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Geotechnical Investigation

South Simpson Block Plan (Headwaters of West Rainbow Creek) and Master Environmental Servicing Plan Update

Coleraine Drive and Mayfield Road, Caledon, Ontario

Submitted to:
Simpson Road Landowners Group Inc.
c/o Ms. Helen Mihailidi
7501 Keele Street, Suite 200
Vaughan, ON L4K 1Y2

Submitted by:
GEI Consultants Canada Ltd.
142 Commerce Park Drive, Unit O
Barrie, Ontario, L4N 8W8
www.geiconsultants.ca

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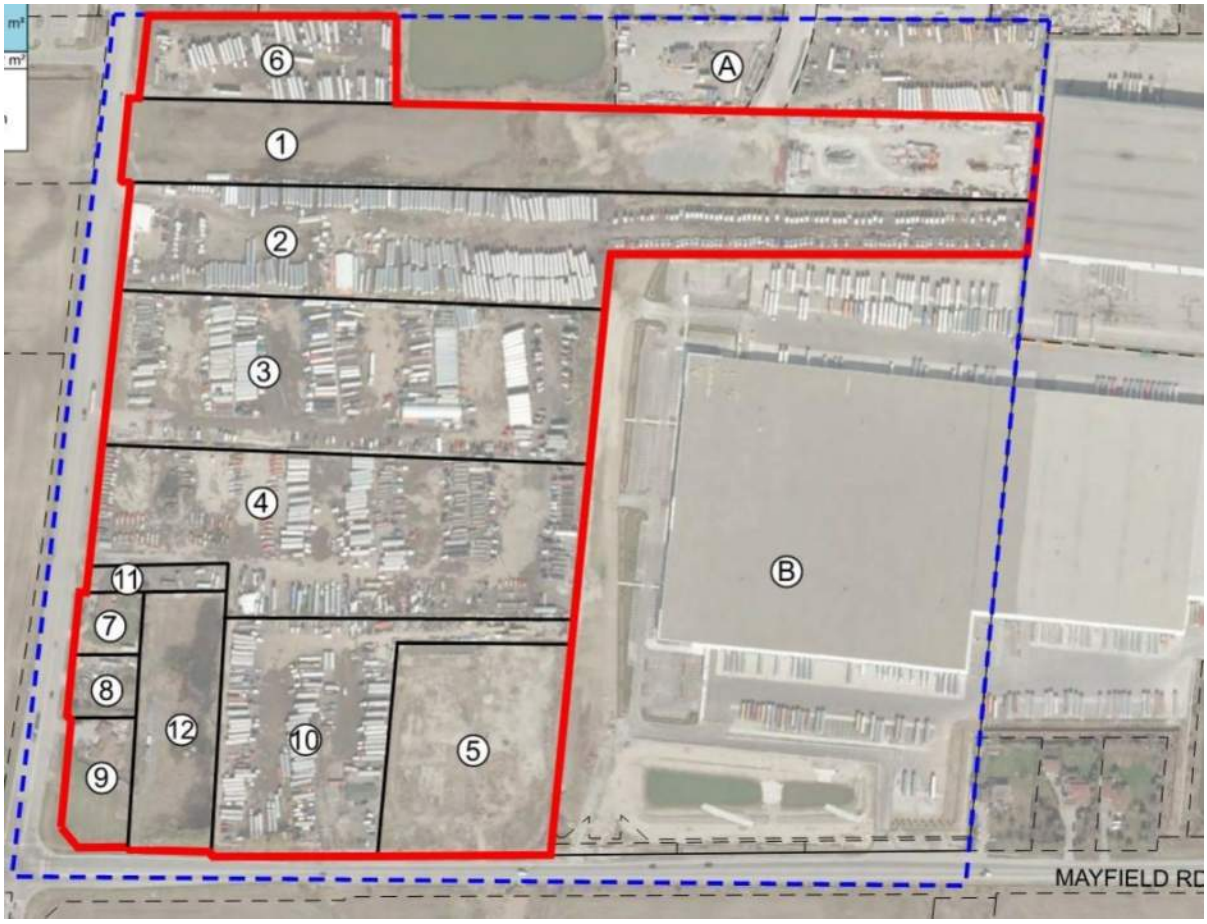
1. Introduction

GEI Consultants Canada Limited (GEI) was retained by Simpson Road Landowners Group Inc. (the Client) to complete a geotechnical report in reference to the required Block Plan and Master Environmental Servicing Plan update at South Simpson (Headwaters of West Rainbow Creek). These works are required as part of the submission for a proposed extension of Simpson Road and provide an update to the Master Environmental Servicing Plan 2000 (MESP) and incorporate the revisions made through the Municipal Class EA for Simpson Road (2013). The location of the proposed extension is in the northeastern quadrant of the intersection of Coleraine Drive and Mayfield Road in Caledon, Ontario. A summarized site location plan is enclosed as Figure 1 and below.

The subject lands are designated Prestige Industrial and General Industrial in the Official Plan. The subject lands are a part of the Town of Caledon's South Simpson Secondary Plan Area and are subdivided into twelve (12) distinct properties, separated by different landowners with the 12th property recently added to the lands. A site plan is below.



The subject lands have an approximate total area of 39.6 ha and are currently occupied by open lands, various truck and transportation uses, and a former garden supply store. The subject lands are bounded by Mayfield Road to the south, Coleraine Drive to the west, and mixed residential, commercial, and undeveloped lands to the east and north. Undeveloped lands exist within a southern parcel located on three sides by subject lands and Mayfield Road to the south.

Local elevations in the northeastern portion of the subject lands are near Elev. 236.0, sloping to the south-southeast with elevations near 230.5 with resulting maximum difference in elevation across the site is approximately 5.5 m based on topographic information provided. An aerial image of the site from 2022 is provided on Figure 2.

It is noted that the site and surrounding streets are not oriented in true north/south or east west directions and for purposes of this report Mayfield Road is considered to be oriented east/west and Coleraine Drive is considered to be oriented north/south.

GEI was provided the following information in preparation of this report:

- "*Block Planning for the South Simpson Secondary Plan, North-East Corner of Coleraine Drive and Mayfield Road, Ward 5."* Staff-Report 2022-0374, dated July 12, 2022, prepared by Planning Department, Town of Caledon
- *"South Simpson Secondary Plan Area Ownership"* Map, from Schedule "C" to Staff Report 2022-0374, dated May 25, 2022.
- *"Terms of Reference: South Simpson (Headwaters of West Rainbow Creek) Master Environmental Servicing Plan Update",* Town of Caledon
- *"Hydrogeological Appraisal Simpson Road Completion from North of George Bolton Parkway to Mayfield Road Town of Caledon, Ontario"* prepared by AMEC Earth & Environmental Limited, dated March 8, 2011.
- *"Simpson Road Extension Phase 3, from 282 m South of Parr Boulevard to Mayfield Road, Contract 14-09",* prepared by Wood and commissioned by Region of Peel, dated November 2020.
- *"Rainbow Creek Channel Realignment",* prepared by Greck, dated July 30, 2025.
- *"MESP Update – Simpson Road",* prepared by GEI, third submission, dated April 2026.

The proposed development involves the construction of the extension of Simpson Road southerly approximately 600 m to Mayfield Road. A road concept plan is shown in Figure 3A. The proposed road is to be constructed about 1 to 2 m above existing grade along the alignment and includes associated site servicing, as deep as 4.0 m below existing grade corresponding to about 5 to 6 m below the proposed road grade. The existing open channel will also be

re-aligned slightly to the west to allow for the road extension. A concept plan for the channel is shown in Figure 3B. It is understood that the latest concept for the channel will comprise an extended SWM pond outlet about 130 m from the SWM pond at the north end of the site, then transition to back to a newly designed open channel. Driveways will be created to provide access to the lots on the west side of the open channel and to allow for lot servicing. Culverts will be utilized to carry the channel under the driveways. The design configuration regarding buildings has not been established at this time but are mainly assumed to comprise large slab-on-grade structures. It is also assumed that some earthworks will be required to establish the proposed grades when the design concept has been confirmed, as the road will be established through raised grades.

The purpose of the geotechnical investigation was to assess the subsurface soil conditions at the site, and based on this information, provide geotechnical engineering recommendations in support of the proposed development. This report summarizes the borehole findings, provides design geotechnical engineering recommendations regarding available bearing capacities for foundations, slabs-on-grade and drainage, site servicing installation, channel implementation and pavement design. Considerations for constructability such as soil excavation, compaction, on-site backfill suitability and temporary groundwater control are also provided.

It is noted that the recommendations provided in this report must be considered preliminary in nature for building foundations and specific lot earthworks due to the current uncertainty of the design for the project. As the design progresses further geotechnical review and input may be required which might necessitate the need for additional investigation and/or analysis.

A hydrogeological report and monthly groundwater measurements were also a part of the scope and are provided under separate cover.

2. Procedures and Methodology

It is noted that all elevations in this report are metric/geodetic and expressed in metres (m). All measurements are also in metric and expressed in millimetres (mm), metres (m) or kilometres (km).

Prior to the commencement of drilling activities, the borehole locations were staked in the field by GEI based on a plan provided by the Client. Ground surface elevations of the boreholes and horizontal co-ordinates (referencing NAD 83 geodetic datum) were surveyed by GEI with a Topcon FC – 5000 GPS Survey unit.

Underground utilities including natural gas, electrical, telephone, water, etc. were marked out by public and private utility locating companies prior to drilling, co-ordinated by GEI.

The fieldwork for the drilling program was carried out on between May 17 and 19, 2023. Boreholes 1 to 8 were drilled to 6.6 m depth (Elev. 223.8 to 227.3). In addition, shallow Boreholes 4S and 6S were drilled adjacent to Boreholes 4 and 6, respectively to 2.3 m depth (Elev. 228.1 and 229.1) to install secondary wells. Borehole logs are provided in Appendix A and the borehole locations are shown on Figure 2.

The boreholes were advanced by a drilling subcontractor retained by the Client and supervised by GEI using a track-mounted drill rig, solid stem augers, and standard soil sampling equipment. Sampling was conducted using a 51 mm O.D. Split Spoon (SS) sampler. Standard Penetration Test (SPT) “N” Values (N values) were recorded for the sampled intervals as the number of blows required to drive an SS sampler 305 mm into the soil using a 63.5 kg drop hammer falling 750 mm, in accordance with ASTM D1586. In each borehole soil sampling was conducted at 0.75 m intervals for the upper 3.0 m and at 1.5 m intervals thereafter.

Monitoring wells were installed in all boreholes except Borehole 7 by GEI to facilitate long-term groundwater monitoring, each consisting of 50 mm diameter PVC pipe with a 1.5 m long screen and protective casing. The well in Borehole 2 was covered soon after installation by a regrading operation and is inaccessible. As noted above shallow secondary wells installed in Boreholes 4S and 6S. Monitoring well construction is shown on the borehole logs in Appendix A. Boreholes without wells were backfilled in accordance with O.Reg. 903.

The GEI field staff examined, and classified characteristics of the soils encountered in the boreholes, including the presence of fill materials, groundwater observations during and upon completion of the drilling, recorded observations of borehole construction, and processed the recovered samples. All recovered soil samples were logged in the field, carefully packaged, and transported to GEI’s laboratory for more detailed examination and classification.

In GEI's laboratory, the samples were classified as to their visual and textural characteristics. Six (6) representative samples of the major soil units were selected and submitted to our laboratory for grain size analysis. Grain size results are provided in Appendix B.

3. Subsurface Conditions

3.1 General Overview

The detailed soil profiles encountered in the boreholes are indicated on the attached borehole logs in Appendix A, and the geotechnical laboratory results are included in Appendix B. The borehole locations are shown in Figure 2.

It should be noted that the conditions indicated on the borehole logs are for specific locations only and can vary between and beyond the locations. It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones and should not be interpreted as exact planes of geological change.

In addition, the descriptions provided in the borehole logs are inferred from a variety of factors, including visual observations of the soil samples retrieved, measurements prior to and after drilling, the drilling process itself (speed of drilling, shaking/grinding of the augers, etc.) and laboratory testing. The passage of time also may result in changes in conditions interpreted to exist at locations where sampling was conducted.

3.2 Stratigraphy

It is noted that Boreholes 4S and 6S have the same stratigraphy as Boreholes 4D and 6D, respectively, and are not referenced below. In the descriptions below, Boreholes 4 and 6 refer to Boreholes 4D and 6D, respectively.

3.2.1 Pavement

Boreholes 1, 2, 6 and 7 encountered asphalt at the ground surface. The asphalt/recycled asphalt was 25 to 760 mm thick. No underlying granular material was distinguishable.

Granular material was present at the surface of Borehole 8 and was 720 mm thick.

3.2.2 Topsoil

A surficial topsoil layer was at the ground surface at Boreholes 3, 4, 5 and was 25 to 180 mm thick. Topsoil thicken may vary across the site considering the various uses and status of the various yards.

3.2.3 Fill

Fill was beneath the surficial soil in Boreholes 1 to 6 and extended to 0.6 to 1.5 m depth (Elev. 229.6 to 233.3). The fill was variable and typically comprised clayey silt, locally sandy silt or sand. The soil was described as moist and moisture contents were 2 to 23%. The N values, where taken, ranged from 6 to 20, indicating firm to very stiff / loose to compact conditions.

3.2.4 Clayey Silt

Underlying the fill and/or topsoil/pavement, an upper clayey silt unit was present to 1.5 to 2.3 m depth (Elev. 228.9 to 232.3) in all boreholes, except Borehole 2. The consistency was stiff to very stiff with N values of 9 to 29, locally firm in Borehole 6 with N values of 4 to 6. The soil was moist with moisture contents of 13 to 24%.

