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A REPORT TO
BRAIRWOOD (DUNDALK) LTD.

HYDROGEOLOGICAL ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
CON 2 SWTSR PT LOT 234
SOUTHEAST OF GREY ROAD 9 AND IDA STREET

TOWNSHIP OF SOUTHGATE (DUNDALK)

REFERENCE NO. 2310-W158

JANUARY 29, 2025

DISTRIBUTION

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Issues and Revisions Registry

Modification	Date	Description of issued and/or revision
1st Draft Report	March 8, 2024	For Review
2nd Draft Report	January 21, 2025	For updated plans
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LMITATIONS OF LIABILITY

This report was prepared by Soil Engineers Ltd. for the account of Briarwood (Dundalk) Ltd., and for review by its designated agents, financial institutions and government agencies, and can be used for development approval purposes by the Township of Southgate and their peer reviewer who may rely on the results of the report. The material in it reflects the judgement of Tarek Agha, EIT., PMP. and Narjes Alijani, M.Sc., P.Geo. Any use which a Third Party makes of this report and/or any reliance on decisions to be made based on it is the responsibility of such Third Parties. Soil Engineers Ltd. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this.

One must understand that the mandate of Soil Engineers Ltd. is to obtain readily available current and past information pertinent to the Subject Site for a Hydrogeological Study only. No other warranty or representation, expressed or implied, as to the accuracy of the information is included or intended by this assessment. Site conditions are not static and this report documents site conditions observed at the time of the Subject Site reconnaissance.

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1.0 EXECUTIVE SUMMARY

Soil Engineers Ltd. (SEL) was retained by Briarwood (Dundalk) Ltd. to conduct a hydrogeological assessment for the parcel of land, legally described as "CON SWTSR PT LOT 234", located at southeast of Grey Road 9 and Ida Street in the Township of Southgate (Dundalk), Ontario (the Subject Site). Considering the provided details, this report will focus on the southwest portion of the Subject Site (the Study Area).

The Subject Site is bounded by few residential houses and primarily open space covered with trees and bushes along with a water body to the north, a local road, Ida Street, and open space covered with trees and bushes along with a water body, to the west, few residential houses, a sewage treatment plant and primarily open space covered with trees and bushes, to the south, and a Grey County CP Rail Trail and open space covered with trees and bushes, to the east.

The Subject Site is primarily weed-covered, with two watercourses and associated wetlands traversing through the property. At the time of investigation, the center portion of the Subject Site was flooded.

A review of the architectural drawings prepared by S&C Architects Inc., dated June 27, 2024, and the Functional Servicing & Grading Plan prepared by Valdor Engineering Inc., dated September 24, 2024, indicate that the proposed development will consist of four (4) residential buildings (buildings A, B, C, and D), with a 1-level underground parking and underground services. Buildings A and C will share an adjoined 1-level underground parking, while buildings B and D will share their own adjoined 1-level underground parking. Additionally, the proposed development will consist of underground services. Design details regarding the underground services were not available for review at the time of preparing this report. As such, dewatering flow rates were not estimated.

As per an email received from Briarwood Homes, it is understood the development will be constructed in four (4) development phases, in alphabetical sequence from building A to building D, phase 1 being building A and phase 4 being building D. The Functional Servicing & Grading Plan indicate that the Finished Floor Elevation (FFE) of the underground parking is set at El. 510.25 meters above seas level (masl). The base of excavation, footing elevation, and base of elevator pit are considered at El. 509.75, 509.0, and 508.75 masl, respectively, for excavation and construction of the proposed 1-level underground parking structure, for each of the four (4) phases. Additionally, implementing permeable shoring was assumed for the current assessment. However, since the excavation for construction of the proposed underground parking will be completed over four (4) phases, the developed shared sides for each of remaining phases 2 to 4, were considered as impermeable shared excavation walls due to previously developed phases.

The current investigation reviled that:

- The Subject Site is located within an area mapped as Till deposits known as Wentworth Till (5b) and Glaciofluvial deposits (7a). The Wentworth Till, consists of predominantly stone-poor, sandy

silt to silty sand textured till deposits, whereas Glaciofluvial deposits consists of river deposits and delta topset facies of sandy deposits.

- The Subject Site is located within a regional physiography of Southern Ontario known as Dundalk Till Plains, consisting of drumlinized till plains
- The Subject Site is located within the Grand River Conservation Authority (GRCA) jurisdictions.
- The highest shallow stabilized groundwater levels elevations were measured at an El. 512.65 masl at BH/MW 1 location, whereas the lowest shallow stabilized groundwater level elevation was measured at an El. 509.51 masl at BH/MW 11 location.

  Hydraulic conductivity of 7.90 x 10^{-7} m/sec (geomean of in-situ hydraulic conductivity testing BH/MWs 1, 2, and 4 installed in the Study Area) were considered for sandy silt till.
- Results of Groundwater quality at a selected monitoring well (BH/MW 2) indicates that the concentration for TSS slightly exceeds the Township of Southgate Storm Sewer Use By-Law standards for unfiltered samples. However, it meets the Township of Southgate Sanitary and Combined Sewer Use By-Law.
- The assumed bulk excavation elevation for the proposed 1-level underground parking is below the highest recorded groundwater level elevation within the footprints of the proposed Buildings. Hence, groundwater seepage is anticipated in the open excavation for excavation and construction of the proposed basement structure and footing installation. Total anticipated flow rate including flow from storm event will reach to total flow rates of 227,950.0L/day, 194,200.0 L/day, 210,250.0 L/day, and 208,000.0 L/day for phases 1, 2, 3, and 4, respectively, considering a safety factor of 1.5, and 32.12 mm rain fall storm event.
- The estimated short-term construction dewatering flow rates are above EASR threshold 50,000 L/day for each of the four (4) development phases. As such, filing EASR with the MECP is required for each of the four (4) development phases, assuming each phase will be constructed separately.
- The estimated long-term foundation drainage flow rate from groundwater source reaches 64,950.0 L/day, 42,150.0 L/day, 59,250.0 L/Day, and 64,200.0 L/day for the proposed phase 1, 2, 3, and 4 developments, respectively, considering a safety factor for 1.5.
- The estimated long-term foundation drainage flow from the groundwater source exceeds the PTTW threshold of 50,000 L/day for development phases 1, 3, and 4. As such, filing PTTW with MECP is required for the phase 1, 3, and 4 developments.
- The conceptual ZOI for dewatering reaches 1112.3 m, 9.8 m, 13.1 m, and 13.1 m away from the dewatering areas for the construction of development phases 1-4, respectively. Potential impacts are as follows:

- There are no existing buildings and roads located within a conceptual ZOI for construction. However, since the proposed development will be constructed over 4 phases, the previously constructed building will be located partially within the conceptual ZoI for the next phase, that should be considered for excavation and construction of each development phase.
- Based on the findings of the dewatering assessment, proposed excavation and construction will be completed below the shallow groundwater table of the Subject Site and the Study Area. Hence, short-term construction dewatering is anticipated for the proposed development. Record review indicates that a wetland and wooded area were identified on the Subject Site and Study Area, and within the conceptual ZOI. As such, impacts to natural heritage features are anticipated pertaining the proposed development. A review of the proposed development plan indicates that the footprint of the proposed buildings A and B will extend into the existing wetland and the wooded lot. As such, it is understood the existing natural features will be partially removed. A monitoring and mitigation plan should be proposed to prevent potential impacts to the nearby natural features during construction.
- A review of the MECP well records confirmed that there are seventeen (17) records for water supply wells that are registered within 500 m of the Subject Site. However, they are not located within the conceptual ZOI for dewatering. As such, potential impacts to the groundwater users are not anticipated.
- Source Water Impact Assessment and Mitigation Plan (SWIAMP) will be required for the Subject Site, considering location of the Subject Site within Grand River Well Head Protections area ‘B’, ‘C’ and ‘D’ with the score varying between 2 and 6.

2.0 INTRODUCTION

2.1 Site Location and Project Description

Soil Engineers Ltd. (SEL) was retained by Briarwood (Dundalk) Ltd. to conduct a hydrogeological assessment for the parcel of land, legally described as "CON SWTSR PT LOT 234", located at southeast of Grey Road 9 and Ida Street in the Township of Southgate (Dundalk), Ontario (the Subject Site). Considering the provided details, this report will focus on the southwest portion of the Subject Site (the Study Area).

The Subject Site is bounded by few residential houses and primarily open space covered with trees and bushes along with a water body to the north, a local road, Ida Street, and open space covered with trees and bushes along with a water body to the west, few residential houses, a sewage treatment plant and primarily open space covered with trees and bushes to the south; and a Grey County CP Rail Trail and open space covered with trees and bushes to the east. Location of the Subject Site is shown on **Drawing 1**.

The Subject Site is primarily weed-covered, with two (2) watercourses and associated wetlands traversing through the Subject Site. At the time of investigation, the center portion of the Subject Site was flooded.

A review of the architectural drawings prepared by S&C Architects Inc., dated June 27, 2024, and the Functional Servicing & Grading Plan prepared by Valdor Engineering Inc., dated September 24, 2024, indicate that the proposed development will consist of four (4) residential buildings (buildings A, B, C, and D), with a 1-level underground parking and underground services. Buildings A and C will share an adjoined 1-level underground parking, while buildings B and D will share their own adjoined 1-level underground parking. Additionally, the proposed development will consist of underground services. At the time of preparing this report, design details regarding the underground services were not available for review, as such, dewatering flow rates were not estimated.

2.2 Project Objectives

The current hydrogeological assessment report presents regional and local setting of the Subject Site. The findings of the fieldwork, including subsoil investigation, groundwater level monitoring, groundwater quality assessment and hydraulic conductivity testing are presented in the report. Potential needs for short-term dewatering control are assessed, and hydrogeological impacts of the proposed development to the nearby groundwater receptors including water supply wells, natural heritage features, and structures are assessed (if applicable). This report provides mitigation plans on the potential impacts of the proposed development to the groundwater receptors, and structures. Comments and recommendation are provided on any needs for applying for Permit to Take Water (PTTW), or posting Environmental Activity and Sector Registry (EASR) with the Ministry of the Environment, Conservation and Parks (MECP).

The current report is prepared in consideration of the Ontario Water Resource Act, and Ontario Regulation 387/04.

2.3 Scope of Work

The scope of work for the hydrogeological assessment is summarized below:

- *Background Review:* Available background geological and hydrogeological information for the Subject Site including topographic mapping, surface geological, natural heritage features databases, Township of Southgate official plans, Grand River Conservation Authority (GRCA) regulated area plans, and MECP water well records were reviewed.
- *Fieldwork:* Fieldwork includes inspecting the Subject Site and surrounding properties with respect to the natural features, groundwater receptors, and structures, as well as installing and developing the monitoring wells. Additionally, groundwater levels within the installed monitoring wells were monitored over three (3) monitoring events, in-situ hydraulic conductivity testing was completed within the installed monitoring wells. Additionally, one (1) set of groundwater samples was collected and submitted to a CALA laboratory to characterize groundwater quality in comparison with the Township of Southgate Sanitary and Storm Sewer Use By-Law parameters.
- *Short-Term Dewatering Needs:* Based on a review of the available conceptual plans, findings of the current subsurface investigation, and recommendations provided in the geotechnical investigation report (if available), short-term dewatering flow rate including groundwater seepage, and anticipated water that should be collected over potential storm events was calculated. A mitigation plan was recommended to mitigate potential short-term dewatering impacts to the nearby groundwater receptors (including natural heritage features and water supply wells), and structures, if applicable.
- Long-term foundation Drainage Control Requirement: Based on a review of the available design drawings, findings of the current subsurface investigation, and recommendations provided in the geotechnical investigation report (if available), total long-term foundation drainage flow rate including groundwater seepage, and anticipated flow from infiltration source was estimated.
- *Permit Requirements:* Considering the estimated short-term construction dewatering flow rate, recommendations were provided on any need for applying for a PTTW or posting on the EASR with the MECP, and the Township of Southgate, if required.

3.0 APPLICABLE REGULATIONS AND OFFICIAL PLANS

The regulations and policies relevant to this hydrogeological assessment and the location of the Subject Site within the official plans are summarized below.

3.1 Grand River Conservation Authority (GRCA) Policies and Regulation (O. Reg. 150/06)

Under Section 28 of the Conservation Authorities Act, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system, and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. The GRCA, through its regulatory mandate, is responsible for issuing permits under Ontario Regulation (O. Reg.) 150/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses for development proposal or Site alteration work to shorelines and watercourses within the regulated areas.

GRCA Regulated Area online mapping was reviewed on January 15, 2025. It is our understanding that majority of the Subject Site is located within a GRCA Regulated Area. As such, it is anticipated that obtaining a permit from the GRCA under O. Reg. 150/06 will be required for the proposed development.

3.2 Clean Water Act

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act, 2006 (CWA). Initiatives under the CWA include the delineation of Well Head Protection Areas (WHPAs), significant groundwater recharge areas (SGRAs) and Highly Vulnerable Aquifers (HVAs) as well as the assessment of drinking water quality and quantity threats within Source Protection Regions. Source Protection Plans are developed under the CWA and include the restriction and prohibition of certain types of activities and land uses within WHPAs.

Based on a review of regional-scale source water protection mapping (Source Water Protection Information atlas) provided by the MECP on January 15, 2025, the Subject Site is not located within the areas designated as Well Head Protection Area Q1 and Q2, HVA and an Event Based Area. Records review indicate that the Subject Site is located within Grand River Well Head Protections area ‘B’, ‘C’ and ‘D’ with the score varying between 2 and 6. As such, Source Water Impact Assessment and Mitigation Plan (SWIAMP) will be required for the Subject Site. SEL will provide SWIAMP letter under separate cover when the necessary details are provided. Moreover, the Subject Site is located within the SGRA and Intake Protection Zone-3.

3.3 Township of Southgate and County of Grey Official Plan

The Township of Southgate and County of Grey Official Plan sets up policies that deal with legislative and administrative concerns, guides physical growth, and addresses social, economic, and environmental concerns. The Official Plan provides land use planning designations and identifies areas of environmental significance where more stringent policies may apply for development applications.

Township of Southgate Official Plan maps were reviewed for the current study with the results summarized as below:

- Map 2 (Dundalk Land Use)-Schedule A- A review of the map, dated May 04, 2022, indicates that the Subject Site is partially located within an area designated as Future Development and the central portion of the Subject Site is located within an area designated as Hazard Land.
- Schedule C (Natural Heritage Features) - A review of the map, dated May 04, 2022, indicates that the two (2) stream/river traverse through the Subject Site. Also, a wetland designated as 'Other Wetland' is located within the central portion of the Subject Site. Moreover, an area designated as Significant Woodlands is also located within the eastern limits of the Subject Site.
- Schedule D (Natural Heritage Core and Linkages) - A review of the map, dated May 04, 2022, indicates that the Subject Site is not located within Core Area and Linkage (200 m wide).
- Schedule E (Subsurface Features and Wildlife Fires) - A review of the map, dated May 04, 2022, indicates that the Subject Site is located within Well Head Protection Zone 'B', 'C' and 'D'.

County of Grey Official Plan maps were reviewed for the current study with the results summarized as below:

- Map 2 (Land Use Types)-Schedule A- A review of the map, dated May 01, 2023, indicates that the Subject Site is located within an area designated as Primary Settlement Area and whereas two (2) separate areas designated as Hazard Lands traverse through the Subject Site.
- Schedule C (Natural Heritage System Core Areas and Linkages) - A review of the map, dated May 01, 2023, indicates that the Subject Site is not located within Core Area and Linkage (200 m wide).
- Appendix A (Constraint Mapping)- Map 2 - A review of the map, dated May 01, 2023, indicates that the Subject Site is located within a Well Head Protection Areas in zone 'B', 'C' and 'D'.
- Appendix B (Constraint Mapping)- Map 2 - A review of the map, dated May 01, 2023, indicates that the two (2) stream/river traverse through the Subject Site. Also, a wetland

designated as ‘Other Wetland’ is located within the central portion of the Subject Site. Moreover, an area designated as Significant Woodlands is also located within the eastern limits of the Subject Site.

- Map 2q (Land Use Types)-Secondary Schedule- A review of the map, dated May 01, 2023, indicates that the Subject Site is located within an area designated as Primary Settlement Area and whereas two (2) separate areas designated as Hazard Lands traversing through the Subject Site.

4.0 METHODOLOGY

4.1 Borehole Advancement and Monitoring Well Installation

Drilling boreholes and construction of monitoring wells were conducted on between October 30 and November 02, 2023. The field program consisted of drilling of eleven (11) boreholes (BH) and the installation of seven (7) monitoring wells (MW), one (1) within each of selected seven (7) boreholes at the time of the borehole drilling. Additional, monitoring wells were proposed within the central portion of the Subject Site. However, the central portion was not accessible due to ponded water. The locations of the boreholes and monitoring wells are shown on **Drawing 2**.

Borehole drilling and monitoring well construction were completed by a licensed water well contractor, under the full-time supervision of a drilling supervisor from SEL. SEL's geotechnical supervisor logged the soil strata encountered during borehole advancement and collected representative soil samples for textural classification. The boreholes were drilled using a track-mounted drill rig equipped with continuous flight, solid-stem augers. Detailed descriptions of the encountered subsoil and groundwater conditions are provided by SEL and presented on the borehole and monitoring well logs, on the enclosed **Appendix A**.

The monitoring wells were constructed using 50-mm diameter Trilock pipes and 3.0 m long 10-slot well screens, which were installed in each of the selected geotechnical boreholes. All seven (7) of the monitoring wells were equipped with monument casing.

The UTM coordinates and ground surface elevations at the monitoring wells' locations, as well as the monitoring well construction details, are presented in **Table 4-1**. The ground surface elevations and horizontal coordinates at the monitoring well locations were determined at the time of the investigation, using a TSC 3 SP 60 (Trimble).

Table 4-1- Monitoring Well Installation Details

Monitoring Well ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Screen Interval (mbgs)	Soil in the Screen Interval	Casing Dia. (mm)	Protective Casing Type
		Easting	Northing					
BH/MW 1	October 30, 2023	548522.6	4889671	513.05	3.1-6.1	Sandy Silt Till	50	Monument
BH/MW 2	October 30, 2023	548565.8	4889727	512.31	3.1-6.1	Sandy Silt Till	50	Monument
BH/MW 4	October 31, 2023	548621	4889681	511.67	3.1-6.1	Sandy Silt Till	50	Monument
BH/MW 6	November 01, 2023	548836.1	4890058	511.44	3.1-6.1	Sandy Silt Till	50	Monument
BH/MW 8	November 02, 2023	548907.2	4890148	511.96	3.1-6.1	Sandy Silt Till	50	Monument
BH/MW 9	October 31, 2023	548826.4	4890004	510.89	3.1-6.1	Sandy Silt Till	50	Monument
BH/MW 11	October 31, 2023	548889.2	4889964	510.41	3.1-6.1	Sandy Silt Till	50	Monument

Notes:
mbgs metres below ground surface
masl metres above sea level

4.2 MECP Water Well Records Review

MECP Water Well Records (WWRs) were reviewed for the registered wells located at the Subject Site and within 500 m radius of the Subject Site boundaries (Study Area). The water well records indicate that fifty-seven (57) well records are listed within the 500 m zone of influence Study Area relative to the Subject Site. The findings of the MECP well records are summarized in the **Section 5.6** of the current report with the details are presented in **Appendix B**.

4.3 Groundwater Monitoring

All seven (7) installed monitoring wells were utilized to measure and monitor groundwater levels. Monitoring wells were developed, and the groundwater monitoring program confirmed the stabilized groundwater level beneath the Subject Site. The stabilized groundwater levels were manually measured over three (3) monitoring events on November 20, 2023, December 11, 2023 and January 10, 2024 with the results presented in **Section 7.1**.

4.4 In-Situ Hydraulic Conductivity Test

SEL has conducted in-situ hydraulic conductivity tests (Falling head) at all the BH/MW locations.

The in-situ hydraulic conductivity test (falling head and rising head) provides estimated hydraulic conductivity (K) for subsoil strata at the depths of the well screens. The monitoring wells were developed in advance of the tests. Well development involves the purging and removal of groundwater from each monitoring well to remove remnants of clay, silt and other debris introduced into the monitoring well during construction, and to induce the flow of formation groundwater through the well screens, thereby improving the transmissivity of the subsoil strata formation at the well screen depths.

The in-situ falling head hydraulic conductivity test involves the placement of a slug of known volume into the monitoring well, below the water table, to displace the groundwater level upward. The in-situ rising head hydraulic conductivity test involves removing a volume of water from the monitoring well to displace the groundwater level downward. The rate at which the water level recovers to static conditions (rising head/falling head) is tracked manually using a water level tape and a data logger. Slug tests in the monitoring wells with partially submerged screens may exabit double straight-line effect due to the filter pack drainage. Therefore, the data that represent the filter pack around the screen is eliminated during the interpretation of the slug test. The rate at which the water table recovers to static conditions is used to estimate the K value for the water-bearing strata formation at the well screen depth using the Bouwer and Rice method (1976). The findings for the hydraulic conductivity testing are presented in **Section 7.3** of the current report with the details are presented in **Appendix C**.

4.5 Groundwater Quality Assessment

Groundwater quality assessment was completed by SEL on January 10, 2024. One (1) set of groundwater samples were collected from one (1) selected monitoring well (BH/MW 2) to characterize its quality for evaluation against Township of Southgate (BL_13_2011) parameters. This is performed to assess whether any anticipated dewatering effluent can be disposed of into the Township of Southgate Storm and Sanitary Sewer system during construction, or following site development for any long-term foundation drainage. Based on the results, recommendations for any pre-treatment for any dewatering/drainage effluent can be developed, if required.

The sample analysis was performed by SGS Canada Inc. and the results of the analysis are discussed in **Section 7.4** of the current report with the details are presented in **Appendix D**.

4.6 Review of Regional Data and Available Reports for the Subject Site

The maps, data, and documents provided by the MECP, Ontario Geological Survey (OGS), Ministry of Natural Resource and Forestry (MNRF) and GRCA were reviewed. Additionally, an issued geotechnical report was reviewed at the time of preparation of the current hydrogeological assessment report, with the findings summarized in S**ections 5 and 6**.

5.0 REGIONAL AND LOCAL SITE SETTING

5.1 Regional Geology

The current understanding of the surface geological setting of the Subject Site is based on scientific work conducted by the OGS (OGS, 2003). The Subject Site is located within an area mapped as Till deposits known as Wentworth Till (5b) and Glaciofluvial deposits (7a). The Wentworth Till (5b), consists of predominantly stone-poor, sandy silt to silty sand textured till deposits, where as Glaciofluvial deposits (7a) consists of river deposits and delta topset facies of sandy deposits. **Drawing 3** illustrates the mapped surficial geology for the Subject Site and the surrounding area.

The underlying bedrock at the Subject Site is the Guelph Formation, which consists of sandstone, shale, dolostone and siltstone (OGS, 2007). A review of the MECP Well Record (Well Id: 2504173) indicates that the bedrock was contacted at an approximate elevation of 485.5 metres above sea level (masl) in the vicinity of the Subject Site.

5.2 Regional Physiography

The Subject Site is located within a regional physiography of Southern Ontario known as Dundalk Till Plains. The Dundalk Till Plains in the Subject Site and its vicinity consists of drumlinized till plains. It is a gently rolling, partially drumlinized and fluted surfaces, consisting of a mix of clay, gravel and boulders, covering an area of about 2,395 km^2 in the counties of Dufferin, Grey and Wellington. Elevations within the till plain ranges from 426 masl to 533 masl. The till plain supports extensive wetland complexes, wet meadows, and agricultural land (Chapman and Putnam, 1984). **Drawing 4** shows the location of the Subject Site within the regional physiography map.

5.3 Regional Topography and Drainage

A review of a regional topography map presented on **Drawing 5** indicates that topography of the Subject Site and surrounding area is generally dropping in elevation towards south. The ground surface elevation ranges approximately between 513.1 masl and 510.4 masl; and between 513.5 masl to 511.7 masl based on ground surface elevations measured at the borehole and monitoring wells' locations located within the Subject Site and the Study Area, respectively.

5.4 Watershed Setting

The Subject Site is located within the Rouge River watershed that falls in the Grand River Conservation Authority (GRCA) jurisdiction.

5.5 Local Surface Water and Natural Heritage Features

MNRF database was reviewed for any natural heritage features including, watercourses, bodies of water, wetland features, Area of Natural and Scientific Interest (ANSI) and wooded areas. **Drawing 6** shows the location of the Subject Site and Study Area within the surrounding Natural Heritage Features.

