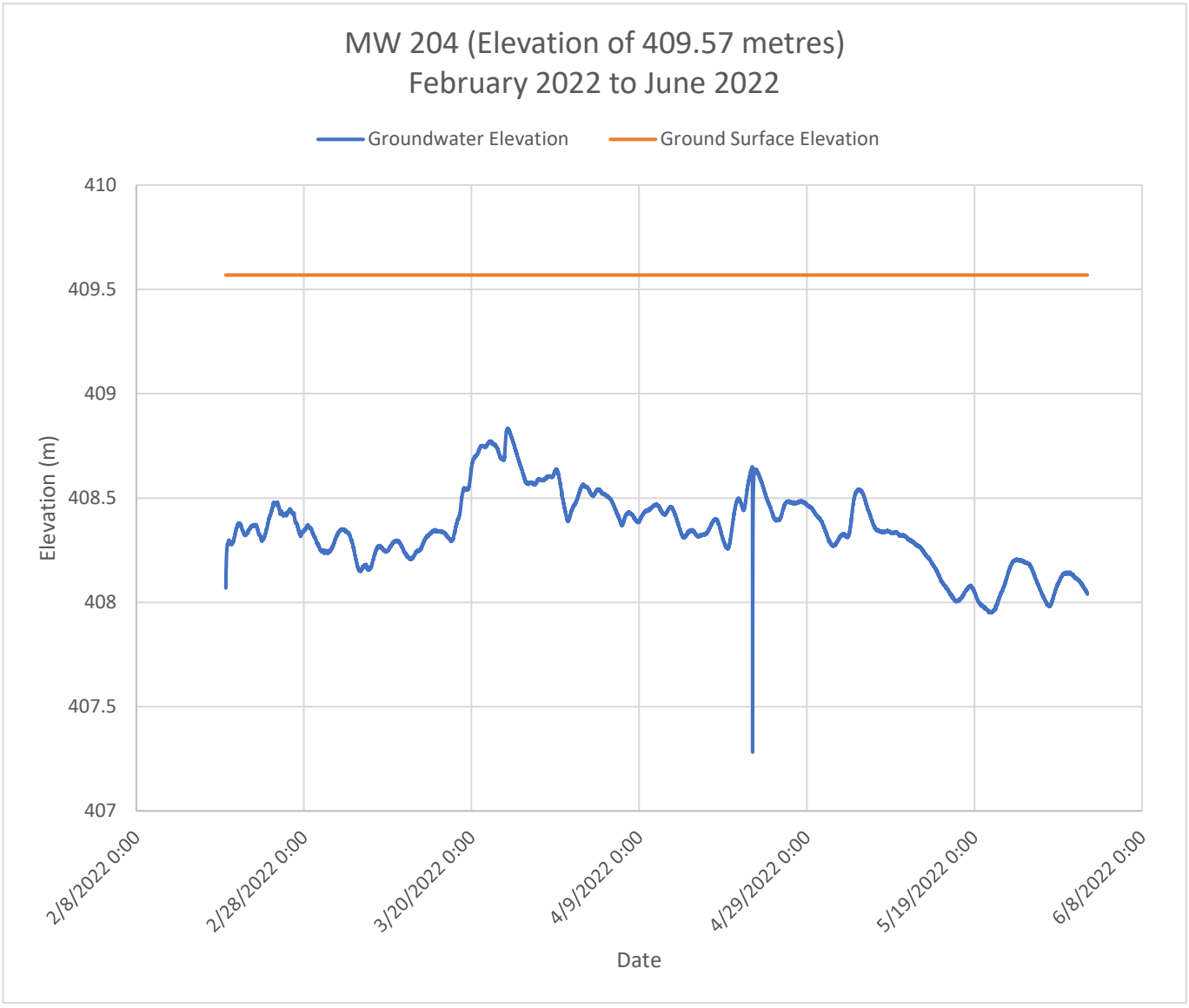
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February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
410
409.5
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408.5
408
407.5
407
Elevation (m)
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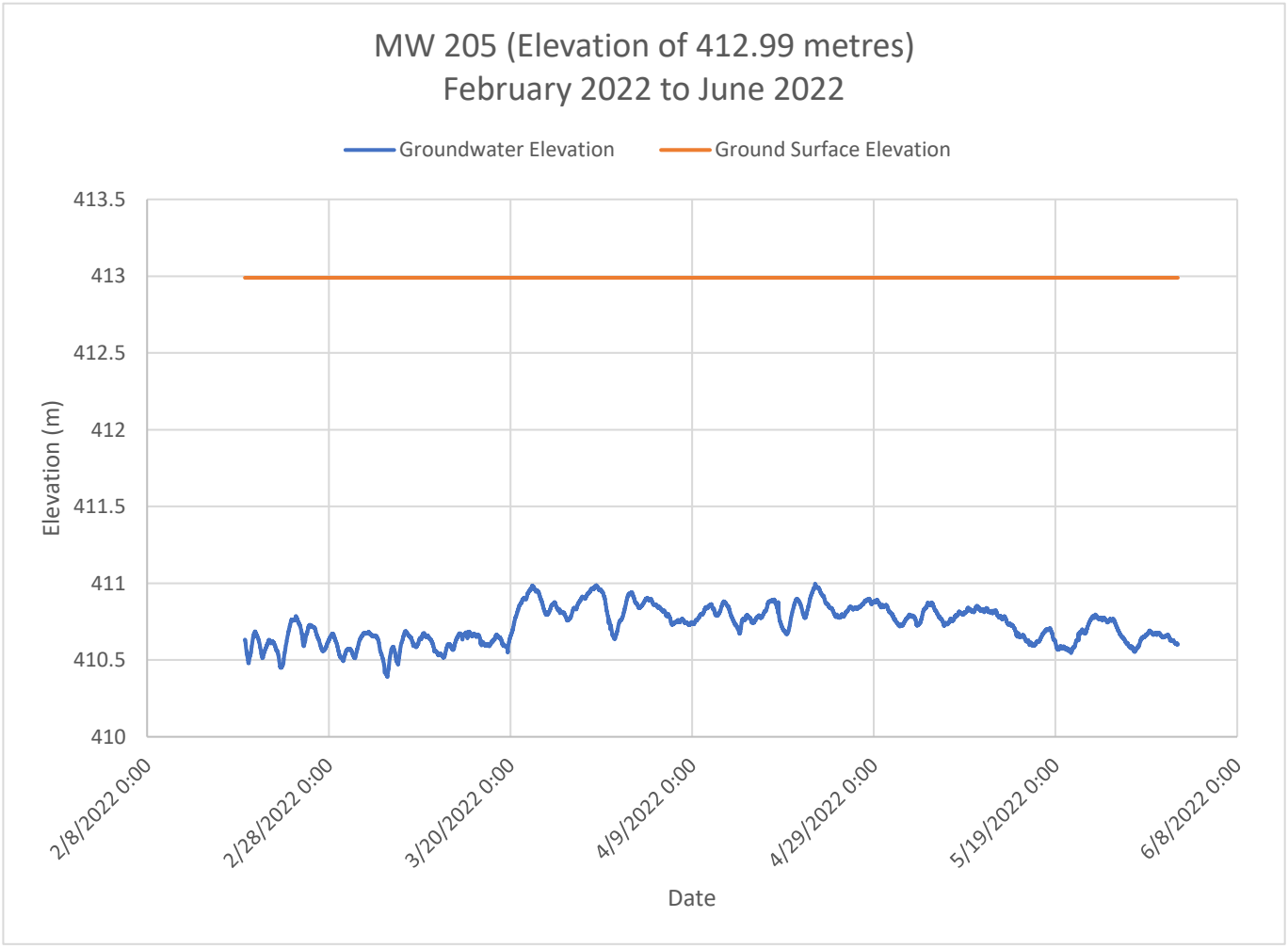
MW 205 (Elevation of 412.99 metres)
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Groundwater Elevation
Ground Surface Elevation
413.5
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Elevation (m)
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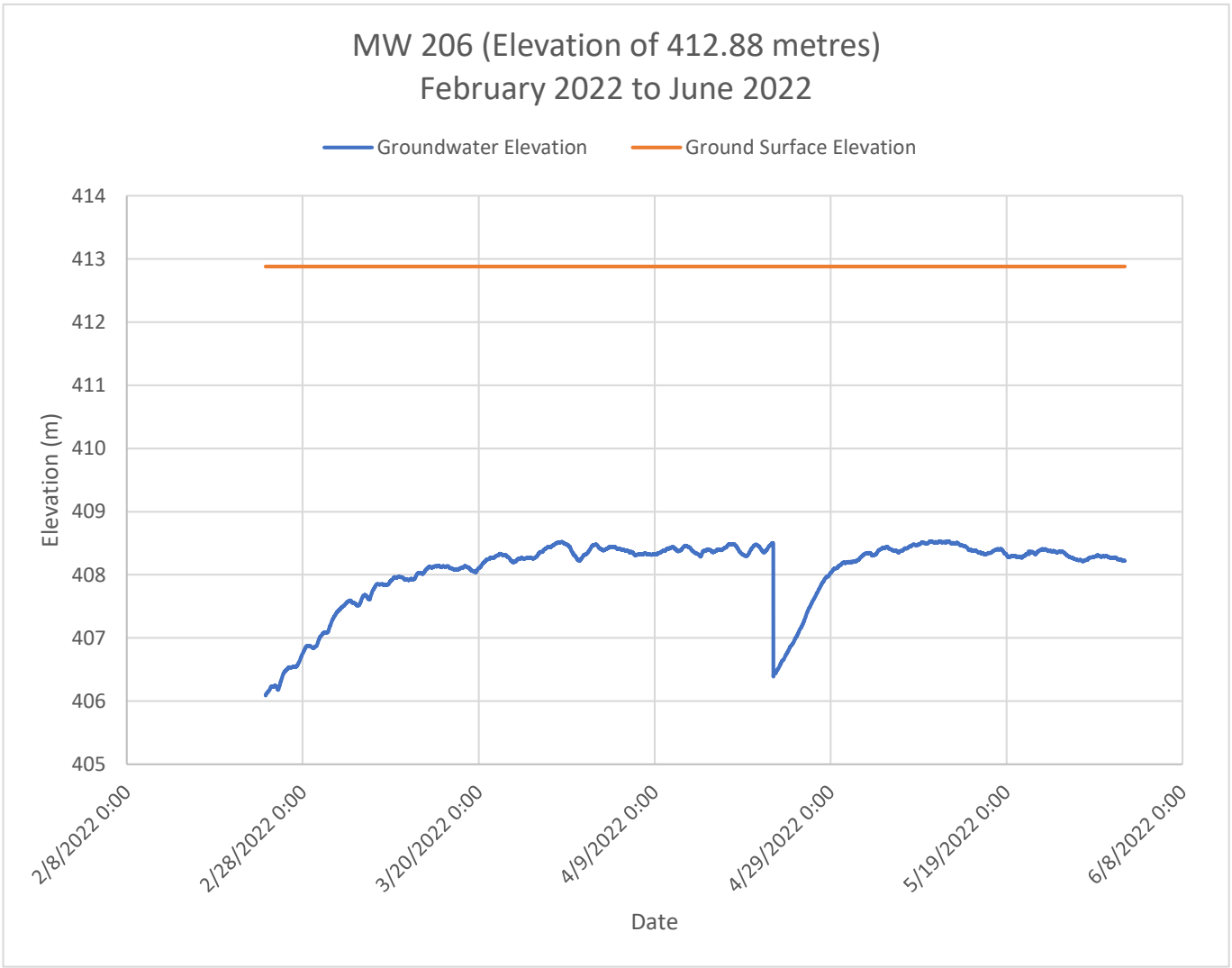
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February 2022 to June 2022
Groundwater Elevation
Ground Surface Elevation
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Elevation (m)
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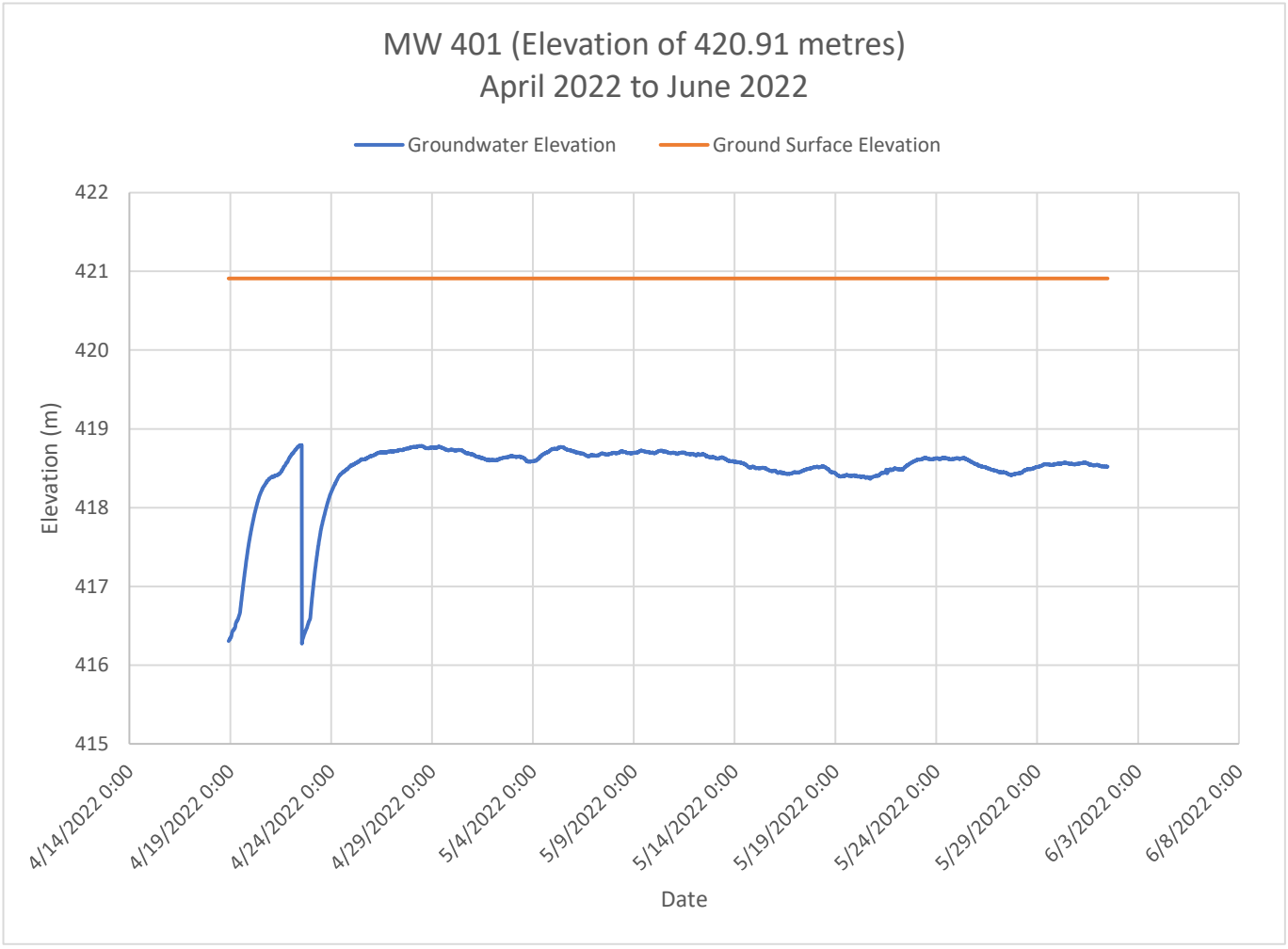
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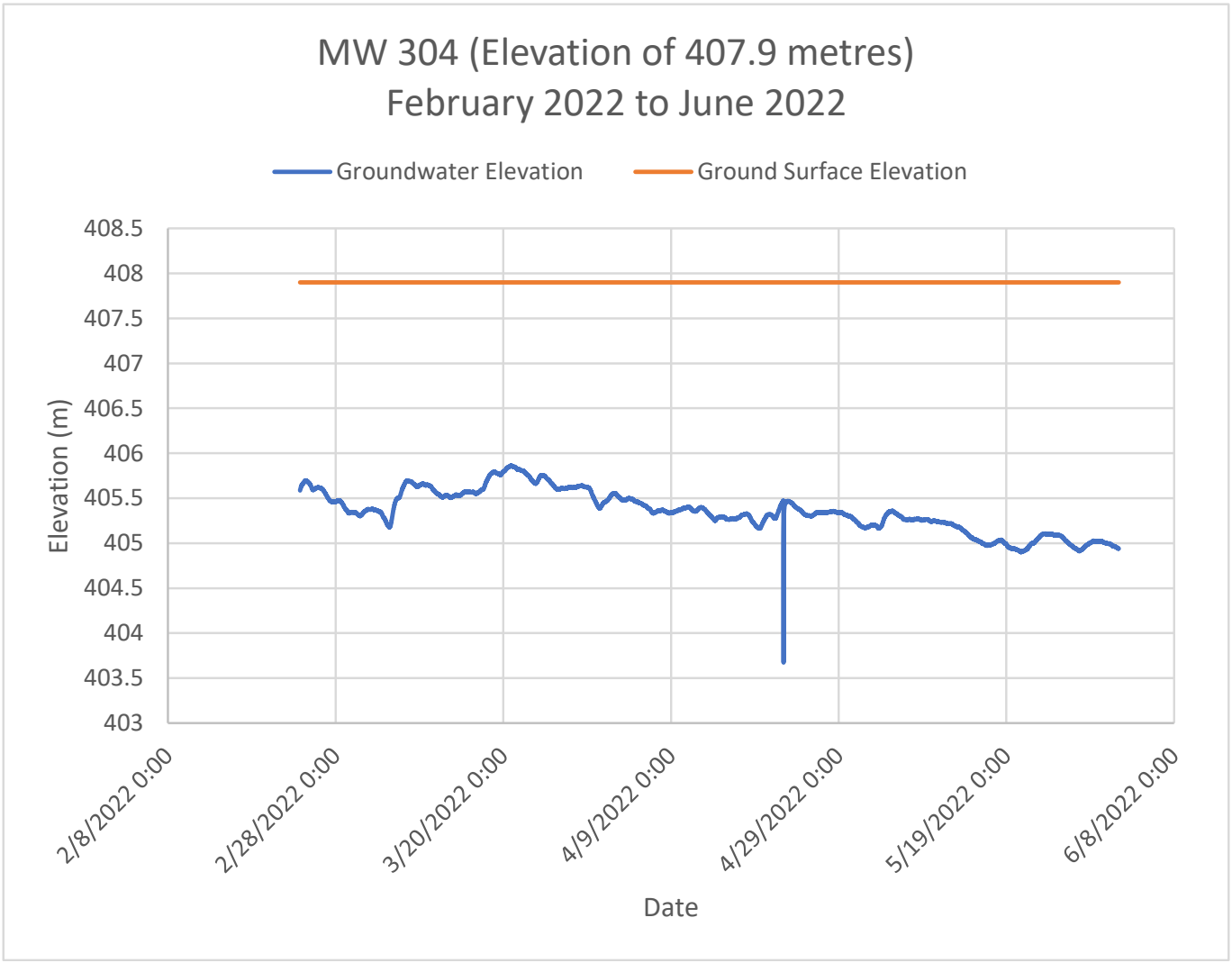
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Elevation (m)
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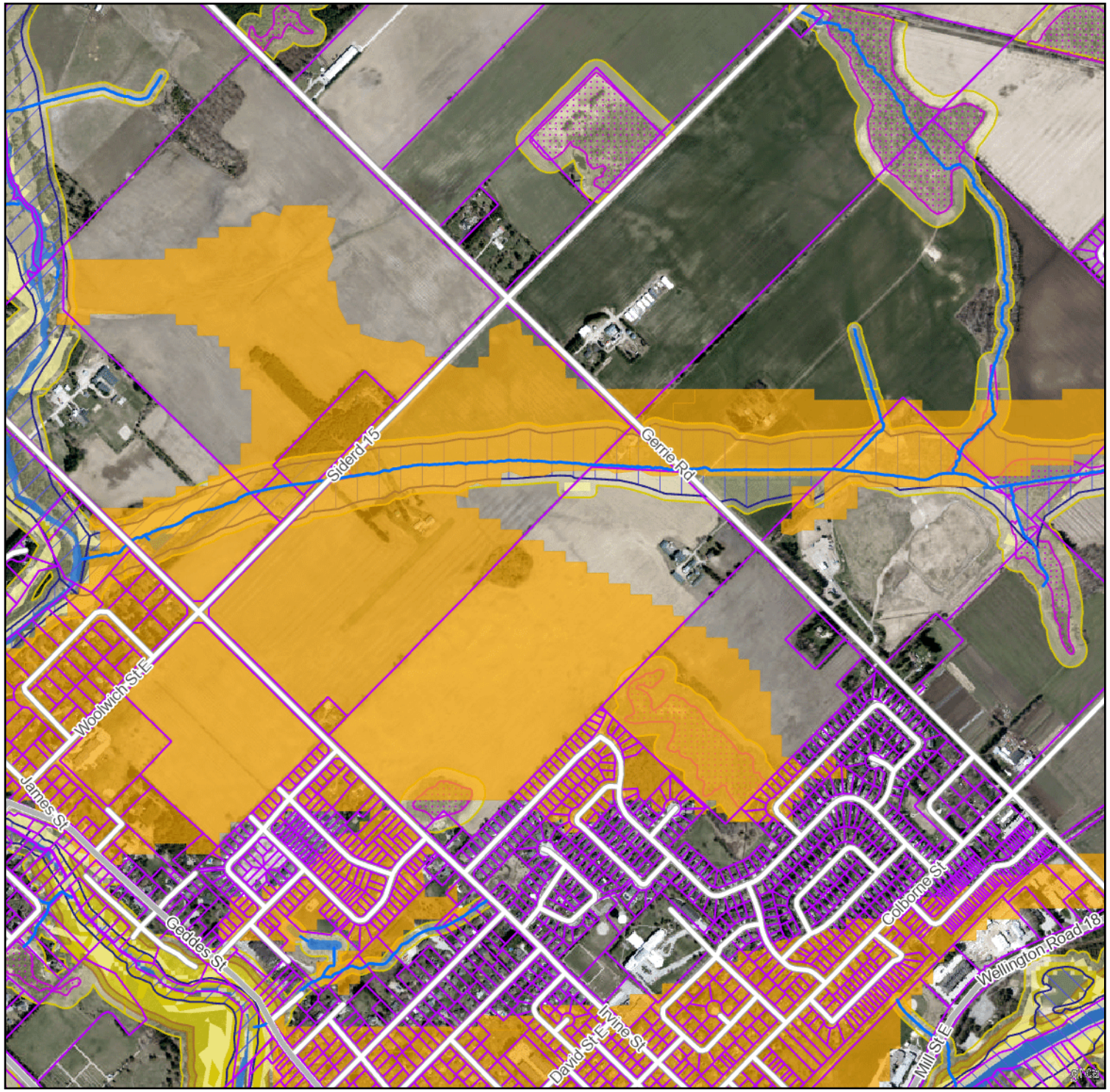
Date