A lower clayey silt layer was present in Boreholes 1 to 3 and 6, beneath the glacial till deposit described below, and extending to the 6.6 m depth of exploration (Elev. 224.9 to 227.3). In Boreholes 4, 5 and 7 the clayey silt unit was penetrated at 6.1 m depth (Elev. 224.3 to 226.5). Two (2) samples of the material from the lower layer were submitted for grain size analysis and the results are provided on Figure B1 in Appendix B. The unit was very stiff with N values of 19 to 20, locally stiff with an N value of 14. The soil was moisture with moisture contents of 10 to 16%.

3.2.5 Glacial Till

A major glacial till deposit was present in all boreholes below the upper clayey silt, locally the fill in Borehole 2, and extended to 4.6 to 6.1 m depth (Elev. 225.3 to 229.) Three (3) samples of the material from the deposit were submitted for grain size analysis and the results are provided on Figure B2 in Appendix B. The deposit varied from clayey silt, some sand to sandy clayey silt with trace gravel. Cobbles and boulder were inferred due to augers grinding. The deposit was very stiff to hard with N values of 15 to 54. The till was moist with moisture contents of 10 to 18%.

A second lower layer of glacial till was revealed in Boreholes 4, 5 and 7 below the lower clayey silt unit at 6.1 m depth (Elev. 224.3 to 226.1) to the 6.6 m depth of exploration (Elev. 223.8 to 226.0). The second till layer was also variable, being sandy silt to sandy clayey silt to clayey silt, with trace gravel. The N values in the lower till layer ranged from 7 to greater than 50 (firm to very stiff, or very dense). The till was moist with moisture contents of 9 to 15%.

3.2.6 Sand and Silt

A discontinuous layer of sand and silt was noted below the till in Borehole 8, from 6.1 m depth to the 6.6 m depth of exploration (Elev. 225.2 to 225.6). A sample of the material from the

deposit was submitted for grain size analysis and the results are provided on Figure B3 in Appendix B. The material was wet, with a moisture content of 13%. The soil was compact with an N value of 24.

3.3 Groundwater

Unstabilized groundwater level measurements and cave measurements were taken upon the completion of drilling of each borehole as shown on the borehole logs in Appendix A. These measurements were taken to provide a rough estimate of the possible excavation and temporary groundwater control constructability considerations that may arise. All boreholes, except Borehole 7 and was outfitted with a monitoring well with 50 mm diameter PVC well and 1.5 m long screen. Secondary wells we also installed in Boreholes 4S and 6S adjacent to Boreholes 4D and 6D with 1.5 m long screens. Monitoring well configuration and groundwater observations are noted on the borehole logs in Appendix A, and a summary is below.

Borehole	Depth of Cave (m) / Elev.	Unstabilized Groundwater Level Depth (m) / Elev.	Depth (m) / Elev. of Groundwater Table, June 7, 2023
1	Open (6.6 / 227.3)	No Water	4.7 / 229.2
2	Open (6.6 / 226.6)	No Water	N/A (well covered)
3	Open (6.6 / 232.1)	No Water	1.3 / 232.1
4D	Open (6.6 / 223.8)	No Water	1.7 / 228.7
4S	Open (2.3 / 228.1)	No Water	1.2 / 229.2
5	Open (6.6 / 224.6)	No Water	1.3 / 229.9
6D	5.4 / 226.0	No Water	1.3 / 230.1
6S	Open (2.3 / 229.1)	2.3 / 229.1	0.5 / 230.9
7	Open (6.6 / 226.0)	5.4 / 227.2	N/A
8	Open (6.6 / 225.2)	5.4 / 226.3	2.0 / 229.7

The stabilized groundwater levels in the monitoring wells were measured at 0.5 to 4.7 m depth in June 2023, typically corresponding to Elev. 229 to 230.

The clayey silt fill, clayey silt and till are typically impermeable. The sand fill and sand and silt are semi-permeable when wet.

GEI is currently conducting monthly groundwater level measurements for a full year and the results will be provided in a summery letter upon completion of the monitoring period.

Groundwater levels are expected to show seasonal fluctuations and vary in response to prevailing climate conditions.

4. Engineering Design Parameters & Analysis

The proposed development involves the construction of the extension of Simpson Road southerly approximately 600 m to Mayfield Road. A road concept plan is shown in Figure 3A. The proposed road is to be constructed about 1 to 2 m above existing grade along the alignment and includes associated site servicing, as deep as 4.0 m below existing grade corresponding to about 5 to 6 m below the proposed road grade. The existing open channel will also be re-aligned slightly to the west to allow for the road extension. A concept plan for the channel is shown in Figure 3B. It is understood that the latest concept for the channel will comprise an extended SWM pond outlet about 130 m from the SWM pond at the north end of the site, then transition to back to a newly designed open channel. Driveways will be created to provide access to the lots on the west side of the open channel and to allow for lot servicing. Culverts will be utilized to carry the channel under the driveways. The design configuration regarding buildings has not been established at this time but are mainly assumed to comprise large slab-on-grade structures. It is also assumed that some earthworks will be required to establish the proposed grades when the design concept has been confirmed, as the road will be established through raised grades.

It is noted that the recommendations provided in this report must be considered preliminary in nature for building foundations and specific lot earthworks due to the current uncertainty of the design for the project. As the design progresses further geotechnical review and input may be required which might necessitate the need for additional investigation and/or analysis.

4.1 Site Grading

The site grading was not fully established at the time of this preliminary report. It is assumed that some grading will be required during the development of the site, as the road grade will be raised about 1 to 2 m above existing grade.

In general, it is recommended to remove existing topsoil/organics, fill or other deleterious material and raise grades to the desired level with engineered fill to support buildings, services and pavements.

4.1.1 Engineered Fill

GEI defines “engineered fill” as material that will support foundations, and which is placed and compacted in a specified and controlled manner under full-time supervision of geotechnical engineering staff.

In any location where engineered fill will be placed to raise grades or replace poor/weak soil, the topsoil, vegetation, peat and unsuitable native soil must be fully removed down to competent native soil. The exposed subgrade soil must be proof-rolled and inspected by the geotechnical engineer to ensure all unsuitable material (e.g., organics, weak or soft soil, weathered / disturbed soil, deleterious materials, existing fill) is removed from the engineered fill footprint. Any unsuitable areas must be further sub-excavated and replaced with fill compacted to targeted 100% Standard Proctor Maximum Dry Density (SPmdd) in building areas and 95% SPmdd in road and servicing areas.

Once the subgrade is approved, engineered fill can be placed. Engineered fill must be placed under the full-time supervision of a geotechnical engineer as required in the Ontario Building Code. The engineered fill may consist of excavated on-site inorganic cohesionless soils provided they have been moisture conditioned to a moisture content within 2% of optimum moisture content and do not contain organics, topsoil/peat or deleterious material. It is recommended that any imported soil consist of Granular B (OPSS.MUNI 1010) and be first used in building areas, with suitable on-site soil used in landscaped or road areas. Engineered fill must be placed in loose lifts of 200 mm or less and compacted as noted above.

In wet subgrade areas, the first lift of engineered fill shall consist of 400 mm of Granular B Type II (OPSS.MUNI 1010). This will help to bridge the weaker subgrade and improve the ability to achieve the compaction specifications for subsequent engineered fill lifts.

The engineered fill must extend a minimum of 1 m out from all sides of the foundations and extend at a 1 horizontal to 1 vertical slope (1H:1V) down to the exposed subgrade. A typical detail for engineered fill pad dimensioning is included in Appendix C.

4.2 Foundation Design

4.2.1 Foundations on Native Soil

The individual lot grading or configuration is to be determined at a later date, and therefore footing levels were not known at the time of this report.

In general, foundations at this site may be constructed as conventional shallow spread and strip footing foundations that bear on the native, undisturbed soil. Existing fill is unsuitable for support of building foundations. For general planning and design purposes, it is recommended that a geotechnical reaction at Serviceability Limit State (SLS) of 150 kPa (for 25 mm or less of total settlement), and a factored geotechnical resistance at Ultimate Limit State (ULS) of 225 kPa be adopted for design. Locally at Boreholes 6 and 7, the upper soil was not suitable to support the bearing resistance values noted above and excavation 1.0 to 1.5 m into the native soil will be required to achieve the bearing resistance noted above.

It is noted that higher bearing resistance are available at depth and can be provided if required.

Final footing elevations must be reviewed by geotechnical personnel from GEI to confirm bearing capacity values. The final site configuration must also be reviewed by GEI to assess the potential for footings to be founded on different soil subgrades, and to assess the potential for differential settlement. It is recommended that all foundations for each individual building / structure be set on the same soil subgrade wherever possible, to reduce the potential for differential settlement.

4.2.2 Foundations on Engineered Fill

If the foundations are supported on an engineered fill pad, constructed as discussed in Section 4.1.1, the spread or strip footings can be designed using the underlying native soil bearing capacity shown above, up to a maximum of 150 kPa at SLS and 225 kPa at ULS.

It is recommended that nominal reinforcing steel for stiffening of the foundation walls made on engineered fill be provided to help mitigate minor cracking due to minor differential settlement. The reinforcing steel in the poured concrete foundation walls may consist of 2-15M bars continuous at the top of the foundation wall, and 2-15M bars continuous at the bottom of the foundation walls. Typically, these bars are placed 100 to 200 mm from the top or bottom of the foundation wall, respectively. The reinforcing steel should extend a minimum of 3 m past any transition zones between engineered fill and native soil. A typical reinforcing steel detail for foundation walls placed on engineered fill is provided within Appendix C. The recommended nominal reinforcing steel should not be considered a structural design. The need for different or additional reinforcement should be reviewed by a structural engineer to ensure the original structural design intent of the structure is maintained.

4.2.3 General Foundation Considerations

All footings exposed to ambient air temperature throughout the year must be provided with a minimum of 1.2 m of earth cover or equivalent insulation for frost protection (25 mm of polystyrene insulation is equivalent to 300 mm of soil cover). The minimum strip and spread footing widths to be used shall be dictated as per the Ontario Building Code, regardless of loading considerations. Footings stepped from one level to another must be at a slope not exceeding 7V:10H.

The foundation design parameters provided above are predicated on the assumption that the foundation subgrade surface is undisturbed, and that all peat, earth fill, deleterious, softened, disturbed, organic, and caved material is removed. The foundation excavation must be done in such a way that groundwater is controlled to prevent any disturbance to the foundation base. The groundwater table must be lowered at least 1 m below the founding elevation prior to excavation to prevent disturbance to the foundation subgrade from groundwater seepage.

The foundation subgrade must be reviewed prior to concrete placement to ensure the foundation design parameters provided are applicable, and to provide remedial recommendations if necessary. If the foundation excavation will be open for a prolonged period of time, the foundation subgrade should be protected with a skim coat of lean mix concrete (applied immediately after inspection by the geotechnical engineer), to ensure that no deterioration will occur due to weather effects.

4.3 Floor Slabs

Based on the discussion in Section 4.1, it is envisioned that the floor slabs will be supported by engineered fill, locally native soils.

The exposed subgrade must be proof-rolled and inspected by the geotechnical engineer. If any soft or weak subgrade areas are identified, or if there are areas containing excessive amounts of deleterious/organic material, they must be locally sub-excavated and backfilled with approved clean earth fill or imported granular material and compacted to a minimum of 98% SPmdd within 2% optimum moisture content.

All building floor slabs must be provided with a capillary moisture barrier and drainage layer. This is made by placing the concrete slab on a minimum 200 mm layer of 19 mm clear stone (OPSS.MUNI 1004) compacted by vibration to a dense state. The upper 50 mm of clear stone can be replaced with 19 mm crusher run limestone for a working surface. The clear stone and the subgrade soil must be separated by a geotextile such as Terrafix 270R (or approved equivalent) to prevent the migration of fines into the clear stone layer which could result in loss of support for the slab. Alternatively, Granular A (OPSS.MUNI 1010) compacted to 100% SPmdd can be utilized without filter cloth.

4.4 Drainage

At this preliminary stage, for the proposed commercial and industrial planned buildings, it assumed that all structures will be slab-on-grade. For new structures that will be slab-on-grade with no basement levels, perimeter and under-slab drainage at the foundation level is not required, provided that the underside of the concrete slab is at least 200 mm above the prevailing grade of the site and the surrounding surfaces slope away from the building at a gradient of at least 2% to promote surface water run-off and to reduce groundwater infiltration adjacent to foundations. To minimize infiltration of surface water, the upper 150 mm of backfill should comprise relatively impervious/cohesive compacted soil material.

4.5 Site Servicing

The drawings provided show the sanitary service as deep as 4 m below existing grades corresponding to 5 to 6 m below the proposed grades. The watermain and storm were typically only about 2.0 to 2.5 m below existing grade.

The proposed extended SWM pond outlet will comprise a 4.2 m wide by 1.5 m high closed bottom pre-cast concrete box culvert with invert about 3.0 to 4.0 m below existing grade.

Servicing for some lots on the west side of the open channel will be carried out within the driveways below the local culverts that will convey the creek under the driveways.

4.5.1 Bedding

The type of material and depth of granular bedding below the pipe will, to some extent, depend on the method of construction used by the contractor. Pipe bedding for flexible pipes should follow the requirements in Ontario Provincial Standard Drawing (OPSD) 802.010 or applicable municipal standards. Pipe bedding for rigid pipes should follow the requirements in OPSD 802.030 to 802.032 or applicable municipal standards.