Records review indicate that two (2) watercourses traverse through the Subject Site, both flowing in southerly direction. During the site visits ponded water was noted along the watercourses. Record review also indicates that bodies of water scattered in the surrounding areas of the Subject Site, where the closest water body is located partially within the northern limits of the Subject Site (within the Subject Site). Another closest waterbody is located approximately 80.0 m east of the Subject Site.

Records of wooded areas are scattered within and surrounding areas of the Subject Site. Portions of the Subject Site and Study Area are covered under wooded area. Additionally, records of wetland features evaluated as Provincial as per Ontario Westland Evaluation System (OWES) is located approximately 300.0 m east and southeast of the Subject Site. Additionally, records of wetland features, not evaluated as Provincial as per OWES, are mapped within portions of the Subject Site and Study Area.

5.6 Ground Water Resources (MECP Well Records)

MECP well record database was reviewed for records located within a radius of 500 m from the approximate Site boundary (Study Area). The records indicate that fifty-seven (57) well records are located within the Study Area relative to the Subject Site boundaries. A summary of the final status of the records is presented in **Table 5-1**.

The locations of the well records, based on the UTM coordinates provided by the records, are shown on **Drawing No. 7**. Details of the MECP water well records that were reviewed are provided in **Appendix B**.

Table 5-1- MECP Well Record Summary

Water Use (Final Status)	
Status	**Number of Records**
Water Supply	17
Unknown	16
Abandoned-Other	12
Observation Wells	10
Monitoring and Test Hole	2

The above summary indicates that there are seventeen (17) water supply wells within the 500 m radius of the Subject Site boundary (Record Nos. 1-14, 21, 45 and 50 on **Drawing 7** and **Appendix B**). However, there are no records of water supply wells in the Subject Site.

5.7 Active Permit to Take Water Application Record Review

MECP website was reviewed for any active PTTW application records within 1.0 km radius of the Subject Site on February 10, 2024. Record review indicates there are two (2) record for active PTTW within the Study Area. Details for each record are summarized in **Table 5-2**.

Table 5-2- Active PTTW Record Summary

Item	Permit Holder	Purpose	Maximum L/day	Source Type	Distance from the Subject Site (km)
1	The Corporation of the Township of Southgate	Water Supply	1,180,800	Groundwater	~0.4
2	The Corporation of the Township of Southgate	Water Supply	1,961,280	Groundwater	~0.3

6.0 SOIL LITHOLOGY AND SUBSURFACE INVESTIGATION

The investigation has disclosed that beneath a layer of topsoil, the Subject Site is underlain by a stratum of sandy silt till extending to the maximum termination depth of investigated at 6.6 metres below ground surface (mbgs). Information regarding borehole logs is presented in **Appendix A**. The approximate locations of boreholes are shown on **Drawing 2**. Additionally, a sub-surface profile is presented on **Drawing 8**. Based on a review of the geotechnical investigation report prepared by SEL, the stratigraphy beneath the investigated areas of the Subject Site generally consists of the followings:

6.1 Topsoil (All BHs and BH/MWs)

A layer of topsoil having thickness between 18 and 40 cm was contacted at above mentioned locations. The thickness of topsoil may vary beyond the investigated locations.

6.2 Sandy Silt Till (All BHs and BH/MWs)

Native deposits of sandy silt till were identified at all the above-mentioned locations. The till consists of a random mixture of soils; the particle sizes range from clay to gravel with occasional boulders and cobbles, with either the sand or silt fraction exerting the dominant influence on their properties. The till was noted to be weathered in the upper depths. The materials in this layer are generally brown in color. The till is loose to very dense in relative density. The moisture contents for the retrieved subsoil samples ranges from 4 to 21%, indicating dry to wet conditions. The high moisture content was generally encountered in the shallower depths within the weathered till.

The estimated permeability for the sandy silt till unit encountered at BH/MW 2, BH/MW 8 and BH/MW 9 at depth of 3.3, 3.3 and 2.5 mbgs, respectively is about 10^{-5},10^{-6} and 10^{-6} cm/sec. Grain size analyses was performed on three (3) subsoil samples, and the gradation is plotted in **Appendix A (Figure 12)**.

7.0 LOCAL HYDROGEOLOGICAL STUDY

7.1 Monitoring Well Development and Groundwater Level Monitoring

The groundwater levels in the monitoring wells were measured, manually on November 20, 2023, December 11, 2023 and January 10, 2024 to record the fluctuation of the shallow groundwater table beneath the Subject Site.

Monitoring wells were developed and groundwater levels were monitored over three (3) monitoring events. SEL measured the groundwater levels using an interface probe (Solinst Interface Metre). A summary of the groundwater level observations and their corresponding elevations are provided in **Table 7-1**.

Table 7-1- A Summary of Groundwater Monitoring

MW* ID	Unit	Groundwater Level		
		November 20, 2023	December 11, 2023	January 10, 2024
BH/MW 1**	Mbgs	1.36	0.72	0.40
	Masl	511.69	512.33	**512.65**
BH/MW 2**	Mbgs	0.83	0.22	-0.05*
	Masl	511.48	512.09	512.36
BH/MW 4**	Mbgs	0.83	0.43	0.24
	Masl	510.84	511.24	511.43
BH/MW 6	Mbgs	1.86	0.79	0.35
	Masl	509.58	510.65	511.10
BH/MW 8	Mbgs	1.66	0.63	0.26
	Masl	510.30	511.33	511.70
BH/MW 9	Mbgs	0.56	0.25	0.23
	Masl	510.33	510.64	510.66
BH/MW 11	Mbgs	0.90	0.71	0.59
	Masl	**509.51**	509.70	509.82

Notes:
mbgs metres below ground surface
masl metres above sea level
*- groundwater level measured above ground surface
** Located within Study Area

As shown in **Table 7-1**, the highest shallow stabilized groundwater levels elevations were measured at an El. 512.65 masl at BH/MW 1 location, whereas the lowest shallow groundwater levels elevations were measured at an El. 509.51 masl at BH/MW 11 location.

7.2 Shallow Groundwater Flow Pattern

The shallow groundwater flow pattern was prepared using the highest measured groundwater levels within all the installed monitoring wells. Due to the presence of surface water onsite and absence of

monitoring wells within the flooded area, the groundwater flow pattern for the eastern portion and western portion was interpreted independently. The prepared groundwater flow pattern indicates that the shallow groundwater flows in a southerly direction in both eastern and western portions. **Drawing 9** presents the interpreted shallow groundwater flow pattern.

7.3 Single Well Response Test

All BH/MW underwent a single well response testing (SWRTs) to assess the hydraulic conductivity (K) for saturated shallow aquifer or water bearing unit at the depths of the well screens. The monitoring well was equipped with a digital transducer to record the fluctuation made to complete the SWRT. The results of the SWRT tests are presented in **Appendix C**, with a summary of the findings provided in **Table 7-2**.

Table 7-2- A Summary of Falling Head Hydraulic Conductivity Testing

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Screened Soil Strata	Hydraulic Conductivity (K in m/s)	Test Method
BH/MW 1*	513.05	6.1	3.1-6.1	Sandy Silt Till	7.63×10^{-7}	Falling Head Test
BH/MW 2*	512.31	6.1	3.1-6.1	Sandy Silt Till	4.45×10^{-6}	Falling Head Test
BH/MW 4*	511.67	6.1	3.1-6.1	Sandy Silt Till	1.45×10^{-7}	Falling Head Test
BH/MW 6	511.44	6.1	3.1-6.1	Sandy Silt Till	1.86×10^{-8}	Falling Head Test
BH/MW 8	511.96	6.1	3.1-6.1	Sandy Silt Till	3.45×10^{-8}	Falling Head Test
BH/MW 9	510.89	6.1	3.1-6.1	Sandy Silt Till	8.75×10^{-8}	Falling Head Test
BH/MW 11	510.41	6.1	3.1-6.1	Sandy Silt Till	4.16×10^{-9}	Falling Head Test

Notes:
mbgs metres below ground surface
masl metres above sea level
* Located within Study Area

7.4 Groundwater Quality

One (1) set of groundwater samples was collected for analysis from the monitoring well BH/MW 2 on January 10, 2024 by SEL. The samples were submitted for analysis and evaluation against the Township of Southgate combined Sanitary and Storm Sewer Use By-Law (BL_13_2011) parameters. Upon sampling, all of the bottles were placed in a cooler for shipment to the analytical laboratory. Sample analysis was performed by SGS Canada Inc., which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Results of the analysis are provided in **Appendix D**, with a discussion of the findings provided below. The chain of custody number for the submitted samples that underwent analysis is 038147.

The groundwater samples collected, comprised of unfiltered groundwater. As per the protocols for Township of Southgate sewer use analysis, a complete set of unfiltered groundwater samples were

submitted to the laboratory with the results being presented as totals for various analyzed parameters. The results of analysis for the unfiltered groundwater indicate one (1) exceedance when compared and evaluated against the Township of Southgate combined Sanitary and Storm Sewer Use By-Law parameters.

The exceedances for unfiltered samples, together with the combined Sanitary and Storm Sewer use Standards, are presented in **Table 7-4**.

Table 7-4- Groundwater Quality Exceedance Results (Unfiltered Sample)

Exceeded Parameter	Groundwater Quality Results (Unfiltered Sample) (mg/L)	Township of Southgate Storm Sewer Use Limits (mg/L)	Township of Southgate Combined Sanitary Sewer Use Limits (mg/L)	Detection Limit (mg/L)
Total Suspended Solids (TSS)	**16**	15	300	2

Note: NL-No Limits defined for Sanitary Sewer Use By-Laws

As shown above, the concentration for TSS slightly exceeds the Storm Sewer Use By-Law standards for unfiltered samples. However, the concentration of TSS is below the combined Sanitary Sewer Use By-Law. These results suggest that any short-term construction dewatering, or long-term foundation drainage discharge would not be acceptable for disposal to the Township of Southgate storm sewer without pre-treatment to reduce the concentration of TSS, but should be acceptable for disposal management to the Township of Southgate combined sanitary sewer without any pre-treatment being required.

The final design for any dewatering effluent pre-treatment system is the responsibility of the contractors responsible for construction, or of the water treatment system design specialist, or mechanical engineer, if required, for any long-term foundation drainage system for the completed underground structure.

8.0 DISCHARGE WATER CONTROL

8.1 A review of Proposed Development Plans

The architectural drawings prepared by S&C Architects Inc., dated June 27, 2024, and the Functional Servicing & Grading Plan prepared by Valdor Engineering Inc., dated September 24, 2024 were reviewed for the current assessment. A review of Drawing A-102 and an email received from Briarwood Homes, dated October 31, 2024, indicates that proposed development at the Study Area of the Subject Site (the southern portion) will be completed over four (4) development phases. It is understood the proposed multi-phase development will include the construction of four (4) residential buildings resting on two 1-level underground parking structures adjoined between buildings A and C, and B and D, respectively. Additionally, the proposed development will consist of underground services. Design details regarding the underground services were not available for review at the time of preparing this report. As such, dewatering flow rates were not estimated.

A review of the Parking Plan (drawing number A-102) indicates that combined footprint of the proposed underground parking structure that will be completed over phases has a total area of 15,022.46 m^2. As such, since the area of the 1-level underground parking has the same dimensions for each of the four (4) development phases, an area of approximately 3,756.0 m^2 was considered for each proposed development phase.

Based on the ground surface elevations of the boreholes drilled at the Subject Site, grading elevation is considered at El. 512.3 masl, 511.7 masl, 513.0 masl, and 513.0 masl for phases 1, 2, 3, and 4, respectively.

The Functional Servicing & Grading Plan indicates that the FFE of the proposed underground parking is set at El. 510.25 masl, which is approximately 1.45 to 2.75 m below the existing ground elevation, depending on the development phase. Reviewed set of drawings are partially presented in **Appendix E**.

8.2 A review of Geotechnical Investigation Report

A review of the Geotechnical Investigation report prepared by SEL Ltd. dated December 2024 indicates that:

- The topsoil must be stripped prior to construction. The topsoil can only be reused in landscaped areas and any surplus must be removed off site. The area around the proposed development must be graded and properly prepared prior to the construction of a crane pad. The crane pad must be properly designed to ensure stability.
- Close monitoring of vertical and lateral movement of the shoring wall should be carried out where shoring is considered for the building construction. Additionally, frequent site inspections

be conducted, to ensure that the excavation does not adversely affect the structural stability of the adjacent structures.

- The proposed buildings can be supported by conventional spread and strip footings founded on engineered fill or sound native soils below the frost penetration depth.
- Excavation must comply with Ontario Regulation 213/91 (Construction Projects) under the Occupational Health and Safety Act.

8.3 Construction Dewatering Requirements

A review of the architectural drawings prepared by S&C Architects Inc., dated June 27, 2024, and the Functional Servicing & Grading Plan prepared by Valdor Engineering Inc., dated September 24, 2024, indicates that the proposed development will consist of four (4) residential buildings (buildings A, B, C, and D), with a 1-level underground parking and underground services. Buildings A and C will share an adjoined 1-level underground parking, while buildings B and D will share their own adjoined 1-level underground parking. Additionally, the proposed development will consist of underground services. At the time of preparing this report, design details regarding the underground services were not available for review. As such, dewatering flow rates were not estimated.

As per an email received from Briarwood Homes, it is understood the development will be constructed in four (4) phases, in alphabetical sequence from building A to building D, phase 1 being building A and phase 4 being building D. The Functional Servicing & Grading Plan indicates that the Finished Floor Elevation (FFE) of the underground parking is set at El. 510.25 meters above seas level (masl). The base of bulk excavation is considered at El. 509.75 (0.5 m below the proposed lowest FFE) for excavation and construction of the proposed 1-level underground parking structure, for each of the four (4) phases.

Additionally, the deepest base of footing as recommended by geotechnical engineer is assumed 1.25 m below lowest FFE at El. 509.0 masl. Proposed base of the elevator pit is not available for review at the time of preparation of the current report. As such, it is assumed to be constructed approximately 1.5 m below the FFE of the proposed underground parking level 1 at El. 508.75 masl.

As a conservative approach, the highest known groundwater level from the monitoring wells located near each development phase, recorded at 512.36 masl (BH/MW 2), 511.43 masl (BH/MW 4), 512.65 masl (BH/MW 1), and 512.65 masl (BH/MW 1) for phases 1, 2, 3, and 4, respectively were considered for the current assessment. The highest groundwater level at phases 1, 2, 3, and 4 is 2.61 m and 3.61 m, 1.68 m and 2.68 m, 2.90 m and 3.90 m, and 2.90 m and 3.90 m above the base of excavation and base of the elevator pit, respectively. As such, groundwater seepage is anticipated during excavation and construction of each development phase.

Shoring design is not available for review at the time of preparation of the current report. As such, permeable shoring was assumed for the current assessment. However, shared excavation walls for the

previously developed phase, were considered impermeable when estimating the groundwater seepage flows for short-term dewatering. The assumptions considered for the dewatering flow rate calculations are summarized in **Table 8-1**.

Table 8-1- Summary of Proposed and Assumptions for Construction of the Underground Structure

Proposed Development	Approximate Underground Parking Dimensions (m)	Proposed FFE (masl)	Assumed Base of Excavation (masl)	Assumed Footing El. (masl)	Shallow Groundwater Level (masl)	Assumed Shoring System
Phase 1 (Building A) - 1-Level Underground Parking	111.8 x 33.6	510.25	509.75	509.0	512.30	Permeable Shoring
Phase 2 (Building B) – 1-Level Underground Parking	111.8 x 33.6	510.25	509.75	509.0	511.43	Permeable Shoring and a Side Wall of Developed Phase 1
Phase 3 (Building C) – 1-Level Underground Parking	111.8 x 33.6	510.25	509.75	509.0	512.65	Permeable Shoring and Side Walls of Developed Phase 1
Phase 4 (Building D) – 1-Level Underground Parking	111.8 x 33.6	510.25	509.75	509.0	512.65	Permeable and Side Walls of Developed Phases 2 and 3

Notes:
mbgs metres below ground surface
masl metres above sea level

Hydraulic conductivity of 7.90 x 10^{-7} m/sec (geomean of in-situ hydraulic conductivity testing BH/MWs 1, 2, and 4) were considered for sandy silt till.

The anticipated groundwater flow rates for short-term dewatering and long-term foundation drainage were estimated using a numerical analysis. Slide 9.025, released October 17, 2022, developed by Rocscience Inc. was used to compute the anticipated flow rates utilizing the Finite Element Modelling (FEM) method. The estimated groundwater flow rates along with reviewed plans (selected drawings) are presented in **Appendix E**.

Anticipated water through storm events should also be considered to estimate short-term dewatering flow rates. Considering the location of the Subject Site IDF curve provided by the Ministry of Transportation (MTO) was reviewed to estimate the anticipated flow during storm event. 32.12 mm storm event (2-year events for a duration of 3 hours) was considered for the current assessment with a summary presented in **Table 8-2**.

Table 8-2-Summary of Anticipated Short-Term Dewatering Flow Rates

Proposed Development	Groundwater Seepage (L/day)	Groundwater Seepage -S.F.* 1.5 (L/day)	Anticipated Flow over Storm Event (L/day)	Total Dewatering Flow Rates-S.F.* 1.5 (L/day)
Phase 1 (Building A) - 1-Level Underground Parking	71,500.0	107,250.0	120,700.0	227,950.0
Phase 2 (Building B) – 1-Level Underground Parking	49,000.0	73,500.0	120,700.0	194,200.0
Phase 3 (Building C) – 1-Level Underground Parking	59,700.0	89,550.0	120,700.0	210,250.0
Phase 4 (Building D) – 1-Level Underground Parking	58,200.0	87,300.0	120,700.0	208,000.0
Total	**238,400.0**	**357,600.0**	**482,800.0**	**840,400.0**

*S. F: Safety Factor

Additionally, storm water flow considering 100-year storm event for a duration of 12 hours was considered to estimate the maximum storm water that can be collected during the excavation and construction period. The maximum additional flow that can be expected in the occurrence of a 100-year could reach up to approximately 405,700.0 L/day during construction of each development phase.

The above estimated short-term dewatering flow rates, does not consider the potential impact of the drainage system for the previously developed phases.

8.4 Long-Term Foundation Drainage

Groundwater seepage and infiltration flow due to storm event should be collected for the post-construction underground parking structure. As such, a foundation drainage system should be designed to collect the anticipated flow. Proposed FFE for the underground parking level 1, and base of the drainage layer were considered at El. 510.25 and 509.75 masl, respectively, for each development phase. The highest groundwater levels were considered at 512.36 masl, 511.43 masl, 512.65 masl, and 512.65 masl for Phases 1, 2, 3, and 4, respectively.

Anticipated flow considering 32.12 mm storm event (2-year events for a duration of 3 hours) was considered to estimate the total anticipated long-term foundation drainage flow rate. Summary of the estimated flow rates is presented in **Table 8-3**.

Table 8-3- Summary of Anticipated Long-Term Foundation Drainage Flow Rates

Proposed Development	Groundwater Seepage (L/day)	Groundwater Seepage -S.F.* 1.5 (L/day)	Anticipated Flow through Infiltration (L/day)	Total Foundation Drainage Flow Rates-S.F.* 1.5 (L/day)
Phase 1 (Building A) - 1-Level Underground Parking	43,300.0	64,950.0	3,900.0	68,850.0

Proposed Development	Groundwater Seepage (L/day)	Groundwater Seepage -S.F.* 1.5 (L/day)	Anticipated Flow through Infiltration (L/day)	Total Foundation Drainage Flow Rates-S.F.* 1.5 (L/day)
Phase 2 (Building B) – 1-Level Underground Parking	28,100.0	42,150.0	3,900.0	46,050.0
Phase 3 (Building C) – 1-Level Underground Parking	39,500.0	59,250.0	3,900.0	63,150.0
Phase 4 (Building D) – 1-Level Underground Parking	42,800.0	64,200.0	3,900.0	68,100.0
Total	**153,700.0**	**230,550.0**	**15,600.0**	**246,150.0**

*S. F: Safety Factor

The above estimated flow rate does not include potential long-term flow for elevator pit, sump pit or any other localized structures that may extend below the drainage layer, assuming the above noted structures will be waterproofed for post-development structure.

As previously mentioned, the proposed excavation and construction will be completed over 4 development phases. Each shared wall for the proposed phases 1 to 4 is excluded from the anticipated seepage calculation through infiltration to estimate long-term foundation drainage flow rate. However, since SEL is not aware of the timeline for each construction phase, additional flow from infiltration source is expected from the proposed shared walls that will be constructed later.

8.5 Permit Requirements

- *Short-Term Construction Dewatering:* Water takings of more than 50,000 L/day but less than 400,000 L/day is to be registered on EASR, while water takings of more than 400,000 L/day require a PTTW issued by the MECP. If it is identified that an EASR or PTTW is required for the Subject Site, a hydrogeological assessment report will need to be submitted in support of the application. The estimated short-term construction dewatering flow rate for construction of the proposed underground parking for phases 1, 2, 3, and 4 reach 227,950.0L/day, 194,200.0 L/day, 210,250.0 L/day, and 208,000.0 L/day, respectively. However, as per the MECP's document titled *"Streamlining Permissions for Low-Risk Short-Term Water Taking Activities"* dated June 2021, if the groundwater seepage is between 50,000 L/day and 400,000 L/day, the water taking limit only applies to groundwater. As such, since the groundwater seepage for the proposed phases 1-4 developments reach 107,250.0 L/day, 73,500.0 L/day, 89,550.0 L/day, and 87,300.0 L/day which is above the MECP EASR threshold limit of 50,000 L/day. As such, filing an EASR with the MECP is required for each of the four (4) development phases, assuming each phase will be constructed separately. Additionally, obtaining discharge agreement from the Township of Southgate is required if short-term dewatering effluent is proposed to be conveyed to the Town's sewer system.

- *Long-Term Foundation Drainage:* If the estimated long-term foundation drainage flow from groundwater source exceeds MECP PTTW threshold limit of 50,000 L/day, applying for PTTW with MECP is required. The estimated long-term foundation drainage flow rate from groundwater source reaches 64,950.0 L/day, 42,150.0 L/day, 59,250.0 L/Day, and 64,200.0 L/day for the proposed phase 1, 2, 3, and 4 developments, respectively. As such, filing PTTW with MECP is required for the phase 1, 3, and 4 developments. Additionally, obtaining discharge agreement from the Township of Southgate is required if long-term foundation drainage effluent is proposed to be conveyed to the Town's sewer system.

8.6 Zone of Influence (ZOI) Groundwater

The conceptual Zone of Influence (ZOI) for dewatering, also known as Radius of Influence (R_0), was calculated based on the anticipated maximum drawdown required and the highest hydraulic conductivity recorded at the Subject Site using Sichardt's relationship.

Equation: $R_0 = 3000*dH*K^{0.5}$

Where R_0: Zone of Influence for dewatering
dH: the drawdown (m) (4.61 m, 3.68 m, 4.90 m, and 4.90 m for phase 1-4, respectively)
K: the hydraulic conductivity (m/s) (7.9×10^7 msec)

Using the above equation, the conceptual ZOI could reach to 12.3 m, 9.8 m, 13.1 m, and 13.1 m away from the excavation and dewatering area of phases 1, 2, 3, and 4, respectively.

8.7 Potential Dewatering Impacts and Mitigation Plan

8.7.1 Short-Term Discharge Water Quality

The dewatering system must be appropriately filtered in order to prevent the pumping of fines and loss of ground during the dewatering activities.

A review of the groundwater quality test results suggests groundwater quality slightly exceeds for TSS compared to the Township of Southgate Storm Sewer Use By-Law standards for unfiltered samples. However, the concentration of TSS is below the Sanitary and Combined Sewer Use By-Law. These results suggest that any short-term construction dewatering, or long-term foundation drainage discharge would not be acceptable for disposal to the Township of Southgate storm sewer without pre-treatment to reduce the concentration of TSS, but should be acceptable for disposal management to the Township of Southgate combined sanitary sewer without any significant pre-treatment being required.

The final design for any temporary construction dewatering or long-term effluent pre-treatment system is the responsibility of contractors responsible for construction, or the water treatment system design specialists, if required.