Appendix E

Source Water Protection Plan Mapping (GRCA)



Map Centre (X,Y): 545977.68, 4838619.67 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)

Grand River Conservation Authority

Date: Jan 31, 2025

Elora Sands/Keating Lands - SGRA Mapping

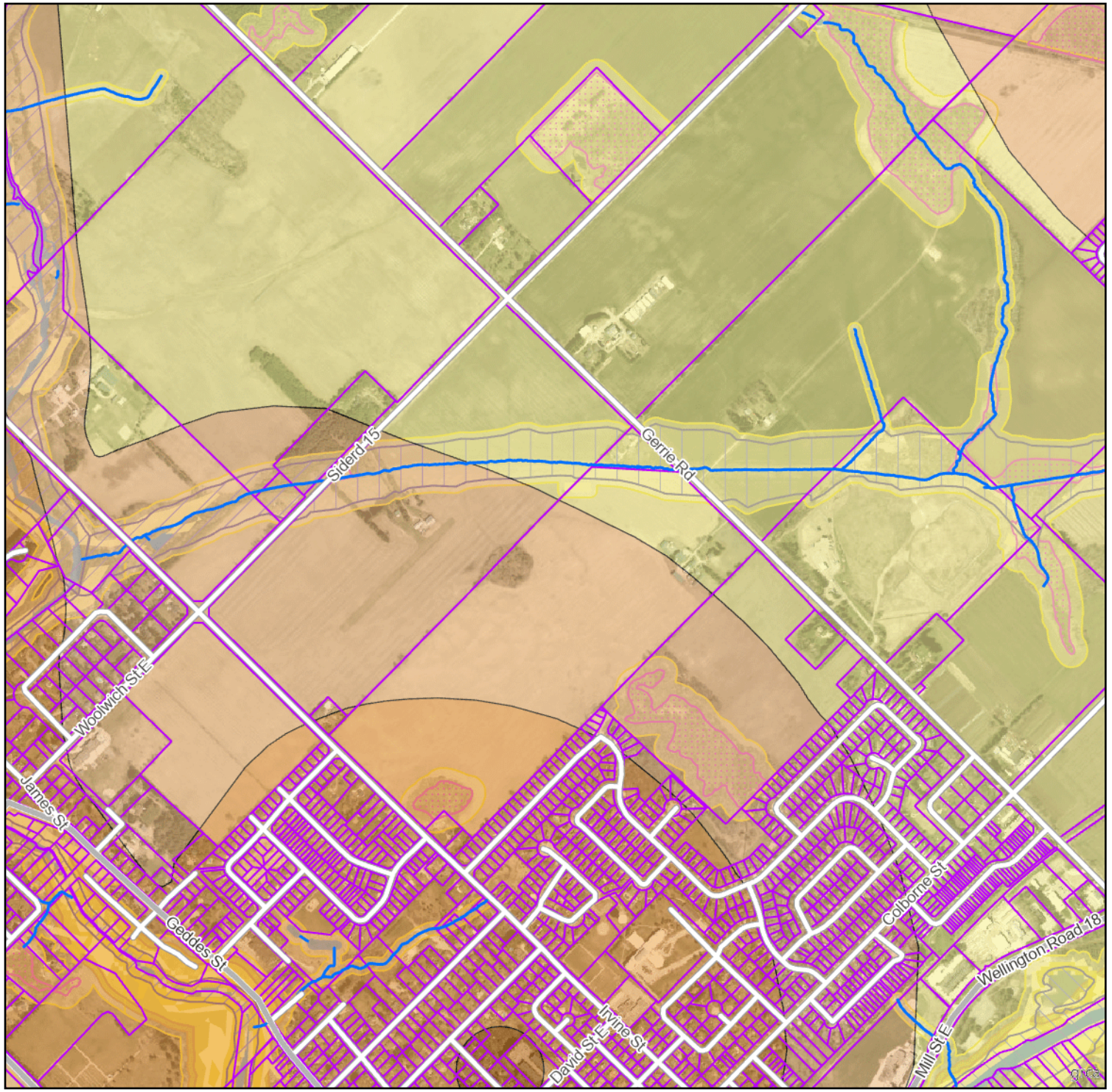
Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- Signif. GW Recharge - Tier 2 (GRCA)

Scale 1:12,880

NAD83 UTM zone 17 (EPSG:26917)

N



Grand River Conservation Authority

Date: Jan 31, 2025

Elora Sands/Keating Lands - WHPA Mapping

Legend

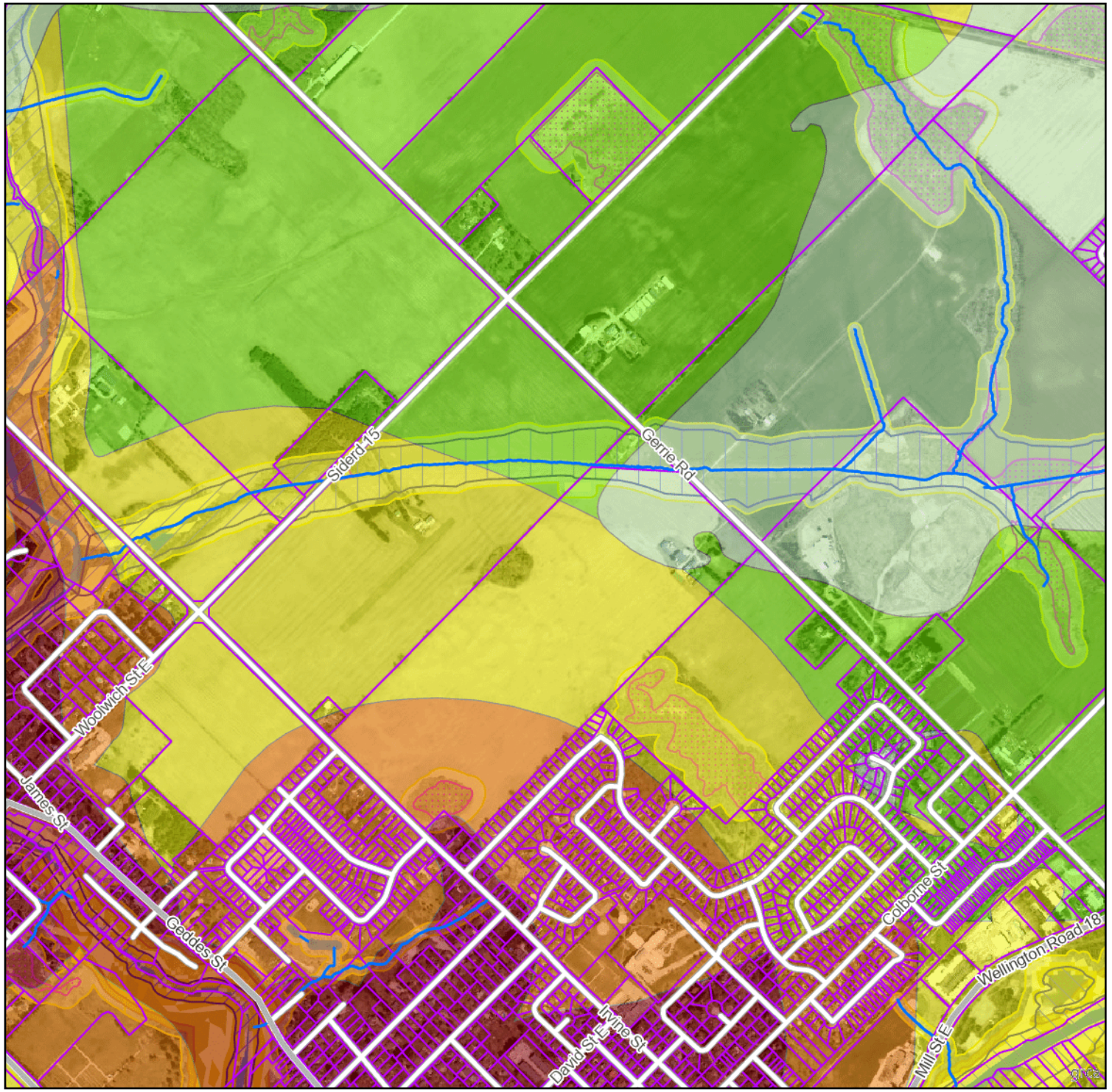
- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- WHPA-Wellhead Protection Area (GRCA)
  - WHPA-A
  - WHPA-B
  - WHPA-C
  - WHPA-D