A subgrade consisting of the inorganic native soil or engineering fill will provide adequate support for pipes with the bedding requirements as laid out in the above referenced OPS drawings. Where disturbance of the trench base has occurred from groundwater seepage, construction traffic, etc., or if loose native soil is present at the invert level, the material should be sub-excavated and replaced with suitably compacted granular fill. If weak zones are encountered, additional bedding materials and differing construction practices may be required and should be determined during construction. Any zones of peat or organic soil should be sub-excavated and replaced with approved earth fill or imported granular material compacted to 95% SPmdd. Details on temporary groundwater control are provided in section 5.2.

Regardless of whether flexible or rigid pipes are implemented, granular bedding and cover material should consist of a well graded, free draining material, such as Granular “A” (OPSS.MUNI 1010). All granular bedding must be compacted to a minimum of 95% SPmdd.

4.5.2 Backfill

Excavated native inorganic cohesionless soil may be re-used as backfill in trenches, provided it is moisture conditioned so that the moisture content is within 2% of optimum. Additional soil compaction details are provided in Section 5.3. The backfill should be compacted to a minimum of 95% SPmdd. In confined areas the layer thickness will have to be reduced to utilize smaller compaction equipment efficiently or by using granular material instead of locally sourced fill. Any backfill that is frozen, contains a high percentage of organic material (topsoil, peat, etc.) or moisture, or has otherwise unsuitable deleterious inclusion should not be

used as backfill. The maximum cobble or boulder size should not exceed half of the loose lift thickness (i.e., all particles with a diameter greater than 100 mm should be removed). Cohesive site soil can be used as backfill but likely will require "drying" prior to use to achieve prior to compaction. The "drying" methods will require time and may not be practical.

Locally, where services cross under driveway culverts, U-fill can be utilized for ease as backfill above the services.

Where trenches are within the traveled portions of a roadway, backfill within the frost penetration depth of 1.2 m should consist of native, non-organic, excavated material consistent with the soils surrounding the trench. If this technique is not undertaken, then frequently problems arise with yearly differential frost heave movements between the trench backfill and the adjacent native soil. This would occur, for example, if imported granular material is used to backfill trenches which is less susceptible to frost effects compared to the native soils on site. Alternatively, if different soil is used as the backfill due to issues with achieving compaction, a frost taper of 10H:1V can be implemented to help mitigate the potential for differential settlement and frost heave.

Where frost cover cannot be achieved with earth cover for service pipes, insulation will be required.

4.6 Pavement Design

4.6.1 Subgrade Preparation

Simpson Road north of the proposed extension, supports an industrial and commercial and a heavy-duty design is warranted. The design drawings provided, noted a pavement design comprising 150 mm of asphalt (3 lifts) overt 150 mm of granular base over 450 mm of granular subbase.

Based on the boreholes and preliminary road profiles provided, the pavement subgrade will typically comprise the engineered fill material used to rase the road grade to design level. If site soils are utilized the material will consist of moderate to highly frost susceptible soil, which will not promote good drainage and require a thicker pavement structure. If a "pit run" material or Granular B Type I (OPSS.MUNI 1010) is utilized to raise grades, then the pavement structure can likely be reduced.

The subgrade must be inspected and approved by the geotechnical engineer at the time of construction. If the subgrade does not comprise engineered fill, the exposed pavement subgrade should be compacted to a minimum 95% SPmdd. If any soft or weak subgrade areas are identified, or if there are areas containing excessive amounts of moisture or

deleterious/organic material, they must be locally sub-excavated and backfilled with approved clean earth fill or imported granular material and compacted to a minimum of 95% SPmdd.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures must be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as possible when fill is placed, and the natural subgrade is not disturbed or weakened after it is exposed.

4.6.2 Drainage

Control of surface water is an important factor in achieving a good pavement life. The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (at a minimum grade of 2 percent) to provide effective drainage toward subdrains. Grading adjacent to pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement.

Continuous pavement subdrains should be provided along both sides of the roadway and drained into respective catchbasins to facilitate drainage of the subgrade and the granular materials. The subdrain invert should be maintained at least 0.3 m below subgrade level. To minimize the problems of differential movement between the pavement and catchbasins/manholes due to frost action, the backfill around the structures should consist of free-draining OPSS Granular B. Typical pavement drainage details are provided in Appendix C.

4.6.3 Pavement Structure

The industry pavement design methods are based on a design life of 15 to 20 years for typical weather conditions depending on actual traffic volumes. The following pavement thickness designs are provided on the above noted considerations with heavy duty traffic assumed, and subgrade comprising of the native moderate to highly frost susceptible soil used to raise the grades:

Pavement Layer	Compaction Requirements	Minimum Component Thickness
Surface Course Asphaltic Concrete: HL3 (OPSS 1150) with PG 58-28 Asphalt Cement (OPSS.MUNI 1101)	92% MRD (OPSS.MUNI 310)	40 mm
Binder Course Asphaltic Concrete: HDBC (OPSS 1150) with PG 58-28 Asphalt Cement (OPSS.MUNI 1101)		50 mm over 60 mm

Pavement Layer	Compaction Requirements	Minimum Component Thickness
Base Course: Granular A (OPSS.MUNI 1010)	100% SPmdd (OPSS.MUNI 501)	150 mm
Subbase Course: Granular B Type I (OPSS.MUNI 1010)		450 mm

The granular materials should be placed in lifts 200 mm thick or less and be compacted to a minimum of 100% SPmdd for both granular base and subbase. The granular and asphalt pavement materials and their placement should conform to OPSS 310, 501, 1010 and 1150.

If the pavement construction occurs in wet, winter or inclement weather, it may be necessary to provide additional subgrade support for heavy construction traffic by increasing the thickness of the granular subbase, base or both. Further, traffic areas for construction equipment may experience unstable subgrade conditions. These areas may be stabilized utilizing additional thickness of granular materials and/or geogrid.

It should be noted that in addition to adherence of the above pavement design recommendations, a close control on the pavement construction process will also be required in order to obtain the desired pavement life. Therefore, it is recommended that regular inspection and testing should be conducted during the pavement construction to confirm material quality, thickness, and to ensure adequate compaction.

Frost tapers of 10H:1V should be implemented between areas of differing pavement thickness and tie-in areas to existing pavement.

Smooth transitions are required in all areas where the new pavement meets the existing asphalt surface. Asphalt joints shall follow OPSS.MUNI 310. Longitudinal asphalt joints should be milled into the existing asphalt a minimum of 0.5 m for each lift. Transverse joint shall be milled into the existing asphalt a minimum 0.5 m for each lift. Successive joints should be staggered.

4.7 Channel Realignment

The proposed development will require realignment of the existing channel. The following geotechnical input/commentary is provided:

- It is understood that the channel will be constructed through cut for the most part, as deep as about 4 m, typically about 1 to 3 m. Beyond the initial cut slopes there will be

a relatively level base area (flood plain) with a deeper channel (about 0.5 m deep) meanders with cascading pools in the central part of the flood plain .

- In general bank slopes inclined at 3H:1V or flatter in native soil are acceptable. Some form/kind of vegetative protection is recommended. Slopes steeper than 3H:1V will require some other form of protection in addition to vegetation;
- Any channel banks that are not constructed in cut and require a bank to be constructed shall be constructed with engineered fill as described in Section 4.1.1, compacted to minimum 95% SPmdd.

5. Constructability Considerations

5.1 Excavations

Excavations for the project site are anticipated to extend about 4.5 m below existing grade to account for the services and bedding. Below the surficial topsoil or asphalt, excavations are anticipated to encounter fill over a cohesive clayey silt unit over a glacial till deposit. Harder digging and cobbles and boulders can be expected in the till deposit.

Excavations must be carried out in accordance with the Occupational Health and Safety Act, Ontario Regulation 213/91 (as amended), Construction Projects, Part III - Excavations, Section 222 through 242. Where workers must enter a trench or excavation the soil must be suitably sloped and/or braced in accordance with the OHSA. These regulations designate four (4) broad classifications of soils to stipulate appropriate measures for excavation safety. If more than one soil type is encountered in an excavation, the most conservative soil type must be followed for sloping the sidewalls of the excavation. Excavations for the site should be completed considering a Type 3 soil geometry, 1H:1V from the base of the excavation, assuming that groundwater control as discussed in the next section is implemented.

Excavation sidewalls will need to be continuously reviewed for evidence of instability and groundwater seepage, particularly following periods of heavy rain or thawing. When required, remedial action must be taken to ensure the continued stability of excavation slopes and the safety of the workers.

Minimum support system requirements for steeper excavations are stipulated in Sections 235 through 238 and 241 of the OHSA and include provisions for timbering, shoring and moveable trench boxes. To reduce the potential for instability of the trench excavations, materials excavated from the service trenches and/or other fill materials or heavy equipment should not be placed near the crest of the trench excavations.

It is important to note that soil encountered in the construction excavations may vary significantly across the site. Our preliminary soil classifications are based solely on the materials encountered in the boreholes advanced on site. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, we recommend that GEI be contacted immediately to evaluate the conditions encountered.

5.2 Temporary Construction Groundwater Control

As noted above, excavation is envisioned to extend to about 4.5 m below existing grade.

The stabilized groundwater levels in the monitoring wells were measured at 0.5 to 4.7 m depth in June 2023, corresponding to typically Elev. 229 to 230.

Based on the above, excavation for the watermain and storm sewer will typically extend to or just above/below the ground water levels noted. The sanitary sewer excavation and channel excavation will extend about 2.0 to 2.5 m below the measured groundwater table.

It is important to control the groundwater adequately. If the groundwater table is not controlled during construction, the base of the excavation foundation pipe bed may become unstable. For trench excavation as described above the excavations will extend through the typically cohesive soil at the site.

No major groundwater problems are anticipated for the installation of watermain or storm sewer. Any water seepage should be controllable by the use of conventional sump pumping.

Deeper excavation for sanitary sewer and channel will be below the groundwater levels noted in some areas, however, will still be within cohesive soil and seepage volumes are not expected to be great. In addition to conventional sump pumping, pumping from keg wells or the likes may be required in sandy areas where greater seepage may occur.

As noted above, it is recommended to carry out the work during the dry time of the year when the groundwater table is lowest, to mitigate groundwater control measures. Also reducing the size of the excavation that is open at any one time will aid in reducing groundwater control requirements.

The exact scenario where certain groundwater control techniques will work are directly correlated to how coarse/fine the native soils are in an excavation, and both the lateral and vertical extent of the wet cohesionless deposits encountered as noted above. If the groundwater table is not controlled during construction, the base of the excavations will be unstable, leading to difficulties in excavating and placement of pipes, footings, and providing safety for the workers.

Based on the above, a Permit-to-Take-Water (PTTW) is likely not required. Registry on the Environmental Activity and Sector Registry (EASR) may be prudent, so a work stoppage is not required.

Further recommendations are provided in our hydrogeological report.

5.3 Compaction Specifications

SPmdd is the specification to indicate the degree to which soil or aggregate is compacted. To achieve the specified SPmdd as indicated in this report, all soils or aggregates must be placed in lift thicknesses no greater than 200 mm. If this is not the case, only the upper portion of the lift will be adequately compacted, and the lower portion of the lift has a high probability of not meeting compaction specifications. In addition, industry standard equipment used to determine the degree of compaction consists of nuclear densometers. These devices have an inherent limitation in that they cannot test beyond 300 mm in depth, and so the degree of compaction beyond this depth cannot be quantitatively determined.

Along with lift thickness, ensuring that the soil or aggregate is within 2% of its optimum moisture content ensures that the specified compaction can be reached. If the soil or aggregate is too dry/wet, it is either very difficult or impossible to reach the specified compaction. This is especially true for when higher compaction specifications such as 98% and 100% SPmdd are required.

Moisture can be increased by adding water and mixing the soil prior to re-use, blending the soil with wetter material, or by importing soil to the site that is at optimum and can be readily compacted.

Moisture can be reduced by tilling or spreading out the soil to dry or blending it with drier material. In-situ moisture contents can change based on the season and local groundwater levels and can also change for stockpiled material due to precipitation.

Site soils are mainly cohesive and may require longer drying times which may be impractical.

In addition to the above compaction specifications, in any areas where compacted fill will be placed over the exposed native soil subgrade, any loose, soft, wet, organic or unstable areas should be sub-excavated, and backfilled with clean earth fill or Granular ‘B’ (OPSS.MUNI 1010) compacted to a minimum of 95% SPmdd. This recommendation applies to site servicing and pavement subgrades. Where structures/buildings require upfilling beneath the structure the fill should be compacted to 100% SPmdd.

5.4 Quality Verification Services

On-site quality verification services are an integral part of the geotechnical design function, and for foundations, engineered fill and retaining walls, are required under the Ontario Building Code. Quality verification services are used to confirm that construction is being conducted in general conformance with the requirements as outlined in the drawings, reports and specifications prepared for the proposed development.

GEI can provide all the on-site quality verification services outlined below:

- The subgrade for shallow foundations for commercial buildings must be field reviewed by the geotechnical engineer as required by the municipal regulating authority.
- Installation of retaining structures over 1.0 m high and related backfilling operations must be field reviewed on a continuous basis by the geotechnical engineer as required in the OBC.
- Full-time monitoring, testing and inspection of engineered fill placement is required by the geotechnical engineer per the OBC.
- Part-time monitoring of the subgrade support capabilities, material quality, lift thickness, moisture content, degree of compaction, etc. is recommended for the following areas to ensure the recommendations within this report are followed and they perform adequately in the long-term;
    - Slab-on-grades;
    - Pavement structure (granular and asphalt); and
    - Bedding/backfilling of site servicing.
- Testing of the concrete (compressive strength, slump, air content, etc.) and testing of the asphalt (asphalt content and gradation) are recommended to ensure that the quality of the materials being brought to site meet the requirements of the project.