8.7.2 Ground Settlement

The conceptual ZOI for dewatering reaches 12.3 m, 9.8 m, 13.1 m, and 13.1 m away from the dewatering areas for the construction of development phases 1-4, respectively. There are no existing buildings and roads located within a conceptual ZOI for construction. However, since the proposed development will be constructed over 4 phases, the previously constructed building will be located partially within the conceptual ZoI for the next phase, that should be considered for excavation and construction of each development phase. **Drawing 10** presents the conceptual ZoI and the proposed buildings footprint.

8.7.3 Surface Water, Wetlands and Areas of Natural Significance

Based on the findings of the dewatering assessment, proposed excavation and construction will be completed below the shallow groundwater table of the Study Area of the Subject Site. Hence, short-term construction dewatering is anticipated for the proposed development. Record review indicates that a wetland and wooded area were identified on the Subject Site and the Study Area, and within the conceptual ZOI. As such, impacts to natural heritage features are anticipated pertaining the proposed development. A review of the proposed development plan indicates that the footprint of the proposed buildings A and B will extend into the existing wetland and the wooded lot. As such, it is understood the existing natural features will be partially removed. A monitoring and mitigation plan should be proposed to prevent potential impacts to the nearby natural features during construction. The extent of the ZOI for each proposed phase is presented on **Drawing 10**.

8.7.4 Water Supply Wells and Zone of Influence

A review of the MECP well records confirmed that there are seventeen (17) records for water supply wells that are registered within 500 m of the Subject Site. However, they are not located within the conceptual ZOI for dewatering. As such, potential impacts to the groundwater users are not anticipated.

Given that the Subject Site is located within Grand River Well Head Protections area ‘B’, ‘C’ and ‘D’ with the score varying between 2 and 6. As such, Source Water Impact Assessment and Mitigation Plan (SWIAMP) will be required for the Subject Site. SEL will provide SWIAMP letter under separate cover when the necessary details are provided.

9.0 CONCLUSIONS AND RECOMMENDATIONS

- The Subject Site is located within an area mapped as Till deposits known as Wentworth Till (5b) and Glaciofluvial deposits (7a). The Wentworth Till, consists of predominantly stone-poor, sandy silt to silty sand textured till deposits, whereas Glaciofluvial deposits consists of river deposits and delta topset facies of sandy deposits.
- The Subject Site is located within a regional physiography of Southern Ontario known as Dundalk Till Plains, consisting of drumlinized till plains
- The Subject Site is located within the Grand River Conservation Authority (GRCA) jurisdictions.
- The highest shallow stabilized groundwater levels elevations were measured at an El. 512.65 masl at BH/MW 1 location, whereas the lowest shallow stabilized groundwater level elevation was measured at an El. 509.51 masl at BH/MW 11 location.

  Hydraulic conductivity of 7.90 x 10^{-7} m/sec (geomean of in-situ hydraulic conductivity testing BH/MWs 1, 2, and 4 installed within the Study Area) were considered for sandy silt till.
- Results of Groundwater quality at a selected monitoring well (BH/MW 2) indicates that the concentration for TSS slightly exceeds the Township of Southgate Storm Sewer Use By-Law standards for unfiltered samples. However, it meets the Township of Southgate Sanitary and Combined Sewer Use By-Law.
- The assumed bulk excavation elevation for the proposed 1-level underground parking is below the highest recorded groundwater level elevation within the footprints of the proposed Buildings. Hence, groundwater seepage is anticipated in the open excavation for excavation and construction of the proposed basement structure and footing installation. Total anticipated flow rate including flow from groundwater source with a safety factor of 1.5 and storm event will reach to total flow rates of 227,950.0L/day, 194,200.0 L/day, 210,250.0 L/day, and 208,000.0 L/day for phases 1, 2, 3, and 4 development, respectively, considering a safety factor of 1.5, and 32.12-mm rain fall storm event.
- The estimated short-term construction dewatering flow rates are above EASR threshold 50,000 L/day for each of the four (4) development phases. As such, filing EASR with the MECP is required for each of the four (4) development phases, assuming each phase will be constructed separately.
- The estimated long-term foundation drainage flow rate from groundwater source reaches 64,950.0 L/day, 42,150.0 L/day, 59,250.0 L/Day, and 64,200.0 L/day for the proposed phase 1, 2, 3, and 4 developments, respectively, considering a safety factor for 1.5.

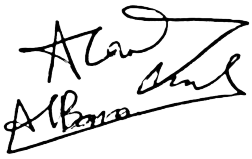
- The estimated long-term foundation drainage flow from the groundwater source exceeds the PTTW threshold of 50,000 L/day for development phases 1, 3, and 4. As such, filing PTTW with MECP is required for the phase 1, 3, and 4 developments.
- The conceptual ZOI for dewatering reaches 1112.3 m, 9.8 m, 13.1 m, and 13.1 m away from the dewatering areas for the construction of development phases 1-4, respectively. Potential impacts are as follows:
    - There are no existing buildings and roads located within a conceptual ZOI for construction. However, since the proposed development will be constructed over 4 phases, the previously constructed building will be located partially within the conceptual ZoI for the next phase, that should be considered for excavation and construction of each development phase.
    - Based on the findings of the dewatering assessment, proposed excavation and construction will be completed below the shallow groundwater table of the Subject Site and the Study Area. Hence, short-term construction dewatering is anticipated for the proposed development. Record review indicates that a wetland and wooded area were identified on the Subject Site and Study Area, and within the conceptual ZOI. As such, impacts to natural heritage features are anticipated pertaining the proposed development. A review of the proposed development plan indicates that the footprint of the proposed buildings A and B will extend into the existing wetland and the wooded lot. As such, it is understood the existing natural features will be partially removed. A monitoring and mitigation plan should be proposed to prevent potential impacts to the nearby natural features during construction.
    - A review of the MECP well records confirmed that there are seventeen (17) records for water supply wells that are registered within 500 m of the Subject Site. However, they are not located within the conceptual ZOI for dewatering. As such, potential impacts to the groundwater users are not anticipated.
    - Source Water Impact Assessment and Mitigation Plan (SWIAMP) will be required for the Subject Site, considering location of the Subject Site within Grand River Well Head Protections area ‘B’, ‘C’ and ‘D’ with the score varying between 2 and 6.

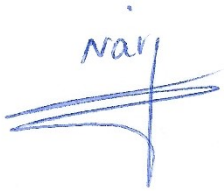
10.0 CLOSURE

We trust that the above-noted information is suitable for your review. If you have any questions regarding this information, please do not hesitate to contact the undersigned.

Yours truly,

SOIL ENGINEERS LTD.





For

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Project Manager -Hydrogeological Services

Narjes Alijani, M.Sc., P.Geo.
Department Manager-Hydrogeological Services

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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

DRAWINGS 1-10

REFERNCE NO. 2310-W058

548900

4890400

4889700

MAIN STREET WEST
VICTORIA STREET WEST
GOLD STREET
YOUNG STREET
HAGAN STREET WEST
HANBURY STREET
IDA STREET
EGO PARKWAY

D:\Projects\2310-W058\

N

References: Ontario Ministry of Natural Resources and Forestry
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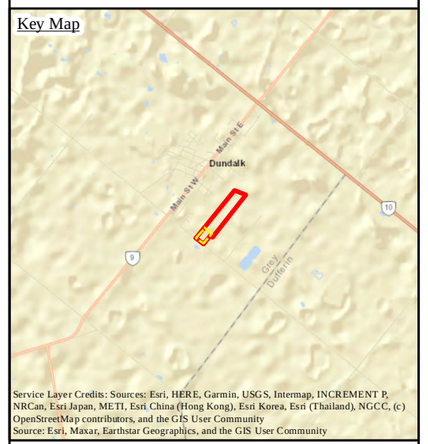
Key Map



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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Approximate Boundary Of Subject Site
- Study Area
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse

Soil Engineers Ltd.

Site Location Plan

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:

0 20 40 80 120 160 200
Metres

Drawing No. 1

548400 548800 549200

4890400 4890000 4889600

MAIN STREET WEST
NIXON STREET
YOUNG STREET
GOLD STREET
VICTORIA STREET WEST
HAGAN STREET WEST
HANBURY STREET
IDA STREET
EGO PARK WAY

BH/MW 8
BH 7
BH 10
BH/MW 6
BH 5
BH/MW 9
BH/MW 11
BH/MW 2
BH/MW 1
BH/MW 4
BH 3

N

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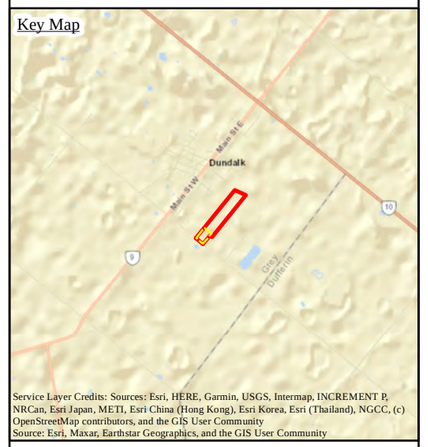
Key Map



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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Approximate Boundary Of Subject Site
- Study Area
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse
- Borehole
- Borehole With Monitoring Well

Soil Engineers Ltd.

Borehole and Monitoring Well Location Plan

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:

0 20 40 80 120 160 200
Metres

Drawing No. 2

D:\Projects\2310-W058\

548200
548900
549600
4890400
4889700
4889000

DUNDALK STREET
ROWES LANE
ELM STREET
GLENELG STREET
YOUNG STREET
MAIN STREET WEST
VICTORIA STREET WEST
GOLD STREET
HAGAN STREET WEST
HANBURY STREET
GREY ROAD 9
IDA STREET
ECO PARK WAY

5b
7a

N

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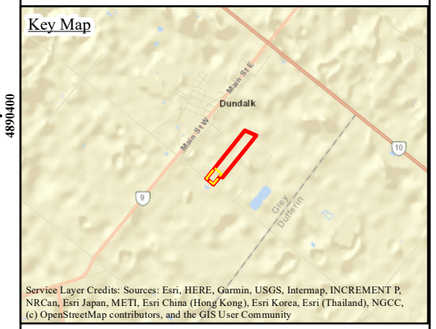
Key Map



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Legend

- Approximate Boundary of Subject Site
- Study Area
- Railway
- Major Road
- Local Road
- 5b: Till; consisting of diamicton
- 7a: Glacial-outwash Sand; consisting of sand gravel: proglacial outwash

Soil Engineers Ltd.

Surface Geology Map

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:

0 80 160 240 320 400
Metres

Drawing No. 3

Source: Ontario Geological Survey, 1997, Miscellaneous Release---Data 0014

D:\Projects\2310-W058\

548200
548900
549600
4890400
4889700
4889000

DUNDALK STREET
ROWES LANE
ELM STREET
MOODY STREET
GLENELG STREET
YOUNG STREET
GOLD STREET
HAGAN STREET WEST
MAIN STREET WEST
VICTORIA STREET WEST
HANBURY STREET
GREY ROAD 9
IDA STREET
ECO PARK WAY

Dundalk Till Plain

Till Plains (Drumlinized)

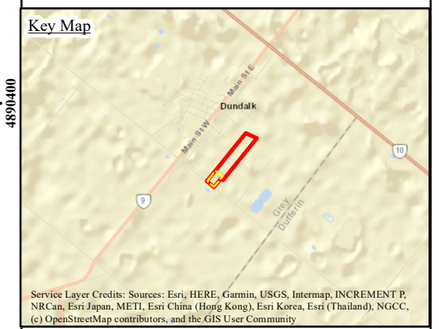
Drumlins

Source: Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 228 ISBN 978-1-4249-5158-1

D:\Projects\2310-W058\

N

Key Map



Legend

- Approximate Boundary of Subject Site
- Study Area
- Major Road
- Local Road
- Railway
- Region Boundary
- Till Plains (Drumlinized)
- Drumlins

Soil Engineers Ltd.

Physiographic Map

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:
0 40 80 160 240 320 400
Metres

Drawing No. 4

548200 548900 549600

4890400 4890400

4889700 4889700

4889000 4889000

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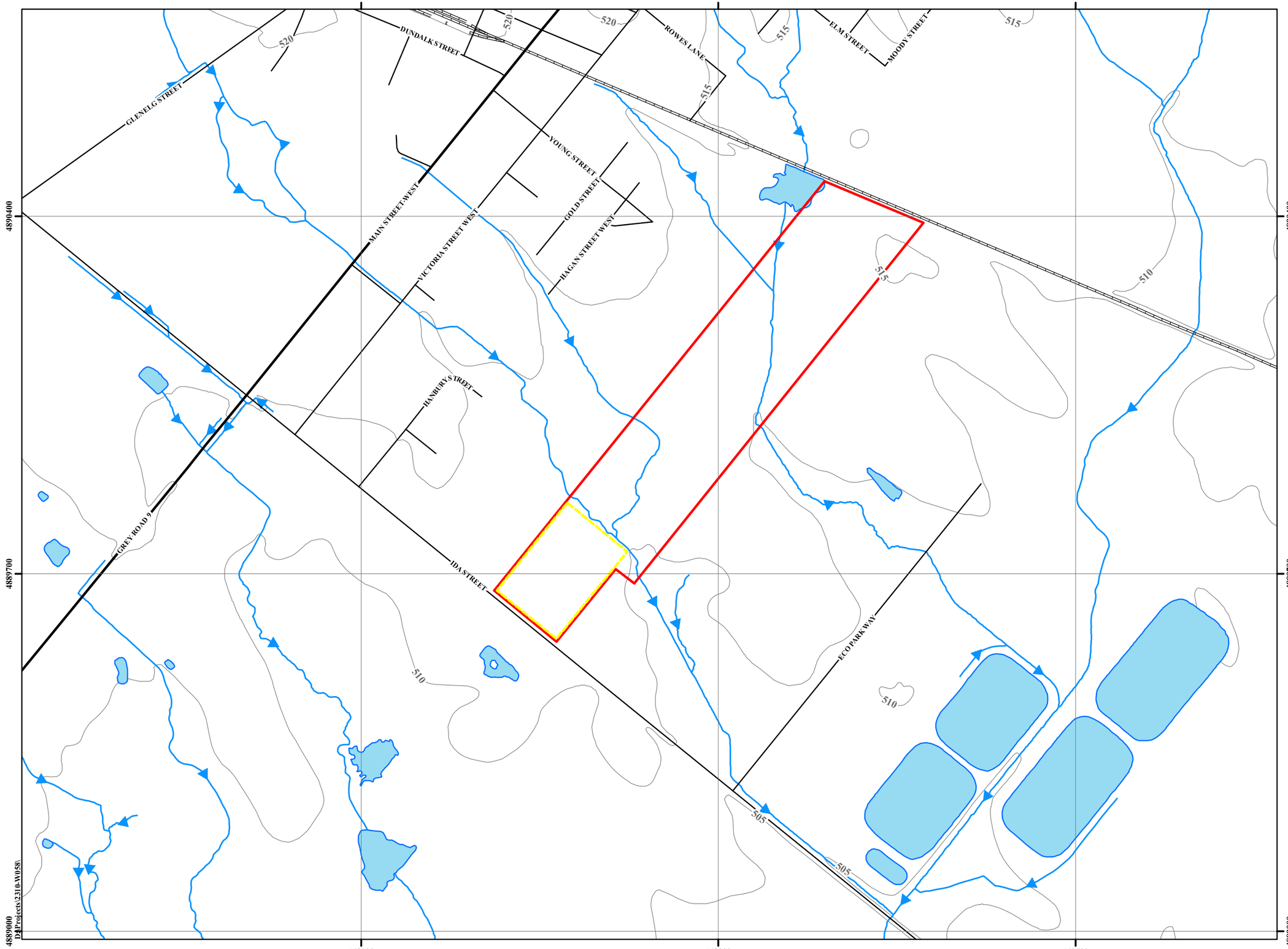

N

References: Ontario Ministry of Natural Resources and Forestry
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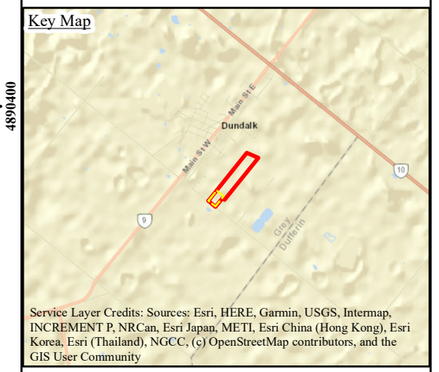
Key Map



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Legend

- Approximately Boundary of Subject Site
- Study Area
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse
- Ontario - 5 m

Soil Engineers Ltd.

Topographic Map

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:

0 40 80 160 240 320 400
Metres

Drawing No. 5

548200
548900
549600
4890400
4889700
4889000

DUNDALK STREET
ROWES LANE
ELM STREET
GLENELG STREET
YOUNG STREET
MAIN STREET WEST
VICTORIA STREET WEST
GOLD STREET
HAGAN STREET WEST
HANBURY STREET
GREY ROAD 9
IDA STREET
ECO PARK WAY

N

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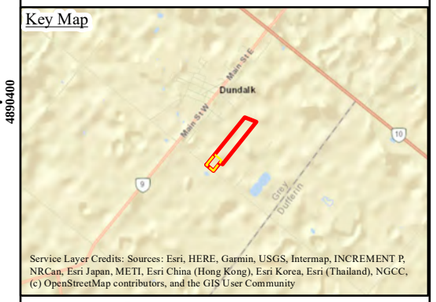
Key Map



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Legend

- Approximate Boundary of Subject Site
- Study Area
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse
- Wooded Area *Wooded Area*
- Wetland (classified as Provincial)
- Wetland (Not evaluated per OWES)

Soil Engineers Ltd.

Natural Features and Protection Area Plan

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:
0 80 160 240 320 400
Metres

Drawing No. 6

D:\Projects\2310-W058\

547500 548200 548900 549600

4890400 4889700 4889000

DOYLE STREET
ARTEMESIA STREET NORTH
OSPREY STREET NORTH
OWEN SOUND STREET
PROTON STREET NORTH
MAIN STREET EAST
VICTORIA STREET EAST
WERRY AVENUE
HAGAN STREET EAST
ELM STREET
VANDUSEN AVENUE
MOODY STREET
RUSSELL STREET
GREY STREET WEST
DUNDALK STREET
TORONTO STREET
GLENELG STREET
ROWES LANE
KEPPEL STREET
YOUNG STREET
NIXON STREET
MAIN STREET WEST
HAGAN STREET WEST
MCAULEY STREET
VICTORIA STREET WEST
HANBURY STREET
GREY ROAD 9
IDA STREET
ECO PARK WAY

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57

N

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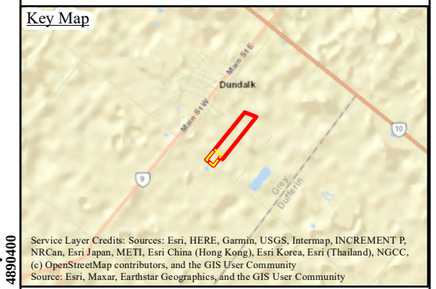
Key Map



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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Approximate Boundary of Subject Site
- Study Area
- 500 Metres From Subject Site Boundary
- Railway
- Major Road
- Local Road
- Waterbody
- Watercourse
- Unknown (7)
- Abandoned-Other (17)
- Monitoring and Test Hole (2)
- Observation Wells (14)
- Water Supply (17)

Soil Engineers Ltd.

MECP Well Location Plan

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:

0 45 90 180 270 360 450
Metres

Drawing No. 7

D:\Projects\2310-W058\

548400
548800
549200
4890400
4890000
4889600

MAIN STREET WEST
NIXON STREET
YOUNG STREET
GOLD STREET
HAGAN STREET WEST
VICTORIA STREET WEST
MCAULEY STREET
HANBURY STREET
MORROW CIRCLE
IDA STREET
ECO PARK WAY

BH/MW 8
(511.70)
BH/MW 6
(511.10)
BH/MW 9
(510.66)
BH/MW 11
(509.82)
BH/MW 2
(512.36)
BH/MW 1
(512.65)
BH/MW 4
(511.43)

511.6
511.4
511.2
511
510.8
510.6
510.4
510.2
510
512.6
512.4
512.2
512
511.8
501.6

515
510

N

References: Ontario Ministry of Natural Resources and Forestry
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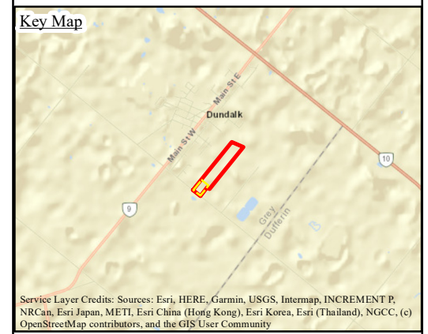
Key Map



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Legend

- Approximate Boundary of Subject Site
- Study Area
- Borehole With Monitoring Well
- Waterbody
- Watercourse
- Railway
- Major Road
- Local Road
- Highest Interpreted Shallow Groundwater
- Highest Inferred Shallow Groundwater Elevation Contour
- Highest Interpreted Shallow Groundwater
- (512.65) Highest Shallow Groundwater Level Measured on January 10, 2024

Soil Engineers Ltd.

Shallow Groundwater Flow Pattern Plan

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:

0 20 40 80 120 160 200
Metres

Drawing No. 9

D:\Projects\2310-W058\

548000 549000 550000

4891000 4890000 4889000

ARTEMESIA STREET NORTH
OWEN SOUND STREET
PROTON STREET NORTH
MAIN STREET EAST
VICTORIA STREET EAST
ROWES LANE
WERRY AVENUE
VANDUSEN AVENUE
RUSSELL STREET
HAGAN STREET EAST
ELM STREET
MOODY STREET
GREY STREET WEST
DUNDALK STREET
GLENELG STREET
YOUNG STREET
MAIN STREET WEST
VICTORIA STREET WEST
HAGAN STREET WEST
HANBURY STREET
GREY ROAD 9
IDA STREET
EGO PARKWAY

1 2 3 4 5 6 7 8 9 10 11 12 13 14 18 45 50

D:\Projects\2310-W058\

N

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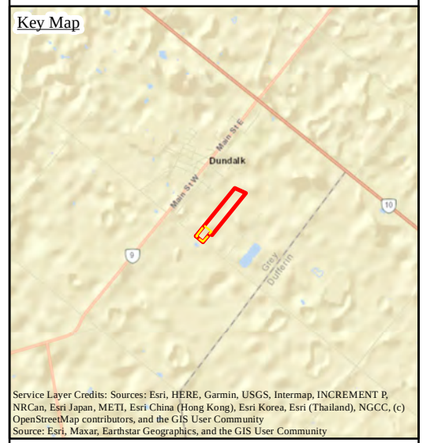
Key Map



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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Approximate Boundary Of Subject Site
- Zone of Influence
- Study Area
- Wooded Area *Wooded Area*
- Wetland (classified as Provincial)
- Wetland (Not evaluated per OWES)
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse
- Water Supply Well

Soil Engineers Ltd.