Scale 1:12,880

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545977.68, 4838619.67 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)



Grand River Conservation Authority

Date: Jan 31, 2025

Elora Sands/Keating Lands - WHPA Vulnerability

Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- WHPA Vulnerability (GRCA)
  - 10
  - 8
  - 6
  - 4
  - 2

Scale 1:12,880

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545977.68, 4838619.67 | Map Link

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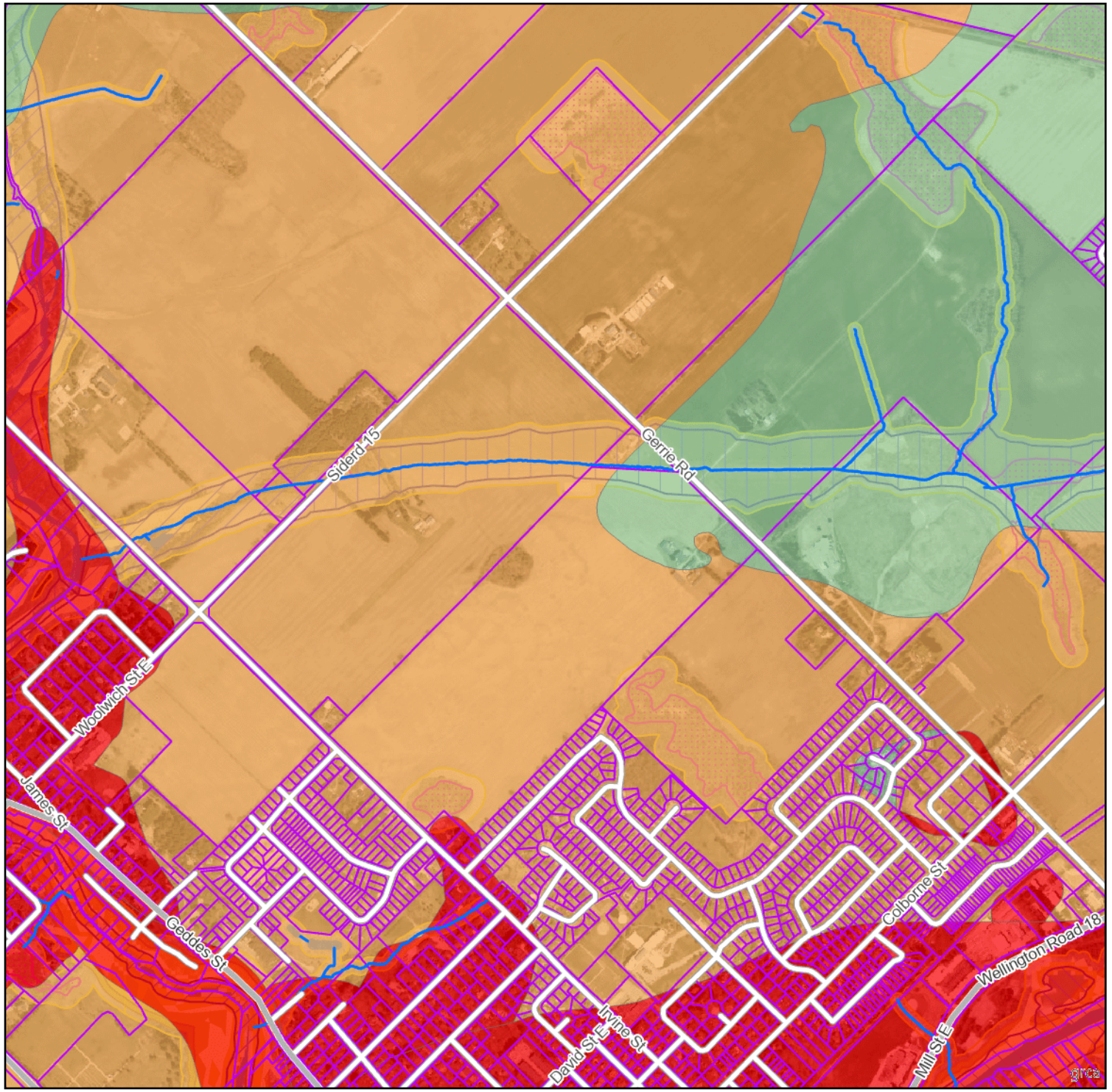


Grand River Conservation Authority

Date: Jan 31, 2025

Elora Sands/Keating Lands - Intrinsic Vulnerability

Legend

- Regulation Limit (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
- Floodplain - Special Policy Area (GRCA)
- Slope Erosion (GRCA)
  - Steep
  - Oversteep
  - Toe
- Slope Valley (GRCA)
  - Steep
  - Oversteep
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)
- Intrinsic Vulnerability (GRCA)
  - H
  - M
  - L

Scale 1:12,880

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545977.68, 4838619.67 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)

Terra-Dynamics inc.
432 Niagara Street, Unit 2 St. Catharines, ON L2M 4W3

March 6, 2025

Cachet Developments
c/o Brendan Walton, P.Eng.
361 Connie Crescent, Suite 200
Concord, ON L4K 5R2

Re: Source Water Protection Due Diligence Review, Elora Sands, 7581 Sideroad 15 (SR15), and Keating Lands (Part of Lot 17, Concession 12), Salem (Elora), ON

Dear Mr. Walton,

1.0 Introduction, Purpose and Background Information

Terra-Dynamics Inc. (Terra-Dynamics) respectfully submits this source water protection due diligence review of the 39.2 hectares of the Elora Sands property at 7581 Sideroad 15 (SR15), and the 38.7 hectares of the adjacent Keating Lands, Part of Lot 17, Concession 12, Elora (Salem), Township of Centre Wellington, County of Wellington, Ontario (Site). It is our understanding that residential development is proposed for the Site and will be serviced by municipal water and sewage (Malone Given Parsons Ltd., 2024).

The purpose of this Source Water Protection due diligence review is to advise Cachet Developments of future site development limitations with respect to addressing source water protection policies or/and related requirements. It is our understanding that the lands have been historically used for agriculture, e.g. corn, soybeans and pasture and corn.

The Site is currently outside of the existing Settlement Area boundary outlined in the Centre Wellington Official Plan, but it is our understanding that an application may be made to bring the Site into the Settlement Area.

2.0 Scope of Work

A background review of available information was completed that included, but was not limited to:

1. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) AgMaps, including mapping of tile drainage, municipal drains and soil types.

2. Ontario Geological Survey (OGS) surficial geology and Aggregate Resources Inventory.

3. Consultant reports (e.g. Soil-Mat, Beacon, MTE, Waterloo Geoscience and GM Blue Plan);

4. Ministry of the Environment, Conservation and Parks, Source Protection Information Atlas.

5. Grand River Source Water Protection Area Source Water Protection datasets and reporting, including vulnerable area mapping (e.g. wellhead protection areas and significant groundwater recharge areas.

6. Liaison with Wellington Source Water Protection (Funk, 2025); and

7. Wellington County Official Plan (2024) and Centre Wellington Official Plan (2005).

3.0 Physical Setting Summary

3.1 Surficial Geology

The surficial geology of the Site has been regionally mapped as primarily gravel (59%) and sand (21%) with some sandy silt to silty sand diamicton (20%) (i.e. till) (Ontario Geological Survey (OGS), 2003). The OGS have also mapped much of the Site as a '*selected sand and gravel resource area of primary significance*' with 7 to 14 metres thickness coarse aggregate based upon water well data (OGS, 1999). This significance is recognized in the Centre Wellington Official Plan in Schedule C - Sand and Gravel Resources (Township of Centre Wellington, 2005). However the regional characterization appears to largely over-estimate the amount of high-permeable materials on-site, this is discussed below.

3.1.1 Elora Sands Property

The surficial geology of the Elora Sands property has been regionally mapped as primarily gravel (49%) and sand (38%) with some sandy silt to silty sand diamicton (13%) (i.e. till) (OGS, 2003). However, Site level borehole investigations of the Elora Sands property by Soil-Mat Engineers & Consultants Ltd. (2022) have proven that the regional mapping does not reflect actual site conditions. For example, the fourteen (14) boreholes completed at the Elora Sands property have delineated no gravel at-surface, and the areas of sand (~33% of the Site) are generally limited to between 1 and 2 metres thick in the northwest (i.e. BH006 and MW401 with sand thicknesses of 1.3 m and 1.6 m, respectively), and central portions of the Site (i.e. BH003 and MW201 with sand thicknesses of 1.7 m and 2.2 m, respectively), although at MW205 the sand thickness was 6.1 m (Drawing No.1, Soil-Mat, 2022).

3.1.1 Keating Lands

A borehole investigation southeast of the Keating Lands also suggests much less permeable/high recharge materials than regionally mapped (GM Blue Plan Engineering, 2023).

3.2 Groundwater Recharge

Groundwater recharge rates have been recently modelled as part of the Centre Wellington Tier Three Water Budget Risk Assessment – Risk Assessment Report (Matrix Solutions Inc., 2020) (Map 1, Figure 5). The modelled groundwater recharge rates are largely a reflection of the regional surficial geological mapping, with 60% of the Site modelled as between 300 and 500 mm/year or greater, i.e. equivalent to coarse sand or gravel (MECP, 1995).

These modelled values appear to include over-estimates for recharge at the Site, as much lower permeability soils have been identified based upon the borehole investigations completed by Soil-Mat Engineers & Consultants Ltd (2022). For example, in the central portion of the Elora Sands at borehole BH003 and MW202, clayey to sandy silt soils were identified (e.g. calculated infiltration rates of <10 mm/hour) and none of the regionally mapped gravel was identified (Drawing No. 1). High infiltration rates have been calculated for some boreholes, e.g. 201, 203 and 205 (50 mm/hour or greater).

3.3 Surface Water

The watercourse crossing the Site, the Nichol Drain (or Municipal Drain No.1), was classified by the Department of Fisheries and Oceans (DFO) in 2022 as "Type E", permanent flow, with a 'Spring' season restricted timing window (OMAFRA, 2025, Map 2). The Site north of the drain is mapped as tile-drained, likely installed about 1 metre below ground surface (OMAFRA, 2007), and tile outlets to the drain were observed by Beacon Environmental (2025). Past research suggests tile-drainage may capture between 10 and 15% of infiltration (Mulhern, 2008). The Nichol Drain outlets to Irvine Creek west of the Site.

Beacon Environmental have indicated the "*Nichol Drain should be considered to have coldwater fishery potential and be classified as a coldwater stream for construction and stormwater management perspective. Watercress was visible during the Beacon investigation, supporting this designation*" (Beacon Environmental, 2025). The drain at the Site has been previously mapped by the GRCA as a groundwater discharge area (GRCA, 2024) since the regional water table is higher in elevation than the drain. Groundwater levels at MW004 appear to support the local water table being higher in elevation than the drain (Drawing No.1).

The GRCA have regionally mapped the Site as about 75% within the Nichol Drain catchment and 25% towards the Queen Street Tributary with a small portion along the eastern boundary towards the southeast (GRCA, 2017). The subcatchment divides have been refined via a Site topographic survey to show a slightly larger area draining towards the Queen Street Tributary and not towards the southeast, under-predevelopment conditions (MTE, 2025).

3.4 Southwest Unevaluated Wetland – Keating Lands

The Ministry of Natural Resources and Forestry (MNRF) and GRCA have regionally mapped a 0.78 ha unevaluated wetland in the southern part of the Site adjacent Irvine Street. This wetland vegetation is presented as part of the Core Greenlands within the Wellington County Official Plan (2024). This wetland vegetation has not been staked with the GRCA, but is scheduled for staking in 2025.

Beacon Environmental have identified the wetland vegetation as consisting of primarily Willow Mineral Thicket Swamp and Red-osier Mineral Thicket Swamp, with some Fresh-Moist Lowland Deciduous Forest adjacent and an inclusion of Mineral Shallow Marsh within the swamp with standing water (Beacon Environmental, 2025).

This unevaluated wetland is located on the margin of regionally mapped gravel and sandy silt/silty sand till (OGS, 2003). Geology from nearby Elora Meadows boreholes MW18 and MW19 recorded sand on silty sand till with groundwater levels as high as within 1 m of surface (Waterloo Geoscience, 2005). It is possible the wetland is an area of slower groundwater recharge as GRCA has regionally mapped a weak

downwards vertical gradient (GRCA, 2024). The wetland vegetation does not appear to have a connection to a watercourse, i.e. it may be supplied water by only precipitation and overland runoff.

3.5 Township of Centre Wellington Well Supply Municipal Well E1

Elora municipal well E1 is located 535 m south-southeast of the Site and 860 m south-southeast of the Elora Sands property (Map 3, Figure 8, Matrix Solutions Inc., 2017). This well is constructed to take water from the bedrock aquifer and is 130 metres deep with casing to 19.8 metres below ground surface (Map 4, Figure 13, Matrix Solutions Inc., 2017). The well produced on average 47% of the Elora municipal supply in 2018 (Matrix Solutions Inc., 2020).

The bedrock aquifer beneath the Site has been most recently regionally mapped as having primarily low vulnerability (vulnerability scores of 2, 4 and 6), with a portion of the southern area of the Site mapped as 8 (medium vulnerability score), and a very small portion mapped as 10 (high) (Map 5, Figure 6-29, Grand River Source Protection Committee, 2022a, and Map 5b, MECP, 2025).

4.0 Source Water Protection

The Site is within the Grand River Source Protection Area. The Grand River Source Protection Committee was responsible for mapping four types of vulnerable areas within the Grand River Source Protection Area: (i) wellhead protection areas, (ii) intake protection zones, (iii) highly vulnerable aquifers and (iv) significant groundwater recharge areas. Two of these types of vulnerable areas are mapped at the Site: (1) wellhead protection areas and (2) significant groundwater recharges areas (MECP, 2025).

Wellhead protection areas (WHPAs) can include different zones for water quality protection of a groundwater supply. These different zones are based largely upon the expected travel time of contaminants to the water supply after they enter the aquifer (Table 1, Figure 1 – Illustration of WHPA Zones, MECP, 2006). These zones were mapped using a groundwater flow model to include both areas upgradient of the well as well as cross- and down-gradient as the well captures water from these areas.