5.5 Site Work

The soils found at this site may become weakened when subjected to traffic, particularly when wet. If there is site work carried out during periods of wet weather, then it can be expected that the subgrade will be disturbed unless an adequate granular working surface is provided to protect the integrity of the subgrade soils from construction traffic. Subgrade preparation works cannot be adequately accomplished during wet weather and the project must be scheduled accordingly. The disturbance caused by the traffic can result in the removal of disturbed soil and use of granular fill material for site restoration or underfloor fill that is not intrinsic to the project requirements.

The most severe loading conditions on the subgrade may occur during construction. Consequently, special provisions such as end dumping and forward spreading of earth and aggregate fills, restricted construction lanes, and half-loads during paving and other work may be required, especially if construction is carried out during unfavourable weather.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the founding subgrade and concrete must be provided. The soil at this site is susceptible to frost damage. Consideration must be given to frost effects, such as heave or softening, on exposed soil surfaces in the context of this particular project development.

6. Limitations and Conclusions

6.1 Limitations

The recommendations and comments provided are necessarily on-going as new information of underground conditions becomes available. More specific information with respect to the conditions between samples, or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during excavation operations. Consequently, conditions not observed during this investigation may become apparent. Should this occur, GEI should be contacted to assess the situation and additional testing and reporting may be required.

GEI should be retained for a general review of the final design drawings and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, GEI will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of the design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

This report was authorized by, and prepared by GEI for, the account of the Simpson Road Landowners Group Inc. (as provided in the signed agreement). Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GEI accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

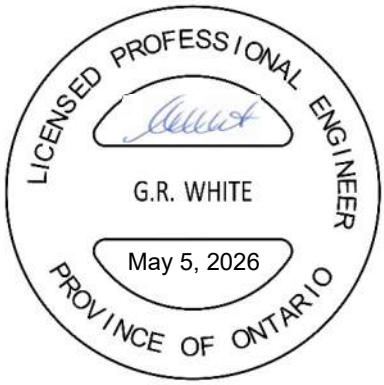
6.2 Conclusion

It is recognized that municipal/regional governing bodies, in their capacity as the planning and building authority under Provincial statues, will make use of and rely upon this report, cognizant of the limitations thereof, both as are expressed and implied.

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to contact our office.

Yours Truly,

GEI Consultants Canada Ltd.



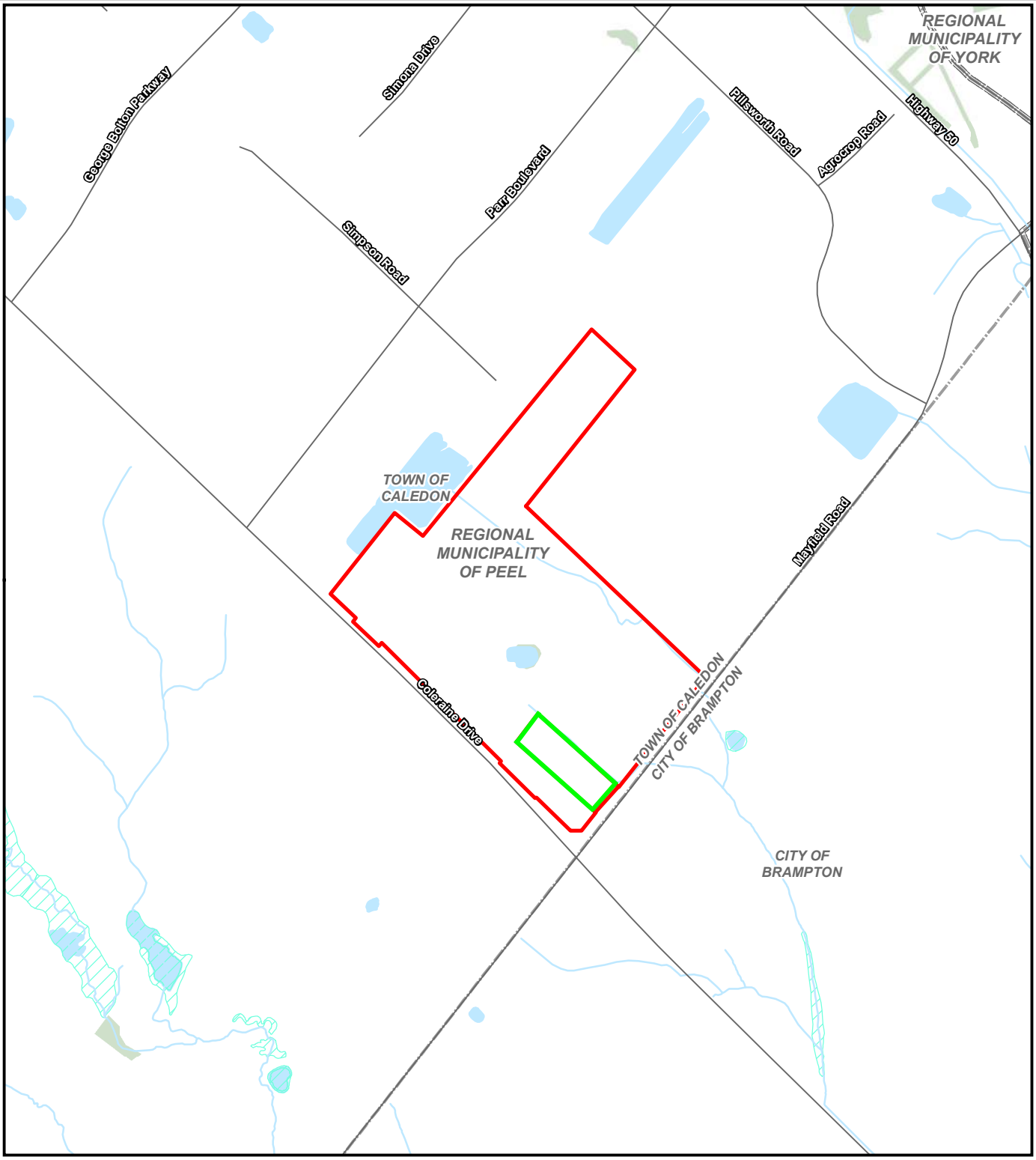
Geoffrey R. White, P.Eng.
Barrie Office Branch Manager and
Senior Geotechnical Engineer

Figures

Site Location Plan

Borehole Location Plan

Concept Plans



NOTES:

1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2023.

Legend

- Subject Area
- Road
- Watercourse
- Waterbody
- Wooded Area
- Wetland - Not evaluated per OWES
- Recent Property Addition

N

0 100 200 m

1:10,000

Natural Heritage, Geotechnical, Hydrogeological and Civil Services - South Simpson (Headwaters of West Rainbow Creek), Caledon, Master Environmental Servicing Plan

Simpson Road Landowners Group Inc.

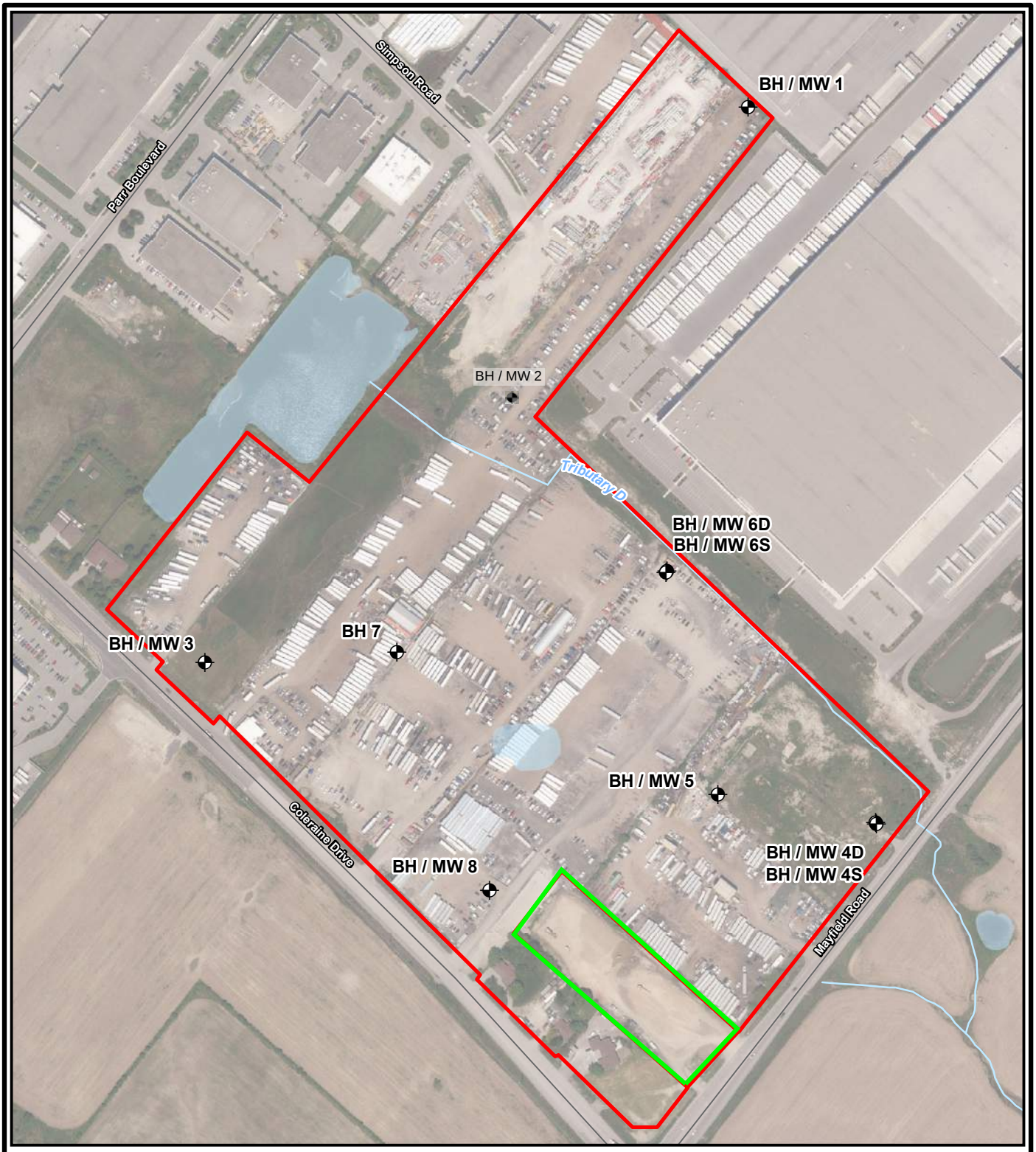
GEI Consultants

SITE LOCATION PLAN

Project 2301130

May 2026

Fig. 1



NOTES:

1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2025, © Caledon Open Data, 2025.
3. Orthoimagery © First Base Solutions, 2025. Imagery taken in 2024.

Legend

- Subject Area
- Road
- Watercourse
- Waterbody
- Borehole/Monitoring Well Location
- Recent Property Addition

N

0 50 100 m

1:4,500

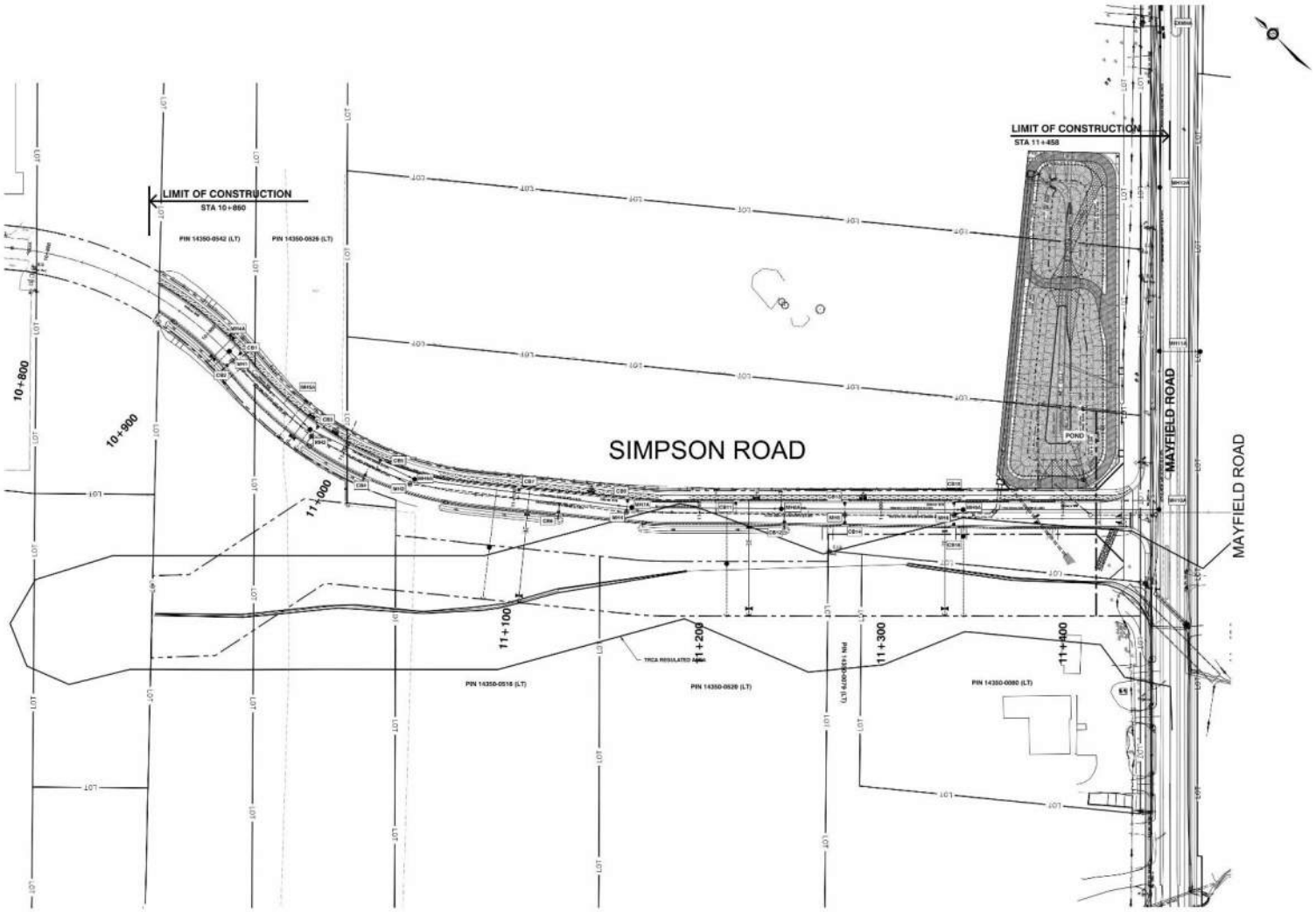
Natural Heritage, Geotechnical, Hydrogeological and Civil Services - South Simpson (Headwaters of West Rainbow Creek), Caledon, Master Environmental Servicing Plan

Simpson Road Landowners Group Inc.