Zone of Influence Plan

Hydrogeological Assessment
Proposed Residential Developments
CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street
Township Of Southgate (Dundalk)

Reference No. 2310-W058

Date: January 20, 2025

Scale:
0 45 90 180 270 360 450
Metres

Drawing No. 10

Soil Engineers Ltd.
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GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE

SUBSURFACE PROFILE
CROSS SECTION
DRAWING NO. 8
SCALE: AS SHOWN

JOB NO.: 2310-W058

REPORT DATE: January 2024

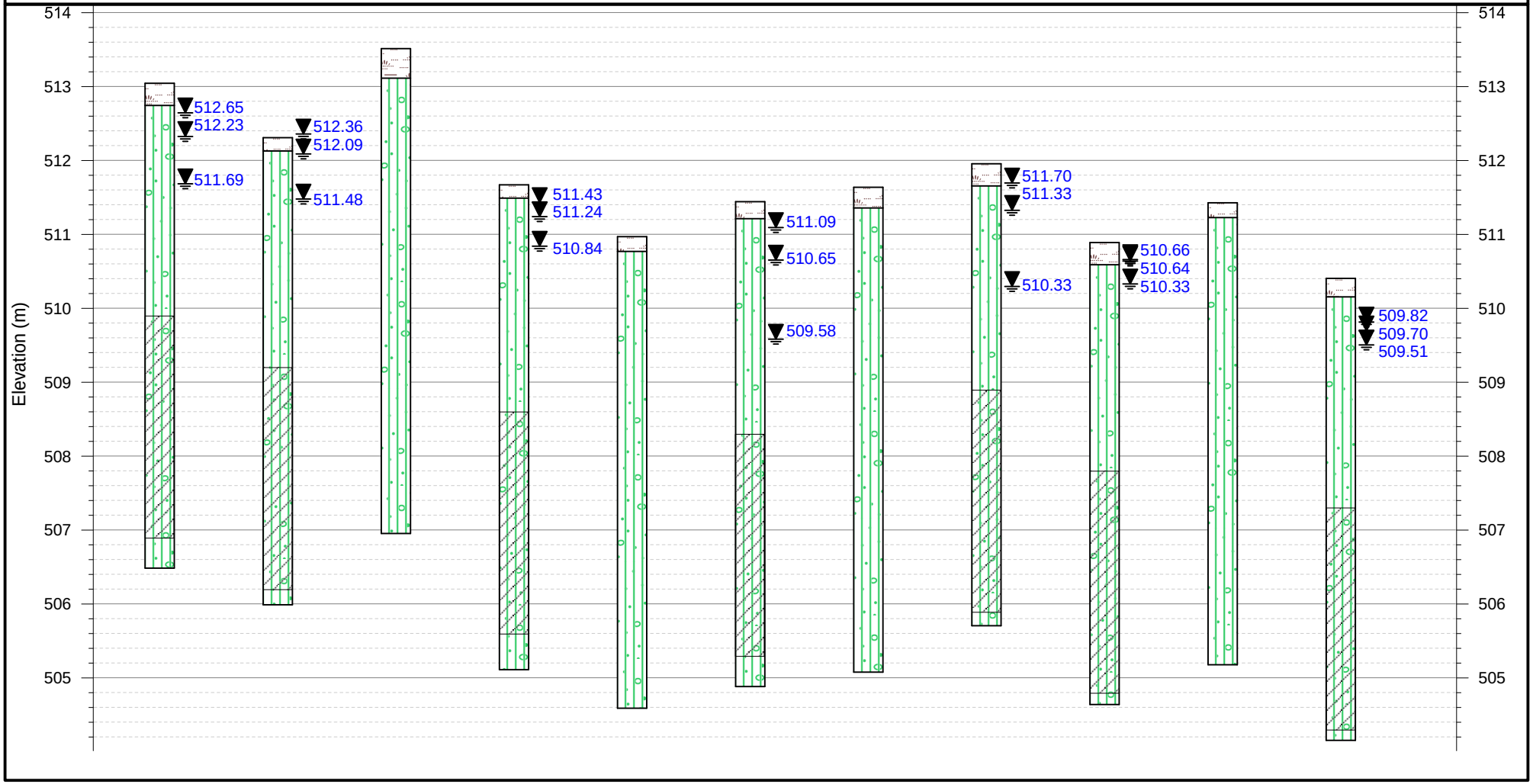
PROJECT DESCRIPTION: Proposed Residential Development

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

LEGEND

SANDY SILT TILL | TOPSOIL | SCREEN

WATER LEVEL (STABILIZED) ▼



Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX 'A'

BOREHOLE AND MONITORING WELL LOGS AND GRAIN SIZE DISTRIBUTION GRAPHS

REFERNCE NO. 2310-W058

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

SAMPLE TYPES

AS Auger sample
CS Chunk sample
DO Drive open (split spoon)
DS Denison type sample
FS Foil sample
RC Rock core (with size and percentage recovery)
ST Slotted tube
TO Thin-walled, open
TP Thin-walled, piston
WS Wash sample

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows for each foot of penetration of a 2-inch diameter, 90° point cone driven by a 140-pound hammer falling 30 inches.

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

The number of blows of a 140-pound hammer falling 30 inches required to advance a 2-inch O.D. drive open sampler one foot into undisturbed soil.

Plotted as '○'

WH Sampler advanced by static weight
PH Sampler advanced by hydraulic pressure
PM Sampler advanced by manual pressure
NP No penetration

SOIL DESCRIPTION

Cohesionless Soils:

'N' (blows/ft)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

Cohesive Soils:

Undrained Shear Strength (ksf)	'N' (blows/ft)	Consistency
less than 0.25	0 to 2	very soft
0.25 to 0.50	2 to 4	soft
0.50 to 1.0	4 to 8	firm
1.0 to 2.0	8 to 16	stiff
2.0 to 4.0	16 to 32	very stiff
over 4.0	over 32	hard

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0 Field vane test in borehole; the number denotes the sensitivity to remoulding

△ Laboratory vane test

☐ Compression test in laboratory

For a saturated cohesive soil, the undrained shear strength is taken as one half of the undrained compressive strength

METRIC CONVERSION FACTORS

1 ft = 0.3048 metres
1lb = 0.454 kg
1 inch = 25.4 mm
1ksf = 47.88 kPa

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH/MW 1

FIGURE NO.: 1

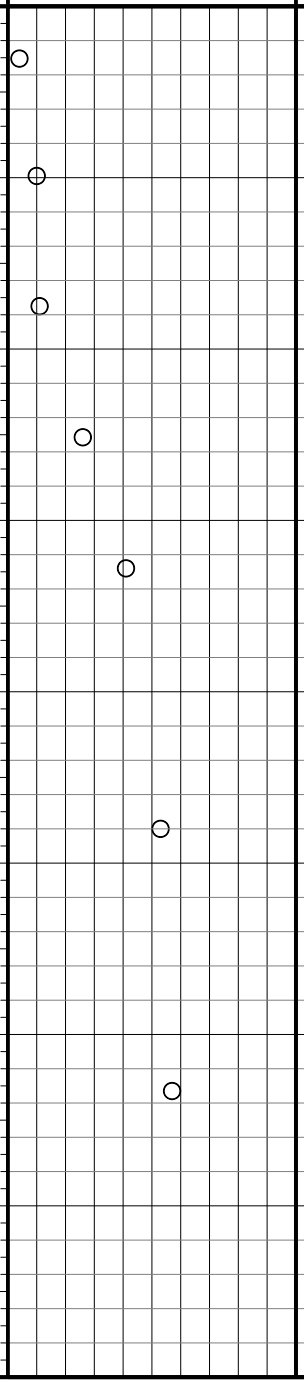
PROJECT DESCRIPTION: Proposed Residential Development

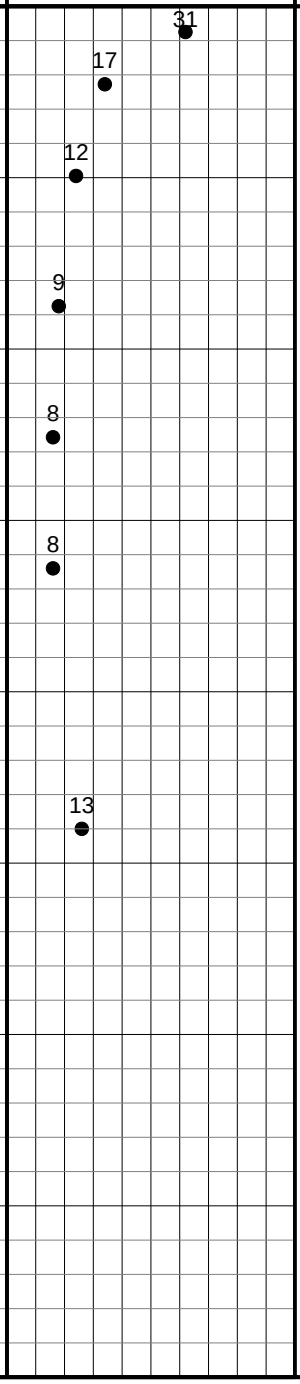
METHOD OF BORING: Hollow Stem Auger

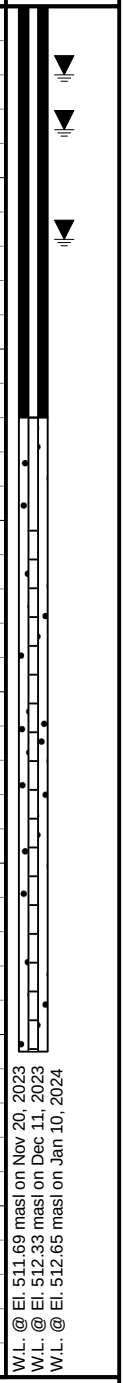
PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 30, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
513.0	Ground Surface				
0.0	**30 cm TOPSOIL**	1A	DO	4	0
0.3	Brown, loose to very dense	1B			
		2	DO	10	1
	weathered				
		3	DO	11	2
	SANDY SILT TILL				
		4	DO	26	3
	traces to some clay and gravel occ. cobbles and boulders	5	DO	41	
		6	DO	53	4
		7	DO	57	5
506.4					6
6.6	**END OF BOREHOLE**				7
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				8







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JOB NO.: 2310-W058

LOG OF BOREHOLE: BH/MW 2

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 30, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
512.3	Ground Surface							
0.0	**18 cm TOPSOIL**	1A	DO	12	0			
0.2	Brown, loose to very dense	1B					10	
		2	DO	7	1		11	
	weathered							
	SANDY SILT TILL	3	DO	20	2		9	
		4	DO	22			8	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	27	3		9	
		6	DO	73	4		8	
					5			
506.0		7	DO	50/8	6			
6.3	**END OF BOREHOLE**							
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7			
					8			

W.L. @ El. 511.48 masl on Nov 20, 2023
W.L. @ El. 512.09 masl on Dec 11, 2023
W.L. @ El. 512.36 masl on Jan 10, 2024

Soil Engineers Ltd.

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 30, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
513.5	Ground Surface							
0.0	**40 cm TOPSOIL**	1A	DO	8	0		28	
0.4		1B					10	
	Brown, loose to dense							
	weathered	2	DO	17	1		11	
		3	DO	18	2		10	
	SANDY SILT TILL	4	DO	29				
		5	DO	23	3		9	
	traces to some clay and gravel occ. cobbles and boulders	6	DO	35	4 5		9	
		7	DO	47	6		9	
506.9					7			
6.6	**END OF BOREHOLE**				8			

Soil Engineers Ltd.

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH/MW 4

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Residential Development

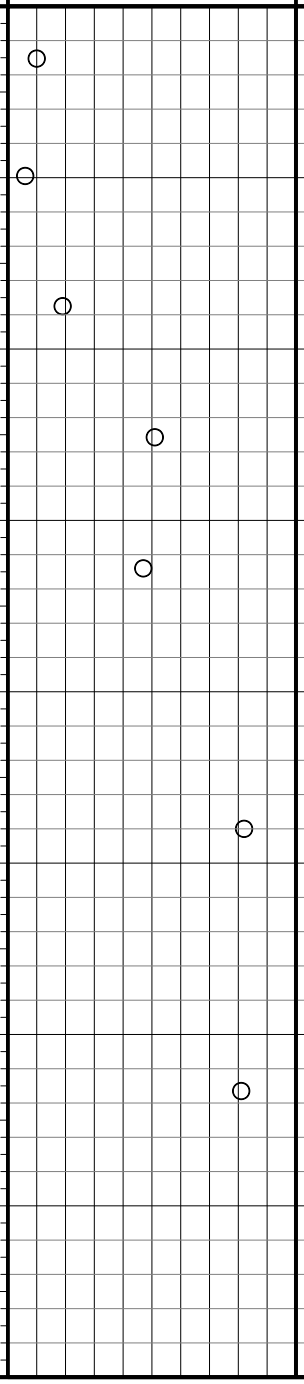
METHOD OF BORING: Hollow Stem Auger

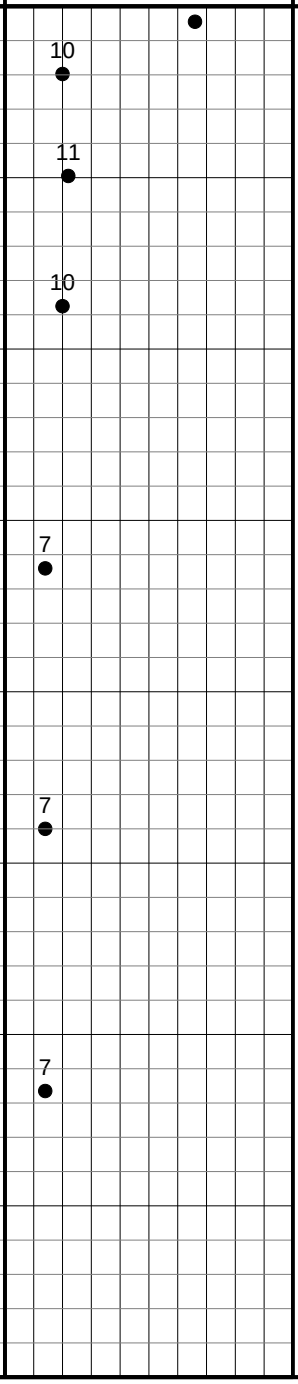
PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

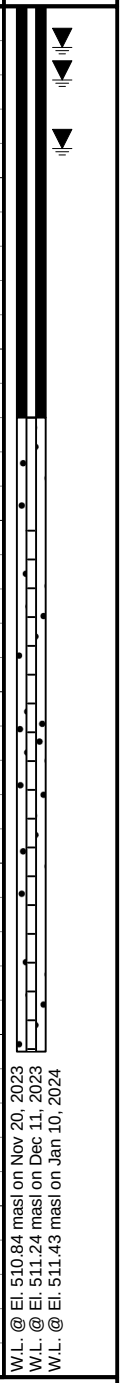
DRILLING DATE: October 31, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
511.7	Ground Surface				
0.0	**18 cm TOPSOIL**	1A	DO	10	0
0.2	Brown, loose to very dense	1B			
		2	DO	6	1
	weathered				
	SANDY SILT TILL	3	DO	19	2
		4	DO	51	3
	traces to some clay and gravel occ. cobbles and boulders	5	DO	47	4
		6	DO	82	5
		7	DO	81	6
505.1					7
6.6	**END OF BOREHOLE**				8

Installed 50 mm Ø monitoring well to 6.1 m
completed with 3.0 m PVC slotted screen
Sand backfill from 2.4 to 6.1 m
Bentonite seal from 0.0 m to 2.4 m
Provided with a monument casing







Soil Engineers Ltd.

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH 5

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: November 1, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
511.0	Ground Surface							
0.0	**20 cm TOPSOIL**	1A	DO	10	0			
0.2	Brown, compact to very dense	1B					11	
		2	DO	10	1		10	
	weathered							
	SANDY SILT TILL	3	DO	24	2		9	
		4	DO	65/20			4	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	50/5	3		6	
		6	DO	99/20	4		6	
		7	DO	50/13	5			
504.6					6			
6.4	**END OF BOREHOLE**				7			
					8			

Soil Engineers Ltd.

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH/MW 6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: November 1, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
511.4	Ground Surface							
0.0	**23 cm TOPSOIL**	1A	DO	8	0		16	
0.2	Brown, loose to very dense	1B						
		2	DO	9	1		10	
	weathered							
		3	DO	24	2		7	
	SANDY SILT TILL							
		4	DO	78			8	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	60/15	3		7	
		6	DO	94	4		6	
		7	DO	90	5		6	
504.8					6			
6.6	**END OF BOREHOLE**				7			
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				8			

W.L. @ El. 509.58 masl on Nov 20, 2023
W.L. @ El. 510.65 masl on Dec 11, 2023
W.L. @ El. 511.09 masl on Jan 10, 2024

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH 7

FIGURE NO.: 7

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: November 1, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
511.6	Ground Surface							
0.0	**28 cm TOPSOIL**	1A	DO	6	0		36	
0.3	Brown, loose to very dense	1B					21	
		2	DO	5	1		13	
	weathered							
		3	DO	9			9	
	SANDY SILT TILL				2			
		4	DO	93/28			8	
		5	DO	50/8	3		7	
	traces to some clay and gravel occ. cobbles and boulders							
		6	DO	87	4		6	
					5			
					6			
		7	DO	69			7	
505.0					7			
6.6	**END OF BOREHOLE**							
					8			

Soil Engineers Ltd.

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH/MW 8

FIGURE NO.: 8

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: November 2, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
512.0	Ground Surface							
0.0	**30 cm TOPSOIL**	1A	DO	5	0		36	
0.3	Brown, loose to very dense	1B					19	
		2	DO	10	1		10	
	weathered							
		3	DO	9	2		11	
	SANDY SILT TILL	4	DO	32			8	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	59	3		6	
		6	DO	92	4		6	
505.7		7	DO	50/15	5		7	
6.3	**END OF BOREHOLE**				6			
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7			
					8			

W.L. @ El. 510.3 masl on Nov 20, 2023
W.L. @ El. 511.33 masl on Dec 11, 2023
W.L. @ El. 511.7 masl on Jan 10, 2024

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH/MW 9

FIGURE NO.: 9

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 31, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
510.9	Ground Surface				
0.0	**30 cm TOPSOIL**	1A	DO	7	0
0.3	Brown, loose to very dense	1B			
	weathered	2	DO	13	1
		3	DO	10	2
	SANDY SILT TILL	4	DO	39	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	50/15	3
		6	DO	50/8	4
504.6		7	DO	70/15	5
6.3	**END OF BOREHOLE**				6
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7
					8

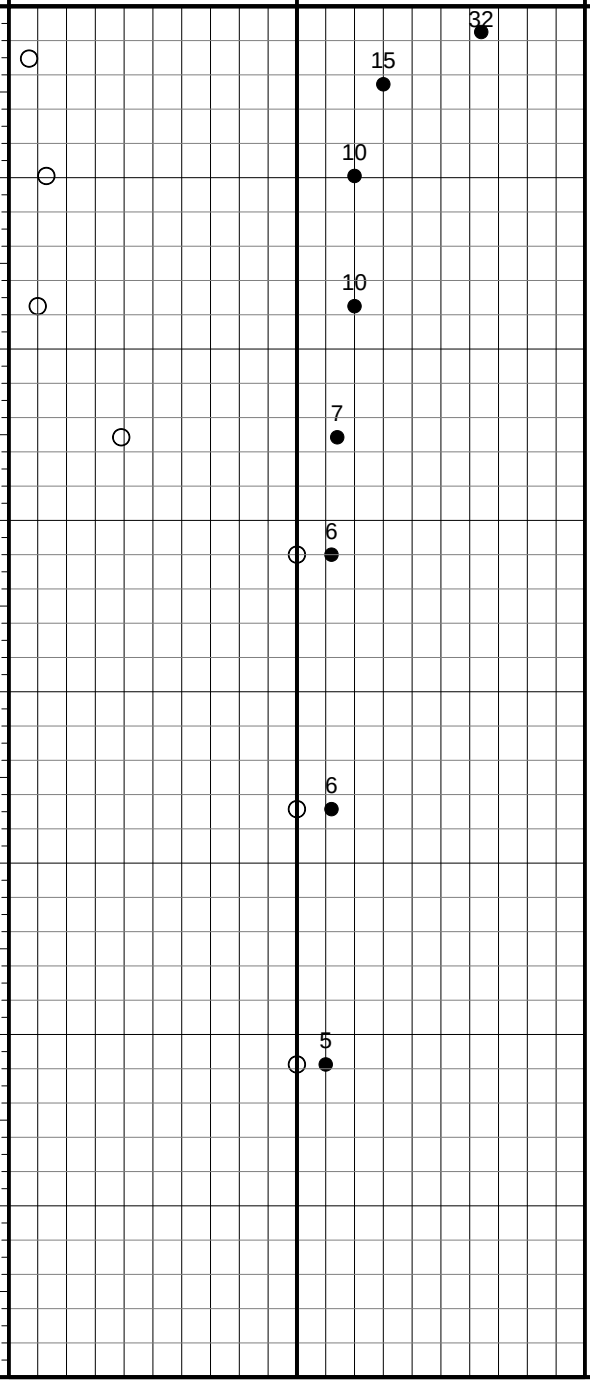
Dynamic Cone (blows/30 cm) 10 30 50 70 90

Shear Strength (kN/m²) 50 100 150 200

Penetration Resistance (blows/30 cm) 10 30 50 70 90

Atterberg Limits PL LL

Moisture Content (%) 10 20 30 40



WATER LEVEL

W.L. @ El. 510.33 masl on Nov 20, 2023
W.L. @ El. 510.64 masl on Dec 11, 2023
W.L. @ El. 510.66 masl on Jan 10, 2024

JOB NO.: 2310-W058

LOG OF BOREHOLE: BH 10

FIGURE NO.: 10

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: November 2, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
511.4	Ground Surface							
0.0	**20 cm TOPSOIL**	1A	DO	7	0		20	
0.2	Brown, loose to very dense	1B						
	weathered	2	DO	15	1		9	
	SANDY SILT TILL	3	DO	11	2		9	
		4	DO	60			7	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	50/15	3		6	
		6	DO	80	4		6	
505.1		7	DO	50/15	6		6	
6.3	**END OF BOREHOLE**				8			

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JOB NO.: 2310-W058

LOG OF BOREHOLE: BH/MW 11

FIGURE NO.: 11

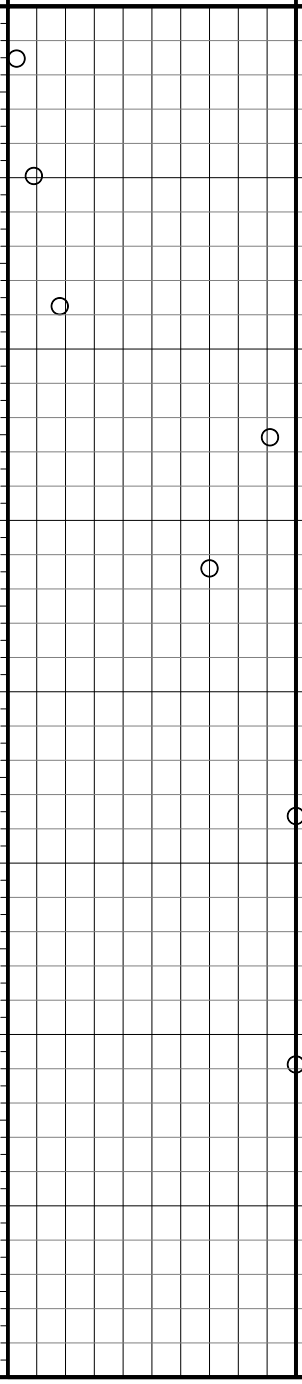
PROJECT DESCRIPTION: Proposed Residential Development

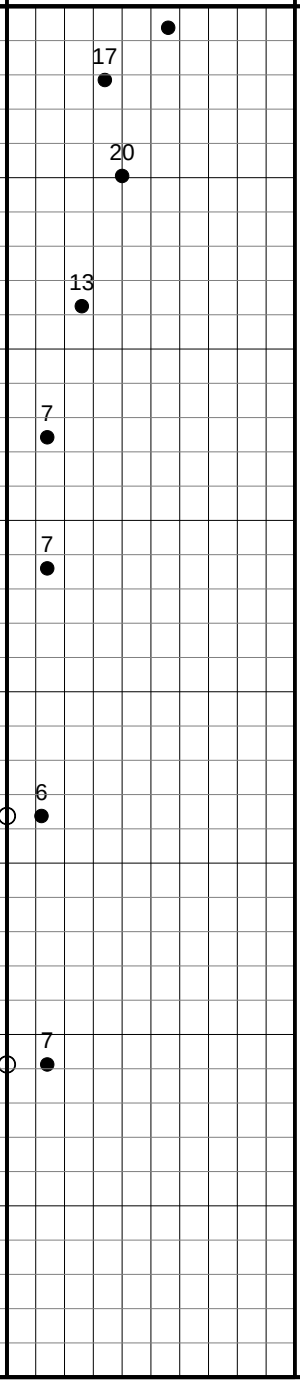
METHOD OF BORING: Hollow Stem Auger

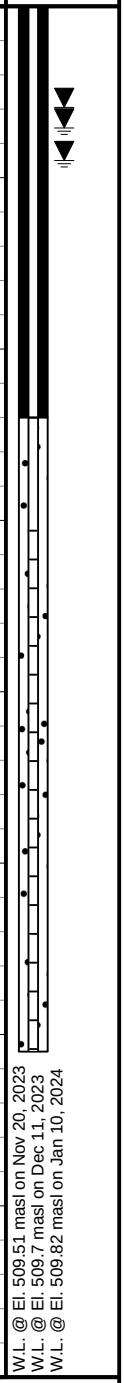
PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 31, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
510.4	Ground Surface				
0.0	**25 cm TOPSOIL**	1A	DO	3	0
0.3	Brown, very loose to very dense	1B			
		2	DO	9	1
	weathered				
		3	DO	18	2
	SANDY SILT TILL				
		4	DO	91	
					3
	traces to some clay and gravel occ. cobbles and boulders	5	DO	70	
					4
		6	DO	60/15	
					5
					6
504.1		7	DO	65/15	
6.3	**END OF BOREHOLE**				7
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				8