Table 1 –Water Quality Well Head Protection Areas (WHPA) Details (MECP, 2006)

WHPA	Description
A	100 m radius
B	2 year Time of Travel
C	2 to 5 year Time of Travel
D	5 to 25 year Time of Travel

WHPAs can also include areas for water quantity protection, called WHPA Q1 and/or Q2. WHPA-Q1 is delineated based upon a combination of the cone of influence of each pumping well and WHPA-Q2 for land areas where reductions in recharge have the potential to have a measurable impact on the municipal wells (Matrix Solutions Inc., 2020).

Significant groundwater recharge areas (SGRAs) were also mapped at the Site, as areas regionally having groundwater recharge 15% above the average watershed rate. The average watershed recharge rate was calculated as 176 mm/year, for an SGRA criterion of greater than 202 mm/year (GRCA, 2023). This mapping was completed as part of the Tier 2 Water Budget Assessment derived from previous GRCA

Hydrologic Response Unit modelling using the Guelph-All-Weather-Storm-Event-Runoff (GAWSER) model which used regional surficial geologic mapping (GRCA, 2023). However, as mentioned in Section 3.2, an analysis of local borehole results is expected to reduce the amount of SGRAs at the Site.

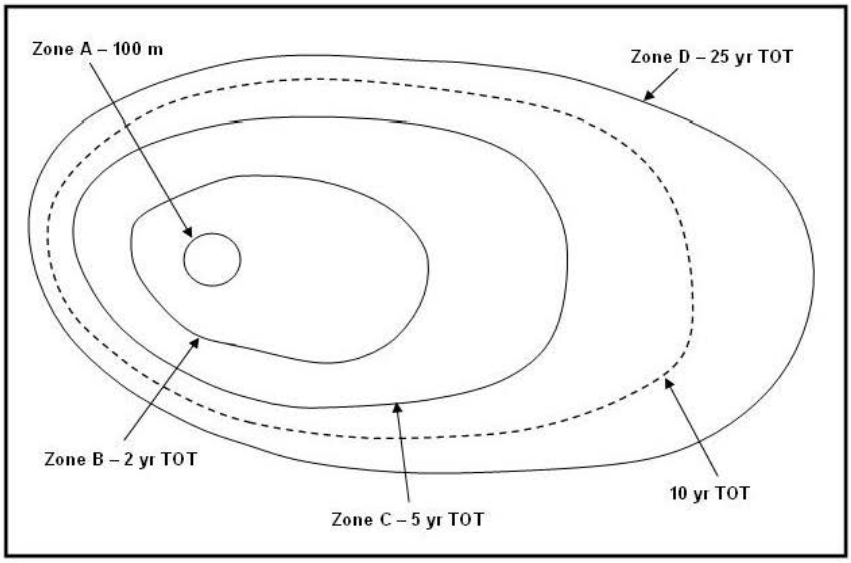


Figure 1 – Illustration of WHPA Zones (MECP, 2006)

4.1 Wellhead Protection Areas

A series of WHPAs for the nearby municipal well E1 extend onto the Site (Map 6, Figure 7.1, Grand River Source Protection Committee, 2022b). The areal coverage and location of these WHPAs is approximated below (Tables 2a and 2b).

A WHPA-Q was also delineated for the Centre Wellington municipal groundwater supplies (Map 7, Figure 11, Matrix Solutions Inc., 2020) as "*the combined area that is the cone of influence of the well… plus the whole of the cones of influence of all other wells… that intersect that area…the WHPA-Q1 and WHPA-Q2 are coincident*" (Matrix Solutions Inc., 2020).

Significant water quality threat policies exist for the WHPA-B and WHPA-C areas that must be conformed to, or complied with (Section 4.3), e.g. regarding dense non-aqueous phase liquids (DNAPLs). Examples of DNAPLs include metal degreasers, paint removers and brake fluid. However, the current Grand River Source Protection Plan does not include policies for moderate and low threats.

With respect to significant water quantity threats, all "*…future areas of recharge reduction (due to land use development within this policy area)* (i.e. WHPA-Q) *are classified as Significant water quantity threats …*" (Matrix Solutions Inc., 2020). This preliminary designation was because "*…the potential impact of stormwater management measures and low impact development techniques was not considered when estimating recharge reductions on future land development areas*" (Matrix Solutions Inc., 2020). For example, southwest lands at 75 Woolwich Street East (Elora, Ontario), were mapped as a '*Groundwater Recharge Reduction Threat*" (Map 7, Figure 11, Matrix Solutions Inc., 2020).

Table 2a – Site WHPA Summary Details (Grand River Source Protection Committee, 2022b)

WHPA	Area (hectares)	Percent of Site	On-site Location	Vulnerability Score	Significant Threat Policy Categories
B	<0.1	<0.2%	Southern	10	Waste Disposal, Sewage Systems, Agricultural Source Material, Non-Agricultural Source Material, Commercial Fertilizer, Pesticide, Road Salt, Storage of Snow, Fuel, DNAPLs, Organic Solvents, Aircraft De-icing, Livestock Area, Oil Pipelines
	10.9	14%	Southern	8	Waste Disposal, Sewage Systems DNAPLs
C	47	60%	Central	6/4/2	DNAPLs
D	20	26%	North/ Northeast	4/2	None
Q1/Q2	Entire Site	100%	NA	NA	To be confirmed

Table 2b – Elora Sands WHPA Summary Details (Grand River Source Protection Committee, 2022b)

WHPA	Area (hectares)	Percent of Site	On-site Location	Vulnerability Score	Significant Threat Policy Categories
B	0.03	<0.1%	South	8	Waste Disposal, Sewage Systems DNAPLs
C	26.5	68%	Southwest	6	DNAPLs
D	12.7	32%	Northeast	4	None
Q1/Q2	Entire Site	100%	NA	NA	To be confirmed

4.2 Significant Groundwater Recharge Areas (SGRAs) Mapping

SGRAs have been regionally mapped to cover about 83% of the Site (Map 8, MECP, 2025). However, this is based upon modelled recharge rates that used regional surficial geologic mapping that appears to over-estimate SGRAs at the Site (Section 3.1). AquaResource Inc. (2009) acknowledge the limitation of regional SGRA modelling and provide the following regarding the SGRA mapping:

> "*Caution also applies to the use of SGRAs, which are delineated using regional estimates of recharge… For use at a site-specific scale, they should be refined to take into account a more detailed hydrogeological characterization.*"

4.3 Source Water Protection Policies

Significant Threat Source Protection Plan policies for consideration include water quality and water quantity. Acronyms used in this section include: WC – Wellington County, CW – Centre Wellington, MC – Must Conform, CWA – Clean Water Act, LID – Low Impact Development and ICA – Issue Contributing Area, TCE – trichloroethylene and EPA – Environmental Protection Act.

The Significant Water Quality Threat policies are presented from greatest to least areal coverage of the Site, i.e. (i) WHPA-C, (ii) WHPA-B vulnerability score of 8, and (iii) WHPA-B vulnerability score of 10.

4.3.1 Significant Water Quality Threats (WHPA-C and WHPA-B vulnerability score of 8)

Within the area of the Site mapped as WHPA-C (or ~60% of the Site), one significant water quality threat may apply, WC-CW-16.3, this policy is listed below (Table 3) (Grand River Source Protection Committee, 2022b). This policy is not expected to exert a constraint on residential development of the Site, as it is intended to inform industrial, commercial, institutional or agricultural activities with respect to the handling and storage of a DNAPL. However, this is expected to be reviewed by the Risk Management Official to determine if a Risk Management Plan is required, and in some cases an Education and Outreach Program for residents will be required.

Table 3 – Relevant DNAPL Policy (Grand River Source Protection Committee, 2022b**)**

Policy	Text
WC-CW-16.3	To ensure any Future handling and storage of a dense non-aqueous phase liquid (DNAPL) for industrial, commercial, institutional or agricultural purposes within a WHPA-B, C or TCE ICA, never becomes a significant drinking water threat, where this activity would be a significant drinking water threat, this activity shall be designated for the purpose of Section 58 of the CWA and a Risk Management Plan shall be required where the following apply: a. Any quantity of DNAPL in a WHPA-B with a vulnerability score of 10, including within an ICA for trichloroethylene; or b. Any quantity of the following chlorinated solvents in a WHPA-B or WHPA-C, with a vulnerability score < 10, including within an ICA for TCE, or within a WHPA-D in an ICA for TCE: • Dioxane-1,4 • Tetrachloroethylene (PCE), TCE or another DNAPL that could degrade to TCE • Vinyl chloride or another DNAPL that could degrade to vinyl chloride; or c. 25 Litres or greater of Poly Aromatic Hydrocarbons (PAHs) in a WHPA-B or WHPA-C, with a vulnerability score < 10, including within an ICA for TCE, or within a WHPA-D in an ICA for TCE.

Within the area of the Site mapped as WHPA-B vulnerability score 8 (approximately 14%), three significant water quality threats may apply, WC-CW-16.3 (already discussed above) as well as policies WC-MC-2.3 and WC-MC-3.4, and these two additional policies are listed below (Table 4). It is not expected that these policies will exert constraints on residential development of the Site as neither a waste management disposal site (WC-MC-2.3) nor a sewage treatment plant (WC-MC-3.4) are proposed.

Table 4 – Waste Disposal and Sewage System Relevant Policies
(Grand River Source Protection Committee, 2022b**)**

Policy	Text
WC-MC-2.3	To ensure the establishment, operation or maintenance of a Future waste disposal site within the meaning of Part V of the *EPA* that is subject to an Environmental Compliance Approval, never becomes a significant drinking water threat, where this activity would be a significant drinking water threat, the MECP shall prohibit these activities within the Environmental Compliance Approvals process.

Policy	Text
WC-MC-3.4	To ensure the establishment of Future sewage treatment plants with effluent and/or bypass discharge or Future sewage treatment plants with sewage storage tanks never becomes a significant drinking water threat, where these activities would be a significant drinking water threat, the MECP shall prohibit these activities within the Environmental Compliance Approvals process. This policy does not apply to the expansion, modification, optimization, re-rating, operation, maintenance or replacement of Existing sewage treatment plants.

Each Significant Water Quality Threat Source Protection Plan policy has a legal effect, and these are listed below in Table 5.

Table 5 – Legal Effect of Water Quality Policies (Grand River Source Protection Committee, 2022b**)**

Policy	Legal Effect
WC-CW-16.3	Section 58 (Risk Management Plans) of the Clean Water Act
WC-MC-2.3	Affects EPA and Ontario Water Resources Act Prescribed Instrument Decisions (e.g. Stormwater management ECA approvals)
WC-MC-3.4	

4.3.2 Significant Water Quantity Threats (WHPA-B vulnerability score of 10)

Within the area of the Site mapped as WHPA-B and a vulnerability score of 10 (or <0.2% of the Site, Map 5b), there are many significant water quality threat policies listed for consideration however many will not require consideration (Grand River Source Protection Committee, 2022b).

For example, the current development plan proposes a southernmost stormwater management facility that covers the WHPA-B with a vulnerability score of 10. Consequently, additional groundwater protection measures will be required by the MECP for the Environmental Compliance Approval (Policy WC-MC-3.7), as well as some Risk Management Plan component (Policy WC-CW-3.8), however these policies do not appear to include prohibition. Also, additional groundwater protection measures will be required for any sanitary sewers in this area by the MECP (WC-MC-3.5), however this policy also does not appear to include prohibition of sanitary sewers and the current design does not appear to have any in this area (MTE, 2025).

The policies discussed in Section 4.3.1 also apply to the small area of WHPA-B with a vulnerability score of 10.

There are also a number of other policies that may apply to this small area regarding road salt, snow storage and fuel storage and handling, e.g. during the construction phase. However, these 'threats' are likely to be managed as part of the stormwater ECA for the built-out development.

However, many of the policies are not expected to affect the proposed development because the water quality threats will not be occurring, e.g. waste disposal sites, sewage holding tanks, sewage treatment plant discharge, industrial effluent, application of agricultural source material, storage of agricultural source material, application of non-agricultural source material, handling and storage of non-agricultural source materials, application of commercial fertilizer to land, handling and storage of commercial fertilizer, application of pesticide, handling and storage of pesticides, the handling and storage of an

organic solvent. de-icing aircraft chemical runoff, livestock grazing/animal yards and a liquid hydrocarbon pipeline.

4.3.3 Significant Water Quantity Threats

There are three Significant Water Quantity Source Protection Plan policies that apply to residential development of the Site: (i) WC-MC-23.2, (ii) WC-MC-23.3 and (iii) WC-MC-23.5. These are listed below from the Source Protection Plan in Table 6.

Table 6 – Relevant Water Quantity Policies (Grand River Source Protection Committee, 2022b**)**

Policy	Text
Common introductory text	To ensure that any Recharge Reducing Activity never becomes a significant drinking water threat, where this activity would be a significant drinking water threat as prescribed by the CWA
WC-MC-23.2	…the MECP should, during any pre-submission consultation for Environmental Compliance Approvals for Stormwater Management Facilities and / or Sewage Works, encourage design and implementation measures for the maintenance of groundwater recharge functions including but not limited to LID, minimizing impervious surfaces, and lot level infiltration. The MECP shall issue Environmental Compliance Approvals for Stormwater Management Facilities and / or Sewage Works that, where appropriate, incorporate conditions that address groundwater recharge considerations. In addition, the MECP, where appropriate, shall consider incorporating conditions in the Environmental Compliance Approvals to address the proper functioning of groundwater recharge measures including, but not limited to, conditions requiring or related to operations, inspection and maintenance of the Stormwater Management Facilities and / or Sewage Works, groundwater or surface water monitoring related to groundwater recharge, and documentation including manuals and maintenance records. For Stormwater Management Facilities and / or Sewage Works located within the WHPA-Q in a Chloride, Sodium or Nitrate ICA, the MECP shall consider conditions that require best management practices that address how recharge will be maintained and water quality will be protected from application and storage of winter maintenance materials including Salt.
WC-MC-23.3	… the County, as the Planning Approval Authority, in consultation with the Municipalities, shall only approve settlement area expansions within a WHPA-Q as part of a municipal comprehensive review or as otherwise provided by the Provincial Growth Plan for the Greater Golden Horseshoe, where it can be adequately demonstrated that recharge functions can be maintained or improved on lands designated as Significant Groundwater Recharge Areas within a WHPA-Q.
WC-MC-23.5	… the Planning Approval Authority shall require that all site plan, subdivision and vacant land condominium applications to facilitate Major Development for new residential, commercial, industrial and institutional uses provide a water balance assessment for the proposed development which addresses each of the following requirements:

Policy	Text
	a. maintain pre-development recharge to the greatest extent feasible through best management practices such as LID, minimizing impervious surfaces, and lot level infiltration; b. where pre-development recharge cannot be maintained on site, implement and maximize off-site recharge enhancement (within the same WHPA-Q) to compensate for any predicted loss of recharge from the development; and c. within a WHPA-Q in a Chloride, Sodium or Nitrate ICA, the water balance assessment must consider water quality when recommending best management practices and address how recharge will be maintained and water quality will be protected including consideration of how water quality will be protected from application and storage of winter maintenance materials including Salt. The Planning Approval Authority shall use its discretion to implement the requirements of this policy to the extent feasible and practicable given the nature of the proposed development, specific circumstances of a site and off-site recharge opportunities.

However, as the Site is not located in a Chloride, Sodium or Nitrate ICA, consequently those portions of these policies should not apply.

Each Significant Water Quantity Threat Source Protection Plan policy has a legal effect, and these are listed below in Table 7.