GEI Consultants

BOREHOLE LOCATION PLAN (AERIAL)

Project 2301130 | May 2026 | Fig. 2



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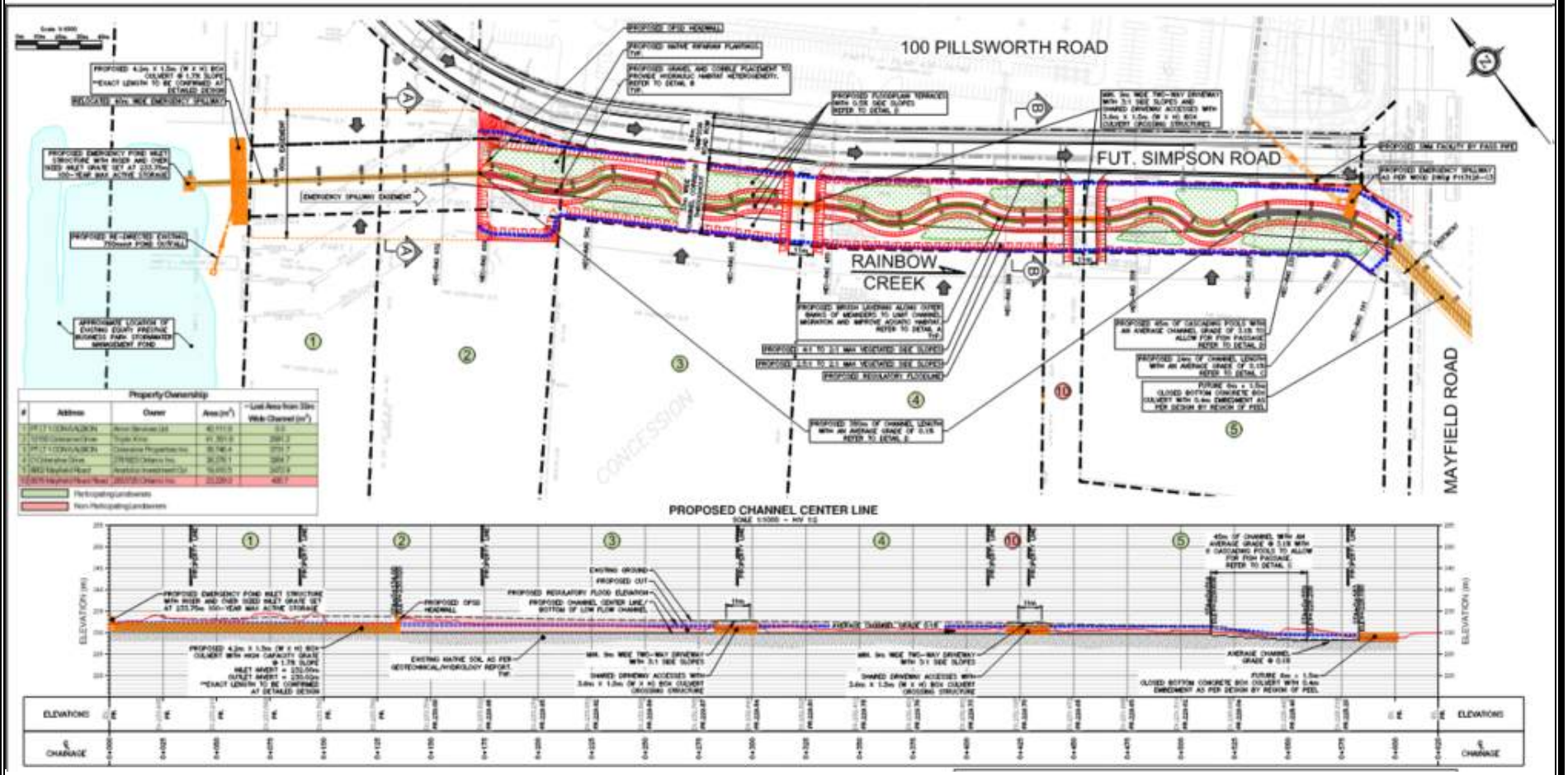
Client: Simpson Road Landowners Group Inc.	Scale: N.T.S.
	Date: May 2026
Project: South Simpson Road Extension Block Plan	Drawn By: M.H
	Project No: 2301130
Title: Road Concept	Figure 3A



GEI Consultants *647 Welham Rd, Unit 14, Barrie, ON, L4N 0B7* *P: (705) 719-7994*	Client: Simpson Road Landowners Group Inc.	Scale: N.T.S.
		Date: May 2026
	Project: Simpson Road LOG	Drawn By: M.H
		Project No: 2301130
	Title: Creek Concept	Figure 3B

Appendix A

Borehole Logs

RECORD OF BOREHOLE No. 1

Project Number: **2301130**
Project Client: **Simpson Road Landowners Group Inc.**
Project Name: **South Simpson -Headwaters W Rainbow Ck**
Project Location: **Caledon, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Track Mount** Drilling Machine: **Solid Stem Augers**
Logged By: **TA** Northing: **4855660.1** Date Started: **May 17/23**
Reviewed By: **GW** Easting: **604127.8** Date Completed: **May 17/23**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%)
	0.0 233.9										GR SA SI CL
	0.2 RECYCLED ASPHALT: 250 mm 233.6					0					
	FILL: Sandy silt, trace gravel, compact, brown, moist 0.6 233.3	AS	1								
	CLAYEY SILT: Some sand, very stiff, brown, moist	SS	2	95	16	1.5	232.5	16	14		
	1.5 232.3										
	CLAYEY SILT GLACIAL TILL: Some sand, inferred cobbles and boulders, very stiff to hard, brown, moist	SS	3	90	26			26	16		
		SS	4	100	34			34	16		
						3	231				
		SS	5	100	54			54	11		
	4.6 229.3					4.5	229.5				
	CLAYEY SILT: Trace sand, very stiff, grey, moist	SS	6	100	21			21	16		First Water Strike SS5
	6.6 227.3					6	228				
		SS	7	100	22			22	15		
	Borehole Terminated at 6.6 m										

FIELD TESTING: Shear Strength Testing (kPa) — Other Test; Pocket Penetrometer; Field Vane (Intact); Field Vane (Remolded); 40 80 120 160. Penetration Testing — SPT; DCPT; 10 20 30 40.

LAB TESTING: Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); 100 200 300 400. Atterberg Limits — PL; LL. Water Content (%); 10 20 30 40.

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Groundwater depth encountered on completion of drilling: Dry
Cave depth after auger removal: Open
Groundwater depth observed on: Jun 7/23 at depth of: 4.7 m.
Groundwater Elevation: 229.2 m

RECORD OF BOREHOLE No. 2

Project Number: **2301130**
Project Client: **Simpson Road Landowners Group Inc.**
Project Name: **South Simpson -Headwaters W Rainbow Ck**
Project Location: **Caledon, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Track Mount** Drilling Machine: **Solid Stem Augers**
Logged By: **TA** Northing: Date Started: **May 18/23**
Reviewed By: **GW** Easting: Date Completed: **May 18/23**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING (Shear Strength Testing (kPa) / Penetration Testing SPT ○ DCPT ●)	LAB TESTING (Combustible Organic Vapour (ppm) △ / Combustible Organic Vapour (%LEL) ▲ / Total Organic Vapour (ppm) ◇ / Atterberg Limits PL–LL / Water Content (%) ○)	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
	0.0 233.2					0								
	RECYCLED ASPHALT: 700 mm	SS	1	40	19			19						
	0.7 232.5						232.5							
	FILL: Clayey silt, trace gravel, very stiff, brown, moist	SS	2	80	20			20	13					
	1.5 231.7					1.5								
	SANDY CLAYEY SILT GLACIAL TILL: Trace gravel, inferred cobbles and boulders, hard, grey, moist	SS	3	45	43			43	14					
							231							
		SS	4	100	47			47	14		5	21	42	32
						3								
		SS	5	100	44			44	13					
							229.5							
	4.6 228.6					4.5								
	CLAYEY SILT: Trace sand, very stiff, grey, very moist	SS	6	100	21			21	13		First Water Strike SS6			
							228							
	6.6 226.6	SS	7	100	19	6		19	14					
	Borehole Terminated at 6.6 m													

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Groundwater depth encountered on completion of drilling: Dry
Groundwater depth observed on: Well covered at depth of: -
Cave depth after auger removal: Open
Groundwater Elevation:

RECORD OF BOREHOLE No. 3

Project Number:	**2301130**				
Project Client:	**Simpson Road Landowners Group Inc.**				
Project Name:	**South Simpson -Headwaters W Rainbow Ck**	Drilling Method: **Track Mount**		Drilling Machine: **Solid Stem Augers**	
Project Location:	**Caledon, ON**	Logged By: **TA**	Northing: **4855211.7**	Date Started: **May 17/23**	
Drilling Location:	**See Borehole Location Plan**	Reviewed By: **GW**	Easting: **603689.4**	Date Completed: **May 17/23**	
Local Benchmark:					

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS & GRAIN SIZE DISTRIBUTION (%)			
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	Shear Strength Testing (kPa); Penetration Testing (SPT ○, DCPT ●)	Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); Atterberg Limits (PL, LL); Water Content (%)	Instrumentation Installation	GR	SA	SI	CL
	0.0 233.4					0								
	TOPSOIL: 75 mm													
	0.1 233.3	SS	1	20	6			6	17					
	FILL: Clayey silt, trace sand, firm, brown, moist													
	0.8 232.6	SS	2	65	20		232.5	20	15					
	CLAYEY SILT: Some sand, very stiff, grey, moist					1.5								
	1.5 231.8	SS	3	100	31			31	16					
	CLAYEY SILT GLACIAL TILL: Some sand, trace gravel, inferred cobbles and boulders, hard, grey to brown, moist						231							
		SS	4	100	47			47	13		8	18	42	32
						3								
		SS	5	80	38			38	18					
							229.5							
	4.6 228.8					4.5								
	SANDY CLAYEY SILT: Trace gravel, very stiff, grey, moist	SS	6	100	29			29	13		4	20	45	31
							228							
	6.6 226.8					6								
		SS	7	100	21			21	14					
	Borehole Terminated at 6.6 m													

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Groundwater depth encountered on completion of drilling: Dry

Cave depth after auger removal: Open

Groundwater depth observed on: Jun 7/23 at depth of: 1.3 m.

Groundwater Elevation: 232.1 m

RECORD OF BOREHOLE No. 4-D

Project Number:	**2301130**						
Project Client:	**Simpson Road Landowners Group Inc.**						
Project Name:	**South Simpson -Headwaters W Rainbow Ck**	Drilling Method:	**Track Mount**		Drilling Machine:	**Solid Stem Augers**	
Project Location:	**Caledon, ON**	Logged By:	**TA**	Northing:	**4855082.3**	Date Started:	**May 18/23**
Drilling Location:	**See Borehole Location Plan**	Reviewed By:	**GW**	Easting:	**604231.5**	Date Completed:	**May 18/23**
Local Benchmark:							

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS & GRAIN SIZE DISTRIBUTION (%)			
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	Shear Strength Testing (kPa): Other Test, Pocket Penetrometer, Field Vane (Intact), Field Vane (Remolded); Penetration Testing: SPT, DCPT	Combustible Organic Vapour (ppm), Combustible Organic Vapour (%LEL), Total Organic Vapour (ppm); Atterberg Limits; Water Content (%)	Instrumentation Installation		GR	SA	SI	CL
	0.0 230.4					0									
	TOPSOIL: 25 mm														
	FILL: Clayey silt, trace sand, stiff, brown, moist	SS	1	75	11			11	23						
	0.8 229.6														
	CLAYEY SILT: Some sand, stiff, brown with grey spotting, moist	SS	2	100	12	1.5	229.5	12	24						
	1.5 228.9														
	CLAYEY SILT GLACIAL TILL: Some sand, inferred cobbles and boulders, very stiff to hard, brown, moist	SS	3	90	26			26	13						
						3	228								
		SS	4	90	26			26	10						
		SS	5	90	41	4.5	226.5	41	13						
	4.6 225.8														
	CLAYEY SILT: Some sand, very stiff, grey, moist	SS	6	100	24			24	12		First Water Strike SS6				
	6.1 224.3					6	225								
	SANDY SILT GLACIAL TILL: Trace clay, trace gravel, inferred cobbles and boulders, very dense, grey, moist	SS	7	95	50+			50+	9						
	6.6 223.8														
	Borehole Terminated at 6.6 m														

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Groundwater depth encountered on completion of drilling: Dry

Cave depth after auger removal: Open

Groundwater depth observed on: Jun 7/23 at depth of: 1.7 m.