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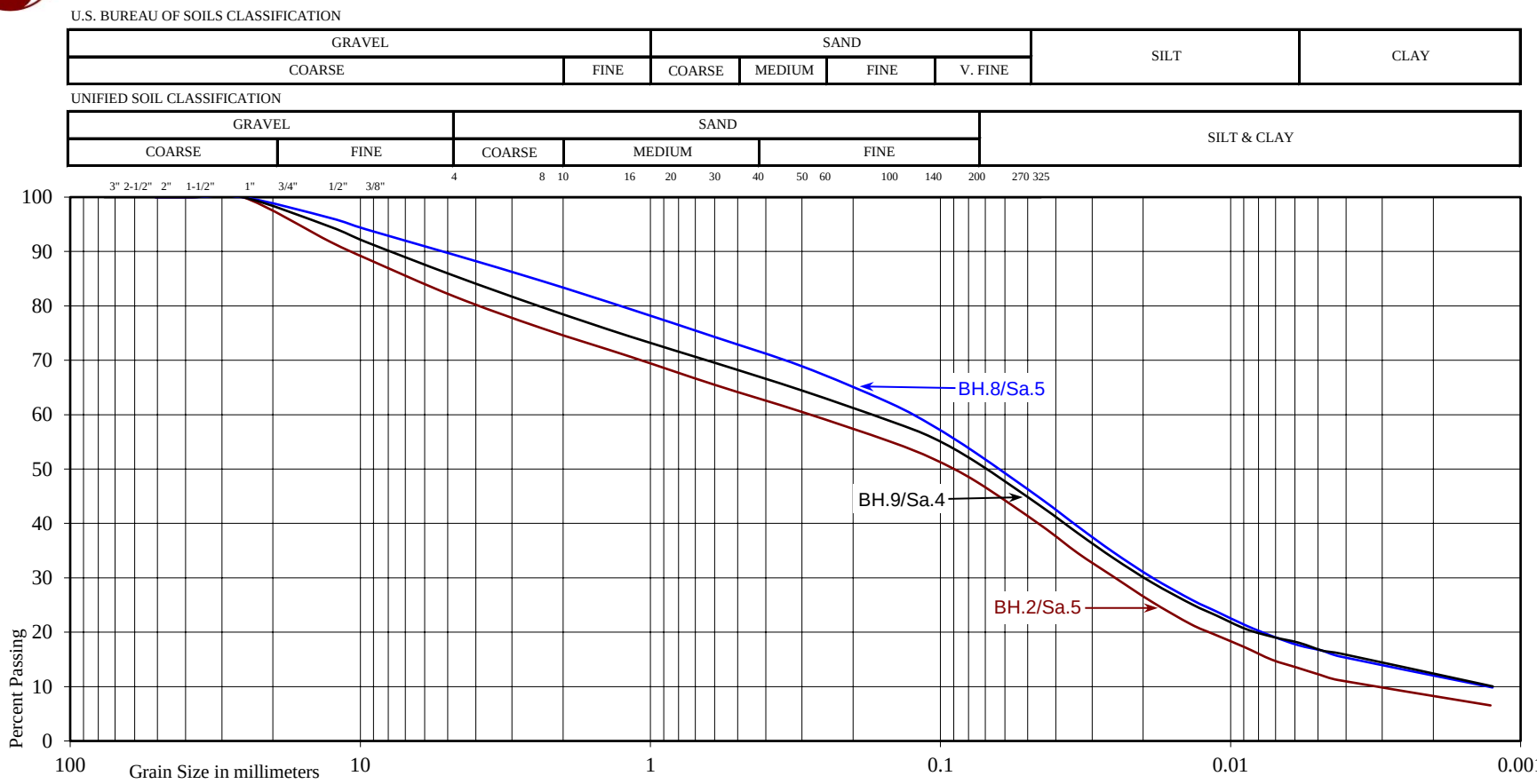
GRAIN SIZE DISTRIBUTION

Reference No: 2310-W058



Project:	Proposed Residential Development			BH./Sa.	2/5	8/5	9/4
Location:	CON SWTSR PT LOT 234, Southeast of Grey Road 9 and Ida Street			Liquid Limit (%) =	-	-	-
	Township of Southgate (Dundalk)			Plastic Limit (%) =	-	-	-
Borehole No:	2	8	9	Plasticity Index (%) =	-	-	-
Sample No:	5	5	4	Moisture Content (%) =	9	6	7
Depth (m):	3.3	3.3	2.5	Estimated Permeability			
Elevation (m):	509.0	508.7	508.4	(cm./sec.) =	10^{-5}	10^{-6}	10^{-6}

Classification of Sample [& Group Symbol]: SANDY SILT TILL
traces to some clay and gravel

Figure: 12

Soil Engineers Ltd.
CONSULTING ENGINEERS
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APPENDIX 'B'

MECP WATER WELL RECORDS

REFERNCE NO. 2310-W058

MECP Well Records Summary

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Well Usage		Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**	Date Completed
				Final Status	First Use				
1	2500885	Cable Tool	47.9	Water Supply	Domestic	9.1	-	-	1955-10-03
2	2500893	Cable Tool	41.1	Water Supply	Domestic	10.7	-	-	1957-05-04
3	2500894	Cable Tool	46.6	Water Supply	Domestic	5.5	-	-	1957-07-19
4	2500899	Cable Tool	18.3	Water Supply	-	1.8	-	-	1967-01-14
5	2502014	Cable Tool	28.0	Water Supply	-	5.8	-	-	1962-03-08
6	2504173	-	29.0	Water Supply	-	4.6	-	-	1973-03-09
7	2505043	-	86.9	Water Supply	-	7.9	-	-	1975-03-18
8	2506053	Rotary (Convent.)	29.3	Water Supply	Domestic	7.0	-	-	1977-04-14
9	2506214	Rotary (Convent.)	29.0	Water Supply	Domestic	4.3	-	-	1977-09-08
10	2509476	Rotary (Convent.)	30.8	Water Supply	Domestic	8.5	-	-	1988-06-02
11	2510354	Rotary (Convent.)	25.9	Water Supply	Domestic	3.0	-	-	1989-11-27
12	2511484	Rotary (Air)	29.3	Water Supply	Domestic	8.5	-	-	1991-09-06
13	2515886	Rotary (Convent.)	31.1	Water Supply	Domestic	8.5	-	-	2003-11-21
14	2515887	Rotary (Convent.)	30.5	Water Supply	Domestic	8.5	-	-	2003-11-20
15	2516266	Other Method	5.5	Observation Wells	-	-	2.4	5.5	2004-10-23
16	2516364	-	-	Abandoned-Other	-	-	-	-	2005-04-22
17	2516756	-	-	Abandoned-Other	-	-	-	-	2005-10-12
18	7118914	Rotary (Convent.)	23.8	Water Supply	Domestic	4.9	-	-	2008-10-14
19	7140442	Other Method	-	Abandoned-Other	Other	1.1	-	-	2010-02-07
20	7140443	-	-	-	-	1.2	-	-	2010-02-07
21	7140444	-	-	-	-	1.2	-	-	2010-02-07
22	7140445	Other Method	-	-	Other	2.1	-	-	2010-02-07
23	7140450	Other Method	-	-	-	1.9	-	-	2010-02-07
24	7140451	-	-	-	-	1.1	-	-	2010-02-07
25	7140452	Other Method	-	Abandoned-Other	Other	3.3	-	-	2010-02-01
26	7168641	-	-	-	-	-	-	-	2011-08-15
27	7175980	-	4.5	-	-	-	1.5	4.5	2012-01-11
28	7175982	-	4.5	-	-	-	1.5	4.5	2012-01-11
29	7175984	Boring	-	-	-	-	-	-	2012-01-11
30	7175981	Driving	4.5	Observation Wells	Monitoring	-	1.5	4.5	2012-01-11
31	7175983	Driving	4.5	Observation Wells	Monitoring	-	1.5	4.5	2012-01-11
32	7178933	-	-	Abandoned-Other	-	-	-	-	2012-01-11
33	7179089	-	-	-	-	-	-	-	2011-12-15
34	7190259	Rotary (Convent.)	5.4	Observation Wells	Monitoring	-	2.4	5.4	2012-10-16
35	7190260	Rotary (Convent.)	42.0	Observation Wells	Monitoring	-	1.5	4.2	2012-10-16
36	7190261	Driving	4.3	Observation Wells	Monitoring	-	1.5	4.2	2012-10-16
37	7190262	Rotary (Convent.)	7.6	Observation Wells	Monitoring	-	4.5	7.6	2012-10-16
38	7224832	-	6.1	-	-	-	3.0	6.1	2014-06-26
39	7240612	Driving	4.5	-	Monitoring	-	1.5	4.5	2015-04-21

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Well Usage		Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**	Date Completed
				Final Status	First Use				
40	7241221	Rotary (Convent.)	4.5	Observation Wells	Monitoring	-	1.5	4.5	2015-04-29
41	7241222	Rotary (Convent.)	3.0	Observation Wells	Monitoring	-	1.5	3.0	2015-04-29
42	7245541	-	1.4	Abandoned-Other	-	-	-	-	2015-07-09
43	7259065	-	-	-	-	-	-	-	2015-08-20
44	7272334	-	-	-	-	-	-	-	1900-01-00
45	7281370	Rotary (Convent.)	96.2	Water Supply	Municipal	7.5	-	-	2017-02-01
46	7308409	-	-	-	-	-	-	-	2017-02-07
47	7332812	Boring	6.1	Monitoring and Test Hole	Monitoring	-	2.6	5.6	2018-07-20
48	7332813	Boring	4.6	-	Monitoring	-	1.5	4.6	2018-07-20
49	7332814	-	6.1	Monitoring and Test Hole	Monitoring	-	2.4	5.5	2018-07-20
50	7333654	-	-	Water Supply	Domestic	2.3	-	-	2019-05-16
51	7339338	Rotary (Convent.)	7.6	Observation Wells	Monitoring	-	4.6	7.6	2019-06-20
52	7361981	-	-	Abandoned-Other	-	-	1.6	4.6	2020-06-03
53	7362026	-	-	Abandoned-Other	-	-	6.1	7.6	2020-06-03
54	7362027	-	-	Abandoned-Other	-	-	1.5	4.6	2020-06-03
55	7362028	-	-	Abandoned-Other	-	-	3.7	6.7	2020-06-03
56	7362029	-	-	Abandoned-Other	-	-	1.7	3.7	2020-06-03
57	7362030	-	-	Abandoned-Other	-	-	0.6	3.0	2020-06-03

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BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX 'C'

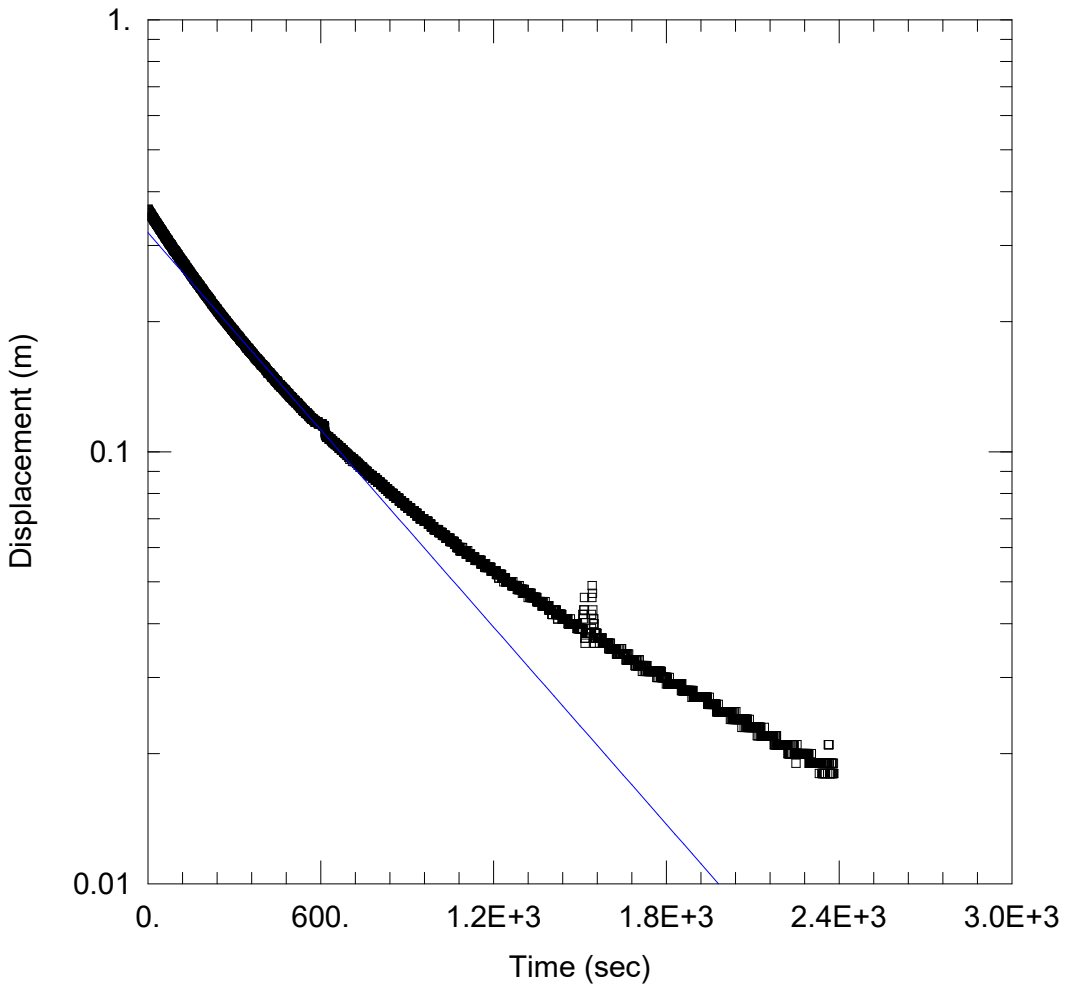
IN-SITU HYDRAULIC CONDUCTIVITY TESTING DETAILS

(SWRT)

REFERNCE NO. 2310-W058

Falling Head SWRT of BH/MW 1

Prepared By:	Prepared For:
Soil Engineers Ltd.	Briarwood (Dundalk) LTD.
Project:	Location:
2310-W058	Grey Rd 9 and Ida St. Dundalk



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.626E-7 m/sec y0 = 0.3213 m

AQUIFER DATA

Saturated Thickness: 5.34 m Anisotropy Ratio (Kz/Kr): 1.

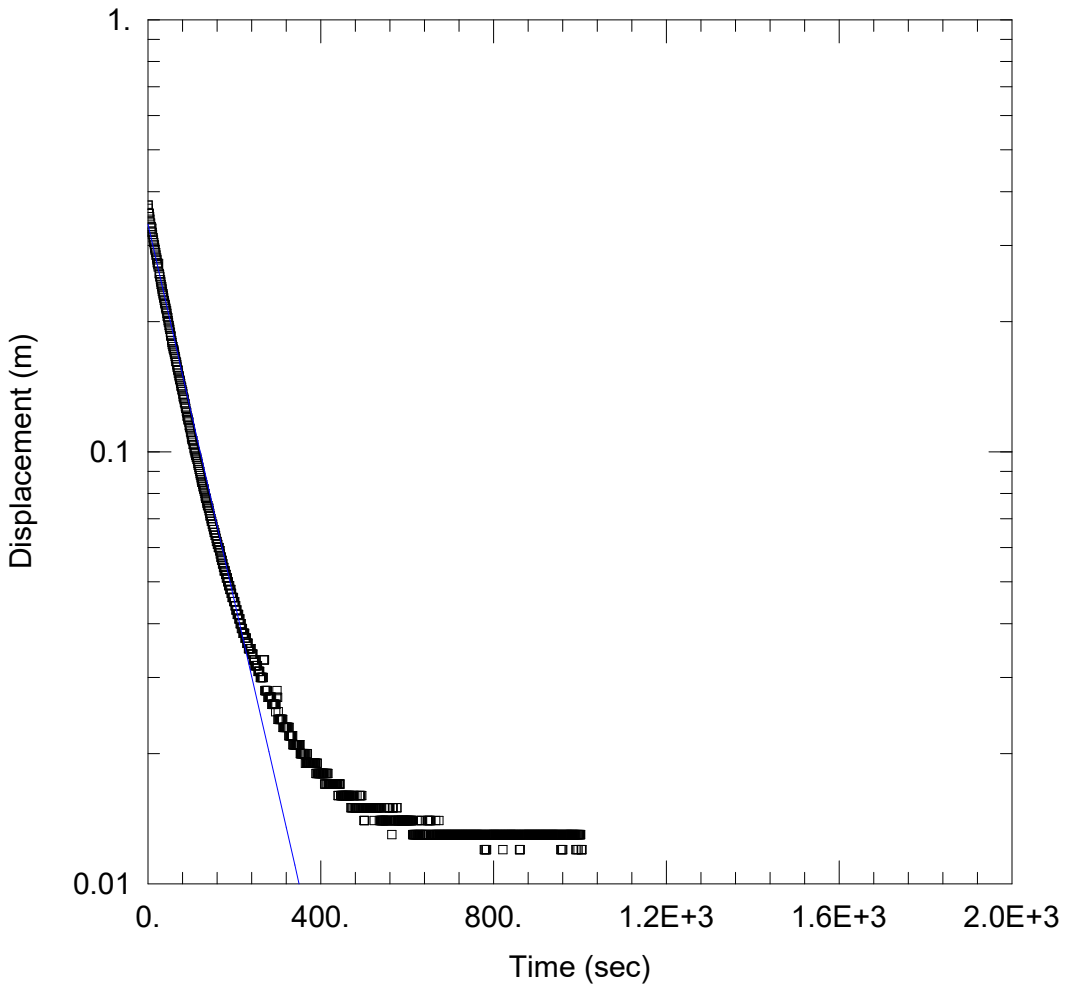
WELL DATA (BH/MW 1)

Initial Displacement: 0.364 m
Static Water Column Height: 5.34 m
Total Well Penetration Depth: 5.34 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Soil Engineers Ltd.

Falling Head SWRT of BH/MW 2

Prepared By:	Prepared For:
Soil Engineers Ltd.	Briarwood (Dundalk) LTD.
Project:	Location:
2310-W058	Grey Rd 9 and Ida St. Dundalk



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.448E-6 m/sec y0 = 0.3361 m

AQUIFER DATA

Saturated Thickness: 5.97 m Anisotropy Ratio (Kz/Kr): 1.

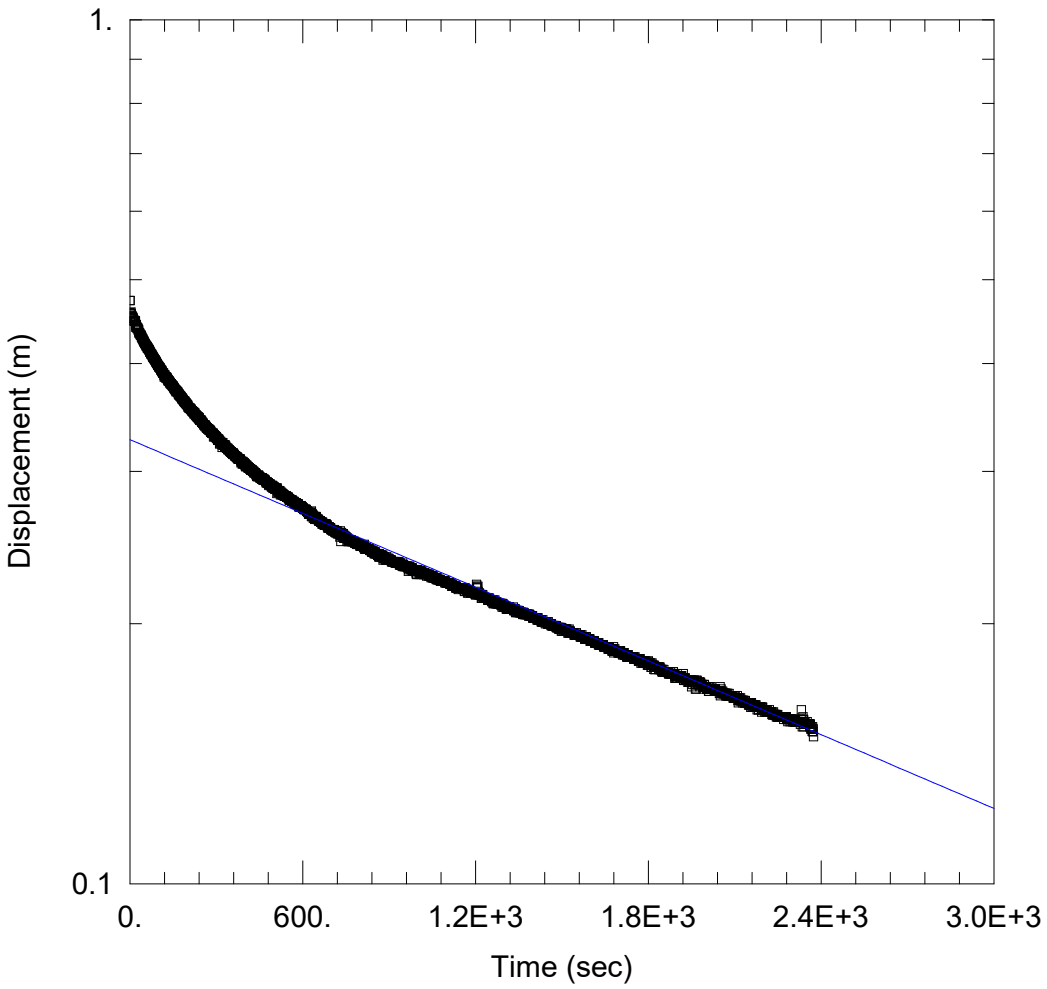
WELL DATA (BH/MW 2)

Initial Displacement: 0.372 m
Static Water Column Height: 5.97 m
Total Well Penetration Depth: 5.97 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Soil Engineers Ltd.

Falling Head SWRT of BH/MW 4

Prepared By:	Prepared For:
Soil Engineers Ltd.	Briarwood (Dundalk) LTD.
Project:	Location:
2310-W058	Grey Rd 9 and Ida St. Dundalk



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.445E-7 m/sec y0 = 0.3265 m

AQUIFER DATA

Saturated Thickness: 5.81 m Anisotropy Ratio (Kz/Kr): 1.

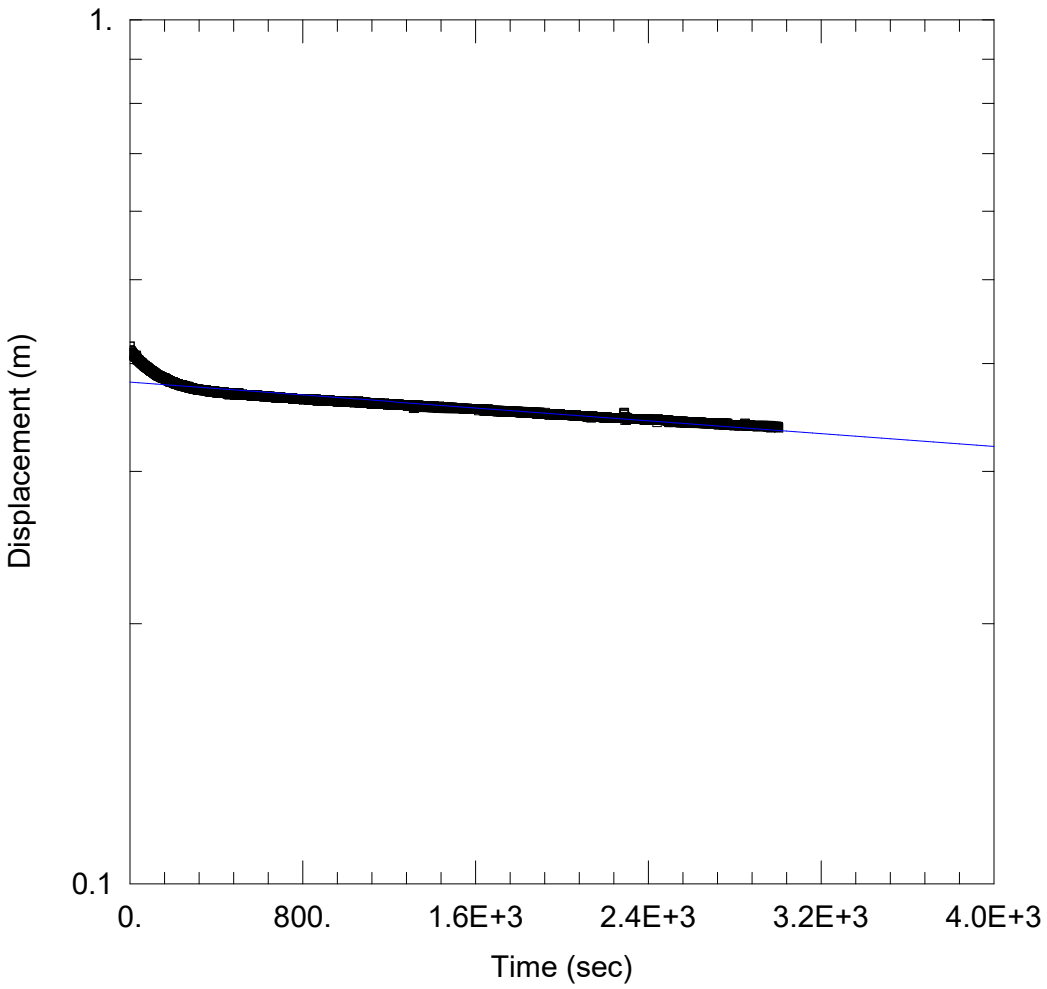
WELL DATA (BH/MW 4)

Initial Displacement: 0.473 m
Static Water Column Height: 5.81 m
Total Well Penetration Depth: 5.81 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Soil Engineers Ltd.