Table 7 – Legal Effect of Water Quantity Policies (Grand River Source Protection Committee, 2022b**)**

Policy	Legal Effect
WC-MC-23.2	Affects EPA and Ontario Water Resources Act Prescribed Instrument Decisions (e.g. Stormwater management ECA approvals)
WC-MC-23.3	Affects decisions under the Planning Act and Condominium Act and Imposes obligation on Municipality and Source Protection Authority
WC-MC-23.5	

5.0 Discussion

For expansion of the Settlement Area (and subsequent development of the Site), it will be required to adequately demonstrate that "*recharge functions can be maintained or improved on lands designated as Significant Groundwater Recharge Areas within a WHPA-Q*" (Policy WC-MC-23.3). However, as mentioned in Section 4.2, the amount of SGRAs at the Site may be reduced upon further analysis.

The demonstration of maintenance, or improvement of recharge, is expected to be accomplished through a water balance assessment (and Stormwater Management Plan) that maintains "…*pre-development recharge to the greatest extent feasible through best management practices such as LID, minimizing impervious surfaces, and lot level infiltration*…" (Policy WC-MC-23.5).

However, it is expected that Site development will also require maintenance of baseflow to the Nichol Drain including ecological function with respect to temperature control (CVC, 2012). This may require additional monitoring of the Nichol Drain.

In a somewhat similar proposed residential development that we assisted with, pre-development recharge was primarily maintained through a below grade infiltration facility to allow for centralized infiltration.

Source Protection Plan policies to prevent significant water quality threats are not anticipated to prohibit the development plan but will require some additional coordination to address potential concerns with the MECP and the Source Water Protection Risk Management Officer.

The unevaluated wetland at the southern end of the Site is presumed to be maintained by a combination of precipitation and runoff, however site characterization would be required to confirm, e.g. wetland hydroperiod monitoring, borehole, monitoring well and measurement of the vertical groundwater gradient.

6.0 Conclusions and Recommendations

The following conclusions are provided:

1. Site boreholes have identified less permeable at-surface soils than regionally mapped and used for regional water budget modelling.

2. Recently modelled GRCA Tier 3 Water Budget recharge rates appear to over-estimate actual Site recharge, and historic GRCA Tier 2 Water Budget recharge rates appear to over-estimate the amount of Significant Groundwater Recharge Areas at the Site.

3. The Site primarily drains to the Nichol Drain, which has permanent flow, a coldwater thermal classification and indicators of groundwater discharge.

4. Tile-drainage is mapped in the northeast portion of the Site with some discharge to the Nichol Drain. This tile-drainage may have a role in sustaining the drain flow and temperature regime.

5. The bedrock aquifer beneath the Site has been primarily mapped as having low vulnerability with a portion of the Site mapped as medium and a very small portion mapped as highly vulnerable.

6. The Site overlies Wellhead Protection Areas (WHPAs) for Municipal Well E1 located about 535 m south-southeast. The WHPAs include both quality protection zones (WHPA-B, WHPA-C and WHPA-D) and a quantity protection zone (WHPA-Q, entire Site).

7. Significant Groundwater Recharge Areas (SGRAs) have been regionally mapped over 83% of the Site and are expected to decline in extent following analyses of local geologic conditions.

8. The Site is considered a significant water quantity threat to the municipal groundwater supplies if groundwater recharge is reduced.

9. Source Water Protection Water Quality Threat Policies are not expected to prevent residential development of the Site, however additional coordination with the MECP and the Source Water Protection Risk Management Officer will be required, e.g. with respect to the southernmost stormwater management facility.

10. Source Water Protection Water Quantity Threat Policies are expected to require post-development groundwater recharge at the Site to equal or exceed pre-development groundwater recharge rates. It is expected that the water management approach will require maintenance of groundwater discharge to the drain including coldwater temperature.

11. The unevaluated wetland may be maintained by a combination of precipitation and runoff but field characterization and analyses would be required to confirm.

The following recommendations are provided:

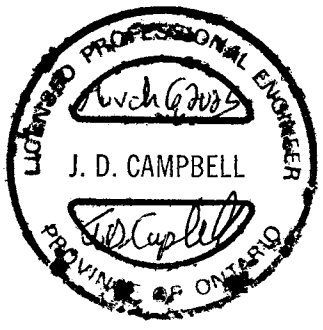
1. Project budgeting for residential development of the Site should include consideration for (a) further Site characterization (e.g. Nichol drain flow, level and temperature monitoring and Unevaluated wetland staff gauge, borehole and monitoring well), (b) analyses of local geologic conditions and GRCA modelling to complete the water balance assessment and refined SGRA mapping, and (c) design of Site infiltration measures.

2. Pre-consultation should be completed with the local government agencies (Wellington County, Centre Wellington, Grand River Conservation Authority and Wellington Source Water Protection) in order to scope the level of assessment required.

We trust this information is sufficient for your present needs. Please do not hesitate to contact us if you have any questions.

Yours truly,

TERRA-DYNAMICS INC.



Jayme D. Campbell, P. Eng.
Senior Water Resources Engineer

Attachments
Drawing No.1 – Elora Sands Borehole Location Plan
Map 1 – Land Use Change and Future Recharge
Map 2 – OMAFRA Municipal Drain and Tile-Drainage

Map 3 – Surficial Geology
Map 4 – Local Elora Cross Section C-C'
Map 5 – Centre Wellington Wellhead Protection Area Final Vulnerability
Map 5b – Bedrock Aquifer Vulnerability
Map 6 – County of Wellington, Centre Wellington Wells, Significant Drinking Water Threat Applicability
Map 7 – Water Quantity Threats
Map 8 – Significant Groundwater Recharge Areas

7.0 References

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LEGEND

- Borehole Location — BH#
- Monitoring Well Location — MW#
- Geological Cross Section Location

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301591-G.

2. Borehole and monitoring well locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Nichol Road 15
Elora, Ontario

Borehole Location Plan

Project No. SM 301591-G

Date: June 2022

Drawn: SW | Checked: IS

SM 301591-G Borehole Location Plan

Drawing No. 1

Easting (m)

541500 543000 544500 546000 547500 549000 550500 552000 553500

Northing (m)

4843500 4842000 4840500 4839000 4837500 4836000 4834500

TOWNSHIP OF MAPLETON

TOWNSHIP OF CENTRE WELLINGTON

SITE

F1 F2 F4 F5 F6 F7

E1 E2 E3 E4

Fergus

Elora

Salem

Belwood Reservoir

Grand River

Irvine Creek

Carroll Creek

Swan Creek

Sideroad 5

Sideroad 10

Sideroad 15

Sideroad 18

Sideroad 19

Sideroad 4

Sideroad 6 North

2nd Line

4th Line

6th Line

Wellington 29 Road

Wellington 7 Road

Townline Eramosa Garafraxa

N

- Land Use Change
- Municipal Boundary
- Water Body
- Watercourse
- Highway
- Road
- Municipal Well

Future Groundwater Recharge (mm/yr)

- 0
- 0 < ... <= 75
- 75 <...<= 125
- 125 < ...<= 200
- 200 < ... <= 300
- 300 < ... <= 400
- 400 < ... <= 500
- > 500

Map 1

1:45,000

500 0 500 1,000 metres

NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget Assessment - Risk Assessment Report

Land Use Change and Future Recharge

Date:	Project:	Submitter:	Reviewer:
October 2019	23876	J. Melchin	D. Van Vliet

Figure 5

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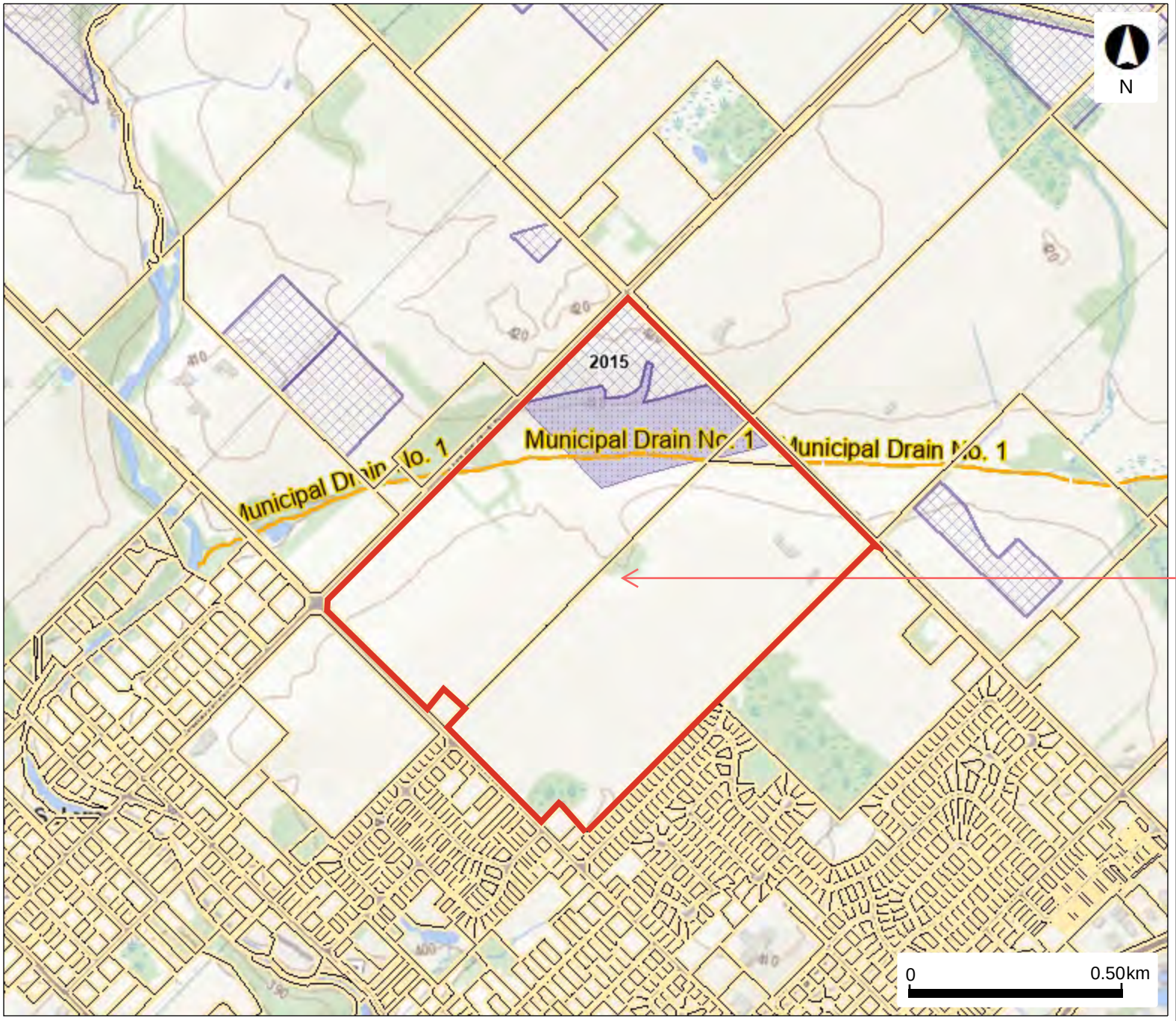
OMAFRA Municipal Drain and Tile-Drainage



Legend

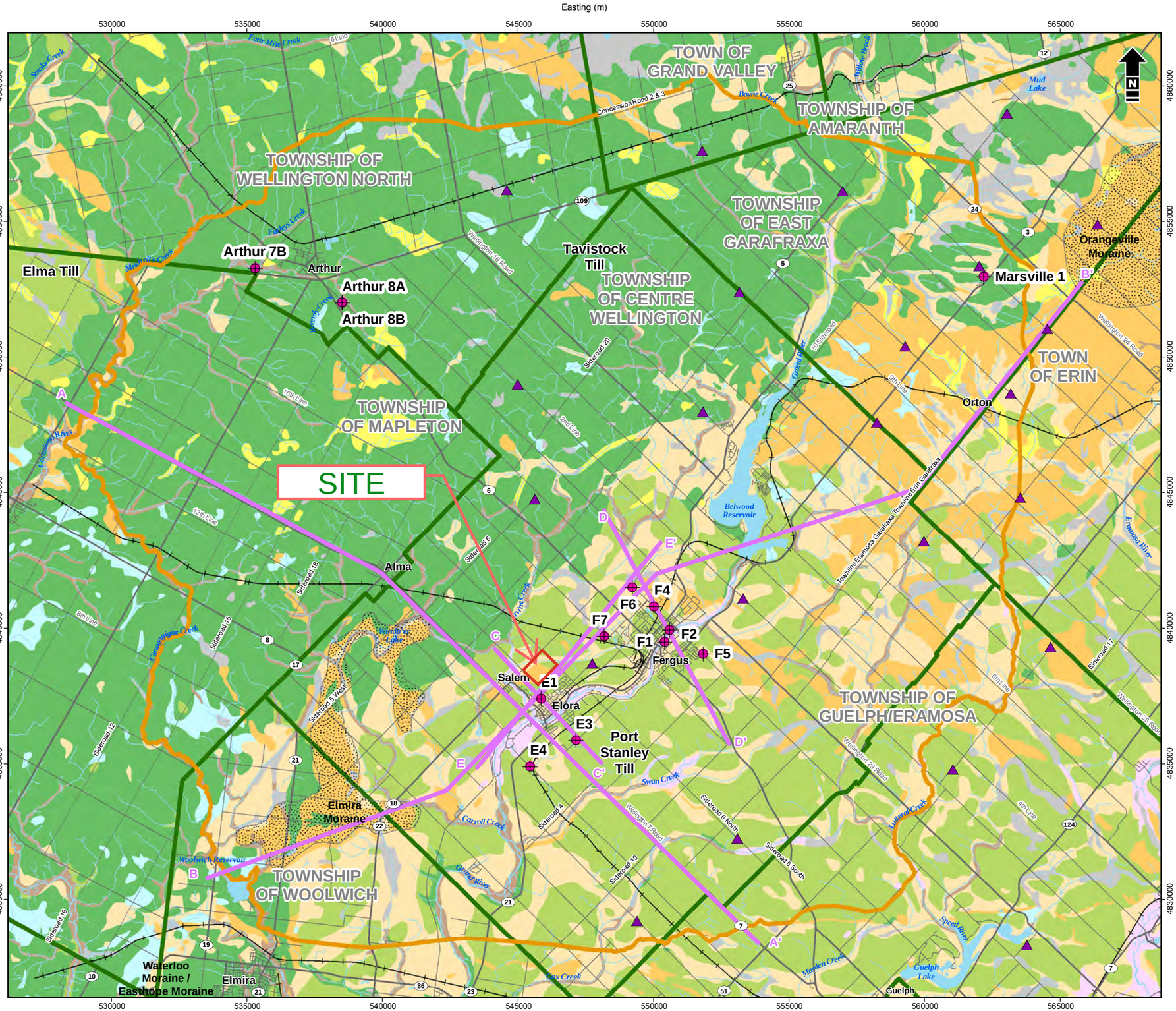
- Assessment Parcel
- Constructed Drains
  - Open or Unknown
  - Closed/Tiled
- Agricultural Tile Drainage
  - Random
  - Systematic

Map 2

SITE

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

Map Created: 2/6/2025
Map Center: 43.6998 N, -80.43191 W



Study Area
Moraine
Municipal Boundary
Water Body
Watercourse
Highway
Road
Railroad Trail
Conceptual Cross Section Location
Municipal Well
High Quality Overburden Well

Surficial Geology

- 3: Paleozoic bedrock
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 5d: Glaciolacustrine-derived silty to clayey till
- 6: Ice-contact stratified deposits
- 7: Glaciofluvial deposits
- 7a: Sandy deposits
- 7b: Gravelly deposits
- 8a: Massive-well laminated
- 9c: Foreshore-basinal deposits
- 19: Modern alluvial deposits
- 20: Organic deposits

Map 3

Reference: Data obtained from Grand River Conservation Authority (2017) and GeoBase® used under license. Municipal boundaries obtained from Ontario Ministry of Municipal Affairs and Housing.
Surficial Geology from the Ontario Geological Survey 2010. Surficial geology of Southern Ontario: Ontario Geological Survey, Miscellaneous Release--Data 128-REV.
Contains information licensed under the Open Government Licence – Ontario.