Groundwater Elevation: 228.7 m

Scale: **1 :75**

RECORD OF BOREHOLE No. 4-S

Project Number: **2301130**
Project Client: **Simpson Road Landowners Group Inc.**
Project Name: **South Simpson -Headwaters W Rainbow Ck**
Project Location: **Caledon, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Track Mount** Drilling Machine: **Solid Stem Augers**
Logged By: **TA** Northing: **4855081.4** Date Started: **May 18/23**
Reviewed By: **GW** Easting: **604231.5** Date Completed: **May 18/23**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS & GRAIN SIZE DISTRIBUTION (%)				
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	Shear Strength Testing (kPa): Other Test, Pocket Penetrometer, Field Vane (Intact), Field Vane (Remolded); Penetration Testing: SPT, DCPT	Combustible Organic Vapour (ppm), Combustible Organic Vapour (%LEL), Total Organic Vapour (ppm); Atterberg Limits; Water Content (%)	Instrumentation Installation		GR	SA	SI	CL
	0.0 230.4 TOPSOIL: 25 mm					0					Descriptions copied from BH 4-D				
	FILL: Clayey silt, trace sand, stiff, brown, moist 0.8 229.6						229.5								
	CLAYEY SILT: Some sand, stiff, brown with grey spotting, moist 1.5 228.8					1.5									
	CLAYEY SILT GLACIAL TILL: Some sand, inferred cobbles and boulders, very stiff to hard, brown, moist 2.3 228.1														
	Borehole Terminated at 2.3 m														

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Groundwater depth encountered on completion of drilling: Dry
Cave depth after auger removal: Open
Groundwater depth observed on: Jun 7/23 at depth of: 1.2 m.
Groundwater Elevation: 229.2 m

Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**
Page: **1 of 1**

RECORD OF BOREHOLE No. 5

Project Number: **2301130**
Project Client: **Simpson Road Landowners Group Inc.**
Project Name: **South Simpson -Headwaters W Rainbow Ck**
Project Location: **Caledon, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Track Mount** Drilling Machine: **Solid Stem Augers**
Logged By: **TA** Northing: **4855105.3** Date Started: **May 18/23**
Reviewed By: **GW** Easting: **604103.3** Date Completed: **May 18/23**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING (Shear Strength Testing (kPa); Penetration Testing SPT/DCPT)	LAB TESTING (Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); Atterberg Limits PL–LL; Water Content (%))	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
	0.0 231.2													
	0.2 TOPSOIL: 180 mm 231.0													
	FILL: 25 mm Gravel over clayey silt, trace gravel, firm, brown, moist 0.8 230.4	SS	1	85	6	0	231	6	22					
	CLAYEY SILT: Some sand, very stiff, brown to grey, moist	SS	2	100	19			19	14					
		SS	3	100	29	1.5	229.5	29	13					
	2.3 228.9													
	CLAYEY SILT GLACIAL TILL: Some sand, inferred cobbles and boulders, very stiff to hard, grey, moist	SS	4	100	21			21	14					
		SS	5	100	43	3	228	43	13		First Water Strike SS5			
	4.6 226.6													
	CLAYEY SILT: Some sand, trace gravel, firm to very stiff, grey, moist	SS	6	100	21	4.5	226.5	21	13		2	17	48	33
	6.1 225.1													
	CLAYEY SILT GLACIAL TILL: Some sand, trace gravel, inferred cobbles and boulders, very stiff, grey, moist 6.6 224.6	SS	7	100	19	6	225	19	15					
	Borehole Terminated at 6.6 m													

Groundwater depth encountered on completion of drilling: Dry
Cave depth after auger removal: Open
Groundwater depth observed on: Jun 7/23 at depth of: 1.3 m.
Groundwater Elevation: 229.9 m

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RECORD OF BOREHOLE No. 6-D

Project Number:	**2301130**						
Project Client:	**Simpson Road Landowners Group Inc.**						
Project Name:	**South Simpson -Headwaters W Rainbow Ck**	Drilling Method:	**Track Mount**	Drilling Machine:	**Solid Stem Augers**		
Project Location:	**Caledon, ON**	Logged By:	**TA**	Northing:	**4855285.3**	Date Started:	**May 19/23**
Drilling Location:	**See Borehole Location Plan**	Reviewed By:	**GW**	Easting:	**604062.3**	Date Completed:	**May 19/23**
Local Benchmark:							

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)
	0.0 231.4						
	ASPHALT: 25 mm						
	FILL: Sand, trace silt, loose, brown, moist	AS	1			0	231
	0.8 230.7						
	CLAYEY SILT: Trace organics, firm, brown, wet	SS	2	55	4		
	- - - Some sand, brown to grey - - -	SS	3	100	6	1.5	229.5
	2.3 229.1						
	CLAYEY SILT GLACIAL TILL: Some sand, inferred cobbles and boulders, very stiff to hard, grey, wet to moist	SS	4	100	24		
		SS	5	100	44	3	228
		SS	6	100	36	4.5	226.5
	6.1 225.3						
	CLAYEY SILT: Some sand, very stiff, grey, wet	SS	7	100	30	6	225
	6.6 224.9						
	Borehole Terminated at 6.6 m						

FIELD TESTING

Shear Strength Testing (kPa)

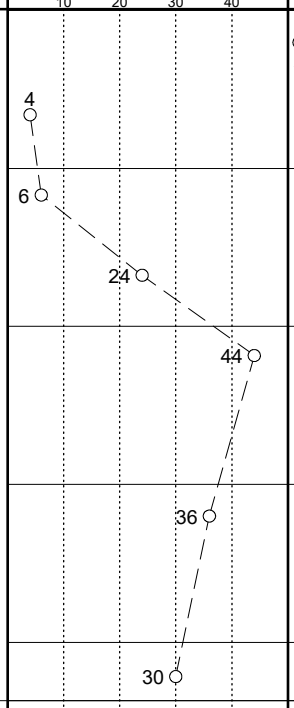
× Other Test
+ Pocket Penetrometer
▲ Field Vane (Intact)
△ Field Vane (Remolded)

40 80 120 160

Penetration Testing

○ SPT ● DCPT

10 20 30 40



LAB TESTING

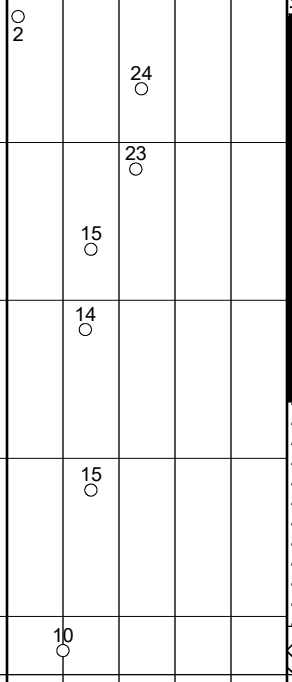
△ Combustible Organic Vapour (ppm)
▲ Combustible Organic Vapour (%LEL)
◇ Total Organic Vapour (ppm)

100 200 300 400

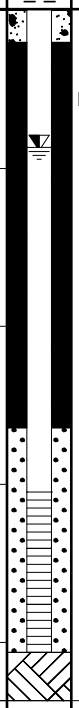
Atterberg Limits

PL ○ Water Content (%) LL

10 20 30 40



Instrumentation Installation



COMMENTS & GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL

First Water Strike SS2

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▽ Groundwater depth encountered on completion of drilling: 5.4 m. (Cave depth after auger removal: Open

▽ Groundwater depth observed on: Jun 7/23 at depth of: 1.3 m. Groundwater Elevation: 230.1 m

Scale: **1 :75**

RECORD OF BOREHOLE No. 6-S

Project Number: **2301130**
Project Client: **Simpson Road Landowners Group Inc.**
Project Name: **South Simpson -Headwaters W Rainbow Ck**
Project Location: **Caledon, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Track Mount** Drilling Machine: **Solid Stem Augers**
Logged By: **TA** Northing: **4855284.8** Date Started: **May 19/23**
Reviewed By: **GW** Easting: **604061.4** Date Completed: **May 19/23**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%)
	0.0 231.4					0	231		
	ASPHALT: 25 mm FILL: Sand, trace silt, loose, brown, moist 0.8 230.7								Descriptions copied from BH 6-D
	CLAYEY SILT: Trace organics, firm, brown, wet - - - Some sand, brown to grey - - - 2.3 229.1					1.5	229.5		First Water Strike SS2
	Borehole Terminated at 2.3 m								

FIELD TESTING
Shear Strength Testing (kPa)
× Other Test
+ Pocket Penetrometer
▲ Field Vane (Intact)
△ Field Vane (Remolded)
40 80 120 160
Penetration Testing
○ SPT ● DCPT
10 20 30 40

LAB TESTING
△ Combustible Organic Vapour (ppm)
▲ Combustible Organic Vapour (%LEL)
◇ Total Organic Vapour (ppm)
100 200 300 400
Atterberg Limits
PL LL
○ Water Content (%)
10 20 30 40

GR SA SI CL

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Groundwater depth encountered on completion of drilling: 2.3 m. Cave depth after auger removal: Open
Groundwater depth observed on: Jun 7.23 at depth of: 0.5 m. Groundwater Elevation: 230.9 m

RECORD OF BOREHOLE No. 7

Project Number: **2301130**
Project Client: **Simpson Road Landowners Group Inc.**
Project Name: **South Simpson -Headwaters W Rainbow Ck**
Project Location: **Caledon, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Track Mount** Drilling Machine: **Solid Stem Augers**
Logged By: **TA** Northing: **4855220.4** Date Started: **May 19/23**
Reviewed By: **GW** Easting: **603844.3** Date Completed: **May 19/23**

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING (Shear Strength Testing (kPa); Penetration Testing SPT/DCPT)	LAB TESTING (Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); Atterberg Limits PL–LL; Water Content (%))	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
	0.0 232.6 RECYCLED ASPHALT: 760 mm	SS	1	80	37	0	232.5	37	5					
	0.8 231.8 CLAYEY SILT: Some sand, stiff to very stiff, brown and grey, moist	SS	2	100	9			9	15					
		SS	3	90	21	1.5	231	21	15					
	2.3 230.3 SANDY CLAYEY SILT GLACIAL TILL: Some gravel, inferred cobbles and boulders, very stiff, grey, moist	SS	4	100	25			25	14		First Water Strike SS4			
		SS	5	100	25	3	229.5	25	14					
	4.6 228.0 CLAYEY SILT: Trace sand, stiff, grey, moist	SS	6	100	14	4.5	228	14	15					
	6.1 226.5 SANDY CLAYEY SILT GLACIAL TILL: Trace gravel, inferred cobbles and boulders, firm, grey, moist	SS	7	85	7	6	226.5	7	15		5	22	45	28
	6.6 226.0 Borehole Terminated at 6.6 m													

Groundwater depth encountered on completion of drilling: 5.4 m. Cave depth after auger removal: Open
Groundwater depth observed on: Groundwater Elevation:

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RECORD OF BOREHOLE No. 8

Project Number:	**2301130**				
Project Client:	**Simpson Road Landowners Group Inc.**				
Project Name:	**South Simpson -Headwaters W Rainbow Ck**	Drilling Method:	**Track Mount**	Drilling Machine:	**Solid Stem Augers**
Project Location:	**Caledon, ON**	Logged By:	**TA**	Northing: **4855027.8**	Date Started: **May 17/23**
Drilling Location:	**See Borehole Location Plan**	Reviewed By:	**GW**	Easting: **603918.9**	Date Completed: **May 17/23**
Local Benchmark:					

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS & GRAIN SIZE DISTRIBUTION (%)				
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	Shear Strength Testing (kPa): Other Test, Pocket Penetrometer, Field Vane (Intact), Field Vane (Remolded); Penetration Testing: SPT, DCPT	Combustible Organic Vapour (ppm), Combustible Organic Vapour (%LEL), Total Organic Vapour (ppm); Atterberg Limits: PL, LL; Water Content (%)	Instrumentation Installation		GR	SA	SI	CL
	0.0 231.7					0	231								
	GRANULAR: 720 mm 0.7 231.0	AS	1												
	CLAYEY SILT: Some sand, stiff, brown, moist 1.5 230.2	SS	2	80	10	1.5	229.5	10	10, 15						
	CLAYEY SILT GLACIAL TILL: Some sand, inferred cobbles and boulders, very stiff to hard, brown, moist	SS	3	100	28	3	228	28	15						
		SS	4	100	35	4.5	226.5	35	13						
		SS	5	100	20	6		20	13						
	- - - Grey - - -	SS	6	45	15			15	16		First Water Strike SS5				
	6.1 225.6														
	SAND AND SILT: Trace clay, compact, grey, wet 6.6 225.2	SS	7	100	24			24	13			0	43	53	4
	Borehole Terminated at 6.6 m														