Falling Head SWRT of BH/MW 6

Prepared By:	Prepared For:
Soil Engineers Ltd.	Briarwood (Dundalk) LTD.
Project:	Location:
2310-W058	Grey Rd 9 and Ida St. Dundalk



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.86E-8 m/sec y0 = 0.3806 m

AQUIFER DATA

Saturated Thickness: 5.3 m Anisotropy Ratio (Kz/Kr): 1.

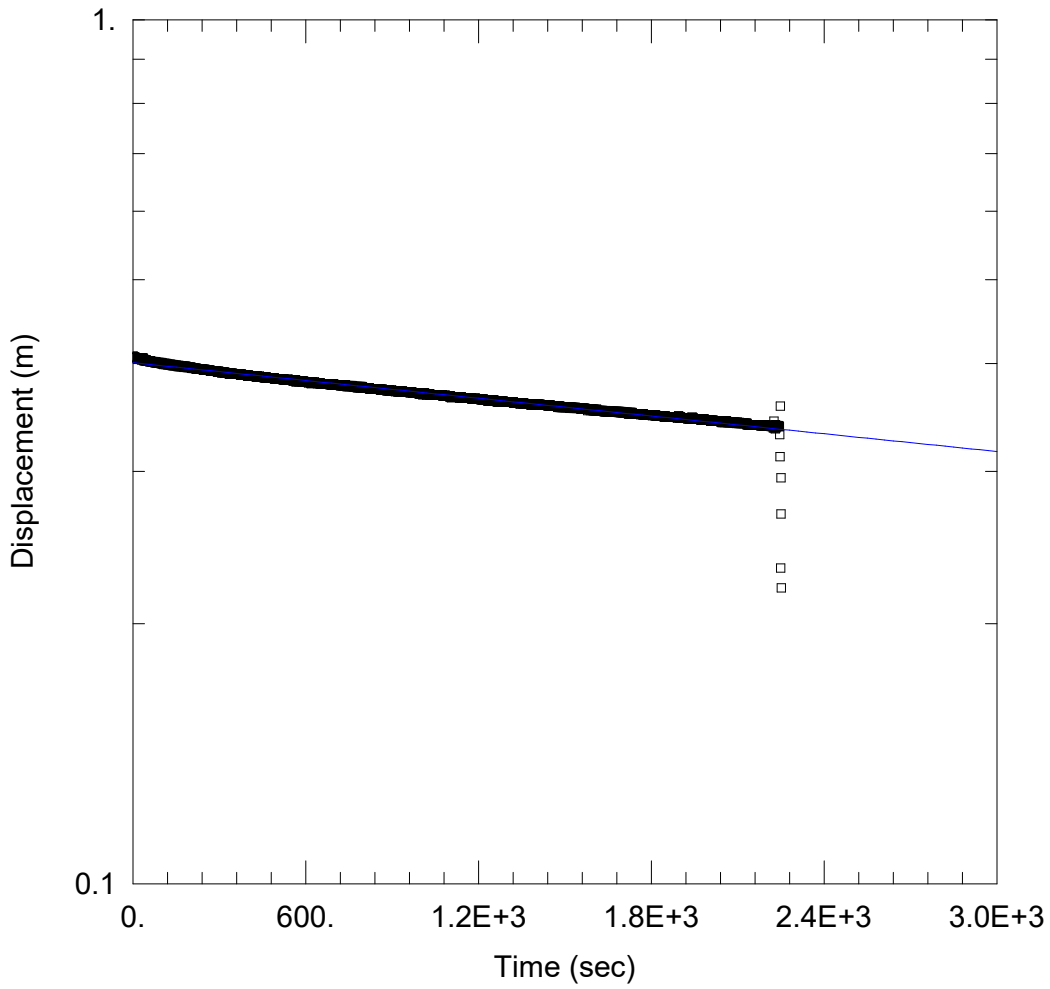
WELL DATA (BH/MW 6)

Initial Displacement: 0.419 m
Static Water Column Height: 5.3 m
Total Well Penetration Depth: 5.3 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Soil Engineers Ltd.

Falling Head SWRT of BH/MW 8

Prepared By:	Prepared For:
Soil Engineers Ltd.	Briarwood (Dundalk) LTD.
Project:	Location:
2310-W058	Grey Rd 9 and Ida St. Dundalk



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.453E-8 m/sec y0 = 0.4008 m

AQUIFER DATA

Saturated Thickness: 5.54 m Anisotropy Ratio (Kz/Kr): 1.

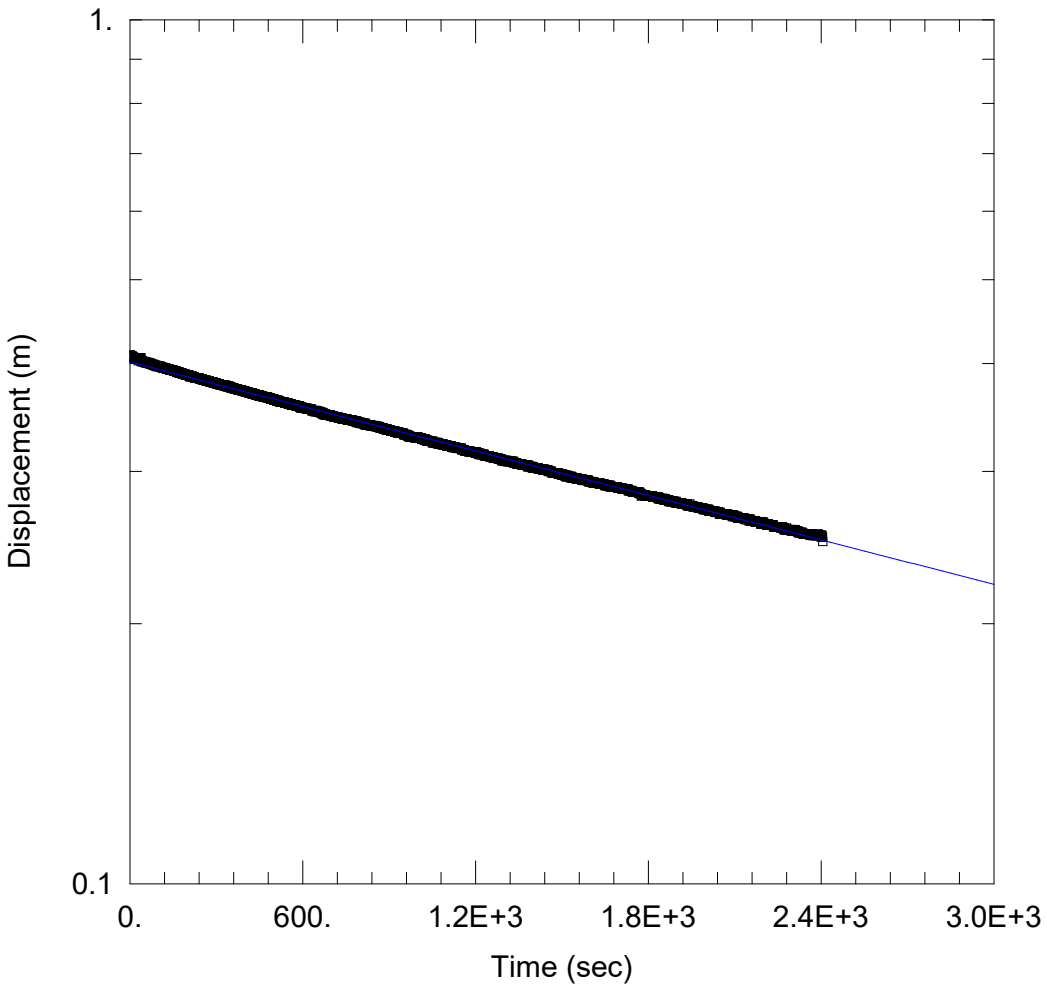
WELL DATA (BH/MW 8)

Initial Displacement: 0.408 m
Static Water Column Height: 5.54 m
Total Well Penetration Depth: 5.54 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Soil Engineers Ltd.

Falling Head SWRT of BH/MW 9

Prepared By:	Prepared For:
Soil Engineers Ltd.	Briarwood (Dundalk) LTD.
Project:	Location:
2310-W058	Grey Rd 9 and Ida St. Dundalk



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 8.746E-8 m/sec y0 = 0.4016 m

AQUIFER DATA

Saturated Thickness: 5.97 m Anisotropy Ratio (Kz/Kr): 1.

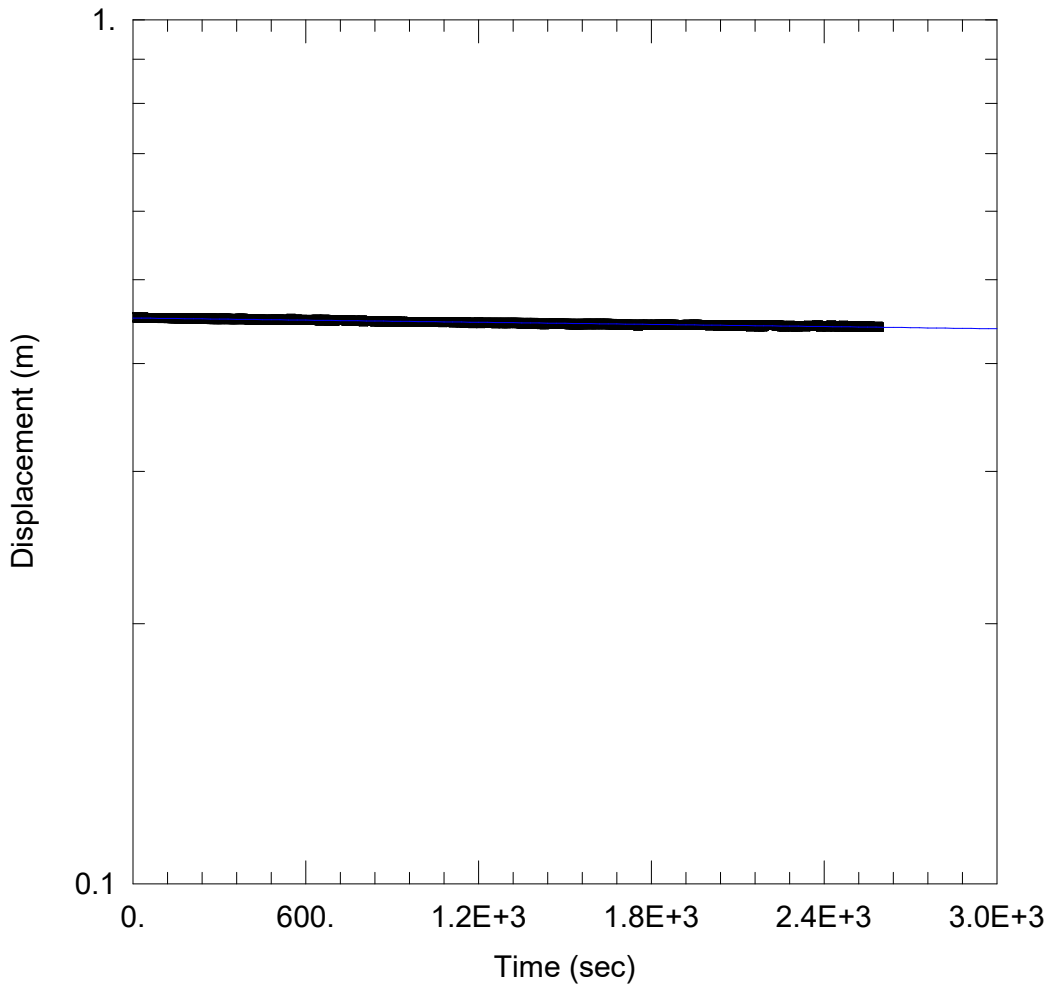
WELL DATA (BH/MW 9)

Initial Displacement: 0.409 m
Static Water Column Height: 5.97 m
Total Well Penetration Depth: 5.97 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Soil Engineers Ltd.

Falling Head SWRT of BH/MW 11

Prepared By:	Prepared For:
Soil Engineers Ltd.	Briarwood (Dundalk) LTD.
Project:	Location:
2310-W058	Grey Rd 9 and Ida St. Dundalk



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.161E-9 m/sec y0 = 0.4516 m

AQUIFER DATA

Saturated Thickness: 5.39 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH/MW 11)

Initial Displacement: 0.453 m
Static Water Column Height: 5.39 m
Total Well Penetration Depth: 5.39 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.0254 m

Soil Engineers Ltd.

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APPENDIX 'D'

GROUNDWATER QUALITY TEST RESULTS

REFERNCE NO. 2310-W058

FINAL REPORT

CA40050-JAN24 R1

2310-W058, Grey Road 9 and Ida Street, Township of Southgate, Dundalk

Prepared for

Soil Engineers Ltd.

FINAL REPORT

First Page

CLIENT DETAILS

Client	Soil Engineers Ltd.
Address	90 West Beaver Creek Rd Richmond, ON M1S 3A7. Canada
Contact	Amar Deep Regmi
Telephone	437-771-6640
Facsimile	416-754-8516
Email	amardeep.regmi@soilengineersltd.com
Project	2310-W058, Grey Road 9 and Ida Street, Township of Southga
Order Number	
Samples	Ground Water (1)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA40050-JAN24
Received	01/10/2024
Approved	01/16/2024
Report Number	CA40050-JAN24 R1
Date Reported	01/16/2024

COMMENTS

RL - SGS Reporting Limit

Temperature of Sample upon Receipt: 8 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: 038147

BOD spike slightly high, accepted based on all other QC

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: Soil Engineers Ltd.

Project: 2310-W058, Grey Road 9 and Ida Street, Township of Southgate, Du

Project Manager: Amar Deep Regmi

Samplers: Amar Deep Rejmi

MATRIX: WATER

L1 = SANSEW / WATER / - - Southgate Sewer Use - Sanitary and Combined Sewer Discharge - BL_13_2011

L2 = SANSEW / WATER / - - Southgate Sewer Use - Storm Sewer Discharge - BL_13_2011

Sample Number	8
Sample Name	BH/MW2
Sample Matrix	Ground Water
Sample Date	10/01/2024

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2	300		< 4 ↑
Chemical Oxygen Demand	mg/L	8	600		< 8
Total Kjeldahl Nitrogen	as N mg/L	0.5	50		< 0.5
Total Suspended Solids	mg/L	2	300	15	16
Metals and Inorganics					
Cyanide (total)	mg/L	0.01	1.2		< 0.01
Sulphide	mg/L	0.02	1		< 0.02
Arsenic (total)	mg/L	0.0002	1		< 0.0002
Cadmium (total)	mg/L	0.000003	0.7	0.001	0.000006
Chromium (total)	mg/L	0.00008	3	0.2	0.00035
Cobalt (total)	mg/L	0.000004	5		0.000081
Copper (total)	mg/L	0.0002	2	0.01	0.0011
Lead (total)	mg/L	0.00009	3	0.05	0.00021
Molybdenum (total)	mg/L	0.00004	5		0.00016
Nickel (total)	mg/L	0.0001	2	0.05	0.0004
Phosphorus (total)	mg/L	0.003	10		0.006
Selenium (total)	mg/L	0.00004	2		0.00021
Silver (total)	mg/L	0.00005	1		< 0.00005
Zinc (total)	mg/L	0.002		0.05	0.004

Client: Soil Engineers Ltd.
Project: 2310-W058, Grey Road 9 and Ida Street, Township of Southgate, Du
Project Manager: Amar Deep Regmi
Samplers: Amar Deep Rejmi

MATRIX: WATER

L1 = SANSEW / WATER / - - Southgate Sewer Use - Sanitary and Combined Sewer Discharge - BL_13_2011

L2 = SANSEW / WATER / - - Southgate Sewer Use - Storm Sewer Discharge - BL_13_2011

Sample Number	8
Sample Name	BH/MW2
Sample Matrix	Ground Water
Sample Date	10/01/2024

Parameter	Units	RL	L1	L2	Result
Microbiology					
Fecal Coliform	cfu/100mL	0		200	0
Oil and Grease					
Oil & Grease (total)	mg/L	2		100	< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4
Other (ORP)					
pH	No unit	0.05	10.5	9	7.78
Mercury (total)	mg/L	0.00001	0.1	0.001	< 0.00001
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.004		< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.002	0.1		< 0.002

Client: Soil Engineers Ltd.

Project: 2310-W058, Grey Road 9 and Ida Street, Township of Southgate, Du

Project Manager: Amar Deep Regmi

Samplers: Amar Deep Rejmi

MATRIX: WATER

Sample Number	8
Sample Name	BH/MW2
Sample Matrix	Ground Water
Sample Date	10/01/2024

L1 = SANSEW / WATER / - - Southgate Sewer Use - Sanitary and Combined Sewer Discharge - BL_13_2011

L2 = SANSEW / WATER / - - Southgate Sewer Use - Storm Sewer Discharge - BL_13_2011

Parameter	Units	RL	L1	L2	Result
SVOCs					
Hexachlorobenzene	mg/L	0.0001	0.0001		< 0.0001
VOCs					
Chloroform	mg/L	0.0005	0.04		< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.05		< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08		< 0.0005
Methylene Chloride	mg/L	0.0005	0.09		< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	0.06		< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	0.06		< 0.0005
Trichloroethylene	mg/L	0.0005	0.05		< 0.0005
VOCs - BTEX					
Benzene	mg/L	0.0005	0.01		< 0.0005
Ethylbenzene	mg/L	0.0005	0.06		< 0.0005
Toluene	mg/L	0.0005	0.02		< 0.0005
Xylene (total)	mg/L	0.0005			< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - Southgate Sewer Use - Sanitary and Combined Sewer Discharge - BL_13_2011 L1	SANSEW / WATER / - - Southgate Sewer Use - Storm Sewer Discharge - BL_13_2011 L2
BH/MW2					
Total Suspended Solids	SM 2540D	mg/L	16		15

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0017-JAN24	mg/L	2	< 2	13	30	93	70	130	134	70	130

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0178-JAN24	mg/L	8	<8	ND	20	94	80	120	89	75	125

Cyanide by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0081-JAN24	mg/L	0.01	<0.01	ND	10	96	90	110	102	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0020-JAN24	mg/L	0.00001	< 0.00001	ND	20	85	80	120	100	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0094-JAN24	mg/L	0.00005	<0.00005	ND	20	102	90	110	83	70	130
Arsenic (total)	EMS0094-JAN24	mg/L	0.0002	<0.0002	2	20	101	90	110	104	70	130
Cadmium (total)	EMS0094-JAN24	mg/L	0.000003	<0.000003	7	20	104	90	110	103	70	130
Cobalt (total)	EMS0094-JAN24	mg/L	0.000004	<0.000004	3	20	101	90	110	97	70	130
Chromium (total)	EMS0094-JAN24	mg/L	0.00008	<0.00008	9	20	103	90	110	94	70	130
Copper (total)	EMS0094-JAN24	mg/L	0.0002	<0.0002	2	20	101	90	110	81	70	130
Molybdenum (total)	EMS0094-JAN24	mg/L	0.00004	<0.00004	2	20	98	90	110	100	70	130
Nickel (total)	EMS0094-JAN24	mg/L	0.0001	<0.0001	2	20	102	90	110	99	70	130
Lead (total)	EMS0094-JAN24	mg/L	0.00009	<0.00009	4	20	100	90	110	97	70	130
Phosphorus (total)	EMS0094-JAN24	mg/L	0.003	<0.003	1	20	99	90	110	NV	70	130
Selenium (total)	EMS0094-JAN24	mg/L	0.00004	<0.00004	0	20	103	90	110	109	70	130
Zinc (total)	EMS0094-JAN24	mg/L	0.002	<0.002	1	20	101	90	110	120	70	130

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-IENVIMIC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fecal Coliform	BAC9164-JAN24	cfu/100mL	-	ACCEPTED	ACCEPTED							

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-IENVIGC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0121-JAN24	mg/L	2	<2	NSS	20	104	75	125			

QC SUMMARY

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0121-JAN24	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0121-JAN24	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0187-JAN24	No unit	0.05	NA	1		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0101-JAN24	mg/L	0.002	<0.002	ND	10	103	80	120	112	75	125

QC SUMMARY

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-IENVIGC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0131-JAN24	mg/L	0.0001	<0.0001	NSS	30	94	60	140	NSS	60	140

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-IENVIGC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Hexachlorobenzene	GCM0137-JAN24	mg/L	0.0001	< 0.0001	NSS	30	93	50	140	NSS	50	140

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-IENVISFA-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0096-JAN24	mg/L	0.02	<0.02	ND	20	110	80	120	NA	75	125

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0188-JAN24	mg/L	2	< 2	1	10	94	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0087-JAN24	as N mg/L	0.5	<0.5	4	10	105	90	110	97	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	85	60	130	102	50	140
1,2-Dichlorobenzene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	86	60	130	95	50	140
1,4-Dichlorobenzene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	86	60	130	96	50	140
Benzene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	90	60	130	99	50	140
Chloroform	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	90	60	130	99	50	140
Ethylbenzene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	88	60	130	97	50	140
m-p-xylene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	86	60	130	95	50	140
Methylene Chloride	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	92	60	130	100	50	140
o-xylene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	89	60	130	101	50	140
Tetrachloroethylene (perchloroethylene)	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	88	60	130	98	50	140
Toluene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	90	60	130	101	50	140
Trichloroethylene	GCM0122-JAN24	mg/L	0.0005	<0.0005	ND	30	91	60	130	96	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY

No: 038147

Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Page ____ of ____

Laboratory Information Section - Lab use only

Received By: Scott Fen
Received Date: 01 / 10 / 2024 (mm/dd/yy)
Received Time: 1 : ____ (hr : min)

Received By (signature): [signature]
Custody Seal Present: Yes ☐ No ☐ (struck through)
Custody Seal Intact: Yes ☐ No ☐

Cooling Agent Present: Yes ☐ No ☒ (struck through) Type: Ice
Temperature Upon Receipt (°C): 8, 6, 3

LAB LIMS #: CA40050-Jan 24

REPORT INFORMATION

Company: Soil Engineers ltd.
Contact: Amar Deep Regmi
Address: 90 West Beaver Creek Rd, Richmond Hill
Phone: 437-771-6640
Fax: amardeep.regmi@soilengineersltd.com
Email:

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email:

Quotation #:
P.O. #:
Project #: 2310-W058
Site Location/ID: Grey Road 9 and Ida Street, Township of Southgate, Dundalk

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park
☐ Table 2 ☐ Ind/Com
☐ Table 3 ☐ Agri/Other
☐ Table ____ Appx. ____
Soil Texture: ☐ Coarse ☐ Medium/Fine
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☐ ODWS Not Reportable *See note

Sewer By-Law:
☑ Sanitary
☑ Storm
Municipality: Southgate

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

Analysis columns: Field Filtered (Y/N); M & I: Metals & Inorganics (incl CrVI, CN, Hg pH, (B(HWS), EC, SAR-soil) (Cl, Na-water)), Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI), ICP Metals only (Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mo, Ni, Se, Ag, Tl, U, V, Zn); SVOC: PAHs only, SVOCs (all incl PAHs, ABNs, CPs); PCB: PCBs (☐ Total ☐ Aroclor); PHC: F1-F4 + BTEX, F1-F4 only (no BTEX); VOC: VOCs (all incl BTEX), BTEX only; Pest: Pesticides (Organochlorine or specify other); Other (please specify): Sewer Use: Southgate (Specify pkg: Sanitary/Storm sewer), Water Characterization Pkg (☐ General ☐ Extended); SPLP (Specify tests: ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN); TCLP (Specify tests: ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.)