1:145,000
m
1,400 0 1,400 2,800
NAD 1983 UTM Zone 17N

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ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget and Local Area Risk Assessment

Surficial Geology

Date:	Project:	Technical:	Reviewer:	Drawn:
24 Nov 2017	23876	J. Melchin	P. Meyer	C. Curry

Figure 8

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Map 4

Irvine Creek
MILLFORD CRES
WOOLWICH ST E
MATHIESON ST
C-C'
SOPHIA ST
E-E'
DAVID ST E
MOIR ST
COLBORNE ST
CHURCH ST E
MILL ST E
Grand River
WATER ST E
MCNAB ST E
YORK ST E
HALLS DR
1ST LINE

SITE

Municipal Well E1

C (N)

C' (S)

6705138 (263.8)
6710107 (57.7)
6710818 (51.5)
6709795 (10.9)
6709734 (32.1)
6709830 (5.1)
6709735 (292.0)
MW2-11 (264.9)
6711919 (32.4)
E1 (48.7)
6710701 (66.5)
6700128 (164.5)
6700126 (168.9)
6700137 (275.7)
6703463 (369.9)
MW1-12 (375.0)
E3 (115.6)
6710773 (41.3)
6705103 (182.6)

Guelph Formation
Goat Island Fm – Ancaster Mbr
Goat Island Fm – Niagara Falls Mbr
Gasport Formation
Lions Head Formation
Cabot Head Fm
Irondequoit, Rockway, and Merriton Fms (IRM)
Older Paleozoic Rocks
?

Elevation (m asl)
420
400
380
360
340
320
300
280
260
240
220

0
1000
2000
3000
4000
5000

Distance (m)

LEGEND

- Road
- Drainage
- Observed Water Level
- Profile
- Top of Bedrock
- Screened Interval

Borehole Lithology

- Topsoil, fill
- Organic deposits
- Clay, silty clay
- Silt, clayey silt, sandy silt
- Clay to clayey silt till
- Silt to sandy silt till
- Sandy till
- Sand, silty sand
- Gravelly sand, gravel
- Limestone, Dolostone
- Shale

Interpreted Unit

- Grand River Outwash (AFA2)
- Tavistock, Port Stanley Till (ATB1)
- Moraine Aquifer (AFB1)
- Maryhill/ Catfish Creek Drift (ATB3, ATC1, AFC1, ATC2)
- Pre-Catfish Aquifer (AFD1)
- Canning Drift Aquitard (ATE1)
- Pre-Canning Aquifer (AFF1)
- PreCanning Aquitard (ATG1)

NOTE: Water levels for domestic wells are levels contained within the WWIS. Water levels for high quality wells are from recent, higher quality transient water level observations.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget and Local Area Risk Assessment

Local Elora Cross Section C-C'

Date:	Project:	Technical:	Reviewer:	Drawn:
08 Nov 2017	23876	J. Melchin	P. Meyer	C.Curry

Figure 13

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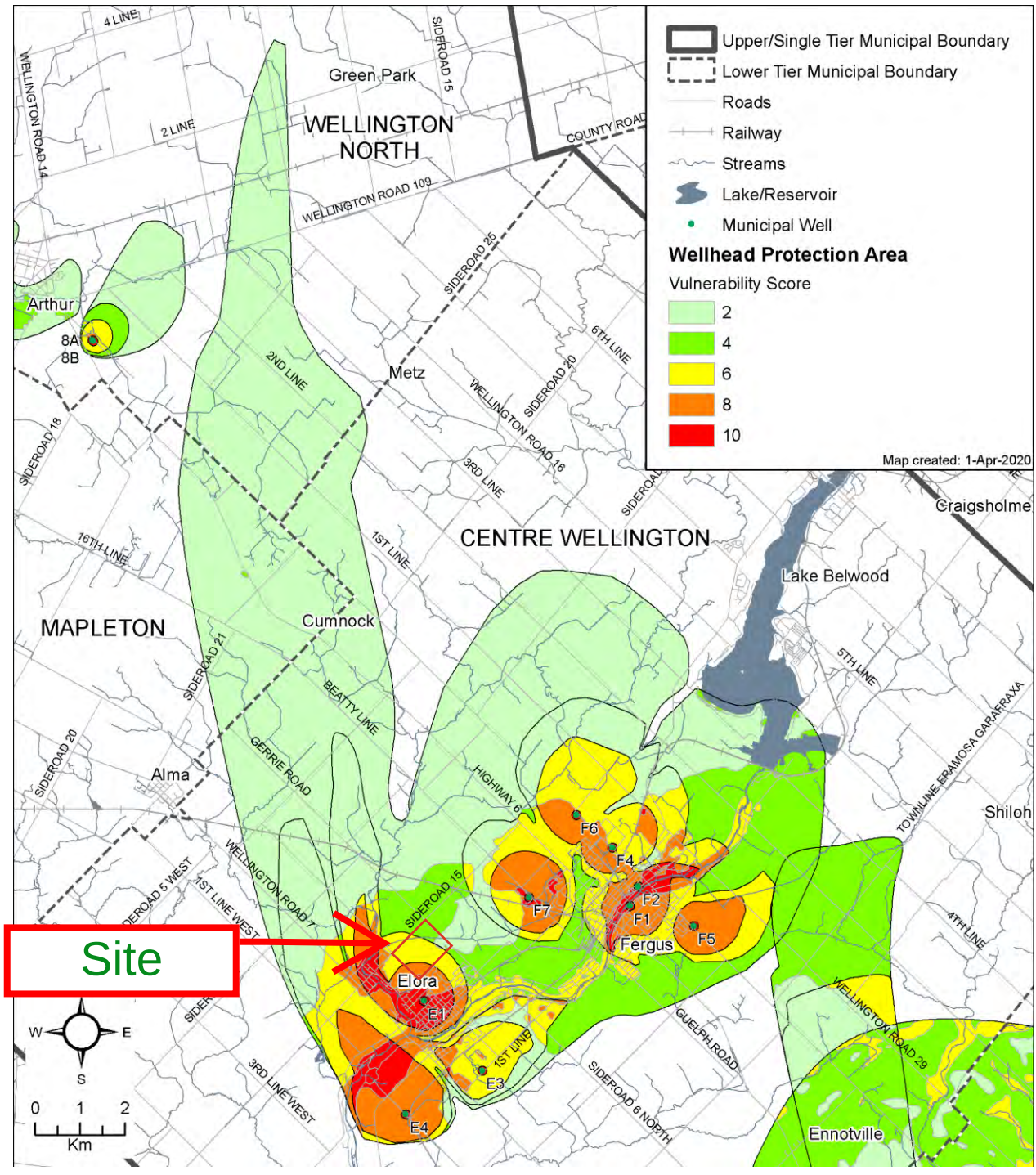
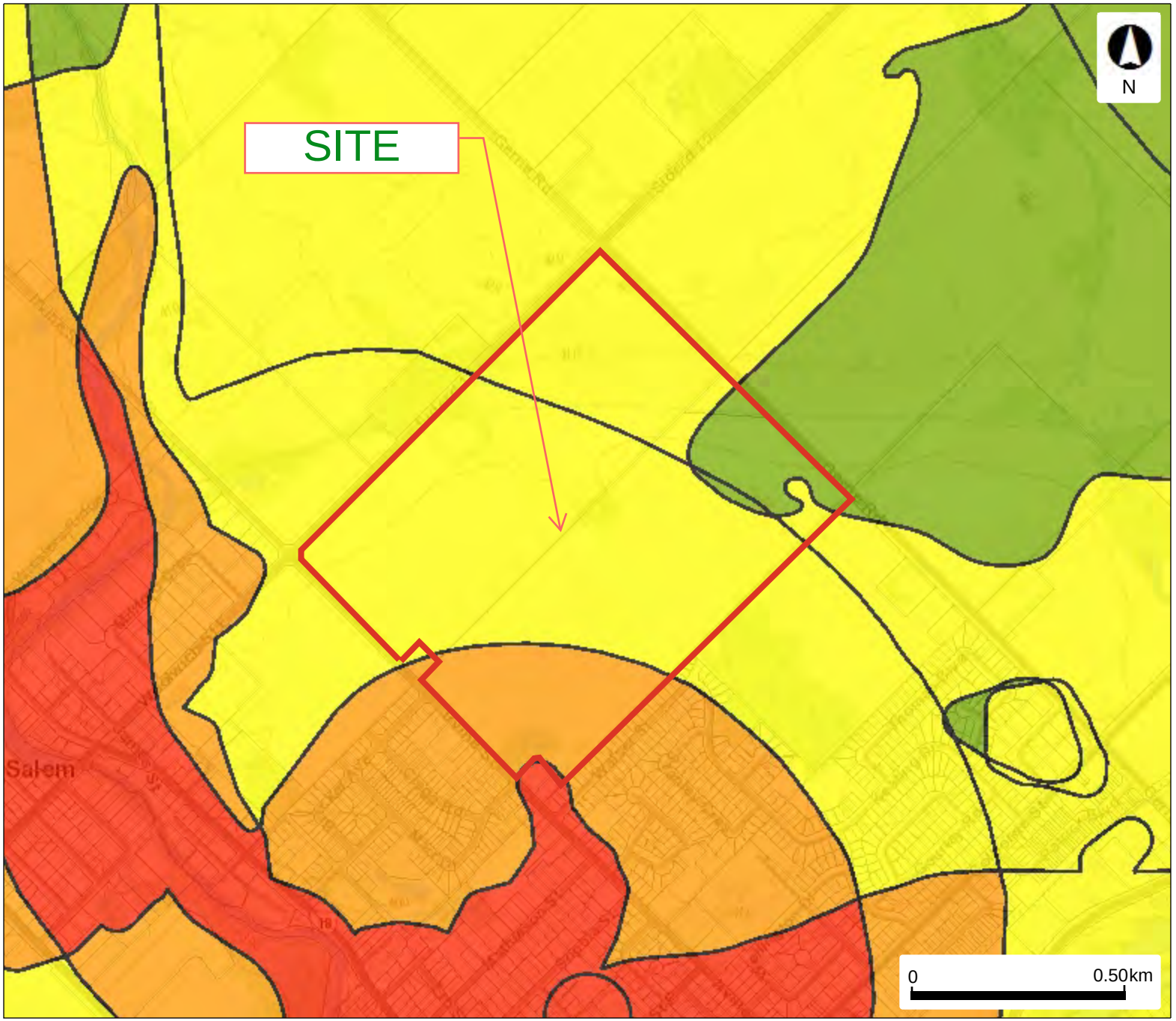
Map 6-29: Centre Wellington Wellhead Protection Area Final Vulnerability



Map 5

MECP Bedrock Groundwater Vulnerability



Legend

Vulnerable Scoring Area - Groundwater

- 2
- 4
- 6
- 8
- 10

Assessment Parcel

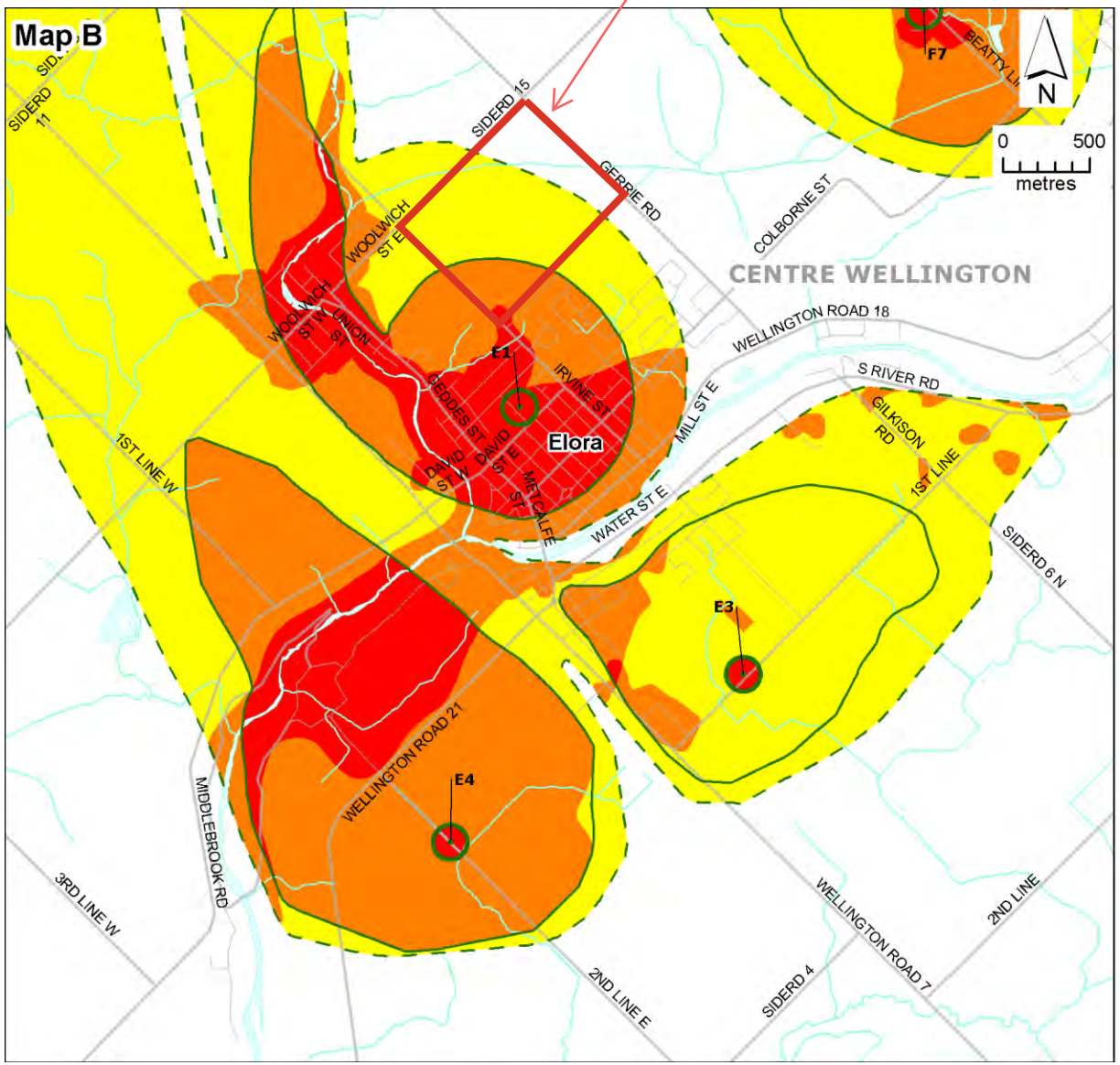
Map 5b

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

Ontario

Map Created: 2/27/2025
Map Center: 43.69877 N, -80.43112 W

7.12 Schedule F: County of Wellington, Centre Wellington Well, Map B



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Significant Drinking Water Threat Policy Applicability

Significant Drinking Water Threat Policy Categories		Vulnerability Scores on Map 10	8	2,4,6
1.	Waste Disposal			
2.	Sewage Systems			
3, 4.	Agricultural Source Material			
6, 7.	Non-Agricultural Source Material*			
8, 9.	Commercial Fertilizer*			
10, 11.	Pesticide			
12, 13.	Road Salt*			
14.	Storage of Snow			
15.	Fuel			
16.	DNAPLs			
17.	Organic Solvents			
18.	Aircraft De-icing			
21.	Livestock Area			
22.	Oil Pipelines			

Note: This table provides a summary of the activities listed in the Clean Water Act (2006) that apply as Prescribed Drinking Water Threats (PDWT) within Non-GUDI Wellhead Protection Zones on this map. For details refer to the Drinking Water Threats Tables from the Ministry of the Environment and Climate Change, and the text of this Source Protection Plan.
*Application of Commercial Fertilizer, Non-Agricultural Source Material, and Road Salt may not be a significant drinking water threat in some areas due to the % managed land, livestock density, and/or % impervious surface calculations for these areas. See the text of this plan for further details.