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Groundwater depth encountered on completion of drilling: 5.4 m. Cave depth after auger removal: Open

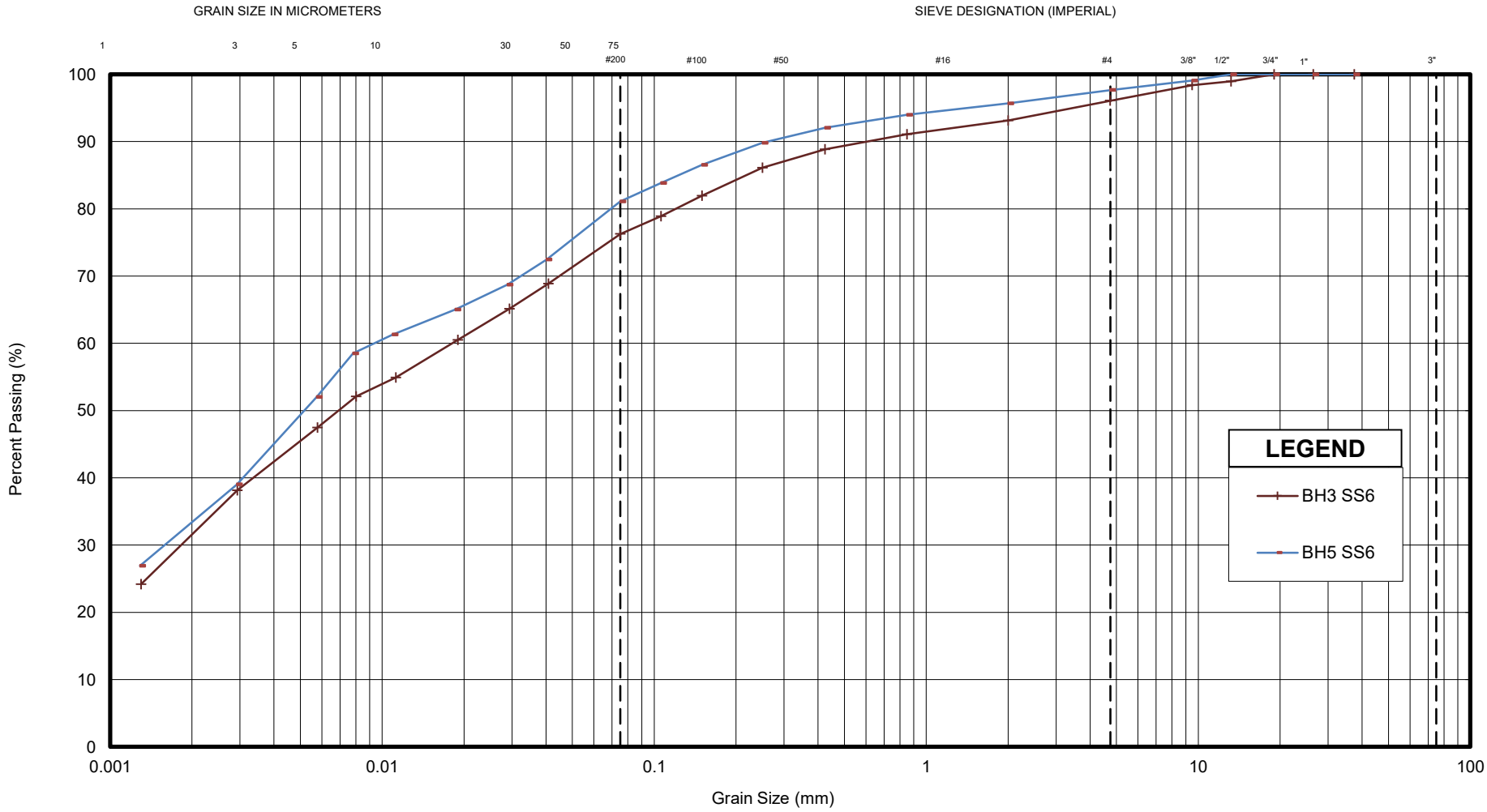
Groundwater depth observed on: Jun 7/23 at depth of: 2.0 m. Groundwater Elevation: 229.7 m

Appendix B

Geotechnical Laboratory Testing

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH3 SS6	SANDY CLAYEY SILT, Trace Gravel	4	20	45	31	-	0.002	0.018	-	-
BH5 SS6	CLAYEY SILT, Some Sand, Trace Gravel	2	17	48	33	-	0.002	0.009	-	-

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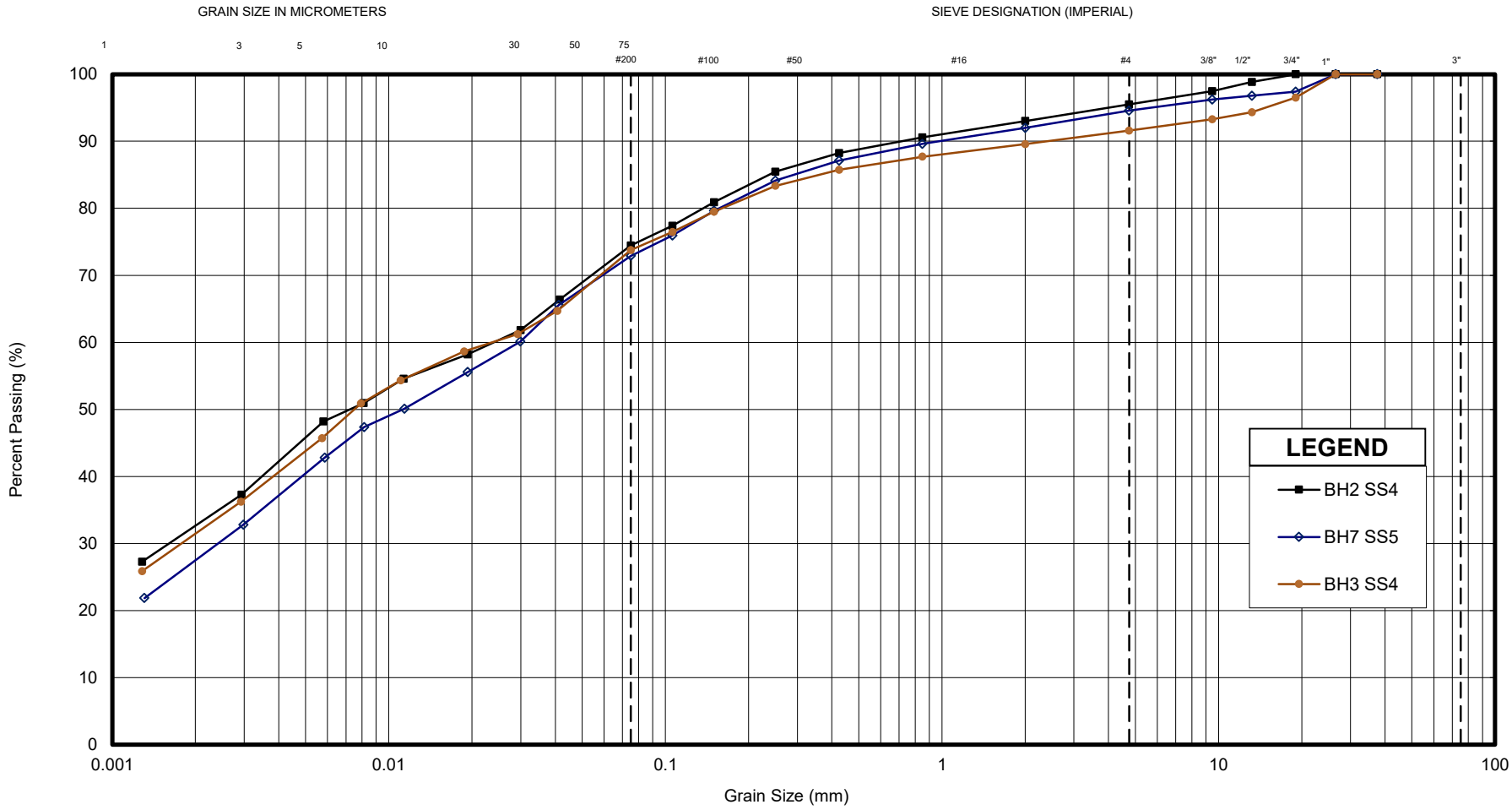
GRAIN SIZE DISTRIBUTION - South Simpson (Headwaters of West Rainbow Creek)

CLAYEY SILT

FIGURE No.	B1
REF. No.	2301130
DATE	May 2026

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH2 SS4	SANDY CLAYEY SILT, Trace Gravel	5	21	42	32	-	0.002	0.024	-	-
BH7 SS7	SANDY CLAYEY SILT, Trace Gravel	5	22	45	28	-	0.002	0.030	-	-
BH3 SS4	CLAYEY SILT, Some Sand, Trace Gravel	8	18	42	32	-	0.002	0.024	-	-

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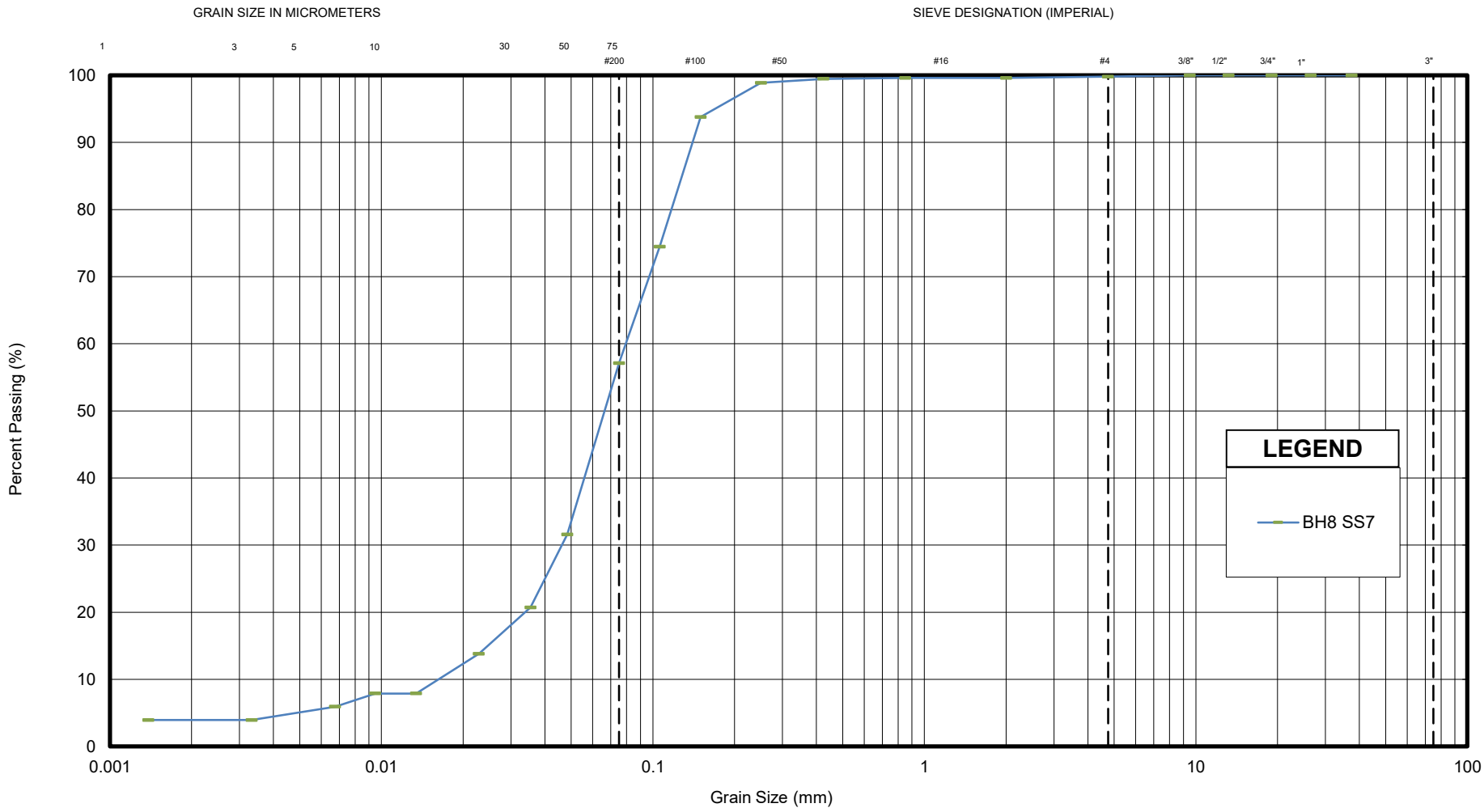
GRAIN SIZE DISTRIBUTION - South Simpson (Headwaters of West Rainbow Creek)

GLACIAL TILL

FIGURE No.	B2
REF. No.	2301130
DATE	May 2026

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH8 SS7	SAND AND SILT, Trace Clay	-	43	53	4	0.016	0.046	0.079	4.9	1.7

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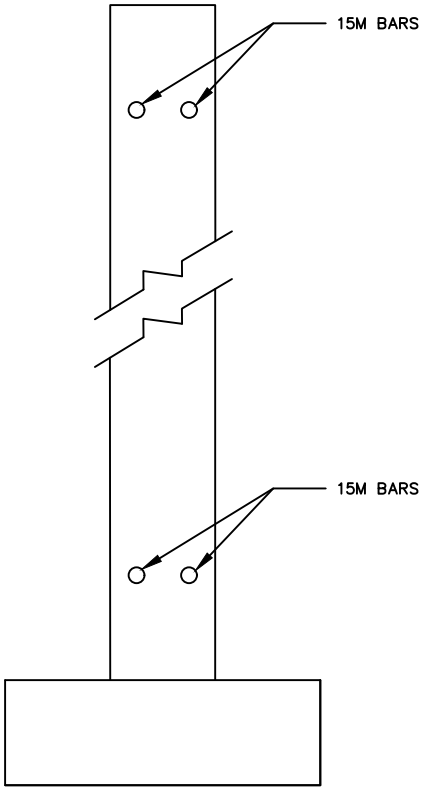
GRAIN SIZE DISTRIBUTION - South Simpson (Headwaters of West Rainbow Creek)