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	COMMENTS
1	BH/MW 2	01/10/24	1:00	16	GW	
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Observations/Comments/Special Instructions

Sampled By (NAME): Amar Deep Regmi Signature: [signature] Date: 01 / 10 / 24 (mm/dd/yy) Pink Copy - Client

Relinquished by (NAME): Amar Deep Regmi Signature: [signature] Date: 01 / 10 / 24 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX 'E'

SHORT-TERM AND LONG-TERM DEWATERING FLOW RATES AND REVIEWED PLANS

REFERNCE NO. 2310-W058

BUILDING A

BUILDING B

BUILDING C

BUILDING D

BB A1

AA A1

A1 BB

AA A1

94 STALLS

STORAGE

PUMP RM

RAMP UP

RAMP DN

OVERHEAD GATE

MECH

ELEC

GARBAGE

BUILDING SERVICES

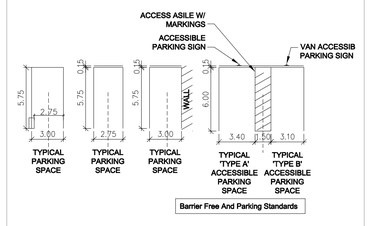
BELOW GRADE PARKING

376parking stall

AREA 15,022.46 m2

AREA 161,700.4 sq,ft.

PARKING PLAN



No.	Description	Date	Rev.
5	ISSUED FOR CLIENT AND CONSULTANT REVIEW	AUG 08, 2024	
4	ISSUED FOR CLIENT AND CONSULTANT REVIEW	JULY 16, 2024	
3	ISSUED FOR CLIENT AND CONSULTANT REVIEW	JULY 1, 2024	
2	ISSUED FOR CLIENT AND CONSULTANT REVIEW	June 27, 2024	SA
1	ISSUED FOR CLIENT AND CONSULTANT REVIEW	June 02, 2024	SA

CLIENT

DUNDALK CONCEPT

ELEVATION:

Drawing No. A-102

PARKING PLAN

DATE ISSUED: JUNE 27,2024

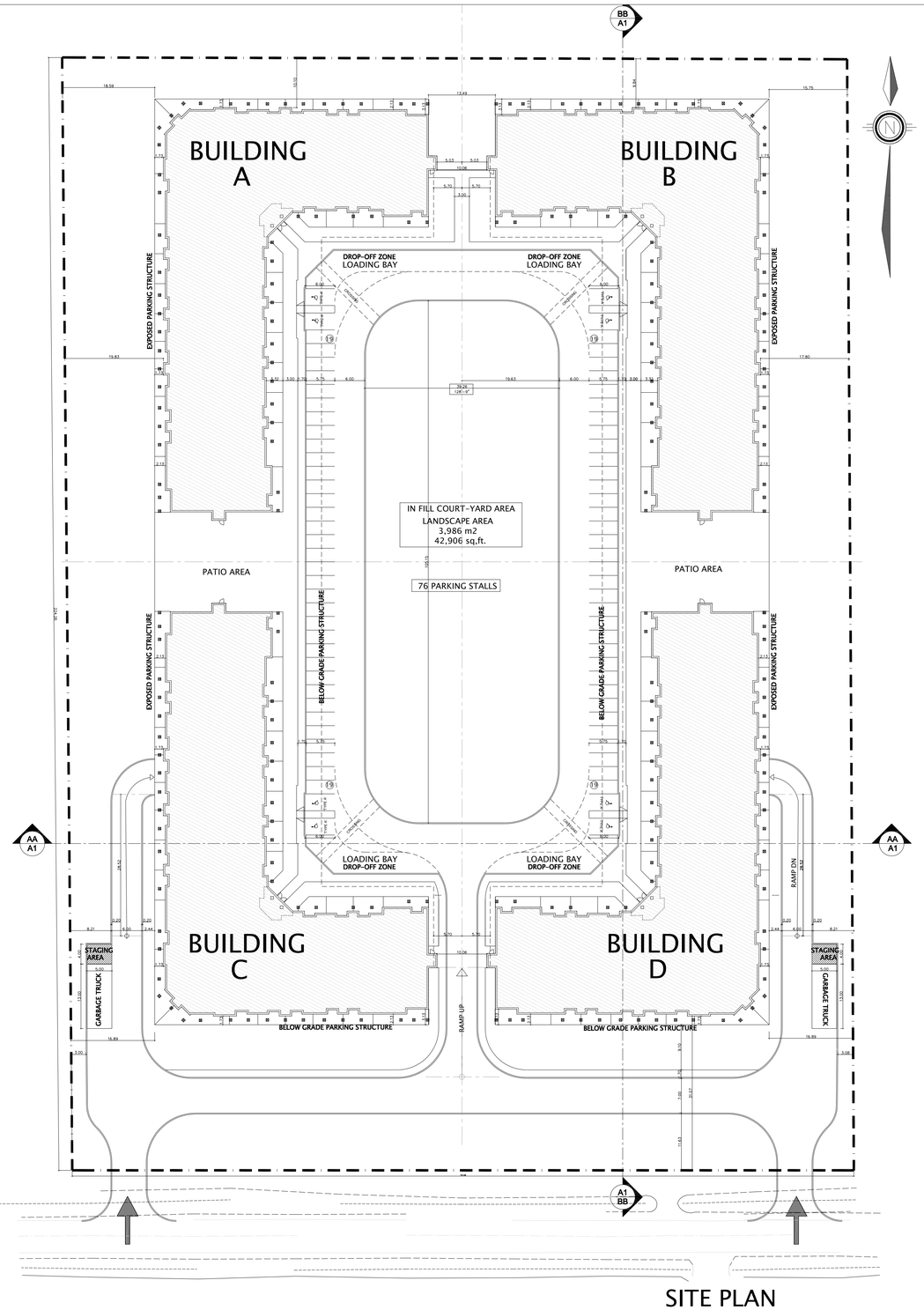
PROJECT # 2024-25

MARKETING NAME: -

SCALE: 1:500

MUNICIPALITY:

S&C ARCHITECTS INC.
T: (416)848-0991 F: (416)860-6101
INFO@SCARCHITECTS.CA
60 RANDALL DRIVE SUITE 10
AJAX, ONTARIO L1S 6L3



SITE PLAN

CONCEPT DATA

OBC: 3.2.245 group C, up to 4 storeys, Sprinklered
(iii) 2400 m2 if 3 storeys in building height.

SITE AREA	35,362.20 m2 380,635.6 sq,ft.
LOT COVERAGE	26%
OPEN AREA	74%
FRONT YARD SET BACK(SOUTH SIDE)	31.07m
SIDE YARD SET BACK (EAST SIDE)	17.46m
SIDE YARD SET BACK (WEST SIDE)	18.17m
REAR YARD SET BACK (NORTH SIDE)	9.84m

PARKING STRUCTURE

EACH STRUCTURE AREA	7,511.23 m2
TOTAL PARKING STRUCTURE	15,7022.46 m2 161,700.4 sq,ft.

PARKING STALLS REQUIRED

PARKING STALLS 1.0 PER UNIT	376
PARKING STALLS VISITOR 0.2 PER UNITS	75
PARKING STALLS REQUIRED	451

PARKING STALLS PROVIDED

PARKING STALLS BELOW GRADE 1.0 PER UNIT	376
PARKING STALLS AT GRADE COURT YARD 0.2 PER UNITS	76
PARKING STALLS PROVIDED	451

BUILDING "A"

MAIN FLOOR AREA	2,330 m2
2ND FLOOR AREA	2,305 m2
3RD FLOOR AREA	2,305 m2
GFA-TOTAL AREA PER BUILDING	6,940 m2

BUILDING "B"

MAIN FLOOR AREA	2,330 m2
2ND FLOOR AREA	2,305 m2
3RD FLOOR AREA	2,305 m2
GFA-TOTAL AREA PER BUILDING	6,940 m2

BUILDING "C"

MAIN FLOOR AREA	2,330 m2
2ND FLOOR AREA	2,305 m2
3RD FLOOR AREA	2,305 m2
GFA-TOTAL AREA PER BUILDING	6,940m2

BUILDING "D"

MAIN FLOOR AREA	2,330 m2
2ND FLOOR AREA	2,305 m2
3RD FLOOR AREA	2,305 m2
GFA-TOTAL AREA PER BUILDING	6,940 m2

GFA-GRAND TOTAL AREA ALL BUILDINGS

GFA-GRAND TOTAL AREA X 4	27,760 m2 298,806.2 sq,ft.

UNITS PER BUILDING

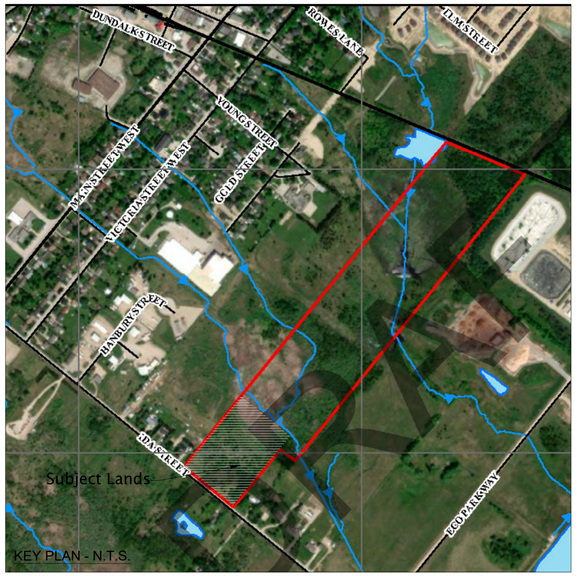
MAIN FLOOR	30
2ND FLOOR	32
3RD FLOOR	32
TOTAL UNITS PER BUILDING	94
GRAND TOTAL UNITS 4 BUILDING	376

UNITS PER BUILDING

1 BED	24
1 BED/DEN	42
2 BED	22
3 BED	06

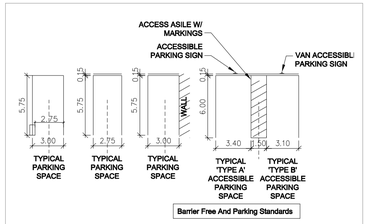
GRAND TOTAL UNITS 4 BUILDING

1 BED	96
1 BED/DEN	168
2 BED	88
3 BED	24
GRAND TOTAL UNITS 4 BUILDING	376



TYPICAL VIEW AT MAIN ENTRY

TYPICAL VIEW AT COURT YARD



NOTE:
ALL LANDSCAPING AND TREE LOCATIONS ARE CONCEPTUAL AND ARE SUBJECT TO LANDSCAPE ARCHITECTS FINAL DWGS

No.	Description	Date	Rev.
5	ISSUED FOR CLIENT AND CONSULTANT REVIEW	Aug 08, 2024	
4	ISSUED FOR CLIENT AND CONSULTANT REVIEW	July 16, 2024	
3	ISSUED FOR CLIENT AND CONSULTANT REVIEW	July 11, 2024	
2	ISSUED FOR CLIENT AND CONSULTANT REVIEW	June 27, 2024	SA
1	ISSUED FOR CLIENT AND CONSULTANT REVIEW	June 05, 2024	SA

CLIENT

DUNDALK CONCEPT

ELEVATION: Drawing No. A-101

SITE PLAN

DATE ISSUED: JUNE 27,2024

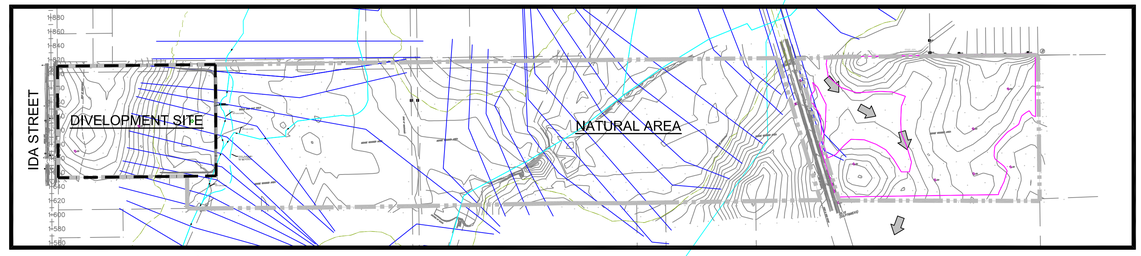
PROJECT #: 2024-25

MARKETING NAME: -

SCALE: 1:500

MUNICIPALITY:

S&C ARCHITECTS INC.
T:(416)848-0991 F:(416)860-6101
INFO@SCARCHITECTS.CA
60 RANDALL DRIVE SUITE 10
AJAX, ONTARIO L1S 6L3



OWNERSHIP KEY MAP
SCALE 1:4000

KEY PLAN
N.T.S

LEGEND:

- SUBDIVISION BOUNDARY
- SITE BOUNDARY
- Ex.REGIONAL FLOOD LINE
- PROPOSED FLOOD LINE
- GROUNDWATER CONTOURS
- PROPOSED FLOOD LINE ELEVATION
- EXISTING ELEVATION
- EXISTING CONTOUR
- DRAINAGE FLOW DIRECTION AND SLOPE
- PROPOSED ELEVATION
- STORM MANHOLE
- CATCHBASIN
- SANITARY MANHOLE
- VALVE AND BOX
- VALVED HYDRANT
- WATERMAIN SERVICE CONNECTION
- PROP. OVERLAND FLOW DIRECTION
- EXTERIOR DOOR LOCATION
- BOREHOLE / MONITORING WELL LOCATION
- PROPOSED WATERMAIN
- PROPOSED STORM SEWER

METRIC

DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOTES:

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS) (2010.0).

FOR BEARING COMPARISONS, A ROTATION OF 00°24'45" COUNTER-CLOCKWISE WAS APPLIED TO BEARINGS ON PLAN P6.
A ROTATION OF 00°26'40" COUNTER-CLOCKWISE WAS APPLIED TO BEARINGS ON PLAN P4 AND P3.
A ROTATION OF 00°00'50" COUNTER-CLOCKWISE WAS APPLIED TO BEARINGS ON D1.
A ROTATION OF 00°25'50" COUNTER-CLOCKWISE WAS APPLIED TO BEARINGS ON P8.
A ROTATION OF 00°30'50" COUNTER-CLOCKWISE WAS APPLIED TO BEARINGS ON P1.
A ROTATION OF 00°25'30" COUNTER-CLOCKWISE WAS APPLIED TO BEARINGS ON P7.

ALL SET SSIB AND PB MONUMENTS WERE USED DUE TO LACK OF OVERBURDEN AND/OR PROXIMITY OF UNDERGROUND UTILITIES IN ACCORDANCE WITH SECTION 11 (4) OF O.REG. 525/91.

No.	DATE	REVISIONS	BY.
3.	OCT.03, 2024	ISSUED FOR COORDINATION	D.G.

PRELIMINARY

VALDOR ENGINEERING INC.
Consulting Engineers - Project Managers
571 Chrislea Road, Unit 4, 2nd Floor, Woodbridge, Ontario, L4L 8A2
TEL (905)264-0254, FAX (905)264-0258
E-MAIL: info@valdor-engineering.com
www.valdor-engineering.com

PROPOSED CONDOMINIUM APARTMENTS

IDA STREET, DUNDALK
TOWNSHIP OF SOUTHGATE

FUNCTIONAL SERVICING & GRADING PLAN.

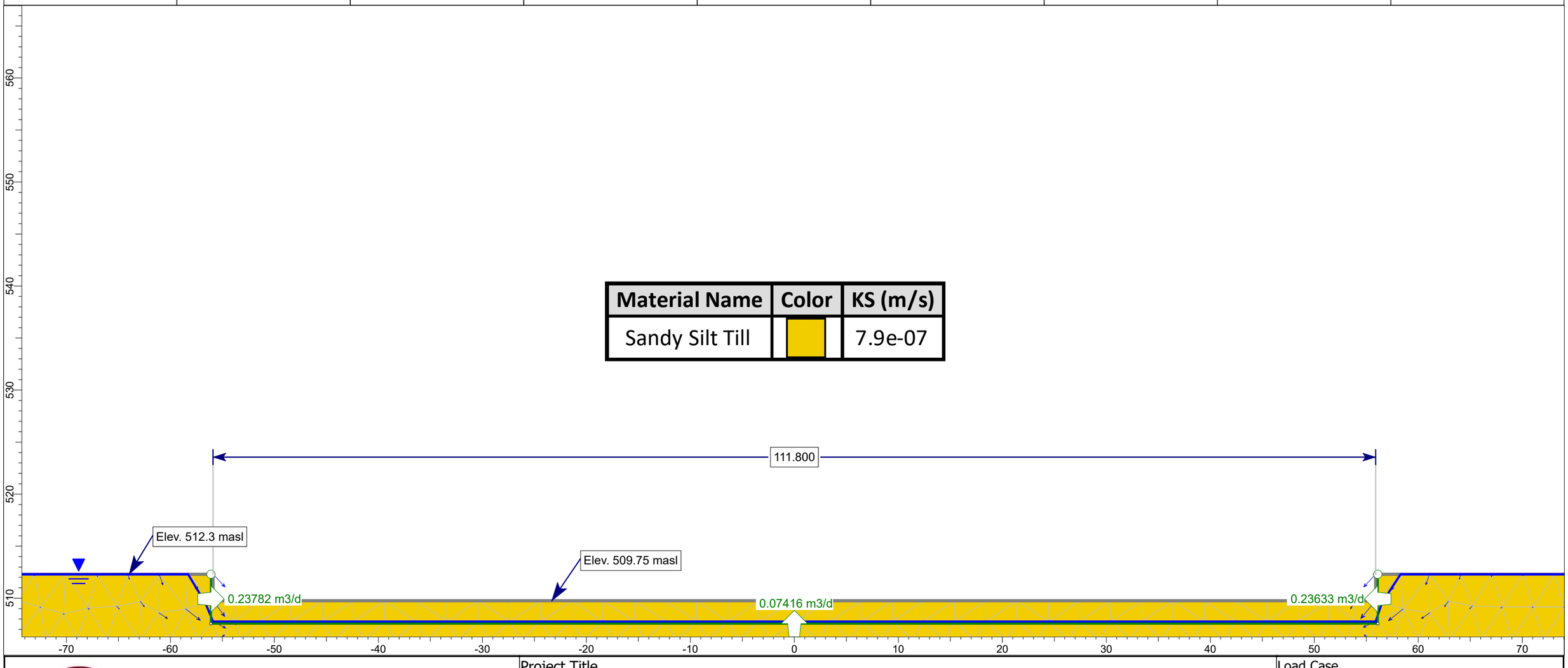
SCALE:	DATE:	PROJECT No.:
1:500	SEP. 27, 2024	23142
DRAWN BY: D.N.Z.	DRAWING No.:	FSGP-1
CHKD BY: D.A.G.		

S:\Projects\2023\23142\Drawings\Working\FSGP-1_23142.dwg, FSGP-1, 2024-10-03 1:14:02 PM

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 1 - Building A
Shoring System	Permeable
Excavation Dimensions (m)	111.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Excavation (masl)	Base of Footings (masl)	Base of Elevator Pit (masl)	Groundwater Table (masl)	Groundwater Flow Rate (L/Day) - SF 1.5	Storm Event Flow Rate (L/Day)	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
512.3	510.25	509.75	509.0	508.75	512.3	107,250.0	120,700.0	227,950.0



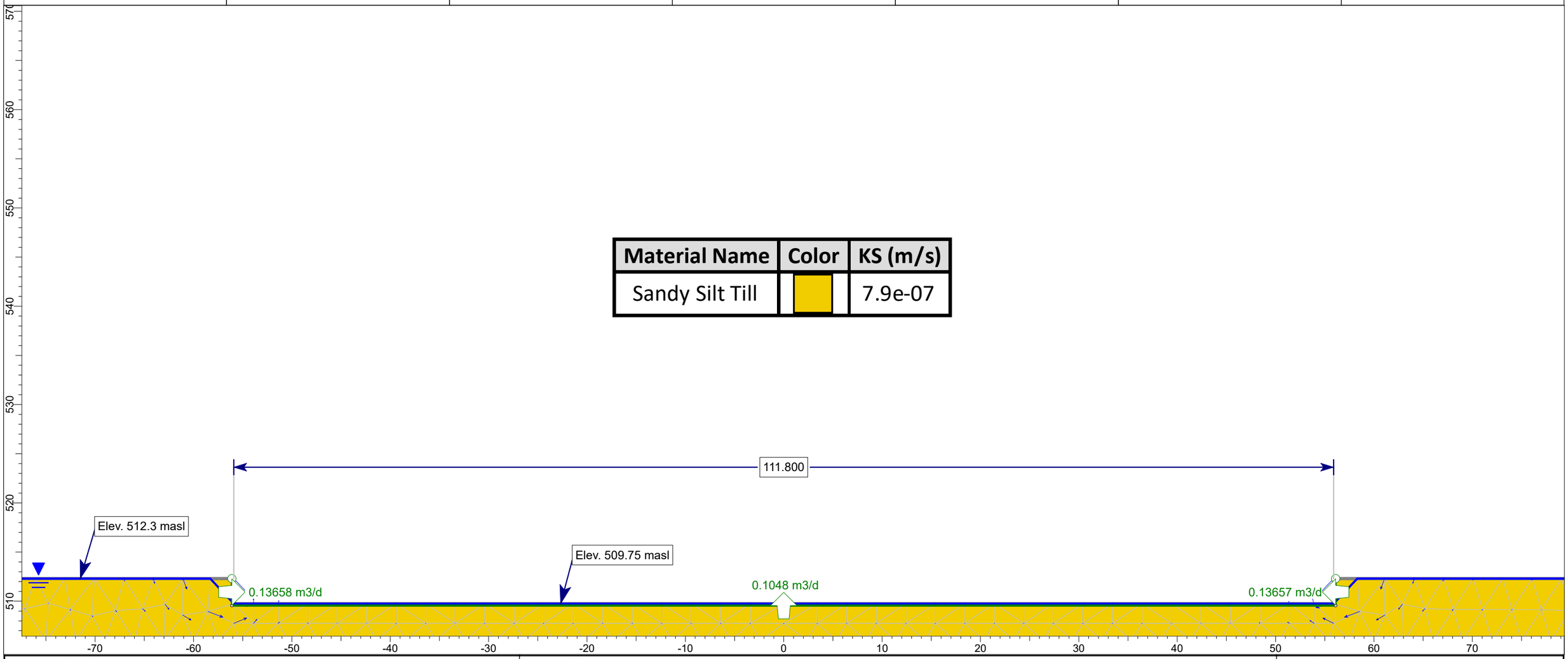
Soil Engineers Ltd.

Project Title	HydroG Asessment		Load Case: Construction Dewatering
Location	Grey Rd 9 and Ida Street, Dundalk		
Drawn By: TA	Checked By: NA	Scale: 1:364	
Date: 2025-01-16, 12:05:54 PM		Reference No.: 2310-W058	Drawing No.: 1

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 1 - Building A
Shoring System	Permeable
Excavation Dimensions (m)	111.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Drainage Layer (masl)	GroundWater Table (masl)	Groundwater flow rate L/Day - SF 1.5	Storm Event Flow Rate L/Day	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
512.3	510.25	509.75	512.3	64,950.0	3,900.0	68,850.0



Soil Engineers Ltd.