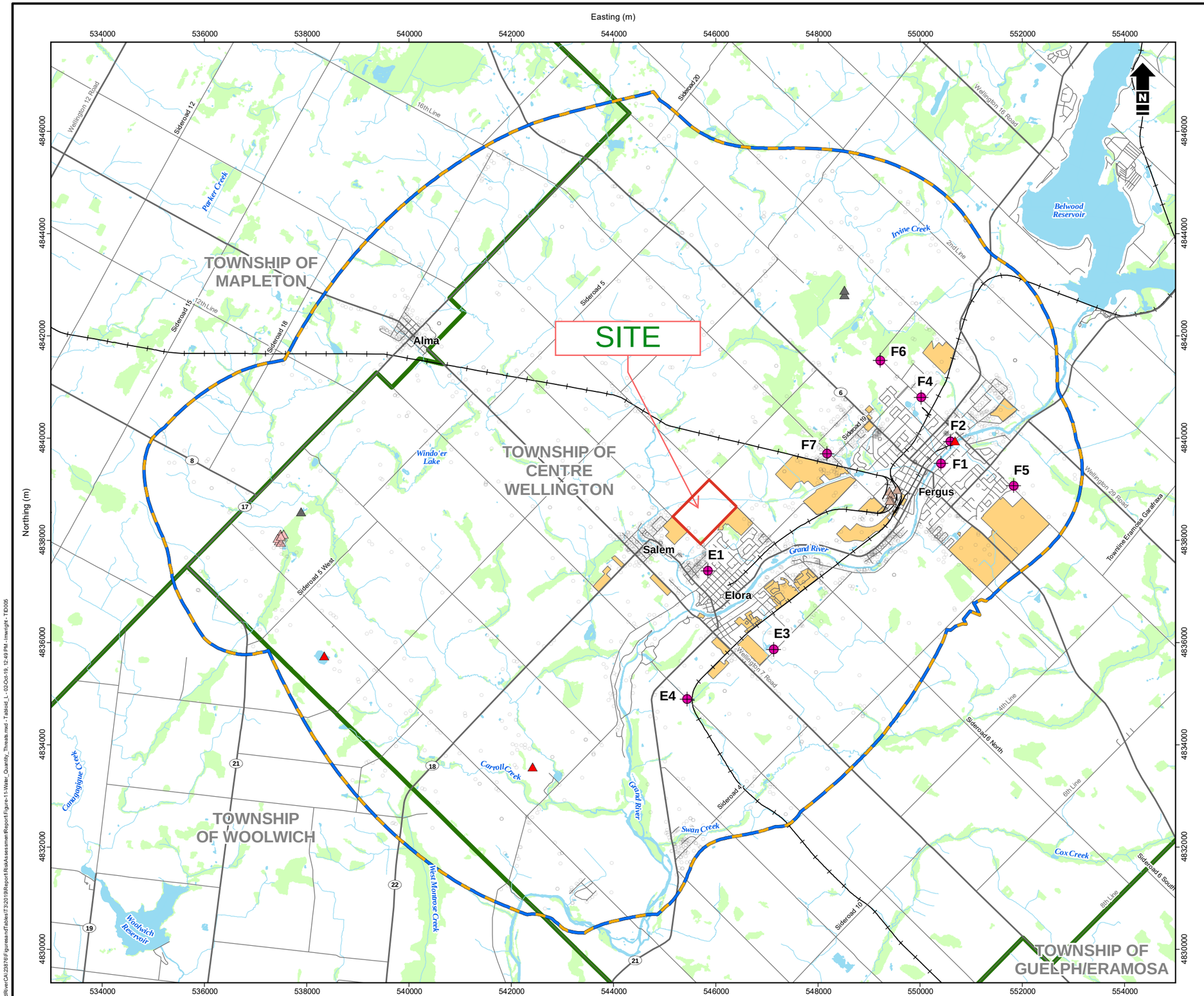
- Well
- Road
- Minor River
- Lake / Main River
- Wellington County Boundary
- Lower Tier Municipal Boundary

Wellhead Protection Zones:
- WHPA-A
- WHPA-B
- WHPA-C

Grand River Conservation Authority

1. Updated November 08, 2019
2. Larger scale mapping of some map layers, including roads and vulnerability scores, is available at www.sourcewater.ca.
3. This map is for illustrative purposes only. Information contained hereon is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.

Map 6



- WHPA-Q1/WHPA-Q2/Groundwater Vulnerable Area
- Municipal Boundary
- Groundwater Recharge Reduction Threat
- Wetland
- Water Body
- Watercourse
- Highway
- Road
- Railroad Trail
- Municipal Well
- Non-Permitted Consumptive Water Taking Threat

Permitted Consumptive Water Taking Threat

- Commercial
- Industrial
- Miscellaneous
- Remediation

Map 7

Note: the Risk Level assignment to the Groundwater Vulnerable Area does not imply that an individual groundwater taking or recharge reduction activity within that area will threaten the reliability of the municipal water supply.

1:75,000 metres
750 0 750 1,500
NAD 1983 UTM Zone 17N

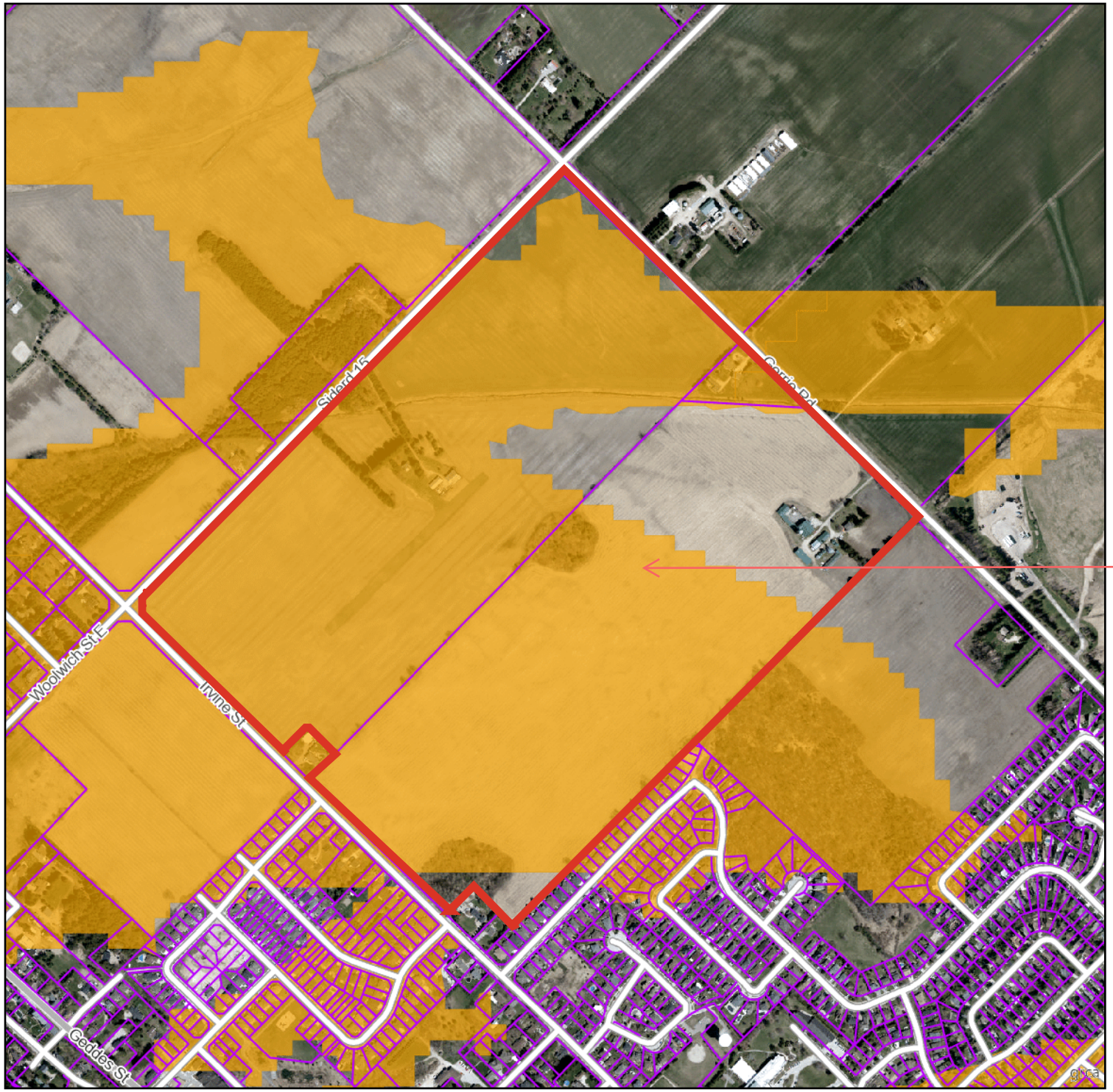
Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority
Centre Wellington Tier Three Water Budget Assessment - Risk Assessment Report

Water Quantity Threats

Date:	Project:	Submitter:	Reviewer:
October 2019	23876	J. Melchin	D. Van Vliet

Figure 11



Grand River Conservation Authority

Date: Mar 06, 2025

Significant Groundwater Recharge Area

Legend

- Parcel - Assessment (MPAC/MNRF)
- Signif. GW Recharge - Tier 2 (GRCA)

Map 8

SITE

Scale 1:9,106

NAD83 UTM zone 17 (EPSG:26917)

Map Centre (X,Y): 545855.94, 4838565.21 | Map Link

This map is not to be used for navigation | 2020 Ortho (ON)

Appendix F

Sanitary Design Sheets

Elora Sands/Keating Lands

Elora, Ontario

SANITARY SEWER TRUNK CAPACITY
EXISTING CONDITIONS
TOWNSHIP OF CENTRE WELLINGTON
Existing Conditions with 235m³/d residential daily flow

Project Number: 49878-100
Date: February 24, 2025
Design By: MXF
Checked By: JEM
Drainage Area Plan No: Figure 5.1
File: Q:\49878\100\Sanitary Trunk Capacities\2025-02-24_OPA Submission\49878-100 Sanitary Sewer Trunks Capacity Analysis_v7.xls

Design Parameters

Average Daily Flow

Residential	0.00272	L/s/c
Commercial	1.16	L/s/ha
Industrial	0.50	L/s/ha
Inst. / School	0.25	L/s/ha

Manning's "*n*"	0.013	
Min. Velocity	0.8	m/sec
Max. Velocity	3.0	m/sec
Residential Harmon Peaking Factor (F)	$F = 1 + 14/(4 + P^{0.5})$	
Commercial Peaking Factor = 2.5		
Infiltration	0.00	L/s/ha