SAND AND SILT

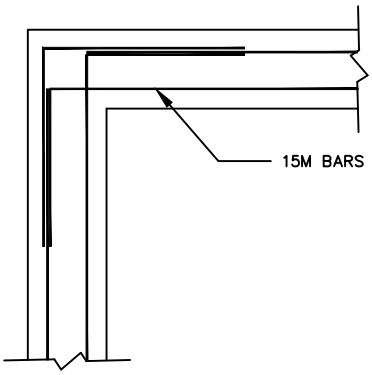
FIGURE No.	B3
REF. No.	2301130
DATE	May 2026

Appendix C

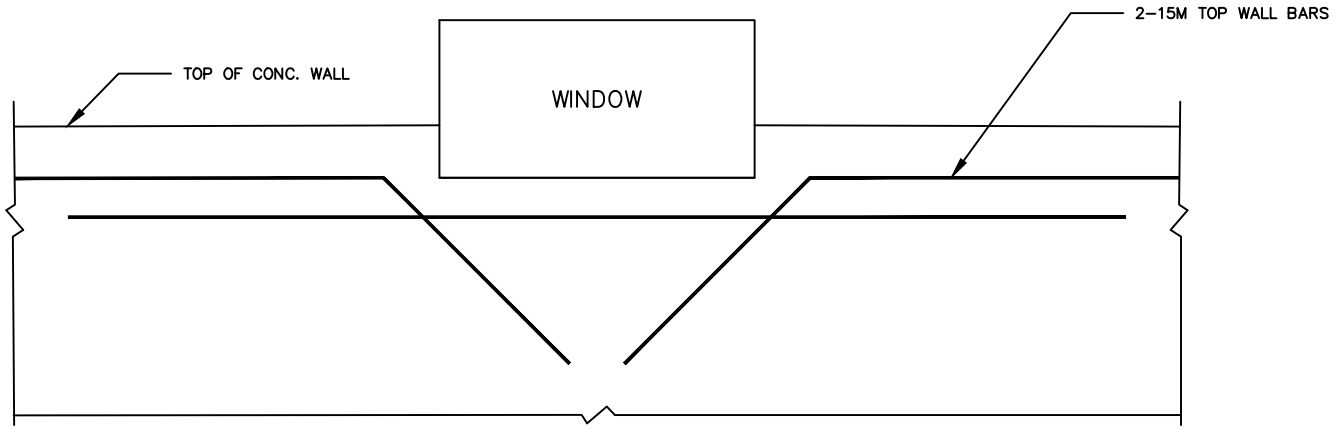
Typical Details



TYPICAL REINFORCED WALL



TYPICAL SPLICING AT CORNERS



TYPICAL WINDOW REINFORCING

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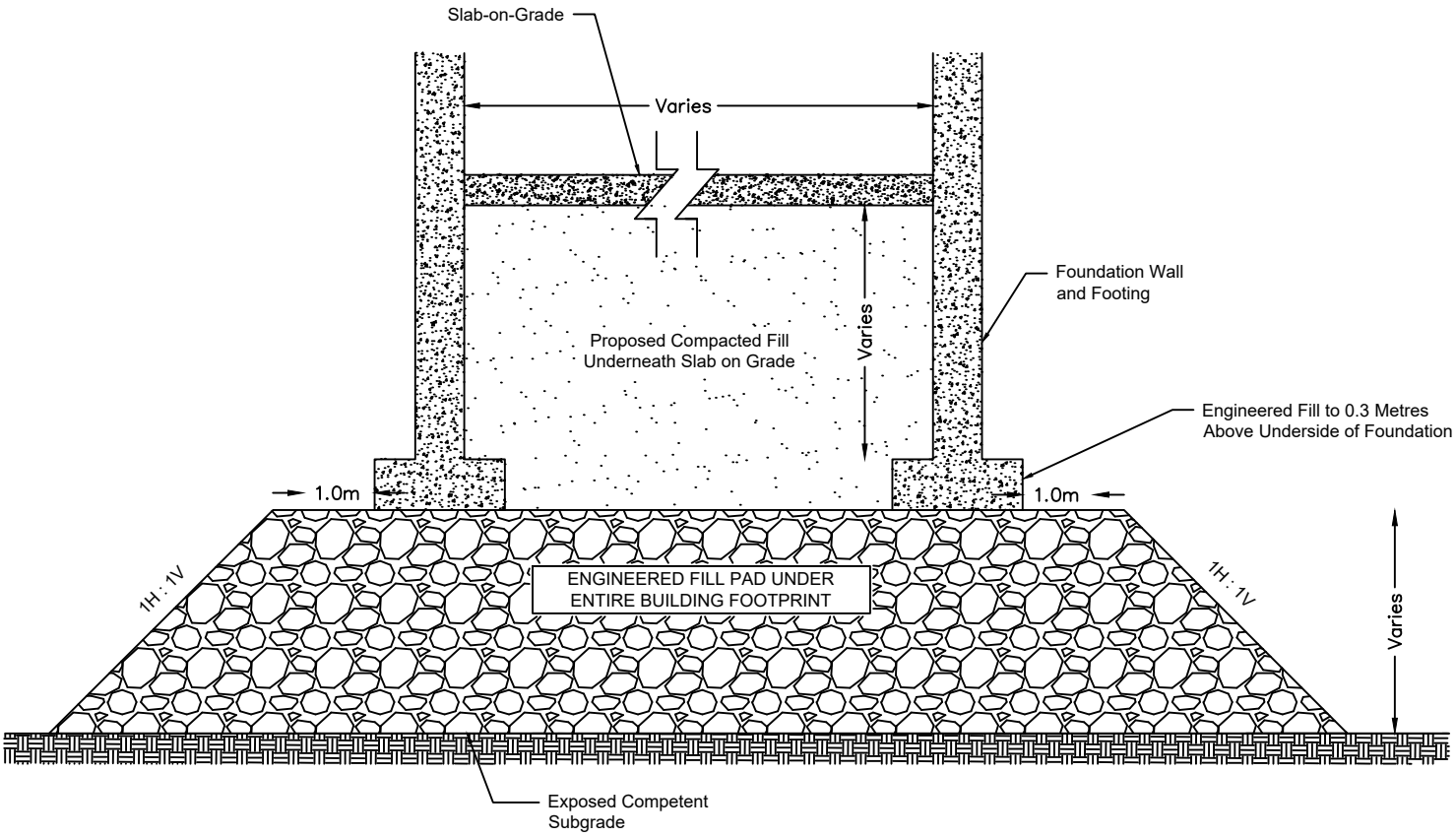
FOUNDATION WALL REINFORCING ON ENGINEERED FILL TYPICAL DETAIL

Notes:

1. Engineered Fill compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) and inspected under the full time supervision of GEI.
2. Engineered fill must be placed in loose lifts of 200 mm or less and then compacted as noted above.
3. Interior non-structural compacted fill compacted to 98% SPMDD with recommended part-time inspection.



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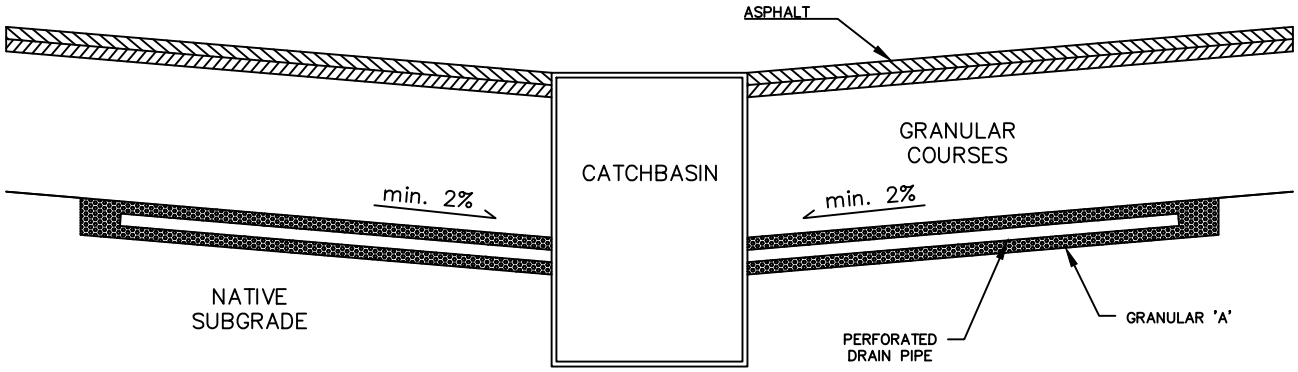
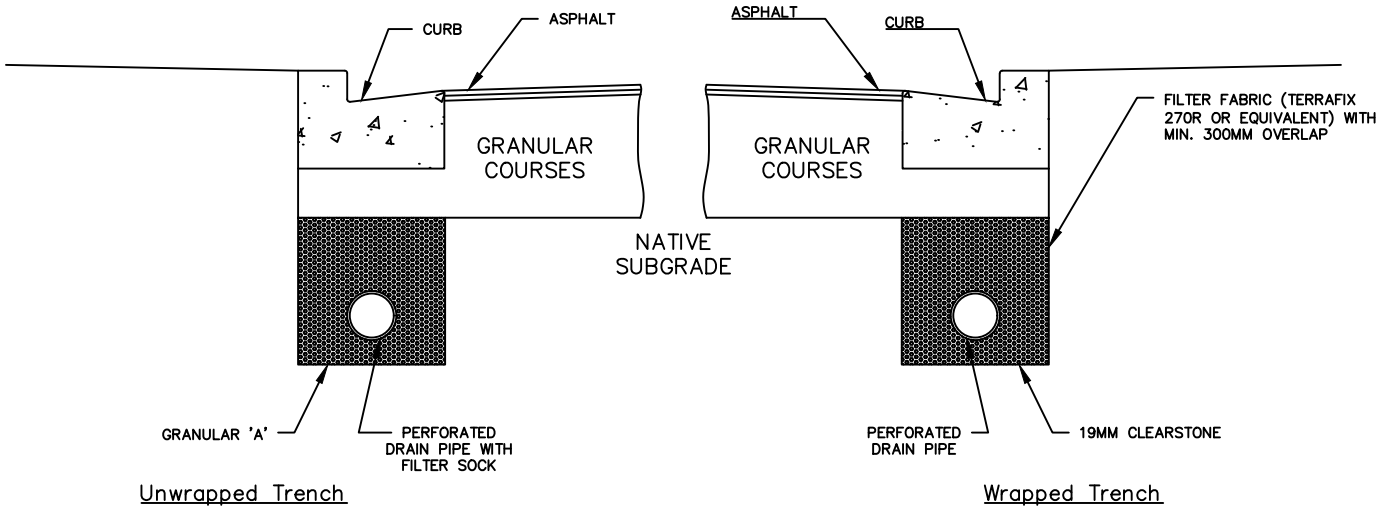
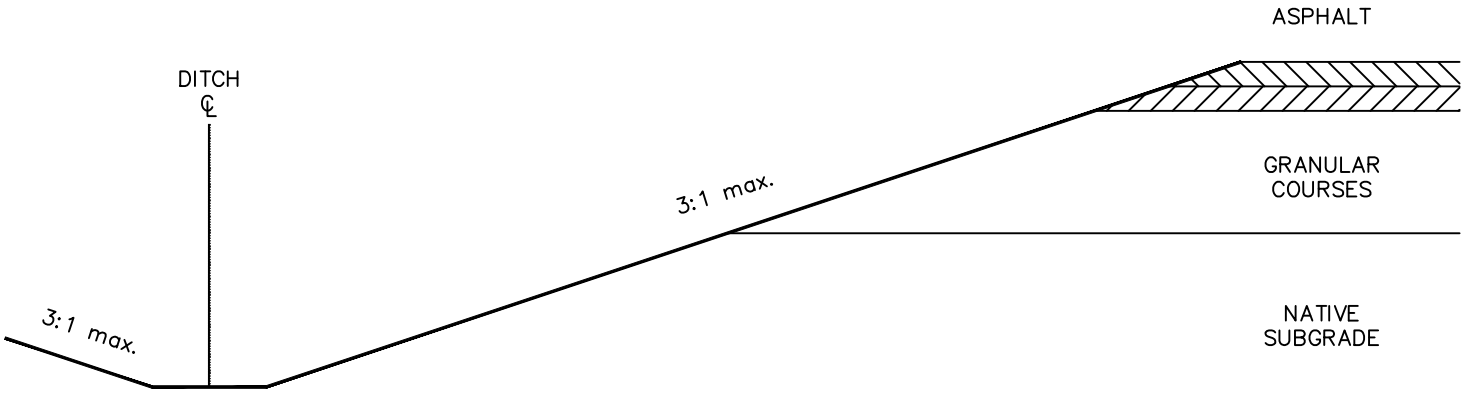
ENGINEERED FILL PAD DIMENSIONING TYPICAL DETAIL





Urban Cross Sections



Rural Cross Section

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PAVEMENT DRAINAGE ALTERNATIVES TYPICAL DETAILS