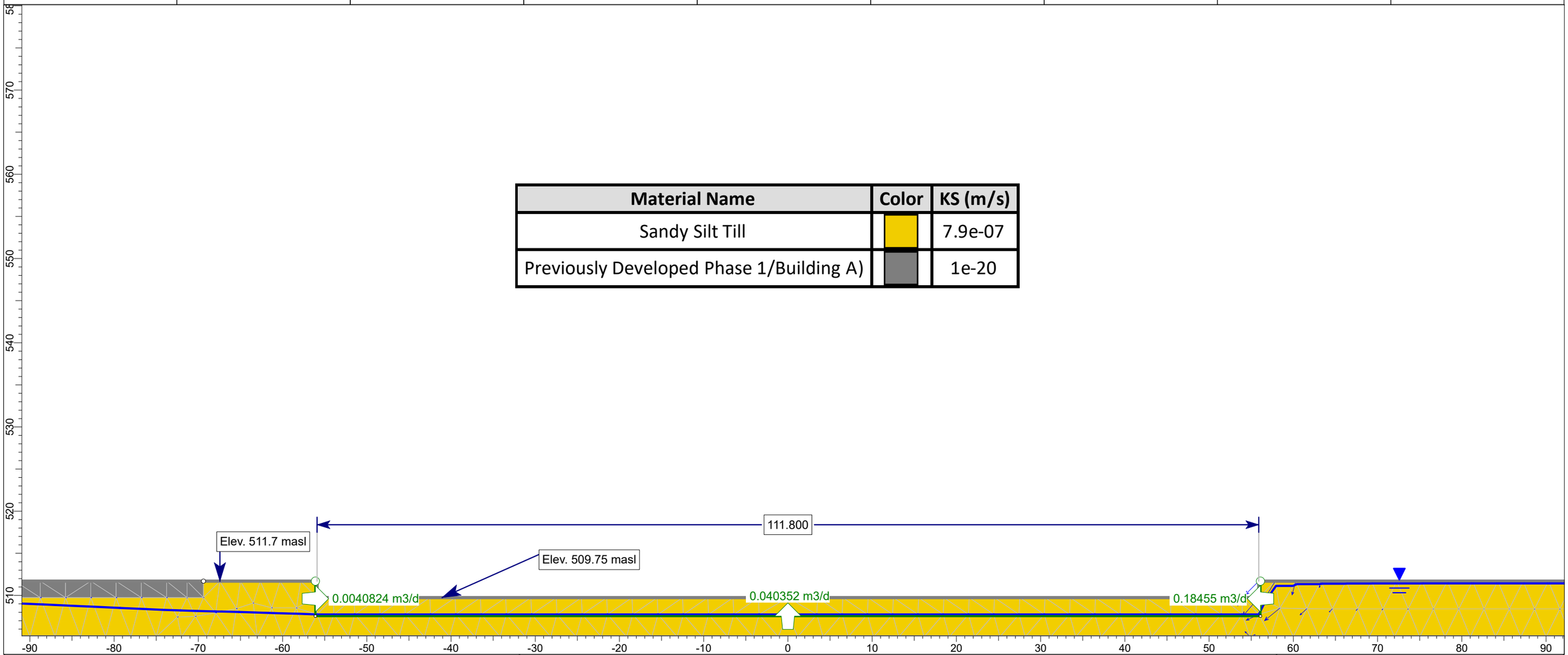
Project Title	HydroG Asessment		Load Case: Foundation Drainage
Location	Grey Rd 9 and Ida Street, Dundalk		
Drawn By: TA	Checked By: NA	Scale: 1:385	
Date: 2025-01-16, 12:05:54 PM		Reference No.: 2310-W058	Drawing No.: 2

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 2 - Building B
Shoring System	Permeable and Previously Developed Phase 1
Excavation Dimensions (m)	11.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Excavation (masl)	Base of Footings (masl)	Base of Elevator Pit (masl)	Groundwater Table (masl)	Groundwater Flow Rate (L/Day) - SF 1.5	Storm Event Flow Rate (L/Day)	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
511.7	510.25	509.75	509.0	508.75	511.43	73,500.0	120,700.0	194,200.0

Material Name	Color	KS (m/s)
Sandy Silt Till		7.9e-07
Previously Developed Phase 1/Building A)		1e-20



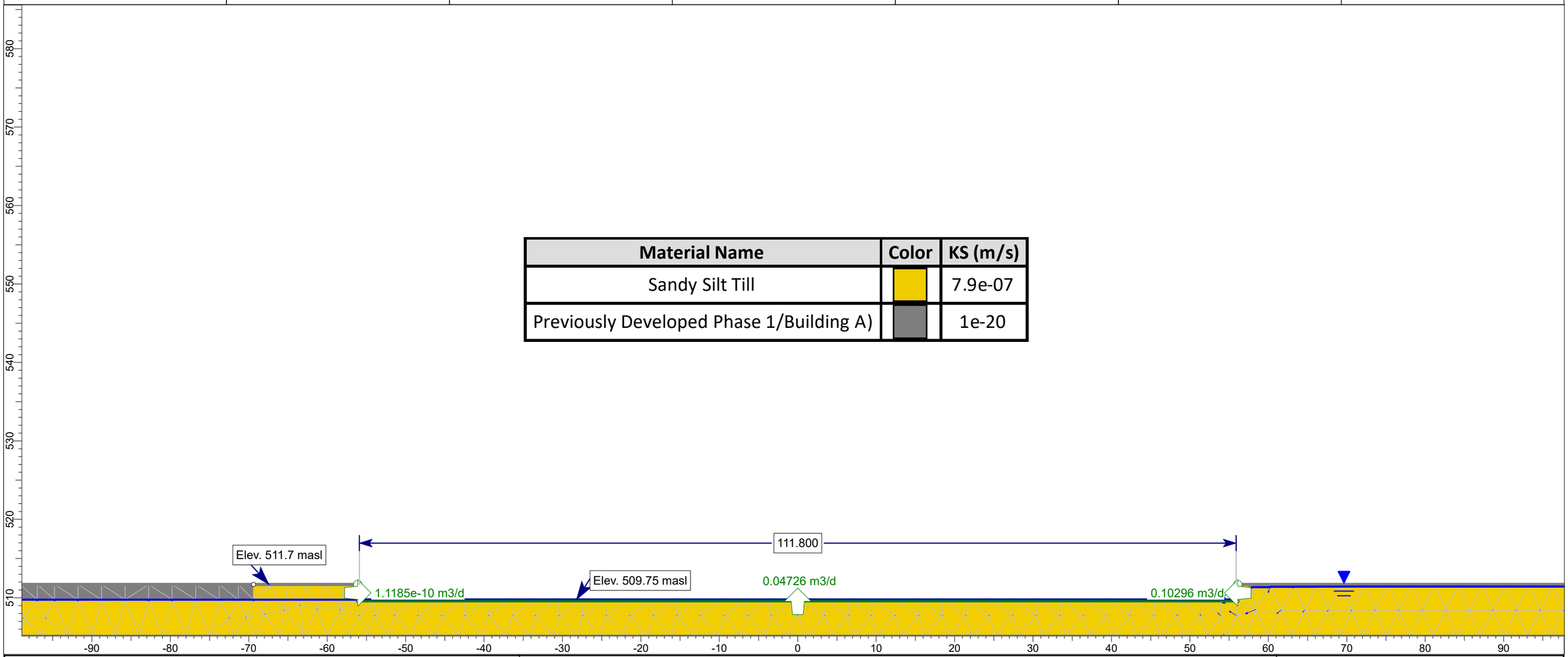
Soil Engineers Ltd.

Project Title	HydroG Assessment			Load Case	Construction Dewatering
Location	Grey Road 9 and Ida Street				
Drawn By	TA	Checked By	NA	Scale	1:450
Date	2025-01-17, 10:12:48 AM			Reference No.	2310-W058
				Drawing No.	3

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 2 - Building B
Shoring System	Permeable and Previously Developed Phase 1
Excavation Dimensions (m)	111.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Drainage Layer (masl)	GroundWater Table (masl)	Groundwater flow rate L/Day - SF 1.5	Storm Event Flow Rate L/Day	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
511.7	510.25	509.75	511.43	42,150.0	3,900.0	46,050.0



Material Name	Color	KS (m/s)
Sandy Silt Till		7.9e-07
Previously Developed Phase 1/Building A)		1e-20

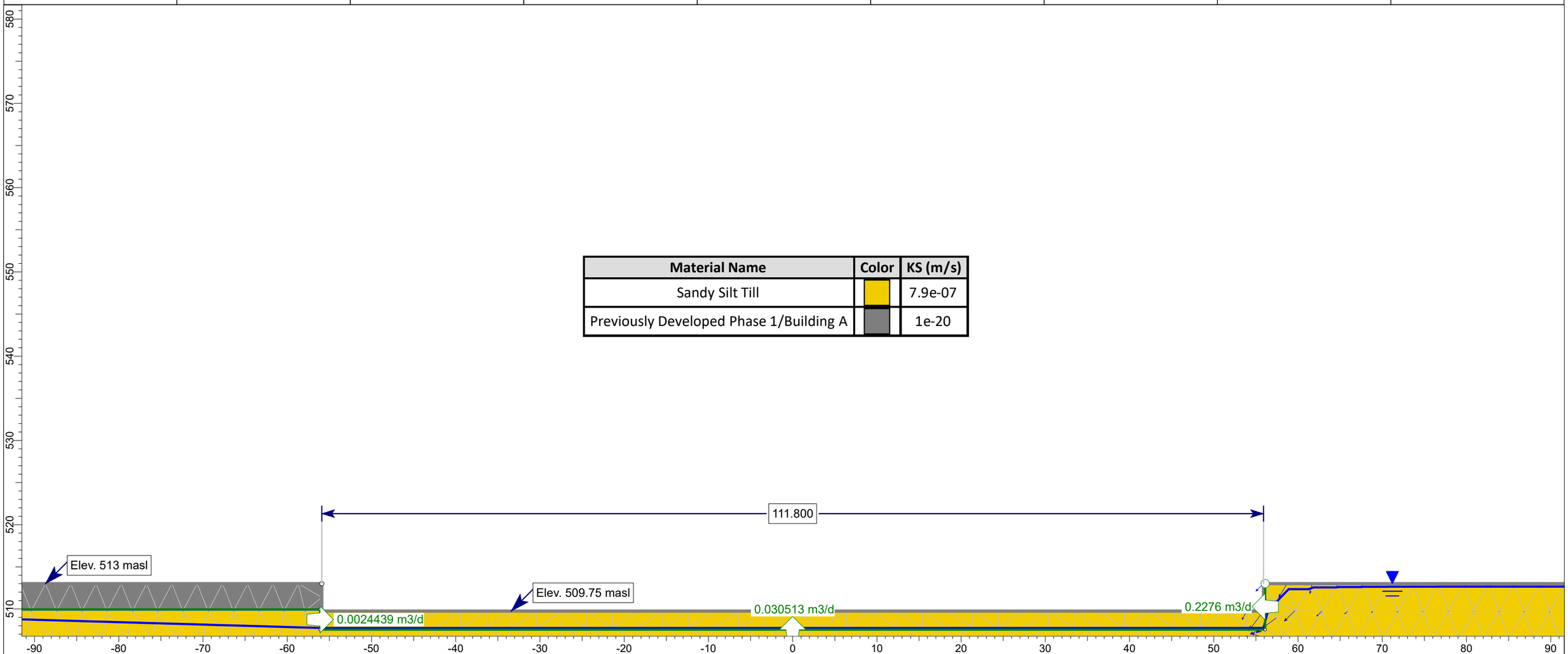
Soil Engineers Ltd.

Project Title	HydroG Assessment		Load Case: Foundation Drainage
Location	Grey Road 9 and Ida Street		
Drawn By: TA	Checked By: NA	Scale: 1:483	
Date: 2025-01-17, 10:12:48 AM		Reference No.: 2310-W058	Drawing No.: 4

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 3 - Building C
Shoring System	Permeable and Previously Developed Phase 1
Excavation Dimensions (m)	111.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Excavation (masl)	Base of Footings (masl)	Base of Elevator Pit (masl)	Groundwater Table (masl)	Groundwater Flow Rate (L/Day) - SF 1.5	Storm Event Flow Rate (L/Day)	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
513.0	510.25	509.75	509.0	508.75	512.65	89,550.0	120,700.0	210,250.0



Material Name	Color	KS (m/s)
Sandy Silt Till		7.9e-07
Previously Developed Phase 1/Building A		1e-20

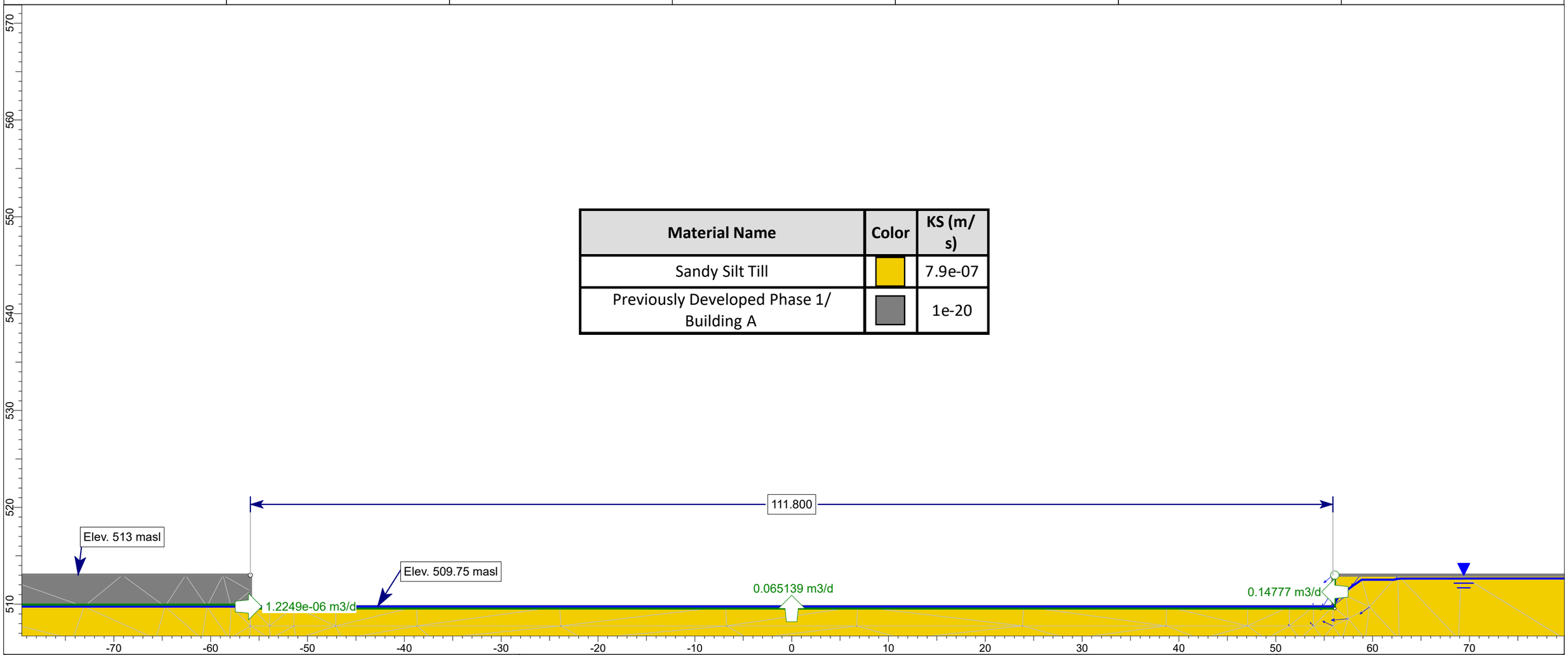
Soil Engineers Ltd.

Project Title	HydroG Assessment			Load Case	Construction Dewatering
Location	Grey Road 9 and Ida Street				
Drawn By	TA	Checked By	NA	Scale	1:450
Date	2025-01-17, 10:48:59 AM			Reference No.	2310-W058
Drawing No.	5				

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 3 - Building C
Shoring System	Permeable with Previously Developed Phase 1
Excavation Dimensions (m)	111.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Drainage Layer (masl)	GroundWater Table (masl)	Groundwater flow rate L/Day - SF 1.5	Storm Event Flow Rate L/Day	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
513.0	510.25	509.75	512.65	59,250.0	3,900.0	63,150.0



Material Name	Color	KS (m/s)
Sandy Silt Till		7.9e-07
Previously Developed Phase 1/ Building A		1e-20

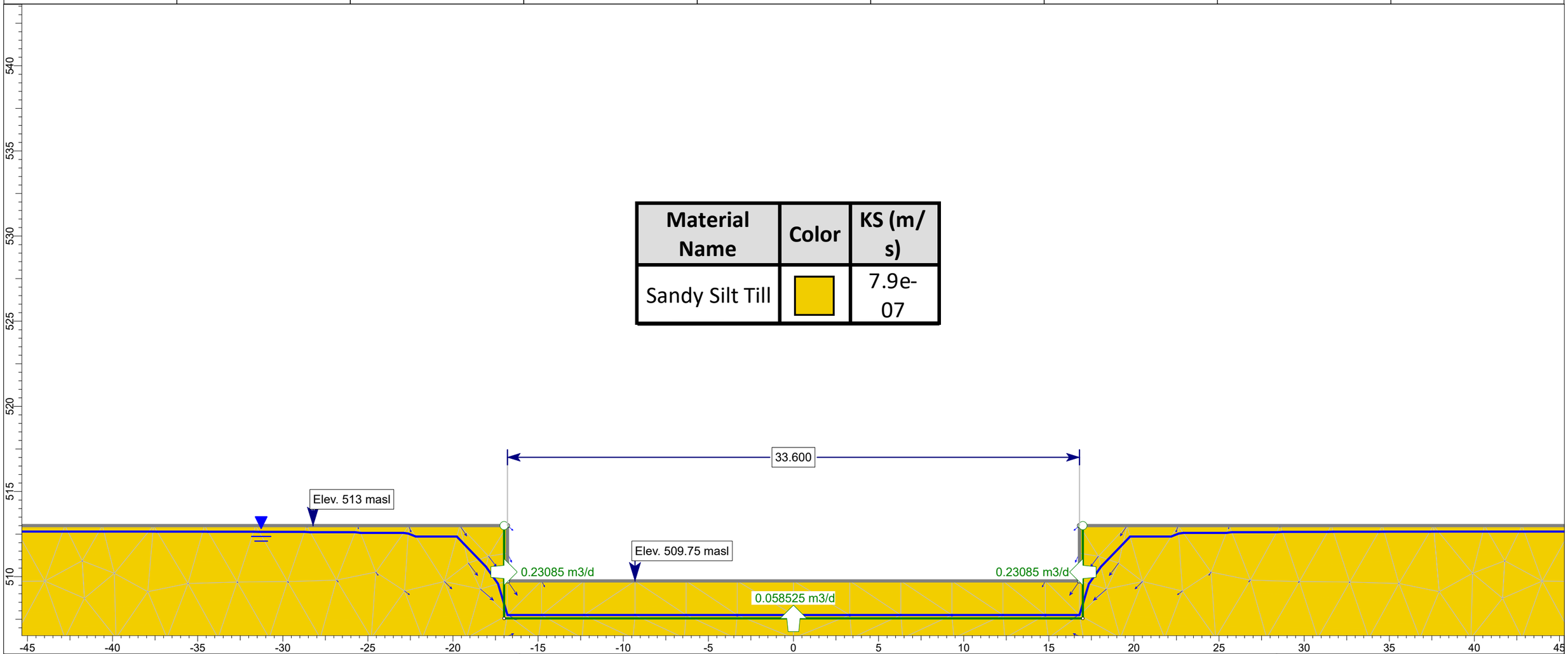
Soil Engineers Ltd.

Project Title	HydroG Assessment			Load Case	Foundation Drainage
Location	Grey Road 9 and Ida Street				
Drawn By	TA	Checked By	NA	Scale	1:391
Date	2025-01-17, 10:48:59 AM			Reference No.	2310-W058
Drawing No.	6				

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 4 - Building D
Shoring System	Permeable and Previously Developed Phases 2 and 3
Excavation Dimensions (m)	111.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Excavation (masl)	Base of Footings (masl)	Base of Elevator Pit (masl)	Groundwater Table (masl)	Groundwater Flow Rate (L/Day) - SF 1.5	Storm Event Flow Rate (L/Day)	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
513.0	510.25	509.75	509.0	508.75	512.65	87,300.0	120,700.0	208,000.0



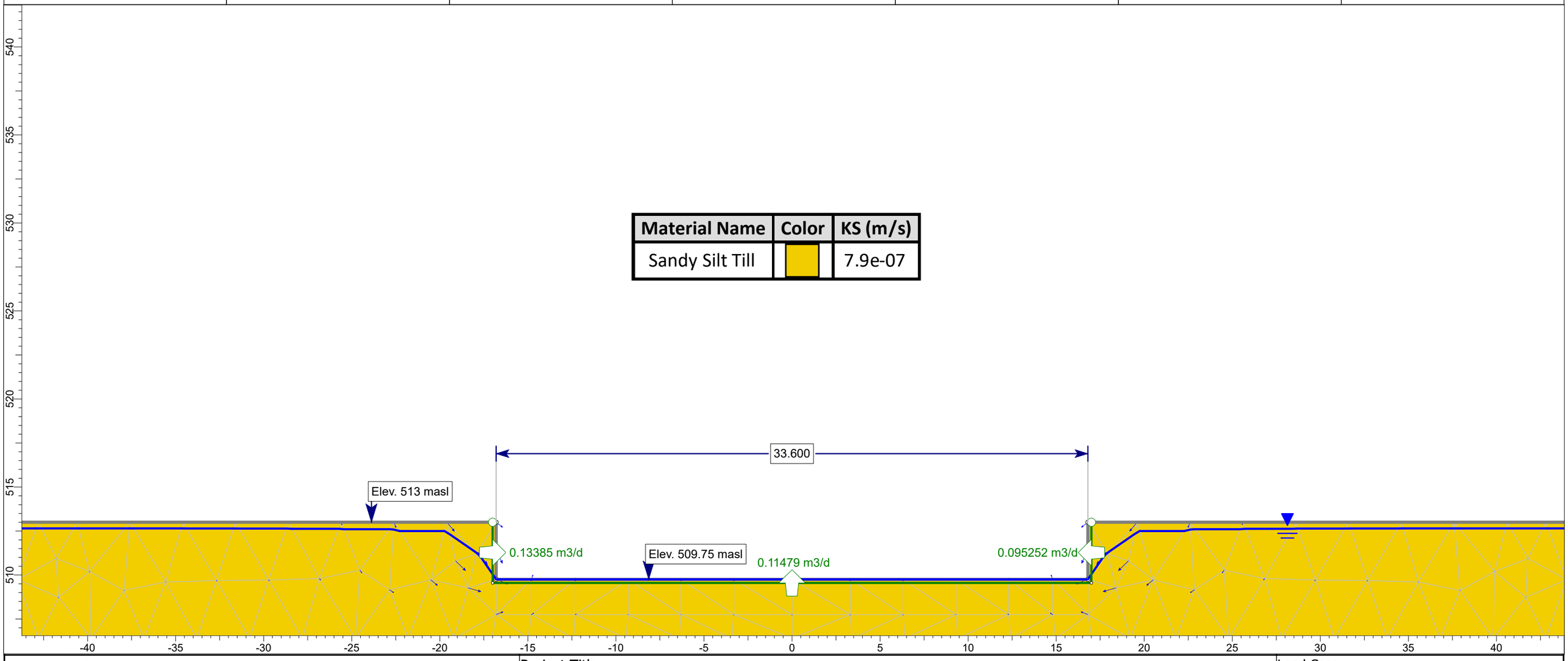
Soil Engineers Ltd.

Project Title	HydroG Assessment			Load Case	Construction Dewatering
Location	Grey Road 9 and Ida Street, Dundalk				
Drawn By	TA	Checked By	NA	Scale	1:223
Date	2025-01-17, 11:18:02 AM			Reference No.	2310-W058
Drawing No.	7				

Groundwater Control Needs
Summary of Assumptions and Proposed Excavation Details

Proposed Excavation Location	Phase 4 - Building D
Shoring System	Permeable and Previously Developed Phases 2 and 3
Excavation Dimensions (m)	111.8 x 33.6

Ground Surface Elevation (masl)	Lowest Finished Floor Elevation (masl)	Base of Drainage Layer (masl)	GroundWater Table (masl)	Groundwater flow rate L/Day - SF 1.5	Storm Event Flow Rate L/Day	Total Construction Dewatering Flow Rate (L/Day) - SF 1.5
513.0	510.25	509.75	512.65	64,200.0	3,900.0	68,100.0



Soil Engineers Ltd.

Project Title	HydroG Assessment		Load Case: Foundation Drainage
Location	Grey Road 9 and Ida Street, Dundalk		
Drawn By: TA	Checked By: NA	Scale: 1:215	
Date: 2025-01-17, 11:18:02 AM		Reference No.: 2310-W058	Drawing No.: 8