LOCATION				RESIDENTIAL AREAS AND POPULATION							SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			PIPE CAPACITY						
											HECTARES AND FLOW OF EACH ZONING																			
											0.25 *L/s/ha*			1.16 *L/s/ha*			0.50 *L/s/ha*												
STREET	JUNCTION		AREA NO.	AREA	No. UNITS 2.80 PPU	No. UNITS @ 2.00 PPU	POPUL.	CUMUL POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	TOTALS-C-I FLOW	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	SLOPE	PIPE SIZE	CAPACITY	MAX. CAPACITY	FULL FLOW VELOCITY	AVAIL. CAPACITY
	From	To		*ha*			*1000s*	*1000s*		*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*%*	*mm*	*L/sec.*	*L/sec.*	*m/s*	*L/sec*
Princess Street																														
Clayton Farms		41	50	11.72	152	119	0.664	0.664	3.91	7.1		0.000	0.0		0.000	0.0		0.000	0.00	0.00	11.72	11.720	0.0	7.1						
Elora Meadows	41	42	51	15.28	167		0.468	1.131	3.76	11.6		0.000	0.0		0.000	0.0		0.000	0.00	0.00	15.28	27.000	0.0	11.6	0.23	200	15.7		0.501	4.1
Erb, Mathieson and Sophia Street	42	43	52	17.99	78		0.218	1.350	3.71	13.6		0.000	0.0		0.000	0.0		0.000	0.00	0.00	17.99	44.990	0.0	13.6	0.40	200	20.7		0.660	7.1
Salem LPS continuous flow		43								3.0																				
David Street PS continuous flow		43								0.8																				
Princess Street	43	4					0.000	1.350	3.71	17.4		0.000	0.0		0.000	0.0		0.000	0.00	0.00	0.00	44.990	0.0	17.4	0.28	201	17.6		0.555	0.2
Irvine Street Trunk																														
North of Walser	31	32	30	3.36	17		0.048	0.048	4.32	0.6		0.000	0.0		0.000	0.0		0.000	0.00	0.00	3.36	3.360	0.0	0.6	0.27	200	17.0		0.542	16.5
Ainley #1		33	31	2.65	36	58	0.217	0.217	4.14	2.4		0.000	0.0		0.000	0.0		0.000	0.00	0.00	2.65	2.650	0.0	2.4						
Walser	33	32	32	4.25	49		0.137	0.354	4.05	3.9		0.000	0.0		0.000	0.0		0.000	0.00	0.00	4.25	10.260	0.0	3.9	0.45	200	22.0		0.700	18.1
Daniel Cres	32	34	33	4.53	47		0.132	0.533	3.96	5.7		0.000	0.0		0.000	0.0		0.000	0.00	0.00	4.53	14.790	0.0	5.7	0.49	200	22.9		0.731	17.2
North of Colborne	34	14	34	2.24	23		0.064	0.598	3.93	6.4	0.71	0.710	0.2		0.000	0.0		0.000	0.00	0.18	2.95	17.740	0.0	6.6	1.02	200	33.1		1.054	26.5
Steven Way Trunk																														
Ainley #2	21	22	22	6.05	81	62	0.351	0.351	4.05	3.9		0.000	0.0		0.000	0.0		0.000	0.00	0.00	6.05	6.050	0.0	3.9	1.40	200	38.8		1.235	34.9
Thomas Bv North	22	23	23	7.13	71		0.199	0.550	3.95	5.9		0.000	0.0		0.000	0.0		0.000	0.00	0.00	7.13	13.180	0.0	5.9	0.50	250	42.0		0.857	36.1
North of Steven		23	21	9.56	100		0.280	0.280	4.09	3.1		0.000	0.0		0.000	0.0		0.000	0.00	0.00	9.56	9.560	0.0	3.1						
Steven Way	23	13	24	7.64	81		0.227	1.056	3.78	10.9		0.000	0.0		0.000	0.0		0.000	0.00	0.00	7.64	30.380	0.0	10.9	0.52	250	42.9		0.874	32.0
Colborne Street																														
East of Keating	11	12	10	6.53	28	50	0.178	0.178	4.17	2.0		0.000	0.0		0.000	0.0		0.000	0.00	0.00	6.53	6.530	0.0	2.0	0.50	200	23.2		0.738	21.2
Keating Drive		12	11	5.86	56		0.157	0.157	4.18	1.8		0.000	0.0		0.000	0.0		0.000	0.00	0.00	5.86	5.860	0.0	1.8						
from Keating to Steven	12	13	12	5.81	33	71	0.234	0.570	3.94	6.1		0.000	0.0		0.000	0.0		0.000	0.00	0.00	5.81	18.200	0.0	6.1	0.35	200	19.4		0.618	13.3
from Steven to Irvine	13	14	25	9.13	58	32	0.226	1.852	3.61	18.2	3.09	3.090	0.8		0.000	0.0		0.000	0.00	0.77	12.22	60.800	0.0	19.0	0.65	200	26.4		0.842	7.5
from Irvine to Queen	14	15	35	11.27	83	97	0.426	2.876	3.46	27.1		3.800	1.0		0.000	0.0		0.000	0.00	0.95	11.27	89.810	0.0	28.0	1.26	200	36.8		1.172	8.8
Queen Street	15	3	36	4.16	16	68	0.181	3.057	3.44	28.6		3.800	1.0		0.000	0.0		0.000	0.00	0.95	4.16	93.970	0.0	29.5	0.54	200	24.1	26.5	0.767	-5.4
Mill Street																														
Wellington Place and Mill Street	1	2	1	6.80	22		0.062	0.062	4.30	0.7	13.4	13.400	3.4	0.50	0.500	1.5		0.000	0.00	4.80	20.70	20.700	0.0	5.5	0.50	250	42.0		0.857	36.5
Gerrie to Queen	2	3	2	18.86	123	48	0.440	0.502	3.97	5.4	4.90	18.300	4.6	5.85	6.350	18.4		0.000	0.00	22.99	29.61	50.310	0.0	28.4	0.43	250	39.0		0.794	10.6
Queen to Princess	3	4	40	13.53	89	6	0.261	3.820	3.35	34.8	1.01	23.110	5.8		6.350	18.4		0.000	0.00	24.19	14.54	158.820	0.0	59.0	0.81	300	87.0		1.231	28.0
Princess to Metcalfe	4	5	60	14.26	50		0.140	5.310	3.22	46.5	0.78	23.890	6.0	8.74	15.090	43.8		0.000	0.00	49.73	23.78	227.590	0.0	96.2	0.50	375	123.9		1.123	27.7

Elora Sands/Keating Lands
Elora, Ontario

SANITARY SEWER TRUNK CAPACITY
ULTIMATE CONDITIONS
TOWNSHIP OF CENTRE WELLINGTON
Ultimate Conditions with 235m^3/d residential daily flow

Project Number: 49878-100
Date: February 24, 2025
Design By: MXF
Checked By: JEM
File: Q:\49878\100\Sanitary Trunk Capacities\2025-02-24_OPA Submission\49878-100 Sanitary Sewer Trunks Capacity Analysis_v7.xls

Future areas population low density 60.0 pp/ha
Future areas population medium density 85.0 pp/ha
Future areas population Seniors Block 100.0 pp/ha
Drainage Area Plan No: Figure 5.2

Design Parameters

Average Daily Flow
Residential 0.00272 L/s/c
Commercial 1.16 L/s/ha
Industrial 0.50 L/s/ha
Inst. / School 0.25 L/s/ha

Mannings "*n*" 0.013
Min. Velocity 0.8 m/sec
Max. Velocity 3.0 m/sec
Residential Harmon Peaking Factor (F) F = 1 + 14/(4 + P$^{0.5}$)
Commercial Peaking Factor = 2.5
Infiltration 0.00 L/s/ha

LOCATION				RESIDENTIAL AREAS AND POPULATION							SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN						
											HECTARES AND FLOW OF EACH ZONING																			
											0.25 *L/s/ha*			1.16 *L/s/ha*			0.50 *L/s/ha*												
STREET	JUNCTION		AREA NO.	AREA	No. UNITS 2.80 PPU	No. UNITS @ 2.00 PPU	POPUL.	CUMUL POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	TOTALS-C-I FLOW	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	SLOPE	PIPE SIZE	CAPACITY	MAX. CAPACITY	FULL FLOW VELOCITY	AVAIL. CAPACITY
	From	To		*ha*			*1000s*	*1000s*		*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*%*	*mm*	*L/sec.*	*L/sec.*	*m/s*	*L/sec*
Princess Street																													
Clayton Farms		41	50	11.72	152	119	0.664	0.664	3.91	7.1		0.00	0.0		0.00	0.0		0.00	0.00	0.00	11.72	11.72	0.0	7.1						
Elora Meadows	41	42	51	15.28	167		0.468	1.131	3.76	11.6		0.00	0.0		0.00	0.0		0.00	0.00	0.00	15.28	27.00	0.0	11.6	0.23	200	15.7		0.501	4.1
Erb, Mathieson and Sophia Street	42	43	52	17.99	78		0.218	1.350	3.71	13.6		0.00	0.0		0.00	0.0		0.00	0.00	0.00	17.99	44.99	0.0	13.6	0.40	200	20.7		0.660	7.1
Salem LPS continuous flow		43								3.0																			
David Street PS continuous flow		43								0.8																			
Princess Street	43	4					0.000	1.350	3.71	17.4		0.00	0.0		0.00	0.0		0.00	0.00	0.00	0.00	44.99	0.0	17.4	0.28	201	17.6		0.555	0.2
Irvine Street																													
Elora Sands #1			101	10.30			0.865	0.865	3.84	9.0		0.00	0.0		0.00	0.0		0.00	0.00	0.00	10.30	10.3	0.0	9.0	0.40	200	20.7		0.660	11.7
Keating Lands #1			201	7.60			0.635	0.635	3.92	6.8		0.00	0.0		0.00	0.0		0.00	0.00	0.00	7.60	17.9	0.0	6.8	0.40	200	20.7		0.660	14.0
North of Walser	31	32	30	3.36	17		0.048	1.548	3.67	15.4		0.00	0.0		0.00	0.0		0.00	0.00	0.00	3.36	21.3	0.0	15.4	0.27	200	17.0		0.542	1.6
Ainley #1		33	31	2.65	36	58	0.217	0.217	4.14	2.4		0.00	0.0		0.00	0.0		0.00	0.00	0.00	2.65	2.65	0.0	2.4						
Walser	33	32	32	4.25	49		0.137	0.354	4.05	3.9		0.00	0.0		0.00	0.0		0.00	0.00	0.00	4.25	6.90	0.0	3.9	0.45	200	22.0		0.700	18.1
Daniel Cres	32	34	33	4.53	47		0.132	2.033	3.58	19.8		0.00	0.0		0.00	0.0		0.00	0.00	0.00	4.53	32.69	0.0	19.8	0.49	200	22.9		0.731	3.1
North of Colborne	34	14	34	2.24	23		0.064	2.098	3.57	20.4	0.71	0.71	0.2		0.00	0.0		0.00	0.00	0.18	2.95	35.64	0.0	20.5	1.02	200	33.1		1.054	12.6
Steven Way																													
Elora Sands #4		52	104	1.0			*0.100*	0.100	4.24	1.2										0.00	1.0	1.00	0.0	1.2						
Elora Sands #3		52	103	8.1			*0.485*	0.585	3.94	6.3										0.00	8.1	9.10	0.0	6.3						
Elora Sands #2		51	102	4.9			*0.445*	1.030	3.79	10.6										0.00	4.9	14.00	0.0	10.6						
Keating Lands #2		50	202	29.5			*1.770*	2.800	3.47	26.4										0.00	29.5	43.50	0.0	26.4						
Subtotal Keating + Gibson	50	21		43.5			*2.800*	2.800	3.47	26.4										0.00	43.5	43.50	0.0	26.4	0.35	300	57.2		0.809	30.8
Ainley #2	21	22	22	6.05	81	62	0.351	3.151	3.42	29.3		0.00	0.0		0.00	0.0		0.000	0.00	0.00	6.05	6.05	0.0	29.3	0.35	300	57.2		0.809	27.8
North of Steven Way		23	21	9.56	100		0.280	0.280	4.09	3.1		0.00	0.0		0.00	0.0		0.00	0.00	0.00	9.56	9.56	0.0	3.1						
Thomas Bv North	22	23	23	7.13	71		0.199	3.350	3.40	31.0		0.00	0.0		0.00	0.0		0.00	0.00	0.00	7.13	13.18	0.0	31.0	0.35	300	57.2		0.809	26.2
Steven Way	23	13	24	7.64	81		0.227	3.856	3.35	35.1		0.00	0.0		0.00	0.0		0.00	0.00	0.00	7.64	30.38	0.0	35.1	0.52	250	42.9		0.874	7.7
Colborne Street																													
East of Keating	11	12	10	6.53	28	50	0.178	0.178	4.17	2.0		0.00	0.0		0.00	0.0		0.00	0.00	0.00	6.53	6.53	0.0	2.0	0.50	200	23.2		0.738	21.2
Keating Drive		12	11	5.86	56		0.157	0.157	4.18	1.8		0.00	0.0		0.00	0.0		0.00	0.00	0.00	5.86	5.86	0.0	1.8						
from Keating to Steven	12	13	12	5.81	33	71	0.234	0.570	3.94	6.1		0.00	0.0		0.00	0.0		0.00	0.00	0.00	5.81	18.20	0.0	6.1	0.35	200	19.4		0.618	13.3
from Steven to Irvine (DC Upgrade)	13	14	25	9.13	58	32	0.226	4.652	3.27	41.4	3.09	3.09	0.8		0.00	0.0		0.00	0.00	0.77	12.22	60.80	0.0	42.2	0.65	300	77.9		1.103	35.7
from Irvine to Queen	14	15	35	11.27	83	97	0.426	7.176	3.10	60.4		3.80	1.0		0.00	0.0		0.00	0.00	0.95	11.27	107.71	0.0	61.4	1.26	300	108.5		1.536	47.1
Queen Street	15	3	36	4.16	16	68	0.181	7.357	3.09	61.7		3.80	1.0		0.00	0.0		0.00	0.00	0.95	4.16	111.87	0.0	62.7	0.54	300	71.0		1.005	8.3
Mill Street																													
Wellington Place and Mill Street	1	2	1	6.80	22		0.062	0.062	4.30	0.7	13.4	13.40	3.4	0.50	0.50	1.5		0.00	0.00	4.80	20.70	20.70	0.0	5.5	0.50	250	42.0		0.857	36.5
Gerrie to Queen	2	3	2	18.86	123	48	0.440	0.502	3.97	5.4	4.90	18.30	4.6	5.85	6.35	18.4		0.00	0.00	22.99	29.61	50.31	0.0	28.4	0.43	250	39.0		0.794	10.6
Queen to Princess	3	4	40	13.53	89	6	0.261	8.120	3.04	67.2	1.01	23.11	5.8		6.35	18.4		0.00	0.00	24.19	14.54	176.72	0.0	91.4	0.81	305	90.9		1.245	0.0
Princess to Metcalfe	4	5	60	14.26	50		0.140	9.610	2.97	77.7	0.78	23.89	6.0	8.74	15.09	43.8		0.00	0.00	49.73	23.78	245.49	0.0	127.4	0.50	375	123.9	136.3	1.123	0.0

Drawings

P:\P\49878\100\49878-100-EC2

MTE FILE PATH:

March 5, 2025 – 4:24:10 PM – Plotted By: Fahim Gangat

WOOLWICH STREET EAST

SIDEROAD 15

EXISTING RESIDENTIAL

SALEM PUBLIC SCHOOL

CLAYTON SUBDIVISION

ELORA SANDS

KEATING LANDS

ELORA MEADOWS

IRVINE STREET

GERRIE ROAD

NICHOL DRAIN No.1

APPROXIMATE FLOODPLAIN (FROM NICHOL DRAIN SUBWATERSHED STUDY PHASE 1 EXISTING CONDITIONS FINAL REPORT)

APPROXIMATE FLOODPLAIN (FROM NICHOL DRAIN SUBWATERSHED STUDY PHASE 1 EXISTING CONDITIONS FINAL REPORT)

BRICKER AVENUE

STUMPF STREET

MARR DRIVE

CLEGG ROAD

WALSER STREET

QUEEN STREET CREEK

AINLEY FARM SUBDIVISION

LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS
- EXISTING CONTOURS
- GRCA CONTOURS
- EXISTING FENCE
- EXISTING EMBANKMENT (SLOPE AS NOTED)
- APPROXIMATE FLOODPLAIN LIMIT (FROM NDSS)
- DRIPLINE
- EXISTING MONITORING WELL
- EXISTING BOREHOLE
- EXISTING MONITORING WELL ELORA MEADOWS
- EXISTING BOREHOLE AINLEY FARM SUBDIVISION

MW SOIL–MAT (FEB,2022) Elev.=407.34 TC=408.26

BH SOIL–MAT (OCT, 2021)

APPROXIMATE MW MTE (JAN, 2024)

APPROXIMATE BH BLUEPLAN (JUNE, 2023)

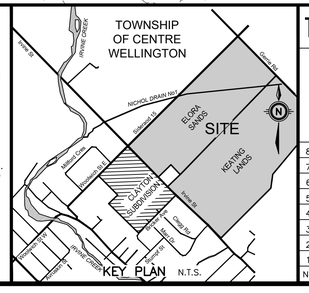
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF CENTRE WELLINGTON

No.	REVISION	BY	YYYY–MM–DD
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.			

GEODETIC BM ELEV. = 387.982m
ELORA POST OFFICE, BOLT IN FRONT WALL, IN LINTEL OF CENTRE BASEMENT WINDOW. (HISTORICAL NUMBER 16U117E)

SITE BENCHMARK ELEV. = m

CLIENT
ELORA SANDS DEVELOPMENTS INC.
2555 Meadowpine Blvd. Unit 3 Mississauga Ont.

PROJECT
ELORA SANDS / KEATING LANDS

DRAWING
EXISTING CONDITIONS PLAN

MTE
Engineers, Scientists, Surveyors
519-743-6500

Project Manager S. PETERSON	Project No. 49878-100
Design By MXF	Checked By JEM
Drawn By ACH	Checked By MXF
Surveyed By MTE/BSRD	Drawing No. EC2.1
Date Jan.29/25	
Scale 1:2000	Sheet of